LOW IMPACT HYDROPOWER INSTITUTE

CERTIFICATION QUESTIONNAIRE

Verso Androscoggin Power LLC
LIHI Certificate No. 48

Attachment 4:

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN ELIAS BALDACCI
GOVERNOR

DAVID P. LITTELL
COMMISSIONER

VIA ELECTRONIC MAIL

April 7, 2010

Thomas B. Saviello
Manager, EHS
Verso Paper
PO Box 20
Jay, ME 04239

RE: Fish Tissue Sampling Report
Riley-Jay-Livermore Hydro Project, FERC No. 2375
Otis Hydro Project, FERC No. 8277

Dear Tom:

As you know, the DEP's May 5, 1998 water quality certification for the Riley-Jay-Livermore and Otis Hydro Projects included a condition stating that IP (now Verso) shall, in cooperation with the DEP, collect and analyze tissue samples from white suckers and smallmouth bass from the Otis impoundment and the river below the Livermore Dam for levels of PCBs and mercury, respectively. The purpose of this sampling and analysis was to determine whether the presence of the project dams is resulting in an increase in contaminant levels in fish and thus is contributing to the issuance of fish consumption advisories on the river.

As you also know, fish tissue sampling and analysis for various toxics was conducted in 2000 and again in 2003. By letter to you dated August 18, 2004, the DEP determined that the data collected to date is inconclusive, and recommended that an additional one-time sampling event, similar to that conducted in 2000 and 2003, be conducted again in 5 years. The DEP believed that this should be long enough to allow for identification of any significant trends in contaminant levels.

IP (new Verso) subsequently agreed to cooperate in the DEP's recommended follow-up study. Under this arrangement, DEP agreed to collect and analyze the required fish samples, while Verso agreed to pay for the analysis.

In 2009, DEP collected fish tissue samples from smallmouth bass and white sucker from the Otis impoundment and from the river below the Livermore Falls Dam.

The analysis of the 2009 samples has now been completed, and is discussed in the attached report from Barry Mower, DEP Division of Environmental Assessment, dated March 20, 2010.

Based on this analysis, the DEP now concludes that there is no significant difference in contaminant levels between fish caught in the Otis impoundment and fish caught in the river below the Livermore Dam, and that the presence of Verso's Riley, Jay, Otis, and Livermore Falls dams is not contributing to the issuance of fish consumption advisories on the Androscoggin River.

Verso has now fulfilled its obligation to conduct fish tissue sampling in compliance with Condition 11 of the May 5, 1998 water quality certification, as modified on July 1, 2003. No further fish tissue sampling will be required.

You will be receiving an invoice for the costs of the DEP's laboratory analysis of the 2009 samples under separate cover.

I commend Verso for its efforts in this matter.

Sincerely,

Dana Paul Murch
Hydropower Specialist

cc: Andy Fisk, DEP
Barry Mower, DEP
Marty Phillips, KA

EFFECT OF VERSO PAPER'S RILEY-JAY-LIVERMORE PROJECT DAMS ON ACCUMULATION OF CONTAMINANTS IN FISH

By Barry Mower
Division of Environmental Assessment, Department of Environmental Protection

March 29, 2010

During the collaborative team process involving International Paper Company's (now Verso Paper) Riley-Jay-Livermore hydropower project, the issue concerning the potential impact of the dams on concentrations of dioxins and furans in fish was raised. The hypothesis is that the dams trap solids discharged by the mill and contaminated with dioxins and furans such that suckers in the impoundments might have higher exposures and therefore higher concentrations of dioxins and furans than suckers downstream of the impoundments. This is a possibility since the primary source of dioxins and furans in fish is via food intake and since white suckers forage in the sediments on the bottom of the river.

