

Briefing Note

EcoLogo™ Program Criteria Review (Round 2)

CCD-077 Printing and Writing Papers
CCD-078 Uncoated Mechanical Printing Papers

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1. Introduction

Several lines of printing and writing papers (CCD-077) and newsprint (CCD-078) have been third-party certified by the EcoLogo™ Program. These products offer environmental benefits and meet requirements for reduction in air emissions, reduction in water emissions, reduction of waste, efficient use of fiber (preferably recycled), and reduction in energy use.

EcoLogo™ certification requirements are regularly updated and products are re-audited regularly to ensure certified products still offer environmental benefits. The purpose of this briefing note is to inform a review and revision of the audit criteria for these products.

2. Current EcoLogo™ Criteria and Certified Products

Three different companies have EcoLogo™ certified paper products (see below). The guiding principle of the Program is that certification requirements represent environmental leadership, or approximately 20% of products in the marketplace.

The paper categories certified by the EcoLogo™ program are:

- **Printing and Writing Paper (CCD-077)**

This category includes uncoated wood-free printing and writing paper and clay coated free sheet paper. It is also referred as office, computer, copier, graphic, printing, stationery, and fine paper. It normally contains less than 10% mechanical paper pulp.

- **Uncoated Mechanical Printing Paper (CCD-078)**

This category is also known as groundwood or wood-containing paper and magazine paper, and includes a wide range of publication papers from book to telephone directory paper. It is also referred to as magazine paper, flier paper, and others. Additionally, this product category also includes newsprint. Papers in this category normally contain more than 10% mechanical paper pulp. Newsprint is a sub-classification of uncoated mechanical paper, normally used to publish newspapers.

Table 1. EcoLogo™ certified products by company 1st quarter 2009

| Company | Product Lines Certified | Criteria |
|----------------------------------|---|-----------------|
| Boise Cascades | 2 lines certified: Eco Aspen, Trillium | CCD-077 |
| Cascades Fine Paper | 7 lines certified: New Life, ReproPlusBrite, Rockland, Rolland Enviro100, Rolland HiTech 30, Rolland Opaque 30, Rolland ST 30 | CCD-077 |
| Atlantic Packaging Products Ltd. | 3 lines certified: 27.7 lb recycled newsprint, 30 lb recycled newsprint, and 32 lb recycled newsprint | CCD-078 |

3. Background

3.1. Current EcoLogo™ Criteria

The current EcoLogo™ certification criteria for printing and writing paper (CCD-077) and mechanical printing paper (CCD-078) were last revised in 1998. A summary of the criteria are below.

- Be manufactured so that the total of load points assessed for fiber use, energy use, global warming potential, COD emissions, sub-lethal toxicity, acidification potential, and solid waste does not exceed 28. (An explanation of the load point system is included below.)
- Be manufactured so that the effluent resulting from the paper mill or any mill supplying market pulp does not contain a measurable concentration of 2,3,7,8-TCDD or 2,3,7,8-TCDF.
- If manufactured from raw wood fiber, use only fiber derived from forests managed under a code of sustainable forest practices.

“Load points” are assigned for each of the seven parameters listed below on a linear scale, starting at the “minimum” value of zero points, to the “threshold” value of four points. A particular paper product can receive no more than 28 load points and still qualify for the EcoLogo™.

Table 2. Current Load Point Values for CCD-077 and 078

| Category | Parameter | Units | Minimum | Threshold |
|--------------------|--|-----------------------------------|---------|-----------|
| Resource Depletion | Fiber Use | tonnes / ADMT product | 0 | 1.3 |
| Liquid Effluent | Chemical Oxygen Demand | kg / ADMT product | 9 | 25 |
| Liquid Effluent | Sublethal toxicity | TEFsub | 0 | 25 |
| Energy Consumption | Energy use | GJ / ADMT product | 15 | 32 |
| Global Warming | Global Warming Potential Measure (estimated CO ₂ emissions) | GJ / ADMT product | 5 | 20 |
| Acidification | Acidification Potential (estimated SO ₂ emissions) | kg SO ₂ / ADMT product | 0 | 0.5 |
| Solid Waste | Solid Waste | m ³ / ADMT product | 0.15 | 0.3 |

Threshold levels were established in 1998 to correspond to approximately the 80th percentile (i.e. top-performing 20%) of commercial operations. Those parameters scoring above the threshold value would be assigned Load Points on the same linear scale. A product with one characteristic parameter that exceeds the threshold value would have to perform well in all other parameters to qualify.

For example, using 100% post-consumer fiber achieves a Load Point value of ‘0’ for Resource Depletion because no raw fiber is used in the production of its pulp. The 80th percentile would be a mill using a mix of recycled content and other fiber sources that results in fiber-use efficiency of 1.3 tonnes input per tonne of pulp produced. This mill would receive a Load Point of ‘4’.

3.2. North American Market

In 2006, Canada and the United States consumed 29.9 million tonnes of printing and writing papers, and 9.9 million tonnes of newsprint. As basis for comparison, in the same period, 11.0 million tonnes of newsprint were produced in this region. Of the supply of printing and writing papers, 68% originated from the U.S., 20% from Canada and 12% from overseas (of which 66% came from Europe, mostly coated and uncoated mechanical papers). Most of what North America produces remains in this region. In 2006, only 3.3% of output was exported.

Table 3. 2004 North America Printing and Writing Paper Capacity

Source: Pulp and Paper Products Council - http://www.pppc.org/en/2_0/2_3.html

| Type | Millions of tonnes | Percentage |
|---------------------|--------------------|-------------|
| Uncoated mechanical | 6.4 | 21.4% |
| Uncoated woodfree | 13.0 | 43.5% |
| Coated woodfree | 4.8 | 16.1% |
| Coated mechanical | 5.7 | 19.1% |
| Total | 29.9 | 100% |

3.3. Activities of Other Type 1 Eco-labels

Since printing and writing paper is a global commodity, there are a number of other ecolabeling programs active in this area. The criteria of other life-cycle based multi-attribute labels (e.g., Green Seal, Nordic Swan) are particularly relevant as are other single-attribute initiatives such as restrictions on chlorine use or requirements for recycled content (e.g. the US General Services Administration).

Green Seal: "Printing and Writing Paper" is covered by Green Seal Environmental Standard GS-7. The environmental requirements for this product category are:

- a) recycled content (30% post consumer minimum);
- b) neither chlorine nor any of its derivatives (e.g. hypochlorite, chlorine dioxide) should be used during manufacture; and
- c) solvents containing chlorine or substances listed on Section 313 of the EPCRA should not be used during manufacture.

Nordic Swan: "Copy and Printing Paper" is covered by the Nordic Swan Label. This is also a point-based certification system, but the parameters are tallied separately from each other and then compared to a reference value. The criteria cover the following items:

- a) Raw Materials (fiber): 20% of the fiber must come from certified forest operations, or 75% of the fibrous material must consist of recycled fiber, wood shavings/sawdust, or both.
- b) Energy: points are allocated comparing energy use to a reference energy value, which is assigned depending on the type of paper manufactured.
- c) Selected emissions to water and air: including COD, phosphorus, sulphur, and NO_x. There is a single point value assigned to all of these emissions together.
- d) Halogenated organic compounds (AOX): emissions must not exceed 0.25 kg/tonne.
- e) Carbon dioxide (CO₂): emissions are also assigned points based on a reference table.

3.4. Proposed Criteria Revisions

This review of CCD-077 and CCD-078 will consist of revising the load-point values to reflect advances in the industry, and incorporating additional environmental considerations (e.g. explicit requirements for recycled content, restricting chemical releases, and specifying the type of chlorine bleaching). Additionally, the EcoLogo™ review process requires the participation of a wide range of expert stakeholders through several conference meetings, as well as a public consultation period. After each stakeholder meeting, or public consultation, the EcoLogo™ Program will publish a new draft document that reflects the changes made to the CCDs. Due to the complex nature of CCD-077 and CCD-078 we anticipate the need for several rounds of stakeholder and public participation, for which several draft documents will be prepared and proposed.

