UPM

April 28, 2008

Department of Environment & Local Government
Project Assessment Branch (EIA)
Sciences and Planning Division
20 McGloin Street
P.O. Box 6000
Fredericton, N.B. E3B 5H1

Attention: Director, Project Assessment Branch

Re: UPM-Kymmene Miramichi Inc. – Decommissioning of Mill and Related Infrastructure, Miramichi, N.B.

A copy of an Environmental Impact Assessment Registration document prepared for the above referenced work is attached. The project will involve decommissioning of UPM-Kymmene Miramichi Inc.'s (UPM Miramichi) mill (closed in 2007), and related infrastructure.

We trust that this information is sufficient for your Department's review of this matter. If there are any questions, please contact the undersigned.

Yours truly,

Bruce Clark, P.Eng.
Engineering Manager

Attachment

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ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION
(Regulation 87-83)

1.0 PROPONENT

(i) Name of Proponent

UPM Kymmene Miramichi Inc. (UPM Miramichi)

(ii) Address of Proponent

345 Curtis Road, Miramichi, N.B.

(iii) Chief Executive Officer

Timo Suutarla, Vice President/General Manager, UPM Miramichi Inc.

(iv) Principal Contact Person for purposes of Environmental Impact Assessment

Bruce Clark, P.Eng., Engineering Manager

(v) Property Ownership

UPM Miramichi Inc.

2.0 THE UNDERTAKING

(i) Name of the Undertaking: UPM Miramichi Paper Mill Decommissioning.

(ii) Project Overview

UPM Miramichi announced on December 17, 2007, plans to close their paper mill operations located in Miramichi, NB. The requirement for closure of the facility was determined to be necessary as the facility is no longer economically viable, and as such does not meet necessary business fundamentals (e.g. return on investment) for UPM's continued operation of the facility. UPM has determined that there is no possibility of their continued or future operation of the mill and therefore is planning to proceed with decommissioning of the facility and related infrastructure.

For the purpose of this registration it is assumed that the complete facility, including all buildings and ancillary operations (e.g. wastewater treatment system and related lagoons, Bryenton water supply system, former Northwest Millstream water supply line, and the Northwest Millstream engineered solid waste landfill) will be decommissioned. An historical aspect of mill operations was the former mill solid waste disposal site located near Oxford Cove approximately 1 km west of the mill yard. Closure of this former solid waste disposal site is proceeding under separate EIA.

Regarding facility decommissioning, as noted above, it is UPM Miramichi's intention that the site be fully decommissioned, i.e. buildings demolished to grade, area(s) reinstated as green field/ vegetated area, and left suitable for future industrial use, where applicable. This being said, it is UPM's intention to continue to work, within a reasonable timeframe, with the Province of New Brunswick in their efforts to attract an alternative business venture(s) that could use the property or related infrastructure (e.g. existing paper machine buildings, boiler houses, landfill site) and thereby offset the economic loss to the community resulting from cessation of the UPM Miramichi operation.

Phased Decommissioning Process – The decommissioning process will be completed in a phased manner. Phasing will assist in addressing environmental objectives related to the project by providing a logical and structured decommissioning framework. Work will be flexible to assist to the extent practical in assisting the Province (e.g. Business New Brunswick) in their efforts in finding a buyer/operator who may wish to use existing building/ infrastructure.

Related work to this EIA registration includes a Phase II Environmental Site Assessment screening of the mill property, and a related PCB Audit that are currently being completed and will be submitted as supporting documents to this registration. The purpose of this work is to assist in screening and identification of possible environmental concerns. This supporting Phase II ESA screening and PCB Audit work includes review of environmental related aspects such as historical and current petroleum storage tanks; review of environmental effects monitoring to identify requirement (if any) related to historical operation and closure of the waste water treatment system; type, location, and status of potential PCB containing equipment and fluids; and review of yard areas (e.g. hog fuel storage areas, woodyard handling and storage areas) to assist in determining the requirement (if any) for remedial measures, if warranted, for particular areas. Results of the ESA screening work and PCB Audit in turn will be used to develop Remedial Action Plan (RAPs) and aspect specific closure plans, where warranted.

A general overview of the project decommissioning phases follows. It is expected that certain aspects within each phase will run concurrently.

> **Phase 1 – Pre-Decommissioning Activities**: This work will consist of compilation of existing information relevant to environmental and human health and safety aspects of each project component that will be decommissioned. For example, a number of buildings have had Asbestos Containing Materials (ACMs) survey work completed whereas others are less well characterized. These gaps will be identified, the required ACM/ related HAZMAT (e.g. lead based paint screening) work completed, and a building specific decommissioning plan developed where appropriate. For certain equipment and structures (e.g. paper machines, buildings constructed post 1980) there will generally be no requirement for ACM/ HAZMAT screening beyond management and disposal of existing fluids/ materials (e.g. machine lubricants) in accordance to standard maintenance and environmental procedures. Decommissioning of these areas (part of Phase 2) will begin immediately upon receipt of permits, where applicable.

Concerning lead based paint and ACMs, the buildings and equipment to be demolished are of various ages and construction materials. The older sections of the mill are represented by buildings left over from the former Kraft Mill operations, whereas much of the remaining infrastructure (e.g. paper mill buildings) are of post 1980 construction (i.e. constructed following phase out of lead based paint and ACM use in typical building construction). The older kraft mill facility was substantially demolished under a separate EIA approval circa 2004. As part of that work, a lead and mercury containing HAZMAT paint survey was completed. It was found that all paint samples collected from the Kraft mill areas during the lead paint HAZMAT screening were not considered lead based paint with the exception of the samples from the former Woodlands office building located in a separate area. Most of the kraft mill structures were unpainted concrete, brick or ceramic materials. Therefore, lead based paint is not anticipated to be a significant concern in the older kraft mill buildings. However, where flaking paint is encountered it will be sampled prior to demolition to document conditions and ensure that it is handled in an appropriate manner.

Phase 2 – Decommissioning of On Site Equipment and Buildings: This phase of the project will consist of removal of all equipment and building shells on the main mill property. Related work will include decommissioning subsurface infrastructure (e.g. sewer system) as required, and re-grading and vegetating the property so that the closed site drains in an environmentally acceptable manner (e.g. runoff by overland flow filtered by natural vegetation). The mill's existing wastewater collection and treatment system which currently contains, collects and treats building and process effluents and most existing mill yard runoff including that from parking areas will be decommissioned in Phase 3. This will serve to minimize/ eliminate potential impact related to runoff from decommissioning activities. The Bryenton Water Supply system will be turned off during Phase 2.

Phase 3 – Decommissioning of Ancillary Facilities: This phase will consist of decommissioning ancillary mill facilities including the waste water collection and treatment system and related lagoons and outfall; Northwest Millstream landfill facility; Bryenton water supply system and on site water treatment facility, and former Northwest Millstream water supply line. These aspects will be decommissioned as follows.

Wastewater Lagoons – it is planned that an Ecological Closure Approach be implemented. This is described in subsequent sections below.

Bryenton Water Supply System – this aspect consists of a pumphouse located approximately 15 km upstream of the mill along the Southwest Miramichi River, a reservoir, approximately 14 km of 1067 mm (42 inch) diameter water transmission line and a break head tank (the tank reduces pressure in the line before it enters the mill). Above ground infrastructure will be demolished to grade, and demolition areas reinstated. The water line will be left in the ground and concrete capped, where warranted.

Former Northwest Millstream Water Supply Line – above ground infrastructure demolished, and the approximately 7 km of 406 mm (16 inch) diameter woodstave water line left in ground.

Northwest Millstream Engineered Solid Waste Landfill - landfill closed in accordance to NBENV solid waste site closure requirements, and steps outlined in the background documentation and related NBENV approvals to construct and operate the site.

Phase 4 – Remedial Action Plans (RAP)/ Closure Monitoring: This phase will consist of development of Remedial Action Plans (RAPs) and related closure monitoring to address regulatory and environmental objectives related to respective aspects identified during completion of the preceding phases, and the related Phase II ESA screening currently in progress. Example work items include development of remedial action plans to address petroleum impacted soils and groundwater, and post closure monitoring for the landfill (a comprehensive monitoring program has been ongoing for this facility since operations began and will form the basis in developing closure monitoring plans). Other potential monitoring will include that associated with addressing petroleum contamination that could potentially be encountered when decommissioning site facilities such as the on site Bunker C storage facility, and petroleum storage tanks located in the woodlands maintenance area. For respective areas that are identified as impacted, management and closure will be in accordance to applicable regulatory requirements and guidelines (e.g. NBENV Guideline for the Management of Contaminated Sites).

Building enclosures will be removed to existing grade unless purchased by other entities. Where warranted, all or a portion of the foundations will be removed to address environmental objectives. The material from building removal will represent the main volume of waste generated. This material will constitute construction & demolition debris which will be recycled where practical with residual material trucked and disposed at a regulatory approved C&D disposal facility. All metal will be separated and sent for recycling.

(iii) Purpose/Rationale/Need for the Undertaking:

Market Potential: Not applicable, other than providing additional industrial area and existing related infrastructure (if not decommissioned) that may assist in attracting other business ventures to the property.

Benefit to Society: See above.

Economic Benefits: Economic benefits will include short term spin-offs related to construction/demolition/ decommissioning related activities. There are potential long term benefits in the event other businesses can be established on the property.

Job Creation Benefits: See above.

Consumer and/or Industrial Demand: Not applicable.

***Discussion of Alternatives*:** There are no reasonable alternatives to the proposed project. The "do-nothing" alternative would entail leaving the existing equipment and building enclosures as is. This is not considered viable due to the long term economic drain of maintaining non productive infrastructure, and the potential environmental (e.g. visual) and health risks (e.g. pests) of leaving uninhabited buildings and unused equipment in place.

(iv) Project Location

Location: The main mill site and related wastewater treatment lagoons are located in the community of Miramichi, N.B. Related infrastructure which extends beyond the footprint of the main mill site includes the Northwest Millstream Landfill; the Bryenton Pumping Station, Reservoir and Water Supply Pipeline; and the former Northwest Millstream Water Supply Line. Regarding the former Northwest Millstream Pumping Station, this facility had previously pumped water from a dam along the Northwest Millstream. The dam and pumping station were decommissioned in 2005 with approval to complete the work obtained under the provincial Watercourse Alteration Permit requirements. Therefore, the water line and related above ground infrastructure (generally limited to concrete bunkers allowing access to woodstave pipe) are the only remaining infrastructure from this former water supply system.

PIDs - Parcel Identification Numbers (PIDs) for the subject properties are provided in Attachment A. A site plan indicating properties within the project footprint, and a separate plan indicating properties adjoining the project footprint are included in Attachment A.

Address: 345 Curtis Road, P.O. Box 5040, Miramichi, N.B.

Location Map: The site location relative to communities, roads, etc, is indicated on 1:50000 scale NTS mapping (Figure 1) and aerial overview mapping (Figure 2).

(v) Siting Considerations

Not applicable.

(vi) Physical Components and Dimensions of the Project

An overview of the facility components to be decommissioned including environmental issues and mitigation measures (where applicable) is provided in Table 1. The main aspects of the undertaking will occur on the main mill property and adjoining wastewater lagoon area. Figure 3 indicates locations of respective mill yard areas referenced in Table 1. Ancilliary components as noted above, will include decommissioning of the outlying Bryenton water supply system, the remaining components of the former Northwest Millstream water line, and the Northwest Millstream Solid Waste Landfill.

Concerning the main mill property, this will involve decommissioning of the building enclosures, equipment and ancillary components related to paper mill operations. Subject to ongoing efforts of Business New Brunswick, it is possible that one or a number of on site building enclosures with related equipment (e.g. paper machine buildings, #1 Warehouse, machine shop and adjoining office space, water treatment area) will remain in place in the event an operator/ new industry for the site can be found. It is planned that the floor slabs of the decommissioned mill enclosures and footing to the extent practical will be removed. Removal of floor slabs will assist in addressing site remediation work, where applicable (e.g. decommissioning of subsurface lines that may require removal to address regulatory requirements).

Following decommissioning operations in the main mill yard area (and in conjunction with that work where practical), the wastewater treatment lagoon properties will be decommissioned. At this time it is planned (pending submission of detailed plans for review and approval by NBENV) that the lagoons will be closed in accordance to an ecological closure approach. This approach essentially involves decommissioning in a manner that tends to maximize long term closure benefits with respect to ecological habitat, and has been shown to be successful in other jurisdictions. With respect to the UPM-Miramichi lagoons, steps would involve dewatering of the existing settled solids basins by gravity drainage, breaching of berms to facilitate long term surface runoff configuration, site regrading, and establishment of vegetation to address ecological restoration and phyto-remediation objectives (where warranted). An overview of the proposed ecological closure approach is provided in Attachment B.

Open areas resulting from decommissioning will be reinstated as grassed/ vegetated area. There will be no increase in impervious surface related to completion of the work. During the building and general yard area decommissioning process the wastewater collection and treatment system will remain in place and be operable so that any site runoff is contained, collected and treated prior to discharge. Once all buildings are decommissioned, the wastewater collection system which presently serves to collect much of the on site runoff will itself be decommissioned in accordance to regulatory requirements. As noted above, at this time it is planned that an ecological closure approach will be implemented subject to review and approval of a lagoon decommissioning plan which addresses regulatory requirements.

During the bulk of the main mill area decommissioning work, there will be no work in or near watercourses, as the facility components are outside typical setback criteria (i.e. greater than 30 m) from watercourses. As noted above, existing on-site drainage features will be retained. These features intercept and collect runoff from the work area and channel this flow to the UPM wastewater treatment system for treatment. Therefore, runoff from the main mill yard work areas will be totally contained and treated eliminating any potential for untreated suspended solids discharge. It is anticipated that limited aspects of the work will require permits under the Watercourse Alteration Permit requirements (e.g. decommissioning of the Bryenton pumphouse along the Southwest Miramichi River). Where permits are required (e.g. for work - if any – on or near watercourses or wetlands), they will be obtained prior to initiating decommissioning activities.

Existing mill and provincial roadways will be used for vehicular traffic. There is expected to be no overall net increase in traffic as the temporary increase during the work will be offset by the cessation of mill operations.

(vii) Construction Details

Approximate Duration: The work will consist of four phases as described above. Phase 2 and 3 represent the period in which most of the physical work involving building/ infrastructure decommissioning and area reinstatement will be completed. It is UPM's objective that Phase 1 and 2 be completed within a one year timeframe (all buildings decommissioned and demolished to grade) unless other businesses are identified that will assume ownership and liability related to use of the building(s) and area. It is planned that Phase 3 be completed within 2 years. Phase 4 Remedial Action Plans (RAPs)/ Closure Monitoring will be subject to scope determined during the preceding phases, and the Phase II ESA screening work currently in progress. It is anticipated that a reasonable timeline for remedial action plans and closure monitoring would not extend beyond 2 years following completion of Phase 1, Phase 2 and Phase 3 although it is acknowledged this will be dependent on actual conditions encountered.

Estimated Hours: **Phase 1 and 2** - Twelve months, 10 hours per day, 5 days per week, Monday to Friday, July 1 , 2008 through July 1, 2009.

Phase 3 – Twenty four months. Estimated hours and timing to be determined pending options selected for ancillary works.

Phase 4 – Two years following completion of decommissioning work (e.g. placement of final cover at the Northwest Millstream Landfill).

Anticipated Equipment: Front end loaders, track mount excavators, compaction equipment, dump trucks, flat bed trucks, cranes. Ancillary equipment to include metal work tools (e.g. welding equipment, saws), and C&D type tools (e.g. wrecking ball, hydraulic hammers).

Date of First Physical Construction-Related Activity: Immediately on receipt of permits required (tentatively July 1, 2008).

Potential Sources of Pollutants: Fugitive dust emissions, noise, construction and demolition debris, suspended solids runoff, spillage of fluids used in equipment such as hydraulic fluid, and fuels potential impacted soil and groundwater from previous site operations.

Fate of Wastes: All waste generated will be handled, managed and disposed in accordance to the New Brunswick Department of Environment (NBENV) regulations and procedures governing respective waste type. The proposed undertaking will be mainly of a construction/ demolition/ decommissioning nature related to building and equipment removal. In this context, two main waste types will be generated: asbestos and construction and demolition debris. These waste types will be removed, handled and

disposed in accordance to the Province of New Brunswick asbestos and construction & demolition debris management procedures and regulations. Some of the demolition debris (e.g. brick work and mortar, concrete) may be recycled as aggregate for infilling areas on site, or alternatively removed from site and used as general fill assuming regulatory permission is granted.

Prior to commencing decommissioning existing equipment within the building enclosures will have had all related process fluids and chemicals removed. It is expected that most of the equipment removed and much of the building materials (e.g. iron work and metal cladding) will be sold to metal recyclers and recycled. Where warranted, selected portions of the equipment will be retained in the event buyers can be found or the equipment can be used by other UPM divisions.

Concerning potential hazardous waste materials, there may be small amounts of PCB type wastes (e.g. from light ballasts in the buildings). Such materials will be inventoried for each area of the mill and removed prior to building/equipment removal. In the event PCB containing ballasts are identified or suspected during the building/ facility decommissioning process, they will be stored in UPM Miramichi's on-site PCB storage facility constructed and operated in accordance to federal standards governing management of PCB materials, and disposed in accordance to established procedures. The PCB storage facility will itself be decommissioned once there is no longer a requirement for its use A PCB Audit is being prepared to address all potential aspects of PCB at the site (including the presence of underground paper insulated lead cable, PILC), and will be submitted as related information to this EIA registration.

Asbestos containing materials (ACMs) represent another type of potentially hazardous material that may be encountered during building removal. UPM has completed an inventory of ACMs through most if its mill facilities. ACMs and PCBs will be removed and disposed in accordance to applicable regulatory, health and safety standards, and UPM-Miramichi's ISO 14001 Environmental Management System procedures, where applicable (a copy of UPM's ACMs and PCBs management protocol/ procedures is provided in Attachment C).

Other items related to previous operations of the facility include miscellaneous process and laboratory materials. All such materials will be relocated to a secure area of the mill and subsequently decommissioned in accordance to regulatory and relevant health and safety requirements. Regarding radioisotope sources in equipment that had been used as part of mill operations (e.g. quality control monitoring), all radioactive sources have been dismounted and moved to approved storage locations in accordance to Atomic Energy of Canada Limited (AECL) regulatory licensing requirements. All waste types are being managed in accordance to applicable federal and provincial regulations.

In the event impacted soil or groundwater are encountered during the work or are identified during the Phase II ESA screening work, waste management measures (e.g. hauling petroleum impacted soil for treatment at an NBENV approved facility) will be identified in the respective Remedial Action Plan (RAP) prepared to address the particular situation.

Access: Access to the site and work areas will be by existing roadways. No new access roads will be constructed.

Clearing and Grubbing: Not applicable.

Fill Material: In the event fill is required it will be obtained from existing pits that are approved and operate in accordance to NBENV regulations.

Work Near Wetlands/Watercourses: All work will be completed on lands zoned as existing industrial land. Most work will be completed outside the 30 m buffer for watercourses, and as outlined above, all runoff during decommissioning will be contained and sent to the UPM treatment system prior to discharge. Where work (if any) on or within 30 m of a watercourse or wetland is completed, appropriate permits will be obtained.

(viii) Operation and Maintenance Details

Not applicable.

(ix) Future Modifications, Extensions, or Abandonment

Not applicable. The undertaking consists of decommissioning existing building enclosures and equipment that are no longer in use. The main mill site will be reinstated to allow for future commercial/ industrial land use.

(x) Project Related Documents

Project related documents applicable to the work include:

- Relevant sections of UPM Miramichi's ISO 14001 Environmental Management System including asbestos and PCB management plans (copy of Table of Contents provided in Attachment C).
- UPM Miramichi's Emergency Response Plan (ERP) and Spill Contingency Plan (SCP) (copy of Table of Contents provided in Attachment D).
- Asbestos Management Plan (Alltech 2002, refer to Attachment C).
- Northwest Millstream Landfill environmental screening work, including Background Documentation and Results of Ongoing Environmental Compliance and Operations Monitoring.
    - ADI Limited, 1996. *Documentation – Proposed Landfill Site, Repap New Brunswick Inc. Prepared for Repap New Brunswick Inc. File No. (80) 2756-013.3*.
    - ADI Limited, 2003. *Monitoring Review – UPM-Kymmene Northwest Millstream Landfill. Prepared for UPM-Kymmene Miramichi Inc. File No. (80) 2756-052.1*.
    - ADI Limited. Various annual environmental compliance monitoring reports prepared for UPM-Miramichi and submitted to NBDENV.

- Environmental Effects Monitoring reports completed to address Environment Canada requirements.
    - Washburn & Gillis Associates Ltd., 1996. Repap New Brunswick Inc., *Kraft Mill First Cycle Environmental Effects Monitoring Program, Interpretive Report (Revised).*
    - Jacques Whitford Environment Limited, 2000. Repap New Brunswick Inc., *Second Cycle Aquatic Environmental Effects Monitoring Study, Kraft Mill.*
    - Jacques Whitford Environment Limited, 2004. *Cycle 3 EEM Report for the UPM Miramichi Inc. Kraft/Paper Mill, Miramichi, NB. Project No. NBF14126.*
    - Jacques Whitford, 2007. *Cycle 4 EEM Report – Paper Mill, Miramichi, NB. Report prepared for UPM-Miramichi Inc., Miramichi, NB. Report No. 1002303*.
- Groundwater monitoring Reports/ Settled Solids Sampling Information for the existing wastewater treatment lagoons.
    - AMEC, September 13, 2002 letter report, *Preliminary Assessment of Sludge and Aerated Stabilization Basin and Boiler Ash – UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE22027.*
    - AMEC, January 31, 2003 letter report, *Groundwater and Landfill Leachate Sampling Results - UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE22089*.
    - AMEC, October 27, 2003 letter report, *Groundwater and Landfill Leachate Sampling Results - UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE23102*.
    - AMEC, November 2, 2005 letter report, *2005 Groundwater Sampling Results - UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE51086*.

Related project documents to be submitted under this EIA Registration include a report on the Phase II ESA screening work, and the PCB Audit which are currently in progress.

*(**Note** - specific staff listed in procedures/protocols provided are subject to ongoing updates that reflect UPM Miramichi's current staffing, eg. staff may change due to such factors as retirement).*

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

(i) Physical and Natural Features

For the main mill yard and wastewater lagoon areas, the project will take place on land that is currently zoned and used for industrial operations. Zoning in most areas outside the main mill site where the outlying infrastructure is located is principally rural. There are no features that are likely to be affected by the project as waste materials will be recycled or disposed at sites currently approved by regulatory agencies. Existing provincial roadways will be used to transport material from the site. During the work, there will be no discharge of untreated water to the environment. Following completion

of the work, the site(s) will be graded and vegetated as warranted to address environmental objectives.

Natural Features **-** Natural features within and near the project footprint were identified through request to NBENV and NBDNR (request for wetlands in the project and surrounding area), and the Atlantic Canada Conservation Data Center (request for search of ACCDC environmental databases).

A copy of the NBENV wetlands mapping for the study region and surrounding area is provided in Attachment E (Figure E-1).. NBDNR Wetlands are shown on Figure 2. Based on this information, there are no significant wetlands anticipated in the areas in which the bulk of the work will take place (e.g. on main mill yard property).

A copy of the results of ACCDC environmental database search information is provided in Attachment E. For the purpose of the search, ACCDC was requested to search within their standard 5 km buffer. Results of the database search were further refined for a 500 m buffer around the project footprint. Individual 5 km buffer maps showing elements observed (i.e. flora and fauna); and environmental sensitive areas (ESAs) or special areas (SAs) in addition to managed areas (MAs) for each of four project sub-components (Main Mill Area, Northwest Millstream Landfill, Bryenton & Northwest Millstream pipelines) are given in Attachment E. It should be noted that while MAs have some degree of protected status, SAs may or may not.

Results of these requests indicated that there are no occurrences of environmental items of concern on the main mill property and wastewater lagoon areas where most of the decommissioning work will occur. Regarding outlying infrastructure, the information request suggested low probability of potential impact on environmental items within the infrastructure footprints.

Regarding MAs and ESAs, there are two MAs and one ESA within 500 m of the project footprint. The MAs include Beaubears Island National Historic Site and the Enclosure and the ESA is the Oxford Cove ESA. However, it is important to note that the decommissioning work would not be expected to have any effect on any of the above noted sites given the nature and location of proposed work activities. Furthermore, it is noted that there is considerable distance between the project footprint and the above noted MAs.

Five flora species were identified in the ACCDC element occurrence (EO) database within 500 m of the project footprint as indicated on Figure E.2. All of these occurrences are located along the Bryenton pipline and the provincial sensitivity ranking for three of these species is “uncommon” as indicated on Figure E.2. One “rare” species (Spongy Arrowhead – *Sagittaria calycina*) and one “extremely rare” species (Greene’s Rush – *Juncas greenei*) were identified. Depending upon the nature of the decommissioning work associated with the Bryenton pipeline, there may be the potential of encountering the above noted rare species. However, the footprint associated with any decommissioning related work would be very limited given the linear nature of the pipeline. In addition, location of planned decommissioning work activities (other than

removal of the powerline wire) will be limited to the pumphouse property, reservoir and break tank locations. There were no ACCDC element occurrences at these locations.

(ii) Cultural Features

Not applicable. The work will be isolated to existing industrial footprint on the main mill and related properties, with travel and access provided by existing provincial roadways.

(iii) Existing and Historic Land Use

Existing and Previous Uses of the Subject Property and Adjoining Lands: The subject properties have been used as industrial land for the wood processing related industry since circa 1940. Regarding the main mill area, the adjoining lands are mainly under provincial control (NBDOT controlled roadways/highways) or rail right-of-way bounding the landward property lines, or federal control (Miramichi River navigable water) to the south. Adjoining property to outlying infrastructure aspects are essentially green area (e.g. woodland).

General Description of the Existing Condition and Use of the Site: Existing industrial land, see above.

Ownership of Lands Abutting Property: Information on land ownership is provided in Attachment A. Regarding abutting lands, it is important to note that most of the area of the subject property on which the main portion of work will be completed (i.e. removal of buildings and equipment) is located toward the center of the subject property with appreciable buffers/setbacks from property lines such that potential impacts to adjoining land parcels will be appropriately mitigated.

Type and Extent of Any Known or Suspected Contamination Resulting from Previous Uses of the Subject Property or Adjacent Property: Any known contamination (i.e. spills and contaminated soils) have been cleaned to regulatory standards in place at the time the contamination was encountered with the exception of petroleum hydrocarbon contamination in the area of the Woodlands Garage/ Maintenance Buildings located near the east boundary of the property. A Phase II ESA Screening study is currently in progress (field work completed and sample results pending). This work included a number of boreholes and monitoring wells in the Woodlands Garage/ Maintenance Building area to address the hydrocarbon contamination known to exist in this area.

The Phase II ESA Screening study is also intended to screen for potential contamination in the other areas of the mill yard. Related work includes a PCB Audit currently in progress. Results of these studies will be submitted as supporting documentation to this EIA registration. Regarding the wastewater treatment lagoons, monitoring of groundwater quality has been ongoing in recent years. A copy of recent monitoring results (including sample results of the settled solids in the settling basins) is provided in Attachment F. Sampling of these lagoon wells for additional parameters has been included in the Phase II ESA Screening study being completed as related work to this EIA registration.

Environmental Effects Monitoring (EEM) Monitoring Results Summary **-** Regarding the potential effects of the historical discharge of mill effluent to the Southwest Miramichi River, there is a substantial environmental effects monitoring (EEM) database which has been compiled from the early 1990s to 2004 as a result of aquatic habitat monitoring and assessment work completed under the amended *Pulp and Paper Effluent Regulations (PPER)* under the federal *Fisheries Act*. Four cycles of EEM were completed over this time period. As required under the PPER, the design of each EEM cycle was submitted to Environment Canada for review and approval by Environment Canada and other federal and provincial regulatory stakeholders including NBDENV. Typically, each EEM cycle consisted of a fish survey, a benthic invertebrate survey and process effluent toxicological testing. The most recent EEM monitoring reports are referenced in Section 2(x) of this registration document.

The results of the EEM programs typically demonstrate a continuous and significant improvement in the environmental performance of the mill for all three of the above noted EEM categories. These improvements were primarily attributed to a reduction in effluent flow and an improvement in effluent quality resulting particularly from closure of the Kraft mill in 2004. Various lesser factors for the general improvement in environmental performance over time include a substantial reduction of in-mill solids and chemical oxygen demand losses; the substitution of chlorine dioxide for elemental chlorine as a bleaching agent; and the optimization of secondary effluent treatment.

The most recent monitoring results are compiled in the Cycle 4 EEM report which was submitted to UPM-Miramichi in 2007 (Jacques Whitford, 2007). The results of the fish survey indicated some differences in measured parameters between the exposure and reference areas which may be attributable to mill effluent. No evidence of significant effects of the mill effluent was noted for any of the benthic invertebrate assessment indices for both univariate and multivariate statistical analysis. Regarding the results of the toxicological testing, the mill effluent was routinely found to be non-acutely lethal to rainbow trout and *Daphnia Magna* (Jacques Whitford, 2007). The report notes that there was a substantial reduction in the potential zone of effect for each sublethal test species across the EEM cycles. The considerable reduction between Cycle 3 and Cycle 4 was attributed to better effluent quality and a reduced zone for the 1% effluent isopleth due to the permanent shutdown of the Kraft mill.

With the complete closure of the entire UPM-Miramichi facility in 2007, the zone of environmental effects on the aquatic environment of the Miramichi River will be eliminated. This expectation is supported by the existing EEM database which clearly demonstrates the correlation over time between improved effluent quality and reduced effluent flow and a considerable increase in environmental performance, as would be anticipated. Since Cycle 4 monitoring was completed immediately following the closure of the Kraft mill, the Cycle 4 findings suggest that there would be little potential for post-mill closure residual environmental effects on the receiving water environment.

Any spills encountered during progress of the work will be addressed in accordance to UPM Miramichi's ISO 14001 EMS spill response protocols/procedures, and applicable regulatory requirements.

4.0 SUMMARY OF ENVIRONMENTAL IMPACTS

A summary of project impacts and benefits listed according to environmental attribute categories is provided in Table 2. Relevant supporting comments follow.

Closure and decommissioning of the mill represents an immediate socio-economic impact to the Miramichi area. This will be temporarily offset to a degree by use of local labour and contractors in decommissioning work. Longer term impacts cannot be determined. Assuming that new industry can be attracted to the site, potential long term impact will serve to offset impact related to the decommissioning. Concerning bio-physical environment, minor environmental impacts will include the use of landfill space at approved C&D disposal facilities. However, this will be more than offset by the preservation of non-renewable resources manifested by the volume of metals from equipment that can be recovered and recycled (e.g. reprocessed as feedstock in scrap metal recovery operations).

Other net positive benefits to the environment will result from elimination of waste water discharges to the Miramichi River, and elimination of greenhouse gases and related air quality discharges associated with paper making and mill operations. Overall, these positive benefits will result in:

- improved air quality;
- improved water quality;
- improved fish habitat within the Miramichi River that had formerly served as the receiving waters for treated wastewater from the mill;
- reduction in odor and related total reduced sulphur emissions;
- reduction in long term fugitive dust emissions related to mill support operations (e.g. yard operations adjacent to the King George Highway); and
- eliminate wastewater treatment loading (e.g. BOD, TSS) to the Miramichi River).

The footprint of the project area(s) will provide for opportunity to develop greenspace (e.g. seeding of former yard and, where practical, building areas). In the case of the mill yard industrial space for future industry will be provided.

5.0 SUMMARY OF PROPOSED MITIGATION

Proposed mitigation measures, where applicable are included in Table 1 and Table 2.

6.0 PUBLIC INVOLVEMENT

A summary of planned public involvement activities (including relevant mill activities to date) is provided in Table 3. Public involvement will be in accordance to the Province of New Brunswick EIA guideline Appendix C requirements, as determined in consultation with NBENV. Written notification to the Miramichi River Environmental Action Committee (MREAC), the Eel Ground First Nation, and the Miramichi City Council will be given. The Miramichi Fire Department and related civil authorities will also be notified in writing.

UPM-Miramichi has completed, in part, the public consultation process though announcement of the mill closure, and related discussion with key stakeholders (e.g. salaried and unioned employees, union representatives, public officials including the Premier's Office). In addition, UPM-Miramichi is continuing to work with Business New Brunswick in attracting new businesses for the area.

In addition to the public involvement activities outlined above, UPM-Miramichi will be making available to the public this EIA registration document.

Table 3 – Summary of Public Involvement

Item	Comments/ Status
Public Notification of Mill closure and Intention to Decommission Facility	UPM announced publicly its plan to cease operations and close the mill on December 17, 2008.
Consultation with employees (salaried and union)	UPM has advised salaried and union employees as to their intentions and has substantially completed their legal obligations regarding employee severance.
Consultation with Provincial Government	UPM has been in continued discussion with the Province regarding the closure and decommissioning and is working with the Province to find an alternate operator for the site.
Consultation with Municipal Government	UPM has consulted with municipal government concerning site closure.
Consultation with First Nations (Eel Ground First Nation)	UPM will send written notification that it plans to decommission the mill to the Eel Ground First Nation as part of the public involvement activities.
Public Notification of EIA Registration Document	A notice will be published in a provincial newspaper (e.g. Moncton Times and Transcript), and in a local Miramichi newspaper (e.g. Miramichi Leader) announcing the project within approximately 60 days of the date of this registration.
Prepare report on results of public involvement activities	A summary report will be submitted to NBENV on results of the public involvement activities.

7.0 APPROVAL OF THE UNDERTAKING

The main authorization required for the undertaking is expected to be a Certificate of Determination issued by NBENV in response to this registration. Local building permits will also be obtained, if required.

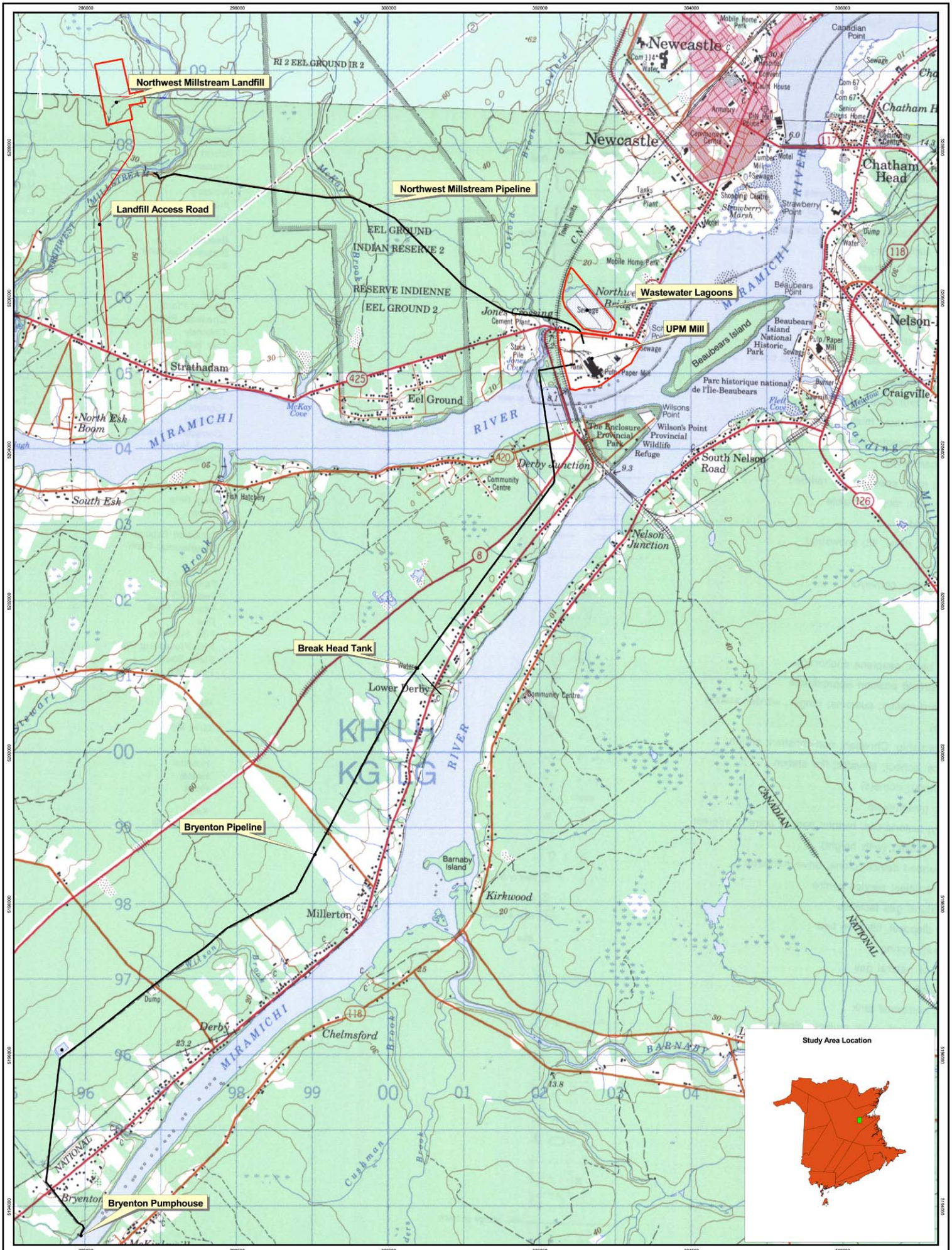
8.0 FUNDING

UPM will pay for the site decommissioning. In the event new businesses assume ownership of lands or facilities formerly owned by UPM, these entities will assume all related environmental liability unless otherwise determined and communicated in writing by UPM.

9.0 SIGNATURE

Date: April 28, 2008

Bruce Clark, P.Eng. for UPM Miramichi Inc.



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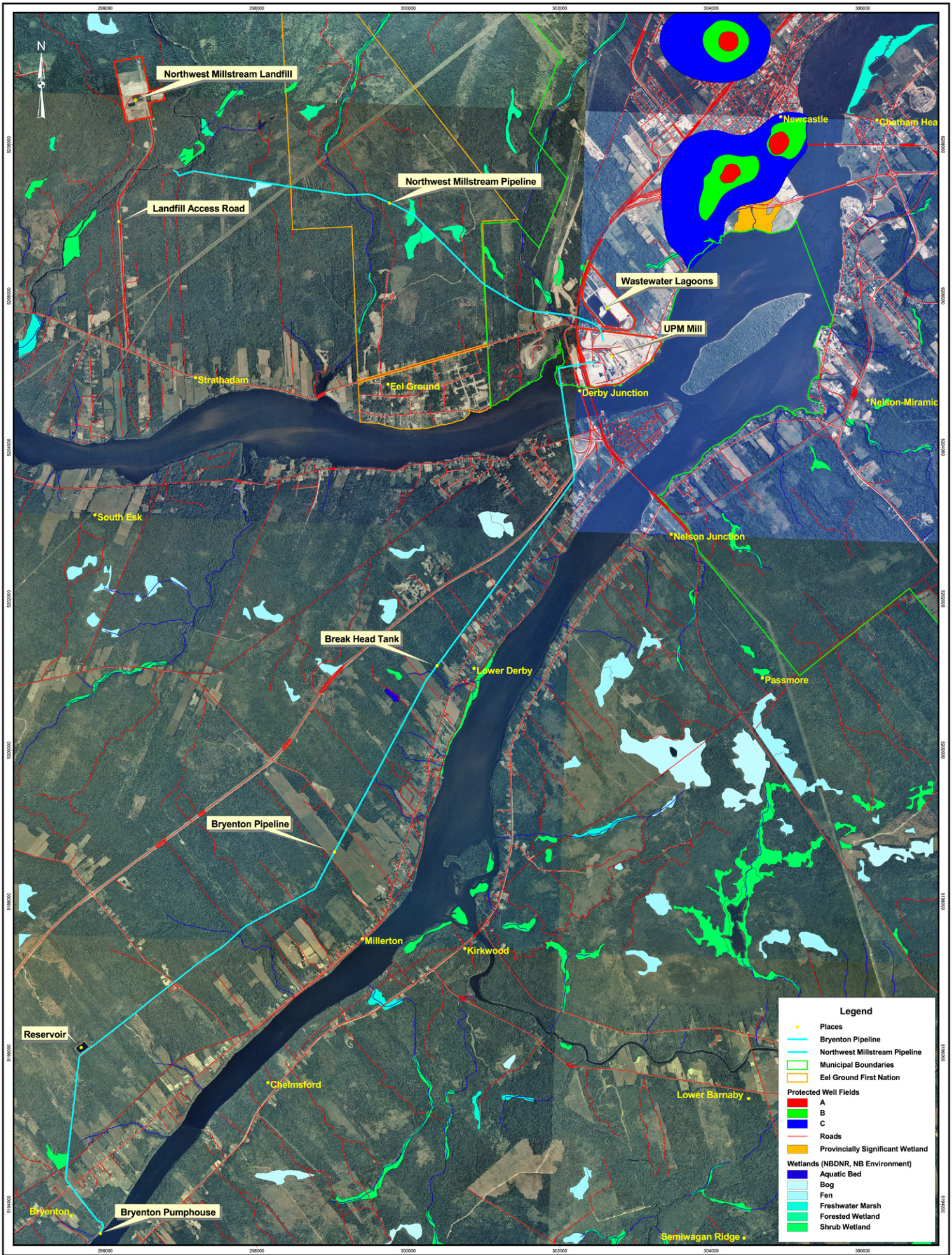
Proj. UPM Miramichi Mill Decommissioning - EIA Registration

Dwg. Figure 1. Study Area

1 0 1 2 Kilometers

Drawn By:	Proj. No:	(82) 2756 - 066.1
Dwg. Standards Chk. by:	Dwg. No	Figure 1
Designed By:	Dwg. Design Chk. By:	Rev.



