

N. McCubbin Consultants Inc.

140 Fisher's Point, Foster, Québec, Canada, J0E 1R0
Tel: +1 (450) 242 3333 Email :: Neil@McCubbin.ca

Ref:
6 April, 2015

Northern Pulp Nova Scotia
New Glasgow

by email to terri.fraser@northernpulp.com

Attn: Terri Fraser

Subject: Comments on NS 2011-076657-R03

Dear Ms. Fraser,

As we discussed by telephone, I reviewed the following documentation, provided by yourself:-

- Detailed data on the mill effluent for the past 8 years
- AMEC report "Boat Harbour Return to Tidal - Re-Evaluation of April 2010";
- Nova Scotia Environment's "Approval-to-operate" the Northern Pulp mill; effective March 9, 2015.

Based on the above documents, and my 49 years' experience in the pulp industry, including 40 as a consultant to mills, regulators and environmental advocacy organizations, I believe that some of the objectives defined by Nova Scotia Environment are attainable, while others are unrealistic. My thoughts are summarized below.

Background

The pulp mill itself is typical of other softwood kraft mills built in the 1960s and 1970s, but the effluent treatment system is unique. When the mill was built in 1967, environmental protection legislation was in its infancy, and knowledge of treatment technologies was minimal. With the benefit of hindsight, it is easy to see that the approach of using Boat Harbour as a natural stabilization basin was an error. However, today's staff at NPNS and Nova Scotia Environment have to live with that history. The Boat Harbour treatment system was generally considered good technology because the treated effluent was good quality and the consumption of energy and chemicals was much lower than the other process being installed around North America at the time.

Current effluent control practices

Over the years, as technologies evolved, activated sludge treatment (AST) has become more popular. A new mill built in 2015 would include an AST system. However, more than 50% of mills operating in North America are operating aerated stabilization basin (ASB) systems and meeting all relevant regulations. I do not know of any ASB systems that are in regulatory compliance being replaced by AST systems. There is no evidence to support the AMEC statement that the ASB has a 5-10 year life. If maintenance is good, and it is not overloaded, an ASB treatment system has an indefinite life.

It is very unusual to discharge treated pulp mill effluent without an underwater diffuser nowadays. The first one I saw was in 1966, and since about 1980 virtually all the 100 or so mills I have visited have been equipped with diffusers for effluent discharge. Many are sufficiently long and/or deep that the effluent is never visible. Some are not completely effective, but still reduce perception of the effluent discharge very substantially.

Normally mixing kraft mill effluent with sea water reduces the visible colour far more than would occur by simple dilution. This reduction of colour was dramatic at the former kraft mill at New Richmond, Quebec when I was working on effluent issues there in the 1970's. The colour discharge was high by today's

standards, but was completely invisible at the surface although the underwater discharge was a simple open ended pipe about 20 feet below the surface.

This suggests that a fairly simple diffuser, discharging a short distance offshore, would substantially reduce effluent visibility at the Boat Harbour discharge. I suspect the effluent is currently remaining on the surface, because its density is lower than sea-water, which will make it more visible along the beach.

COD discharge limitation

The US EPA considered regulating COD in the major revision of rules for pulp and paper mills in the late 1990's, but elected not to do so. Since then EPA has taken no action on the issue, and I do not foresee any in the next few years. COD regulation is common for pulp mills in Europe and South America, but I do not know of any COD limits applied to North American pulp mills.

The approval-to-operate requires that the maximum COD discharge be 11,890 kg/day at Point C. This is equivalent to approximately 13.6 kg COD per ton pulp produced.

The COD discharge limit of 13.6 kg/ADt will be extremely difficult to comply with if the words are taken as written, since they mean that the maximum discharge in any one day would be 11,890 kg/day. Most discussions of COD discharges in the literature, and the (rather sparse) discussion of COD in the AMEC report refer to annual average COD discharges. Typically, the highest daily discharge of most pollutants from well operated systems will be about 1.5 to 2.5 times the annual average.

I consider that it is critical that the Province recognizes the difference between an effluent discharge limitation defined as a daily maximum value and the Long Term Average (LTA).

It is widely recognized by regulators, industries and academics that some day-to-day variation in the characteristics of effluents discharged by industrial plants is inevitable and unavoidable. It is common practice to compare discharges from different pulp mills, and also to compare different effluent control technologies, on the basis of the Long Term Average discharge. The well-known reports by EKONO use this approach, as do Environment Canada and the US EPA.

It is very common practice to define regulatory values for daily maxima and monthly maxima by multiplying the LTA value by a variability factor. The magnitude of variability factors used differ amongst regulators and for different parameters. The acceptable maximum daily discharge is usually defined somewhere between two and four times the LTA for a defined, modern, technology.