In the first revision draft submitted in October 2007, we had proposed a tier approach for distinguishing three increasingly stringent levels of environmental performance. We had proposed that a *Silver* tier outline the basic requirements for achieving EcoLogo™ certification, and that *Gold* and *Platinum* tiers represent increasingly more stringent requirements, which included further restrictions on recycled content, bleaching processes, forestry certification, the protection of environmentally sensitive areas, and GHG emissions from fossil fuel use. Several stakeholders involved in the review process pointed out some inconsistencies and difficulties in assigning “leadership within leadership” in the proposed tier approach.

After further research and serious deliberation we have decided to withdraw the proposed tier approach. However, we have formulated an alternative proposition, which continues to allow for a broader range of acceptable certification criteria options, while informing purchasers of the actual achieved environmental performance of a given product. As such, in this second revision draft we propose that the former requirements of the *Silver* certification tier (with some modifications) continue to serve as the minimum requirements for achieving EcoLogo™ certification, and that a new procedure for informing purchasers of the exact specifications reached by a successful EcoLogo™ applicant be conveyed by means of a transparent communication device. In order to inform purchasers of the exact performance levels achieved by a successful EcoLogo™ applicant, we propose that the amount of recycled content, bleaching mechanism, forestry certification scheme, and demonstration of protection of sensitive / ancient forests be published on the EcoLogo™ web site (www.ecologo.org) and any other publicity materials.

Table 4. EcoLogo™ Certification Requirements for CCD-077

| | Minimum Requirements |
|--|---------------------------|
| Recycled Content | 30% + |
| Bleaching | Any (ECF, PCF, TCF) |
| Forestry Certification | Any (FSC, CSA, SFI, ATFS) |
| Sensitive / Ancient Forest Protection | No requirements, or AFF |
| GHG from fossil fuel use (CO ₂ eq.) | Less than 1100 kg / ADMt |
| Chemical Management | List of substances |
| Load Points | 32 Load points maximum |

(See Table 5 for acronyms.)

Similarly, we propose that the specifications given in the table below be used as minimum requirements for certification for CCD-078, but that the actual performance levels achieved for each category be published on the EcoLogo™ web site (www.ecologo.org) and any other publicity materials.

Table 5. EcoLogo™ Certification Requirements for CCD-078

| | Minimum Requirements |
|--|---------------------------|
| Recycled Content | 50% + |
| Bleaching | Any (ECF,PCF, TCF) |
| Forestry Certification | Any (FSC, CSA, SFI, ATFS) |
| Sensitive / Ancient Forest Protection | No requirements, or AFF |
| GHG from fossil fuel use (CO ₂ eq.) | Less than 800 kg / ADMt |
| Chemical Management | List of substances |
| Load Points | 32 Load points maximum |

AFF – Ancient Forest Friendly
 FSC – Forest Stewardship Council
 CSA – Canadian Standards Association
 SFI – Sustainable Forestry Initiative

ECF – Elemental Chlorine Free
 PCF – Processed Chlorine Free
 TCF – Totally Chlorine Free

In the first revision draft submitted in October 2007, we had proposed to add criteria regarding greenhouse gas (GHG) emissions from the transportation of pulp to the paper producing facility, and paper to the paper conversion facilities. While we recognize that GHG emissions for the transport of pulp and paper over large distances can be significant for non-integrated mills, we have found it very difficult to acquire the necessary data from the literature, or other sources, to help us specify threshold values that would represent environmental leadership for CCD-077 and CCD-078. We have therefore removed the proposed criteria regarding greenhouse gas (GHG) emissions from the transportation of pulp to the paper producing facility, and paper to the paper conversion facilities.

Similarly, we had also proposed to add criteria regarding emissions of fine particulate matter from pulp and paper mills. The October 2007 stakeholder review process revealed that quantifying PM_{2.5} may prove to be operationally difficult, while determining total particulate matter (TPM) would be more appropriate. While we were successful in obtaining TPM emission data to help us specify threshold values that would represent environmental leadership, we found several inconsistencies in the scientific methodology employed by the various pulp and paper mills when gathering and reporting emissions data. Indeed, our research revealed that under current government emissions reporting guidelines (e.g. NPRI), pulp and paper mills can use one of several accepted sampling methodologies that ultimately result in estimates which may not be used for mill to mill comparisons. Until methodological issues are resolved we have removed the proposed criteria regarding emissions of fine particulate matter from pulp and paper mills.

4. Environmental Considerations

4.1. Explicit Requirements for Recycled Content

A very common *buyer* request is the specification of recycled content in environmental criteria documents. Several pieces of legislation specify a certain minimum recycled content – for example, the US General Services Administration and the State of California both specify a minimum requirement of 30% recycled content. For newsprint, the value specified can be up to 50% in some states such as California, Connecticut and Missouri.

Establishing an explicit recycled content requirement would simplify the use of the EcoLogo™ as a procurement tool. We propose establishing a minimum recycled content of 30% post-consumer recycled material for CCD-077, and 50% for CCD-078. This proposed specification matches the post-consumer recycled material specified in other North American environmental certification systems, and coincides with the proposed change in fiber use described in the Load Point System. Indeed, the original Load Point System was designed to exclude products that did not include recycled content.

4.2. Sustainable Forest Management and Sensitive /Ancient Forest Protection

A specific requirement of the current criteria documents is that the paper products must be “manufactured under a code of sustainable forest practices”. To improve forest management issues in EcoLogo™ certified papers, we propose to add the following requirements:

- If manufactured from pulp made from primary wood fiber, use only pulp derived from forests which have been harvested under a third party forestry certification system, such as the Forest Stewardship Council (FSC), Canadian Standards Association (CSA), Sustainable Forestry Initiative (SFI), American Tree Farm System (ATFS), or another forestry certification scheme recognized by the Programme for the Endorsement of Forest Certification schemes (PEFC).

The EcoLogo™ Program noted stakeholder concerns regarding adding an “Ancient Forest Friendly” (AFF) requirement in the first proposed CCD draft documents of October 2007. Stakeholders identified difficulties in appropriately quantifying and subsequently verifying the requirements specified in the AFF standard. However, we continue to believe that there is value in identifying paper products that protect sensitive and ancient forests, in ways that may not be addressed in current sustainable forest management certification schemes. Therefore, we have removed the statement in CCD-077 and CCD-078 that the AFF standard is mandatory to meet the minimum EcoLogo™ requirements. Instead, EcoLogo™ will recommend that paper products certified under CCD-077 or CCD-078 that are currently recognized by AFF be acknowledged by the EcoLogo™ Program, by means of a transparent communication device as explained in section 3.4. The AFF requirements are:

- If manufactured from pulp made from primary wood fiber, only use fiber not derived from endangered forests or high conservation value forests. These are forests that belong to one or more of the following categories:
 - Intact forest landscapes (also known as Frontier Forests);
 - Restoration and remnant forest types;
 - Exceptional biodiversity values (e.g., rare forest types, forests exhibiting high endemism)

- o or species richness);
- o Core habitat of focal conservation species;
- o Forest areas containing globally, nationally or regionally significant concentrations of biodiversity values;
- o Forest areas containing globally, regionally or nationally significant large landscape level forests;
- o Forest areas that are in or contain rare, threatened or endangered ecosystems;
- o Forest areas that provide basic services of nature in critical situations;
- o Forest areas fundamental to meeting basic needs of local communities; and
- o Forest areas critical to local communities' traditional cultural identity.