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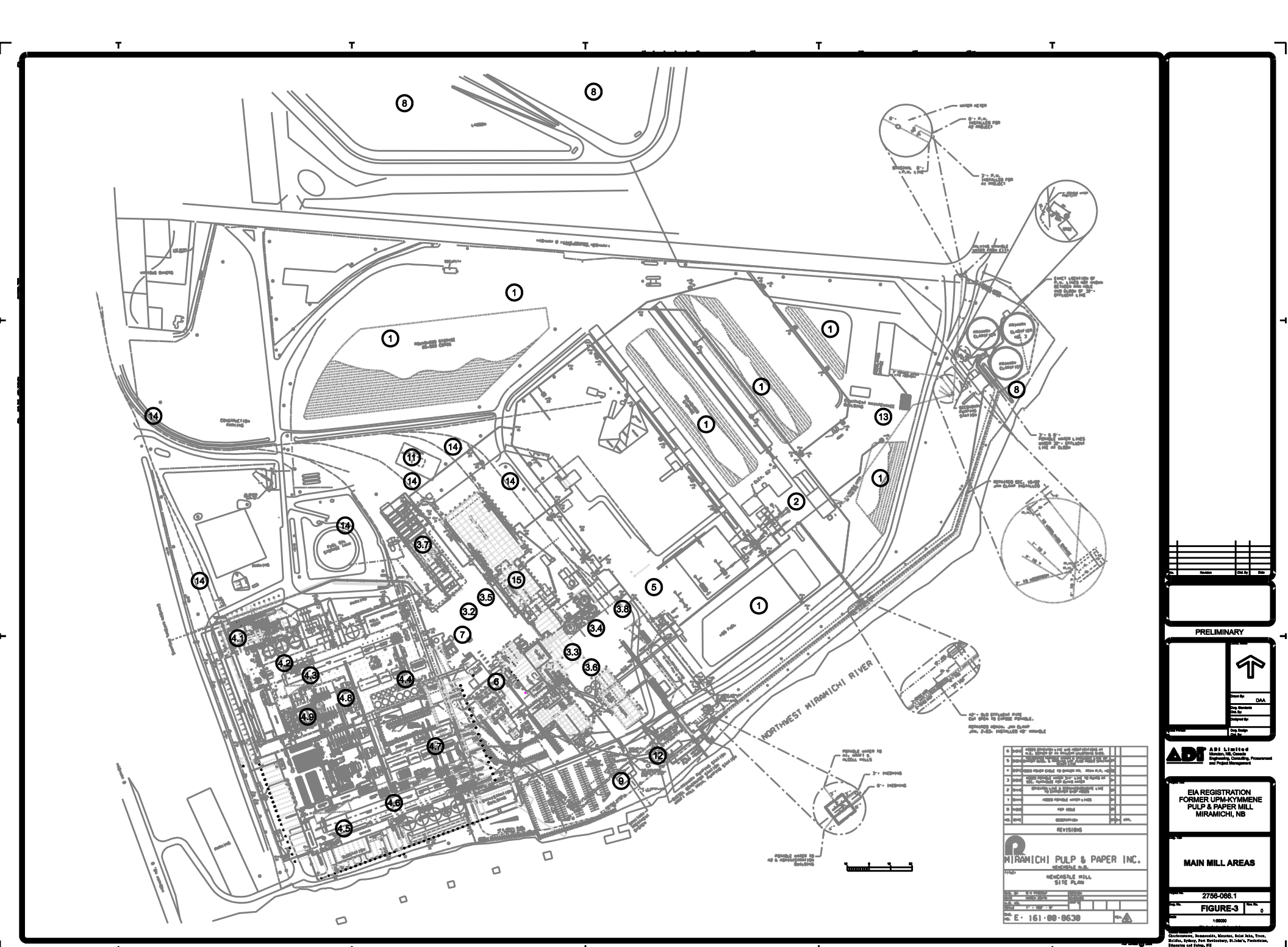
Proj.	UPM Miramichi Mill Decommissioning - EIA Registration	Drawn By:	Proj. No: (82) 2756 - 066.1
Dwg.	Figure 2. Aerial Overview	Dwg. Standards Chk. by:	Dwg. No Figure 2
1 0 1 2 Kilometers		Designed By:	Dwg. Design Chk. By: / Rev.



...\Figure 3 - jrda April 22.08.DGN 4/22/2008 4:06:39 PM

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
Wood Storage and Handling Areas			
1) Wood Storage and Hog Fuel Areas	- Wood storage (various locations).	- Possible fuel/hydraulic oil leakage from heavy equipment.	- Much of the typical inventory of this material has already been consumed or removed from the property. It is expected that the majority of any remaining wood and hog fuel will either be burned in the on-site boilers or sold and transferred off-site. Any residual material would be hauled to a regulatory approved C & D disposal site.
2) Woodroom	- The woodroom was the starting point in the pulping process where the wood was debarked and chipped. The sludge handling system was also located in this area.	- Miscellaneous storage of POLs (45 gal drums). - Three transformers possibly containing PCBs.	- Prior to demolition of the structure, all chemicals will be removed from the site and any remaining transformers will be screened for the presence of PCBs. A qualified PCB waste handling contractor will be retained for handling, transporting and ultimate off-site disposal/destruction of any PCBs or PCB containing equipment. - The woodroom will be demolished with the resulting C & D waste recycled where practical and residual sent to an approved disposal facility.
Paper Mill Areas			

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
4.1) Paper Mill – Pulper Area	- Pulp from the groundwood mill was re-pulped in this area.	- Miscellaneous chemical storage in large tanks.	- All chemicals and or lubricants will be removed from the site by qualified suppliers. Prior to initiation of C&D demolition work, any remaining chemicals will have been removed by suppliers in accordance to applicable health and safety requirements. - Most process fluids have been removed. Any remaining process fluids will be washed to sewer for treatment in the mill's wastewater treatment system. - Given the relatively recent age of the equipment and structures, HAZMAT issues (e.g. asbestos containing materials, PCBs, lead based paint) are unlikely to be an issue).
4.2) Paper Mill – A-1 Stock Preparation Area	- A mixture of 50% Kraft stock and 50% groundwood pulp was combined in a chest at a consistency of 99% water.	- Miscellaneous chemical storage, oil drum storage (45 gal drums), etc. Floor drainage, overflows and process effluent were directed to the main sewer for treatment in the mill's effluent treatment system.	- As per Location 4.1.
4.3) Paper Mill – A-1 Paper Machine	- This paper machine produced the base sheet for the Lightweight Coated Paper. The paper was rolled into "jumbo rolls" and sent to the coater.	- Miscellaneous chemical storage. Floor drainage, overflow and process wastewater from this area was directed to the basement effluent sewer for treatment.	- As per Location 4.1. - Metal and other suitable machine components will be sold for recycling where possible.

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
4.4) Paper Mill – A-1 Coater & Coating Kitchen	- The roll from the paper machine was unwound and a clay coating was applied to one side of the sheet. The sheet was then passed through large dryers which served to dry the coating. The coating process was repeated for the reverse side and the sheet was passed through a second set of dryers and subsequently rewound.	- Miscellaneous chemical and clay storage. All effluent was discharged to the wastewater sewer for treatment.	- As per Location 4.1.
4.5) Paper Mill - A-2 Stock Preparation Area	- This area supported the A-2 Paper Machine.	- Miscellaneous chemical storage, oil drum storage (45 gal drums), etc. All effluent was discharged to the wastewater sewer for treatment.	- As per Location 4.1.
4.6) Paper Mill – A-2 Paper Machine	- This machine is similar to the A-1 Paper Machine. However, it is wider and has more dryer cans than the A-1. The machine produced a premium grade base sheet of paper in the heavier grade of Lightweight Paper.	- Miscellaneous chemical storage.	- As per Location 4.1. - Metal and other suitable machine components will be sold for recycling where possible.
4.7) Paper Mill - A-2 Coater & Coating Kitchen	- Coating was added to the paper.	- Miscellaneous chemical and clay storage. All effluent was discharged to the mill's effluent treatment system.	- As per Location 4.1.
4.8) Paper Mill – Supercalenders	- The coated paper was polished by passing the sheet through one of the supercalendar machines which had a design speed of about 2600 ft/min. Pressure and heat were applied in the form of steam.	- N/A.	- All equipment to be decommissioned and recycled and/or sent to a regulatory approved C & D disposal facility.

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
4.9) Paper Mill - Winders	- The winders were used to custom cut the large rolls of paper to smaller size in accordance to customer specifications. The market size rolls were covered with a brown protective wrapping in the roll wrap area. The winder machines operated at about 7500 ft/min.	- The winder area was a relatively dry area with no significant liquid effluent.	- All equipment to be decommissioned and recycled and/or sent to a regulatory approved C & D disposal facility.
4.10) Office Building	- Not applicable (houses mill administrative offices)	Small quantities of cleaning chemicals/ liquids.	-Remove household type cleaning supplies and dispose of in accordance to Provincial requirements.
Kraft Mill Areas			
3.1) Kraft Mill – Recovery Area	- Green liquor from the recovery boiler was pumped to the recaustizing area to be mixed with lime to produce white liquor to be used in the cooking process.	Miscellaneous chemical storage (process liquors, boiler feed water treatment chemicals).	- Process fluids have been removed. Prior to initiation of demolition work, any remaining chemicals will have been removed by suppliers in accordance to applicable health and safety requirements.
3.2) Kraft Mill – Lime Kiln Area	- Lime produced in the lime kilns was used to manufacture cooking liquor.	- Bunker C fuel used for the lime kilns.	- This portion of the mill was demolished in 2005. All C & D debris was removed from the site for off-site disposal.
3.3) Kraft Mill – Washing & Screening Area	- Brownstock was screened to remove knots and uncooked wood pieces and subsequently washed to remove any black liquor. The black liquor was concentrated and recovered; washed pulp was sent to screening system and dewatered prior to storage.	- Miscellaneous chemical storage and large tanks.	- This portion of the mill was demolished in 2005. All C & D debris was removed from the site for off-site disposal.
3.4) Kraft Mill – Bleachery Area	- Pulp stock was bleached in this area.	- Process chemical storage.	- This portion of the mill was demolished in 2005. All C & D debris was removed from the site for off-site disposal.
3.5) Kraft Mill – Recaustizing Area	- Part of cooking liquor manufacturing process – calcium carbonate was precipitated from green liquor to produce white liquor which was recovered for re-use.	- Process chemical storage.	- This portion of the mill was demolished in 2005. All C & D debris was removed from the site for off-site disposal.
3.6) Kraft Mill – Digester Area	- Wood was digested to pulp/brownstock. Process related materials included weak	- Process liquors and chemical storage.	- This portion of the mill was demolished in 2005. All C & D debris was removed from

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
	black liquor, pitch dispersant and 50% liquor.		the site for off-site disposal.
3.7) Kraft Mill – Water Treatment Area	- Process water intake was located upstream of the mill in the Southwest Miramichi River at Bryenton. In this area of the mill, alum was added to the process water for suspended solids removal. Boiler feed water was treated with polymers, sulphuric acid and caustic soda for softening and demineralization.	- Miscellaneous chemical storage in large tanks.	- Prior to initiation of demolition work, any remaining chemicals will have been removed by suppliers in accordance to applicable health and safety requirements.
3.8) Kraft Mill – Chemical Preparation Area	- Former unloading/storage area for various chemicals including sulphuric acid, sulphur dioxide, chlorine, caustic soda, sodium chlorate, hydrogen peroxide, chlorine dioxide, liquid oxygen and spend acid.	- Miscellaneous chemical storage in large tanks located inside and outside the building. - Chemical unloading from rail cars or tanker trucks via an above ground transfer pipeline.	- This portion of the mill was demolished in 2005. All C & D debris was removed from the site for off-site disposal.
ALLCELL Pilot Plant			
5) ALLCELL Plant	- Experimental plant that used an alcohol based pulping process. Mothballed in the 1990s.	- Miscellaneous chemicals, alcohol solutions and process fluids.	- This portion of the mill was demolished in 2005. All C & D debris was removed from the site for off-site disposal.
Boiler Plant			
6) Boiler Plant	- The boiler plant provided energy to mill operations. Boiler units included No. 1 Power Boiler (converted to burn hog fuel in 1987); No. 4 Power Boiler (Bunker C or hog fuel); No. 6 Power Boiler (Bunker C – package boiler); No. 4 Recovery Boiler (black liquor); and No. 3 Recovery Boiler (black liquor). In the early 1990s, a 22 MW turbine utilizing high pressure steam from the boiler plant was installed.	- Miscellaneous chemical compounds and petroleum products stored in small quantity (e.g. 45 gal drums) containers. - Black liquor. - Asbestos insulation at older boiler installations.	- The No. 3 recovery boiler was decommissioned in 1990 and demolished and hauled from the site for off-site disposal as part of the Kraft mill decommissioning work completed in 2005. - The boiler building and contents will be demolished and the resulting C & D debris will be hauled away for off-site disposal at a regulatory approved site.
Fuel Oil Storage and Handling Area			
7) Fuel Oil Storage	- Fuel oil storage primarily consisted of	- Bunker C and light oil.	- The contents of the fuel storage tanks will be

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
and Handling Area	three above ground tanks: a bulk Bunker C storage tank; a Bunker C day tank; and a light oil storage tank. Bunker C was used to fuel the boiler plant and the lime kilns. The light oil was used as a fuel for the startup of the No. 4 Recovery Boiler. Secondary containment was provided for the main tanks. Three above ground propane tanks are also located at the site.		pumped out/removed. Each tank will then be removed from the site for off-site disposal or recycling. - Any identified contamination will be dealt with in accordance to the NBDENV Guideline for the Management of Contaminated Sites. - A specialty contractor will remove the propane tanks from the property.
PCB Storage Area			
11) PCB Storage Facility	- The PCB Storage Facility, which is located north of the former Kraft mill complex, was constructed and is maintained in accordance with applicable regulatory requirements.	- PCB storage.	- The facility will be used to temporarily store some existing equipment and any PCB containing items identified during the decommissioning work. An approved PCB waste handling firm will be retained to prepare any stored equipment for transport and off-site disposal or destruction. Work plans will be developed and submitted to NBDENV for approval prior to initiating the work for any transformers (refer to discussion under Location 10). - Prior to demolishing the facility, the portion of the floor area where some historical PCB leakage is reported to have occurred will be remediated by a qualified PCB waste handling firm.
Diesel Generator Station			
12) Diesel Generator Station	- Provided backup power to primary effluent pumphouse during power failures. An above ground diesel storage tank which stores fuel for the generator is located adjacent to the station.	- Storage of petroleum hydrocarbons. A concrete containment dyke is situated around the diesel storage tank.	- Pumphouse building will be demolished. The contents of the fuel storage tank will be pumped out/removed. The tank will then be removed from the site for off-site disposal or recycling.

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
Equipment Maintenance Garage and Yard			
13) Equipment Maintenance Garage and Yard	- This portion of the mill consists of a garage for maintenance of yard equipment, a small storage building and a maintenance yard. A vehicle refueling station is located in this area. Several existing and historical petroleum storage tanks are associated with this area.	- Heavy equipment maintenance. - Petroleum hydrocarbon storage and dispensing.	Structures to be demolished with waste taken to an approved C & D disposal facility. - The contents of the fuel or waste oil storage tanks will be pumped out/removed. Each tank will then be removed from the site for off-site disposal or recycling by a licensed installer. - The fuel dispensing pumps and lines; and pump island will be decommissioned. - Any identified contamination will be dealt with in accordance to the NBDENV Guideline for the Management of Contaminated Sites.
Off Loading Facilities and Rail Sidings			
14) Off Loading Facilities and Rail Sidings	- Truck loading and unloading facilities were situated at several areas within the mill complex. In addition, there are seven general areas of rail sidings for off-loading chemicals and other materials.	- Potential spillage of various process related and other chemicals during unloading.	- Rail spur lines and ties will be removed and these materials will be recycled and/or hauled to an approved C & D disposal area. - Any identified contamination will be dealt with in accordance to the NBDENV Guideline for the Management of Contaminated Sites.
Machine Shops			
15) Machine Shops	- Mill machine shop area.	- Machining of metals and use of petroleum based products.	- Structure to be demolished with waste taken to an approved C & D disposal facility.
Main Mill Area Property Perimeter			
16) Main Mill Area Property Perimeter	- N/A.	- N/A.	- Groundwater monitoring wells will be installed around the perimeter of the mill property and analyzed for a broad suite of potential mill operations related contaminants as part of the Phase II ESA screening. This

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
			will serve to 1) evaluate potential off-site impacts to groundwater quality, 2) establish upgradient or background groundwater quality and 3) provide a "full subject property scale" snapshot of groundwater quality in the study area.
Electrical Substations and Equipment			
10.1) Electrical substations	- Two main electrical substations are located on-site. The substations are fenced and locked. It is understood that the substations do not contain PCBs.	- N/A.	- The substations will be decommissioned.
10.2) Transformers	- Provision of electric power to mill operations.	- It is possible that some older transformers may contain PCBs. UPM-Miramichi has some existing information on the PCB status of the on-site transformers and any data gaps will be addressed by the PCB audit completed in conjunction with the Phase II ESA screening.	- Any identified PCB containing transformers will be dealt with by an approved PCB waste handling firm. A work plan detailing draining, loading and transportation procedures in addition to the intended carrier and receiver will be prepared for NBDENV approval prior to initiating the work.
10.3) High Voltage Cables	- Provision of electric power to mill operations.	- A few oil filled high voltage cables may contain PCBs. The locations of any suspect cables will be identified in the PCB audit.	- Any identified PCB containing high voltage cables and associated potheads will be dealt with by an approved PCB waste handling firm. If these items are identified or suspected during the PCB audit, a work plan detailing the proposed decommissioning and disposal activities will be prepared for NBDENV approval prior to initiating the work. It is expected that the ends of any sections of PCB containing cables embedded in concrete slabs or structures will be sealed upon discovery and that the embedded cables will subsequently be removed during the final stages of the project.

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
10.4) Light ballasts and capacitors.	- N/A.	- Capacitors in older (pre-1980) fluorescent light ballasts and high intensity discharge (HID) fixtures may contain PCBs.	- Prior to decommissioning buildings constructed prior to 1980, all fluorescent lamp ballasts and HID fixtures will be screened for the potential presence of PCBs using identification markings on the equipment. Any potential PCB containing fixtures will subsequently be collected and stored in the on-site PCB storage facility which itself will eventually be decommissioned (refer to comments for Location 11).
Effluent Wastewater Treatment System			
8.1) Lagoons	- The aerated lagoon system provided secondary treatment of mill effluent. The system consists of one settling basin followed by two aerated stabilization basins (ASBs) connected in series with a residence time of approximately seven to eight days.	- Mill process effluent.	- It is planned that the lagoons will be decommissioned using an Ecological Closure Approach (see Attachment B of this EIA registration). An Ecological Closure Plan brief will be submitted for NBENV review and approval, and appropriate regulatory procedure followed.
8.2) Clarifiers	- Three clarifiers provided primary treatment of the mill effluent and suspended solids removal.	- Mill process effluent.	- Contents discharged to existing wastewater lagoons. Clarifier structures and equipment will be dismantled, and area infilled, graded, and seeded.
8.3) Subsurface Sewer System	- Conveyed mill effluent from source to treatment system.	- Mill process effluent	- Remove manholes and infill pipe in place.
Sanitary Wastewater Treatment System			
9.1) Treatment Plant	- Sanitary effluent from the mill complex was directed to the treatment plant via dedicated sewers. The plant provided primary treatment through an activated sludge clarifier. The treated effluent was subjected to ultraviolet disinfection prior to discharge to the river.	- Sanitary sewage.	- Prior to demolition, remove any chemicals and sludge from the building/clarifier and dispose of in accordance with regulatory requirements.
9.2) Subsurface sewer system.	- Conveyed mill sewage to the treatment plant.	- Sanitary sewage.	- Remove manholes and infill pipe in place.
Bryenton Water Supply System			

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
19.1) Pumphouse and Infrastructure	- Housed pumps for the mill process water supply from the Southwest Miramichi River.	- Not applicable.	- Remove pumphouse and equipment. Reinstate area.
19.2) Reservoir	- Water supply reservoir for mill process water storage.	- Not applicable.	- Re-grade and vegetate.
19.3) Pipeline	- Underground water conveyance pipeline of wood stave type construction.	- Creosote (contains PAHs) preservative on wood stave pipeline.	- Remove surface structures and reinstate areas of removed structures. Abandon subsurface pipeline in place; cap with concrete where warranted.
19.4) Break Head Tank	- Reduced pressure head along water line.	- N/A.	- Demolish and re-grade, as required. All waste to an approved C &D disposal facility.
19.5) Power Line	- Provided power supply to the Bryenton pumphouse.	- N/A.	- Remove power line and electrical equipment for recycling or disposal at an approved facility. Abandon power poles in place.
Northwest Millstream Solid Waste Landfill			
18.1) Landfill Cell	- The landfill received selected waste from the mill from 2001 to the closure of the mill in 2007. The cell contains an engineered liner (recompacted till/HDPE) and leachate collection and removal (LCR) system.	- Landfill leachate. - Landfill gas.	- Close in accordance to regulatory requirements (e.g. final cap with minimum 600 mm hydraulic barrier, gas vent system and vegetative cover)
18.2) Leachate Collection System	- Leachate from the cell is collected in a collection pipe which drains by gravity to a leachate sewer. The latter sewer drains leachate by gravity to the leachate holding pond.	- Landfill leachate.	- Remove manholes and infill pipe in place.
18.3) Leachate Holding Pond	- Leachate is collected in the holding pond which is emptied, as required, by trucking the contents of the pond to the mill's aerated settling basin (ASB) for final treatment prior to discharge with treated mill effluent. The holding pond contains a recompacted till/HDPE liner.	- Landfill leachate.	- Re-grade as warranted and vegetate.
18.4) Sedimentation Pond	- Surface water drainage from the landfill area is directed to the sedimentation pond.	- Silt and sediment in site runoff water.	- Re-grade and vegetate as required.

Table 1 – Summary of Mill and Ancillary Facilities

Location	Process Summary	Environmental Items/Issues	Comments/ Mitigative Measures
18.5) Access Road and Northwest Millstream Bridge	- Provides access to the landfill site from NB Route 425.	- Not applicable.	- Remove bridge structure, and abandon roadway following completion of closure monitoring.
18.6) Environmental Monitoring System	- Groundwater monitoring wells and surface water monitoring locations were established as part of the environmental compliance monitoring program for the landfill.	- Groundwater monitoring wells could be potential entry point for groundwater contaminants if the landfill site is not secure and the wells are no longer maintained.	- Decommission in accordance to regulatory guidelines for decommissioning of monitoring wells subsequent to the completion of closure monitoring.
Oxford Cove Landfill			
17.1) Landfill	- This landfill received waste from the mill from about 1950 to 2001 when the facility was closed and replaced by the Northwest Millstream engineered landfill.	- Long term relatively unsupervised disposal of miscellaneous waste from the mill in an unlined dumpsite. - The dumpsite is located in a groundwater discharge area and there are no downgradient groundwater users.	- Close in accordance to regulatory requirements (i.e. final cap with hydraulic barrier, gas vent system and vegetative cover). Closure plan has been approved by NBENV and site closure work is currently in process.
17.2) Sedimentation Pond	- Sedimentation pond to collect site runoff was completed in 2006 in conjunction with site closure activities.	- Silt and sediment in site runoff water.	- Re-grade and vegetate as required.
17.3) Groundwater monitoring wells.	- Groundwater monitoring wells have been established to monitor groundwater quality.	- Groundwater monitoring wells could be potential entry point for groundwater contaminants if the landfill site is not secure and the wells are no longer maintained.	- Decommission in accordance to regulatory guidelines for decommissioning of monitoring wells.
Northwest Millstream Water Line(Note – Dam and Pumphouse previously decommissioned and removed)			
19.1) Water Line	- Conveyed process water to the mill from the Northwest Millstream.	- Creosote (contains PAHs) preservative on wood stave pipeline.	- Remove surface structures and reinstate areas of removed structures. Abandon subsurface pipeline in place.

Table 2 – Summary of Environmental Impact/ Benefit by Attribute

Attribute	Negative Environmental Impact (if any)	Environmental Benefit	Mitigative Measures (if applicable)
1) Air Quality			
Particulate/smoke	No negative impact.	***Significant improvement*** in air quality particulate as a result of cessation of mill process and power generation operations and closure of wastewater treatment lagoons.	
Dust	Minor short term dust impacts from C&D type operations and trucking.	***Significant long term improvement*** as result of cessation of mill activities.	Apply fugitive dust control measures (e.g. watering of roadways, suspension of operations during windy days) as required.
Odours/fumes	No noticeable impacts.	Improvement due to decrease in total reduced sulphur compounds from wastewater lagoons, and cessation of mill operations.	Suspend operations on windy days.
Visibility	Minor short term impact related to short term construction/demolition related work.	Improved visibility by providing unobstructed view of River in areas previously blocked by building shells. Improved air quality/opacity resulting from mill closure.	
Primary Chemical Loadings (NOx,SOx, etc.)	Minor short term impact related to short term construction/demolition related work.	***Significant Improvement*** due to termination of energy consumption resulting from cessation of mill operations and decreased maintenance requirements.	
Secondary Chemical Loading (e.g. photochemical smog)	Minor short term impact related to short term construction/demolition related work.	***Significant Improvement*** due to termination of energy consumption resulting from cessation of mill operations.	
Greenhouse Gas Emissions	No negative impact.	***Significant Improvement*** due to termination of energy consumption resulting from mill operations.	
2) Biology and Ecology (Aquatic)			
Deep Sea Marine Habitat (Seasonal and Permanent)	No negative impact.	Improvement.	

Table 2 – Summary of Environmental Impact/ Benefit by Attribute

Attribute	Negative Environmental Impact (if any)	Environmental Benefit	Mitigative Measures (if applicable)
Inshore Marine Habitat (Seasonal and Permanent)	No negative impact.	Improvement.	
Inter-tidal Marine Habitat (Seasonal and Permanent)	No negative impact.	Improvement.	
Lacustrine Habitat (Seasonal and Permanent)	Not applicable.	Not applicable.	
Fluvial Habitat (Seasonal and Permanent)	No negative impact.	Improvement.	
Wetland Habitat (Seasonal and Permanent)	Not applicable.	Not applicable.	
Spawning, feeding, breeding sites	No negative impact.	Improvement.	
Populations/communities of aquatic species (including flora, fish, birds, marine mammals, etc.)	No negative impact.	Improvement.	
Species diversity and variety	No negative impact.	Improvement.	
Species at risk and other species of conservation concern	No negative impact.		
Migration routes/movement corridors	Not applicable.		
Aquaculture	Not applicable.		
Sports Fisheries	No negative impact.	Improvement.	
Commercial Fisheries	No negative impact.	Improvement.	
Subsistence Fisheries	No negative impact.	Improvement.	
Native (Cultural) Fisheries	No negative impact.	Improvement.	
3) Biology and Ecology (Terrestrial)			
Natural Vegetative Cover/Vegetation communities	No negative impact.	Improvement.	
Virgin/old growth timber stands	No negative impact.	Improved woodland conservation.	
Farmland/crops/domestic livestock/orchards	Not applicable.	Not applicable.	
Agricultural capability	Not applicable.	Not applicable.	
Migration routes/movement corridors	Not applicable.	Not applicable.	
Temporary (seasonal) habitat	No negative impact.	Improvement.	
Permanent habitat	No negative impact.		
Nesting Breeding feeding sites	No negative impact.	Improvement.	

Table 2 – Summary of Environmental Impact/ Benefit by Attribute

Attribute	Negative Environmental Impact (if any)	Environmental Benefit	Mitigative Measures (if applicable)
Size and distribution of populations/communities (animals, birds, reptiles, amphibians, insects)	No negative impact.	Improvement.	
Species at risk and other species of conservation concern	No negative impact.		
Species diversity and variety	No negative impact.		
Sport, recreational, commercial, subsistence hunting/trapping/ gathering	No negative impact.		
4) Physical (Climate/Atmosphere)			
Macro-climate	No negative impact.	Improvement – via improved air quality, decrease in greenhouse gas generation resulting from cessation of power generation and mill operations.	
Micro-climate	No negative impact.	Improvement – via improved air quality, decrease in greenhouse gas generation resulting from cessation of power generation and mill operations, and closure of wastewater lagoons.	
Temperature	No negative impact.		
Humidity	No negative impact.		
Wind Patterns/Air circulation	No negative impact.		
Precipitation patterns	No negative impact.		
Fog	No negative impact.		
Thermal inversions	No negative impact.	Improvement.	
High level ozone (ozone layer)	No negative impact.	Improvement.	
Shadow effects/sun blockages	No negative impact.	Improvement.	
Noise or Vibration	No negative impact.	Improvement.	
5) Physical (Geology)			
Aggregate or Mineral resource potential	Not applicable.		
Rock Pressure	Not applicable.		
Geochemistry (e.g. acid rock drainage, etc.)	Not applicable.		
6) Physical (Geomorphology)			

Table 2 – Summary of Environmental Impact/ Benefit by Attribute

Attribute	Negative Environmental Impact (if any)	Environmental Benefit	Mitigative Measures (if applicable)
Landforms, Topography		Improvement	
Soil Erosion		Improvement	
Soil Permeably		Improvement.	
Total Site Imperviousness		Improvement	
Ground transmitted noise/vibration		Improvement	
Soil Bearing Capacity/Settling/ Liquefaction	Not applicable.		
Slope Stability/Earth slides/Rock slides/Slumps	Not applicable.		
Aggregate or mineral resource potential	Not applicable.		
Soil Fertility		Improvement	
Soil Moisture/Drainage		Improvement	
7) Physical (Groundwater)			
Quantity (aquifer yields, etc.)	Not applicable.		
Quality (e.g. salinity, nitrates, toxic substances)	Not applicable.		
Base flow to streams/springs/seepages	Not applicable.		
Depth to Water Table (mounding, draw down, etc.)	Not applicable.		
Flow Direction	Not applicable.		
Recharge areas	Not applicable.		
Domestic/Municipal/Industrial/ Agricultural Supplies	Not applicable.		
8) Physical (Surface Water)			
Quantity of flowing and standing water (rivers, lakes and streams)	Not applicable.	Improvement resulting from closure of Bryenton pumphouse operations.	
Quality of water, Temperature, BOD, Dissolved Oxygen, Bacteria, Turbidity (suspended solids, sediments), nutrients, pH, pesticides, chlorinated organics, trace metals, hydrocarbons, Misc. toxics, salinity, taste, odour, floating debris	Not applicable.	Improvement – elimination of waste water loadings.	
Tidal patterns and ranges	Not applicable.		

Table 2 – Summary of Environmental Impact/ Benefit by Attribute

Attribute	Negative Environmental Impact (if any)	Environmental Benefit	Mitigative Measures (if applicable)
Quantity and quality of wetlands	Not applicable.		
Flood Frequency/magnitude/elevation	Not applicable.		
Currents/circulation patterns	Not applicable.		
Wave patterns	Not applicable.		
Beaches/Dunes (size and substrate)	Not applicable.		
Flow regime (variability, frequency, velocity)	Not applicable.		
Domestic/municipal/industrial/ agricultural supplies	Not applicable.		
Thermal Regime (stratification)	Not applicable.		
Chemical equilibrium/mobilization (movement between sediments and water column)	Not applicable.		
Trophic state	Not applicable.		
Drainage patterns, Catchment Boundaries hydrologic transfers/ losses	Not applicable.		
Unique Physical Features	Not applicable.		
Shoreline Processes (erosion, transportation, deposition)	Not applicable.		
Channel morphology, configuration	Not applicable.		
9) Valued Spaces/Locations			
Significant Structures, Sites, Monuments, Objects	Not applicable.		
Archaeological Sites	Not applicable.		
Paleontological (Fossil) Sites	Not applicable.		
Areas of Special Local Significance (Spiritual, Cultural, Ecological)	Not applicable.		
Parks and Reserves	Not applicable.		
Sites of Educational, Scientific, Natural, or Historical Interest	Not applicable.		
Visual Character (Scenery, Views, Vistas)		Improvement	
Ornamental Features (Plantings, Landscaping)		Improvement	

Table 2 – Summary of Environmental Impact/ Benefit by Attribute

Attribute	Negative Environmental Impact (if any)	Environmental Benefit	Mitigative Measures (if applicable)
Unique Physical Features	Not applicable.		
10) Community Structure (Socio-economic)			
Population Size and Density		No benefit.	Decommissioning of the facility will result in socio-economic impact to the Miramichi area. Mitigative measures will include UPM's cooperation, assistance and support, as practical, to assist the Province of New Brunswick and the City of Miramichi in attracting new business to the property.
Housing Availability		Improvement.	
Public Health		No net benefit other than improved ambient air quality.	
Incomes Levels		No benefit.	
Employment Opportunities		Short term benefit. Long term benefit can not be determined.	
Municipal Income (Tax Base/ Grants, etc.)		No benefit.	
Property Values		No benefit.	
Municipal Expenditures		No benefit.	
11) Community Structure (Physical and Functional)			
Land Use Compatibility	- Not applicable.		
Temporary or permanent Barriers to Vehicular/Pedestrian Movement	- Not applicable.		
Temporary Land use Restrictions/ Disruptions	- Not applicable.		
Municipal Infrastructure, Utilities, Fire/Police Protection	- Not applicable.		
Transportation Patterns (modes and routes)	- Not applicable.	Improvement.	
Traffic Volumes	- No noticeable impacts.	Improvement.	
Access to and within Farms, Homes, Businesses, Industries	- Not applicable.		
Operational Practices of Farms, Businesses, Industries	- Not applicable.		
12) Lifestyles and Quality of Life			
Access to Existing Recreational Opportunities	- Not applicable.		
Cultural Facilities	- Not applicable.		
Congestion	- No negative impact.	Improvement.	

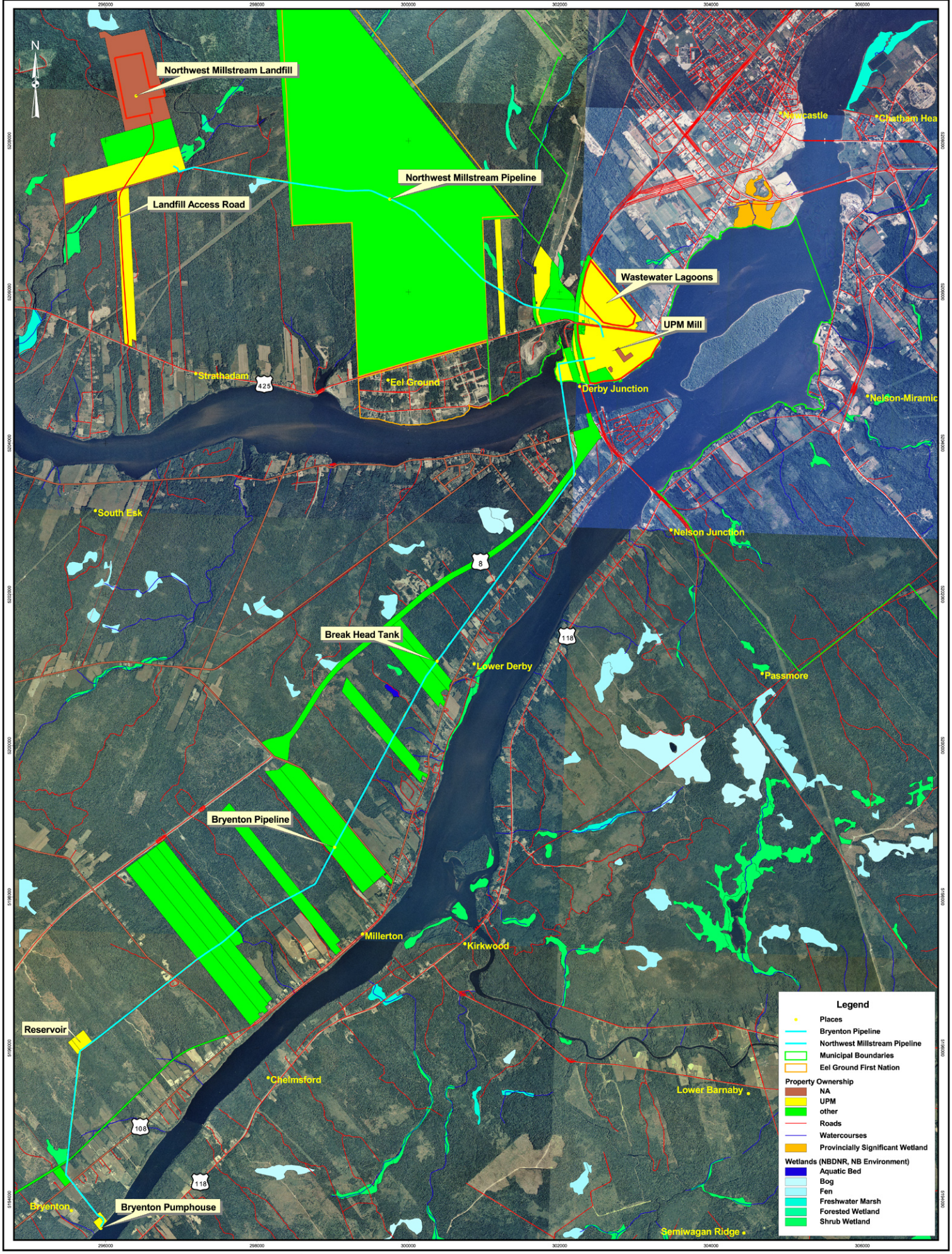
Table 2 – Summary of Environmental Impact/ Benefit by Attribute

Attribute	Negative Environmental Impact (if any)	Environmental Benefit	Mitigative Measures (if applicable)
Community noise levels/vibration	- Minor short term impact related to short term construction/demolition work.	Improvement from cessation of mill operations.	

ATTACHMENT A

PID/Ownership Information

Properties Within Project Footprint



ADI Limited
Moncton, NB, Canada
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Charlottetown, Moncton, Saint John, Truro, Halifax, Sydney, Port Hawkesbury, St. John's, Fredericton and Salem, NH

Proj.	UPM Miramichi Mill Decommissioning - EIA Registration	Drawn By:	Proj. No: (82) 2756 - 066.1
Dwg.	A-1. Property Ownership Within Project Footprint.	Dwg. Standards Chk. by:	Dwg. No A-1
1 0 1 2 Kilometers		Designed By:	Dwg. Design Chk. By: Rev.

Table A-1 Property Ownership Within Project Footprint

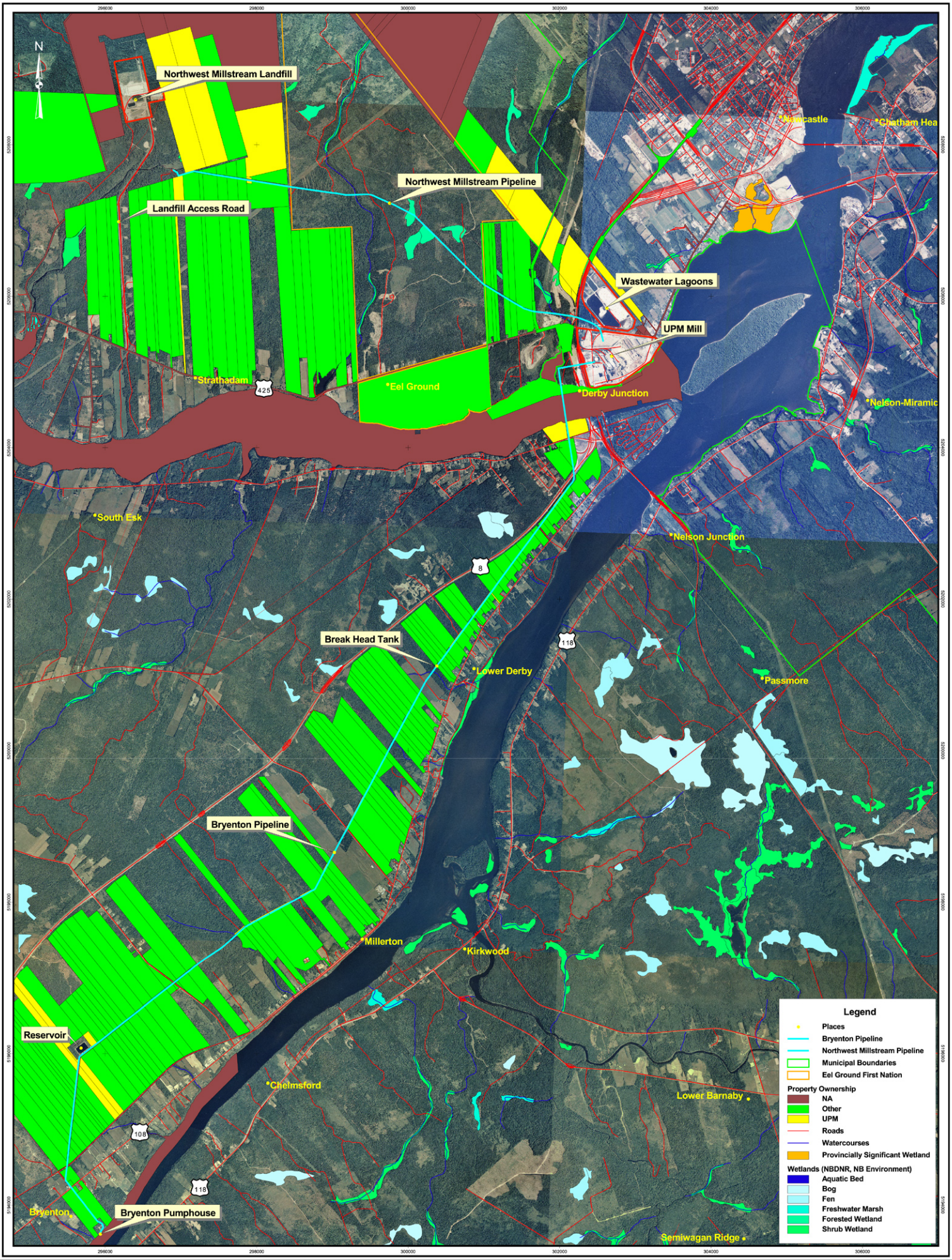
KEY	ENTERPRISE	S_LAST_NAM	S_FIRST_NA	S_MIDDLE_N
40065492	New Brunswick Housing Corporation			
40204570	40103970			
40204638	40114944			
40065567	40114944			
40114944	UPM-KYMMENE INC.			
40114456	UPM-KYMMENE INC.			
40103053	UPM-KYMMENE INC.			
40103046	UPM-KYMMENE INC.			
40105553	UPM-KYMMENE INC.			
40105736	UPM-KYMMENE INC.			
40114720	UPM-KYMMENE INC.			
40103566	UPM-KYMMENE INC.			
40066722	Toronto-Dominion Bank			
40105405	UPM-KYMMENE INC.			
40144651	UPM-KYMMENE INC.			
40135972	UPM-KYMMENE INC.			
40111841	UPM-KYMMENE INC.			
40144214	UPM-KYMMENE INC.			
40144503	UPM-KYMMENE INC.			
40238982	UPM-KYMMENE INC.			
40248494	UPM-KYMMENE INC.			
40249187	UPM-KYMMENE INC.			
40238057	UPM-KYMMENE INC.			
40250946	UPM-KYMMENE INC.			
40249583	UPM-KYMMENE INC.			
40067407	Aliant Telecom Inc.			
40229569	UPM-KYMMENE INC.			
40239097	UPM-KYMMENE INC.			
40211351	UPM-KYMMENE INC.			
40247124	UPM-KYMMENE INC.			
40210536	UPM-KYMMENE INC.			
40207441	UPM-KYMMENE INC.			
40207433	UPM-KYMMENE INC.			
40064024	UPM-KYMMENE INC.			
40143000	UPM-KYMMENE INC.			
40064602	UPM-KYMMENE INC.			
40141418	Victory Baptist Fellowship Inc			
40065377	UPM-KYMMENE INC.			
40143216	UPM-KYMMENE INC.			
40144396	UPM-KYMMENE INC.			
40064602	UPM-KYMMENE INC.			
40066375	UPM-KYMMENE INC.			
40135956	UPM-KYMMENE INC.			
40381386	UPM-KYMMENE INC.			
40065906	Taylor W Robert	TAYLOR	W	ROBERT
40336240	N.B.Transportation			
40064198	UPM-KYMMENE INC.			
40135899	UPM-KYMMENE INC.			