Environment Canada's Pulp and Paper Effluent Regulations use a variability factor of 2.5 to calculate the maximum daily discharge of TSS and BOD from the acceptable LTA values. The USEPA uses similar values. I suspect that the Province means that the annual average COD discharge should be reduced to 11,890 kg/day, but this should be clarified. The following comments assume that the 11,890 kg/day limit refers to an annual average value. In any event, there seems to be some room for negotiation, given the wording on the paragraphs 6(d) through 6(g).

The lowest COD discharge by a Canadian softwood kraft mill, that I am aware of, is from the AIPac mill in Alberta. The data I have indicate that the annual average COD discharge was 11.5 kg/ADt of pulp when the mill is pulping softwood only. This mill is located on a fairly small river, already loaded with discharge from two other mills, so was designed to very stringent standards when it was built in the early 1990s. It has oxygen delignification, ECF bleaching and an Activated Sludge Treatment (AST) system for the effluent. Extensive spill recovery systems were incorporated in the mill design to minimize losses of black liquor. I am not aware of any other Northern American mill that is meeting the discharge limit of 13.6 kg/ADt that is imposed on Northern Pulp, even on the basis of the annual average discharge..

The Skookumchuk bleached softwood kraft mill in BC reported an annual average COD discharge of 24.4 kg/ton pulp for 2014. The mill has oxygen delignification, excellent brownstock washing and an ASB effluent treatment system.

A few other kraft mills operate with annual average COD discharges of 15 kg/ton, demonstrating this level is attainable, but not without considerable effort. I consider that oxygen delignification, improved brown stock washing and screen-room closure, and substantially upgraded spill recovery systems for black liquor would be required to attain such a COD discharge level in the NPNS mill. Most of the mills operating with very low COD discharges are pulping eucalyptus, aspen or poplar. These hardwood species inherently result in less COD generation than Canadian softwoods. In addition, the COD from hardwoods is more readily biodegradable than that from softwoods, so that the COD removal efficiency of the effluent treatment systems is better than could be attained by any system at Northern Pulp.

Referring to page 37 of the AMEC report that shows graphs of annual average COD discharge data for other mills, all the mills discharging under 20 kg/ton, have the above mentioned process features, and almost all have AST systems for the effluent.

At NPNS, it would probably be necessary to replace the ASB with an AST system to attain the level of COD discharge required by Nova Scotia Environment. This would be a considerable expense. Confirming that the COD limit is an annual average (rather than a daily maximum), and having the number relaxed, or regulation of COD discharge abandoned, would be warranted.

I did not find any support in the AMEC report for the COD discharge limit of 11,890 kg/day. The only definitive numbers I could find are for untreated COD shown in the mass balances. The lowest value of 89 kg/ton would result in an annual average COD discharge of about 55 kg/ton.

I could not find any discussion of COD by AMEC, beyond the comparisons with other mills.

Control of black liquor spills

Control of planned and unplanned losses of black liquor is one potentially effective way of reducing COD and colour of the mill effluent, because they are rather high in NPNS, and black liquor organics are not oxidized effectively in any kind of biological treatment system.

The data in the AMEC report indicates that the sources of colour discharge are roughly one third each for brown stock washer losses, bleach plant and spills. The sources of COD are probably distributed similarly, except the condensates and causticising department will contribute some COD. These latter two sources will contribute virtually nothing to the COD of the treated effluent since the substances in them are very efficiently oxidized in any kind of biological treatment system.

AMEC have stated that older mills can reduce colour discharges to 20-40 kg/ton. This comment seems to ignore the difference between softwood and hardwood pulping. To attain this range, a mill has to have good brown stock washing, good spill recovery, closed screen room, aggressive oxygen delignification and ECF bleaching. The low end of the range will probably be impossible in a softwood mill. Notice that most low-colour mills have AST systems. They reduce colour by about 50% relative to a mill with an ASB system.

The COD losses from the brown stock can be almost eliminated with an additional washer stage and closing the screen room water cycle. The capital cost would be significant.

COD from the bleach plant can be cut by about 40% by installing an oxygen delignification stage.

This would leave the so called "spills", which consist of accidental losses, leaks, draining equipment for maintenance, operator errors, etc. Consideration of the variations in daily COD discharges suggests to me that there is room for fairly inexpensive and substantial improvement in this area. However, it must be

recognized that while spills can be reduced, one can no more eliminate spills completely than one can eliminate traffic accidents.

AMEC mention the installation of spill recovery sumps, as is normal in modern mills. I understand you have some already, but I am not familiar with your current installation.