Currently, AFF recognizes conservation status in the form of designated protected areas which are currently being mapped and monitored by the World Database on Protected Areas Consortium as part of the IUCN (International Union for Conservation of Nature) and United Nations Environment Programme (UNEP), although the list is not considered to be complete.

4.3. Greenhouse Gas Emissions from Fossil Fuel Use

The EcoLogo™ Program proposes the inclusion of a maximum emission factor for greenhouse gases derived from the use of fossil fuels during paper manufacture. These emissions include the CO₂ equivalents due to energy use at the mill site.

For CO₂ equivalents due to fossil fuel at the mill site, the proposed minimum emission limits are: 1,100 kg CO₂ eq. / ADMt paper for CCD-077 and 800 kg CO₂ eq. / ADMt for CCD-078.

4.4. Pulp Bleaching

There are four basic classifications for office paper products according to the bleaching mechanism used in their manufacture:

- Totally Chlorine Free (TCF) is a product that has been produced without the use of chlorine compounds, including elemental chlorine gas, chlorine compounds and chlorine derivatives. Since it is impossible to tell whether the recycled content has been bleached with chlorine in the past, post-consumer recycled fiber may not be labeled as "chlorine free".
- Processed Chlorine Free (PCF) products contain post-consumer recycled fiber content, which has been re-bleached with a process that does not use chlorine compounds.
- Elemental Chlorine Free (ECF) is a product that has been produced without chlorine gas; however, the bleaching process does involve the use of other chlorine compounds such as chlorine dioxide.
- Traditional or chlorine bleaching uses chlorine gas to bleach the wood pulp.

The major environmental concern with chlorine bleaching is that chlorine bonds with organic compounds in pulp (e.g. lignin) to produce toxic pollutants. Amongst these, the substances of highest

concern are dioxins, which are regarded as some of the most carcinogenic substances. All variants for “chlorine free” bleaching attempt to minimize or eliminate the formation of dioxins.

- According to Environmental Defense, only 2.4 % of the non-recycled pulp used to manufacture fine papers in North America consists of traditional or chlorine bleaching – this makes a distinction on this basis easy to include. We recommend adding the restriction that no traditional chlorine bleached pulp be allowed for certification.
- Alternative non-bleaching methods may result in the discharge of other deleterious substances such as chelating compounds (EDTA, NTA) and heavy metals from hydrogen peroxide bleaching (Fenton reaction). Although the emission of these compounds may be controlled or prevented with efficient wastewater treatment, the potential for discharge remains. No standard or certification program mentions these substances specifically. Participants in this review are encouraged to bring forward their opinion on whether emissions of these substances should be explicitly restricted in this set of criteria.

The current criteria statement relating to dioxins and furans in CCD-077 and CCD-078 states that in order to be EcoLogo™ certified, the product must: “be manufactured so that the effluent from the mill, or any mill that supplies market pulp, does not contain a measurable concentration of 2,3,7,8-TCDD or a measurable concentration of 2,3,7,8-TCDF”.

It is proposed that in the revised versions of CCD-077 and CCD-078, the wording be changed slightly as follows: “be manufactured so that the effluent from the paper mill or any mill which produces a component pulp, if such mills operate a chlorine bleaching plant, does not contain a measurable concentration of 2,3,7,8-TCDD or a measurable concentration of 2,3,7,8-TCDF”.

It should also be noted that the limits of quantification (LOQs) given in the Interpretation section for both dioxins and furans will be changed to 15 ppq. In the previous version of CCD-077 and 078, the LOQ values were given as 10 ppq. The new LOQ value of 15 ppq is based on:

<http://www.ec.gc.ca/CEPARRegistry/documents/pubs/eps-1-rm-19/chap6.cfm#table5>

4.5. Chemical Management

In order to avoid chemicals that present significant human health or environmental hazards, the compounds listed below must *not* be used during the manufacture of papers in order to become EcoLogo™ certified:

- Thiourea Dioxide: used as non-chlorine bleaching agent, and excluded due to potential carcinogenicity;
- Nitrioltriacetic Acid (NTA): used as a sequestering agent during non-chlorine bleaching, and considered potentially carcinogenic to humans and can be substituted with other chelating agents;
- Bisphenol A: used as a binding agent in coated paper grades, and a suspected endocrine disruptor;
- Peroxide, (1,1,4,4-tetramethyl-1,4-butanediyl) bis[(1,1-dimethylethyl) (DMHBP): used as non-chlorine bleaching agent and as a polymer for paper coatings. It is excluded due to toxicity and irritation risks to workers during the manufacturing process, and to its bio-persistence.

5. Load Point Determination

5.1. Resource Depletion: Fiber Use

Table 6. Proposed Changes for Fiber Use

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units |
|-----------|-----|---------------------|-----------|----------------------|-----------|-------------------|
| | | Minimum | Threshold | Minimum | Threshold | |
| Fiber Use | 077 | 0 | 1.3 | 0 | 1.3 | tonne fiber /ADMt |
| | 078 | 0 | 1.3 | 0 | 0.6 | tonne fiber /ADMt |

The principal material components in the manufacture of paper are fiber and non-fibrous filler (e.g. materials such as calcium carbonate and clay that are used to reduce product costs and improve brightness and opacity). Fine papers normally contain less than 20% filler, and values of 15-16% are considered normal. Although fine paper may contain mechanical pulp fiber and/or thermomechanical pulp, typical papers are made of kraft bleached and recycled pulp.

In order to reduce the depletion of resources and since cellulose fiber is the primary raw material used in paper production, the EcoLogo™ is proposing to continue with a limit on the amount of fiber used by setting a recycled content requirement of 30% post-consumer recycled fiber for CCD-077. This specification is used by the US General Services Administration and other environmental certification organizations as a guideline for sourcing printing papers. CCD-078 has similar requirements, but the recycled content requirements are established at 50% post-consumer recycled fiber.

To calculate load point values, CCD-077 and CCD-078 assign different multipliers to the different types of fibrous inputs used for paper manufacture. A mill using 100% post consumer recycled fiber would have an equivalent fiber use load point of zero, indicating that the use of post-consumer fiber is not resource depleting.

Table 7. Fiber Type Multipliers

| Fiber type | Multiplier |
|---|------------|
| Raw / virgin wood fiber | 1.00 |
| Pre-consumer material (e.g. internal broke) | 0.75 |
| Wood waste (e.g. planar shavings, sawdust) | 0.33 |
| Post-consumer materials | 0.00 |

Using the 30% post-consumer content requirement for CCD-077 (i.e. this will be the threshold value) together with the fiber type multipliers, we calculated the number of tonnes of fiber that would be needed for one tonne of air dried product (i.e. at 10% moisture content). The calculations for CCD-078 are identical, but recycled content is established at 50% (6% moisture content).