40127433	UPM-KYMMENE INC.			
40446890	Not Listed			
40332272	UPM-KYMMENE INC.			
00000001	Not Listed			
40331936	UPM-KYMMENE INC.			
40317745	Government of Canada-Ind&Nor Aff			
40332330	UPM-KYMMENE INC.			
40332355	UPM-KYMMENE INC.			
40332009	UPM-KYMMENE INC.			
40332025	UPM-KYMMENE INC.			
40127425	Keating Perry	KEATING	PERRY	
40331878	N.B.Transportation			
40128266	UPM-KYMMENE INC.			
40331944	UPM-KYMMENE INC.			
40331969	UPM-KYMMENE INC.			
40331985	UPM-KYMMENE INC.			
00000003	Not Listed			
40208803	UPM-KYMMENE INC.			
40211971	UPM-KYMMENE INC.			
40065898	Taylor W Robert	TAYLOR	W	ROBERT
40006397	UPM-KYMMENE INC.			
40208431	UPM-KYMMENE INC.			
40213753	UPM-KYMMENE INC.			
40211849	UPM-KYMMENE INC.			
40211013	UPM-KYMMENE INC.			
40417099	UPM-KYMMENE INC.			
40164360	Henderson Rose Marie	HENDERSON	ROSE	MARIE
40368987	Hare William M	HARE	WILLIAM	M
40164345	Henderson Jr Herman E	HENDERSONJR	HERMAN	E
40076432	UPM-KYMMENE INC.			
40240483	UPM-KYMMENE INC.			
40240160	UPM-KYMMENE INC.			
40240996	UPM-KYMMENE INC.			
40094146	UPM-KYMMENE INC.			
40067068	Esson Joyce Marie	ESSON	JOYCE	MARIE
40067084	Esson Joyce Marie	ESSON	JOYCE	MARIE
40209819	UPM-KYMMENE INC.			
40216285	UPM-KYMMENE INC.			
40064065	UPM-KYMMENE INC.			
40211963	UPM-KYMMENE INC.			
00000003	Not Listed			
40179681	UPM-KYMMENE INC.			
40163883	UPM-KYMMENE INC.			
40445348	N.B.Transportation			
40437154	N.B.Transportation			
40390213	Not Listed			
40169864	New Brunswick East Coast Railway Company Inc			
40166233	UPM-Kymmene Miramichi Inc.			
40169864	New Brunswick East Coast Railway Company Inc			
40161861	Dunnett Jean	DUNNETT	JEAN	
40162505	Hare William	HARE	WILLIAM	
40164204	Henderson Gary	HENDERSON	GARY	

40405664	UPM-KYMMENE INC.			
40166258	UPM-KYMMENE INC.			
40166233	UPM-Kymmene Miramichi Inc.			
40166241	Henderson Keith G	HENDERSON	KEITH	G
40440893	Henderson Gary	HENDERSON	GARY	
40437162	N.B.Transportation			
40164295	UPM-KYMMENE INC.			
40390494	Not Listed			
40390205	Repap New Brunswick Inc			
40113680	UPM-KYMMENE INC.			
40437147	N.B.Transportation			
40127318	UPM-KYMMENE INC.			
40127235	UPM-KYMMENE INC.			
40332322	UPM-KYMMENE INC.			
40332314	UPM-KYMMENE INC.			
40207318	UPM-KYMMENE INC.			
40163859	UPM-KYMMENE INC.			
40445330	N.B.Transportation			
40163859	UPM-KYMMENE INC.			
40437121	N.B.Transportation			
40371296	Natural Resources & Energy			
00000003	Not Listed			
40104457	UPM-KYMMENE INC.			
40104457	UPM-KYMMENE INC.			
40064388	Bryenton Helen Loggie	BRYENTON	HELEN	LOGGIE
40103947	UPM-KYMMENE INC.			
40103368	UPM-KYMMENE INC.			
40405615	UPM-KYMMENE INC.			
40103426	UPM-KYMMENE INC.			
40247165	UPM-KYMMENE INC.			
40098576	UPM-KYMMENE INC.			
40248106	UPM-KYMMENE INC.			
40247173	UPM-KYMMENE INC.			
40220196	UPM-KYMMENE INC.			
40035073	UPM-KYMMENE INC.			
40098733	UPM-KYMMENE INC.			
40248924	UPM-KYMMENE INC.			
40112351	UPM-KYMMENE INC.			
40035461	UPM-KYMMENE INC.			
40033771	UPM-KYMMENE INC.			
40037400	UPM-KYMMENE INC.			
40016727	UPM-KYMMENE INC.			
40103186	UPM-KYMMENE INC.			
40104044	UPM-KYMMENE INC.			
40106221	UPM-KYMMENE INC.			
40106213	UPM-KYMMENE INC.			
40106205	UPM-KYMMENE INC.			
40106197	UPM-KYMMENE INC.			
40112260	UPM-KYMMENE INC.			
00000003	Not Listed			
40114498	UPM-KYMMENE INC.			
40114472	UPM-KYMMENE INC.			

40114464	UPM-KYMMENE INC.
40114449	UPM-KYMMENE INC.
40104390	UPM-KYMMENE INC.

Adjoining Properties



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Proj. UPM Miramichi Mill Decommissioning - EIA Registration

Dwg. A-2. Property Ownership Adjacent to Project Footprint

1 0 1 2 Kilometers

Drawn By:	Proj. No: (82) 2756 - 066.1
Dwg. Standards Chk. by:	Dwg. No A-2
Designed By:	Dwg. Design Chk. By: Rev.

Table A-2 Property Ownership Adjacent to Footprint

KEY	ENTERPRISE	LAST_NAME	FIRST_NAME	MIDDLE_NAM
40317745	Government of Canada-Ind&Nor Aff			
00000003	Not Listed			
40113698	UPM-KYMMENE INC.			
40102493	Not Listed			
40113763	Not Listed			
40113722		Falconer	James	
40113714	UPM-KYMMENE INC.			
40432502	Not Listed			
40113797	Not Listed			
40113953	Not Listed			
40178758	UPM-KYMMENE INC.			
40408049	New Brunswick East Coast Railway Company Inc			
40165888	Not Listed			
40308322	Not Listed			
40167108	Not Listed			
40066839		Vanderbeck	James	I
40066888		Vanderbeck	Alice	
40067290	046183 N B LTD			
40064297		Connors-Dunphy	Heather	
40067357		Arseneau	Ruby	Irene
40471534		Simpson	William	James
40065435		Mckibbon	Valeria	Jean K
40065435		Mckibbon	Valeria	Jean K
40103970	UPM-KYMMENE INC.			
40471534		Simpson	William	James
40107989	UPM-KYMMENE INC.			
40066573		Dutcher	Janice	
40107997	UPM-KYMMENE INC.			
40102808	UPM-KYMMENE INC.			
40064370		Goodfellow	John	Frederic
40067183		Betts	Donald	B
40066573		Dutcher	Janice	
40103988	UPM-KYMMENE INC.			
40105397	UPM-KYMMENE INC.			
40144206	UPM-KYMMENE INC.			
40067308		Kenny	Robert	
40067324		Barrieau	Brent	J
40067480		Bateman	Gary	Lee
40065682		Cann	Mary	Jacqueline
40067332		Esson	James	H.
40067514		Newman	Roy	A
40067548		Curtis	Freeman	
40348377		Newman	Roy	A
40348518		Creamer	Warren	M
40064255		Creamer	Warren	M
40065849		Saunders	Edgar	F
40065831		Sobey	Ray	Scott
40065690		Molloy	Elizabeth	

40376535		Matchett	Mary	Catherine
40463150	Aliant Telecom Inc.			
40409211		Hamilton	Wayne	Allan
40066193		Clouston	Oman	
40066177		Drillen	Alfred	R
40217358	UPM-KYMMENE INC.			
40065104		Donovan	Ian	Christopher
40381436		O'donnell	Diane	M
40066227		Matchett	David	Raymond
40216384	UPM-KYMMENE INC.			
40064982	Scotia Mortgage Corporation			
40066292		Harris	John	Allan
40481939		Hughes	Linda	J.
40348567		Barry	Elizabeth	
40348567		Barry	Elizabeth	
40348567		Barry	Elizabeth	
40064073		Clouston	Oman	Jr
40474181		Barry	Elizabeth	M.
40066482	Miramichi City Scrap Metals and Redemption Centre			
40141434		Whalen	Bettina	J
40262479		Murphy	J	Timothy
40262495		D'alessio	Armande	M
40262503		Manderville	Susan	M
40141467		Mullin	Margaret	A
40141467		Mullin	Margaret	A
40141434		Whalen	Bettina	J
40381352	N.B.Transportation			
40381360		Wilson	Helen	Ann Daigle
40141418	Victory Baptist Fellowship Inc			
40141400		Wilson	Carole	Anne
40143083	UPM-KYMMENE INC.			
40143083	UPM-KYMMENE INC.			
40066615	Transportation			
40066714		Saunders	Roy	
40066565		Flett	Eva	M
40066672	Miramac Farm Inc.			
40066763		Mossman	Phyllis	
40066797	Miramac Farm Inc.			
40066839		Vanderbeck	James	I
40066854		Carroll	Gladys	I
40066888		Vanderbeck	Alice	
40348542		Hetherington	Murray	R
40348542		Hetherington	Murray	R
40132516	Not Listed			
00000001	Not Listed			
40332132	Not Listed			
40333700	Natural Resources & Energy			
40333700	Natural Resources & Energy			
40335887	Not Listed			
40131393	UPM-KYMMENE INC.			
40131385	UPM-KYMMENE INC.			
40331910		McKay	Mona	Katherine

40127896		Scott	Stuart	William
40127599		Keating	Percival	P
40331902	UPM-KYMMENE INC.			
40127904		Taylor	Trudy	
40127938		Keating	Percival	P
40127813	New Brunswick Power Corporation			
40331936	UPM-KYMMENE INC.			
40127839		Taylor	Carolyn	
40127797		Estey	Anna	Margaret
40127649		Mckay	David	A
40387797		Keating	Percival	P
40404824		Keating	Val	P
40324303		Keating	Val	
40127581		Mckay	David	A
40317588		Mckenzie	Cecilia	
40127813	New Brunswick Power Corporation			
40127839		Taylor	Carolyn	
40127797		Estey	Anna	Margaret
40131377	UPM-KYMMENE INC.			
40332256	UPM-KYMMENE INC.			
40332041		Mckay	Herman	L
40332041		Mckay	Herman	L
40332249	UPM-KYMMENE INC.			
40127789	Not Listed			
40332215		Sherrard	Mary	Evelyn
40128290		MacTavish	Boyd	
40457723		MacTavish	David	G.
40324733		Sherrard	Allan	J.
40128209	New Brunswick Power Corporation			
40128183		Curtis	Edward	Perley
40324758		Cameron	Daniel	
40128225		Mactavish	Hazel	Ann
40127896		Scott	Stuart	William
40128217		Silikier	Anna	Georgina
40127904		Taylor	Trudy	
40066227		Matchett	David	Raymond
40064255		Creamer	Warren	M
40348518		Creamer	Warren	M
40066169		Clouston	Mabel	I
40423550		Green	Frederick	George
40067332		Esson	James	H.
40067357		Arseneau	Ruby	Irene
40067548		Curtis	Freeman	
40067514		Newman	Roy	A
40348377		Newman	Roy	A
40067480		Bateman	Gary	Lee
40066797	Miramac Farm Inc.			
40491870		MacCullam	Muriel	
40065948		Cox	Karen	May
40488074		Mullin	Chris	
40065369		Mullin	Irene	
40212052	UPM-KYMMENE INC.			

40212219	UPM-KYMMENE INC.			
40065922		MacCullam	Valarie	
40065369		Mullin	Irene	
40065849		Saunders	Edgar	F
40065831		Sobey	Ray	Scott
40065690		Molloy	Elizabeth	
40065682		Cann	Mary	Jacqueline
40065948		Cox	Karen	May
40065963		Mullin	Dolores	
40065963		Mullin	Dolores	
40065997		Mullin	Russell	
40262404		Richardson	Mary	Delcia
40081879	UPM-KYMMENE INC.			
40067324		Barrieau	Brent	J
40067308		Kenny	Robert	
40064297		Connors-Dunphy	Heather	
40067290	046183 N B LTD			
40067282		Saunders	Edgar	
40239592	UPM-KYMMENE INC.			
40248700	UPM-KYMMENE INC.			
40392813	New Brunswick Power Corporation			
40066169		Clouston	Mabel	I
40066029		Clouston	Magnus	W
40211252	UPM-KYMMENE INC.			
40209819	UPM-KYMMENE INC.			
40423550		Green	Frederick	George
00000002	Not Listed			
40178493	Not Listed			
40168460	Not Listed			
40166332	Not Listed			
40169161	Not Listed			
40162133	Not Listed			
40163834	Not Listed			
40163842	Not Listed			
40163826	Natural Resources & Energy			
40164774	Not Listed			
40113680	UPM-KYMMENE INC.			
40163875	UPM-KYMMENE INC.			
40445355	N.B.Transportation			
40163859	UPM-KYMMENE INC.			
00000002	Not Listed			
40163826	Natural Resources & Energy			
40324295	N.B.Transportation			
00000002	Not Listed			
40437147	N.B.Transportation			
40122038		Walsh	Leone	G
40122046		Mclenaghan	Frederick	L
40127607		Simpson	Brenda	Lee
40127615		Glidden	Mary	
40127383		Kenny	Colleen	Eliza
40317588		Mckenzie	Cecilia	
40122038		Walsh	Leone	G

40437170	N.B.Transportation			
40122046		Mclenaghan	Frederick	L
40437188	N.B.Transportation			
40127300		Forsythe	Mary	Hilda
40163875	UPM-KYMMENE INC.			
40437196	N.B.Transportation			
40127607		Simpson	Brenda	Lee
40127615		Glidden	Mary	
40127383		Kenny	Colleen	Eliza
00000003	Not Listed			
40127508		Keating	Val	P
40127573		Keating	Val	
40127300		Forsythe	Mary	Hilda
40454472	Transportation			
40437139	N.B.Transportation			
40113672		Henderson	Carmel	L
40332207		Sherrard	Mary	Evelyn
40409575	L W F Enterprises LTD			
00000002	Not Listed			
40102451		Holt	Leona	
40064545		Swaine	Gordon	W
40064636		Cassidy	Philip	M.
40064743		Bancroft	C	O
40447203		Bryenton	Robert	Newton
40064834		Hambrook	Donna	Lynn
40064008	UPM-KYMMENE INC.			
40204216	UPM-KYMMENE INC.			
40064230		Curtis	Aileen	M
40064222		Hubbard	Wilson	
40063877		Hubbard	Gerald	
40063901		Mcallister	Paul	
40063927		DaNBy	Edna	
40482259	Royal Bank of Canada			
40063950		Wilson	Carole	Ann
40063976		Dawson	Stephen	James
40063984	Aliant Telecom Inc.			
40063992		Manderville	Kathryn	S
40487050		Clark	Randall	Robert
40063810		Donovan	Gregory	J.
40064388		Bryenton	Helen	Loggie
40063810		Donovan	Gregory	J.
40063802		Tebou	Judith	Manderville
40019507		Gilks	Hazen	D.
40064354		Manderville	Clell	
40064230		Curtis	Aileen	M
40204216	UPM-KYMMENE INC.			
40064008	UPM-KYMMENE INC.			
40063992		Manderville	Kathryn	S
40482259	Royal Bank of Canada			
40063976		Dawson	Stephen	James
40063984	Aliant Telecom Inc.			
40063950		Wilson	Carole	Ann

40447203		Bryenton	Robert	Newton
40063877		Hubbard	Gerald	
40063901		Mcallister	Paul	
40063927		DaNBy	Edna	
40064222		Hubbard	Wilson	
40102451		Holt	Leona	
40064545		Swaine	Gordon	W
40064743		Bancroft	C	O
40064750		Curtis	James	Alexander
40065161		Sears	Mark	William
40064636		Cassidy	Philip	M.
40035388	UPM-KYMMENE INC.			
40064875		MacGregor	Mary	Anne
40064354		Manderville	Clell	
40065112		Smith	Delbert	L
40065138		Parks	Edith	A
40064750		Curtis	James	Alexander
40064834		Hambrook	Donna	Lynn
40064875		MacGregor	Mary	Anne
40065039	Aliant Telecom Inc.			
40065138		Parks	Edith	A
40065112		Smith	Delbert	L
40065039	Aliant Telecom Inc.			
40065161		Sears	Mark	William
40065328		Parker	Leona	
40065385	N.B.Municipalities, Culture and Housing			
40442543	N.B.Municipalities, Culture and Housing			
40065534		Mcallister	Paul	W
40065393		McAllister	Paul	Willis

ATTACHMENT B

Overview of Proposed Wastewater Lagoon Ecological Closure Approach

April 11, 2008

MIRAMICHI MILL
WASTEWATER TREATMENT ECOLOGICAL CLOSURE APPROACH OVERVIEW

General

The Miramichi Mill has significant information on the physical and chemical composition of residuals within the wastewater impoundments. Site residuals studies for beneficial agricultural and forestry applications indicate organic and nutrient levels of primary and secondary solids that would support an ecological closure of the wastewater impoundments. Factors supporting an Ecological Closure Approach include:

- Previous residuals studies and applications (e.g. use of lagoon settled solids in manufactured soils, landfill cap) support the sound science of an ecological closure approach and provide supportive data on which to base a regulatory approval.
- Ecological closures of pulp & paper mill wastewater lagoons have been successfully completed at other North American mill sites (e.g. International Paper Company Mobile, Alabama, and Camden, Arkansas), and have demonstrated the long term environmental benefits of this approach.

Pulp and Paper Industry Experience

Ecological wastewater impoundment closures with residuals in place have been successfully completed in the pulp and paper industrial sector. Two examples are a bleached Kraft mill site in Mobile, Alabama and an unbleached Kraft mill site in Camden, Arkansas. Both mill sites had impoundments exceeding 150 acres with solids depths from 1 to over 5 meters within the basins. The impoundments included biological sludge storage / disposal, primary settling, aeration, and settling basins. Specifics associated with these closures included:

- Solids within the impoundments were dewatered by controlled gravity dewatering using existing / modified discharge structures. Solids consolidation of over 10:1 were achieved following initial gravity dewatering with further solids solidification to an estimated 40% solids within 2 weeks. Within one month substantial natural vegetative germination occurred over exposed solids and solids consolidation continued.
- A combination of natural revegetation and selective plantings has been accomplished to produce diverse ecological settings including upland habitat, transitional wetlands, low gradient riverine wetlands / connected floodplain depression wetlands and open water habitat. The impoundment areas were reconnected to surrounded ecosystem by selective breaching of impoundment dikes completing area restorations.
- Chemical residuals have not been observed migrating from closed areas in storm water runoff and regulatory agencies have discontinued permitting / sampling requirements. Potential chemical component residuals that are hydrophobic such as dioxin TEQ congeners are bound in dewatered solids and the ecological closure approach continually diminishes potential exposures with vegetative ecological maturation. Organic residuals undergo an enhanced natural attenuation due to vegetative and biologically active substrate.

- Closed impoundments with buffer areas were deed restricted for no future intrusive use / development and conservations easements placed on the areas for long-term wildlife management. The long-term management of the ecological closure was accomplished by collaboration with non-profit conservation organizations.
- Selective plantings can establish mixed vegetative ecosystems from emergent wetlands to hardwood and pine flats. A mixed vegetative ecology has the greatest wildlife benefit and will also mitigate any mobile constituent of process residuals from migration in groundwater with the use of conifer and deep-rooted hardwoods (phyto-remediation).
- These industrial ecological closures now have approximately 5 years of restoration completed and at the Mobile site the most productive heron rookery in Alabama exists where one of the species, the Louisiana Heron is thriving (a rare species in Alabama). At the Camden site the area has been fully integrated with surrounding ecological habitats and it is managed as a wildlife conservation area by the state.

Miramichi Mill Wastewater Treatment Units Ecological Closure

For the proposed Ecological Closure of the UPM Miramichi wastewater lagoons a formal closure plan will be developed and forwarded for review by NBENV. Specific points and information included in the ecological closure approach/ plan for the wastewater impoundments will include:

- General discussion of ecological closure approach - environmental quality, wildlife, community, and partnership demonstration (e.g. with non profit conservation organizations).
- Existing data discussion with reference to prior evaluations and use proposed closure materials (e.g. ash, settled solids as soil nutrient supplements).
- Photographs of existing area with plan view diagrams showing projected diverse ecological areas to be developed. Discussion on impoundment areas restoration and reconnection to surrounding ecosystem. Analysis/ discussion on how the ecological closure approach is expected to enhance existing area ecology and habitats. Indicate on closure plan drawings projected locations for breaching dikes (ecosystem reconnection), varied ecological areas based on solids depths (closure solids topography projected within basins), and types of proposed vegetative plantings including area interior and boundary plantings (e.g. deep rooted tree species to enhance groundwater withdrawal, if warranted).
- Dependant on underlying impoundment soils and site topography, discussion on how permanent or transient wetlands can be created over a portion of the area by the design of the dike modifications for ecosystem reconnection.
- Discussion on public consultation with and possible partnerships with organizations that have experience in restoration of surplus industrial property such as Ducks Unlimited.
- Identification of potential data gaps relevant to regulatory review/ evaluation and environmental integrity of the proposed closure approach and identification of action plans to address any such data gaps (e.g. evaluations of natural attenuation, passive environmental controls and storm water runoff quality).

Tentative Schedule for Wastewater System Ecological Closure Program

It is planned that the wastewater units will be maintained in an active status for use through equipment salvage and demolition operations related to decommissioning of the main mill yard infrastructure. Storm water from structural demolition and yard cleanup operations will be managed using the existing wastewater system.

Once all site closure salvage, demolition and yard process residuals have been completed the closure of the impoundments can be undertaken. Depending on the intensity of this initial site closure activity the wastewater system will typically be needed for 6 to 18 months (actual schedule can be affected by intensity of site activity and weather factors). For representative mill closures in the US, the environmental agencies have provided companies with a continuation of the mill's discharge allocation (BOD, COD, TSS) through the site salvage and demolition operations. Based on studies done at the 2 US mills, it is expected that effluent quality will be well below existing Federal and Provincial effluent limits.

The closure of the wastewater impoundments can be expected to take approximately 6 months to actively dewater the units and one growing / planting season to establish the mixed ecological polygons (emergent herbaceous plantings, uplands habitat, and tree plantings). A second growing / planting season may be required dependant on survival of initial plantings in achieving desired habitats and coverage.

Typical Mill Closure Schedule		
Activity	**Duration**	**Comments**
Site Salvage and Demolition	18 months	Process equipment removal, metal salvage, and structural unit demolition may generate some wastewater and storm water with process residuals and TSS contents that require management in mill's wastewater system.
Manufacturing Area Final Grading and Closure Completion	1-3 months	Depending on site topography and regulatory requirements, it may be necessary to modify site storm water runoff patterns and get concurrence that no continuing storm water management permitting is required. (Note: Storm water may be an asset to the wastewater basin closures depending on ecological polygons desired and site topography.)
Wastewater Basin Dewatering	6 months	This is dependent on ability to use existing outfall discharge configuration, volume of impoundments and weather affecting ability to discharge.
Establishment of Ecological Polygons	1-2 growing seasons	Initial planting of ecological areas during planting season - fall and spring. Evaluation of initial planting survival, coverage and replanting.
Verification of Closure and Retirement of Permit	0-1 year	Dependant on discussion/ approvals with NBENV.
Long-term Property Management	--	Ideally this will be completed in partnership with non profit environmental/ conservation organizations.

Wastewater Impoundment Dewatering

It is expected that use of gravity drainage can effectively be used to achieve the majority of impoundment system dewatering. Following the main mill yard area closure, the wastewater within the basins can be characterized to determine any effluent discharge limitations and the existing gravity discharge used to achieve initial dewatering. It is expected that following the initial draining of the aerated basin and polishing pond there will be pockets / areas where solids deposits result in pooled areas that won't readily gravity drain. Dependent on the site specifics these areas may require trenching for continued drainage of pumping with a portable pump system to achieve dewatering.

Following the initial draining using the existing piping system, the internal dikes for the earthen basins can be selectively breached to promote interconnection and long-tern drainage objectives. The specifics of the dike modification will be dependent on ecological habitats desired and solids topography following initial dewatering within the various basins.

If significant solids deposits exist at the outfall structure that prevent effective use of the existing discharge system, then a system using portable pumps and / or siphons will be required to achieve initial dewatering. In this case, once the initial dewatering is achieved the solid deposits can be contoured to promote the long-tem gravity discharge from the closed system. If the existing gravity discharge cannot be used, the use of alternate discharge schemes will be developed to extend the dewatering period.

Development of Ecological Habitat Closure Concept and Ultimate Site Deposition

Organizations such as Ducks Unlimited (DU) can provide useful information in formulation of the desired / potential ecological habitats and long-term goals for ecological closures of large wastewater systems to maximize wildlife, environment, and public benefits. The development of the final closure concept for the various impoundments is dependent on the ecological system desired. Experience at other sites indicates that most closures can effectively achieve multiple ecological habitats with no / low long-term management requirements.

Final grading within the impoundments (solids grading and final earthen dike reconnections to surrounding area) can achieve seasonal, transient, ephemeral, and open water wetlands together with uplands habitats. The closure concept has a degree of flexibility to achieve varied ecological polygons dependent on the wildlife habitats and use desired. The goals will be to achieve ecological settings that do not require active long-term vegetation or water management (e.g., pumping to maintain open water and wetlands areas, annual feedstock plantings, etc.). This goal of no active management maximizes the ecological value, and ability for long term management with minimal external inputs.

Key issues to define in developing the ecological closure concept are:

- Ecological habitats achievable (wildlife nesting and feedstock areas);
- Wildlife desired;
- Interconnection with surrounding area habitats / ecology;
- Viable emergent herbaceous plantings and schedule to produce natural, sustainable ecologies;

- Plantings that consider ongoing environmental benefits of natural attenuation; and
- Level of effort (closure costs) to produce desired ecological settings.

The ultimate goal is close the system with maximum benefit to the environment. Organizations such as DU can assist in development of a conservation easement that set the area as a wildlife management area in perpetuity.

Solid Waste Unit Ecological Closure Experience

Although not the main focus of this document, natural ecological covers with low to no maintenance requirements have been successfully employed at engineered, non-engineered, and historic solid waste units. These covers have demonstrated improved environmental aspects including restoration and enhancement of natural habitats with better environmental mitigation results in many instances than standard engineered monoculture vegetative covers that require continuing maintenance.

At sites that do not employ synthetic membranes as part of engineered covers, varied vegetative plantings that include deep rooted species have been shown to enhance natural attenuation and control groundwater migration of otherwise potentially mobile waste constituents. There is significant experience with the use of hard and soft wood tree species to prevent groundwater migration by the cone of depression created with deep-root systems. In at least one instance, this form of phyto-remediation was used to control creosote constituent groundwater migration at a permitted hazardous waste site (site has been in operation since mid-1990s).

ATTACHMENT C

C1- ISO 14001 Environmental Management System
(Table of Contents)

C2 - UPM's ISO 14001PCBs Management Protocol/Procedures

C3 - UPM's ISO 14001 Asbestos Management
Protocol/Procedure (includes Asbestos Management Plan
– All-Tech, March 2002)

C1- ISO 14001 Environmental Management System
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Registration Certificate
EMS Policy
Environmental Policy
Occupational Health & Safety Policy
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Policy Statement
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Emergency Preparedness and Response - 4.4.7
Environment - Communications - 4.4.3
Environment - Employee Competence, Training and Awareness - 4.4.2
Environment - Identification and Ranking of Hazards (Risks) - 4.3.1
Environment - Legal and Other Requirements - 4.3.2
Environment - Measuring and Monitoring Performance - 4.5.1
Environment - Nonconformance and Corrective Action - 4.5.2
Environment - Records - 4.5.3
Environmental Management System-Roles and Responsibilities - 4.4.1
Integrated Management System Audits - 4.5.4
Management Review - 4.6
Occupational Health and Safety Accidents, Incidents, Nonconformances - 4.5.2
Occupational Health and Safety Consultation and Communication - 4.4.3
EMS Policy Manual Revision History
Occupational Health and Safety Hazard Identification, Risk Assessment and Risk Control - 4.3.1
Occupational Health and Safety Legal Requirements - 4.3.2
Occupational Health and Safety Management Programs - 4.3.4
Occupational Health and Safety Operational Controls - 4.4.6
Occupational Health and Safety Performance Measuring and Monitoring - 4.5.1
Occupational Health and Safety Records - 4.5.3
Occupational Health and Safety Responsibilities - 4.4.1
Occupational Health and Safety Training - 4.4.2
Scope of the Integrated Management System
Setting Objectives, Targets and Action Plans - 4.3.3
Revision History

C2 - UPM's ISO 14001PCBs Management Protocol/Procedures

UPM-Kymmene Miramichi Inc.

345 Curtis Rd. P.O. Box 5040 Miramichi, NB E1V 3N3

Procedure

Title: **PCB Management (Warehouse and Disposal)**

Doc Number E-0044
Revision: 1

Approved & Released Procedure

Department:
Engineering, Environment, Kraft Fibre Line, Kraft Steam and Recovery, Kraft Woodroom, Maintenance, Organizational Development, Paper Machine 1, Paper Machine 2, Preventive Maintenance, Purchasing, Site Management

Implementation Date:
09/24/2003

Area:
KM PCB Storage Shed

Type of Document:

Review Period - 365 **Days**

1.0 Purpose:
To ensure that all regulatory requirements for PCB storage and disposal are followed, including the operation of a PCB storage warehouse.

2.0 Scope:
Applies to all UPM-Kymmene Miramichi operations.

3.0 Responsibilities:
The environmental department is responsible for PCB management.

4.0 Definitions:

5.0 Health and Safety:
Hazard is chemical exposure

6.0 Environment:
Hazards are:

Spills / accidental releases
Leaks
Hazardous waste generation
Improper waste storage and disposal
Access control
Soil contamination

7.0 Quality:

8.0 Procedure:

NB. ANY SPILLS OF PCB MATERIAL MUST BE IMMEDIATELY REPORTED TO THE UPM-KYMMENE MIRAMICHI ENVIRONMENT DEPARTMENT. CALL EXTENSION 5240, 5157 OR PAGER 5117, 5627.

Site Access

The doors to the warehouse and fence surrounding the warehouse must always be kept locked. Keys are kept by authorized personnel - see 9.0 Associated Documents.
See 9.0 Associated Documents for PCB Warehouse Authorization List.
Visitors are allowed to enter the site if accompanied by one of the above authorized people.
Upon entry to the site each person must fill out the register and indicate their name, business address, and telephone number. See Section 9.0 "Associated Documents" for registry.

Inspections

PCB site inspections are conducted monthly by authorized personnel - see 9.0 Associated Documents, by using a checklist and recording any non-conformances. See 9.0 Associated Documents.
Submit the inspection checklist to the UPM-Kymmene environment department. Non-conformances must be reported to the UPM-Kymmene Environment Department immediately.

PCB Disposal

PCB waste disposal or PCB equipment decommissioning and PCB waste transfer into storage must be approved by the ELGNB prior to the undertaking. This is done through the submission of detailed Work Plans to the ELGNB for review and approval.
PCB wastes must only be sent to approved disposal or recycling facilities.
All PCB waste transfers fall under "Transportation of Dangerous Goods" and "Hazardous Waste" regulations. These regulations must be followed.
Hazardous waste manifests must be completed for each PCB shipment or transfer.Copies of the manifests must be kept on file and sent to the appropriate authorities. **Note:** all manifests have a unique identification number, original copies must be obtained from government authorities.
"Certificates of Destruction" for PCB wastes transferred for disposal must be obtained from the disposal company. These certificates must be kept on file for the life of the company.

Emergencies / Fire

Emergency procedures are outlined in the company Emergency Response Plan. See 9.0 Associated Documents.

9.0 Associated Documents:

FCD-0158 -- PCB Monthly Site Inspections
FCD-0159 -- PCB Warehouse Authorization List
I-0047 -- Environment Health and Safety NCR CAR Database
FCD-0160 -- PCB Storage Site-Entry Record
Emergency response procedure

9.1 Documents Generated:

Document Title	Responsibility	Department
Annual PCB inventory report as per provincial and federal regulations	Environmental Engineer	Environment
Hazardous waste manifests	Environmental Engineer	Environment
All completed inspection checklists and comments to address non-conformances	Environmental Engineer	Environment
PCB storage provincial permit + regulation and federal regyulation	Environmental Engineer	Environment
Certificates of Destruction	Environmental Engineer	Environment
All other relevant correspondence and records relating to PCB removal and storage + government inspections	Environmental Engineer	Environment

10.0 Document Revision History:

Revision: 1

Date Created: 04/21/2003
Date of Last Revision: 09/24/2003

Last Approval Date: 09/24/2003

Document Author:
Phil Riebel

11.0 Reason for Change:

Revision:	Sec/Para Changed	Change Made:
1	N/A	Initial Issue of Document

13.0 Approvals:

Name: Ian Maclean
Title: Environmental Engineer

9/17/03 - Approved by: Ian Maclean

Name: Joe Veriker
Title: Human Resources Development Manager

9/24/03 - Approved by: Joe Veriker

Document History Section

UPM-Kymmene Miramichi Inc.

345 Curtis Rd. P.O. Box 5040 Miramichi, NB E1V 3N3

Emergency Procedure Form

Title: **No. 43 Scenario: PCB Spills and Fires**

Control Number EP-0071
Revision: 1

Department:
Environment, Kraft Fibre Line, Kraft Woodroom

Approved & Released Emergency Procedure Form

Implementation Date:
10/17/2003

Area:
KM Bleach Plant, KM Woodroom, KM PCB Storage Site

Type of Document:

Review Period - 365 **Days**

EMS Type: A. ERP-Fire/Explosion, B. ERP-Gas/Liquid Release

LOCATION	PCB Warehouse, Woodroom, Bleach Plant
DESCRIPTION	Old transformers leak PCB's. Spill on soil, PCB's will soak into the ground and cling to individual particles of soil. Spill on Concrete/Asphalt, the PCB will flow to low lying areas and collect in pools. Spill in water, PCB will settle to the bottom. Fire will produce a contaminated soot which will cling to all surfaces in the area.
HAZARDS	Harmful if breathed in or ingested. Legal implications. A fire involving PCB's will produce a clingy contaminated soot and toxic vapor.
CONSEQUENCES	Environmental contamination. Higher specific gravity than water. High cost of clean up and removal. Explosion/fire.
DETECTION	Visual observations
CANUTEC GUIDE	No. 151
AUTOMATIC	None

MITIGATION

SHELTER/ EVACUATION

Shut off ventilation system in that area.
Area needs to be evacuated until PCB is cleaned up.

OPERATOR ACTIONS

Localize and block the spill (be it a crack, spill, or valve).
Dam the spill on as small a surface as possible to avoid further contamination.
Spread some absorbent material to minimize soil infiltration.
Absorbent material will be deposited in watertight containers and stored or disposed of according to current government regulations.
The spill area is to be immediately sealed and only personnel authorized by the Environmental Manager should be admitted to the area.
For clean-up, authorized contractors will be used.

<u>PCB Spill in Water</u>

1). Minimize agitation in water so PCB will collect in a pool.
2). Dam the contaminated area upstream and downstream.
3). Incoming water should be bypassed around the contaminated section.
4). The N.B. Department of Environment and local Government should be consulted for cleanup procedures appropriate for the particular situation.
5). A variety of techniques are possible, such as the use of suction dredges or vacuum trucks to collect pools of PCB and contaminated sediment.

<u>PCB Spill on Concrete and Asphalt</u>

1). Plug or dike all drains to sewer.
2). If spillage occurs on a roadway, dike the area to prevent PCB from soaking into the shoulder of the road or from running into nearby bodies of water.
3). Soak up the PCB using absorbent materials.
4). If the absorbent is a loose fill type, sweep it around the area to soak up the PCB.
5). Wipe up the remaining PCB using a mop, cleaning rags and paper towels.
6). Wash and wipe up the area with a solvent.
7). Put these absorbent materials into storage drums.
* If the surface has not been treated with PCB resistant paint, (ie. epoxy paint), there will be some penetration of the concrete by the PCB's, resulting in the concrete having to be removed and put in steel barrels approved for storage of PCB contaminated waste.

<u>PCB Spill on Soil</u>

1) Build dikes or trenches to contain the PCB to as small an area as possible.
2) This will also help to keep it from flowing into bodies of water.
3) Use a pump, or other available container suitable for the purpose, to transfer pools of PCB's into storage drums.
4) Soak up the pools of spilled PCB's by using absorbent materials.
(Use caution to minimize the penetration of PCB's deeper into the soil.)
5) Remove all soil visibly stained with PCB, shovel it directly into drums.
6) Decontaminate earth handling equipment by rinsing and wiping using solvents.
7) Obtain two, foot-deep core samples of spill-site to determine how far the PCB has penetrated vertically and horizontally beyond the excavated area.
8) The contaminated soil should be removed for disposal.
9) Block off the area to pedestrians and vehicular traffic and cover the area with plastic sheeting in a manner which will shed rainfall.
10) After the second excavation is complete, obtain another set of core samples of the area as a safety check of the completeness of the excavations.
11) Dispose of all additional contaminated soil.

12) Wells and other bodies of water in the vicinity should then be monitored for traces of PCB contamination.

Fire Involving PCB's

1). Do not begin clean-up until the temperature in the area has returned to normal.
2). Shut all electrical power off in the area.
3). Wear proper protective clothing.
4). Air and surface wipe samples are to be taken.
5). Wipe down all impervious surfaces to remove the contaminated soot.
6). Rinse and wipe several times using rags and solvent.
7). Obtain air and surface wipe samples to determine extent of contamination and to determine when re-occupation is possible.

Disposal of PCB's (Storage)

1) Liquid PCB and any other liquids involved in the clean-up such as solvents should be stored in a good quality, 45-gal, steel drum of 16 gauge or heavier.
2). All solid PCB contaminated material should be stored in a similar drum with a removable steel lid and screw lug tightening ring.
3). All drums must be properly labelled and exact records kept of quantity, location.
4). Central storage area is presently behind the shipping shed. All contaminated material must be labelled before being moved to the storage site and must be accompanied by the supervisor in charge of clean-up. Contaminated material in transit must never be left unattended. The Environmental Engineer or Environmental Manager will be responsible for any government notification required.
5). All storage must be in accordance with the PCB Storage Standards, Clean Environment Act as laid out in appendices "A", "B" and "C" of the ELGNB permit to operate the UPM-Kymmene Miramichi PCB storage site.

RESPONSE TIER 1 or 2

ENVIRONMENTAL NOTIFICATIONS
Environmental Manager and Environmental Engineer
Local office of Department Environment and Local Government N.B.
Environment Canada
Enter event into NCR database

Associated Documents:

Federal PCB regulation, provincial permit on PCB's

Document Revision History:

Revision: 1

Date Created: 08/19/2003
Date of Last Revision: 10/17/2003

Last Approval Date: 10/17/2003

Document Author:
Joanne Carter

Document Manager:
Beth Hennessy

Reason for Change:

Revision:	Sec/Para Changed	Change Made:
1	N/A	Initial Issue of Document

Approvals:

Name: Phil Riebel
Title: Environmental Manager
10/14/03 - Approved by: Phil Riebel

Name: Gary Dewitt
Title: Health and Safety Manager
10/14/03 - Approved by: Gary Dewitt

Name: Jim Clark
Title: Mechanical Project Engineer
10/17/03 - Approved by: Jim Clark

Document History Section

C3 - UPM's ISO 14001 Asbestos Management Protocol/Procedure (includes Asbestos Management Plan – All-Tech, March 2002)

UPM-Kymmene Miramichi Inc.

345 Curtis Rd. P.O. Box 5040 Miramichi, NB E1V 3N3

Procedure

Title: **Asbestos Management**

Doc Number S-0010
Revision: 1

Approved & Released Procedure

Implementation Date: 05/18/2004

Department:
Administration, Automation Maintenance, Communications, Engineering, Environment, Groundwood, Health and Safety, Kraft Fibre Line, Kraft Steam and Recovery, Kraft Woodroom, Maintenance, OMC 1, OMC 2, Organizational Development, Paper Machine 1, Paper Machine 2, Preventive Maintenance, Site Management, Security, Supercalenders, Winders, Wrapline

Area:

Type of Document:

Review Period - 365 **Days**

1.0 Purpose:
To establish the management and administrative framework for safely working with materials containing asbestos.