Effluent discharge flow limitation

I would expect that net water consumption by the mill is be roughly 5 m³/ton. Evaporation is quite a bit more than that, but water comes in with the wood and chemicals.

Concerns that lowering effluent flow may negatively impact effluent quality

Such concerns are often expressed, but in practice, I do not see this as a realistic problem in the pulp industry. I was surprised to see the idea even mentioned in the approval document of March 9, 2015. I see no merit in modeling the impact of water flow reductions on effluent characteristics mentioned in paragraph 6(h). There are no methods of doing so that are supported by practical results, although various theoretical approaches could be attempted.

Effluent treatment system

Replacing the ASB with an AST system would reduce COD discharges somewhat, probably by roughly 20%. However, the cost would be significant.

AMEC suggest that if the effluent flow were reduced so that the untreated BOD is more concentrated than 300 mg/L, then a AST systems would be necessary. I disagree. An ASB can treat kraft mill effluent much stronger than 300 mg/L.

I do not see any problem with generation of solids in the ASB if the BOD of the untreated effluent rises over 300 mg/L, as long as the ASB retention time and aeration are adequate. Since the intent is to reduce untreated BOD somewhat, I expect this issue will disappear. The existing ASB seems to be operating fairly well. Generally, when black liquor losses are reduced, the performance of an ASB improves even more than one would expect based on the BOD load alone.

Feel free to call or email if you wish further information or wish to discuss the foregoing. I am travelling at the moment, but should be available on my mobile phone below.



Yours very truly,
Neil McCubbin, Eng.
Mobile +1 (450) 330 0133

Resume of Neil McCubbin



Citizenship Canadian and British

Languages English, French, some Spanish and German

Education B.Sc. (Eng.) 1st Class Hons.
University of Glasgow, Scotland, 1964
Associate of the Royal College of Science and
Technology, Glasgow.

Membership PAPTAC
Registered Professional Engineer in Quebec

Contact Neil@McCubbin.ca +1 (450) 242 3333

Since immigrating to Canada from Scotland in 1965, Neil McCubbin's professional activities have been almost entirely related to pulp and paper industry. Initially, he worked in mills and later as a consultant to various interested parties in Canada and overseas. In the earlier stages of his career he worked on detail design of pulp production, pollution prevention and effluent treatment systems. Latterly he has concentrated on process studies and environmental impact assessment. Many of these have included assistance in resolving conflicting environmental issues and reaching consensus amongst management of the pulp and paper industry, environmental advocacy groups, and regulatory agencies.

Typical assignments completed are described below.

Legal and quasi-legal assignments

Member of team representing Uruguay in The International Court of Justice, The Hague in *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*. Neil McCubbin was retained to address the Court on Uruguay's behalf, along with the attorneys during final arguments. The objective was to counter a request by Argentina to have the, then new, kraft mill at Fray Bentos dismantled. Project was successful.

Expert witness for Natural Resources Council of Maine (NRCM), contesting an effluent discharge permit issued to Verso Paper Company in Jay, Maine. This assignment led to being honoured with the NRCM's 2007 Environmental Award

Retained by a public interest litigation group to assist in resolving a conflict over pollution of the Altamaha River in Georgia, USA. (Greenlaw, Atlanta, GA)

Technical support and advice to plaintiff's counsel on litigation by Ester Johnson vs International Paper Company, concerning wastewater discharges from the company's pulp and paper mill in Pensacola, FL. (Levin, Papantonio..., Pensacola, FL)

Technical support to US Department of Justice in litigation on behalf of US vs Westvaco Inc concerning discharges from the company's bleached kraft pulp mill in Luke, MD. Assignment included testimony in US court in Baltimore, MD.

Technical support to Altamaha Riverkeepers in negotiations with Rayonier Inc, Jesup, Georgia on reducing the color of the mill effluent discharge (Georgia Center for Law in the Public Interest)

Advice to Cunningham Bounds (plaintiff's counsel) in litigation between local citizens and International Paper Co., Pine Hill, Alabama. Case was settled to plaintiff's satisfaction before trial.

Advice to Cunningham Bounds (plaintiff's counsel) in litigation between local citizens and Weyerhaeuser Co., Pine Hill, Alabama. Case was settled to plaintiff's satisfaction before trial.

Advice to counsel and provision of expert testimony in the case of Vermont vs. International Paper Company at Ticonderoga, New York. This case was tried before a special master of the US Supreme Court. N. McCubbin was responsible for all air pollution aspects of Vermont's case. Services included testifying and assisting in subsequent settlement negotiations. The litigation was spread over several years with total legal and engineering/scientific services fees of several million dollars. (State of Vermont, Montpelier, Vermont)

Advice to investigator and counsel for Environment Canada, vs Tembec Inc. (Environment Canada, Montreal).