Table 8. Fiber Use Calculations

| Printing Paper (Paper Typical Formulation - for 1 tonne air-dried metric tonne of paper) | | | | |
|---|---------------|---------------|---|------------|
| ADMT | 100% | | | |
| Filler (kaolin, etc) | 16% | | Wood Pulp Composition | Pulp Yield |
| Water | 10% | Softwood | 33.3 % | 40 % |
| Pulp | 74% | Hardwood | 66.7 % | 50 % |
| | | | Pulp Yield = | 46.7 % |
| Pulp Breakdown | Tonnes | | Fiber Use (tonnes) | |
| Tonnes Pulp | 0.74 | | Virgin Pulp / Pulp yield | |
| 1% Losses | 0.7474 | | 0.5232 / 46.7 % = 1.23 Tonnes | |
| Recycled Pulp 30% | 0.2242 | | | |
| Virgin Pulp 70% | 0.5232 | | Threshold 1.30 Tonnes fiber / ADMt product | |
| Newsprint (Newsprint Typical Formulation - for 1 tonne air-dried metric tonne of paper) | | | | |
| ADMT | 100% | | | |
| Filler (kaolin, etc) | 0% | | Wood Pulp Composition | Pulp Yield |
| Water | 6% | Hard/softwood | 100% | 90% |
| Pulp | 94% | | | |
| Pulp Breakdown | Tonnes | | Fiber Use (tonnes) | |
| Tonnes Pulp | 0.94 | | Virgin yield / Pulp yield | |
| 1% Losses | 0.9494 | | 0.4747 / 90.0 % = 0.53 Tonnes | |
| Recycled Pulp 50% | 0.4747 | | | |
| Virgin Pulp 50% | 0.4747 | | Threshold 0.60 Tonnes fiber / ADMt newsprint | |

Based on this rationale, a mill using only post-consumer fiber would result in an equivalent fiber consumption of zero tonnes of fiber / ADMT paper, which will be assigned a load point of zero. We propose keeping the current threshold value of 1.3 tonnes of fiber / ADMT for CCD-077, and adjusting the threshold to 0.6 tonnes of fiber / ADMT for CCD-078.

5.2. Liquid Effluent

5.2.1. Chemical Oxygen Demand (COD)

Table 9. Proposed Changes for COD

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units |
|-----------|-------------|---------------------|-----------|----------------------|-----------|--------------|
| | | Minimum | Threshold | Minimum | Threshold | |
| COD | 077 and 078 | 9 | 25 | 9 | 25 | kg COD /ADMt |

In pulp and paper mill effluent, chemical oxygen demand (COD) is an indication of oxidisable material discharged with the effluent. It also is a measure of how effectively paper mills recover the non-fibrous portion of the raw wood. High COD levels in a mill's effluent indicate lost cellulose fiber, carbohydrate, starch, lignin and other compounds.

Although biochemical oxygen demand (BOD) data for pulp and paper mills are more widely available in North America, we believe COD is a better indicator of environmental impacts.

- COD indicates the presence of both organic degradable material and compounds that are not readily degradable through biological processes – lignin residuals, chlorophenols, catechol, and sulfo-aromatic compounds. Since these compounds are not readily biodegradable, they are not detectable by ordinary BOD tests.
- Compounds responsible for aesthetic alterations in water (coloring/flavoring) do not biodegrade readily, and are therefore not detectable by ordinary BOD tests.
- When hydrogen peroxide is used in bleaching, a chelating agent (e.g. EDTA) is often required. Chelating agents have high toxicity to some algae, and also contribute to eutrophication due to increased mobilization of metal ions in water. These agents are not readily biodegradable, and therefore not detectable by ordinary BOD tests.
- COD tests take less time than BOD assessments.

It is technically feasible to reduce COD discharges to nearly zero with advanced wastewater treatment technology (secondary and tertiary treatment). However, this is expensive and exceptional according to current industry practices. Taking into consideration the need to balance multiple parameters and the levels specified by other programs, we have established a more conservative limit. The minimum load point value of zero is proposed at 9 kg COD / ADMt product, and the threshold limit (4 load points) is proposed at 25 kg COD / ADMt product.

Table 10. COD Levels in Paper Manufacturing

| Program | Specification | kg/tonne |
|---------------------------|--------------------|---------------|
| Environmental Defense | 0% Recycled | 45.87 |
| | 30% Recycled | 36.25 |
| World Bank | 100% Recycled | 13.80 |
| | Average | 35.00 |
| Nordic Swan Paper Machine | BAT Pulp only | 15.00 |
| | Kraft Pulp only | 18.00 |
| | DIP Pulp only | 3.00 |
| EU-Flower | UCFS Machine | 2.00 |
| EU-BAT | Newsprint | 10.00 – 20.00 |
| Netherlands | Copying Paper | 30.00 |
| New Zealand | Office Paper | 20.00 |
| | Fine Paper (Kraft) | 50.00 |

5.2.2. Sublethal Toxicity

Table 11. Proposed Changes for Sublethal Toxicity

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units |
|--------------------|-------------|---------------------|-----------|----------------------|-----------|--------|
| | | Minimum | Threshold | Minimum | Threshold | |
| Sublethal toxicity | 077 and 078 | 0 | 25 | 0 | 22 | TEFsub |

Sublethal toxicity is a measure of the non-lethal effects from a mill's effluent on aquatic environments. We believe this is a better parameter than lethal toxicity assessments because it can reveal negative effects that are not possible to measure in a lethality test, such as size variation and reproductive impairments.

This parameter is calculated using the equation $TEF_{sub} = [\log(100/IC_{25}\%)] \times \text{mill effluent in m}^3/\text{tonne}$. The value for $IC_{25}\%$ is the average of the sublethal tests for all species assessed. Normally these include one species each of fish, crustacean and microorganism.

Canada monitors pulp and paper mill effluent toxicity through the Environmental Effects Monitoring (EEM) Program. Data for integrated paper mills and kraft pulp mills were reviewed to determine the levels of sublethal toxicity in the effluent. The threshold value was originally estimated at a $TEF_{sub} = 25 \text{ m}^3 / \text{ADMt}$ in 1998, based on the information from the first cycle of test data from the EEM Program.

Environment Canada has reported improvement in the quality of the discharge from pulp and paper mills. The National Environmental Effects Monitoring Office reports that:

“[...] sub-lethal toxicity data showed a national improvement in effluent quality at Canadian pulp and paper mills [...]. This improvement is largely attributed to the installation of secondary treatment systems after Cycle 1 at many mills across the country. In summary, effluent quality has vastly improved [...]”
(Environment Canada, 2003).

Our review of these data has revealed a very significant reduction in sublethal toxicity from mill effluents. The results from kraft pulp and integrated paper mills indicated that 70% of the mills release effluents with a toxicity below $TEF_{sub} = 25 \text{ m}^3/\text{ADMt}$ and one mill reported zero TEF_{sub} . Mills that discharge their effluent into a municipal wastewater treatment plant are also considered to have a sublethal toxicity of zero.

Table 12. TEF_{sub} Benchmark Data
Zero load points / New Threshold / Old Threshold

| Mill | Year | TEF_{sub} | Mill | Year | TEF_{sub} |
|------|------|-------------|------|------|-------------|
| 1 | 2004 | 0.00 | 13 | 2002 | 14.05 |
| 2 | 2004 | 0.93 | 14 | 2005 | 14.12 |
| 3 | 2006 | 1.92 | 15 | 2004 | 15.82 |
| 4 | 2002 | 2.11 | 16 | 2005 | 16.57 |
| 5 | 2005 | 2.44 | 17 | 2002 | 17.76 |
| 6 | 2005 | 3.00 | 18 | 2001 | 24.84 |
| 7 | 2005 | 5.27 | 19 | 1999 | 25.14 |
| 8 | 2005 | 5.77 | 20 | 2002 | 27.13 |
| 9 | 2005 | 7.25 | 21 | 2005 | 31.94 |
| 10 | 2006 | 13.44 | 22 | 2005 | 37.92 |
| 11 | 2002 | 13.66 | 23 | 1999 | 104.91 |
| 12 | 1995 | 14.05 | | | |

Based on these results, we recommend modifying the threshold value to $TEF_{sub} = 22 \text{ m}^3/\text{ADMt}$ paper. This value would be assigned 4 load points. Since some mills operate without any measurable sublethal toxic discharge, and it is impossible to have a negative value, the recommended TEF_{sub} value corresponding to zero load points should remain at $TEF_{sub} = 0$.

