HDR Report to the NWPPA: *"Increasing the Fish Consumption Rate: Report of Fiscal Impact to Select Northwest Pulp & Paper Mills"*

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EXECUTIVE SUMMARY

The Oregon Department of Environmental Quality (ODEQ), United States Environmental Protection Agency (EPA) and Confederated Tribes of the Umatilla Indian Reservation (CTUIR) are planning to make human health water quality criteria (HHWQC) more stringent. This change is due to indications by CTUIR that some of its members consume fish at a greater fish consumption rate (FCR) than the FCR that HHWQC are currently based on. If the FCR used for establishing HHWQC is increased, HHWQC will correspondingly become more stringent.

The initiative to determine the need and justification for the more stringent WQC is referred to as the Oregon Fish and Shellfish Consumption Rate Project and was started by ODEQ, EPA and CTUIR. As part of the project, the ODEQ commissioned Science Applications International Corporation (SAIC) to prepare a report evaluating necessary actions and costs to meet more stringent WQC. SAIC completed this report in January 2008 and it is named *Cost of Compliance with Water Quality Criteria for Toxic Pollutants for Oregon Waters*. It is the opinion of several point source dischargers that the SAIC report did not fully capture costs associated with achieving statewide compliance with revised HHWQC and the costs presented were significantly underestimated. In addition, the report did not sufficiently address the ability of currently available technology to meet the new HHWQC particularly when the HHWQC is below analytical method detection limits.

The purpose of this study and report is to verify the HHWQC that must be met, determine if proposed technologies will meet the limits, and develop an opinion of probable cost for implementing and operating these technologies. Since several of the proposed technologies have not been tested or advanced beyond bench-scale testing, there is much uncertainty in the full-scale applicability of some of the technologies. Therefore, bench testing, pilot-plant testing and/or full-scale demonstrations would be needed to verify with greater accuracy the actual achievable effluent quality for these technologies.

This report develops an opinion of fiscal impacts to the Oregon pulp and paper industry due to more stringent HHWQC from increased FCR. The following report methodology was used to determine these impacts:

1. Collection and review of treated wastewater effluent data from four different pulp and paper mills.
2. Determination of current HHWQC and potentially more stringent HHWQC due to increased FCR; these criteria were then compared with mill final effluent data.

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3. A list of candidate treatment technologies was developed for removing these constituents by reviewing studies pertinent to the Fish Consumption Project. Additional literature was reviewed as well to determine other potential treatment technologies.
4. Treatment technologies were screened for reliability and feasibility in meeting applicable HHWQC.
5. Capital and operational cost opinions were developed for the screened treatment alternatives.

Four representative mills were evaluated for this report and are summarized below. :

Mill A – Bleached Kraft Process
Mill B – Unbleached Kraft Process
Mill C – Thermomechanical Pulping/Deink Process
Mill D – Bleached Kraft Process

Data from the four mills was compiled, averaged and compared to HHWQC at increased FCRs. HHWQC at increased FCRs were calculated with the aid of a computer model spreadsheet developed by the ODEQ. The spreadsheet utilizes epidemiological data including reference doses, bioconcentration factors, carcinogen slope factors and other parameters to determine WQC for a given FCR, water intake and body weight.

The model was run at three different FCRs including 17.5 g/day, 63.2 g/day, 113 g/day and 175 g/day. Current WQC is based on a FCR of 17.5 g/day. Changes to WQC by ODEQ could be based on a FCR as high as 175 g/day. The spreadsheet model shows that current mill effluent quality may exceed some of the HHWQC at the elevated FCRs.

It is critical noting that the lowest method detection limit (MDL) for all EPA-approved analytical methods is greater than the new HHWQC for some constituents. While this report identifies potential technologies for removing these constituents, it is impossible to know for certain whether technologies actually can or cannot meet HHWQC since there is no way to accurately measure at such low concentrations at this time. Despite the inability to measure accurately to the HHWQC, it is expected that point source dischargers would still need to plan to meet HHWQC since more sensitive analytical methods could become available. Furthermore, regulating authorities would expect point source dischargers to meet WQC whether or not analytical methods could accurately detect below the WQC.

HHWQC limits at increased FCRs are extremely stringent compared to other environmental standards. HHWQC at increased FCRs should be scrutinized to compare the value of improving water quality with to the actual protection to human health. For example, revised HHWQC at increased FCRs are multiple orders of magnitude more protective than national drinking water standards. Another comparison of note is background water quality. A review of current water quality shows that many of the revised HHWQC may already be exceeded in Oregon surface waters. Therefore, the

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opportunity for applying pass-through credits to point source dischargers should be considered where background constituent levels are high.