Technical support for Environment Canada in investigation of a mill in Ontario over alleged infringements of the Pulp and Paper Effluent Regulations. (Environment Canada, Montreal) The company pled guilty and was fined, prior to trial.

Advice to counsel in Gateway Industries vs. Crown. Defense of charges of infringement of Pulp and Paper Effluent Regulations. (Gateway Industries, Winnipeg, Manitoba)

Advice to counsel in E. B. Eddy vs. Crown. Defense of charges of infringement of Pulp and Paper Effluent Regulations by paper mill in Ottawa. (E. B. Eddy Ltd, Toronto. Charges were dropped.

Assistance to Lerner David, (Attorneys for Union Camp Corp) in litigation over patent rights to ozone delignification technology. Case settled when the plaintiff company was taken over.

Advice on resolution of dispute over warranty claims for new boiler in paper mill. (Confidential client). Settled without litigation.

Independent review of application for effluent and atmospheric emission permits for the Organosolv pulp mill proposed by Alcell Technologies in Atholville New Brunswick. (Alcell Technologies)

Pulp and Paper Industry Engineering

Principal engineer of team developing the EIA for the Montes del Plata mill near Colonia in Uruguay. This mill is designed to produce 1.5 million adt/year bleached market kraft pulp. Being downstream of the mill at Fray Bentos which had been the subject of considerable controversy, as well as litigation in the International Court of Justice in the Hague, and also within sight from Buenos Aires, this was a particularly sensitive EIA from the perspective of public reaction. Results were satisfactory, since the negotiations with regulatory authorities on the basis of the EIA proceeded smoothly to the issue of construction permits. Bankers financing the project were also satisfied with the EIA. There was no significant public opposition to the project. (Montes del Plata, Montevideo)

Review of Environmental Impact Assessment reports along with comments by the Government of Argentina, and the public on proposals to build two bleached kraft mills near Fray Bentos, in Uruguay. The purpose was to assist the International Finance Corporation (IFC), the commercial arm of the World Bank, in deciding whether to lend to the developers of the two mills and to assist the Multilateral Investment Guarantee Agency (also a member of the World Bank Group) evaluating whether to provide political risk insurance to one of the two mill developers. This assignment involved first critiquing an EIA by one consultant, developing terms of reference for competitive bidding by consultants to rectify deficiencies in the first EIA, and advising on consultant selection, and reviewing the EIA update prepared by the successful bidder. The issues were resolved successfully and the mill is in operation. (IFC, Washington, DC).

Development of plan to minimize effects of recycled board mill on receiving water by a combination of process upgrades and effluent treatment in a recycled board mill. (Petrocart, Piatra – Neamt, Romania)

Process design and equipment specifications for in-plant pollution prevention measures and effluent treatment system for kraft linerboard mill at Puerto Piray, Argentina. This included assisting local engineers in the detail design phase. (SNC-Rust, Montreal)

Technical assistance to owner's design group developing process concept and basic design for a new 750,000 tpy mill in Brazil. (Veracel Cellulose SA, Sao Paulo, Brazil)

Process studies and equipment selection for effluent treatment systems for several mills including Cellulose du Rhone, Tarascon, Procter and Gamble, Grande Prairie, Alberta, Boise Cascade, International Falls, Minn., and Irving Pulp and Paper, Saint John, NB.

Computer simulation of the processes of a number of mills including Rayonier, Jesup, Georgia; Thames Board, Workington, England; Consolidated Bathurst, Shawinigan, Quebec; Consolidated Bathurst, Bathurst, New Brunswick; Boise Cascade, Kenora, Ontario; QUNO, Thorold, Ontario; St. Regis Paper, Sudbrook, Wales, F. F. Soucy, Riviere du Loup, Que., Consolidated Paper, Wisconsin Rapids, Wisc., and advice to a number of mills and consulting firms on the use of process simulation. The purpose of these projects was to improve process operations, to reduce effluent and energy losses. In all cases, it was necessary to spend several weeks in the mills concerned to document the process operations in detail, in addition to the simulation work itself.