5.3. Energy Consumed: Energy Use

Table 13. Proposed Changes for Energy Use

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units |
|------------|-----|---------------------|-----------|----------------------|-----------|-----------|
| | | Minimum | Threshold | Minimum | Threshold | |
| Energy Use | 077 | 15 | 32 | 15 | 30 | GJ / ADMt |
| | 078 | 15 | 32 | 3.5 | 12.5 | GJ / ADMt |

Paper mills use energy for process heating, drying, pumping, and other processes. Reducing energy use for paper production reduces the environmental effects of a paper mill. To evaluate the energy used by pulp and paper mills, the PAPRICAN benchmarking study on paper mills in Canada was used (Francis et al. 2002). This study evaluated 23 kraft pulp mills according to process energy consumption, and includes 2 mills in the U.S. To evaluate the energy requirements of the papermaking process and the manufacture of recycled pulp, we used the data presented by Jacobs and the Institute of Paper Science and Technology (Jacobs/IPST, 2006). A combination of these data was used to establish the energy requirements for fine paper production, as well as to estimate the minimum energy requirements according to best available technologies (BAT). To maintain consistency, the composition of the pulp was considered to include 30% recycled content.

Table 14. Energy Use Benchmark
Zero load points / New Threshold / Old Threshold

| Fine Paper | Pulp Mill | | | Paper Machine | | Total |
|------------|-------------|-------|-------------|---------------|-------|-------|
| | Electricity | Steam | Fossil Fuel | Electricity | Steam | |
| Mill | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT |
| BAT | 1.53 | 5.02 | 1.06 | 2.15 | 4.88 | 14.64 |
| Mill 1 | 2.68 | 11.16 | 2.24 | 2.89 | 6.63 | 25.60 |
| Mill 2 | 2.74 | 12.07 | 2.28 | 2.89 | 6.63 | 26.60 |
| Mill 3 | 2.78 | 12.98 | 2.44 | 2.89 | 6.63 | 27.71 |
| Mill 4 | 2.30 | 12.39 | 3.57 | 2.89 | 6.63 | 27.77 |
| Mill 5 | 2.79 | 13.17 | 2.67 | 2.89 | 6.63 | 28.14 |
| Mill 6 | 2.51 | 12.80 | 3.71 | 2.89 | 6.63 | 28.53 |
| Mill 7 | 2.81 | 13.75 | 2.98 | 2.89 | 6.63 | 29.05 |
| Mill 8 | 2.55 | 13.16 | 3.86 | 2.89 | 6.63 | 29.09 |
| Mill 9 | 2.84 | 14.52 | 3.14 | 2.89 | 6.63 | 30.02 |
| Mill 10 | 3.06 | 15.18 | 3.16 | 2.89 | 6.63 | 30.91 |
| Mill 11 | 2.57 | 14.52 | 4.34 | 2.89 | 6.63 | 30.94 |
| Mill 12 | 2.68 | 14.87 | 4.40 | 2.89 | 6.63 | 31.46 |
| Mill 13 | 2.71 | 15.03 | 4.45 | 2.89 | 6.63 | 31.69 |
| Mill 14 | 2.73 | 15.05 | 4.94 | 2.89 | 6.63 | 32.23 |

| | | | | | | |
|------------------|--------------------|--------------|--------------------|----------------------|--------------|--------------|
| Mill 15 | 3.13 | 16.67 | 3.33 | 2.89 | 6.63 | 32.64 |
| Mill 16 | 2.74 | 15.28 | 5.24 | 2.89 | 6.63 | 32.77 |
| Mill 17 | 3.26 | 16.69 | 3.43 | 2.89 | 6.63 | 32.89 |
| Mill 18 | 2.76 | 17.46 | 5.39 | 2.89 | 6.63 | 35.13 |
| Mill 19 | 3.61 | 18.69 | 3.49 | 2.89 | 6.63 | 35.31 |
| Mill 20 | 2.96 | 17.47 | 5.68 | 2.89 | 6.63 | 35.62 |
| Mill 21 | 2.98 | 17.67 | 7.07 | 2.89 | 6.63 | 37.23 |
| Mill 22 | 3.00 | 18.01 | 7.99 | 2.89 | 6.63 | 38.51 |
| Mill 23 | 3.27 | 21.31 | 8.05 | 2.89 | 6.63 | 42.15 |
| | Pulp Mill | | | Paper Machine | | Total |
| Newsprint | Electricity | Steam | Fossil Fuel | Electricity | Steam | Total |
| Mill | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT |
| BAT Mill | 5.13 | -2.75 | 0.8 | Included | Included | 3.18 |
| Threshold | 6.26 | 2.95 | 3.18 | Included | Included | 12.39 |

Based on this analysis, we have estimated that a mill using the best available technologies would require approximately 15 GJ/ADMT paper. We propose assigning zero Load Points to this value for CCD-077. At ~80th percentile, the energy use is approximately 28 GJ/ADMT for CCD-077. We propose applying a conservative reduction to the current energy use threshold (32 GJ/ADMT), and establishing a new threshold of 30 GJ/ADMT for CCD-077. This threshold value will correspond to 4 load points. For CCD-078, the corresponding values are 3.5 GJ/ADMT (0 load points), and 12.5 GJ/ADMT (4 load points).

5.4. Global Warming: Fossil Fuel Use from the Mill Site

Table 15. Proposed Changes for Fossil Fuel Use

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units |
|-----------------|-----|---------------------|--------------|----------------------|-----------|-------------------------------|
| | | Minimum | Threshold | Minimum | Threshold | |
| Fossil Fuel Use | 077 | 5 (GJ/ADMT) | 20 (GJ/ADMT) | 290 | 1100 | kg CO ₂ eq. / ADMt |
| | 078 | 5 (GJ/ADMT) | 20 (GJ/ADMT) | 390 | 800 | kg CO ₂ eq. / ADMt |

Paper manufacturing contributes to non-biogenic carbon dioxide emissions due to combustion of fossil fuels. Biomass fuel from waste wood, bark and pulping liquors contribute to a significant portion of the energy requirements in the industry, but are considered to be carbon dioxide neutral.

5.4.1. Carbon Dioxide Equivalent Emissions

The method for determining global warming potential is to use the estimates for energy use together with the fuel mix for pulp and paper production (from US Manufacturing Energy Consumption Survey and the Forest Products Association of Canada (2005)), carbon dioxide emission factors for specific fuel combustion (Intergovernmental Panel on Climate Change, 1996) and carbon dioxide emission factors for electricity production on a national average basis.

Table 16. Fossil Fuel Use Benchmark for Paper Production
(based on data from the PAPRICAN benchmarking study on paper mills (Francis et al. 2002))

| | | Pulp Mill | | | Paper Machine | | Total |
|---------------|---------------|-------------|-------|-------------|---------------|-------|-------|
| | | Electricity | Steam | Fossil Fuel | Electricity | Steam | |
| Fine Paper | | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT |
| BAT | 0 load points | -0.18 | -3.60 | 1.20 | 2.15 | 4.88 | 4.46 |
| 1st. Quartile | Mill 5 | 3.06 | 0.00 | 4.25 | 2.89 | 6.63 | 16.82 |
| Threshold | 4 load points | | | | | | 20 |

| Newsprint | | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT | GJ/MT |
|---------------|---------------|-------|-------|-------|----------|-------|-------|
| BAT | 0 load points | 5.13 | -2.75 | 3.30 | Included | | 8.43 |
| 1st. Quartile | Mill 5 | 5.30 | 2.36 | 3.76 | Included | | 11.42 |
| Threshold | 4 load points | | | | | | 11.5 |

Table 17. Pulp and Paper Mill Fuel Mix

| Fuel | USA | Canada | Type |
|---------------------|--------|--------|------------|
| Pulping Liquor | 38.55% | 35.70% | non-fossil |
| Natural gas | 21.30% | 12.70% | fossil |
| Wood/bark | 14.66% | 15.30% | non-fossil |
| Coal | 9.90% | 0.20% | fossil |
| Electricity | 9.40% | 26.10% | variable |
| Residual fuel oil | 4.20% | 7.70% | fossil |
| Other byproducts | 1.09% | 1.09% | non-fossil |
| LPG | 0.30% | 0.10% | fossil |
| Distillate fuel oil | 0.60% | 0.30% | fossil |

Table 18. Fuel Emission Factors

| Fuel | kg CO ₂ / GJ |
|---------------------|-------------------------|
| Crude oil | 73.3 |
| Gasoline | 69.3 |
| Kerosene | 71.9 |
| Distillate fuel oil | 74.1 |
| Residual fuel oil | 77.4 |
| LPG | 63.1 |
| Coke | 100.8 |
| Bituminous coal | 94.6 |
| Sub-bituminous coal | 96.1 |
| Anthracite coal | 98.3 |
| Peat | 106 |
| Natural gas | 56.1 |
| Black liquor* | 0.00 |
| Hog fuel* | 0.00 |

*Although these biogenic fuels emit CH₄ and NO_x, these have been excluded for simplification.