A literature review of treatment technologies was completed to determine which, if any, technologies can reliably meet the revised HHWQC at higher FCRs. The literature review showed that most published results for constituent removal are related to higher untreated constituent concentrations and technologies for achieving less stringent effluent criteria. These less stringent effluent criteria (including drinking water standards) are orders of magnitude greater than HHWQC for this study. As a result, little research has been conducted investigating constituent removal technologies to extremely low levels. Therefore, published literature does not support or deny that more stringent HHWQC can be met using currently available technologies. Technologies suggested for meeting low level constituents (mostly for metals) included iron coprecipitation, granular activated carbon, ion exchange, nanofiltration and reverse osmosis. Further evaluation of the technologies showed that iron coprecipitation, nanofiltration and reverse osmosis would have the best possibility of meeting HHWQC at increased FCRs and were then evaluated for cost.

Capital and O&M cost opinions for the four mills were evaluated for the three candidate technologies. The costs are summarized below.

Summary of Capital, O&M and Annualized Costs

		Mill A	Mill B	Mill C	Mill D
Capital Costs	Iron Coprecipitation	$31,000,000	$25,000,000	$19,000,000	$34,000,000
	Nanofiltration	$91,000,000	$67,000,000	$41,000,000	$101,000,000
	Reverse Osmosis	$107,000,000	$79,000,000	$48,000,000	$119,000,000
Annual O&M Cost	Iron Coprecipitation	$28,000,000	$20,000,000	$11,000,000	$31,000,000
	Nanofiltration	$9,500,000	$6,700,000	$3,900,000	$10,500,000
	Reverse Osmosis	$10,500,000	$7,400,000	$4,300,000	$11,700,000
Annualized Costs (10 yrs, 7%)	Iron Coprecipitation	$32,000,000	$24,000,000	$14,000,000	$36,000,000
	Nanofiltration	$22,000,000	$16,000,000	$10,000,000	$25,000,000
	Reverse Osmosis	$26,000,000	$19,000,000	$11,000,000	$29,000,000

Cost provided above represent only four of the eight large mills located in Oregon. The cost related to simply installing technology to meet revised HHWQC at increased FCRs is significant and would cost the Oregon pulp and paper industry in excess of $500 million. In addition, annual costs to operate these technologies would cost Oregon pulp and paper mills in the range of $30 to $90 million annually. While costs are significant, there is no certainty at this time that revised HHWQC could be met using existing technology. Steps forward should first ensure that technologies are available for meeting more stringent HHWQC before significant capital expenditures are made.

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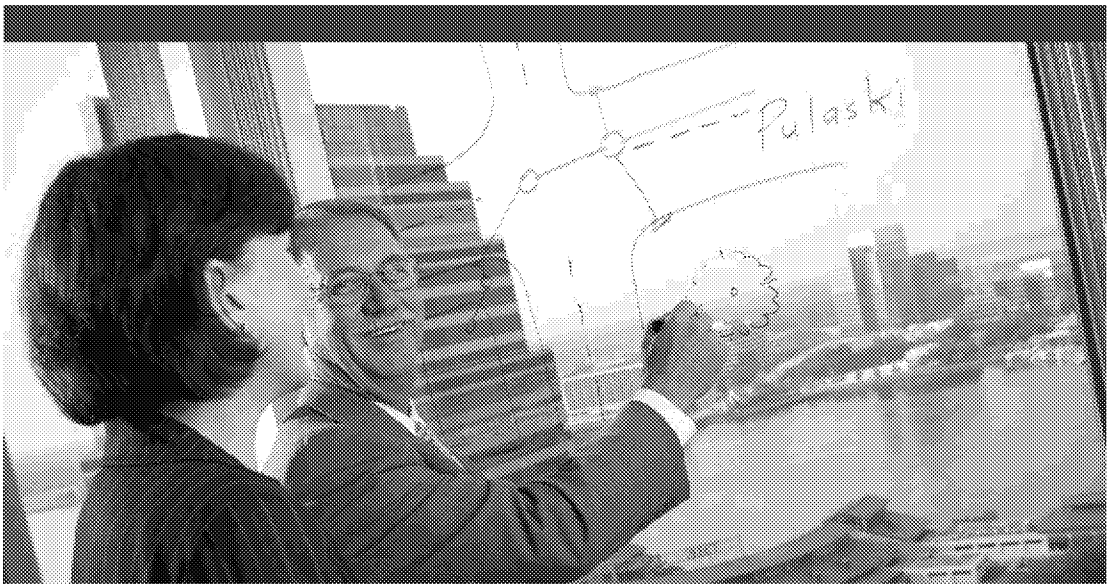

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