Environmental risk analysis of current operations and recommendations on modifications to Baikalsk Pulp and Paper Co. dissolving kraft pulp mill to minimize environmental impact. The mill is located on Lake Baikal in Siberia, which is a unique body of water, and requires exceptional protection measures be implemented in the mill. (UNIDO, Vienna)

Analysis of environmental risks and predicted costs for two bleached kraft mills as part of preparation of prospectus for a public offering of shares in a spin-off company from Kimberly Clark Corporation.. (Tory and Tory, Toronto)

Review of reports on alternatives for chlorine bleaching. (Beak Consultants, Toronto, and Teltech, Minneapolis)

Assess the technical and economic feasibility of expanding recovery boilers in the Canadian kraft pulp industry to assist mills in complying with proposed organochlorine regulations. (Industry, Science and Technology Canada, Ottawa)

Review and appraisal of the alternate means of complying with the long term government objectives for the aqueous discharges from a sulphite pulp mill. (Kruger Inc., Trois Rivières, Quebec)

Development of short and medium term plan for compliance with current and proposed regulations on effluent for an integrated TMP and newsprint mill. (Kruger Inc., Bromptonville, Quebec)

Design for pulp washing, black liquor evaporation and strong liquor sales system for two very small kraft mills. These projects utilized conventional kraft recovery technology adapted to the local conditions to reduce BOD discharges. (Bolloré, Troyes and JOB, St-Girons, France)

Analysis of technical and economic feasibility of application of ozone bleaching in kraft mills. The purpose was to assist manufacturers of chemicals competing with ozone to assess future market developments. (CEFIC. Association of European Chemical Manufacturers)

Environmental regulatory agencies

Member of a three man Scientific Review Panel to advise the Minister of Water, Lands and Parks of British Columbia in regulation of AOX discharges from the 13 kraft mills, and one sulphite mill, in the Province. Project included review by public, and response to comments in public meeting. (BC Ministry of WLAP, 2002)

Engineering member of a three man "Expert Committee" to study effluents from 18 "non-kraft" mills in Ontario, recommend control regulations and evaluate the economic impact of such regulations. (Ontario Ministry of the Environment, Toronto)

Engineering member of "Kraft Mill Expert Committee" to study kraft mill effluents, recommend control regulations and evaluate the economic impact of such regulations. (Ontario Ministry of the Environment, Toronto)

Evaluation of consultants reports on the capabilities of the environmental protection systems for a proposed greenfield market kraft mill in Athabasca, Alberta. (Alberta Pacific Scientific Review Board, Edmonton)

Participation in review panel and public meetings for Alberta Pacific Forest Industries new kraft mill at Boyle, Alberta. (AIPac, Boyle, Alberta)

Review of technology and costs for control of phosphorus and BOD discharges from three integrated bleached kraft mills by internal upgrades and effluent treatment. The objective was to assist a broadly based stakeholder group in arriving at a consensus on new effluent discharge limits. (State of Maine, Department of Environmental Protection, Augusta, ME, USA)

Review of technology available for reducing dioxin discharges from bleached kraft mills to levels substantially below those defined in EPA and Canadian regulations. (State of Maine, Department of Environmental Protection, Augusta, ME, USA)

Analysis of problems of tainting of fish in the Kitimat River, caused by an unbleached kraft mill. Analysis of mill operations and development of mitigating measures. Report for the Kitimat Taint Management Committee, which includes industry, aboriginal peoples, and regulatory agencies. (Environment Canada, Ottawa and Vancouver)

Technical support and development of cost model for US Environmental Protection Agency's proposed regulatory update for effluents from US bleached chemical pulp and paper mills, and also mills processing recycled fiber. Defined alternative pollution prevention technology, developed simulation of process alternatives and a mathematical model to estimate costs of applying various technologies to each of the 86 bleached kraft mills in the US, assisted in writing technical support documents, analysis of several controversial issues related to cost and technical feasibility of alternate regulatory scenarios. Assistance to EPA in responding to comments by public. Included technical co-ordination with concurrent development of regulations for atmospheric emissions from the industry. (sub-contract Eastern Research Group, Washington, DC. Repeated assignments over an 11 year period)

Assessment of environmental impact of ammonium base sulphite at Tartas, France. (Ministère de l'environnement, Paris)

Assessment of technical feasibility and economic impact of proposed 1992 Federal Regulations for the pulp and paper industry. This project included calculating the capital and operating cost of the primary and secondary effluent treatment systems which would be required for each of the 115 Canadian mills affected to comply with the proposed regulations. An economic analysis of the combined effects of proposed regulation of AOX, dioxins, TSS, BOD and toxicity for the all kraft and bleached sulphite mills was also included. (Environment Canada, Hull)

Review of pulp and paper section of a report on alternatives to use of chlorine in Canada. (Consortium of Federal and Provincial environmental authorities)

Definition of Best Available Technology for controlling effluent discharges from pulp and paper mills. The project included estimating capital and operating costs of applying these technologies to the 27 mills in Ontario in 1991. (Ontario Ministry of Environment, Toronto, Ontario) Further assignment to update study in 1999.