2.0 Scope:
Applies to all maintenance and production areas at UPM-Kymmene Miramichi Inc.

3.0 Responsibilities:
Applies to all UPM-Kymmene Miramichi Inc. personnel.

4.0 Definitions:
Asbestos Coordinator (AC)
Asbestos Containing Materials (ACM)

5.0 Health and Safety:
See section "9.0 Associated Documents"

6.0 Environment:
Air Contaminants

7.0 Quality:
N/A

8.0 Procedure:
The Asbestos Coordinator (AC) will coordinate and oversee work activities pertaining to asbestos containing materials (ACM) including: record keeping, project specifications, regulatory compliance and administration of the UPM-Miramichi Inc. Asbestos Management Plan.

Health & Safety Group

Maintains the following records:

Exposure records - for 30 years.
Medical records for asbestos workers for duration of employment - plus 30 years.
Respiratory fit testing and pulmonary function testing - for three years.
Incident reports and workers compensation claims related to ACM - for 30 year

9.0 Associated Documents:
FCD-0378 -- Safety Hazards in Mills
S-0008 -- Housekeeping
S-0036 -- Respiratory Protection Policy
S-0076 -- Barricade|Caution Tape and Tag


Asbestos Mgmt Plan.doc

WHSCC Regulation 92-106 A Code of Practice for Working with Materials Containing Asbestos in New Brunswick.
LINK TO WHSCC

9.1 Documents Generated:

Document Title	Responsibility	Department

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Document Author:
Beth Hennessy

Document Manager:
Gary Dewitt

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13.0 Approvals:

Name: Dan LaBerge
Title: Safety Coordinator Superintendent

5/18/04 - Approved by: Dan LaBerge

Name: Gary Dewitt
Title: Safety and Development Manager

5/18/04 - Approved by: Gary Dewitt

Document History Section

ASBESTOS MANAGEMENT PLAN
UPM-KYMMENE, MIRAMICHI
MIRAMICHI, NEW BRUNSWICK

Prepared by:

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March 6, 2002

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1.0 Asbestos Background & Classification of products

Asbestos is a generic term, which is used to describe a group of fibrous hydrated mineral silicates. The six major types of asbestos are; chrysotile (white asbestos), crocidolite (blue), amosite (brown), anthophyllite, tremolite and actinolite. Its heat and corrosion resistant qualities have been so beneficial and so desirable that between the years 1900 and 1980 36 million metric tons were used worldwide in over 3000 products. Commercially, asbestos has been used widely in such applications as fireproofing, textiles, friction products, reinforcing materials (i.e. cement pipes, sheets) and insulation (both thermal and acoustic).

Asbestos materials can be found in one of two forms; a friable asbestos or a non-friable type. Friable asbestos material refers to material, that when dry, can be crumbled, pulverized or reduced to a powder by hand pressure. This type of asbestos material is hazardous due to its potential to become airborne if damaged or disturbed.

Friable asbestos building products used in the past were sprayed acoustic & fire protection insulation, heat shields on incandescent light fixtures, ceiling/wall finishes, drywall joint compounds, mechanical insulation on pipes, tanks, boilers, vessels, etc.

Non-friable building products used in the past were vinyl asbestos floor tiles, gaskets, transite panels, transite piping and transite shingles. Non-friable materials if handled improperly during removal or renovations, such as cutting transite panels with an electrical tool, can cause high fibre release. Also, non-friable asbestos products can become friable if damaged through years of use (water damage, general deterioration of materials, etc.).

Asbestos containing materials can be properly managed and left in place depending on their location and friability. Non-friable materials receive less attention than friable materials due to the fact that the asbestos fibres in the non-friable material are bound or held tightly together. This makes the non-friable products safer and easier to manage.

2.0 Health Issues Regarding Exposure To Asbestos

Asbestos can enter the human body in three ways:

- Inhalation
- Absorption
- Ingestion

Based upon health studies the primary health concern associated with exposure to asbestos appears to by inhalation of airborne fibres. Respiratory diseases (Asbestosis/ Lung Cancers) have been linked to heavy occupational exposures to airborne asbestos.

During the 1980's health related concerns linked to asbestos led to the Ontario Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario. The conclusion of the Royal Commission Report was that:

"In dramatic contrast, the exposure of building occupants to asbestos fibres during normal building use will be shown to be insignificant.

We will conclude that it is rarely necessary to take corrective action in buildings containing asbestos insulation in order to protect the general occupants of those buildings.

On the other hand, construction, demolition, renovations, maintenance, and custodial workers in asbestos containing buildings may be exposed to significant asbestos fibre levels and may, during their work, cause elevated fibre levels for nearby occupants."

Based on the information provided by the Ontario Royal Commission, the Federal Government and Provincial Governments enacted legislation to control Asbestos in the Work place which in turn lead to the development of Asbestos Management Plans.

The purpose of an Asbestos Management Plan is for UPM-Kymmene, Miramichi, NB to fulfill responsibilities according to New Brunswick REGULATION 92-106 Titled "*Code of Practice for Working with Material Containing Asbestos Regulation - under the Occupational Health and Safety Act (O.C. 92-647)*", filed August 18, 1992.

3.0 Reporting Methodology

The following Asbestos Management Plan developed for this property is based on the following government documents:

< Public Works and Government Canada Deputy Minister Directive (DIR: 057) Titled Asbestos Management which applies to government owned or leased building and facilities.

- Section 4 of New Brunswick REGULATION 92-106 Titled "*Code of Practice for Working with Material Containing Asbestos Regulation - under the Occupational Health and Safety Act (O.C. 92-647)*", filed August 18, 1992.

4.0 Purpose Of The Asbestos Management Plan

To remove or repair asbestos containing materials which are deteriorating and identified in the Asbestos Assessment Report. This may involve major or minor removal operations.

To establish procedures for building maintenance or renovation, where the removal of asbestos containing building materials are not undertaken, requiring minor removal of friable asbestos.

To inspect and monitor the performance and work procedures of building maintenance or renovation work to ensure that proper procedures are used and followed.

To provide training and equipment to workers at where asbestos containing materials and products exist.

To conduct annual inspections and evaluations and to conduct any asbestos work identified during that inspection.

To remove or identify all asbestos-containing materials, which may be in areas of future projects, prior to undertaking major or minor renovations.

To maintain a record of asbestos work within the facility.

5.0 Responsibilities Under UPM-Kymmene, Miramichi Asbestos Management Plan (AMP)

The following outlines personnel responsibilities in UPM-Kymmene, Miramichi Asbestos Management Plan (AMP).

Personnel Title	Address, Telephone Number
Asbestos Coordinator	345, Curtis Road, P.O. Box 5040 Miramichi, NB E1V 3N3 Tel: (506) 627-3735
Safety Superintendent	345, Curtis Road, P.O. Box 5040 Miramichi, NB E1V 3N3 Tel: (506) 627-3685

5.1 Personnel Titles and Their Responsibilities under UPM-Kymmene's AMP

The following is a list of responsibilities of the ***Asbestos Coordinator:***

- Maintain and update the Asbestos Management Plan (AMP) following reassessments and abatement/ removal activities.
- Conduct quarterly reviews of the implementation of the Asbestos Management Plan.
- Inform the appropriate UPM-Kymmene personnel, contractors, and tenants, regarding repair, renovations and maintenance or installation work involving ACM's to be performed on site in writing and in advance of work to be performed.
- Ensure that recommended procedures and safety precautions provided in worker training courses and outlined in the Asbestos Management Plan will be followed for planned maintenance work or emergencies involving ACM's.
- Coordinate with a consultant for routine ACM reassessments.
- Hiring an Asbestos Consultant to coordinate the removals or repairs of ACM's.
- Respond to questions and requests for asbestos related information.
- Identifying, reporting and documenting work related asbestos concerns/ emergencies.
- Preparing work orders for planned maintenance activities in which ACM was identified in the areas where the work will be carried out.
- Updating the Asbestos Trakker™ System when updates are received from the asbestos consultant and continuously updating asbestos inventories.
- Handling asbestos emergencies.
- Assisting asbestos consultants during routine inspections.
- Updating the Asbestos Management Plan Report , when new data is received and ensuring that this report, along with all Asbestos work forms are made accessible to maintenance staff and outside contractors.

The following is a list of responsibilities of the ***Safety Superintendent:***

< Handling questions requests from tenants or EH&S Committees for information regarding asbestos.

< Preparing standard notification letters for building tenants EH&S, cleaning staff, and contractors indicating the location and the physical condition of ACM that is present nearby.

< Maintain and update worker training records.

< Informing tenants of planned repair, renovations, maintenance, or installation work to be completed in their occupied areas that may disturb ACM's.

< Maintaining and updating the AMP when updates are received from the Asbestos Consultant.

< Handling asbestos emergencies.

< Assisting asbestos consultants during routine inspections.

< Coordinating the asbestos training program for all UPM-Kymmene personnel.

The following is a list of responsibilities of the ***Asbestos Consultant:***

< Updating the locations and the approximate quantity of ACM's in the building or facility on floor plans, and the in the Asbestos Trakker™ program.

< Classifying asbestos removal or repair work, preparing scope of work/ tender documents, and coordinating asbestos related work with the ***Asbestos Coordinator.***

< Selecting and evaluating the use of appropriate safety equipment used in the Asbestos Management Plan.

< Conducting the required training of UPM-Kymmene, Miramichi staff as outlined with in the Asbestos Management Plan.

< Providing inspection and air monitoring during asbestos abatement projects. Enforcing proper work procedures i.e.: Type 1 ,Type 2, and Type 3 removal procedures.

< Providing written reports to the ***Asbestos Coordinator*** summarizing asbestos related work that has been completed during abatement projects and the results of air monitoring.

< Updating Asbestos Management Plan as required by UPM-Kymmene, Miramichi.

The following is a list of responsibilities of the ***Asbestos Abatement Contractor:***

< Obtaining work orders from UPM-Kymmene, Miramichi prior to start up.

< Providing proof of training for Asbestos Abatement Work along with past work references.

< Arranging for the proper storage, transportation and disposal of any asbestos waste generated during abatement work.

< Supplying waste manifests upon disposal.

< Conducting all asbestos abatement project work according to proper work procedures outlined in the scope of work or as instructed by the Asbestos Consultant.

The following is a list of responsibilities of ***Non-Asbestos Contractors:***

< Do not conduct any work at the facility before reviewing the Asbestos Precautions identified on the work order.

< If materials are encountered or identified in the work area that are suspected to contain asbestos do not commence work (or if identified during work, stop work) and contact the ***Asbestos Coordinator.***

The following is a list of responsibilities of the ***Tenant/ EH&S Committee/ Cleaning Contractor/ UPM-Kymmene Non- maintenance staff:***

< Contact the ***Asbestos Coordinator*** prior to conducting any maintenance work or attaching or removing anything from building surfaces i.e.: walls, floors, ceilings, pipe systems, mechanical systems, etc.

< Immediately report any damage to walls or other building components to the ***Asbestos Coordinator.***

6.0 Classification Of Asbestos Related Work

It is UPM-Kymmene's policy that their employees do not conduct any major asbestos abatement/ removals or repairs. All major asbestos abatement work must be performed by trained qualified asbestos abatement contractors. In the event of an emergency, UPM-Kymmene, Miramichi employees should follow the Emergency Procedures outlined in the following section.

Based upon Federal Government Regulations and industry standards the following criteria shall be used in determining the classification of asbestos work.

TYPE 1 WORK

T Installation or removal of a non-friable ACM with a hand tool.
T Disturbance of a non-friable ACM with a powered tool equipped with a HEPA dust collection device.
T Removal of drywall materials where joint filling materials contain asbestos.
T Removal or replacement of ten or less asbestos-containing compressed mineral fibre type ceiling tiles.
T Collecting samples of asbestos-suspect friable materials.
T Working close to friable sprayed asbestos, where the material may be affected by the work activities.

TYPE 2 WORK

T Removal or replacement of more than ten asbestos-containing compressed mineral fibre type ceiling tiles.
T Entry into ceiling spaces, crawlspaces, pipe tunnels, etc., where friable asbestos debris is present.
T Minor removal of friable ACM. Type 2 removal is limited to a maximum per work period of 1 m^2.
T Repair of asbestos mechanical insulation. (No limit is imposed to the amount of repair permitted under Type 2 conditions.)

TYPE 3 WORK

T More than minor removal or disturbance of friable ACM.
T Use of power tool on non-friable ACM without HEPA exhausted dust collection.
T The spray application of an encapsulant or sealer to friable asbestos surfacing

materials.

- T Disturbance of the duct work and air handling equipment serving or passing through areas of buildings with sprayed asbestos fireproofing or insulation.
- T Repair, alteration or demolition of a boiler, furnace, kiln, or similar equipment with asbestos-containing refractory.

EMERGENCIES

Summary of Emergency Procedures

If an emergency necessitated access to suspect contaminated area, ***that trained personnel*** wear proper protective clothing and certified respirator to enter contaminated area.

In the event of asbestos emergency at UPM-Kymmene, Miramichi, the following people must be contacted:

- T Asbestos Coordinator
- T Safety Superintendent
- T Building Tenants
- T Asbestos Consultant
- T Asbestos Contractor

Emergencies - General Information, What is an emergency?

Example: An asbestos insulated heating main breaks, floods the building.

Most asbestos emergencies are unique, but basic procedures apply in all cases:

- T handle emergencies as quickly as possible
- T follow standard procedures
- T notify the appropriate personnel at once
- T evacuate tenants

The main goal is to limit contamination within the building and this can be achieved by completing the following tasks:

- T Decontaminate and/or enclose problem areas with polyethylene.
- T Shut off air-handling units to affected areas.
- T Post warning signs.

In a minor emergency, decontamination may be handled by trained in-house personnel or by a reputable asbestos contractor.

The project is under control when the asbestos creating the emergency is enclosed.

Monitor the air as soon as possible and before removing the polyethylene enclosure. Provide the regulatory bodies with air monitoring results of this project.

7.0 Project Start Up

Although there is no Asbestos Control Board, removal projects involve building occupants and the municipal, provincial and federal governments. Municipalities control landfills; and, provinces issue waste generator numbers.

Agencies to notify are:

- New Brunswick Department of WorkPlace Health, Safety and Compensation Commission.
- Local Landfill Site

DO NOT START an asbestos removal project without notifying the appropriate approval authorities.

DO NOT START an asbestos removal project without notifying all building occupants.

DO NOT START an asbestos removal (except in an emergency) without first considering what will be done with the asbestos waste:

- Storage
- Disposal
- Combination of the above.

Major Project

Project Managers should give at least ten days notice for all projects to remove: sprayed on material containing asbestos; large quantities of pipe lagging; and, all other large scale asbestos projects. Tender package plans and specifications will be prepared for project approval, and allow the opportunity to preview prospective asbestos projects for buildings and express concerns for the safety of occupants. All projects must adhere to all government requirements.

Minor Repair and Maintenance Projects

The practice of providing advance notice for planned work in this category, will continue as a courtesy, so that authorities may inform local unions or committees of this work. Every effort must be made to provide notice of such work as soon as possible.

Although authorities are not obliged to provide plans and specifications, ***Project Managers*** are to be informed of the general scope and methodology of the planned work, and assured that standard procedures, applicable to this category of work, will be followed.

Emergency Projects

The primary requirements for emergency projects are immediate and safe implementation, not only for the protection of personnel, but for the protection of the facility and the particular systems (e.g. heating) affected. Standard procedures will apply authorities must be notified as soon as possible before commencing work, circumstances permitting.

8.0 Transport and Disposal of Asbestos Contaminated Waste

1. Place waste into an asbestos labelled disposal bag and seal with tape. Clean the exterior of the bag with a clean cloth and place into a second clean bag. Use a barrel, fibre drum, cardboard or wooden box, instead of a second bag, when the waste material is likely to tear the inner bag. Seal the outer bag or container.

2. Provide a secure storage area, near the work site, for holding minor amounts of asbestos waste in sealed, labelled containers that are assigned for asbestos waste, exclusively. Periodically, transfer waste containers to a secure location until a sufficient quantity of waste accumulates for waste pick-up.
3. Retain copies of waste waybills, from the disposal firm, as waste is removed from the site. When waste is transported for disposal in New-Brunswick, refer to "Transportation and Disposal of Asbestos Waste" .

9.0 UPM-Kymmene, Miramichi Training Requirements

Although UPM personnel do not work directly with ACM products they must be made aware of the potential ACM in facilities being managed. All employees that may come in contact with Asbestos within the buildings should obtain asbestos training/ awareness. The ***Safety Superintendent*** is to ensure procedures are in place to maintain a list of trained workers with the date and type of Asbestos training course taken.

Therefore the following training topics should be covered during a one day awareness course:

- T Introduction to asbestos.
- T Identification of possible ACM Building materials.
- T Friable and non-friable ACM products.
- T Insulation on mechanical piping systems.
- T Sprayed on plaster finishes.
- T Floor covering.
- T Health effects.
- T Regulations - Provincial/ Federal.
- T Classification of asbestos abatement, Type 1, Type 2, Type 3.
- T Asbestos Management.
- T Asbestos control options Hands on Demonstrations.
- T Worker protection.

10.0 Asbestos Trakker Program

The room by room survey results are available on the customized asbestos tracking program designed to assist in developing a long term asbestos management plan. This computerized asbestos survey program will be used to maintain a permanent record of the current status, condition and quantities of all asbestos containing materials found during assessment. A summary of the type of asbestos, the location of the materials, quantities, and conditions of the materials are found in the Asbestos Trakker™ and in Appendix 2 and 3.

10.1 Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A) Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. This includes areas within reach from a fixed

ladder or catwalk, i.e tops of equipment, mezzanines, frequently entered pipe chases, tunnels and service areas.

ACCESS (B) Areas of the building above eight feet (8'-0") where use of a ladder is required to reach the ACM.

ACCESS (C) Areas of the building within reach (from floor level) of all building users. Includes areas such as work areas, offices, workshops and storage areas where activities of the building users may result in disturbance of ACM not normally with reach from floor level.

ACCESS (D) Areas of the building behind inaccessible solid ceiling systems, walls or mechanical equipment etc where demolition of the ceiling, wall or equipment etc is required to reach the ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

10.2 Action Matrix and Definitions for Asbestos Containing Materials (ACM)

ACCESS	*CONDITION*			*DEBRIS*
	GOOD	*FAIR*	*POOR*	
(A)	**ACTION 7**	**ACTION 6/5 3**	**ACTION 3**	**ACTION 1**
(B)	**ACTION 7**	**ACTION 7**	**ACTION 4**	**ACTION 2**
(C)	**ACTION 5/7 1**	**ACTION 5/6 2**	**ACTION 3**	**ACTION 1**
(D)	**ACTION 7**	**ACTION 7**	**ACTION 7**	**ACTION 7**

Notes:
material in **ACCESS (C)/GOOD** condition is not removed **ACTION 7** is required.
material in **ACCESS (C)/FAIR** condition is not removed **ACTION 6** is required.
emove ACM in **ACCESS (A)/FAIR** condition if ACM is likely to be disturbed.

10.3 Action Definitions

ACTION 1 **Immediate Clean-up of Debris that is Likely to be Disturbed**

Restrict access that is likely to cause a disturbance of the ACM **DEBRIS** and clean-up ACM **DEBRIS** immediately. Utilize correct asbestos procedures. This action is required for compliance with regulatory requirements. The surveyor should immediately notify the Asbestos Coordinator of the condition.

ACTION 2 **Enclosure Precautions for Entry into Areas with ACM DEBRIS**
At locations where ACM **DEBRIS** can be isolated in lieu of removal or clean up, use appropriate means to limit entry to the area. Restrict access to the area to persons utilizing full enclosure asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 **ACM Removal Required for Compliance**
Remove ACM for compliance with regulatory requirements. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 **Enclosure Precautions for Access into Areas Where ACM Is Present and Likely to be Disturbed by Access.**
Use enclosure asbestos precautions when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is removed (Use **ACTION 1** or **ACTION 2** if **DEBRIS** is present).

ACTION 5 **Proactive ACM Removal**
Remove ACM in lieu of repair, or at locations where the presence of asbestos in **GOOD** condition is not desirable.

ACTION 6 **ACM Repair**
Repair ACM found in **FAIR** condition and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the repair work treat ACM as material in **GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, implement **ACTION 5**.

ACTION 7 **Routine Surveillance**
Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (glove bag, or full enclosure) during disturbance of the remaining ACM.

The action and access codes are taken from Public Works and Government Services document *(DIR: 057) Evaluation and Recommendations for Control of Asbestos Containing Materials (ACM).*

ATTACHMENT D

UPM Miramichi Emergency Response Plan (ERP) and Spill Contingency Plan (SCP) Information

	Number	Document Title
A. ERP-Fire/Explosion		
	EP-0014	No. 7 Scenario: Propane Large Release - not immediately ignited
	EP-0019	No. 12 Scenario: Chlorine Dioxide Generator Detonation
	EP-0020	No. 13 Scenario: Hydrogen Peroxide Release - 50 percent or less
	EP-0021	No. 14 Scenario: Methanol Large Release
	EP-0022	No. 15 Scenario: Methanol Small Release
	EP-0023	No. 16 Scenario: Methanol Release from Storage Tank
	EP-0024	No. 17 Scenario: Oxygen Liquid Release
	EP-0027	No. 20 Scenario: Sodium Chlorate Solution Release
	EP-0028	No. 21 Scenario: Chip Fire
	EP-0030	No. 23 Scenario: Digester Vessel Rupture
	EP-0031	No. 24 Scenario: Bunker C Fire-Groundwood Mill
	EP-0032	No. 25 Scenario: Flash Dryer Fire - Groundwood Mill
	EP-0033	No. 26 Scenario: Hog Fuel Fire at Pile
	EP-0034	No. 27 Scenario: Hog Fuel Fire at Boiler
	EP-0035	No. 28 Scenario: Gas Release
	EP-0036	No. 29 Scenario: Reflux Condenser Explosion
	EP-0038	No. 31 Scenario: Building Fire at Paper Mills
	EP-0039	No. 32 Scenario: Paper Dryer Fire
	EP-0041	No. 34 Scenario: Propane Release at OMC1 or OMC2
	EP-0043	No. 36 Scenario: Furnace Explosion Power Boiler
	EP-0044	No. 37 Scenario: Furnace Explosion CRU4
	EP-0045	No. 38 Scenario: Tube Rupture
	EP-0046	No. 39 Scenario: Bunker C Fire-Bulk Storage Tank
	EP-0047	No. 40 Scenario: Propane Large Release with Early Ignition
	EP-0048	No. 41 Scenario: Propane Small Release
	EP-0065	No. 49 Scenario: Gasoline or Diesel Spill
	EP-0066	No. 56 Scenario: Large Caustic Spills
	EP-0071	No. 43 Scenario: PCB Spills and Fires
	EP-0073	BLEVE Hazard Distances
	EP-0076	NFPA Hazard Ratings
	EP-0080	Event Trees
B. ERP-Gas/Liquid Release		
	EP-0007	No. 4 Scenario: Chlorine Dioxide Large Release-Bleach Plant
	EP-0009	No. 51 Scenario: Treatment Plant Rake and Skimmer - Mechanical F
	EP-0010	No. 42 Scenario: Mechanical Pump Failure - Loss of Pumping
	EP-0012	No. 5 Scenario: Hydrogen Sulphide Release from Sewers
	EP-0016	No. 9 Scenario: Chlorine Small Release
	EP-0017	No. 10 Scenario: Chlorine Dioxide Large Release
	EP-0018	No. 11 Scenario: Chlorine Dioxide Small Release
	EP-0019	No. 12 Scenario: Chlorine Dioxide Generator Detonation
	EP-0020	No. 13 Scenario: Hydrogen Peroxide Release - 50 percent or less
	EP-0021	No. 14 Scenario: Methanol Large Release
	EP-0022	No. 15 Scenario: Methanol Small Release
	EP-0023	No. 16 Scenario: Methanol Release from Storage Tank
	EP-0024	No. 17 Scenario: Oxygen Liquid Release
	EP-0025	No. 18 Scenario: Sulphur Dioxide Large Release
	EP-0026	No. 19 Scenario: Sulphur Dioxide Small Release - Chemical Prepar
	EP-0027	No. 20 Scenario: Sodium Chlorate Solution Release
	EP-0029	No. 22 Scenario: Digester Line Rupture
	EP-0030	No. 23 Scenario: Digester Vessel Rupture
	EP-0031	No. 24 Scenario: Bunker C Fire-Groundwood Mill
	EP-0035	No. 28 Scenario: Gas Release
	EP-0036	No. 29 Scenario: Reflux Condenser Explosion
	EP-0037	No. 30 Scenario: Sulphur Dioxide Small Release-PM1
	EP-0041	No. 34 Scenario: Propane Release at OMC1 or OMC2
	EP-0043	No. 36 Scenario: Furnace Explosion Power Boiler
	EP-0045	No. 38 Scenario: Tube Rupture
	EP-0046	No. 39 Scenario: Bunker C Fire-Bulk Storage Tank
	EP-0060	No. 47 Scenario: Sulphuric Acid Spill to Environment or Process
	EP-0061	No. 46 Scenario: Biocide Spill
	EP-0062	No. 44 Scenario: Bunker C Oil Spill
	EP-0063	No. 45 Scenario: Concentrated Dye Leak or Spill
	EP-0064	No. 55 Scenario: Lagoon Dike Failure or Overflow
	EP-0065	No. 49 Scenario: Gasoline or Diesel Spill
	EP-0066	No. 56 Scenario: Large Caustic Spills
	EP-0067	No. 52 Scenario: Leachate Holding Pond Liner Leak or Cracked Int
	EP-0068	No. 53 Scenario: Overflow of Leachate
	EP-0069	No. 54 Scenario: Truck Accident

EP-0070 No. 50 Scenario: Overflow at Primary or Secondary Pumphouse
EP-0071 No. 43 Scenario: PCB Spills and Fires
EP-0076 NFPA Hazard Ratings
EP-0080 Event Trees
EP-0084 Black Liquor spills to the ground and process sewer

C. ERP-Power Failure

EP-0013 No. 6 Scenario: Power Failure-Bleachery
EP-0040 No. 33 Scenario: Power Failure at Paper Mills

D. ERP-Other Emergencies

EP-0006 No. 1 Scenario: Bomb Threat
EP-0008 No. 2 Scenario: Terrorism
EP-0011 No. 3 Scenario: Windstorm
EP-0042 No. 35 Scenario: Bryenton Pipeline Water Main Failure
EP-0072 No. 48 Scenario: Precipitator Outage for Repairs

E. Overview

EP-0001 Emergency Response Plan
EP-0082 Listing of Detailed Action Plans
EP-0083 Acronyms
EP-0085 Emergency Response Plan Strike 2004

F. Administration

EP-0050 Plan Distribution

G. Roles and Responsibilities

EP-0002 Emergency Response Roles
EP-0003 Emergency Response Tier Organization

H. Muster Stations

EP-0053 Muster Stations - Area Evacuation Routes and Schematics

I. Contacts

EP-0054 External Contacts
EP-0055 Radio Channels and Telephones

J. Resources

EP-0075 Consequence Analysis
EP-0079 CANUTEC Guide

K. Equipment

EP-0056 Emergency Response Equipment
EP-0057 Inspection-Maintenance-Testing of Fire Protection Systems

L. Forms

EP-0058 Emergency Response Training
EP-0059 Emergency Drills and Testing
EP-0074 Detailed Action Plan Checklist
EP-0077 Emergency Response Incident Report
EP-0078 Bomb Threat Report

ATTACHMENT E

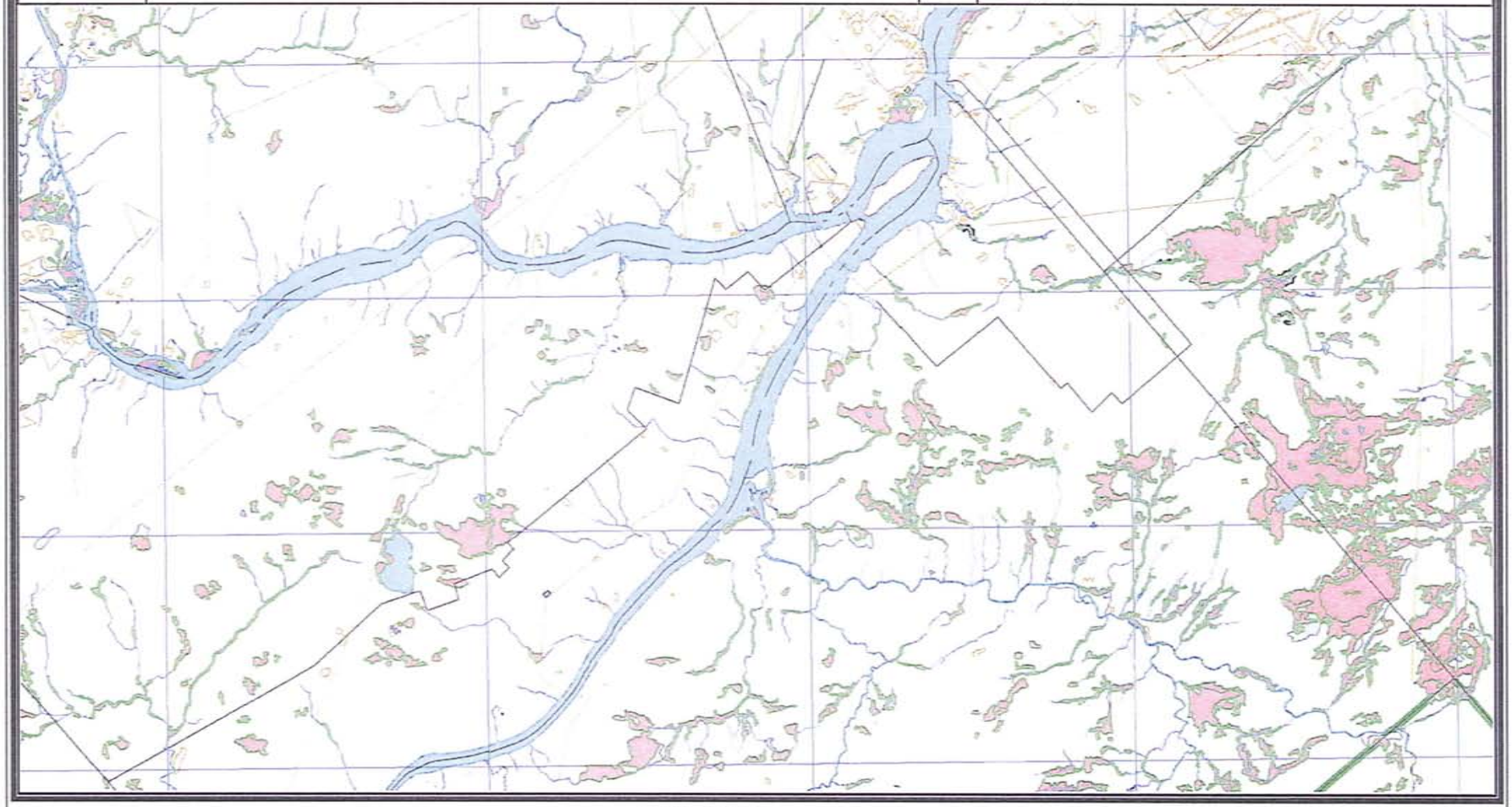
NBENV (Wetlands Mapping), and ACCDC Environmental Database Screening Information

NBENV Wetlands Mapping
For Study Region

New Nouveau Brunswick

Department of Environment (ENV)
ministère de l'Environnement (ENV)

Map / Carte	UPM EIA Submission	Date	Friday, April 18, 2008



1:138,418.04

FIGURE E-1

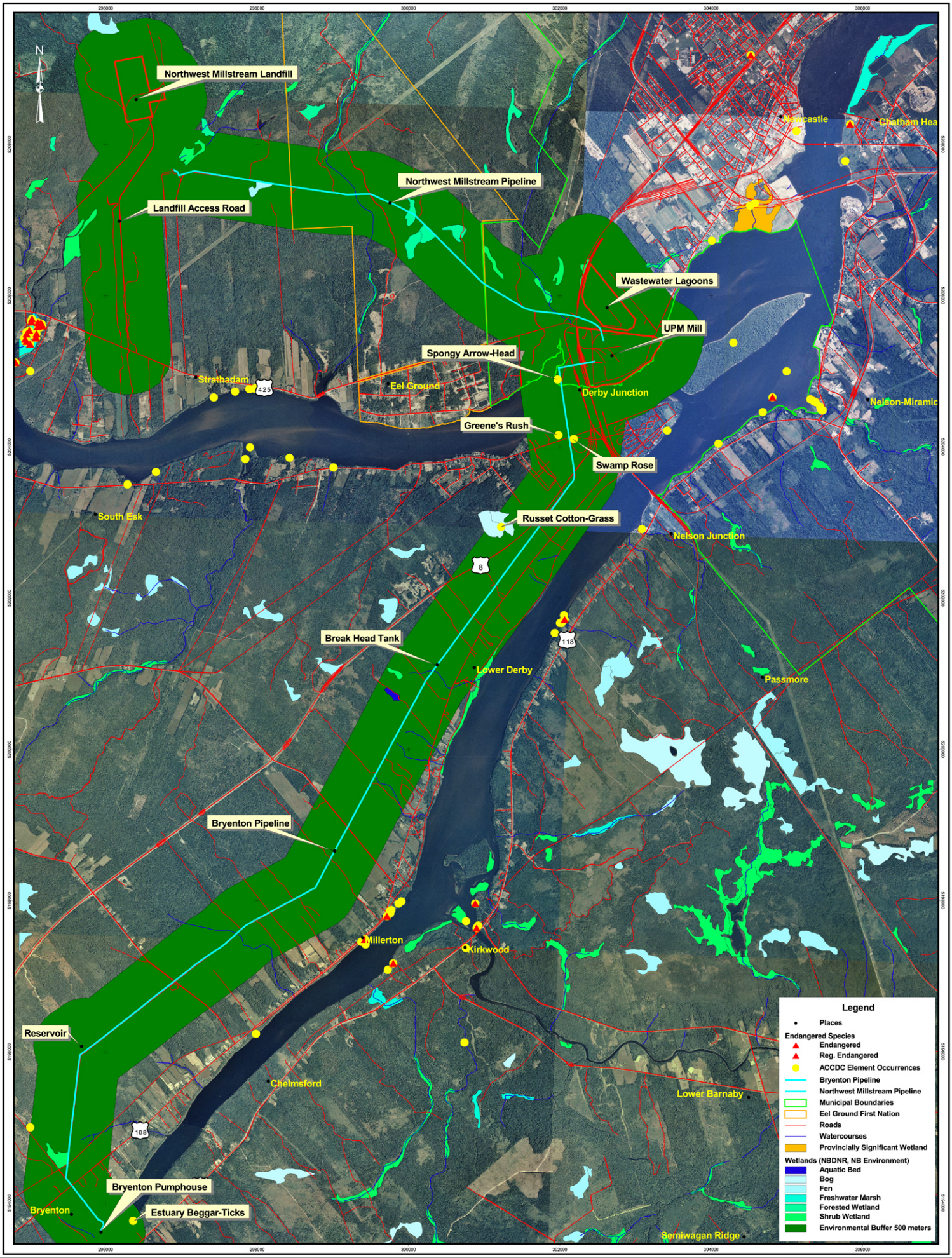
ACCDC Environmental Database
Search Results

Figure E-2: Summary of ACCDC Element Occurrences (those within 500 m buffer of Project Footprint labeled)

Followed by:

ACCDC Summary Reports and ESA/MA Location Maps for 5 km Zone Around:

1) Main Mill Area (map reference 2935)
2) Northwest Millstream Landfill (map reference 2934)
3) Northwest Millstream Pipeline (map reference 2933)
4) Bryenton Pipeline (map reference 2932)



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Proj. UPM Miramichi Mill Decommissioning - EIA Registration

Dwg. E-2. ACCDC Element Occurrence Database.

1 0 1 2 Kilometers

Drawn By:	Proj. No: (82) 2756 - 066.1
Dwg. Standards Chk. by:	Dwg. No E-2
Designed By:	Dwg. Design Chk. By: / Rev.

ACCDC Data (Summary Report and ESA/MA Location Map for a 5 km Buffer)

- Main Mill Area (map reference 2935)

Robert Gallagher

2756-66.1/2.2

From: John Sims [jsims@adi.ca]
Sent: Wednesday, April 23, 2008 1:32 PM
To: Robert Gallagher
Subject: FW: ACCDC DATA REQUEST 2935: Miramichi millsite NB <ASAP>
Importance: High

Mill Area

-----Original Message-----
From: D. Doucet [mailto:ddoucet@mta.ca]
Sent: Tuesday, April 22, 2008 1:57 PM
To: jsims@adi.ca
Subject: ACCDC DATA REQUEST 2935: Miramichi millsite NB <ASAP>
Importance: High

Mr Sims,

Attached here are the data found in our GIS scan of the specified study area. The results are summarised in the Sections below (supplementary data is not included in summary); please read restrictive Caveats in Section 5.
NOTE: A spatial buffer has been added to the study area, in order to include adjacent EOs.
NOTE: We include supplementary tables of data which are not fully represented in ACCDC data:
- NB Freshwater Fish data (cf *FF.dbf)

Sincerely,

Stefen Gerriets, Senior Data Manager
Atlantic Canada Conservation Data Centre
Box 6416, Sackville NB E4L 1G6
tel: 506-364-2657 fax: 506-364-2656

DATA SUMMARY

---

1. INTRODUCTION

1.1 DATA PRODUCTS
The ACCDC provides two categories of information concerning rare biota:
RARITY RANKS: The expert consensus on the rarity of a taxon in a jurisdiction, subnational, national and global;
ELEMENT OCCURRENCES: Natural landscape observed to be utilised in a significant way by a rare taxon.
For the convenience of our Clients, we also report records of Managed and Special Areas.

1.2 BILLABLE COSTS
FOR-PROFIT CLIENTS will be billed for ACCDC personnel time at the rate of $100/hr, 1 hr minimum.

1.3 DATA REPORT DOCUMENTS
Attached to this summary document are:
4 files: [EO,FF,MA,SA] (taxon ranks included in tables)
2 maps: [EO,FF] & [MA,SA] (cf Map Symbology below)

1.4 SUPPLEMENTARY TEXTS
See attached Ranking document for explanation of S-Ranks.
See attached Data Dictionary for definition of data fields.
See attached Threat-Profile Texts for Wood Turtle.

2.0 STUDY AREA RESULTS

2.1 DATA SUMMARY

A 5km buffer around the study area contains a relatively moderate (quintile 3) number of rare taxa records: 92 records of 39 taxa from 14 sources. (Data Density: 0.95 rec/km2).

2.2 FLORA
A 5km buffer around the study area contains 59 records of 20 rare vascular, 0 records of rare nonvascular flora (see attached *eo.dbf).

2.3 FAUNA
A 5km buffer around the study area contains 33 records of 19 rare vertebrate, 0 records of rare invertebrate fauna (see attached *eo.dbf).
NOTE: Wood Turtles are POTENTIALLY present in the study area (i.e. present in adjacent watersheds), and utilise both the upper and lower elevations (see attached GLYPinsc.rtf).

2.4 SPECIAL AREAS
The GIS scan identified 4 Managed Areas with some degree of protected status, in the vicinity of the study area (see attached *ma.dbf).
The GIS scan also identified 3 Special Areas in the vicinity of the study area; such sites are known for exceptional biotic richness but may or may not have legal status (see attached *sa.dbf).

2.5 ADDITIONAL INFORMATION
Please direct biological questions about ACCDC data to: Sean Blaney, ACCDC: (506) 364-2658, and technical data queries to: Stefen Gerriets, ACCDC: (506) 364-2657.
For provincial information on rare taxa and protected areas, or information on game animals, deer yards, old growth forest, archeological sites, fish habitat etc, please contact Stewart Lusk, NBDNR: (506) 453-2440.

3.0 SOURCE ACKNOWLEDGEMENT
The recipient of this data shall acknowledge the ACCDC and the Sources of the dataset in any documents, reports, publications or presentations, in which this dataset makes a major contribution.
Sources are defined as those persons or institutions listed in the CITATION field of each data record (see list below):

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25 Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax. 82,125 recs.
21 Connell Herbarium Specimens. University New Brunswick, Fredericton. 2003.
17 Coursol, F. 2005. Electronic dataset from New Brunswick fieldwork for Eriocaulon parkeri COSEWIC report.
7 Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl.
4 Clayden, S.R. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB.
4 Connell Herbarium Specimen Data . University New Brunswick, Fredericton. 2003.
4 Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc.
2 Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS.
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1 McLeod, D. & Merrithew, C. 2005. The Inventory of the Flora and Fauna of the French Fort Cove Nature Park. French Fort Cove Development Commission,
1 Scott, Fred W. 1998. Updated Status Report on the Cougar (Puma Concolor couguar) [Eastern population]. Committee on the Status of Endangered Wildlife in Canada (COSEWIC),

---

4. MAP SYMBOLOGY

4.1 BIOTA
- Vascular Flora occurrences are shown as yellow-green symbols;
- Nonvascular Flora occurrences are shown as blue-green symbols;
- Vertebrate Fauna occurrences are shown as red symbols;
- Invertebrate Fauna occurrences are shown as orange symbols;
- Wood Turtle watersheds shaded diagonally in green, dense for present, light for possible.
- Freshwater Fish areas shaded perpendicular yellow; lines by yellow cross-bars.
- Saltwater Fish as dark-blue fish symbol; larvae/ eggs as dark-blue small fish symbol.

Symbol shape indicates precision of geolocation:
- circle: within 100s of meters;
- triangle: within kilometers;
- square small: within 5 km, medium: within 10km, large: within 50km
- diamond: within county.

Cetacea are shown (for marine sites) as
- S1 to S1S2 taxa as yellow flukes
- S2 to S2S3 taxa as magenta flukes
- S3 to S3S4 taxa as red flukes
- S4 taxa as light blue flukes

4.2 SPECIAL AREAS
- Study Area buffer is shown as a red circle, labeled with radius;
- Managed/Protected Areas are shown as red outlines with light-yellow fill (red-bordered diamond-shaped polygons represent sites with unknown boundaries);
- Environmentally Significant Areas are shown as shadowed green cubes (green-bordered diamond-shaped polygons represent sites with known areas)

4.3 ENVIRONMENT (as in National Topographic Series)
- Hydrology is shown as medium blue polygons and lines;
- Wetlands are shown as speckled blue polygons;
- Forest-cover is shown as light green polygons;
- Towns are shown as small light grey squares;
- Roads are shown as light grey lines;
- 10km UTM grid is shown as light blue lines.