Table 19. Electrical Energy Emissions Factors

| Canada | | USA | | | |
|-----------------------|------------------------------|---------------|------------------------------|----------------|------------------------------|
| Province | kg CO ₂ eq. / kWh | State | kg CO ₂ eq. / kWh | State | kg CO ₂ eq. / kWh |
| Newfoundland & Lab. | 0.19 | Alabama | 0.611 | Montana | 0.586 |
| Prince Edward Island | 0.546 | Alaska | 0.563 | Nebraska | 0.638 |
| Nova Scotia | 0.78 | Arizona | 0.461 | Nevada | 0.755 |
| New Brunswick | 0.546 | Arkansas | 0.594 | New Hampshire | 0.338 |
| Quebec | 0.0014 | California | 0.138 | New Jersey | 0.257 |
| Ontario | 0.18 | Colorado | 0.929 | New Mexico | 0.952 |
| Manitoba | 0.011 | Connecticut | 0.515 | New York | 0.361 |
| Saskatchewan | 0.862 | Delaware | 0.842 | North Carolina | 0.564 |
| Alberta | 0.991 | Florida | 0.65 | North Dakota | 0.993 |
| British Columbia | 0.02 | Georgia | 0.644 | Ohio | 0.823 |
| Yukon | variable | Hawaii | 0.824 | Oklahoma | 0.802 |
| Northwest Territories | variable | Idaho | 0 | Oregon | 0.08 |
| Nunavut | variable | Illinois | 0.534 | Pennsylvania | 0.554 |
| | | Indiana | 0.968 | Rhode Island | 0.418 |
| | | Iowa | 0.899 | South Carolina | 0.37 |
| | | Kansas | 0.79 | South Dakota | 0.325 |
| | | Kentucky | 0.901 | Tennessee | 0.565 |
| | | Louisiana | 0.603 | Texas | 0.702 |
| | | Maine | 0.408 | Utah | 0.88 |
| | | Maryland + DC | 0.613 | Vermont | 0.008 |
| | | Massachusetts | 0.561 | Virginia | 0.493 |
| | | Michigan | 0.79 | Washington | 0.083 |
| | | Minnesota | 0.72 | West Virginia | 0.895 |
| | | Mississippi | 0.599 | Wisconsin | 0.813 |
| | | Missouri | 0.862 | Wyoming | 0.995 |

Canadian National Average (2001)

0.233

USA National Average

0.65

Using these parameters, the carbon dioxide emissions for a paper mill in Canada equipped with the best available technologies (zero load points) and the threshold value (4 load points) can be calculated, using the following methodology:

1. **Determine the amount of fossil fuel energy required to make one air-dried metric tonne of paper.** From Table 16, pulping consumes 1.2 GJ of energy from fossil fuels, but generates 3.60 GJ from biomass that are in turn used by the paper machine. Papermaking uses a total of 4.88 GJ/ADMt. Therefore $1.2\text{GJ} - 3.60\text{GJ} + 4.88\text{GJ} = 2.48\text{GJ}$ per ADMt paper. Note that emissions derived from the fossil fuels used to generate purchased electricity will be considered separately.

2. **Break down that fossil fuel energy per ADMt into different fossil fuel sources.** Pulp and paper fuel mix data are normalized for only fossil fuels (e.g. natural gas = 60.48% of fossil fuels).
3. **Calculate the individual fossil fuel energy consumption.** Multiply the total fossil fuel energy needed from Step 1 by the percentage of each fossil fuel from Step 2 (e.g. natural gas: 2.48 GJ/ADMt x 60.48% = 1.50 GJ/ADMt).
4. **Calculate the amount of carbon dioxide resulting from the combustion of each fossil fuel.** Multiply the individual fossil fuel energy consumption by the IPCC fuel emission factor (e.g. natural gas: 1.50 GJ/ADMt x 56.1 kg CO₂/GJ = 84.08 kg CO₂ /ADMt).
5. **Calculate the total carbon dioxide emissions from fossil fuels.** Add the CO₂ emissions for all fossil fuels: 0.75 (LPG) + 84.08 (natural gas) + 2.62 (distillate fuel oil) + 70.29 (residual fuel oil) + 2.23 (coal) = 159.97 kg CO₂ /ADMt.
6. **Calculate the CO₂ emissions from purchased electricity.** Multiply the electricity requirements (converted to kilowatt-hours) by the carbon dioxide emission factor for electricity [1.97 GJ/ADMt / 0.0036 GJ per kWh x 0.233 kg CO₂ / kWh = 127.50 kg CO₂/ADMt).
7. **Calculate the total CO₂ emissions from the mill site.** Add the carbon dioxide emissions from fossil fuels and purchased electricity: 159.97 kg CO₂/ADMt + 127.50 kg CO₂/ADMt = 287.47 kg CO₂/ADMt.

Table 20. Minimum Values (zero load points)

| FINE PAPER | | | |
|---------------------|------------|-----------------------------|--------------------|
| Fossil Fuel Mix | | GJ/ADMt | kg CO ₂ |
| LPG | 0.48% | 0.012 | 0.75 |
| Natural Gas | 60.48% | 1.500 | 84.08 |
| Distillate Fuel Oil | 1.43% | 0.035 | 2.62 |
| Residual Fuel Oil | 36.67% | 0.909 | 70.29 |
| Coal | 0.95% | 0.024 | 2.23 |
| Fossil fuels | | 2.48 | 159.97 |
| Power | kWh | 547.20 | 127.50 |
| | Min | kg CO₂ eq | 287.47 |

| NEWSPRINT | | | |
|---------------------|------------|-----------------------------|--------------------|
| Fossil Fuel Mix | | GJ/ADMt | kg CO ₂ |
| LPG | 0.48% | 0.004 | 0.242 |
| Natural Gas | 60.48% | 0.484 | 27.14 |
| Distillate Fuel Oil | 1.43% | 0.011 | 0.84 |
| Residual Fuel Oil | 36.67% | 0.293 | 22.71 |
| Coal | 0.95% | 0.008 | 0.73 |
| Fossil fuels | | 2.48 | 0.80 |
| Power | kWh | 1425 | 332.03 |
| | Min | kg CO₂ eq | 383.70 |