Member of panel of engineers, toxicologists and other scientists convened by the Ontario Ministry of the Environment to advise on whether the Province should pursue a ten year old commitment to require the pulp industry to eliminate discharges of chlorinated organics by 2002. The panel included representatives of the industry, chemical suppliers and academia. (Ontario MoE, 2001)

Review and comment on regulatory development procedures and practices relative to the pulp and paper industry (Auditor General of Canada)

Technical support for confidential analysis of regulatory issues. (Auditor General of Canada)

Technical support to consultant preparing a manual on enforcement of water pollution control regulations for regulators dealing with the pulp and paper industry in the US. (Eastern Research Group, Lexington, Mass., EPA contract)

Miscellaneous assignments

International expert retained by the World Bank to advise the Ministry of the Environment of Indonesia on regulating dioxin discharges from pulp and paper mills. Project involved inspecting mills, calculating the discharge rates on the basis of mill processes, training Ministry staff and working with senior staff to develop Ministry Policy

Assessment of environmental performance of paper mills supplying National Geographic magazine, to assist in paper purchasing decisions.

Retained by ChemOne Holdings Pte Ltd, Singapore to assist in environmental permitting and planning a new kraft pulp mill in Indonesia.

Assistance to Ecometrix (Toronto, Canada) in preparation of application of environmental permits and for loan application to international banks, for proposed 1,300,000 ADt/year bleached kraft mill on the Rio de la Plata in Uruguay. Mill owned by a consortium of Stora-Enso and Celulosa d'Arauco.

Assessment of the technological level of the US pulp and paper industry and suppliers of technology to the industry, with respect to pollution prevention. (Office of Technology Assessment, US Congress)

Analysis of relationship between water use and greenhouse gas emissions in the Canadian pulp and paper industry. (Environment Canada, Ottawa)

Technical support to the Commission for Environmental Cooperation (a NAFTA Commission) in developing a factual record in response to a submission by several environmental advocacy groups which asserted that Canada had not effectively enforced effluent control regulations in Eastern Provinces. (CEC, Montreal)

Participant in the Water Working Group, a committee formed by Environment Canada of stakeholders from environmental NGO's, regulators academics and industry representatives to advise the Minister of the Environment on water and effluent issues related to the pulp and paper industry. (Environment Canada, Ottawa).

Invited by the Australian Pulp and Paper Technical Association (Appita) on tour of 15 pulp and paper mills in Australia and New Zealand to speak to industry management on environmental and process closure issues. Also presented two one-day seminars on process closure and addressed two Appita section meetings. (Appita, Melbourne)

Member of team developing methodology for application of Life Cycle Analysis techniques to pulp and paper manufacturing operations for Canadian Standards Association. (sub to Jacques Whitford, Toronto)

Preparation of brief criticizing the criteria proposed by the European Union Commission for award of Eco-labels for paper products in the European Community. (Canadian Pulp and Paper Association, Montreal)

Review of a technical and market analysis for new bleaching technology. (Confidential client)

Analysis of technical and scientific aspects of proposed criteria for award of an Eco-Logo for pulp and paper products. (Environmental Choice Program, Ottawa)

Analysis of effluent data from nine pulp mills in Alberta and Northern BC, including development of software to facilitate access to database by researchers. (Northern River Basins Study Board, Edmonton, Alberta)

Air pollution issues

Assessment of the atmospheric emissions from a group of seven pulp and paper mills, recommendations on control technology for current and predicted regulations and the preparation of order of magnitude capital cost estimates. Projects included analyses of the dispersion of the atmospheric emissions using various computer models. (Consolidated Bathurst, Head Office, Montreal, Quebec)

Study of operating electrostatic precipitator which had never attained design efficiency. This resulted in a low cost solution to the problem and the publication of a paper which won the Douglas Jones Award for the best environmental paper presented at CPPA meetings that year. (Consolidated Bathurst, New Richmond, Quebec)

Evaluation of air pollution dispersion models. (Environment Canada, Ottawa)

Critical review of an assessment of air pollution control program by a major consulting firm. (Environment Canada, Ottawa)

Calculation of impact of proposed water pollution control regulations for all US kraft and sulfite pulp mills on atmospheric emissions (EPA, Washington, DC).

Investigation of dioxin emissions from kraft pulp mill recovery and power boilers. (EPA, Washington, DC)

Measurement and mass balances for steam and gas emissions from innovative TMP mill system. (Kruger Paper, Corner Brook, Newfoundland)

Measurement of atmospheric emissions from approximately twenty of pulp and paper mills in Eastern Canada. Projects involved supervision of team of technicians, calculations of emissions, and responsibility for reporting, relations with clients (all mills) and communications with regulatory agencies.

Simulation of dispersion of atmospheric pollutants for several mills including Corner Brook Pulp & Paper, Corner Brook, Newfoundland, Western Pulp, Squamish, B.C., and Domtar Inc., Windsor, Quebec. These projects were part of larger projects to assist in negotiating discharge permits with the regulatory agencies.

