Letter Health Consultation

Evaluation of 2016 Fish Tissue Data from the Cape Fear River in the Vicinity of the International Paper Company Mill at Riegelwood, North Carolina

RIEGELWOOD, COLUMBUS COUNTY, NORTH CAROLINA

Prepared by the

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North Carolina Department of Health and Human Services
Division of Public Health

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Division Director

April 11, 2017

MEMORANDUM

TO: Daniel Staley, Division Director

THROUGH: Zack Moore, Section Chief
Mina Shehee, Branch Manager

FROM: Beth Dittman, Environmental Program Consultant

SUBJECT: **Evaluation of 2016 Fish Tissue Data from the Cape Fear River in the Vicinity of the International Paper Company Mill at Riegelwood, North Carolina**

In January 2017, The North Carolina Division of Public Health (DPH) was provided a copy of the 2016 report from the annual dioxin monitoring study of fish tissue from the Cape Fear River near the International Paper Company Mill in Riegelwood, NC [CRZ 2016]. This annual monitoring complies with International Paper's NPDES permit and a 1990 Special Order by Consent (SOC). Staff from DPH's Occupational and Environmental Epidemiology Branch (OEEB) reviewed the data to determine the adequacy of the samples and if there is a need for a fish consumption advisory.

Sample description

Three sampling stations were used per the current NPDES permit and SOC. Station 1 is a control site located upstream from International Paper's mill discharge and separated by a physical barrier. Station 2 is approximately 2 miles downstream from the mill discharge on the Cape Fear River. Station 3 is approximately 13 miles downstream of the mill discharge near the confluence of the Cape Fear River and the Black River.

Fish samples were collected in September 2016 (Stations 1 and 2) and in November 2016 (Stations 2 and 3). Individual samples were grouped together and homogenized to create composite samples consisting of 5-10 individuals per composite (Table 1). Samples were analyzed using EPA Method 1613B for 2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD), 2,3,7,8-

tetrachloroinated dibenzofuran (TCDF), and all 17 of the dioxin and furan congeners that are substituted with chlorine at the 2,3,7, and 8 positions.

Table 1. Summary of composite samples submitted for analysis.

Station Number	Composite Number	Species	Number in composite	Average length (mm)	Average fish weight (g)	Average fillet weight (g)
1	1	Bluegill	10	148.9	58.5	8.0
1	2	Bluegill	10	169.1	95.6	13.0
1	3	Blue catfish	10	606.4	3,250.7	352.0[a]
1	4	Common carp	6	576.0	3,614.0	309.0
2	5	Bluegill	10	172.4	105.7	18.0
2	6	Bluegill	5	215.2	206.0	34.0
2	7	Blue catfish	10	606.4	3,205.5	407.0
2	8	Common carp	10	576.0	3,446.0	343.0
3	9	Bluegill	6	184.7	197.7	34.0
3	10	Blue catfish	10	631.5	3,314.5	465.8
3	11	Blue catfish	5	734.0	5,512.0	818.0
3	12	Common carp	10	570.0	3,464.0	347.0

[a] Replicate sample submitted

OEEB Data Evaluation Approach

Data provided was evaluated per the OEEB Standard Operating Procedure for Fish Consumption Advisories [OEEB 2017]. The number of samples failed to meet the required number to make a recommendation regarding fish consumption from these three sampling areas. For a reliable risk assessment, OEEB requires a minimum of either 3 fillet composite samples consisting of tissue from 3-7 fish or 5 fillet samples each from individual fish for each species at each location. For this assessment, there were an insufficient number of composite samples for all species at all locations, so the measured concentrations of dioxins may not be representative of the true contaminant level in fish residing in these areas of the Cape Fear River. OEEB still evaluated the data to determine if further sample collection and analysis is warranted.

If analytes were not detected in tissue samples, one half the detection limit was used as the tissue concentration. If analytes had values flagged as EMPC (Estimated Maximum Possible Concentration[1]), the EMPC value was used as the tissue concentration. Toxicity equivalency factors were applied to all compounds to determine the TCDD toxicity equivalency (TEQ) concentration. Samples from the same species and location were averaged and health-protective

[1] EMPC indicates estimated maximum value due to ion ratio failure

meal limit estimates were calculated for both cancer and non-cancer endpoints. A summary of the data can be found in Table 2.

Table 2. Summary of dioxin concentration and estimated meal limits.

Station Number	Species	# Composite samples	Average TCDD-TEQ Concentration (mg/kg)	Average Meal Limit – Cancer[a] (meal/week)	Average Meal Limit - Non-cancer[a] (meal/week)
1	Bluegill	2	1.82E-07	28	25
1	Blue Catfish	1[b]	1.43E-06	4	4
1	Common Carp	1	1.30E-06	4	4
2	Bluegill	2	2.77E-07	19	17
2	Blue Catfish	1	1.04E-06	5	4
2	Common Carp	1	8.40E-07	6	6
3	Bluegill	1	1.53E-07	33	30
3	Blue Catfish	2	1.07E-06	8	7
3	Common Carp	1	9.17E-07	6	5

[a] Inadequate data to use for a fish consumption advisory

[b] One composite sample was taken, but a replicate sample was submitted for analysis; results shown are the average.

Conclusions and Recommendations

An insufficient number of samples were collected and analyzed for DPH to issue a fish consumption advisory for the sampled areas of the Cape Fear River. Further, inconsistencies in the detection limits and measured congener concentrations of the replicate samples (composites 3 and 13) raise concerns about data quality. However, the estimated meal limits for the blue catfish and common carp samples from all sampling stations indicate that more sampling is needed to ensure protection of the health of people consuming fish caught from this waterway. It is noteworthy that the samples with larger fish size had higher concentrations of dioxins, and therefore a robust data set representative of fish normally consumed from this waterway is necessary. Potential health effects from consumption of elevated levels of dioxins include reproductive and developmental effects, damage to the immune system, and interference with hormones.

OEEB recommends that future annual testing for the monitoring of dioxin in fish tissue from the Cape Fear River near the International Paper Company Mill be done in accordance with the OEEB Standard Operating Procedure for Fish Consumption Advisories [OEEB 2017]. This includes analyzing at least 3 composite samples (consisting of tissue from 3-7 fish) or 5 individual samples for each species from each sampling site for a more representative and robust data set.

Questions regarding this evaluation or the conclusions and recommendations can be directed to the Occupational and Environmental Epidemiology Branch at 919-707-5900.

References

[CRZ 2016] *Dioxin Monitoring Study of Fish Tissue from the Cape Fear River in the Vicinity of the International Paper Mill at Riegelwood, North Carolina.* CRZ Incorporated. December 2016.

[OEEB 2017] *Standard Operating Procedure for Fish Consumption Advisories.* NC DHHS DPH OEEB. February 8, 2017.

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