Table 21. Threshold Values (four load points)

| FINE PAPER | | | |
|---------------------|------------------|-----------------------------|--------------------|
| Fossil Fuel Mix | | GJ/ADMt | kg CO ₂ |
| LPG | 0.48% | 0.052 | 3.27 |
| Natural Gas | 60.48% | 6.580 | 368.86 |
| Distillate Fuel Oil | 1.43% | 0.155 | 11.50 |
| Residual Fuel Oil | 36.67% | 3.989 | 308.38 |
| Coal | 0.95% | 0.104 | 9.80 |
| Fossil fuels | | 10.880 | 701.81 |
| Power | kWh | 1,652.78 | 385.10 |
| | Threshold | kg CO₂ eq | 1,086.91 |

| NEWSPRINT | | | |
|---------------------|------------------|-----------------------------|--------------------|
| Fossil Fuel Mix | | GJ/ADMt | kg CO ₂ |
| LPG | 0.48% | 0.029 | 1.857 |
| Natural Gas | 60.48% | 3.707 | 207.986 |
| Distillate Fuel Oil | 1.43% | 0.088 | 6.496 |
| Residual Fuel Oil | 36.67% | 2.248 | 173.985 |
| Coal | 0.95% | 0.058 | 5.596 |
| Fossil fuels | | 6.13 | 395.920 |
| Power | kWh | 1,738.54 | 405.080 |
| | Threshold | kg CO₂ eq | 801.00 |

If the calculations for global warming are based on the emission of CO₂ equivalent tonnes instead of energy intensity, the lower limit would correspond to a value of approximately 290 kg CO₂ eq./ADMt for CCD-077. This value will be assigned a load point value of zero. The threshold value will be

assigned at 1100 kg CO₂ eq./ADMt for CCD-077. This value will be assigned a load point value of 4. For CCD-078, these values are adjusted to 390 kg CO₂ eq./ADMt, and 800 kg CO₂ eq./ADMt, respectively.

(Note that in the first round of review for CCD-078, the threshold value was proposed to be 840 kg CO₂ eq./ADMt. However, this value was erroneous: the correct value should be 800 kg CO₂ eq./ADMt.)

5.5. Criteria Air Contaminants: Acidification Potential Use

Table 22. Proposed Changes for Acidification Potential Use

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units |
|-------------------------|-------------|---------------------|-----------|----------------------|-----------|---------------------------|
| | | Minimum | Threshold | Minimum | Threshold | |
| Acidification Potential | 077 and 078 | 0 | 0.5 | 0 | 0.35 | kg SO ₂ / ADMt |

Pulp and paper mills emit sulphur dioxide (SO₂) from fossil fuel combustion, kraft recovery boilers and equipment that flares gases containing malodorous sulphurous compounds. Sulfur dioxides may cause acid precipitation, and contribute to accelerated erosion and the acidification of aquatic ecosystems.

The emissions of SO₂ by pulp and paper mills are reported to the National Pollutant Release Inventory (NPRI) in Canada, and to the EPA National Emission Inventory (NEI) in the US. NPRI emission reports are available up to and including the year 2005; the latest NEI update includes data for 2002. Note that only the SO₂ emissions generated on-site have been considered, and emissions from indirect sources (e.g. energy generation) have been excluded.

The emission intensities of sulphur dioxide from pulp and paper mills varied widely, with the average calculated at 2.9 kg SO₂/ADMt. Twenty-eight percent of the mills reported values below the current threshold of 0.5 kg SO₂/ADMt.

Since it is possible to operate a paper mill without any measurable discharge of sulphur dioxide (e.g. by installing scrubbers), this will be the lower limit used to calculate Load Points. A discharge of 0 kg SO₂ / ADMt paper would be assigned zero Load Points.

At the 80th percentile, 2 mills reported emissions of 0.3 kg SO₂/ ADMt. We recommend adopting a slightly more conservative estimate and assign a threshold value to an emission factor of 0.35 kg SO₂ / ADMt paper. This will be assigned a load point value of 4.

Table 23. SO₂ Emissions Benchmark

| Mill # | SO2 (kg/tonne) |
|--------|----------------|
| 1 | 0.033 |
| 2 | 0.050 |
| 3 | 0.050 |

| Mill # | SO2 (kg/tonne) |
|--------|----------------|
| 15 | 0.722 |
| 16 | 0.94 |
| 17 | 1.059 |

| Mill # | SO2 (kg/tonne) |
|--------|----------------|
| 30 | 3.387 |
| 31 | 3.462 |
| 32 | 3.500 |

| | | | | | | |
|----|-------|--------------------------|----|-------|----|--------|
| 4 | 0.055 | | 18 | 1.116 | 33 | 3.769 |
| 5 | 0.069 | | 19 | 1.191 | 34 | 3.788 |
| 6 | 0.139 | | 20 | 1.201 | 35 | 4.051 |
| 7 | 0.150 | | 21 | 1.209 | 36 | 4.200 |
| 8 | 0.200 | | 22 | 1.369 | 37 | 7.744 |
| 9 | 0.200 | | 23 | 1.590 | 38 | 12.098 |
| 10 | 0.300 | | 24 | 1.979 | 39 | 15.630 |
| 11 | 0.300 | | 25 | 2.022 | 40 | 24.840 |
| 12 | 0.372 | Threshold = 0.35 kg/ADMt | 26 | 2.700 | | |
| 13 | 0.500 | | 27 | 2.909 | | |
| 14 | 0.543 | | 28 | 2.938 | | |
| 15 | 0.722 | | 29 | 3.190 | | |

5.6. Solid Waste

Table 24. Proposed Changes for Solid Waste

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units |
|-------------|-------------|---------------------|-----------|----------------------|-----------|-----------------------|
| | | Minimum | Threshold | Minimum | Threshold | |
| Solid Waste | 077 and 078 | 0.15 | 0.3 | (0.1) | (0.3) | m ³ / ADMt |
| | | (103.5) | (207) | 70 | 210 | kg / ADMt |

Note: The EcoLogo™ has changed the units for this parameter in this revision from cubic meters to kilograms

The Solid Waste Measure represents the amount of solid waste generated in the manufacture of one air dry metric tonne (ADMt) of product. Only wastes sent for landfilling or incineration without energy recovery are considered. Wastes incinerated with energy recovery are assigned a value of "0". Ashes resulting from incineration and requiring landfilling will count towards the solid waste generated.

Integrated fine paper mills report values from 8.28 to 85.5 kg / ADMt paper. These values are lower than the current established value for zero Load Points (103.5 kg/ADMt paper). Therefore, we recommend lowering this parameter slightly to 70 kg/ADMt paper. This would be assigned zero load points. On the other extreme, deinked (recycled) paper results in higher generation of solid wastes. The reported value for a single deinking pulp plant was 103.5 kg /ADMt paper, but Environmental Defense reports average values of 338.10 kg / ADMt for 100% recycled paper and 234.6 kg/ ADMt for 30% recycled paper. We believe that the use of recycled content should not be punished. Therefore, we suggest maintaining the current threshold value of ~210 kg / ADMt paper; this value will be assigned 4 load points.

Table 25. Solid Waste Benchmarking

| Mill # | Type | Solid Waste (kg / ADMt) |
|--------|------------|-------------------------|
| 1 | Kraft pulp | 2.76 |
| 2 | Paper | 4.83 |
| 3 | Integrated | 8.28 |

| | | | |
|----|---------------|--------|------------------------------|
| 4 | Integrated | 9.66 | |
| 5 | Kraft pulp | 10.35 | |
| 6 | Paper-LWC | 20.7 | |
| 7 | Paper-NP | 41.4 | |
| 8 | Integrated | 42.09 | |
| 9 | Integrated NP | 48.3 | |
| 10 | Paper | 49.68 | |
| 11 | Kraft pulp | 62.1 | 0 Load points = 70 kg / ADMT |
| 12 | Paper | 76.59 | |
| 13 | Paper | 82.8 | |
| 14 | Integrated | 84.18 | |
| 15 | Integrated | 85.56 | |
| 16 | DIP | 103.5 | |
| 17 | Kraft Pulp | 110.4 | |
| 18 | Sulphite Pulp | 119.37 | |
| 19 | Kraft Pulp | 131.79 | |
| 20 | Kraft Pulp | 195.27 | Load points = 210 kg / ADMT |
| 21 | Paper | 222.87 | |

5.7. Water Consumption: Water Use (i.e. Effluent Flow)

The pulp and paper industry is the largest industrial process water user in the Canada and the U.S (Office of the Auditor General of Canada, 1993; U.S. Department of Commerce, 2000). The sources of fresh water to a mill can include groundwater, water diverted from a river or lake and water that enters the mill with wood and chemicals. Water leaves the mill through the evaporation of water from the black liquor, removal of water by the paper machine through the drying process, and lime kilns evaporate water during the calcining of lime, amongst others. It has been argued that the quantity of freshwater consumed to produce a tonne of final product and the effluent flow from the mill are essentially the same; the amount of water entering the mill and losses from evaporation are about equal (Paper Task Force, 1995).