Refer also to projects mentioned herein that included assessment and/or testimony concerning the overall environmental impacts of pulp and paper mills, which included air pollution aspects.

Training

Neil McCubbin has presented a number of short courses for engineers in the pulp and paper industry, and has also participated as an instructor in courses run by others. Courses were typically 2 to 5 days long. Examples include:

Preparation and presentation of one-day seminars on process closure technology for mill engineers in Melbourne Australia and in Rotorua, New Zealand.

Preparation and presentation of short course on pollution prevention in the pulp and paper industry for Environmental Regulatory Agencies in the State of Bahia, Brazil. (CRA, Salvador, Brazil)

Preparation and presentation of short course on pollution prevention in the pulp and paper industry to engineers in Morocco. (US Agency for International Development)

Course Leader and Lecturer in CPPA Environment Course 1990 and 1992. Short course in environmental protection technology for pulp mill engineers. (Canadian Pulp and Paper Association, Toronto and Edmonton)

Course Leader and Lecturer in CPPA Energy Course 1983 and 1986. Short course in energy conservation technology for pulp mill engineers. (Canadian Pulp and Paper Association, Montebello, Québec and Saint John, NB)

Energy conservation course for group of kraft mills in Price George, BC (PG Pulp and Paper, 1984)

Training engineers in use of process simulation software in a number of mills and consulting firms including Produits Forestiers Alliance, Dolbeau, Que., Papier Cascades Inc., Kingsey Falls, Que., NLK Vancouver, Dick Engineering, Toronto, ITT Rayonier, Jesup, Georgia; Thames Board, Workington, England; and QUNO, Thorold, Ontario.

Invited lecturer in CPPA Bleaching Courses 1995, 1997 and 1998. Short courses in bleaching for pulp mill engineers. (Canadian Pulp and Paper Association, various Canadian locations)

Invited lecturer in CPPA Mill Closure Course 1997. Short course in design of closed cycle pulp and paper mills for experienced engineers in the industry. (Canadian Pulp and Paper Association, Montreal)

Invited lecturer in three Kraft Mill Closure courses (1998, 1999 and 2002). Short course in reduction of kraft mill effluent discharges by using modern process closure technology, for engineers experienced in the industry. (Technical Association of the Pulp and Paper Industry)

Preparation of reports on the "Basic Technology of the Pulp and Paper Industry and its Environmental Protection Practices" and "State of the Art of the Pulp and Paper Industry and its Environmental Protection Practices". The report won a "Distinguished" award from the Society for Technical Communications. Several short courses were presented based on these manuals. (Government of Canada, Environmental Protection Service)

Previous employment

Prior to entering private practice, Neil McCubbin was employed by pulp mills and the associated service industry

1970 - 1973 Beak Consultants, Montreal, Quebec, Project Engineer

Responsible for a number of feasibility studies and detailed design for pulp and paper mill effluent treatment systems, and internal process modifications to control effluent quality.

Review of air pollution control technology in the Swedish pulp industry. This included visits to eleven mills and the preparation of the project (CPAR Secretariat, Ottawa, Ontario)

Review of European experience with Rotating Biological Contactor waste treatment systems. This included visits to six operating installations and various research establishments in Germany, France, Denmark, and England (Environment Canada, Ottawa, Ontario)

1968 - 1970 Multifibre Process Limited, Montreal, Quebec.

Project Engineer with turnkey chlorine dioxide system equipment manufacturer.

Responsible for design, construction and start-up of bleach chemical plants and air pollution control equipment (Georgia Pacific, Crossett, Arkansas and Western Kraft, Hawesville, Kentucky).

1966 - 1968 North Western Pulp and Power Ltd., Hinton, Alberta

Engineer in pulp mill. Projects included installation of primary clarifier and aerated stabilization basin.

1965 - 1966 Rayonier Canada Ltd., Woodfibre, B.C.

Project Engineer during start-up of kraft pulp mill expansion.

Publications

Solutions to Limitations in Recovery System Capacity when Closing the Process in Existing Mills. International Non-chlorine Bleaching Conference, Orlando, 1996.