To test this hypothesis, in 1996, on behalf of Verso (then International Paper), DEP collected 20 white suckers from the Otis Impoundment (ALV) and 20 white suckers downstream of the Livermore Falls dam (ALF), in a free-flowing reach of the Androscoggin River, as part of DEP's annual Dioxin Monitoring Program. Samples were sent to the Water Resources Institute at the Unversity of Maine for analyses for all 2-3-7-8 substituted dioxins and furans.

Results show that concentrations of dioxin (TCDD) in the suckers were not significantly different ($p=0.05$) between the two sites (Table 1). Concentrations of furans (TCDF), and hence Dioxin Toxic Equivalents (DTEo), however, were significantly higher (33% and 25% respectively) in the Otis Impoundment than below the Livermore Falls dam ($p=0.05$). The difference between dioxins and furans is not surprising since furan is usually present at concentrations an order of magnitude higher than dioxins in samples of most media, as was the case with these fish samples. The sizes of the fish were not significantly different between sites.

Although the concentrations of furans are below the threshold for fish consumption advisories currently used by the Maine Bureau of Health, a similar question remained for smallmouth bass, which have a lower threshold but were not compared between these two sites. Recent changes in the discharge of dioxins and furans from Verso and other mills on the Androscoggin may or may not result in reductions in furan concentrations that would be below the threshold for the bass as well. These results demonstrated that the hypothesis may be valid for some compounds but not others.

It was not determined that the dams had caused or contributed to the Fish Consumption Advisory in the impoundments, allowing the hydropower permit application to be certified as meeting Maine's Water Quality Standards. Since there was some uncertainty,

however, the project received 401 certification but with a condition that additional samples were to be collected at both sites and analyzed for other contaminants, namely mercury and PCBs.

To assist Verso Paper, DEP collected ten smallmouth bass and ten white suckers at both stations in 2000 while on site for sampling during its Dioxin Monitoring Program. The analytical results show that concentrations of mercury and PCB were significantly higher in bass above the Otis dam than below the Livermore Falls dam (Table 1). Concentrations of PCB were not significantly higher in suckers above the Otis dam at $p=0.05$ but were at $p=0.10$.

The 1996 and 2000 results indicated that the presence of the Otis and Livermore Falls dams create conditions that result in a significant increase in contaminants in fish in the Androscoggin River. Concentrations of DTEo in suckers from the 1996 data did not exceed the Maine Bureau of Health's Fish Tissue Action Level (FTAL), but bass were not tested at both stations. Nevertheless, the 95 upper confidence level of DTEh in bass approached the FTAL in several years and combined with coplanar (dioxin-like) PCBs, did exceed the FTAL. Concentrations of mercury and PCBs in bass and suckers from the 2000 data at both stations did exceed the FTAL. Given that there are already statewide fish consumption advisories due to mercury and more stringent advisories on the Androscoggin due to dioxins, both of which result in non-attainment of Maine's water quality standards, any increase in concentrations increases the risk, which may exacerbate the advisories. Consequently, it appeared the presence of the dams may contribute to non-attainment of the water quality standards.

To be sure, additional sampling of fish was needed. Consequently the Department modified its 1998 Water Quality Cerfification (see modification Order #L-18829-33-I-M dated July 1, 2003) to require additional sample collection. In 2003 DEP collected bass and suckers at both stations to be analyzed for dioxins, PCBs, and mercury. The results showed that TCDF was actually lower in bass from the Otis impoundment than below the Livermore Falls dam (Table 1). PCB and mercury concentrations in both bass and suckers were not significantly different between locations These results are unlike those from 2000 for the bass. There was, however, significantly more TCDD, TCDF and DTEo in suckers from the Otis impoundment than in suckers from below the Livermore Falls dam. These results are similar to what was found in 1996 for TCDF and DTEo. Concentrations of TCDD, TCDF, and DTEo in 2003, however,were lower than in previous years although concentrations of TCDF in suckers still exceeds the FTAL.