---

5. CAVEATS

While the ACCDC makes a strong effort to verify the accuracy of all the data it obtains, generates and manages, it shall not be held responsible for any inaccuracies in any data that it provides. The following CAVEATS apply:

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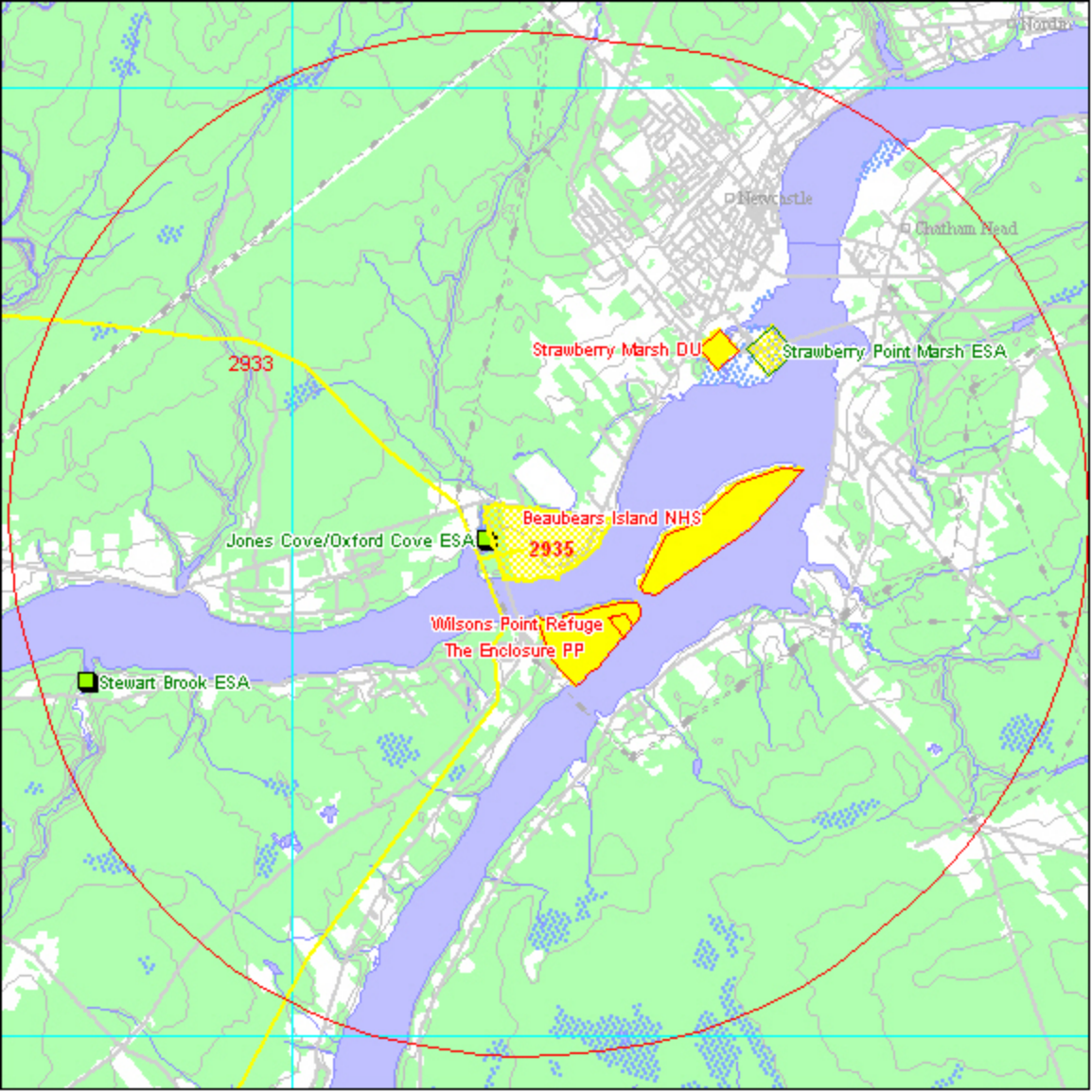
Newcastle
Chatham Head
2933
Strawberry Marsh DU
Strawberry Point Marsh ESA
Beaubears Island NHS
2935
Jones Cove/Oxford Cove ESA
Wilsons Point Refuge
The Enclosure PP
Stewart Brook ESA

ACCDC Data (Summary Report and ESA/MA Location Map for a 5 km Buffer)

- Northwest Millstream Landfill (map reference 2934)

2756-66.1
22

Robert Gallagher

From: John Sims [jsims@adi.ca]
Sent: Wednesday, April 23, 2008 1:31 PM
To: Robert Gallagher
Subject: FW: ACCDC DATA REQUEST 2934: Miramichi landfill NB <ASAP>
Importance: High

NWM Landfill

-----Original Message-----
From: D. Doucet [mailto:ddoucet@mta.ca]
Sent: Tuesday, April 22, 2008 1:54 PM
To: jsims@adi.ca
Subject: ACCDC DATA REQUEST 2934: Miramichi landfill NB <ASAP>
Importance: High

Mr Sims,

Attached here are the data found in our GIS scan of the specified study area. The results are summarised in the Sections below (supplementary data is not included in summary); please read restrictive Caveats in Section 5.
NOTE: A spatial buffer has been added to the study area, in order to include adjacent EOs.
NOTE: We include supplementary tables of data which are not fully represented in ACCDC data:
- NB Freshwater Fish data (cf *FF.dbf)

Sincerely,

Stefen Gerriets, Senior Data Manager
Atlantic Canada Conservation Data Centre
Box 6416, Sackville NB E4L 1G6
tel: 506-364-2657 fax: 506-364-2656

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For the convenience of our Clients, we also report records of Managed and Special Areas.

1.2 BILLABLE COSTS
FOR-PROFIT CLIENTS will be billed for ACCDC personnel time at the rate of $100/hr, 1 hr minimum.

1.3 DATA REPORT DOCUMENTS
Attached to this summary document are:
3 files: [EO,FF,MA] (taxon ranks included in tables)
2 maps: [EO,FF] & [MA] (cf Map Symbology below)

1.4 SUPPLEMENTARY TEXTS
See attached Ranking document for explanation of S-Ranks.
See attached Data Dictionary for definition of data fields.
See attached Threat-Profile Texts for Wood Turtle.

2.0 STUDY AREA RESULTS

2.1 DATA SUMMARY

A 5km buffer around the study area contains a relatively moderate-to-large (quintile 4) number of rare taxa records: 96 records of 25 taxa from 10 sources. (Data Density: 1.09 rec/km2).

2.2 FLORA
A 5km buffer around the study area contains 82 records of 16 rare vascular, 0 records of rare nonvascular flora (see attached *eo.dbf).

2.3 FAUNA
A 5km buffer around the study area contains 14 records of 9 rare vertebrate, 0 records of rare invertebrate fauna (see attached *eo.dbf).
NOTE: Wood Turtles are POTENTIALLY present in the study area (i.e. present in adjacent watersheds), and utilise both the upper and lower elevations (see attached GLYPinsc.rtf).

2.4 SPECIAL AREAS
The GIS scan identified no Managed Areas in the vicinity of the study area.
The GIS scan identified 2 Special Areas in the vicinity of the study area; such sites are known for exceptional biotic richness but may or may not have legal status (see attached *sa.dbf).

2.5 ADDITIONAL INFORMATION
Please direct biological questions about ACCDC data to: Sean Blaney, ACCDC: (506) 364-2658, and technical data queries to: Stefen Gerriets, ACCDC: (506) 364-2657.
For provincial information on rare taxa and protected areas, or information on game animals, deer yards, old growth forest, archeological sites, fish habitat etc, please contact Stewart Lusk, NBDNR: (506) 453-2440.

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Sources are defined as those persons or institutions listed in the CITATION field of each data record (see list below):

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1 Toner, M. 2005. Pers. comm. (e-mail) to C.S. Blaney re findings of NB DNR fieldwork on Parker's Pipewort, carried out in 2005 by Eric Sullivan and Dave Dunnett

---

4. MAP SYMBOLOGY

4.1 BIOTA
- Vascular Flora occurrences are shown as yellow-green symbols;
- Nonvascular Flora occurrences are shown as blue-green symbols;
- Vertebrate Fauna occurrences are shown as red symbols;
- Invertebrate Fauna occurrences are shown as orange symbols;
- Wood Turtle watersheds shaded diagonally in green, dense for present, light for possible.
- Freshwater Fish areas shaded perpendicular yellow; lines by yellow cross-bars.
- Saltwater Fish as dark-blue fish symbol; larvae/ eggs as dark-blue small fish symbol.

Symbol shape indicates precision of geolocation:
- circle: within 100s of meters;
- triangle: within kilometers;
- square small: within 5 km, medium: within 10km, large: within 50km
- diamond: within county.

Cetacea are shown (for marine sites) as
- S1 to S1S2 taxa as yellow flukes
- S2 to S2S3 taxa as magenta flukes
- S3 to S3S4 taxa as red flukes
- S4 taxa as light blue flukes

4.2 SPECIAL AREAS
- Study Area buffer is shown as a red circle, labeled with radius;
- Managed/Protected Areas are shown as red outlines with light-yellow fill

(red-bordered diamond-shaped polygons represent sites with unknown boundaries);
- Environmentally Significant Areas are shown as shadowed green cubes
(green-bordered diamond-shaped polygons represent sites with known areas)

4.3 ENVIRONMENT (as in National Topographic Series)
- Hydrology is shown as medium blue polygons and lines;
- Wetlands are shown as speckled blue polygons;
- Forest-cover is shown as light green polygons;
- Towns are shown as small light grey squares;
- Roads are shown as light grey lines;
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---

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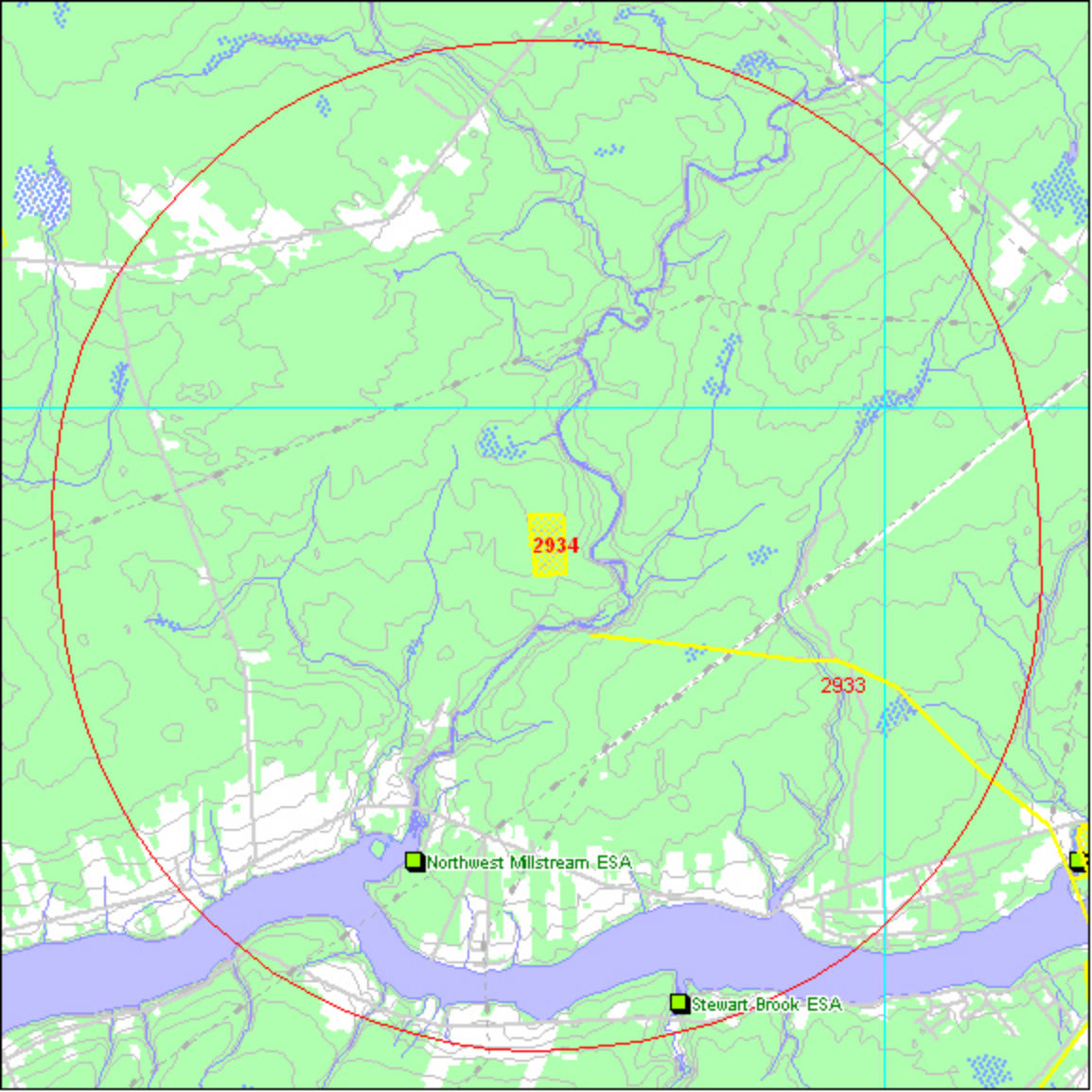
2934
2933
Northwest Millstream ESA
Stewart Brook ESA

ACCDC Data (Summary Report and ESA/MA Location Map for a 5 km Buffer)

- Northwest Millstream Pipeline (map reference 2933)

2756-66.1/22

Robert Gallagher

From: John Sims [jsims@adi.ca]
Sent: Wednesday, April 23, 2008 1:30 PM
To: Robert Gallagher
Subject: FW: ACCDC DATA REQUEST 2933: Miramichi pipeline W NB <ASAP>
Importance: High

NWMillstream waterline

-----Original Message-----
From: D. Doucet [mailto:ddoucet@mta.ca]
Sent: Tuesday, April 22, 2008 1:51 PM
To: jsims@adi.ca
Subject: ACCDC DATA REQUEST 2933: Miramichi pipeline W NB <ASAP>
Importance: High

Mr Sims,

Attached here are the data found in our GIS scan of the specified study area. The results are summarised in the Sections below (supplementary data is not included in summary); please read restrictive Caveats in Section 5.
NOTE: A spatial buffer has been added to the study area, in order to include adjacent EOs.
NOTE: We include supplementary tables of data which are not fully represented in ACCDC data:
- NB Freshwater Fish data (cf *FF.dbf)

Sincerely,

Stefen Gerriets, Senior Data Manager
Atlantic Canada Conservation Data Centre
Box 6416, Sackville NB E4L 1G6
tel: 506-364-2657 fax: 506-364-2656

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---

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The ACCDC provides two categories of information concerning rare biota:
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2 maps: [EO,FF] & [MA,SA] (cf Map Symbology below)

1.4 SUPPLEMENTARY TEXTS
See attached Ranking document for explanation of S-Ranks.
See attached Data Dictionary for definition of data fields.
See attached Threat-Profile Texts for Wood Turtle.

2.0 STUDY AREA RESULTS

2.1 DATA SUMMARY

A 5km buffer around the study area contains a relatively moderate-to-large (quintile 4) number of rare taxa records: 169 records of 44 taxa from 17 sources. (Data Density: 1.21 rec/km2).

2.2 FLORA
A 5km buffer around the study area contains 127 records of 24 rare vascular, 0 records of rare nonvascular flora (see attached *eo.dbf).

2.3 FAUNA
A 5km buffer around the study area contains 42 records of 20 rare vertebrate, 0 records of rare invertebrate fauna (see attached *eo.dbf).
NOTE: Wood Turtles are POTENTIALLY present in the study area (i.e. present in adjacent watersheds), and utilise both the upper and lower elevations (see attached GLYPinsc.rtf).

2.4 SPECIAL AREAS
The GIS scan identified 4 Managed Areas with some degree of protected status, in the vicinity of the study area (see attached *ma.dbf).
The GIS scan also identified 4 Special Areas in the vicinity of the study area; such sites are known for exceptional biotic richness but may or may not have legal status (see attached *sa.dbf).

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- Environmentally Significant Areas are shown as shadowed green cubes (green-bordered diamond-shaped polygons represent sites with known areas)

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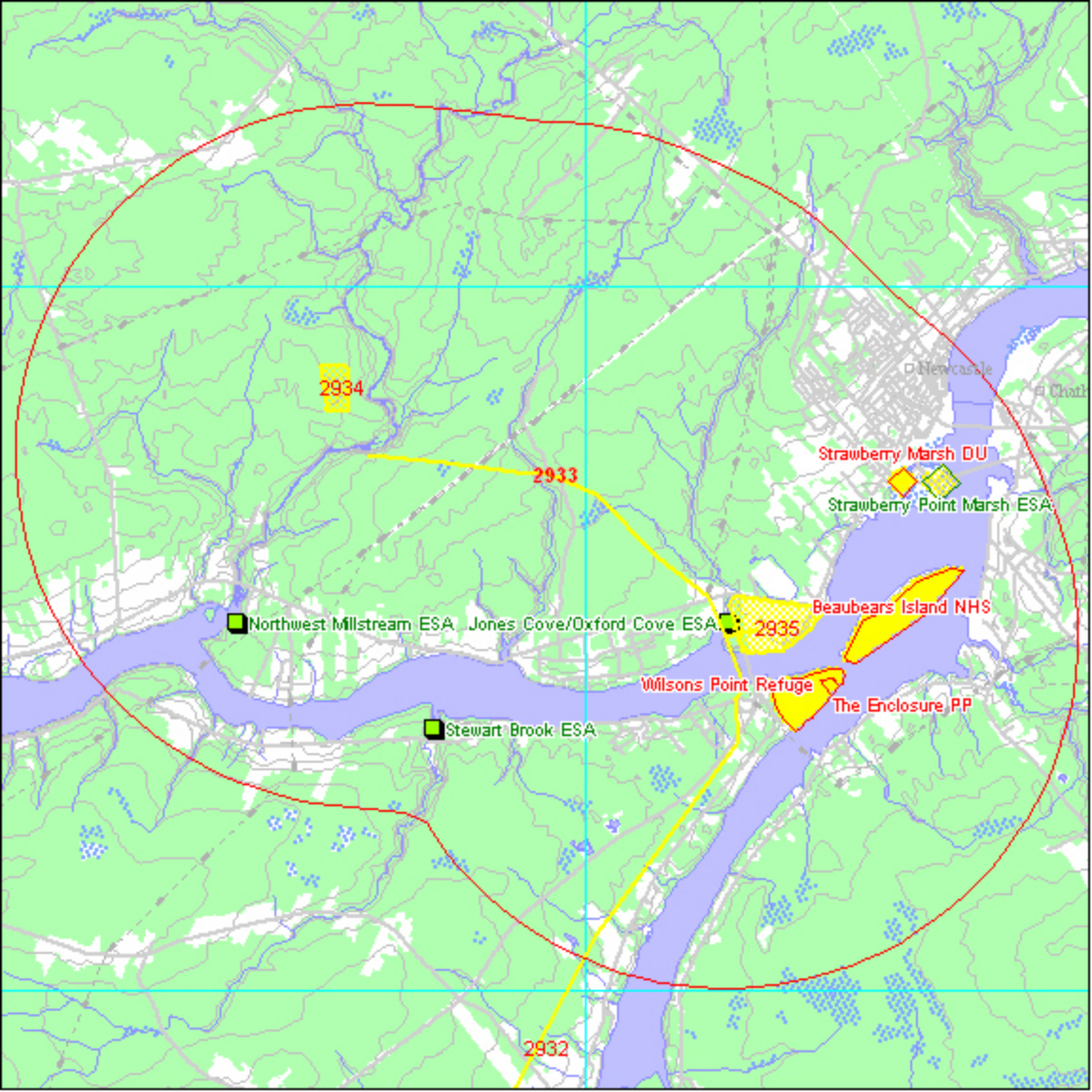
2934
2933
2935
2932
Strawberry Marsh DU
Strawberry Point Marsh ESA
Beaubears Island NHS
Wilsons Point Refuge
The Enclosure PP
Northwest Millstream ESA
Jones Cove/Oxford Cove ESA
Stewart Brook ESA

ACCDC Data (Summary Report and ESA/MA Location Map for a 5 km Buffer)

- Bryenton Pipeline (map reference 2932)

Robert Gallagher

2756-66.1/2.2

From: John Sims [jsims@adi.ca]
Sent: Wednesday, April 23, 2008 1:29 PM
To: Robert Gallagher
Subject: FW: ACCDC DATA REQUEST 2932: Miramichi pipeline S NB <ASAP>
Importance: High

Bryenton

-----Original Message-----
From: D. Doucet [mailto:ddoucet@mta.ca]
Sent: Tuesday, April 22, 2008 1:45 PM
To: jsims@adi.ca
Subject: ACCDC DATA REQUEST 2932: Miramichi pipeline S NB <ASAP>
Importance: High

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1.3 DATA REPORT DOCUMENTS
Attached to this summary document are:
4 files: [EO,FF,MA,SA] (taxon ranks included in tables)
2 maps: [EO,FF] & [MA,SA] (cf Map Symbology below)

1.4 SUPPLEMENTARY TEXTS
See attached Ranking document for explanation of S-Ranks.
See attached Data Dictionary for definition of data fields.
See attached Threat-Profile Texts for Wood Turtle.

2.0 STUDY AREA RESULTS

2.1 DATA SUMMARY

A 5km buffer around the study area contains a relatively moderate (quintile 3) number of rare taxa records: 136 records of 47 taxa from 18 sources. (Data Density: 0.61 rec/km2).

2.2 FLORA
A 5km buffer around the study area contains 98 records of 28 rare vascular, 0 records of rare nonvascular flora (see attached *eo.dbf).

2.3 FAUNA
A 5km buffer around the study area contains 38 records of 19 rare vertebrate, 0 records of rare invertebrate fauna (see attached *eo.dbf).
NOTE: Wood Turtles are POTENTIALLY present in the study area (i.e. present in adjacent watersheds), and utilise both the upper and lower elevations (see attached GLYPinsc.rtf).

2.4 SPECIAL AREAS
The GIS scan identified 4 Managed Areas with some degree of protected status, in the vicinity of the study area (see attached *ma.dbf).
The GIS scan also identified 5 Special Areas in the vicinity of the study area; such sites are known for exceptional biotic richness but may or may not have legal status (see attached *sa.dbf).

2.5 ADDITIONAL INFORMATION
Please direct biological questions about ACCDC data to: Sean Blaney, ACCDC: (506) 364-2658, and technical data queries to: Stefen Gerriets, ACCDC: (506) 364-2657.
For provincial information on rare taxa and protected areas, or information on game animals, deer yards, old growth forest, archeological sites, fish habitat etc, please contact Stewart Lusk, NBDNR: (506) 453-2440.

3.0 SOURCE ACKNOWLEDGEMENT
The recipient of this data shall acknowledge the ACCDC and the Sources of the dataset in any documents, reports, publications or presentations, in which this dataset makes a major contribution.
Sources are defined as those persons or institutions listed in the CITATION field of each data record (see list below):

recs source
31 Coursol, F. 2005. Electronic dataset from New Brunswick fieldwork for Eriocaulon parkeri COSEWIC report.
30 Connell Herbarium Specimens. University New Brunswick, Fredericton. 2003.
30 Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax. 82,125 recs.
9 Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl.
8 Connell Herbarium Specimen Data . University New Brunswick, Fredericton. 2003.
6 Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc.
4 Clayden, S.R. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB.
3 Blaney, C.S.; Spicer, C.D.; Mazerolle, D.M. 2005. Fieldwork 2005. Atlantic Canada Conservation Data Centre. Sackville NB.
3 Connell Herbarium Specimen Database Download 2004. Connell Memorial Herbarium, University of New Brunswick. 2004.
2 Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS.
2 Bradford, R.G. et al. 1999. Update on the Status of Striped bass (Morone saxatilis) in eastern Canada in 1998.
2 Department of Fisheris and Oceans 2001. Atlantic Salmon Maritime provinces overview for 2000.
1 DFO Maritimes 1999. Status of Wild Striped Bass, and Interaction between Wild and Cultured Striped Bass in the Maritime Provinces. Dept of Fisheries & Oceans. Science Stock Status Report D3-22_.
1 Hinds, H.R. 1999. Connell Herbarium Database. University New Brunswick, Fredericton.
1 McLeod, D. & Merrithew, C. 2005. The Inventory of the Flora and Fauna of the French Fort Cove Nature Park. French Fort Cove Development Commission,
1 Scott, Fred W. 1998. Updated Status Report on the Cougar (Puma Concolor couguar) [Eastern population]. Committee on the Status of Endangered Wildlife in Canada (COSEWIC),
1 Spicer, C.D. 2004. Specimens from CWS Herbarium, Mount Allison Herbarium Database. Mount Allison University.
1 Toner, M. 2005. Pers. comm. (e-mail) to C.S. Blaney re findings of NB DNR fieldwork on Parker's Pipewort, carried out in 2005 by Eric Sullivan and Dave Dunnett

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4. MAP SYMBOLOGY

4.1 BIOTA
- Vascular Flora occurrences are shown as yellow-green symbols;
- Nonvascular Flora occurrences are shown as blue-green symbols;
- Vertebrate Fauna occurrences are shown as red symbols;
- Invertebrate Fauna occurrences are shown as orange symbols;
- Wood Turtle watersheds shaded diagonally in green, dense for present, light for possible.
- Freshwater Fish areas shaded perpendicular yellow; lines by yellow cross-bars.
- Saltwater Fish as dark-blue fish symbol; larvae/ eggs as dark-blue small fish symbol.

Symbol shape indicates precision of geolocation:
- circle: within 100s of meters;
- triangle: within kilometers;
- square small: within 5 km, medium: within 10km, large: within 50km
- diamond: within county.

Cetacea are shown (for marine sites) as

- S1 to S1S2 taxa as yellow flukes
- S2 to S2S3 taxa as magenta flukes
- S3 to S3S4 taxa as red flukes
- S4 taxa as light blue flukes

4.2 SPECIAL AREAS
- Study Area buffer is shown as a red circle, labeled with radius;
- Managed/Protected Areas are shown as red outlines with light-yellow fill (red-bordered diamond-shaped polygons represent sites with unknown boundaries);
- Environmentally Significant Areas are shown as shadowed green cubes (green-bordered diamond-shaped polygons represent sites with known areas)

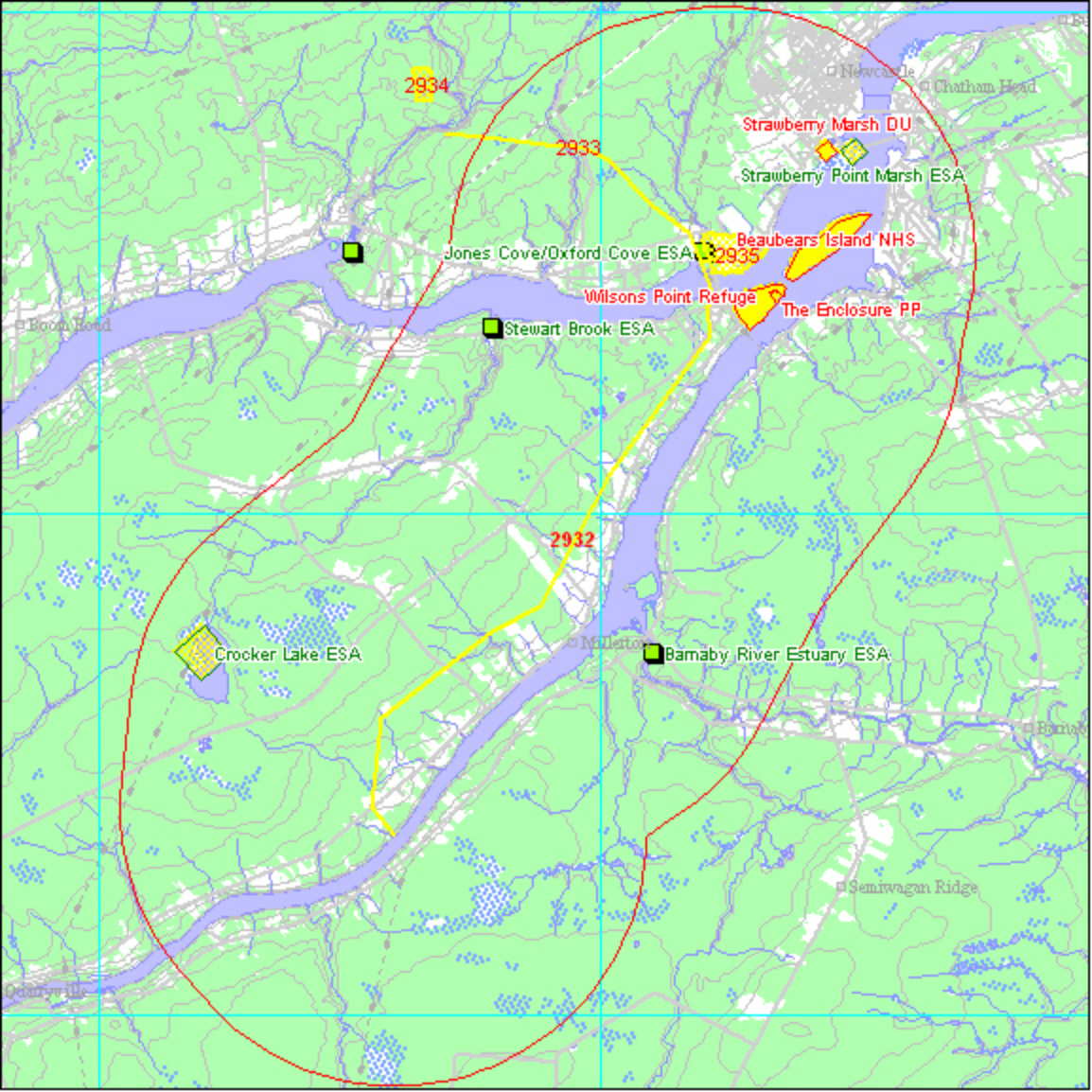
4.3 ENVIRONMENT (as in National Topographic Series)
- Hydrology is shown as medium blue polygons and lines;
- Wetlands are shown as speckled blue polygons;
- Forest-cover is shown as light green polygons;
- Towns are shown as small light grey squares;
- Roads are shown as light grey lines;
- 10km UTM grid is shown as light blue lines.

---

5. CAVEATS

While the ACCDC makes a strong effort to verify the accuracy of all the data it obtains, generates and manages, it shall not be held responsible for any inaccuracies in any data that it provides. The following CAVEATS apply:

a.) ACCDC data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
b.) To ensure the currency of data, the ACCDC requires Data Users to destroy all copies of data **12 months** after receipt; if data is still needed after that term, the ACCDC will supply current data as a replacement.
c.) ACCDC data responses are restricted to that data in our Data System at the time of the data request.
d.) Data is qualified as to location (Precision) and time (SurveyDate); cf attached Data Dictionary for details.
e.) ACCDC data reports are not to be construed as exhaustive inventories of taxa in an area.
f.) The non-occurrence of a taxon cannot be inferred by its absence in an ACCDC data report.


2934
2933
2935
2932
Strawberry Marsh DU
Strawberry Point Marsh ESA
Beaubears Island NHS
Jones Cove/Oxford Cove ESA
Wilsons Point Refuge
The Enclosure PP
Stewart Brook ESA
Crocker Lake ESA
Barnaby River Estuary ESA
Newcastle
Chatham Head
Boom Road
Millerton
Semiwagan Ridge
Derbyville

ATTACHMENT F

Wastewater Lagoon Groundwater Monitoring Information

AMEC, September 13, 2002 letter report, *Preliminary Assessment of Sludge and Aerated Stabilization Basin and Boiler Ash – UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE22027.*

September 13, 2002

TE22027

Mr. Phil Riebel
Environmental Manager
UPM – Kymmene Miramichi Inc.
P.O. Box 5040
Miramichi, NB

Dear Mr. Riebel:

Re: Preliminary Assessment of Sludge from Aerated Stabilization Basin and Boiler Ash – UPM-Kymmene Miramichi Inc., Miramichi, NB

AMEC Earth & Environmental Limited (AMEC) was retained by UPM–Kymmene Miramichi Inc. (UPM) to collect sludge samples from the aerated stabilization basin (ASB), the boiler ash cell (BAC) and the ash conveyor within the UPM facility situated in Miramichi City, NB. The work was completed in accordance with the scope of work outlined in our proposal dated March 4, 2002 and subsequent email forwarded to UPM on March 15, 2002.

The following outlines the scope of work for the project, the analytical results, and compares analyses to established guidelines.

Scope of Work

The purpose of the sampling program was to gain a preliminary assessment of the suitability of the sediments from the ASB and BAC for disposal through various land applications or composting opportunities. It is AMEC 's understanding that UPM is considering dredging the northern third of the ASB (approximate dimensions 200 metres by 140 metres) and one of the BAC (approximate dimensions 50 metres by 50 metres). As a result, our sampling was restricted to these areas. UPM representatives have estimated sludge depths in both the ASB and BAC at 1.5 metres – 3.0 metres.

Sampling Methodology

On March 26, 2002, representatives on AMEC were at the UPM facility to collect samples from the ASB, the BAC and the ash conveyor within the mill. The following methods were employed to collect the samples.

Aerated Stabilization Basin

AMEC separated the proposed area to be dredged within the ASB into three zones with analyses being completed on single composite samples from each zone. Zone A included an area extending the entire width the ASB from the northern berm to a point 70 metres south. Zone B extended the entire width of the ASB from a point 70 metres to a point 140 metres south

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of the northern berm, while Zone C included an area extending the entire width of the ASB from a point 140 metres to a point 200 metres south of the northern berm. The approximate location of the sampling points are provided in Figure 1 (attached).

The sludge samples were obtained using a manually operated core sampler. Every attempt was made to extract the sample from the full depth of the sludge with the average sampling depth estimated to be 3.0 to 4.0 metres below water surface at each location.

AMEC collected sludge samples from three (3) locations within each zone and combine the samples to form a representative composite sample for each zone using a quartering method. With this method, a homogenous aggregate of the three samples was divided into quarters and two randomly chosen quarters were discarded at each division until the appropriate composite sample volume was obtained.

Boiler Ash Cell & Boiler Conveyor

AMEC was unable to collect the sludge samples for the boiler ash cells as the surface of the cells were frozen during our visit. Attempts to manually remove enough ice in order to obtain a sample were unsuccessful. A single load of the ash was delivered to the site and deposited in the frozen cell while AMEC staff was working in the ASB. A single sample of this material was collected and forwarded to the laboratory for analyses at the direction of UPM. A sample of boiler ash was also collected from an ash conveyor at the location specified by the UPM staff.

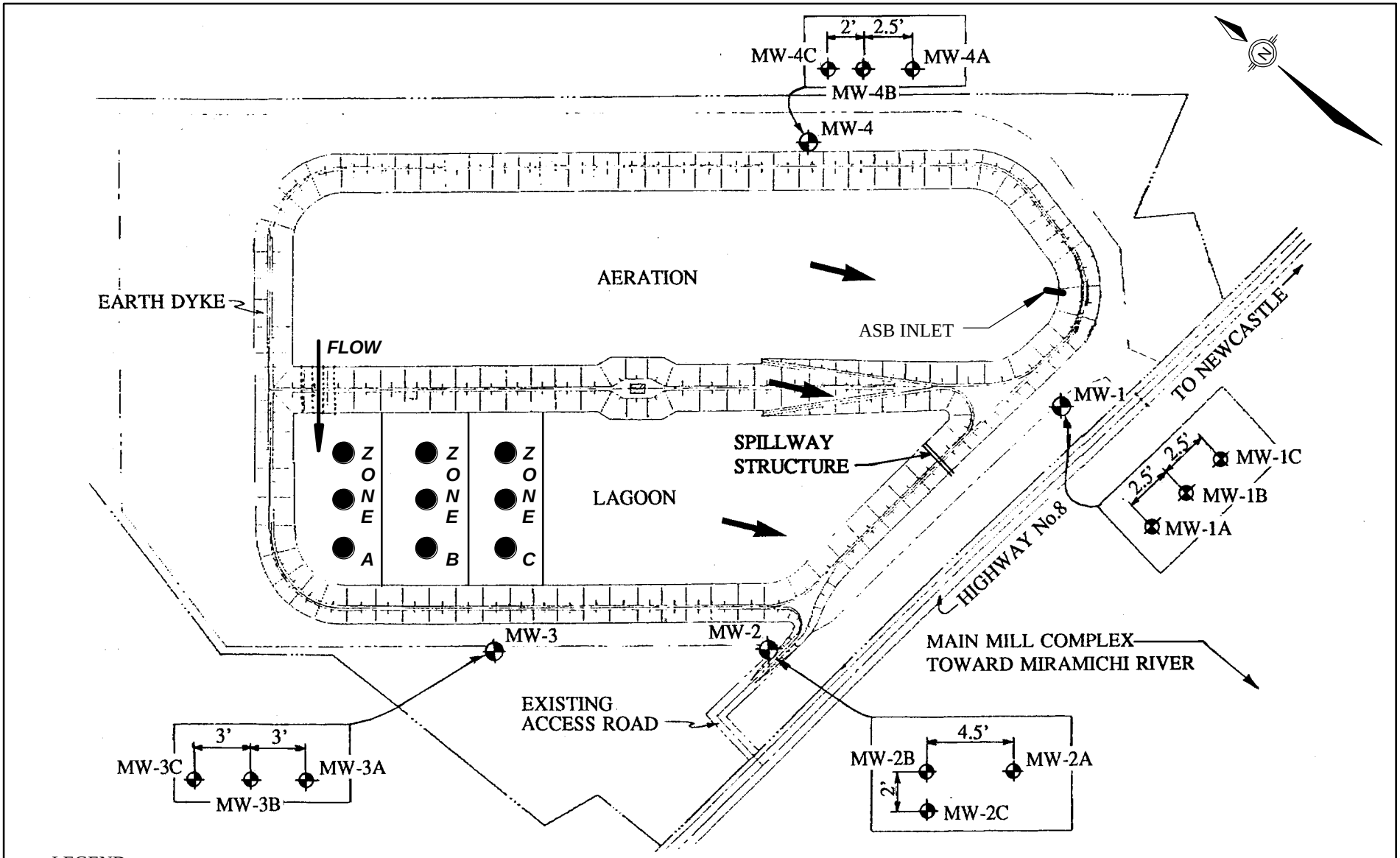
Laboratory Analyses

The New Brunswick Department of Environmental and Local Government (NBELG) Guidelines for Issuing Certificates of Approval for the Utilization of Waste as Soil Additives recognizes that industrial sludge may contain contaminants not specifically covered under this guideline. The document stipulates that additional parameters are required for characterization purposes. Based on the review of the applicable guidelines and conversations with NBDELG representatives, the potential recipient of the sludge, and UPM representatives, the samples were analysed for the following parameters: total solid (%), total volatile solid (%), moisture content (%), pH, nutrients levels, trace metals including mercury, sodium, chloride, TPH/BTEX, PAH, PCB and dioxin/furans. The Nutrient level analyses are to include Total Kjeldahl Nitrogen (TKN), ammonium, nitrate and nitrite, total phosphorus, potassium, calcium and magnesium.

A total of three (3) composite sludge samples from the ASB, one (1) sample for the ash from the BAC, and one (1) sample from the boiler ash conveyor were submitted to a Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited facility for analyses.

Results

The results of the analytical analyses conducted on the samples for the ASB, BAC, and the ash conveyor are presented in the attached Tables 1 through 5. With the exception of the hydrocarbon results, the results were compared to the New Brunswick Guidelines for Issuing Certificates of Approval for the Utilization of Wastes as Soil Additives (NBGUWSA) and Canadian Council of Ministers of the Environment (CCME) guidelines for Canadian Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health. The CCME SQG offers several acceptable concentrations for each listed parameter depending on land use. Based on conservations with UPM representatives, the fate of the material from the ASB and



LEGEND

APPROXIMATE SLUDGE SAMPLING LOCATION
GROUNDWATER FLOW DIRECTION

0 50 100 150 200
METRES

SOURCE: MODIFIED AFTER GEOCON 91/01/14.

FIGURE 1
APPROXIMATE SAMPLING LOCATIONS
AERATED STABILIZATION BASIN

amec

R-UPM 02-2/sludge samples (2002/02/19)

BAC is presently unknown but is being considered as a potential feedstock for an industrial composting operation. Therefore, the results have been compared to the CCME industrial land use levels. A comparison to the CCME Guidelines for compost quality (category B) has also been included.

The material from the ash conveyor is being considered for direct land application and was compared to the agricultural guidelines. Changes to the fate of the material would require a re-evaluation of the applicability of the guidelines.

The hydrocarbon results were compared to the Provincial Tier I Guidelines for the Management of Contaminated Sites. These guidelines define acceptable levels of hydrocarbon in soil based on site characteristics such as land use including surrounding properties, utilization of ground water in the area, and site soil conditions. For the purpose of this project, the most stringent guideline was considered as the location and characteristics of the composting site are presently unknown.

Inorganic Analyses

The inorganic analyses (Table 1) suggest sludge samples for the ASB meet the NBGUWSA and CCME industrial level guidelines with the exception of one parameter. Zinc levels in all three of the composite samples from the ASB were found to exceed the specified CCME Guidelines of 360 ppm. Zinc values in these samples varied from 664 to 687 ppm. Elevated zinc levels were also noted in the BAC sample (547 ppm). The BAC sample tested above the CCME industrial guidelines for Nickel (50 ppm) with a result of 110 ppm.

The ash conveyor sample was found to generally comply with the NBGUWSA and CCME Soil Quality Guidelines for agricultural land with a few exceptions. The sample analysed showed cadmium levels of 2.0 ppm and zinc levels of 220 ppm. These values are above the respective CCME agricultural levels of 1.4 ppm and 200 ppm for Cadmium and Zinc.

Although the above-mentioned exceedances do not comply with the applied CCME guidelines, a comparison to the NBGUWSA, and the applicable composting guidelines reveal that the inorganic results meet the requirements for maximum acceptable metal concentration in waste and category B compost.

TPH Analyses

The hydrocarbon analyses (Table 2) were completed as per the requirement of the New Brunswick Guidelines for the Management of Contaminated Sites. The results suggest modified TPH values from the ASB of 1100 ppm to 3700 ppm. These values exceed acceptable limits for residential potable land uses in the Tier I Look Tables. Similarly, the benzene, toluene and ethylbenzene values for all the samples were found to be above this same guideline.