Is Deinking Environmentally Desirable? Proc. International Environmental Conference, Portland, Oregon, 1994. (With Jens Folke) Paper won prize as "Best in General Category"

Dioxins and Organochlorines in the Ontario Kraft Industry. Proc. CPPA Annual Mtg., Montreal, 1989. (with J.B. Sprague and N. C. Bonsor)

Best Available Technology for the Ontario Pulp and Paper Industry. (With E. Barnes, E. Bergman, H Edde, J Folke, and H Edde). Report prepared for the Ontario Ministry of the Environment. 1992 (600 pp)

Kraft Mill Effluents In Ontario (with John B. Sprague and Norman C. Bonsor), April 1988. Report prepared for the Ontario Ministry of the Environment (260 pp)

Effluents from Non-kraft Pulp and Paper Mills in Ontario (with John B. Sprague and Norman C. Bonsor), 1991. Report prepared for the Ontario Ministry of the Environment (300 pp)

The Basic Technology of the Pulp and Paper Industry and its Environmental Protection Practices, Environment Canada, EPS 6-EP-83-1. (winner of distinguished award, Society for Technical Publications and Graphic Arts Competition, 1984) (179 pp)

State of the Art of the Pulp and Paper Industry and its Environmental Protection Practices, Environment Canada, EPS 3-EP-84-2. (128 pp)

Costs and Benefits of Various Pollution Prevention Technologies in the Kraft Pulp Industry. Proc. International Symposium of Pollution Prevention in the Manufacture of Pulp and Paper - Opportunities and Barriers. Washington DC. August 18-20, 1992.

Economic Impact of Proposed Regulations on Pulp and Paper Industry - BOD, TSS, Toxicity, Organochlorines (AOX) Dioxins and Furans, Prepared for Environment Canada, No C&P KE 144-9-6190. 1990

Technology Available to Compensate for Recovery Boiler Overloads, Proc. CPPA Environment Conference, Thunder Bay, Ontario, October, 1993.

Review of Technology for Overcoming Capacity Limitations in Kraft Pulp Industry Recovery Boilers. Prepared for Industry and Science and Technology Canada (July, 1990)

Review of EPA Regulations. Pulp and Paper Canada, December 1993.

Eco-Labeling in Europe. Pulp and Paper Canada, September 1993.

Summary of Proposed Air Emission Standards for US Mills, Pulp and Paper Canada, February, 1994.

Significance of AOX vs. Unchlorinated Organics, Proc. CPPA Environment Conference, Thunder Bay, Ontario. October 1993.

Variability of Effluents from Mills with Advanced Control, Proc TAPPI Environmental Conference, Richmond VA, 1992. (with Jens Folke, Alistair Stewart, and Kirsten Vice) TAPPI Vol. 77, No. 1, January 1994..

Simplified Bioassays and Chemical Analyses to be Used for Regulatory Purposes in the Pulp Industry. (with Jens Folke, Lars Landner and Karl-Johan Lehtinen) Proc TAPPI Environmental Conference, Boston, March 1993.

Is AOX Removal by Biological Treatment Consistent with Environmental Protection Objectives? Proc. TAPPI Environmental Conference, Richmond VA, 1992. (with Jens Folke and Lars Landner)

An Evaluation of European Experience with the Rotating Biological Contactor, Environment Canada, EPS 4-WP-73-4.

Review of Swedish Pulp and Paper Industry Air Pollution Control Technology, CPPA Environmental Conference, 1974, Member of Five-member Canadian Study Group (report author), CPAR Secretariat.

Energy Conservation vs. Fuel Alternatives: Conservation Could be the Better Investment, Pulp and Paper Canada, May 1981.

A Practical Method to Increase Efficiency of Existing Precipitators, (Winner of 1978 Douglas Jones Award).

In-plant Suspended Solids Control Systems are the Most Economical, Pulp and Paper Canada, April 1984.

Simplified Toxicity Testing for Mill Effluents, Pulp and Paper Canada, July 1984.

Dispersing Atmospheric Pollutants, Pulp and Paper Canada, November 1984.

Monthly series on using microcomputers in mill engineering and technical departments. (October 83 to Dec 2004).

Process Engineering: What Role for Micro-computers?, TAPPI Engineering Conference, Boston 1984.

Process Simulation: A Key Tool for the Design and Modernization of Mills in the Eighties, Pulp and Paper Canada, August 1982.

Generation of Steam for TMP Mill Exhausts, Pulp and Paper Canada, March 1981.

Alternatives to Fossil Fuel for the Lime Kiln, Proc. Ottawa, CPPA Energy Conference 1983.

Assessment of Chlorine Dioxide Generating Capacity in the Canadian Bleached Pulp Industry. Industry, Science and Technology Canada, Ottawa, Ontario, Contract No. 67RPI-9-0278, July 1990. (With Dennis Owen)

Awards

Best paper in "General Category" at TAPPI International Environmental Conference, Portland, Oregon, 1994.

Doug Jones Award 1978 (Best paper presented at a CPPA meeting on an environmental issue).

National Award Society of Technical Communications 1984.

Tasman Fellowship 1988.

Canada's Who's Who - 1991 to date.