There are four essential functions of water in pulp and paper mills:

- Process chemicals (e.g., adding water to sodium chlorate);
- Conveying/controlling material through manufacturing unit processes;
- Separating and purging contaminants from the product; and
- Cooling: a significant water activity in mills to remove heat from different plant processes.

In order to establish environmental criteria threshold limits for water use that will represent leadership, data must be collected and comparisons made according to product type, process type, and mill practices. The current paper categories certified by the EcoLogo™ Program are restricted to uncoated wood-free printing & writing paper and clay coated free sheet for CCD-077, and uncoated mechanical printing paper for CCD-078. It is therefore necessary to determine benchmarking values that correspond to the types of mills that are capable of manufacturing products that fall under the scope of CCD-077 and CCD-078. The EcoLogo™ Program proposed to use a load point determination method, whereby points are given starting at the “minimum” value of zero points, to the “threshold” value of four points. Using values from the literature, various pulp and paper databases, and other documents, we propose the following “minimum” and “threshold” values:

Table 26. Proposed Values for Water Consumption

| Parameter | CCD | Current Load Points | | Proposed Load Points | | Units * |
|---------------|-----|---------------------|-----------|----------------------|-----------|-----------------------|
| | | Minimum | Threshold | Minimum | Threshold | |
| Effluent Flow | 077 | N/A | N/A | 35 | 60 | m ³ / ADMt |
| | 078 | N/A | N/A | 15 | 30 | m ³ / ADMt |

Please note that the values for water consumption listed above are tentative and EcoLogo invites stakeholders to provide additional data and input relating to this impact category.

6. Summary of Proposed Criteria Revisions

6.1. Criteria Statements

6.1.1. Revised Wording of Current Criteria

In the current version of CCD-077 and CCD-078, there are three criteria statements. These current statements are the same for both CCDs. These criteria will remain in the revised versions of the CCDs; however the wording will be modified as summarized below:

To be authorized to carry the EcoLogo™, the [printing and writing paper (CCD-077) or uncoated mechanical printing paper (CCD-078)] must:

[Current]:

(a) be manufactured so that the total of load points assessed for Fiber-Use, COD, TEFsub, Energy-Use, Global Warming Potential Measure, Acidification Potential Measure, and Solid Waste does not exceed 28 (note that Appendix I contains the table for calculating Load Points, and Appendix II contains the methodology for collecting data);

[Revised]:

(a) be manufactured so that the total of load points assessed for Fiber Use, COD, TEFsub, Energy Use, Global Warming Potential Measure, Acidification Potential Measure, Solid Waste, and Water Use does not exceed 32 (note that Appendix I contains the table for calculating Load Points, and Appendix II contains the methodology for collecting data);

[Current]:

(b) be manufactured so that the effluent from the mill, or any mill that supplies market pulp, does not contain a measurable concentration of 2,3,7,8-TCDD or a measurable concentration of 2,3,7,8-TCDF; and

[Revised]:

(b) be manufactured so that the effluent from the paper mill or any mill which produces a component pulp, if such mills operate a chlorine bleaching plant, does not contain a measurable concentration of 2,3,7,8-TCDD or a measurable concentration of 2,3,7,8-TCDF;

[Current]:

(c) use only raw wood fiber that has been managed under a code of sustainable forestry practices.

[Revised]:

(c) If manufactured from pulp made from primary wood fiber, use only pulp derived from forests which have been harvested under a third party forestry certification system, such as the Forest Stewardship Council (FSC), Canadian Standards Association (CSA), Sustainable Forestry Initiative (SFI), American Tree Farm System (ATFS), or another forestry certification scheme recognized by the Programme for the Endorsement of Forest Certification schemes (PEFC).

6.1.2. New Criteria Statements Added

It is proposed that four new criteria statements be added to the revised versions of both CCD-077 and CCD-078. These statements are summarized below:

To be authorized to carry the EcoLogo™, the [printing and writing paper (CCD-077) or uncoated mechanical printing paper (CCD-078)] must:

[for CCD-077]: (d) contain at least 30% post-consumer recycled fiber;

[for CCD-078]: (d) contain at least 50% post-consumer recycled fiber;

(e) not contain fiber that has been bleached with:

- (i) elemental chlorine (i.e. the fiber must be “elemental chlorine-free”), or
- (ii) thiourea dioxide;

(f) not be manufactured with:

- (i) NTA,
- (ii) bisphenol A, or
- (iii) DMHBP; and

(g) be manufactured in such a manner that fossil fuel use results in air emissions of less than 1,100 [for CCD-077 or] 800 [for CCD-078] kg CO₂ equivalents per ADMt of product.

6.1.3. Declaration of Product Specifications

A new procedure will be implemented by EcoLogo™ in order to encourage manufacturers to make information available to purchasers regarding the environmental attributes of paper products. This will be a transparent communication device on the EcoLogo™ website (and any other publicity materials) to inform purchasers of the exact specifications reached by a successful EcoLogo™ applicant. Participation by manufacturers will be strongly encouraged; however participation is not mandatory in order to become EcoLogo™ certified.

EcoLogo™ will add a statement to the section “Conditions for EcoLogo™ Use” as follows:

Manufacturers with EcoLogo certified products will be given the option to share verified environmental information about their products on the EcoLogo website and product packaging as a way of responding to customers seeking additional details such as the amount of recycled content, bleaching mechanism, forestry certification scheme, or other environmental information relevant for the product category. Participation in this optional communication process is not a requirement for EcoLogo™ certification.

6.2. Revised Load Points

It is proposed that a new impact category (Water Consumption) should be added to the load point tables for both CCD-077 and 078. This means that, for both CCDs, the maximum number of points allowable will increase from 28 to 32. The revised load point tables are summarized below:

Table 27. Revised Load Point Values for CCD-077 and 078

| Category | Parameter | Units | CCD-077 | | CCD-078 | |
|--------------------|----------------------------------|---------------------------------------|---------|-----------|---------|-----------|
| | | | Minimum | Threshold | Minimum | Threshold |
| Resource Depletion | Fiber Use | tonne / ADMT product | 0 | 1.3 | 0 | 0.6 |
| Liquid Effluent | Chemical Oxygen Demand | kg / ADMT product | 9 | 25 | 9 | 25 |
| Liquid Effluent | Sublethal toxicity | TEFsub | 0 | 22 | 0 | 22 |
| Energy Consumption | Energy use | GJ / ADMT product | 15 | 30 | 3.5 | 12.5 |
| Global Warming | Global Warming Potential Measure | kg CO ₂ eq. / ADMT product | 290 | 1100 | 390 | 800 |
| Acidification | Acidification Potential | kg SO ₂ / ADMT product | 0 | 0.35 | 0 | 0.35 |
| Solid Waste | Solid Waste | kg / ADMT product | 70 | 210 | 70 | 210 |
| Water Consumption | Effluent Flow | m ³ / ADMt product | 35 | 60 | 15 | 30 |

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