Polycyclic Aromatic Hydrocarbon & Chlorinated Hydrocarbons

The results of Polycyclic Aromatic Hydrocarbon (PAHs) and Polychlorinated Biphenyls (PCBs) (Table 3) analyses indicate values for all three of the ASB samples and the BAC sample are within the CCME Industrial Guidelines. The napthlene level in the AC sample, 0.55 ppm, was

found to be above the CCME agricultural guideline of 0.1 ppm. No PCBs were recorded in any of the samples.

Dioxin and furan analyses (Table 4) indicate levels in two of the three samples from the ASB to be above agricultural guidelines but well within residential/parkland guidelines. No industrial limits are specified within the CCME Soil Quality Guidelines. The total dioxin and furans detected in the ASB ranged from 2.2 to 46.8 ppt NATO–Toxicity Equivalency Quantity(TEQ)/g dry wt where the CCME Guidelines is 10 ppt NATO-TEQ for agricultural soils and 1000 ppt NATO-TEQ for residential/parklands.

Other Analyses

The nutrient analyses (Table 5) show ammonia (as N) to range between 4300 ppm and 6670 ppm and Total Kjeldahl Nitrogen to range between 12 600 ppm and 15 600 ppm in the ASB. The chloride values in the ASB ranged from 2 640 ppm to 3 120 ppm with pH values between 7.5 – 7.6. The total solids for the samples recovered in the ASB varied from 7.4 to 8.7% with the volatile portion comprising 58.5 % to 65.3%.

CONCLUSION

Based on a review of the analytical results, the samples from the ASB and BAC generally meet the CCME Soil Quality Guidelines for industrial land uses with the exception of Zinc in all the samples and Nickel in the BAC sample. The acceptability of this material as a feedstock for an industrial composting operation will be dependant on the facility's ability to reduce these values through the composting process. The hydrocarbon results from the ASB show values in exceedance with the New Brunswick Tier I Guidelines for residential potable sandy soil.

The results from the AC sample generally meet the CCME guidelines for agricultural lands with the exception of two inorganic parameters (cadmium and zinc) and napthalene levels. These inorganic values were found to be within the CCME Category B compost guidelines as well as the provincial guidelines for issuing certificates of approval for the utilization of waste as soil additives (maximum acceptable metal concentration in waste).

We trust this information is sufficient for your needs at this time. Please do not hesitate to contact us at your convenience should you have questions concerning this report.

Sincerely,

G. Todd Scott, B.Sc., CET
Project Manager
Direct Tel: +1 (506) 856-9642
Direct Fax: + 1 (506) 857-9974
Email: todd.g.scott@amec.com

GTS/cjy
Attachments

TABLE 1

Trace Metal Analytical Results

ASB Sludge and Boiler Ash Samples, UPM-Kymmene Miramichi Inc.

Parameters	Concentrations (ppm)[1,2]											
	Sample Identifiation					CCME Guidelines[3]				NB Waste Additive Guidelines[4]	CCME Guidelines for Compost Quality[5]	
	ASB A	ASB B	ASB C	BA 1	AC 1	Agriculture	Residential/ parkland	Commercial	Industrial		Category A	Category B
Aluminum	14200	14900	14100	73100	28900	---[6]	---	---	---	---		
Antimony	0.4	0.4	0.3	0.4	0.1	20	20	40	40	---		
Arsenic	2	1	<1[3]	3	<1	12	12	12	12	75	13	75
Barium	324	392	351	887	603	750	500	2000	2000	---		
Beryllium	0.2	0.2	0.2	0.7	0.3	4	4	4	4	---		
Bismuth	2.0	<1	<1	<1	<1	---	---	---	---	---		
Boron	18	21	15	48	30	---	---	---	---	---		
Cadmium	5.7	6.0	5.6	5.8	*2.0*	1.4	10	22	22	20	3	20
Calcium	38200	36800	36200	145000	72100	---	---	---	---	---		
Chromium	44	23	24	46	17	64	64	87	87	1100	210	
Cobalt	2.5	2.3	1.7	11.4	3.6	40	50	300	300	150	34	150
Copper	23	22	22	42	18	63	63	91	91	850	100	
Iron	3210	3390	2970	10300	3130	---	---	---	---	---		
Lead	33.6	37.6	31.5	58.2	22.5	70	140	260	600	500	150	500
Lithium	4.2	4.1	5.0	33.1	14.5	---	---	---	---	---		
Magnesium	1210	1300	950	7520	3990	---	---	---	---	---		
Manganese	1120	1230	1070	5260	3410	---	---	≤50	---	---		
Mercury	0.24	0.23	0.24	0.20	0.14	6.6	6.6	24	50	5	0.8	5
Molybdenum	2.4	2.2	2.6	2.7	0.9	5	10	40	40	20	5	20
Nickel	24	22	20	**110**	32	50	50	50	50	180	62	180
Phosphorus	4580	48800	3310	3140	1460	---	---	---	---	---		
Potassium	630	720	660	8630	5950	---	---	---	---	---		
Rubidium	3.1	3.4	3.2	29.3	19.3	---	---	---	---	---		
Selenium	2	1	1	<1	<1	2	3	10	10	14	2	14
Silver	1.5	1.6	1.5	1.5	0.5	20	20	40	40	---		
Sodium	4240	4620	4700	6410	1950	---	---	---	---	---		
Strontium	45	43	42	190	125	---	---	---	---	---		
Tellurium	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	---	---	---		
Thallium	0.9	0.9	0.9	1.0	0.3	1	1	1	1	---		
Tin	1.9	1.4	1.6	6.4	1.7	5	50	300	300	---		
Uranium	1.4	2.1	1.6	1.4	0.5	---	---	---	---	---		
Vanadium	71	70	79	**229**	75	130	130	130	130	---		
Zinc	**664**	**687**	**681**	**547**	*220*	200	200	360	360	1850	500	1850

Note:

1. Shaded Italics denote values exceeding CCME Soil Quality Guidelines for agricultural Sites.
2. Shaded Bold denote values exceeding CCME Soil Quality Guidelines for Industrial Sites
3. CCME Guidelines 1999 – Canadian Soil Quality Guidelines for the protection of Environmental and Human Health Table 2 – Historical record of interim remediation criteria for soil and soil quality guidelines.
4. New Brunswick Guidelines for Issuing Certificates of Approval for the Utilization of Waste as Soil Additives
5. CCME Guidelines for Compost Quality, March 1996
6. --- - No Guideline – CCME Guidelines not available for this parameter.

TABLE 2

Analytical Results for BTEX/TPH (Atlantic PIRI Methodology)
ASB Sludge and Boiler Ash Samples, UPM-Kymmene Miramichi Inc.

Sample Location	Sample ID	Date Sampled	Results (ppm)[1,2]								
			Benzene	Toluene	Ethylbenzene	Xylenes	Modified Total Petroleum Hydrocarbons (TPH)				Resemblance
							C6-C10	C10-C21	C21-C32	Total	
Aerated Stabilization Basin	ASB A	26-Mar-02	**<0.10**[2]	**0.81**	**<0.10**	<0.10	2.6	250	830	**1100**	Motor Oil
Aerated Stabilization Basin	ASB B	26-Mar-02	**<0.10**	**0.65**	**<0.10**	<0.10	ND	320	2300	**2600**	Motor Oil
Aerated Stabilization Basin	ASB C	26-Mar-02	**<0.10**	**0.82**	**<0.10**	<0.10	ND	720	3000	**3700**	Motor Oil
Boiler Ash	BA 1	26-Mar-02	**<0.05**	ND	**<0.05**	ND	ND	ND	ND	ND	
Boiler Ash Conveyor Belt	AC 1	26-Mar-02	**<0. 10**	<0.10	**<0.10**	<0.10	ND	ND	ND	ND	
Atlantic PIRI Tier I Risk-Based Screening Levels Residential potable sandy soil			0.01	0.1	0.02	2.4	---	----	---	55 (as Gasoline) 110 (as Diesel/#2) 840 (as #6 Oil)	

Note:

1. Detection limits – 0.01 ppm for benzene and ethylbenzene; 0.05 ppm for toluene and xylene; 2.5 ppm TPH (as gasoline); 25 ppm TPH (as fuel oil); 40 ppm TPH (as motor oil)
2. Shaded Bold denotes values above the provincial guidelines for residential with potable water use and sandy soils.

TABLE 3

Analytical Results for Polycyclic Aromatic Hydrocarbons (PAH) &
Polychlorinated Biphenyls (PCB)
ASB Sludge and Boiler Ash Samples, UPM-Kymmene Miramichi Inc.

Parameters	Concentrations (ppm)[1,2,3]								
	Sample identification					CCME Guidelines[4]			
	ASB A	**ASB B**	**ASB C**	**BA 1**	**AC 1**	Agriculture	Residential/ parkland	Commercial	Industrial
Naphthalene	0.16[3]	0.18	0.16	1.68	*0.55*[2]	0.1	0.6	22	22
Acenaphthylene	ND	ND	ND	0.27	ND	---[3]	---	---	---
Acenaphthene	ND	ND	ND	ND	ND	---	---	---	---
Fluorene	ND	0.10	ND	ND	ND	---	---	---	---
Phenanthrene	ND	ND	ND	*0.65*	ND	0.1	5	50	50
Anthracene	18.2	42.8	22.0	0.10	ND	---	---	---	---
Fluoranthene	0.22	0.30	0.29	0.47	ND	---	---	---	---
Pyrene	0.19	0.32	0.29	*0.39*	ND	0.1	10	100	100
Benzo(a)anthracene	ND	0.1	0.1	0.06	ND	0.1	1	10	10
Chrysene/Triphenylene	ND	ND	ND	0.17	ND	---	---	---	---
Benzo(b+k)fluoranthene	ND	ND	ND	0.06	ND	0.1	1	10	10
Benzo(e)pyrene	ND	ND	ND	0.07	ND	---	---	---	---
Benzo(a)pyrene	ND	ND	ND	0.05	ND	0.1	0.7	0.7	0.7
Indenopyrene	ND	ND	ND	ND	ND	0.1	1	10	10
Benzo(ghi)perylene	ND	ND	ND	0.06	ND	---	---	---	---
Dibenzo(ah)anthracene	ND	ND	ND	0.05	ND	0.1	1	10	10
PCB's	ND	ND	ND	ND	ND	0.5	1.3	33	33

Note:

1. Shaded Italics denote values above the CCME agricultural Guidelines.
2. --- - No Guideline – CCME does not have Guidelines for all parameters.
3. ND - not detected.
4. CCME Guidelines 1999 – Canadian Soil Quality Guidelines for the protection of Environmental and Human Health Table 2 – Historical record of interim remediation criteria for soil and soil quality guidelines.

TABLE 4

Analytical Results for Dioxins and Furans

ASB Sludge and Boiler Ash Samples, UPM-Kymmene Miramichi Inc.

Parameters	Concentration (ppt-NATO-TEQ dry wt.)[1,2,3]								
	Sample identification					CCME Guidelines[4,5]			
	ASB A	**ASB B**	**ASB C**	**BA 1**	**AC 1**	Agriculture	Residential/ parkland	Commercial	Industrial
Congeners									
2,3,7,8-TCDD	41.1	<9.2	25.7	<0.2	<0.3	---	---	---	---
1,2,3,7,8 – PeCDD	3.5	<2.3	3.9	0.5	<0.5	---	---	---	---
1,2,3,4,7,8-HxCDD	1.28	<1.5	<1.12	0.26	0.26	---	---	---	---
1,2,3,6,7,8 –HxCDD	<1.06	<1.55	<2.27	0.21	<0.11	---	---	---	---
1,2,3,7,8,9-HxCDD	<1.51	1.49	<1.9	0.26	<0.12	---	---	---	---
1,2,3,4,6,7,8-HpCDD	<0.921	<1.28	<1.38	<0.086	<0.052	---	---	---	---
OCDD	0.592	0.72	0.999	0.0104	0.0029	---	---	---	---
2,3,7,8-TCDF	<11.7	<4.59	<6.9	0.24	<0.06	---	---	---	---
1,2,3,7,8-PeCDF	0.38	<0.45	<0.35	<0.02	<0.02	---	---	---	---
2,3,4,,7,8-PeCDF	<3.3	<4.35	<3.4	<0.3	<0.2	---	---	---	---
1,2,3,4,7,8-HxCDF	<0.65	<0.8	<0.71	<0.06	<0.02	---	---	---	---
1,2,3,6,7,8-HxCDF	<0.58	<0.71	<0.63	<0.03	<0.02	---	---	---	---
2,3,4,6,7,8-HxCDF	<0.66	<0.82	<0.72	<0.04	<0.02	---	---	---	---
1,2,3,7,8,9-HxCDF	<0.73	<0.89	<0.79	<0.04	<0.02	---	---	---	---
1,2,3,4,6,7,8-HpCDF	<0.097	<0.117	0.091	<0.007	<0.005	---	---	---	---
1,2,3,4,7,8,9-HpCDF	<0.074	<0.142	<0.082	<0.004	<0.006	---	---	---	---
OCDF	<0.0239	<0.019	<0.0252	<0.0014	<0.0006	---	---	---	---
Total (detected +(0xDLxI-TEF))	***46.8***	2.2	*30.7*	1.5	0.3	10	1000	---	---
Total (Max. possible: Detected + (1xDLxI-TEF))	<68.1	<30.9	<51.0	<2.3	<1.7	---	---	---	---
Concentration (ppt dry wt)									
Homologues									
TCDD	1100	181	1050	556	370	---	---	---	---
PeCDD	378	257	654	224	140	---	---	---	---
HxCDD	349	235	377	111	81.5	---	---	---	---
HpCDD	76.6	117	NDR	NDR	NDR	---	---	---	---
OCDD	592	720	999	10.4	2.9	---	---	---	---
Total Dioxins	2500	1510	3080	901	594	---	---	---	---
TCDF	52.3	10.8	36.6	4.6	0.2	---	---	---	---
PeCDF	29.8	49.1	68	1.4	NDR	---	---	---	---
KxCDF	ND[5]	ND	7.4	0.3	0.3	---	---	---	---
HpCDF	NDR	13.5	25.4	NDR	ND	---	---	---	---
OCDF	NDR	NDR	NDR	NDR	NDR	---	---	---	---
Total Furans	82.1	73.4	137	6.3	0.5	---	---	---	---

Note:

1. Bold Italics denote values above the CCME Soil Quality Guidelines for agricultural sites.
2. NDR – Not detected due to incorrect isotope ratio.
3. ND – Not detected.
4. CCME Guidelines 1999 – Canadian Soil Quality Guidelines for the protection of Environmental and Human Health Table 2 – Historical record of interim remediation criteria for soil and soil quality guidelines.
5. --- - No Guideline – CCME Guidelines not available for this parameter.

TABLE 5

Other Analytical Results

ASB Sludge and Boiler Ash Samples, UPM-Kymmene Miramichi Inc.

Parameters	Concentrations (ppm)				
	Sample Identification				
	ASB A	**ASB B**	**ASB C**	**BA 1**	**AC 1**
Ammonia (as N)	4300	6670	4190	14	<10
Chloride	2640	4590	3120	<50	<75
Kjeldahl Nitrogen	12600	15100	15600	378	609
Nitrate (as N)	<25	<15	<15	<10	<10
Nitrite (as N)	<25	<15	<15	<10	<10
Moisture (%)	92.6	91.9	91.3	74.2	88.3
pH (units)	7.6	7.6	7.5	11.6	11.8
Total solids (%)	7.4	8.1	8.7	25.8	11.7
Total Volatile Solids (%)	58.5	65.3	59.4	10.9	72.1

January 31, 2003

TE22089

Mr. Phil Riebel
Environmental Manager
UPM – Kymmene Miramichi Inc.
P.O. Box 5040
Miramichi, NB E1V 3N3

Dear Mr. Riebel:

Re: Groundwater and Landfill Leachate Sampling Results – UPM-Kymmene Miramichi Inc., Miramichi, NB

AMEC Earth & Environmental Limited (AMEC) was retained by UPM–Kymmene Miramichi Inc. (UPM) to collect groundwater and leachate samples from established sampling points around the aeration stabilization basin (ASB) and old landfill site. The work was completed as a requirement of the facility's Certificate of Approval to Operate, I-2327 (CoA), issued by the New Brunswick Department of Environment and Local Government (NBDELG) in December 1999.

An AMEC representative collected groundwater samples on September 19, 2002 from four monitoring wells surrounding the ASB. The water level in each well was measured and an adequate volume of the water was purged from the wells prior to sampling to ensure a representative sample was collected. A sample from the scale house well and from the old landfill site at the point of the confluence of the perimeter ditch and the Miramichi River were also obtained during the site visit. All the samples were forward to accredited laboratories and analyzed for the parameters set forth in the CoA.

A summary of the groundwater inorganic and resins and total fatty acids are provided in Table 1 (attached) with the ASB influent analytical results included in Table 2 (attached). The Canadian Council of Ministers of the Environment (CCME) Guidelines for Canadian Drinking Water Quality have been included in Table 1 for comparative purposes, with any exceedances highlighted for your convenience. The analytical results fall within acceptable limits with the exception of several of the arsenic values, where levels above the CCME guidelines were noted for MW-2C, MW-3C and MW-4C. Levels of iron in the scale house well and levels of manganese in MW-1C, MW-2C, MW-3C and the scale house well were also found to be above the CCME aesthetic guidelines.

A review of regional water chemistry data supplied by NBDELG for areas in a 1-kilometre, 2-kilometre, 3-kilometre, 4-kilometre and 5-kilometer radius around the ASB was completed. Reported arsenic levels in groundwater samples ranged from non-detectable to 5.5 mg/L, with approximately one-third of all results exceeding the CCME guidelines. Iron levels were found to range from non-detectable to 2.21 mg/L, with approximately one-fifth of all results exceeding the CCME guidelines. Manganese levels were found to range from non-detectable to 1.46

…/2

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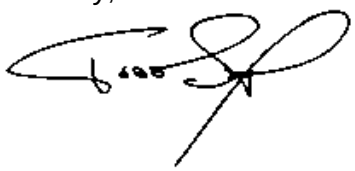
mg/L, with approximately nine-tenths of all results exceeding the CCME guidelines. Exceedences were reported in all five of the above noted areas This data is comprised of analytical results for seventy-six samples obtained by NBDELG since 1994 from a variety of residential, commercial, institutional and industrial wells. Considering that ASB influent arsenic levels fall below the CCME guideline levels and approximately one-third of wells tested by NBDELG in the area exceed the guidelines, the arsenic levels in the groundwater wells surrounding the ASB appear to be indicative of naturally occurring conditions in the area, rather than from ASB operations.

Water levels were also obtained in all the monitoring wells on the site and the groundwater flow determined. The interpreted groundwater flow direction is in a southeastern direction toward the Miramichi River and is similar to previous sampling events. The general flow direction of the shallow aquifer and deep aquifers is provided in Figures 1 and 2, respectively.

Table 3 contains the pentachlorophenol (PCP), resins and fatty acids, inorganic analytical results, and toxicity tests for the leachate sample collected from the old landfill. The CCME guidelines for Freshwater Aquatic Life have been provided for comparative purposes and exceedances highlighted for your convenience. The PCP and resins and fatty acids were all determined to be below the detection limits except for palmitic and stearic which had concentrations of 1.9 and 1.6 ug/L, respectively. The toxicity analysis indicates the sample is non-lethal with no mortality at any of the concentrations tested.

We trust this information is sufficient for your needs at this time. Please do not hesitate to contact us at your convenience should you have questions concerning this report.

Sincerely,



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TM/cjy

Attachments

TABLE 1
Summary of Groundwater Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi City, NB

Analytes	Detection Limits	Monitoring Stations: MW-1C						MW-2C						MW-3C						MW-4C						Scale House						CCME Criteria[1] Drinking Water
		29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	
Inorganic Analytes (units)																																
Arsenic (mg/L)	0.001	0.004	<0.001	< 0.001	< 0.001	0.013	<0.001	0.006	0.021	**0.036** [2]	< 0.001	**0.109**	**0.156**	**0.099**	**0.054**	**0.082**	**0.095**	**0.1**	**0.13**	**0.093**	**0.037**	**0.098**	**0.112**	**0.172**	**0.147**	<0.001	<0.001	0.002	< 0.001	< 0.001	<0.001	0.025
Iron (mg/L)	0.02	**4.4**	**0.36**	0.038	**1.81**	**2.09**	<0.02	**7.57**	0.13	0.038	**1.05**	**2.31**	0.2	0.25	0.14	0.006	**20.2**	**0.679**	0.02	**4.98**	**0.75**	0.011	**18.5**	**4.38**	0.02	**0.57**	0.07	<0.005	0.21	**0.914**	**1.36**	≤ 0.3 (4)
Lead (mg/L)	0.0001	0.0004	<0.0001	< 0.01	< 0.01	< 0.001	0.0001	0.0009	<0.0001	< 0.01	< 0.01	<0.001	<0.0001	0.0004	<0.0001	< 0.01	0.02	<0.001	<0.0001	0.0005	<0.0001	< 0.01	< 0.01	< 0.001	0.0001	<0.0001	<0.0001	< 0.01	< 0.01	< 0.001	0.0002	0.01
Calcium (mg/L)	0.05	13	14.7	13.4	13	34.3	19.1	21	10.9	8.71	11	15	4.75	11.6	12.5	11.1	13	13.6	25	9.6	8.81	8.26	7.6	13	5.2	55.4	65.9	55.4	55	60	62.5	- - -
Sodium (mg/L)	0.05	57	52.8	50.5	52	49	33.5	58.3	46.4	32.3	36	38.6	83.8	71.9	50.9	59.3	60	57.2	38.1	48.3	49.8	48.1	51	55.1	151	24.7	45.1	27.4	24	25.8	24.6	≤ 200
Manganese (mg/L)	0.001	**1.67**	**2.41**	**1.74**	**2.21**	**0.682**	**0.549**	**6.31**	**0.872**	**0.59**	**0.79**	**0.355**	**0.236**	**0.195**	**0.323**	**0.181**	**0.44**	0.09	**0.249**	**0.258**	**0.193**	**0.21**	**0.32**	**0.13**	0.045	**1.15**	**1.12**	**1.05**	**1.00**	**0.711**	**1.360**	≤ 0.05 (4)
Chloride (mg/L)	0.1	43.4	55.3	42	44	38.7	0.008	85.5	13.6	24	38	47.5	0.0085	2.8	2.3	2.5	2.9	2.5	0.0358	4.2	6.1	5.6	5	6.4	0.0037	45.4	46.7	49	42	39.9	0.0479	≤ 250
Aluminum (mg/L)	0.001	0.229	0.042	< 0.025	1.2	0.026	0.014	0.200	0.008	0.027	0.85	0.042	0.016	0.346	0.003	< 0.025	19.4	0.587	0.002	0.228	0.273	< 0.025	7.51	0.089	0.032	<0.001	<0.001	< 0.025	0.032	0.01	<0.001	- - - (5)
pH (units)	NA [6]	6.9	6.7	6.5	6.6	6.64	7.2	6.8	7.2	6.7	6.7	6.99	7.5	7.7	7.5	7.2	7.3	7.53	7.4	7.0	6.9	6.6	6.8	6.93	8.0	7.7	7.8	7.1	7.3	7.56	7.4	6.5-8.5
Resins and Fatty Acids (units)																																
Abietic Acid (ug/L)	0.03	ND [7]	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Oleic Acid (ug/L)	0.03	1.7	2.2	ND	ND	ND	ND (8)	ND	2.5	ND	ND	ND	ND (8)	1.8	8.4	ND	ND	ND	ND (8)	1.5	3.3	ND	ND	ND	ND (8)	1.9	3.2	ND	ND	ND	ND (8)	- - -
Pimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -

Notes - "1" denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Drinking Water Quality
- 2 "shaded" areas denote values in exceedence of the CCME guidelines
- "3" bold denotes values in exceedance of the CCME aesthetic guidelines
- "4" denotes CCME aesthetic guidelines
- 5 "- - -" denotes no guideline
- 6 "NA" denotes Not Applicable
- 7 ND denotes Not Detected
- "8" denotes detection limit of 1 ug/L

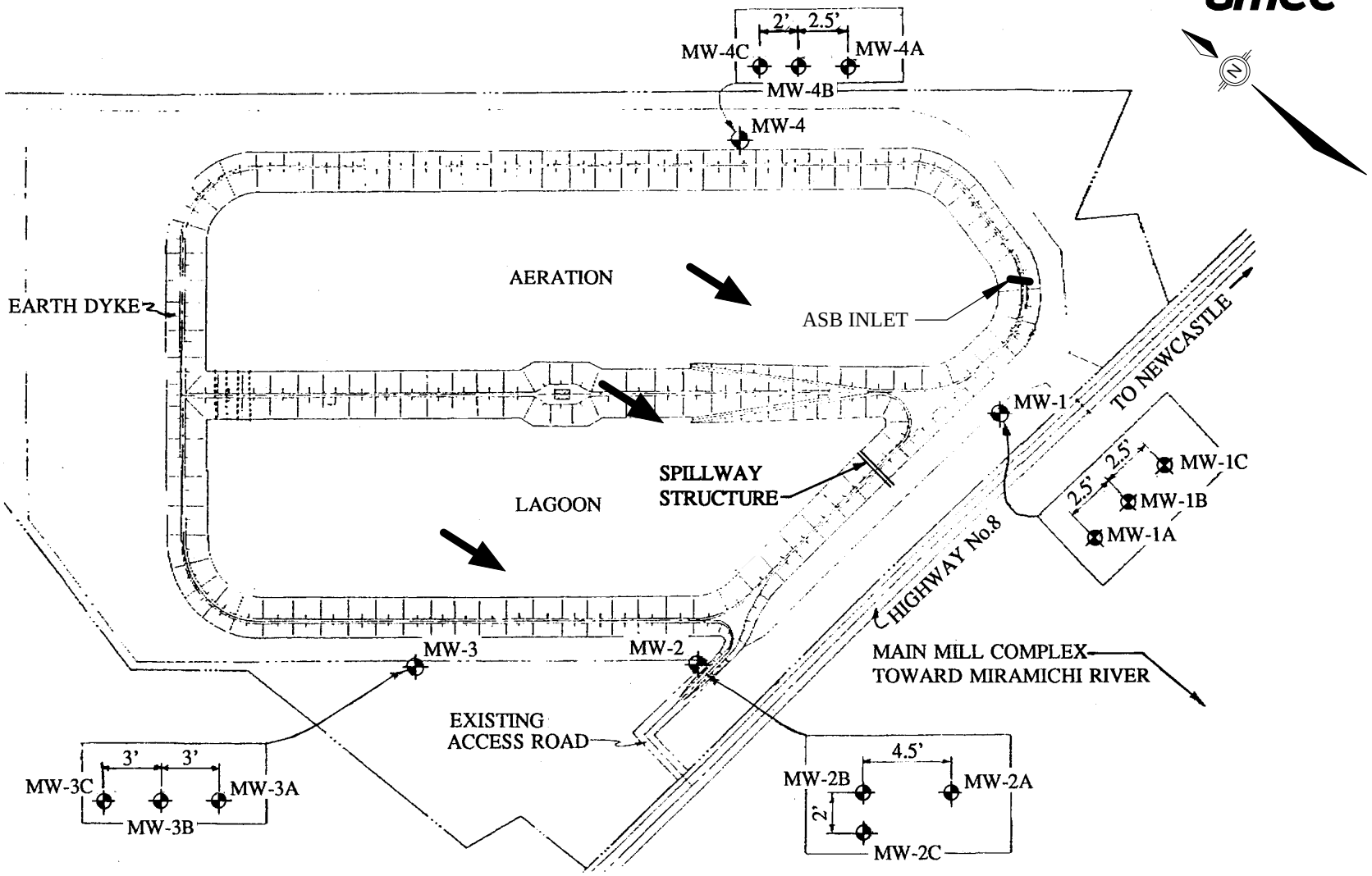
TABLE 2
Summary of ASB Influent Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi Inc., NB

Analytes	Detection Limits	ASB Inlet		
		24-Aug-00	13-Nov-01	19-Sep-02
Inorganic Analytes (units)				
Arsenic (mg/L)	0.001	< 0.001	0.002	0.002
Iron (mg/L)	0.02	0.55	0.477	1.09
Lead (mg/L)	0.0001	< 0.01	0.043	0.0082
Calcium (mg/L)	0.05	214	213	166
Sodium (mg/L)	0.05	405	3120	329
Manganese (mg/L)	0.001	2.73	0.281	2.51
Chloride (mg/L)	0.1	385	193	0.182
Aluminum (mg/L)	0.001	2.3	5.3	4.56
pH (units)	NA	6.4	6.5	7.0
Resins and Fatty Acids (units)				
Abietic Acid (ug/L)	1	766	14.7	630
Dehydroabietic Acid (ug/L)	1	89	13.9	1020
Isopimaric Acid (ug/L)	1	1410	2.7	240
Levopimaric Acid (ug/L)	1	ND	2.79	ND
Neoabietic Acid (ug/L)	1	188	1.72	100
Oleic Acid (ug/L)	1	1470	4.14	260
Pimaric Acid (ug/L)	1	1160	2.5	110
1,4 - Chlorodehydroabietic Acid (ug/L)	1	808	1.47	ND
1,2 - Chlorodehydroabietic Acid (ug/L)	1	ND	ND	ND

TABLE 3
Summary of Leachate Analytical Results, Old Landfill
UPM-Kymmene Miramichi Inc., NB

ANALYTES	Monitoring Stations								CCME Criteria
	Detection	Old Landfill							Freshwater
	Limits	2002	2001	2000	1999	1998	1997	1996	Aquatic life
PCP (units)									
Monochlorophenols (ug/L)	2	ND [1]	NS [2]	NS	ND	ND	ND	NS	7
Dichlorophenols (ug/L)	1	ND	NS	NS	ND	ND	ND	NS	0.2
Trichlorophenols (ug/L)	1	ND	NS	NS	ND	ND	ND	NS	18
Tetrachlorophenols (ug/L)	0.75	ND	NS	NS	ND	ND	ND	NS	1
Pentachlorophenols (ug/L)	0.25	ND	ND	ND	ND	ND	ND	ND	0.5
Resins and Fatty Acids (units)									
Abietic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	2.5	- - - [(4)]
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	NS	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Oleic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Pimaric Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	NS	- - -
Sandaracopimaric (ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Palustric (ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Palmitic (ug/L)	1	1.9	NS	NS	NS	NS	NS	2.3	- - -
Stearic (ug/L)	1	1.6	NS	NS	NS	NS	NS	1.8	- - -
Linoleic (ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Linolenic(ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Inorganic Parameters (units)									
pH (units)	NA [5]	NS	8.4	8.2	8.2	NS	NS	NS	- - -
Aluminum (mg/L)	0.005	0.034	**0.122** [7]	0.073	0.047	0.14	**0.129**	0.45	0.005 - 0.1[(2)]
Chloride (mg/L)	0.1	790	618	75	200	0.176	0.202	0.171	- - -
Toxicity (units)									
Daphnia Magna (% mortality)	NA	NS	NS	NS	0	0	0	0	- - -
Rainbow Trout (% mortality)	NA	0	0	0	0	0	0	0	- - -

Note - 1 "ND" denotes Not Detected
- 2 "NS" denotes sample not tested
- "3" denotes earlier detection limit of 1 ug/L
- 4 "- - -" denotes no guideline
- 5 NA denotes Not Applicable
- "6" CCME Criteria varies with pH, 0.005 mg/L; 0.1 mg/L for pH $\geq$ 6.5
- 7 "shaded" areas indicate the corresponding CCME criteria are exceeded.



LEGEND

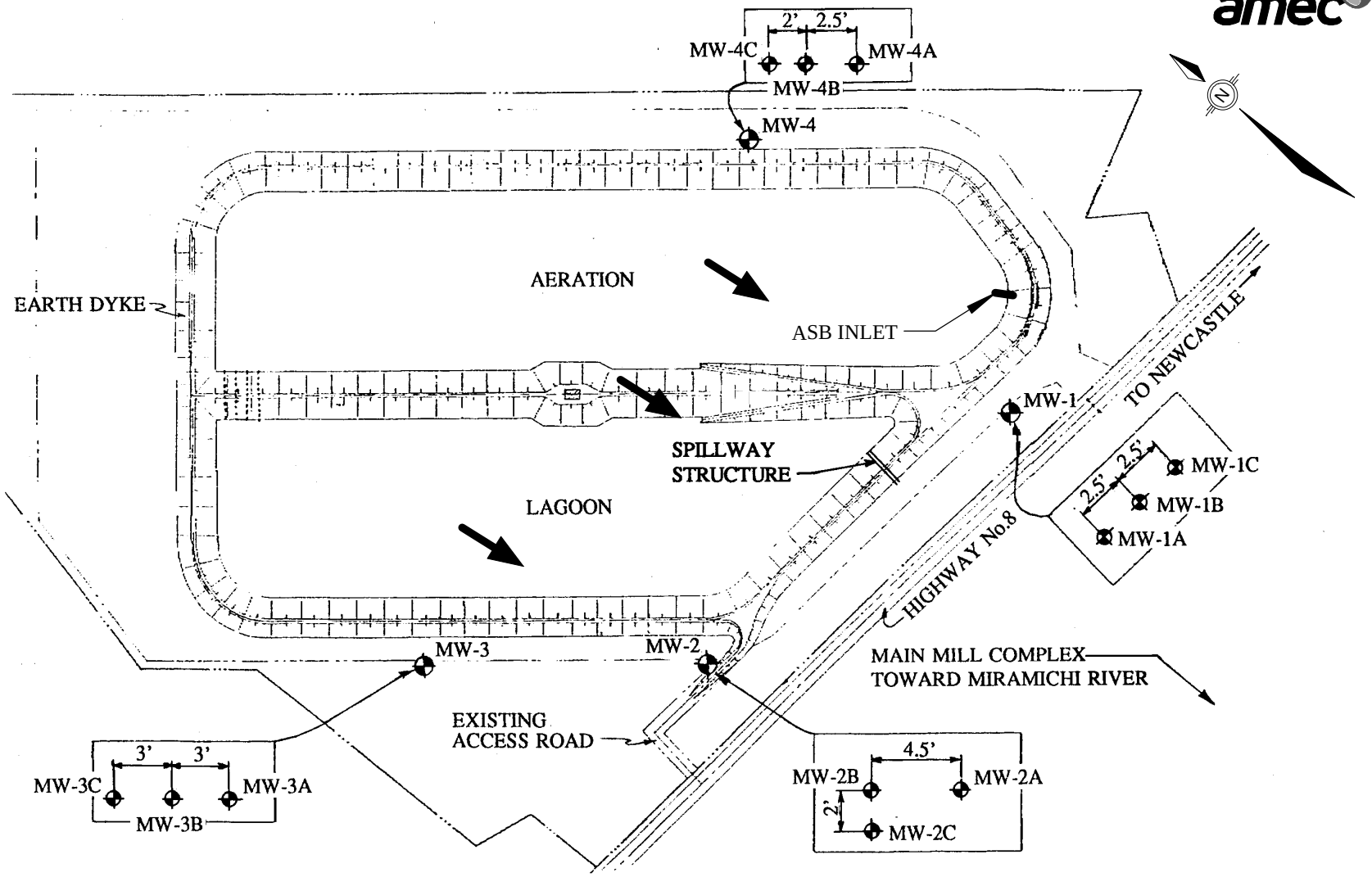
APPARENT GROUNDWATER FLOW DIRECTION
(SEPTEMBER 19, 2002)

0 50 100 150 200
METRES

SOURCE: MODIFIED AFTER GEOCON 91/01/14.

FIGURE 1
SHALLOW GROUNDWATER FLOW DIRECTION

TE22089/shallow gwater (2002/12/10)



LEGEND

APPARENT GROUNDWATER FLOW DIRECTION
(SEPTEMBER 19, 2002)

0 50 100 150 200
METRES

SOURCE: MODIFIED AFTER GEOCON 91/01/14.

FIGURE 2
DEEP GROUNDWATER
FLOW DIRECTION

TE22089/deep gwater (2002/12/10)

AMEC, January 31, 2003 letter report, *Groundwater and Landfill Leachate Sampling Results - UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE22089.*

January 31, 2003

TE22089

Mr. Phil Riebel
Environmental Manager
UPM – Kymmene Miramichi Inc.
P.O. Box 5040
Miramichi, NB E1V 3N3

Dear Mr. Riebel:

Re: Groundwater and Landfill Leachate Sampling Results – UPM-Kymmene Miramichi Inc., Miramichi, NB

AMEC Earth & Environmental Limited (AMEC) was retained by UPM–Kymmene Miramichi Inc. (UPM) to collect groundwater and leachate samples from established sampling points around the aeration stabilization basin (ASB) and old landfill site. The work was completed as a requirement of the facility's Certificate of Approval to Operate, I-2327 (CoA), issued by the New Brunswick Department of Environment and Local Government (NBDELG) in December 1999.

An AMEC representative collected groundwater samples on September 19, 2002 from four monitoring wells surrounding the ASB. The water level in each well was measured and an adequate volume of the water was purged from the wells prior to sampling to ensure a representative sample was collected. A sample from the scale house well and from the old landfill site at the point of the confluence of the perimeter ditch and the Miramichi River were also obtained during the site visit. All the samples were forward to accredited laboratories and analyzed for the parameters set forth in the CoA.

A summary of the groundwater inorganic and resins and total fatty acids are provided in Table 1 (attached) with the ASB influent analytical results included in Table 2 (attached). The Canadian Council of Ministers of the Environment (CCME) Guidelines for Canadian Drinking Water Quality have been included in Table 1 for comparative purposes, with any exceedances highlighted for your convenience. The analytical results fall within acceptable limits with the exception of several of the arsenic values, where levels above the CCME guidelines were noted for MW-2C, MW-3C and MW-4C. Levels of iron in the scale house well and levels of manganese in MW-1C, MW-2C, MW-3C and the scale house well were also found to be above the CCME aesthetic guidelines.

A review of regional water chemistry data supplied by NBDELG for areas in a 1-kilometre, 2-kilometre, 3-kilometre, 4-kilometre and 5-kilometer radius around the ASB was completed. Reported arsenic levels in groundwater samples ranged from non-detectable to 5.5 mg/L, with approximately one-third of all results exceeding the CCME guidelines. Iron levels were found to range from non-detectable to 2.21 mg/L, with approximately one-fifth of all results exceeding the CCME guidelines. Manganese levels were found to range from non-detectable to 1.46

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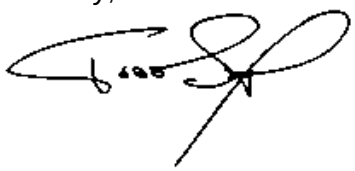
mg/L, with approximately nine-tenths of all results exceeding the CCME guidelines. Exceedences were reported in all five of the above noted areas This data is comprised of analytical results for seventy-six samples obtained by NBDELG since 1994 from a variety of residential, commercial, institutional and industrial wells. Considering that ASB influent arsenic levels fall below the CCME guideline levels and approximately one-third of wells tested by NBDELG in the area exceed the guidelines, the arsenic levels in the groundwater wells surrounding the ASB appear to be indicative of naturally occurring conditions in the area, rather than from ASB operations.

Water levels were also obtained in all the monitoring wells on the site and the groundwater flow determined. The interpreted groundwater flow direction is in a southeastern direction toward the Miramichi River and is similar to previous sampling events. The general flow direction of the shallow aquifer and deep aquifers is provided in Figures 1 and 2, respectively.

Table 3 contains the pentachlorophenol (PCP), resins and fatty acids, inorganic analytical results, and toxicity tests for the leachate sample collected from the old landfill. The CCME guidelines for Freshwater Aquatic Life have been provided for comparative purposes and exceedances highlighted for your convenience. The PCP and resins and fatty acids were all determined to be below the detection limits except for palmitic and stearic which had concentrations of 1.9 and 1.6 ug/L, respectively. The toxicity analysis indicates the sample is non-lethal with no mortality at any of the concentrations tested.

We trust this information is sufficient for your needs at this time. Please do not hesitate to contact us at your convenience should you have questions concerning this report.