The data are conflicting. Differences between locations seen in earlier years in bass were not seen in 2003. Nevertheless, suckers in the Otis impoundment have consistently had more dioxin and furan than those below the Livermore Falls dam. Given that suckers are more likely to show impacts of contaminated sediments, it appears that the Otis dam, and probably the other dams, do trap contaminated sediments and result in increased contamination of fish. Nevertheless, concentrations in the Otis impoundment and consequently, differences between stations were declining and could become

insignificant in the future as the discharge of dioxin from the mill diminished or was eliminated. Sampling again in 5 years was the recommended action.

Sampling was repeated in 2009. DEP collected 16 smallmouth bass and 16 white sucker from both the Otis impoundment and the river below the Livermore Falls dam. The samples were combined into 4 composites of 4 fish each which increases the sensitivity while controlling costs. Smallmouth bass were analyzed for wet weight mercury while white sucker were analyzed for lipid normalized PCBs. Site differences were analyzed by ANCOVA with length as a covariant. The results of the 2009 study show that there was no significant ($p<0.05$) difference in wet weight mercury in smallmouth bass, or wet or lipid normalized PCBs in white sucker between stations (Table 1).

Table 1. IP/Verso Hydro Studies 1996, 2000, 2003, 2009

YEAR	STATION	SPECIES	TCDD pg/g	TCDF pg/g	DTEo pg/g	HG ug/g	PCBw ng/g	PCBl ng/g
1996	ALV	WHS	0.59	**12.6**	**3.4**			
	ALF	WHS	0.57	**9.7**	**2.8**			
2000	ALV	SMB				**0.56**	**38.2**	
	ALF	SMB				**0.41**	**26.0**	
	ALV	WHS					48.1	
	ALF	WHS					41.9	
2003	ALV	SMB	0.08	**0.49**	0.21	0.62	22.4	
	ALF	SMB	0.07	**0.72**	0.24	0.58	18.8	
	ALV	WHS	**0.28**	**7.68**	**1.63**	0.40	44.0	
	ALF	WHS	**0.12**	**2.87**	**0.61**	0.34	32.6	
2009	ALV	SMB				0.63		
	ALF	SMB				0.69		
	ALV	WHS					71	2414
	ALF	WHS					40	1820

bold = significantly different at $p<0.05$
ALV is in Otis impoundment, ALF is below the Livermore Falls dam
PCBw = wet weight PCBs, PCBl = lipid normalized PCBs

CONCLUSIONS

While concentrations of contaminants have appeared to be greater in the Otis Impoundment than below the Livermore Falls dam for some years, since 2003 there has been no significant difference for contaminants.. Although the raw wet weight 2009 PCBs appear higher in the impoundment than below the dam, there is no significant difference either wet weight mercury or lipid normalized PCBs.

The most recent data for dioxins (2003) show significantly higher amounts in the impoundment. In 2004, however, the Department found that Maine's paper mills were no longer discharging measurable amounts of dioxins. The Department's 2008 Integrated Water Quality Monitoring and Assessment Report lists this reach of the Androscoggin River as in 'Category 4-B: Rivers and streams impaired by pollutants- pollution control requirements reasonably expected to result in attainment'. Consequently, the Department expects that the difference between stations will disappear.

In 2008, the Maine Center for Disease Control and Prevention (MCDC) modified their Fish Tissue Action Levels (FTAL) for the non-cancer endpoint from 1.8 pg/g to 0.4 pg/g for dioxins (DTEo or TEQ). The cancer endpoint remained at 1.5 pg/g, but now FTAL for the new non-cancer endpoint is the controlling FTAL. The DTEo for smallmouth bass were below the non-cancer FTAL for both the Otis Impoundment and below the Livermore Falls dam for the 2003 data. Although the DTEo for white sucker were above the FTAL for both stations for the 2003 data, the difference between stations is not enough to change the fish consumption advisory between the stations. Consequently, the presence of the dam is not considered to cause non-attainment of Maine's water quality standards.