TEXAS DEPARTMENT OF HEALTH

Austin Texas

INTER-OFFICE MEMORANDUM

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SUBJECT: Aggregate Risk Assessment For Consumption of Fish from East Texas Lakes

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BACKGROUND AND STATEMENT OF ISSUES

The Texas Department of Health Seafood Safety Division has asked the Health Risk Assessment & Toxicology Program to evaluate the health risks associated with consumption of fish taken collectively or individually from Caddo Lake, Cypress Creek, Toledo Bend Reservoir, Sam Rayburn Reservoir, and Steinhagen Reservoir. This risk evaluation considers the potential for exposure to mercury contaminated fish for recreational fishers and their families who may be taking fish from a number of waterbodies in East Texas or who may be taking fish from the local waterbody. The assessment is intended to supplement previous risk assessments written to evaluate risk from consumption of mercury contaminated fish from individual waterbodies in East Texas.

DISCUSSION

A total of 118 freshwater drum and largemouth bass taken from Steinhagen Reservoir, Toledo Bend, Caddo Lake, Cypress Creek, and Sam Rayburn Reservoir were shown to contain elevated levels of mercury in fish tissue. Additionally, five white bass taken from Steinhagen Reservoir had elevated levels of mercury. White bass from the other areas investigated had lower levels of mercury. Thirteen other species of fish contained an overall lower average of mercury (0.4 ppm).

Previous risk assessments established consumption limits for mercury contaminated fish from individual lakes. The potential exists for recreational fishers to consume fish from several or all of the contaminated areas over a given period of time. In this case, consumption limits must consider an overall level of mercury exposure for these fishers and their families.

For public protection, it was decided that an aggregate risk assessment would be based on a reasonable maximum exposure scenario using the average level of mercury for largemouth bass and freshwater drum from Caddo Lake. These species contain the highest level of mercury for the five areas investigated. Consumption limits for fish from East Texas Lakes were based on these species. This will allow protection of the person who fishes only Caddo Lake, as well as protecting those who may consume fish from several lakes. Consumption limits are not recommended for the thirteen other species investigated from East Texas Lakes.

An average of 1.05 ppm mercury was found in 23 largemouth bass (>14") and freshwater drum from Caddo Lake. Largemouth bass between 14 and 18" are illegal in Caddo Lake; however, for all other lakes considered in the aggregate risk assessment, 14" is the minimum size limit for largemouth bass. For the purpose of determining consumption limits for East Texas Lakes, the mercury concentrations in freshwater drum and largemouth bass over 14" from Caddo Lake were used.

The EPA reference dose of 0.0003 mg/kg/day was used to calculate an upper limit of consumption for women of childbearing age. This level allows a 2-4 fold margin of safety below the lowest observable adverse effects level (LOAEL) for fetal effects and is equivalent to maternal hair levels of approximately 5 ppm mercury. At the recommended consumption limits, the risk for developmental effects, such as late walking, is approximately 0-2% for infants exposed prenatally (WHO, 1990).

The recommended consumption limits concern are as follows:

Species	
Largemouth bass and freshwater drum	2 meals per month (8 oz/meal adults, 4 oz/meal children)
White bass from Steinhagen Reservoir	1 meal per month
All others	no limit

These limits consider that fishers may eat mercury contaminated fish from a number of areas over the given time period or that they may fish the area of greatest contamination. The geographical area of concern shows a consistent pattern of mercury contamination in similar species. An exception was noted in white bass from Steinhagen Reservoir. Because these fish had very high mercury levels, a separate consumption limit of two meals per month was calculated for these fish. Considering that fishers may also consume two meals per month of largemouth bass and freshwater drum from the other areas, the limit for Steinhagen white bass was reduced to one meal per month. The recommended limit allows a 3.7 fold margin of safety below the LOAEL for combined consumption of Steinhagen white bass and largemouth bass and freshwater drum from the five areas of concern and allows an 4.9 fold margin of safety below the LOAEL for consumers of Caddo Lake fish. Travelling fishers and fishers of the other lakes may have a larger margin of safety below the LOAEL, based on the data provided. These consumption limits and risk estimates are based on the average level of mercury found in largemouth bass and freshwater drum from the area of highest contamination. It is possible that an individual could catch several fish with higher mercury levels, thus resulting in higher exposure.

CONCLUSIONS AND RECOMMENDATIONS

Combined consumption of largemouth bass and freshwater drum should be limited to two meals per month from Toledo Bend, Steinhagen Reservoir, Sam Rayburn Reservoir, Caddo Lake and Cypress Creek.

Additionally, consumption of white bass from Steinhagen Reservoir should be limited to one meal per month.

Actual mercury exposure may be higher or lower than the maximum allowable level due to natural variation in fish tissue concentrations (range 0.12-1.65 ppm in largemouth bass and freshwater drum).

Some uncertainty exists over the accuracy of the EPA RfD and the level of exposure associated with the LOAEL.

The aggegrate risk assessment is based on a reasonable maximum scenario of consumption using the average mercury concentration for the most heavily contaminated fish, given the data provided.

REFERENCES

WHO (1990). Environmental Health Criteria; 101: Methylmercury. World Health Organization, Geneva.