Sincerely,



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Attachments

TABLE 1
Summary of Groundwater Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi City, NB

Analytes	Detection Limits	Monitoring Stations: MW-1C						MW-2C						MW-3C						MW-4C						Scale House						CCME Criteria (1) Drinking Water
		29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	
Inorganic Analytes (units)																																
Arsenic (mg/L)	0.001	0.004	<0.001	< 0.001	< 0.001	0.013	<0.001	0.006	0.021	**0.036** [2]	< 0.001	**0.109**	**0.156**	**0.099**	**0.054**	**0.082**	**0.095**	**0.1**	**0.13**	**0.093**	**0.037**	**0.098**	**0.112**	**0.172**	**0.147**	<0.001	<0.001	0.002	< 0.001	< 0.001	<0.001	0.025
Iron (mg/L)	0.02	**4.4**	**0.36**	0.038	**1.81**	**2.09**	<0.02	**7.57**	0.13	0.038	**1.05**	**2.31**	0.2	0.25	0.14	0.006	**20.2**	**0.679**	0.02	**4.98**	**0.75**	0.011	**18.5**	**4.38**	0.02	**0.57**	0.07	<0.005	0.21	**0.914**	**1.36**	≤ 0.3 (4)
Lead (mg/L)	0.0001	0.0004	<0.0001	< 0.01	< 0.01	< 0.001	0.0001	0.0009	<0.0001	< 0.01	< 0.01	<0.001	<0.0001	0.0004	<0.0001	< 0.01	0.02	<0.001	<0.0001	0.0005	<0.0001	< 0.01	< 0.01	< 0.001	0.0001	<0.0001	<0.0001	< 0.01	< 0.01	< 0.001	0.0002	0.01
Calcium (mg/L)	0.05	13	14.7	13.4	13	34.3	19.1	21	10.9	8.71	11	15	4.75	11.6	12.5	11.1	13	13.6	25	9.6	8.81	8.26	7.6	13	5.2	55.4	65.9	55.4	55	60	62.5	- - -
Sodium (mg/L)	0.05	57	52.8	50.5	52	49	33.5	58.3	46.4	32.3	36	38.6	83.8	71.9	50.9	59.3	60	57.2	38.1	48.3	49.8	48.1	51	55.1	151	24.7	45.1	27.4	24	25.8	24.6	≤ 200
Manganese (mg/L)	0.001	**1.67**	**2.41**	**1.74**	**2.21**	**0.682**	**0.549**	**6.31**	**0.872**	**0.59**	**0.79**	**0.355**	**0.236**	**0.195**	**0.323**	**0.181**	**0.44**	0.09	**0.249**	**0.258**	**0.193**	**0.21**	**0.32**	**0.13**	0.045	**1.15**	**1.12**	**1.05**	**1.00**	**0.711**	**1.360**	≤ 0.05 (4)
Chloride (mg/L)	0.1	43.4	55.3	42	44	38.7	0.008	85.5	13.6	24	38	47.5	0.0085	2.8	2.3	2.5	2.9	2.5	0.0358	4.2	6.1	5.6	5	6.4	0.0037	45.4	46.7	49	42	39.9	0.0479	≤ 250
Aluminum (mg/L)	0.001	0.229	0.042	< 0.025	1.2	0.026	0.014	0.200	0.008	0.027	0.85	0.042	0.016	0.346	0.003	< 0.025	19.4	0.587	0.002	0.228	0.273	< 0.025	7.51	0.089	0.032	<0.001	<0.001	< 0.025	0.032	0.01	<0.001	- - - (5)
pH (units)	NA [6]	6.9	6.7	6.5	6.6	6.64	7.2	6.8	7.2	6.7	6.7	6.99	7.5	7.7	7.5	7.2	7.3	7.53	7.4	7.0	6.9	6.6	6.8	6.93	8.0	7.7	7.8	7.1	7.3	7.56	7.4	6.5-8.5
Resins and Fatty Acids (units)																																
Abietic Acid (ug/L)	0.03	ND [7]	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
Oleic Acid (ug/L)	0.03	1.7	2.2	ND	ND	ND	ND (8)	ND	2.5	ND	ND	ND	ND (8)	1.8	8.4	ND	ND	ND	ND (8)	1.5	3.3	ND	ND	ND	ND (8)	1.9	3.2	ND	ND	ND	ND (8)	- - -
Pimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	ND	ND	ND	ND	ND	ND (8)	- - -

Notes - "1" denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Drinking Water Quality
- 2 "shaded" areas denote values in exceedence of the CCME guidelines
- "3" bold denotes values in exceedance of the CCME aesthetic guidelines
- "4" denotes CCME aesthetic guidelines
- 5 "- - -" denotes no guideline
- 6 "NA" denotes Not Applicable
- 7 ND denotes Not Detected
- "8" denotes detection limit of 1 ug/L

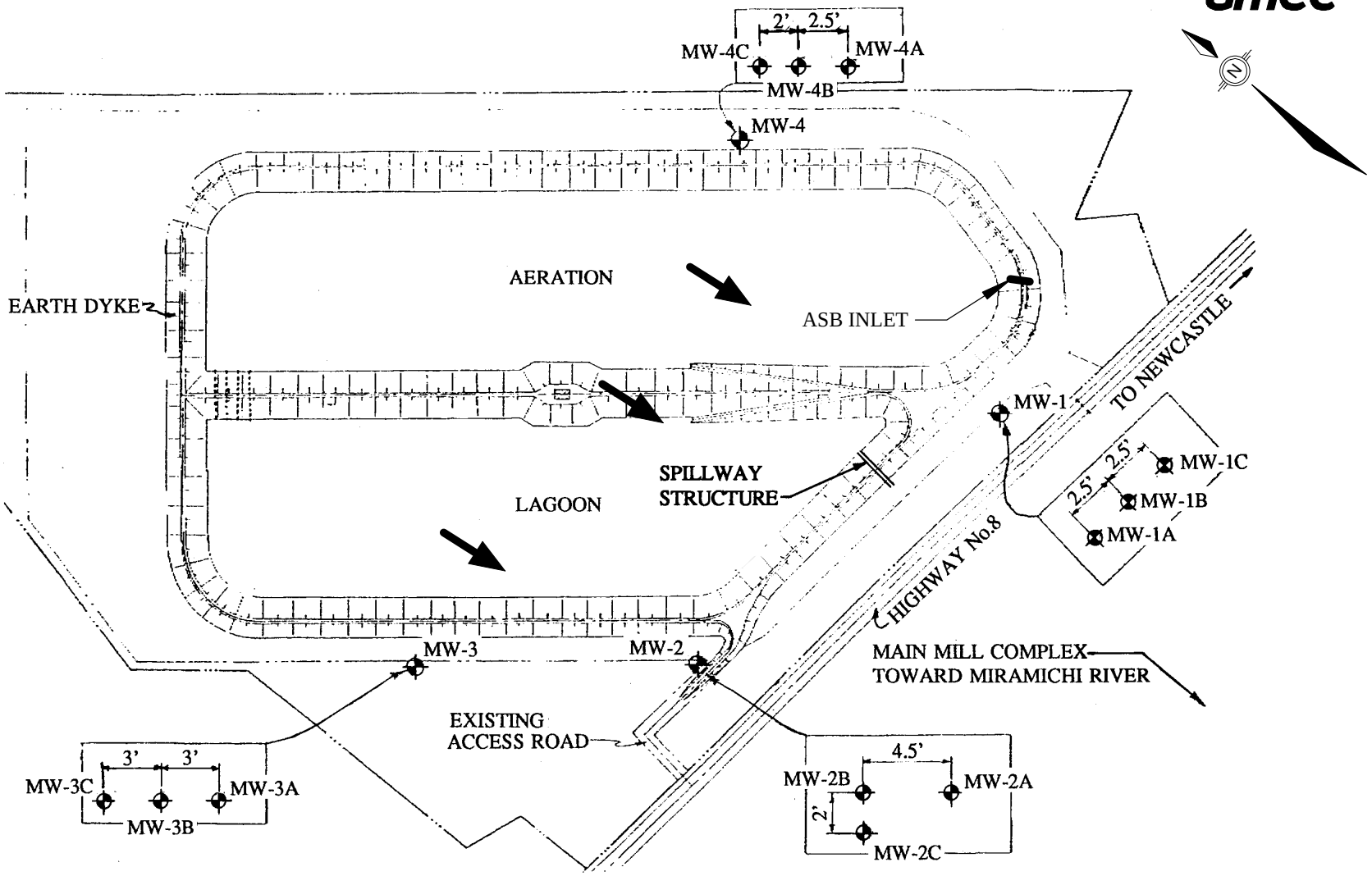
TABLE 2
Summary of ASB Influent Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi Inc., NB

Analytes	Detection Limits	ASB Inlet		
		24-Aug-00	13-Nov-01	19-Sep-02
Inorganic Analytes (units)				
Arsenic (mg/L)	0.001	< 0.001	0.002	0.002
Iron (mg/L)	0.02	0.55	0.477	1.09
Lead (mg/L)	0.0001	< 0.01	0.043	0.0082
Calcium (mg/L)	0.05	214	213	166
Sodium (mg/L)	0.05	405	3120	329
Manganese (mg/L)	0.001	2.73	0.281	2.51
Chloride (mg/L)	0.1	385	193	0.182
Aluminum (mg/L)	0.001	2.3	5.3	4.56
pH (units)	NA	6.4	6.5	7.0
Resins and Fatty Acids (units)				
Abietic Acid (ug/L)	1	766	14.7	630
Dehydroabietic Acid (ug/L)	1	89	13.9	1020
Isopimaric Acid (ug/L)	1	1410	2.7	240
Levopimaric Acid (ug/L)	1	ND	2.79	ND
Neoabietic Acid (ug/L)	1	188	1.72	100
Oleic Acid (ug/L)	1	1470	4.14	260
Pimaric Acid (ug/L)	1	1160	2.5	110
1,4 - Chlorodehydroabietic Acid (ug/L)	1	808	1.47	ND
1,2 - Chlorodehydroabietic Acid (ug/L)	1	ND	ND	ND

TABLE 3
Summary of Leachate Analytical Results, Old Landfill
UPM-Kymmene Miramichi Inc., NB

ANALYTES	Monitoring Stations								CCME Criteria
	Detection	Old Landfill							Freshwater
	Limits	2002	2001	2000	1999	1998	1997	1996	Aquatic life
PCP (units)									
Monochlorophenols (ug/L)	2	ND [1]	NS [2]	NS	ND	ND	ND	NS	7
Dichlorophenols (ug/L)	1	ND	NS	NS	ND	ND	ND	NS	0.2
Trichlorophenols (ug/L)	1	ND	NS	NS	ND	ND	ND	NS	18
Tetrachlorophenols (ug/L)	0.75	ND	NS	NS	ND	ND	ND	NS	1
Pentachlorophenols (ug/L)	0.25	ND	ND	ND	ND	ND	ND	ND	0.5
Resins and Fatty Acids (units)									
Abietic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	2.5	- - - [(4)]
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	NS	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Oleic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
Pimaric Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND[(3)]	ND[(3)]	ND[(3)]	ND[(3)]	NS	- - -
Sandaracopimaric (ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Palustric (ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Palmitic (ug/L)	1	1.9	NS	NS	NS	NS	NS	2.3	- - -
Stearic (ug/L)	1	1.6	NS	NS	NS	NS	NS	1.8	- - -
Linoleic (ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Linolenic(ug/L)	1	ND	NS	NS	NS	NS	NS	ND	- - -
Inorganic Parameters (units)									
pH (units)	NA [5]	NS	8.4	8.2	8.2	NS	NS	NS	- - -
Aluminum (mg/L)	0.005	0.034	**0.122** [7]	0.073	0.047	0.14	**0.129**	0.45	0.005 - 0.1[(2)]
Chloride (mg/L)	0.1	790	618	75	200	0.176	0.202	0.171	- - -
Toxicity (units)									
Daphnia Magna (% mortality)	NA	NS	NS	NS	0	0	0	0	- - -
Rainbow Trout (% mortality)	NA	0	0	0	0	0	0	0	- - -

Note - 1 "ND" denotes Not Detected
- 2 "NS" denotes sample not tested
- "3" denotes earlier detection limit of 1 ug/L
- 4 "- - -" denotes no guideline
- 5 NA denotes Not Applicable
- "6" CCME Criteria varies with pH, 0.005 mg/L; 0.1 mg/L for pH $\geq$ 6.5
- 7 "shaded" areas indicate the corresponding CCME criteria are exceeded.



LEGEND

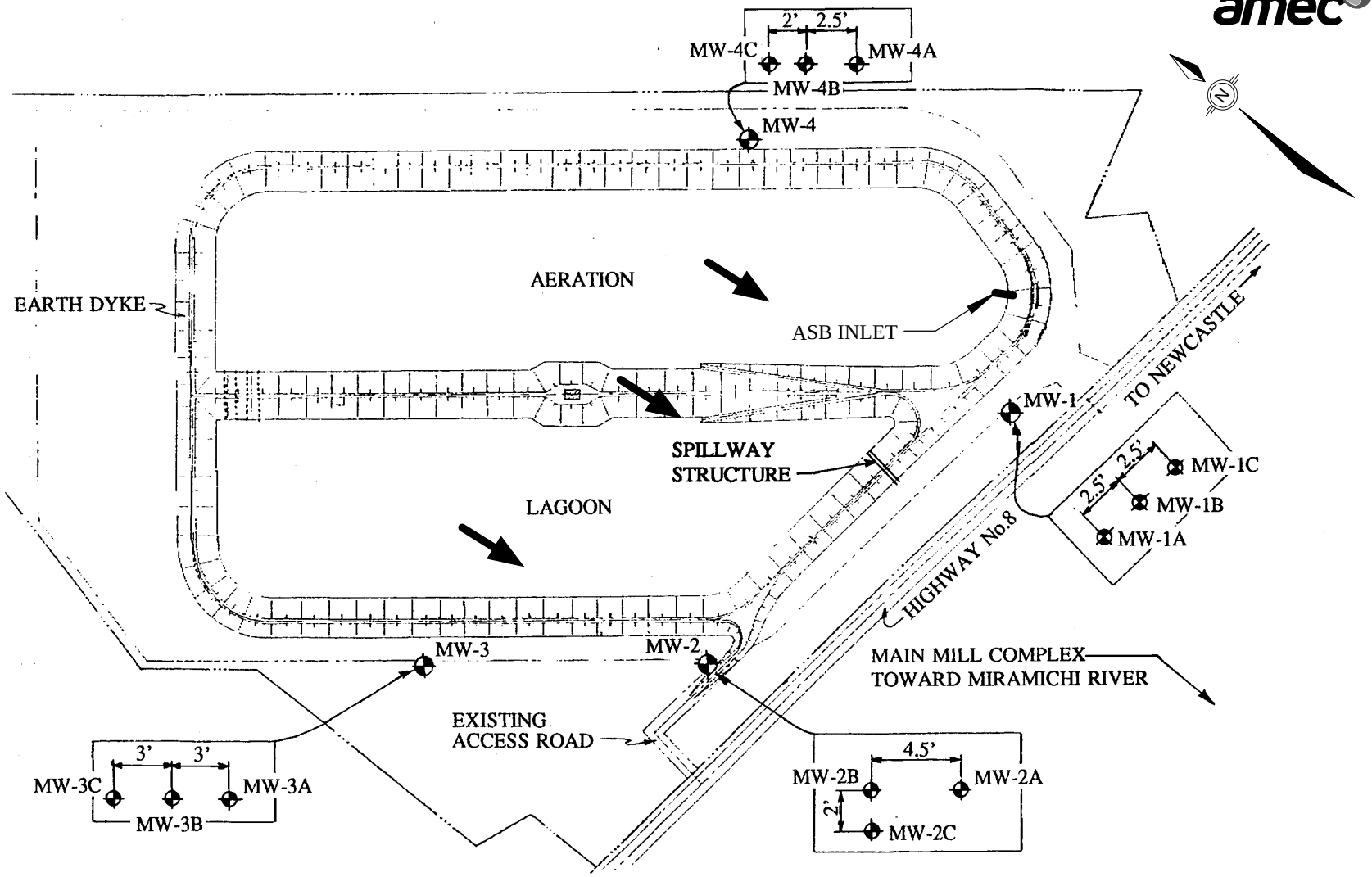
APPARENT GROUNDWATER FLOW DIRECTION
(SEPTEMBER 19, 2002)

0 50 100 150 200
METRES

SOURCE: MODIFIED AFTER GEOCON 91/01/14.

FIGURE 1
SHALLOW GROUNDWATER FLOW DIRECTION

TE22089/shallow gwater (2002/12/10)



LEGEND

APPARENT GROUNDWATER FLOW DIRECTION
(SEPTEMBER 19, 2002)

0 50 100 150 200
METRES

SOURCE: MODIFIED AFTER GEOCON 91/01/14.

FIGURE 2
DEEP GROUNDWATER
FLOW DIRECTION

TE22089/deep gwater (2002/12/10)

AMEC, October 27, 2003 letter report, *Groundwater and Landfill Leachate Sampling Results - UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE23102.*

October 27, 2003

TE23102

Mr. Phil Riebel
Environmental Manager
UPM – Kymmene Miramichi Inc.
P.O. Box 5040
Miramichi, NB E1V 3N3

Dear Mr. Riebel:

Re: Groundwater and Landfill Leachate Sampling Results – UPM-Kymmene Miramichi Inc., Miramichi, NB

AMEC Earth & Environmental Limited (AMEC) was retained by UPM–Kymmene Miramichi Inc. (UPM) to collect groundwater and leachate samples from established sampling points around the aeration stabilization basin (ASB) and old landfill site. The work was completed as a requirement of the facility's Certificate of Approval to Operate, I-2327 (CoA), issued by the New Brunswick Department of Environment and Local Government (NBDELG) in December 1999.

An AMEC representative collected groundwater samples on September 24, 2002 from four monitoring wells surrounding the ASB. The water level in each well was measured and an adequate volume of the water was purged from the wells prior to sampling to help ensure a representative sample was collected. A sample from the scale house well and from the old landfill site at the point of the confluence of the perimeter ditch and the Miramichi River were also obtained during the site visit. All the samples were forwarded to accredited laboratories and analyzed for the parameters set forth in the CoA.

A summary of the groundwater and ASB influent inorganic and resins and total fatty acids are provided in Table 1. The Canadian Council of Ministers of the Environment (CCME) Guidelines for Canadian Drinking Water Quality have been included in Table 1 for comparative purposes, with any exceedances highlighted for your convenience. The analytical results generally fall within acceptable limits with the exception of several of the arsenic, sodium, iron and manganese values. Arsenic values above the CCME guidelines were noted for MW-2C, MW-3C and MW-4C. Sodium was found in excess of the CCME guidelines in the ASB Inlet. Levels of iron in MW-2C, the scale house well, and ASB Inlet and levels of manganese in all samples tested were also found to be above the CCME aesthetic guidelines. The Certificates of Analyses are attached.

A review of regional water chemistry data supplied by NBDELG for areas in a 1-kilometre, 2-kilometre, 3-kilometre, 4-kilometre and 5-kilometre radius around the ASB was completed. Reported arsenic levels in groundwater samples ranged from non-detectable levels to 5.5 mg/L, with approximately one-third of all results exceeding the CCME guidelines. Iron levels were found to range from non-detectable to 2.21 mg/L, with approximately one-fifth of all results exceeding the CCME guidelines. Manganese levels were found to range from non-detectable

…/2

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to 1.46 mg/L, with approximately nine-tenths of all results exceeding the CCME guidelines. Exceedences were reported in all five of the above-noted radii around the ASB. This data is comprised of analytical results for 76 samples obtained by NBDELG between 1994 and 2001 from a variety of residential, commercial, institutional and industrial wells. Considering that ASB influent arsenic levels fall below the CCME guideline levels and approximately one-third of wells tested by NBDELG in the area exceed the guidelines, the arsenic levels in the groundwater wells surrounding the ASB appear to be indicative of naturally occurring conditions in the area, rather than from ASB operations.

Water levels were also obtained in all the monitoring wells on the site and the groundwater flow determined. The interpreted groundwater flow direction is in a southeastern direction toward the Miramichi River and is similar to previous sampling events. The general flow direction of the shallow aquifer and deep aquifers is provided in Figures 1 and 2, respectively.

Table 2 contains the Pentachlorophenol (PCP), resins and fatty acids, inorganic analytical results, and toxicity tests for the leachate sample collected from the old landfill. The CCME guidelines for Freshwater Aquatic Life have been provided for comparative purposes and exceedances highlighted for your convenience. The PCP and resins and fatty acids were all determined to be below the detection limits except for dehydroabietic acid and palmitic acid which had concentrations of 1.2 and 1.9 ug/L, respectively. The toxicity analysis indicates the sample was lethal to 10% of test organisms (one of ten test fish) at the 100% concentration. The sample was noted to be black in color, opaque and with a foul odour, likely due to low water conditions at the time of sample collection.

We trust this information is sufficient for your needs at this time. Please do not hesitate to contact us at your convenience should you have questions concerning this report.

Sincerely,

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Manager, Environmental Engineering
Tel: +1(506) 458-1000
Fax: + 1(506) 450-0829
E-mail: lee.macwilliams@amec.com

TM/cjy

Attachments

TABLE 1
Summary of Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi City, NB

Analytes	Detection Limits	Monitoring Stations																						CCME Criteria[1] Drinking Water
		MW-1C							MW-2C							MW-3C								
		29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	
Inorganic Analytes (units)																								
Arsenic (mg/L)	0.001	0.004	<0.001	< 0.001	< 0.001	0.013	<0.001	0.001	0.006	0.021	0.036 [2]	< 0.001	0.109	0.156	0.085	0.099	0.054	0.082	0.095	0.1	0.13	0.129	0.025
Iron (mg/L)	0.02	**4.4** [3]	**0.36**	0.038	**1.81**	**2.09**	<0.02	0.04	**7.57**	0.13	0.038	**1.05**	**2.31**	0.2	**1.37**	0.25	0.14	0.006	**20.2**	**0.679**	0.02	0.03	≤ 0.3[4]
Lead (mg/L)	0.0001	0.0004	<0.0001	< 0.01	< 0.01	< 0.001	0.0001	0.0001	0.0009	<0.0001	< 0.01	< 0.01	<0.001	<0.0001	0.0034	0.0004	<0.0001	< 0.01	0.02	<0.001	<0.0001	<0.0001	0.01
Calcium (mg/L)	0.05	13	14.7	13.4	13	34.3	19.1	19.2	21	10.9	8.71	11	15	4.75	4.87	11.6	12.5	11.1	13	13.6	25	24.1	- - - [5]
Sodium (mg/L)	0.05	57	52.8	50.5	52	49	33.5	32.6	58.3	46.4	32.3	36	38.6	83.8	73.5	71.9	50.9	59.3	60	57.2	38.1	35.6	≤ 200
Manganese (mg/L)	0.001	**1.67**	**2.41**	**1.74**	**2.21**	**0.682**	**0.549**	**0.55**	**6.31**	**0.872**	**0.59**	**0.79**	**0.355**	**0.236**	**0.085**	**0.195**	**0.323**	**0.181**	**0.44**	0.09	**0.249**	**0.244**	≤ 0.05[4]
Chloride (mg/L)	0.1	43.4	55.3	42	44	38.7	8	5.8	85.5	13.6	24	38	47.5	8.5	30.0	2.8	2.3	2.5	2.9	2.5	35.8	39.5	≤ 250
Aluminum (mg/L)	0.001	0.229	0.042	< 0.025	1.2	0.026	0.014	0.036	0.200	0.008	0.027	0.85	0.042	0.016	1.38	0.346	0.003	< 0.025	19.4	0.587	0.002	0.003	- - -
pH (units)	NA [6]	6.9	6.7	6.5	6.6	6.64	7.2	8.2	6.8	7.2	6.7	6.7	6.99	7.5	8.2	7.7	7.5	7.2	7.3	7.53	7.4	8.3	6.5-8.5
Resins and Fatty Acids (units)																								
Abietic Acid (ug/L)	0.03	ND [7]	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	- - -
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	- - -
Oleic Acid (ug/L)	0.03	1.7	2.2	ND	ND	ND	ND [8]	ND [8]	ND	2.5	ND	ND	ND	ND [8]	ND [8]	1.8	8.4	ND	ND	ND	ND [8]	ND [8]	- - -
Pimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	NS [9]	ND	ND	ND	ND	ND	ND [8]	NS	ND	ND	ND	ND	ND	ND [8]	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	NS	ND	ND	ND	ND	ND	ND [8]	NS	ND	ND	ND	ND	ND	ND [8]	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	ND [3]	ND	ND	ND	ND	ND	NS	ND [3]	ND	ND	ND	ND	ND	NS	ND [3]	- - -

Notes 1 - Denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Drinking Water Quality
2 - Shaded areas denote values in exceedence of the CCME guidelines
3 - Bold a denotes values in exceedence of the CCME aesthetic guidelines
4 - Denotes CCME aesthetic guidelines
5 - "- - -" denotes no guideline
6 - NA denotes Not Applicable
7 - ND denotes Not Detected
8 - Denotes detection limit of 1 ug/L

TABLE 1 (Cont'd)
Summary of Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi Inc., NB

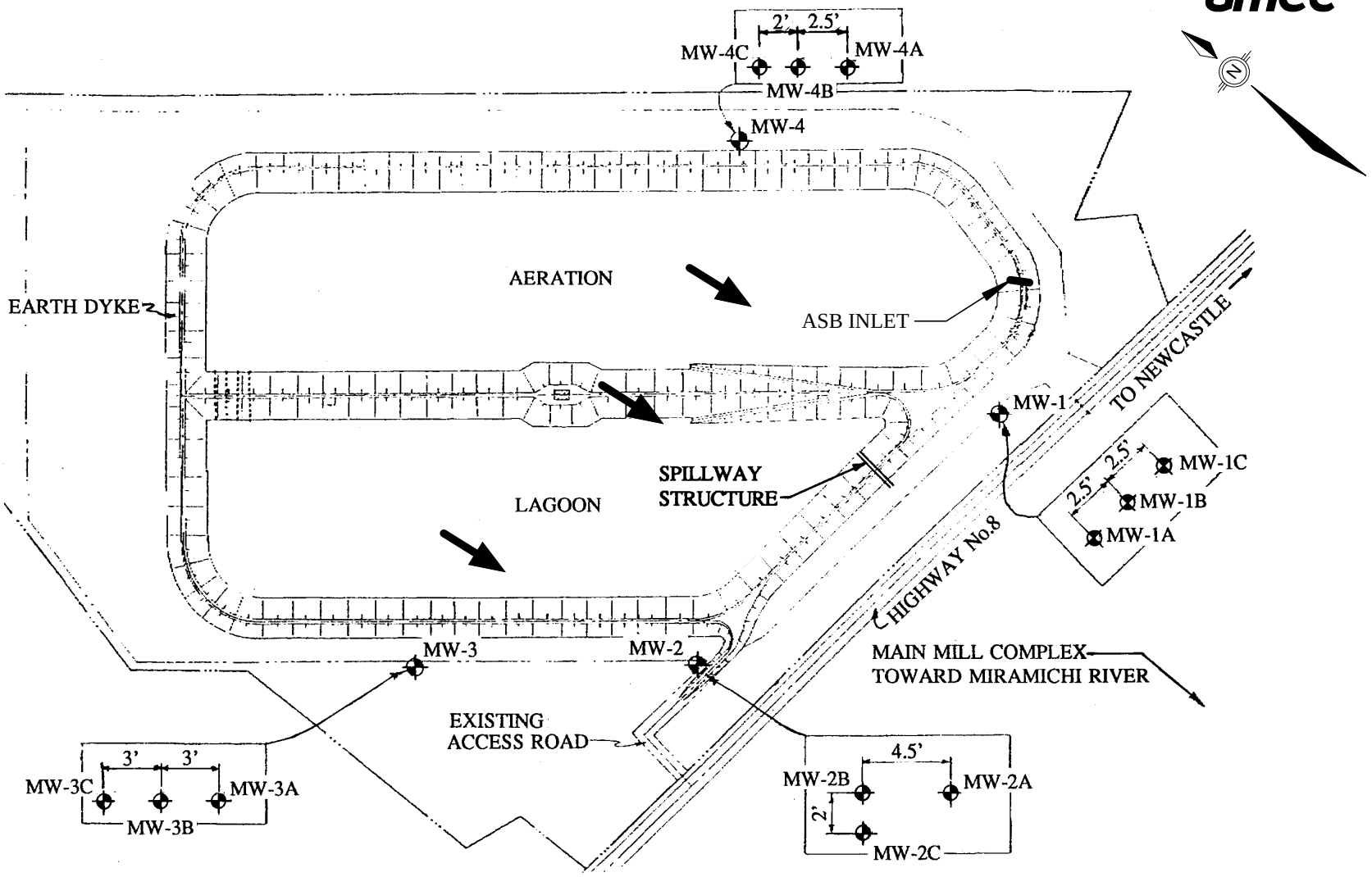
Analytes	Detection Limits	MW-4C							Scale House							ASB Inlet				CCME Criteria[1] Drinking Water
		29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	24-Aug-00	13-Nov-01	19-Sep-02	24-Sep-03	
Inorganic Analytes (units)																				
Arsenic (mg/L)	0.001	0.093 [2]	0.037	0.098	0.112	0.172	0.147	0.17	<0.001	<0.001	0.002	< 0.001	< 0.001	<0.001	<0.001	< 0.001	0.002	0.002	<0.005	0.025
Iron (mg/L)	0.02	**4.98** [3]	**0.75**	0.011	**18.5**	**4.38**	0.02	0.04	**0.57**	0.07	<0.005	0.21	**0.914**	**1.36**	**1.05**	**0.55**	**0.477**	**1.09**	**0.51**	≤ 0.3[4]
Lead (mg/L)	0.0001	0.0005	<0.0001	< 0.01	< 0.01	< 0.001	0.0001	0.0003	<0.0001	<0.0001	< 0.01	< 0.01	< 0.001	0.0002	0.0001	< 0.01	0.043	0.0082	0.0047	0.01
Calcium (mg/L)	0.05	9.6	8.81	8.26	7.6	13	5.2	4.92	55.4	65.9	55.4	55	60	62.5	61.2	214	213	166	186	- - - [5]
Sodium (mg/L)	0.05	48.3	49.8	48.1	51	55.1	151	147	24.7	45.1	27.4	24	25.8	24.6	23.7	405	3120	329	379	≤ 200
Manganese (mg/L)	0.001	**0.258**	**0.193**	**0.21**	**0.32**	**0.13**	0.045	**0.053**	**1.15**	**1.12**	**1.05**	**1.00**	**0.711**	**1.360**	**1.380**	**2.73**	**0.281**	**2.51**	**2.62**	≤ 0.05[4]
Chloride (mg/L)	0.1	4.2	6.1	5.6	5	6.4	3.7	2.5	45.4	46.7	49	42	39.9	47.9	47.9	385	193	182	211	≤ 250
Aluminum (mg/L)	0.001	0.228	0.273	< 0.025	7.51	0.089	0.032	0.04	<0.001	<0.001	< 0.025	0.032	0.01	<0.001	<0.001	2.3	5.3	4.56	1.94	- - -
pH (units)	NA [6]	7.0	6.9	6.6	6.8	6.93	8.0	8.1	7.7	7.8	7.1	7.3	7.56	7.4	8.4	6.4	6.5	7.0	7.2	6.5-8.5
Resins and Fatty Acids (units)																				
Abietic Acid (ug/L)	0.03	ND [7]	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	766	14.7	630	1,200	- - -
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	89	13.9	1,020	1,300	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	1,410	2.7	240	440	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	2.79	ND [8]	ND [8]	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	188	1.72	100	140	- - -
Oleic Acid (ug/L)	0.03	1.5	3.3	ND	ND	ND	ND [8]	ND [8]	1.9	3.2	ND	ND	ND	ND [8]	ND [8]	1,470	4.14	260	320	- - -
Pimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	1,160	2.5	110	100	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	NS [9]	ND	ND	ND	ND	ND	ND [8]	NS	808	1.47	ND [8]	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	NS	ND	ND	ND	ND	ND	ND [8]	NS	ND	ND	ND [8]	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	ND	ND	ND	ND	ND	NS	ND [3]	ND	ND	ND	ND	ND	NS	ND [3]	ND	ND	ND [8]	ND [8]	- - -

Notes 1 - Denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Drinking Water Quality
2 - Shaded areas denote values in exceedence of the CCME guidelines
3 - Bold and underline text denotes values in exceedence of the CCME aesthetic guidelines
4 - Denotes CCME aesthetic guidelines
5 - "- - -" denotes no guideline
6 - NA denotes Not Applicable
7 - ND denotes Not Detected
8 - Denotes detection limit of 1 ug/L

TABLE 2
Summary of Leachate Analytical Results, Old Landfill
UPM-Kymmene Miramichi Inc., NB

ANALYTES	Monitoring Station									CCME Criteria Freshwater Aquatic life [1]
	Detection Limits	Old Landfill								
		2003	2002	2001	2000	1999	1998	1997	1996	
PCP (units)										
Monochlorophenols (ug/L)	2	NS [2]	ND [3]	NS	NS	ND	ND	ND	NS	7
Dichlorophenols (ug/L)	1	NS	ND	NS	NS	ND	ND	ND	NS	0.2
Trichlorophenols (ug/L)	1	NS	ND	NS	NS	ND	ND	ND	NS	18
Tetrachlorophenols (ug/L)	0.75	NS	ND	NS	NS	ND	ND	ND	NS	1
Pentachlorophenols (ug/L)	0.25	ND	ND	ND	ND	ND	ND	ND	ND	0.5
Resins and Fatty Acids (units)										
Abietic Acid (ug/L)	0.03	ND [4]	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	2.5	- - - [5]
Dehydroabietic Acid (ug/L)	0.04	1.2	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	ND[1]	- - -
Isopimaric Acid (ug/L)	0.04	ND [4]	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	ND[1]	- - -
Levopimaric Acid (ug/L)	0.03	ND [4]	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	NS	- - -
Neoabietic Acid (ug/L)	0.03	ND [4]	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	ND[1]	- - -
Oleic Acid (ug/L)	0.03	ND [4]	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	ND[1]	- - -
Pimaric Acid (ug/L)	0.03	ND [4]	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	ND[1]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	NS	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	NS	ND	ND	ND[4]	ND[4]	ND[4]	ND[4]	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	ND [4]	NS	NS	NS	NS	NS	NS	NS	- - -
Sandaracopimaric (ug/L)	1	ND [4]	ND	NS	NS	NS	NS	NS	ND	- - -
Palustric (ug/L)	1	ND [4]	ND	NS	NS	NS	NS	NS	ND	- - -
Palmitic (ug/L)	1	1.9	1.9	NS	NS	NS	NS	NS	2.3	- - -
Stearic (ug/L)	1	ND [4]	1.6	NS	NS	NS	NS	NS	1.8	- - -
Linoleic (ug/L)	1	ND [4]	ND	NS	NS	NS	NS	NS	ND	- - -
Linolenic(ug/L)	1	ND [4]	ND	NS	NS	NS	NS	NS	ND	- - -
Inorganic Parameters (units)										
pH (units)	NA [6]	NS	NS	8.4	8.2	8.2	NS	NS	NS	- - -
Aluminum (mg/L)	0.005	0.02	0.034	0.122 [7]	0.073	0.047	0.14	0.129	0.45	0.005 - 0.1[8]
Chloride (mg/L)	0.1	75.3	790	618	75	200	0.176	0.202	0.171	- - -
Toxicity (units)										
Daphnia Magna (% mortality)	NA	NS	NS	NS	NS	0	0	0	0	- - -
Rainbow Trout (% mortality)	NA	10	0	0	0	0	0	0	0	- - -

Notes 1 - Denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Freshwater Aquatic Life
2 - NS denotes sample not tested
3 - ND denotes Not Detected
4 - Denotes detection limit of 1 ug/L
5 - "- - -" denotes no guideline
6 - NA denotes Not Applicable
7 - Shaded areas indicate the corresponding CCME criteria are exceeded
8 - CCME Criteria varies with pH, 0.005 mg/L; 0.1 mg/L for pH $\geq$ 6.5



LEGEND

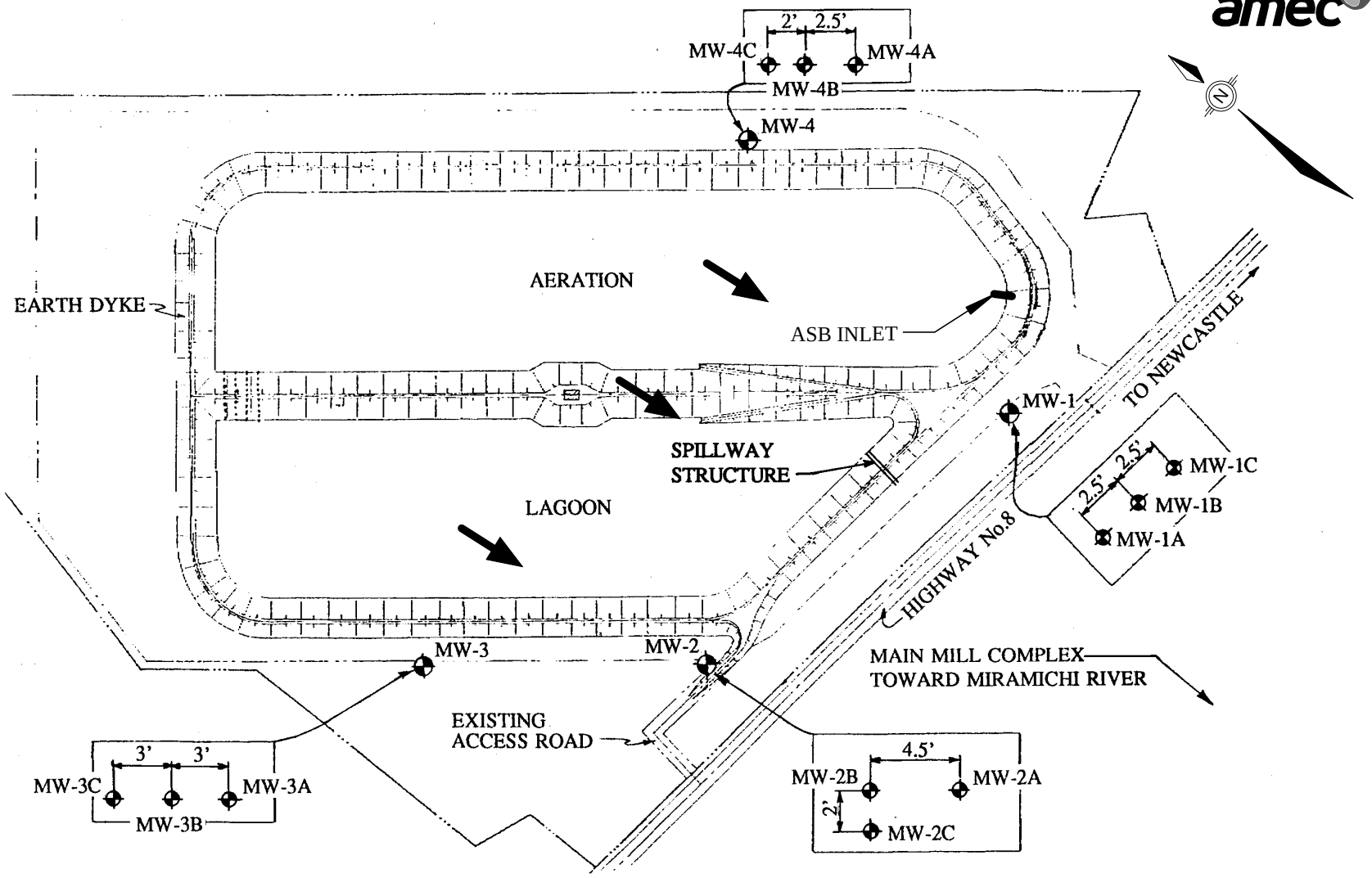
APPARENT GROUNDWATER FLOW DIRECTION
(SEPTEMBER 24, 2003)

0 50 100 150 200
METRES

SOURCE: MODIFIED AFTER GEOCON 91/01/14.

FIGURE 1
SHALLOW GROUNDWATER FLOW DIRECTION

TE23102/shallow gwater (2003/10/17)



LEGEND

APPARENT GROUNDWATER FLOW DIRECTION
(SEPTEMBER 24, 2003)

SOURCE: MODIFIED AFTER GEOCON 91/01/14.

0 50 100 150 200
METRES

FIGURE 2
DEEP GROUNDWATER
FLOW DIRECTION

TE23102/deep gwater (2003/10/17)

Date Received: September 26, 2003
Client P/O Number: Not Available
Client Job Number: TE 23102

Number of Samples: 7

Attention: Tom MacNeil
Fax #: 450-0829

AMEC Earth & Environmental Ltd
25 Waggoners Lane
Fredericton NB E3B 2L2

Submission ID: 33551-IAS
Page: 1 of 1
October 10, 2003

Analysis of Water

RPC ID:	33551-1	33551-2	33551-3	33551-4	33551-5	33551-6	33551-7
Client ID:	MW1	MW2	MW3	MW4	ASB Inlet	Scalehouse Well	Old Landfill
Date Sampled:	Sep 24/03	Sep 24/03	Sep 24/03	Sep 24/03	Sep 24/03	Sep 24/03	Sep 24/03
Aluminum (µg/L)	36	1380	3	40	1940	< 1	20
Arsenic (µg/L)	1	85	129	170	< 5	< 1	
Calcium (µg/L)	19200	4870	24100	4920	186000	61200	
Iron (µg/L)	40	1370	30	40	510	1050	
Lead (µg/L)	0.1	3.4	< 0.1	0.3	4.7	0.1	
Manganese (µg/L)	550	85	244	53	2620	1380	
Sodium (µg/L)	32600	73500	35600	147000	379000	23700	
Chloride (mg/L)	5.8	30.0	39.5	2.5	211	47.9	75.3
pH	8.2	8.2	8.3	8.1	7.2	8.4	

A. Ross Kean, M.Sc.
Department Head
Inorganic Analytical Chemistry

RPC
921 College Hill Road
Fredericton NB E3B 6Z9
Telephone: 506-452-1212
Fax: 506-452-0594

Peter Crowhurst, B.Sc., C.Chem.
Analytical Chemist
Inorganic Analytical Chemistry

Submission #: 33551-OAS

October 15, 2003

Client #: C949900

Tom MacNeil
AMEC Earth & Environmental Ltd.
25 Waggoners Lane
Fredericton, N. B.
E3B 2L2
Client Project # TE 23102

RECEIVED OCT 2 1 2003

Samples: Seven water samples, received October 26, 2003.

Analysis: Resin and Fatty Acids.

Results: Results are expressed in μg/L.

Resin Acids	MW 1	MW 2	MW 3	MW 4	ASB Inlet	Scalehouse Well	Old Landfill	Blank 1	Blank 2
Pimaric	-	-	-	-	100	-	-	-	-
Sandaracopimaric	-	-	-	-	130	-	-	-	-
Neoabietic	-	-	-	-	140	-	-	-	-
Dehydroabietic	-	-	-	-	1300	-	1.2	-	-
Abietic	-	-	-	-	1200	-	-	-	-
Isopimaric	-	-	-	-	440	-	-	-	-
Palustric	-	-	-	-	150	-	-	-	-
Levopimaric	-	-	-	-	-	-	-	-	-
Chlorodehydroabietic	-	-	-	-	-	-	-	-	-
Total Resin Acids	-	-	-	-	3500	-	1.2	-	-
Fatty Acids									
Palmitic	1.4	5.4	1.0	1.6	67	-	1.9	-	-
Stearic	-	1.4	-	-	98	-	-	-	-
Oleic	-	1.0	-	-	320	-	-	-	-
Linoleic	-	-	-	-	38	-	-	-	-
Linolenic	-	-	-	-	-	-	-	-	-
Total Fatty Acids	1.4	7.8	1.0	1.6	520	-	1.9	-	-

Note: "-" = not detected. Detection limit = 1 μg/L.

μg/L = parts per billion (ppb).

This report relates only to the sample(s) and information provided to the laboratory. All sample containers and excess sample material associated with this project will be discarded or returned a minimum of three (3) months after date of invoice, unless instructed otherwise. Electronic data will be archived for a minimum of three (3) years.

Angela Colford
Lab Supervisor
Organics

Bruce Phillips
Section Manager
Organics

Analytical Services
RPC
921 College Hill Road
Fredericton, NB
E3B 6Z9
Telephone: 506-452-1212
Fax: 506-452-0594

RPC

Submission ID:33551-TOAS

Client No.:C949900

AMEC Earth & Environmental Ltd.
25 Waggoners Lane
Fredericton NB E3B 2L2
Fax: (506) 450-0829

Contact: Tom MacNeil

October 20, 2003

Samples:	1 water sample
Date Collected:	September 24, 2003
Date Received:	September 26, 2003
Date Extracted:	October 16-17, 2003
Date Analyzed:	October 17-20, 2003

Analysis: Pentachlorophenol in water by gas chromatograph/mass selective detector (GC/MSD)

RPC Sample ID	33551-7	Blank	Spike	MDL
RPC Task ID	263534	n.a.	n.a.	
Client Sample ID	Old Landfill	n.a.	n.a.	
Units	ng/ml	ng/ml	%	ng/ml
Pentachlorophenol	n.d.	n.d.	114	2.5

Notes on Results table:
n.a. = not applicable
n.d. = not detected
ng/ml = parts per billion (ppb)
MDL = Method Detection Limit

Troy Smith, Chemist
Trace Organics

John Macaulay, Ph.D., Section Manager
Trace Organics

Analytical Chemistry Services
RPC
921 College Hill Road
Fredericton NB E3B 6Z9
Telephone: (506) 452-1212
Fax: (506) 452-0594

rpc

FISH TOXICITY REPORT (SINGLE CONCENTRATION)

Client: AMEC Earth & Environmental	Test Facility: Harris Industrial Testing Service Ltd.
Address: Fredericton New Brunswick	Location: 1320 Ashdale Rd., South Rawdon, RR#1 Mt. Uniacke Nova Scotia, Canada B0N 1Z0 Tel: 902 757-0232
Contact: Tom MacNeil	Fax: 902 757-0973 E-mail: HITS@ns.sympatico.ca
This laboratory is accredited by the Standards Council of Canada (SCC), in co-operation with the Canadian Association for Environmental Analytical Laboratories (CAEAL).. The tests included in this report are within the scope of this accreditation.	

Sample Data

Sample/Location	UPM Kymmene Old Landfill	Lab ID. #	3-378
Sampling Method	Grab	Sampler	T. MacNeil
Date/Time Collected	Sept. 24 2003 1440 Hrs	Received	Sept. 26 2003
Date/Time Started	Sept. 27 2003 1115 Hrs	Completed	Oct. 01 2003 1115 Hrs

Test Conditions

Method: EPS 1/RM/13 2nd Edition Dec. 2000	Volume: 20 L Depth: 36.2 cm	Number of fish: Control: 10 Test: 10
Type: Single Concentration Pass/Fail Test		
Test Organism: Fingerling Rainbow Trout Batch #: 115	Mean wet weight: 0.94 g ± 0.26 g SD Range: 0.56 g - 1.20 g	Mean fork length: 42.4 mm ± 4.55 mm SD Range: 37 mm - 48 mm
Stock Tank Mortality: 0 % 1-7 days prior to test		
Dilution Water: Well Water	Loading Density: 0.47 g/L	Sample Homogenized: No
Aeration : Continuous by Airstone Rate: 6.5 ± 1 ml/min/L	Conductivity Sample: 3.27 ms/cm Control: 0.26 ms/cm	Mandatory 30 minute pre-aeration: Time: 0945 hrs D.O.: 4.3 mg/L Continued: 60 min. @ 1015 hrs
Temperature: 15 ± 1 °C	Pre-test Temperature: 19.5 °C	Primary Analyst(s): A. Huybers
Test Duration: 96 hours	Pre-test D.O.: 0.07 mg/L	
	Pre-test pH: 8.0 Adj: No	

Test Parameters

Initial					Final		
Conc. %	Temp.° C	D.O mg/L	pH	Cond. ms/cm	Temp.° C	D.O mg/L	pH
100	16.0	6.8	8.3	3.42	16.0	9.7	9.0
Control	16.0	9.4	8.2	0.26	16.0	9.2	8.2

Test Results

		24 Hrs	48 Hrs	72 Hrs	96 Hrs	% Mortality
Test Organisms	Number Dead	**1/10**	**1/10**	**1/10**	**1/10**	**10%**
	Number Stressed					
Control Organisms	Number Dead	0/10	0/10	0/10	0/10	0%
	Number Stressed					

96 Hour Test Results = 10% Mortality (Pass)

Reference Toxicant on Phenol Batch 115	96 Hour LC_{50} for Phenol: 13.4 mg/L	95% Conf. Limits 12.2 – 15.0 mg/L
Historical Phenol Mean: 12.4 mg/L	Warning Limits ± 2 SD 10.0 - 15.3 mg/L	Date: Sept. 09 – 13 2003

Comments: Black in colour, opaque, with a foul odour. Very large amount of organic debris present, eg; bark.

Verified by: C Harris Authorized by: Date: Oct 1/03

AMEC, November 2, 2005 letter report, *2005 Groundwater Sampling Results - UPM-Kymmene Miramichi Inc., Miramichi, NB. Project No. TE51086.*

November 2, 2005

TE51086

Mr. Phil Riebel
Environmental Director - North America
UPM-Kymmene Inc.
P.O. Box 5040
Miramichi, NB E1V 3N3

Dear Mr. Riebel:

Re: 2005 Groundwater Sampling Results – UPM-Kymmene Miramichi Inc., Miramichi, NB

AMEC Earth & Environmental, a Division of AMEC Americas Limited (AMEC) was retained by UPM–Kymmene Miramichi Inc. (UPM) to collect groundwater samples from established sampling points around the Aeration Stabilization Basin (ASB), Scale House Well and ASB Inlet. The work was completed as a requirement of the facility's Certificate of Approval to Operate, I-4426 (CoA), issued by the New Brunswick Department of Environment and Local Government (NBDELG) in November 2004.

There are four nested monitoring wells surrounding the ASB, with each location having three levels. An AMEC representative collected groundwater samples on September 20, 2005 from each of the four locations and at each of the respective levels except for MW-4, where the deep and intermediate wells, MW-4A and 4B respectively, were obstructed and only MW-4C could be sampled.

The water level in each well was measured and an adequate volume of the water was purged from the wells prior to sampling to help ensure a representative sample was collected. A sample from the Scale House well was also obtained during the site visit. All the samples were forwarded to accredited laboratories and analyzed for the parameters set forth in the CoA.

A summary of the groundwater and ASB Influent Inorganic and Resins and Fatty Acids are provided in Tables 1 and 2. The Canadian Council of Ministers of the Environment (CCME) Guidelines for Canadian Drinking Water Quality has been included in Table 1 for comparative purposes, with any exceedances highlighted for your convenience. The analytical results fall within acceptable CCME Guidelines with the exception of the arsenic value for MW-1B, MW-2A, MW-3A, MW-3C, and MW-4C. Historical results showed arsenic generally exceeded CCME Guidelines in shallow 'C' wells MW-2C, 3C, and 4C. Levels of iron in MW-2B, 2C, 3B, and the Scale House well, and levels of manganese in all samples tested were also found to be above the CCME aesthetic Guidelines. Detectable concentrations of Palmitic Acid and Stearic Acid were found in all samples, including the Scale House sample. Detectable concentrations of Oleic Acid were also found in MW-3A and MW-4C. The ASB Inlet also had detectable concentrations of all Resins and Fatty Acids except for Chlorodehydroabietic Acid, Oleic Acid, Linoleic Acid and Limolenic Acid. There are no CCME Guidelines for the Resins and Fatty

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Acids. In general, the parameters which exceeded the CCME Guidelines are naturally occurring and the ASB inlet composition is normal for a pulp and paper mill with Kraft pulping.

A review of regional water chemistry data supplied by NBDELG in 2001 for areas in a 1-kilometre, 2-kilometre, 3-kilometre, 4-kilometre and 5-kilometer radius around the ASB was completed. Reported arsenic levels in groundwater samples ranged from non-detectable to 5.5 mg/L, with approximately one-third of all results exceeding the CCME Guidelines. Iron levels were found to range from non-detectable to 2.21 mg/L, with approximately one-fifth of all results exceeding the CCME Guidelines. Manganese levels were found to range from non-detectable to 1.46 mg/L, with approximately nine-tenths of all results exceeding the CCME Guidelines. Exceedences were reported in all five of the above-noted areas. This data is comprised of analytical results for 76 samples obtained by NBDELG between 1994 and 2001 from a variety of residential, commercial, institutional and industrial wells. Considering that ASB influent arsenic levels fall below the CCME Guideline levels and approximately one-third of wells tested by NBDELG in the area exceed the Guidelines for arsenic, one-fifth exceed for iron and nine-tenths exceed for manganese, levels in the groundwater wells surrounding the ASB appear to be indicative of naturally occurring conditions in the area, rather than from ASB operations.

Water levels were measured in all the monitoring wells except for MW-4A and 4B and the groundwater flow direction was interpreted to be in a north to northeast direction, as shown in Figures 1 and 2 for the shallow and deep groundwater respectively. Results for 2005 are generally consistent with the 2004 monitoring event.

In general, the concentrations for all parameters tested as part of this sampling program appear to be stable in nature with respect to past sampling events as no significant increases or decreases were noted.

We trust this information is sufficient for your needs at this time. Please do not hesitate to contact us at your convenience should you have questions concerning this report.

Sincerely,

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THM/cgy

Attachments

TABLE 1
Summary of Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi City, NB

Analytes	Detection Limits	Monitoring Stations MW-1A 20-Sep-05	MW-1B 20-Sep-05	MW-1C 29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	14-Sep-04	20-Sep-05	CCME Criteria[1] Drinking Water
Inorganic Analytes (units)													
Arsenic (mg/L)	0.001	0.002	0.068	0.004	ND	ND	ND	0.013	ND	0.001	0.002	0.005	0.025
Iron (mg/L)	0.02	ND	0.04	**4.4**[3]	**0.36**	0.038	**1.81**	**2.09**	<0.02	0.04	0.22	0.26	≤ 0.3[4]
Lead (mg/L)	0.0001	ND	ND	0.0004	ND	< 0.01	< 0.01	< 0.001	0.0001	0.0001	ND	ND	0.01
Calcium (mg/L)	0.05	19.4	29	13	14.7	13.4	13	34.3	19.1	19.2	17.8	21	- - -[5]
Sodium (mg/L)	0.05	30.5	14.8	57	52.8	50.5	52	49	33.5	32.6	35.9	32.4	≤ 200
Manganese (mg/L)	0.001	**0.603**	**0.349**	**1.67**	**2.41**	**1.74**	**2.21**	**0.682**	**0.549**	**0.55**	**2.93**	**1.9**	≤ 0.05[4]
Chloride (mg/L)	0.1	6.3	1.5	43.4	55.3	42	44	38.7	8	5.8	45.2	51.6	≤ 250
Aluminum (mg/L)	0.001	0.017	0.102	0.229	0.042	< 0.025	1.2	0.026	0.014	0.036	ND	0.033	- - -
pH (units)	NA[6]	7.8	7.9	6.9	6.7	6.5	6.6	6.64	7.2	8.2	7.6	6.9	6.5-8.5
Resins and Fatty Acids (units)													
Pimaric Acid (ug/L)	0.03	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Sandaroacopimaric Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Neoabietic Acid (ug/L)	0.03	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Dehydroabietic Acid (ug/L)	0.04	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Abietic Acid (ug/L)	0.03	ND[8]	ND[8]	ND[7]	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Isopimaric Acid (ug/L)	0.04	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Palustric Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Levopimaric Acid (ug/L)	0.03	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	NS	NS	ND	ND	ND	ND	ND	ND[8]	NS[9]	NS	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	NS	NS	ND	ND	ND	ND	ND	ND[8]	NS	NS	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	ND[3]	ND[8]	ND[8]	- - -
Palmitic Acid (ug/L)	1	4.3	12	NS	NS	NS	NS	NS	NS	NS	8.9	7.7	- - -
Stearic Acid (ug/L)	1	3.6	9.1	NS	NS	NS	NS	NS	NS	NS	2.0	5.4	- - -
Oleic Acid (ug/L)	0.03	ND[8]	ND[8]	1.7	2.2	ND	ND	ND	ND[8]	ND[8]	1.1	ND[8]	- - -
Linoleic Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Linolenic Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -

Analytes	Detection Limits	Monitoring Stations MW-2A 20-Sep-05	MW-2B 20-Sep-05	MW-2C 29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	14-Sep-04	20-Sep-05	CCME Criteria[1] Drinking Water
Inorganic Analytes (units)													
Arsenic (mg/L)	0.001	0.038	0.008	0.006	0.021	0.036[2]	< 0.001	0.109	0.156	0.085	<0.001	0.007	0.025
Iron (mg/L)	0.02	0.22	**2.99**	**7.57**	0.13	0.038	**1.05**	**2.31**	0.2	**1.37**	0.11	**8.3**	≤ 0.3[4]
Lead (mg/L)	0.0001	0.0005	ND	0.0009	ND	< 0.01	< 0.01	<0.001	<0.0001	0.0034	0.0001	0.0003	0.01
Calcium (mg/L)	0.05	9.92	23.3	21	10.9	8.71	11	15	4.75	4.87	6.78	11.7	- - -[5]
Sodium (mg/L)	0.05	73.2	43.8	58.3	46.4	32.3	36	38.6	83.8	73.5	17.9	51.6	≤ 200
Manganese (mg/L)	0.001	**0.322**	**2.51**	**6.31**	**0.872**	**0.59**	**0.79**	**0.355**	**0.236**	**0.085**	**0.808**	**3.2**	≤ 0.05[4]
Chloride (mg/L)	0.1	29.3	125	85.5	13.6	24	38	47.5	8.5	30.0	49.6	77.8	≤ 250
Aluminum (mg/L)	0.001	0.446	0.006	0.200	0.008	0.027	0.85	0.042	0.016	1.38	0.015	0.049	- - -
pH (units)	NA[6]	7.4	6.8	6.8	7.2	6.7	6.7	6.99	7.5	8.2	7.5	7	6.5-8.5
Resins and Fatty Acids (units)													
Pimaric Acid (ug/L)	0.03	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Sandaroacopimaric Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Neoabietic Acid (ug/L)	0.03	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Dehydroabietic Acid (ug/L)	0.04	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Abietic Acid (ug/L)	0.03	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Isopimaric Acid (ug/L)	0.04	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Palustric Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Levopimaric Acid (ug/L)	0.03	ND[8]	ND[8]	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	NS	NS	ND	ND	ND	ND	ND	ND[8]	NS	NS	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	NS	NS	ND	ND	ND	ND	ND	ND[8]	NS	NS	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	ND[8]	ND[8]	ND	ND	ND	ND	ND	NS	ND[3]	ND[8]	ND[8]	- - -
Palmitic Acid (ug/L)	1	8.3	3.6	NS	NS	NS	NS	NS	NS	NS	1.5	7.2	- - -
Stearic Acid (ug/L)	1	6.5	3.8	NS	NS	NS	NS	NS	NS	NS	1.2	7.0	- - -
Oleic Acid (ug/L)	0.03	ND[8]	ND[8]	ND	2.5	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Linoleic Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Linolenic Acid (ug/L)	1	ND[8]	ND[8]	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -

Notes 1 - Denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Drinking Water Quality (2002)
2 - Shaded areas denote values in exceedence of the CCME guidelines
3 - Bold and underline text denotes values in exceedence of the CCME aesthetic guidelines
4 - Denotes CCME aesthetic guidelines
5 - "- - -" denotes no guideline
6 - NA denotes Not Applicable
7 - ND denotes Not Detected
8 - Denotes detection limit of 1 ug/L
9 - NS denotes sample not tested

TABLE 1 …continued

Summary of Analytical Results, Kraft Mill Aeration Lagoon

UPM-Kymmene Miramichi City, NB

Analytes	Detection Limits	Monitoring Stations MW-3A 20-Sep-05	MW-3B 20-Sep-05	MW-3C 29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	14-Sep-04	20-Sep-05	CCME Criteria[1] Drinking Water
Inorganic Analytes (units)													
Arsenic (mg/L)	0.001	0.096	0.014	0.099	0.054	0.082	0.095	0.1	0.13	0.129	0.064	0.074	0.025
Iron (mg/L)	0.02	0.02	**1.38**	0.25	0.14	0.006	**20.2**	**0.679**	0.02	0.03	0.03	0.07	≤ 0.3[4]
Lead (mg/L)	0.0001	ND	0.0042	0.0004	ND	< 0.01	0.02	<0.001	ND	ND	ND	ND	0.01
Calcium (mg/L)	0.05	26.8	28.1	11.6	12.5	11.1	13	13.6	25	24.1	14.3	17.8	- - - [5]
Sodium (mg/L)	0.05	39.7	40.2	71.9	50.9	59.3	60	57.2	38.1	35.6	46.1	38.7	≤ 200
Manganese (mg/L)	0.001	**0.24**	**0.303**	**0.195**	**0.323**	**0.181**	**0.44**	**0.09**	**0.249**	**0.244**	**0.291**	**0.281**	≤ 0.05[4]
Chloride (mg/L)	0.1	48.3	23.0	2.8	2.3	2.5	2.9	2.5	35.8	39.5	3.8	4.5	≤ 250
Aluminum (mg/L)	0.001	0.006	1.19	0.346	0.003	< 0.025	19.4	0.587	0.002	0.003	0.003	0.106	- - -
pH (units)	NA [6]	7.8	7.7	7.7	7.5	7.2	7.3	7.53	7.4	8.3	7.6	7.7	6.5-8.5
Resins and Fatty Acids (units)													
Pimaric Acid (ug/L)	0.03	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Sandaroacopimaric Acid (ug/L)	1	ND [8]	ND [8]	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -
Neoabietic Acid (ug/L)	0.03	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Dehydroabietic Acid (ug/L)	0.04	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Abietic Acid (ug/L)	0.03	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Isopimaric Acid (ug/L)	0.04	ND [8]	ND [8]	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -
Palustric Acid (ug/L)	1	ND [8]	ND [8]	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -
Levopimaric Acid (ug/L)	0.03	ND [8]	ND [8]	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	NS	NS	ND	ND	ND	ND	ND	ND [8]	NS	NS	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	NS	NS	ND	ND	ND	ND	ND	ND [8]	NS	NS	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	ND [8]	ND [8]	ND	ND	ND	ND	ND	NS	ND [3]	ND [8]	ND [8]	- - -
Palmitic Acid (ug/L)	1	6.9	9.2	NS	NS	NS	NS	NS	NS	NS	2.1	3.4	- - -
Stearic Acid (ug/L)	1	5.6	8.3	NS	NS	NS	NS	NS	NS	NS	1.8	2.6	- - -
Oleic Acid (ug/L)	0.03	1.1	ND [8]	1.8	8.4	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Linoleic Acid (ug/L)	1	ND [8]	ND [8]	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -
Linolenic Acid (ug/L)	1	ND [8]	ND [8]	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -

Analytes	Detection Limits	Monitoring Stations MW-4C 29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	14-Sep-04	20-Sep-05	CCME Criteria[1] Drinking Water
Inorganic Analytes (units)											
Arsenic (mg/L)	0.001	0.093 [2]	0.037	0.098	0.112	0.172	0.147	0.17	0.005	0.028	0.025
Iron (mg/L)	0.02	**4.98** [3]	**0.75**	0.011	**18.5**	**4.38**	0.02	0.04	0.07	0.14	≤ 0.3[4]
Lead (mg/L)	0.0001	0.0005	<0.0001	< 0.01	< 0.01	< 0.001	0.0001	0.0003	<0.0001	ND	0.01
Calcium (mg/L)	0.05	9.6	8.81	8.26	7.6	13	5.2	4.92	9.2	9.71	- - - [5]
Sodium (mg/L)	0.05	48.3	49.8	48.1	51	55.1	151	147	48.7	50.5	≤ 200
Manganese (mg/L)	0.001	**0.258**	**0.193**	**0.21**	**0.32**	**0.13**	0.045	**0.053**	<0.001	**0.25**	≤ 0.05[4]
Chloride (mg/L)	0.1	4.2	6.1	5.6	5	6.4	3.7	2.5	8.3	9.4	≤ 250
Aluminum (mg/L)	0.001	0.228	0.273	< 0.025	7.51	0.089	0.032	0.04	<0.001	0.049	- - -
pH (units)	NA [6]	7.0	6.9	6.6	6.8	6.93	8.0	8.1	7.6	7.5	6.5-8.5
Resins and Fatty Acids (units)											
Pimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Sandaroacopimaric Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Abietic Acid (ug/L)	0.03	ND [7]	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
Palustric Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	ND [8]	ND [8]	ND [8]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND [8]	NS [9]	NS	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND [8]	NS	NS	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	ND	ND	ND	ND	ND	NS	ND [3]	ND [8]	ND [8]	- - -
Palmitic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	115	45	- - -
Stearic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	14	25	- - -
Oleic Acid (ug/L)	0.03	1.5	3.3	ND	ND	ND	ND [8]	ND [8]	86	23	- - -
Linoleic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -
Linolenic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND [8]	ND [8]	- - -

Notes 1 - Denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Drinking Water Quality (2002)
2 - Shaded areas denote values in exceedence of the CCME guidelines
3 - Bold and underline text denotes values in exceedence of the CCME aesthetic guidelines
4 - Denotes CCME aesthetic guidelines
5 - "- - -" denotes no guideline
6 - NA denotes Not Applicable
7 - ND denotes Not Detected
8 - Denotes detection limit of 1 ug/L
9 - NS denotes sample not tested

TABLE 1 …continued
Summary of Analytical Results, Kraft Mill Aeration Lagoon
UPM-Kymmene Miramichi Inc., NB

Analytes	Detection Limits	Monitoring Station: Scale House									CCME Criteria[1] Drinking Water
		29-Sep-97	16-Sep-98	23-Aug-99	24-Aug-00	25-Sep-01	19-Sep-02	24-Sep-03	14-Sep-04	20-Sep-05	
Inorganic Analytes (units)											
Arsenic (mg/L)	0.001	<0.001	<0.001	0.002	< 0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	0.025
Iron (mg/L)	0.02	**0.57**	0.07	<0.005	0.21	**0.914**	**1.36**	**1.05**	**1.15**	**0.57**	≤ 0.3[4]
Lead (mg/L)	0.0001	<0.0001	<0.0001	< 0.01	< 0.01	< 0.001	0.0002	0.0001	0.0001	ND	0.01
Calcium (mg/L)	0.05	55.4	65.9	55.4	55	60	62.5	61.2	62.4	60.4	- - -[5]
Sodium (mg/L)	0.05	24.7	45.1	27.4	24	25.8	24.6	23.7	24.1	25.1	≤ 200
Manganese (mg/L)	0.001	**1.15**	**1.12**	**1.05**	**1.00**	**0.711**	**1.360**	**1.380**	1.38	**1.29**	≤ 0.05[4]
Chloride (mg/L)	0.1	45.4	46.7	49	42	39.9	47.9	47.9	49.7	48	≤ 250
Aluminum (mg/L)	0.001	<0.001	<0.001	< 0.025	0.032	0.01	<0.001	<0.001	<0.001	0.008	- - -
pH (units)	NA[6]	7.7	7.8	7.1	7.3	7.56	7.4	8.4	7.7	8	6.5-8.5
Resins and Fatty Acids (units)											
Pimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Sandaroacopimaric Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Neoabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Dehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Abietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Isopimaric Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Palustric Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Levopimaric Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	ND	ND	ND	ND	ND	ND[8]	NS	NS	NS	- - -
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND	ND	ND	ND[8]	NS	NS	NS	- - -
Chlorodehydroabietic Acid (ug/L)	1	ND	ND	ND	ND	ND	NS	ND[3]	ND[8]	ND[8]	- - -
Palmitic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	1.8	3.7	- - -
Stearic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	1.4	3	- - -
Oleic Acid (ug/L)	0.03	1.9	3.2	ND	ND	ND	ND[8]	ND[8]	ND[8]	ND[8]	- - -
Linoleic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -
Linolenic Acid (ug/L)	1	NS	NS	NS	NS	NS	NS	NS	ND[8]	ND[8]	- - -

Notes
1 - Denotes Canadian Council of the Ministers of the Environment (CCME), Guidelines for Drinking Water Quality (2002)
2 - Shaded areas denote values in exceedence of the CCME guidelines
3 - Bold and underline text denotes values in exceedence of the CCME aesthetic guidelines
4 - Denotes CCME aesthetic guidelines
5 - "- - -" denotes no guideline
6 - NA denotes Not Applicable
7 - ND denotes Not Detected
8 - Denotes detection limit of 1 ug/L
9 - NS denotes sample not tested

TABLE 2

Summary of Analytical Results, Kraft Mill Aeration Lagoon ASB Inlet

UPM-Kymmene Miramichi Inc., NB

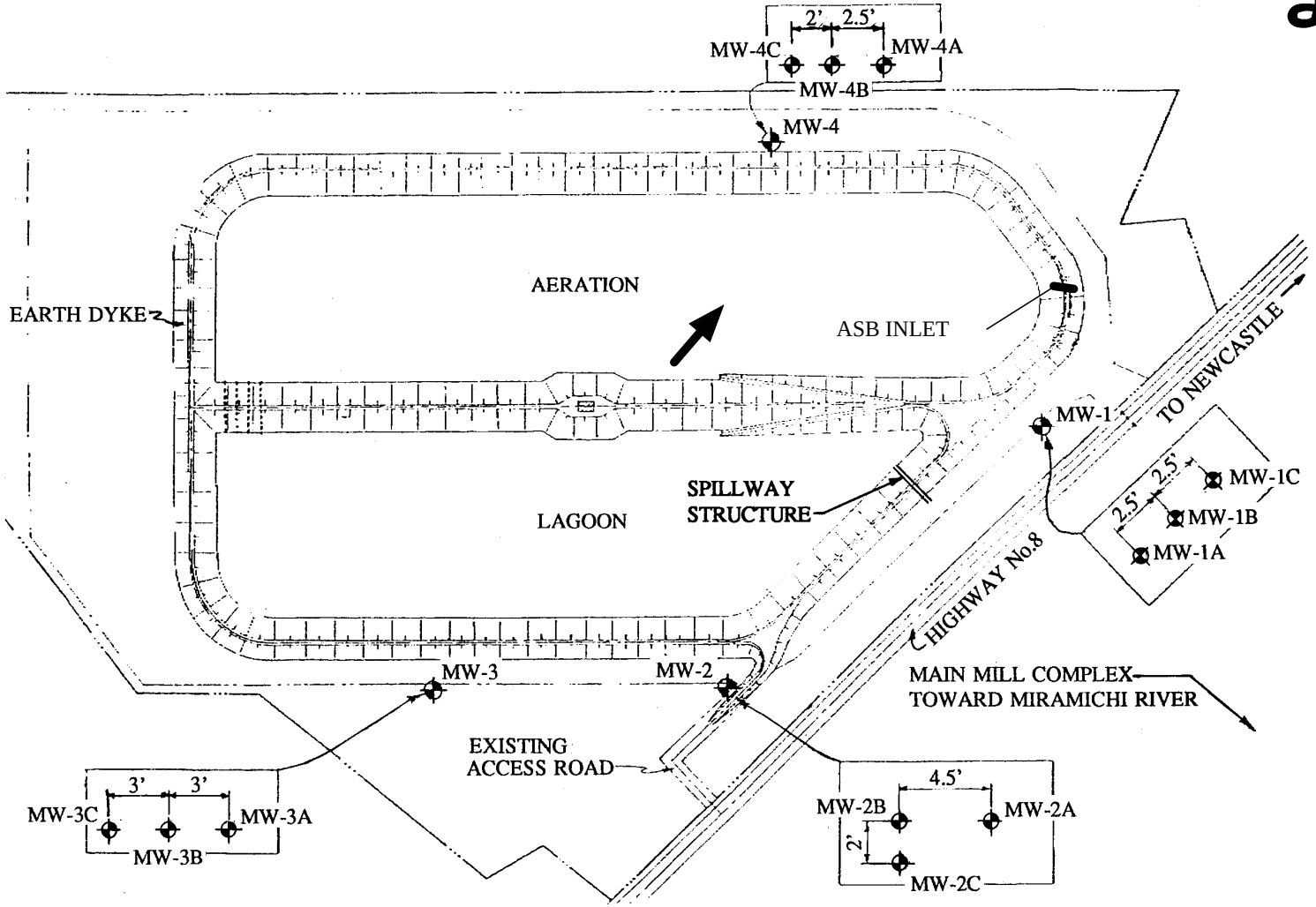
Analytes	Detection Limits	ASB Inlet					
		24-Aug-00	13-Nov-01	19-Sep-02	24-Sep-03	14-Sep-04	20-Sep-05
Inorganic Analytes (units)							
Arsenic (mg/L)	0.001	< 0.001	0.002	0.002	<0.005	<0.005	0.001
Iron (mg/L)	0.02	0.55	0.477	1.09	0.51	0.95	0.14
Lead (mg/L)	0.0001	< 0.01	0.043	0.0082	0.0047	0.0071	0.0007
Calcium (mg/L)	0.05	214	213	166	186	158	35.1
Sodium (mg/L)	0.05	405	3120	329	379	443	101
Manganese (mg/L)	0.001	2.73	0.281	2.51	2.62	3.09	0.14
Chloride (mg/L)	0.1	385	193	182	211	198	14.4
Aluminum (mg/L)	0.001	2.3	5.3	4.56	1.94	7.99	5.08
pH (units)	NA (1)	6.4	6.5	7.0	7.2	7.3	9.4
Resins and Fatty Acids (units)							
Pimaric Acid (ug/L)	0.03	1,160	2.5	110	100	29	86
Sandaroacopimaric Acid (ug/L)	1	NS (4)	NS	NS	NS	22	100
Neoabietic Acid (ug/L)	0.03	188	1.72	100	140	41	1.1
Dehydroabietic Acid (ug/L)	0.04	89	13.9	1,020	1,300	420	470
Abietic Acid (ug/L)	0.03	766	14.7	630	1,200	110	96
Isopimaric Acid (ug/L)	0.04	1,410	2.7	240	440	63	200
Palustric Acid (ug/L)	1	NS	NS	NS	NS	39	58
Levopimaric Acid (ug/L)	0.03	ND (2)	2.79	ND (3)	ND (3)	ND (3)	35
1,4 - Chlorodehydroabietic Acid (ug/L)	0.04	808	1.47	ND (3)	NS	NS	NS
1,2 - Chlorodehydroabietic Acid (ug/L)	0.03	ND	ND	ND (3)	NS	NS	NS
Chlorodehydroabietic Acid (ug/L)	1	ND	ND	ND (3)	ND (3)	ND (3)	ND (8)
Palmitic Acid (ug/L)	1	NS	NS	NS	NS	60	1.4
Stearic Acid (ug/L)	1	NS	NS	NS	NS	28	1.1
Oleic Acid (ug/L)	0.03	1,470	4.14	260	320	150	ND (8)
Linoleic Acid (ug/L)	1	NS	NS	NS	NS	160	ND (8)
Linolenic Acid (ug/L)	1	NS	NS	NS	NS	ND (3)	ND (8)

Notes 1 - NA denotes Not Applicable

2 - ND denotes Not Detected

3 - Denotes detection limit of 1 ug/L

4 - NS denotes sample not tested

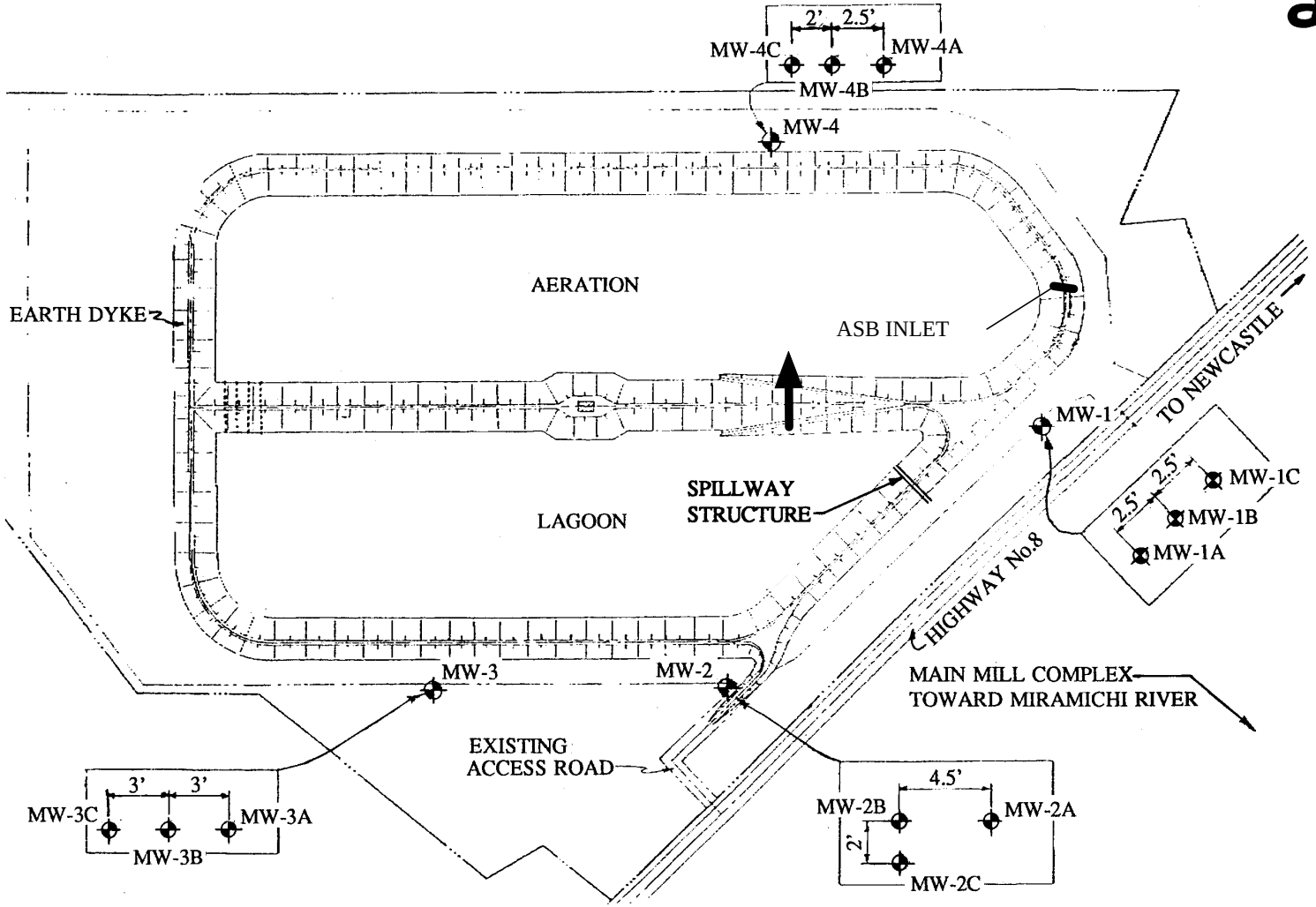


LEGEND:

APPARENT GROUNDWATER FLOW DIRECTION (September 20, 2005)

SOURCE: Basemap Modified After Geocon, January 14, 1991.

SCALE: 1:5000 0 200 METRES	DATE: October 25, 2005 DRAWN BY: D. McCoy PROJECT No.: TE51086 FILE NAME: gwater flow.tcw/shalllow	**UPM MIRAMICHI GROUNDWATER MONITORING**	**FIGURE 1 SHALLOW (C) GROUNDWATER FLOW DIRECTION**



LEGEND:

APPARENT GROUNDWATER FLOW DIRECTION (September 20, 2005)

SOURCE: Basemap Modified After Geocon, January 14, 1991.

SCALE: 1:5000 0 200 METRES	DATE: October 25, 2005 DRAWN BY: D. McCoy PROJECT No.: TE51086 FILE NAME: gwater flow.tcw/deep	**UPM MIRAMICHI GROUNDWATER MONITORING**	**FIGURE 2 DEEP (A) GROUNDWATER FLOW DIRECTION**

RPC
921 College Hill Rd,
Fredericton, N.B. E3B 6Z9
Report No.: 53454-IAS

AMEC Earth & Environmental Ltd
25 Waggoners Lane
Fredericton NB E3B 2L2
Attn: Tom MacNeil
Job No.: TE 51 UPM

October 06, 2005

Fax: 506.450.0829

Analysis of Water

RPC ID	53454-01	53454-02	53454-03	53454-04	53454-05	53454-06
Client ID	MW-1A Sept. 20/05	MW-1B Sept. 20/05	MW-1C Sept. 20/05	MW-2A Sept. 20/05	MW-2B Sept. 20/05	MW-2C Sept. 20/05
	Concentration (µg/L)					
Aluminum	17	102	33	446	6	49
Arsenic	2	68	5	38	8	7
Calcium	19400	29000	21000	9920	23300	11700
Iron	< 20	40	260	220	2990	8300
Lead	< 0.1	< 0.1	< 0.1	0.5	< 0.1	0.3
Manganese	603	349	1900	322	2510	3200
Sodium	30500	14800	32400	73200	43800	51600

Chloride (mg/L)	6.3	1.5	51.6	29.3	125	77.8
pH	7.8	7.9	6.9	7.4	6.8	7.0

A. Ross Kean, M.Sc.
Department Head
Inorganic Analytical Chemistry

Peter Crowhurst, B.Sc., C.Chem.
Analytical Chemist
Inorganic Analytical Chemistry

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Analysis of Water

RPC ID	53454-07	53454-08	53454-09	53454-10	53454-11	53454-12
Client ID	MW-3A Sept. 20/05	MW-3B Sept. 20/05	MW-3C Sept. 20/05	MW-4C Sept. 20/05	Guard House Sept. 20/05	Influent Sept. 20/05
	Concentration (µg/L)					
Aluminum	6	1190	106	49	8	5080
Arsenic	96	14	74	28	< 1	1
Calcium	26800	28100	17800	9710	60400	35100
Iron	20	1380	70	140	570	140
Lead	< 0.1	4.2	< 0.1	< 0.1	< 0.1	0.7
Manganese	240	303	281	250	1290	140
Sodium	39700	40200	38700	50500	25100	101000
Chloride (mg/L)	48.3	23.0	4.5	9.4	48.0	14.4
pH	7.8	7.7	7.7	7.5	8.0	9.4

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Report ID: 53454-OAS
Report Date: 05-Oct-05
Date Received: 21-Sep-05

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thomas.macneil@amec.com

Project #: TE 51 UPM

Resin and Fatty Acid Analysis in Water

RPC Sample ID:			53454-1	53454-2	53454-3	53454-4	53454-5
Client Sample ID:			MW-1A	MW-1B	MW-1C	MW-2A	MW-2B
Date Sampled:			20-Sep-05	20-Sep-05	20-Sep-05	20-Sep-05	20-Sep-05
Matrix:			Water	Water	Water	Water	Water
Analytes	Units	RL					
Resin Acids							
Pimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sandaracopimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Neoabietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dehydroabietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Abietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Palustric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Levopimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodehydroabietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Resin Acids	µg/L	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Fatty Acids							
Palmitic	µg/L	1.0	4.3	12	7.7	8.3	3.6
Stearic	µg/L	1.0	3.6	9.1	5.4	6.5	3.8
Oleic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Linoleic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Linolenic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Fatty Acids	µg/L	2.2	7.9	21	13	15	7.4

Method: Dichloromethane extraction; derivitization. Analysis by GC/MS.
This report relates only to the sample(s) and information provided to the laboratory.
RL = Reporting Limit

Bruce Phillips
Dept. Head
Organic Analytical Services

Troy Smith
Chemist
Organic Analytical Services

Report ID: 53454-OAS
Report Date: 05-Oct-05
Date Received: 21-Sep-05

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Project #: TE 51 UPM

Resin and Fatty Acid Analysis in Water

RPC Sample ID:			53454-6	53454-7	53454-8	53454-9	53454-10
Client Sample ID:			MW-2C	MW-3A	MW-3B	MW-3C	MW-4C
Date Sampled:			20-Sep-05	20-Sep-05	20-Sep-05	20-Sep-05	20-Sep-05
Matrix:			Water	Water	Water	Water	Water
Analytes	Units	RL					
Resin Acids							
Pimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sandaracopimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Neoabietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dehydroabietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Abietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Palustric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Levopimaric	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodehydroabietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Resin Acids	µg/L	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Fatty Acids							
Palmitic	µg/L	1.0	7.2	6.9	9.2	3.4	45
Stearic	µg/L	1.0	7.0	5.6	8.3	2.6	25
Oleic	µg/L	1.0	<1.0	1.1	<1.0	<1.0	23
Linoleic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Linolenic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Fatty Acids	µg/L	2.2	14	14	18	6.0	93

Method: Dichloromethane extraction; derivitization.
This report relates only to the sample(s) and inform
RL = Reporting Limit

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Troy Smith
Chemist
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Project #: TE 51 UPM

Resin and Fatty Acid Analysis in Water

RPC Sample ID:			53454-11	53454-12	Method Blank 1	Method Blank 2
Client Sample ID:			Guard House	Influent		
Date Sampled:			20-Sep-05	20-Sep-05		
Matrix:			Water	Water	Water	Water
Analytes	Units	RL				
Resin Acids						
Pimaric	µg/L	1.0	<1.0	86	<1.0	<1.0
Sandaracopimaric	µg/L	1.0	<1.0	100	<1.0	<1.0
Neoabietic	µg/L	1.0	<1.0	1.1	<1.0	<1.0
Dehydroabietic	µg/L	1.0	<1.0	470	<1.0	<1.0
Abietic	µg/L	1.0	<1.0	96	<1.0	<1.0
Isopimaric	µg/L	1.0	<1.0	200	<1.0	<1.0
Palustric	µg/L	1.0	<1.0	58	<1.0	<1.0
Levopimaric	µg/L	1.0	<1.0	35	<1.0	<1.0
Chlorodehydroabietic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0
Total Resin Acids	µg/L	3.0	<3.0	1050	<3.0	<3.0
Fatty Acids						
Palmitic	µg/L	1.0	3.7	260	2.2	1.4
Stearic	µg/L	1.0	3.0	350	1.8	1.1
Oleic	µg/L	1.0	<1.0	17	<1.0	<1.0
Linoleic	µg/L	1.0	<1.0	21	<1.0	<1.0
Linolenic	µg/L	1.0	<1.0	<1.0	<1.0	<1.0
Total Fatty Acids	µg/L	2.2	6.7	650	4.0	2.5

Method: Dichloromethane extraction; derivitization.
This report relates only to the sample(s) and inform
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