



United States Department of the Interior

FISH AND WILDLIFE SERVICE
DIVISION OF ECOLOGICAL SERVICES
1825B VIRGINIA STREET
ANNAPOLIS, MARYLAND 21401

October 17, 1986

Mr. J. Volman
Naval Ordnance Station
Indian Head, Maryland 20640-5000

RE: 5090, Ser 04C/106
Sampling Fish and Shellfish For
Heavy Metals

Dear Mr. Volman:

We apologize for the delay of our reply, but in the interim we have talked to Mr. Tommy Woo of your staff. As you may be aware, we are conducting a study on the effects of point source discharges from Indian Head on aquatic resources in Mattawoman Creek. We have provided preliminary results of contaminant body burdens from organisms collected at both the Indian Head facility and an upstream control.

The data have not been rigorously analyzed yet but it is most apparent that mercury accumulation in aquatic resources near Indian Head is not posing a human health problem. The Food and Drug Administrations (FDA) action level (that contaminant level in food at which FDA will take legal action to remove it from the market) for methyl mercury is 1 part per million (ppm). Our data for fish collected at Indian Head show that the species (channel catfish) with the highest average of 0.058 ppm is several orders of magnitude below the FDA action level. There are two things to keep in mind however:

1. Levels in our samples were total mercury and not the highly toxic methyl speciation. Therefore, our values, which include methyl mercury and all other forms, are higher and represent a conservative approach.
2. Our data was based on whole fish, not edible portions, which is the FDA testing requirement. However, most research has shown that equal portions of mercury are found in the edible portion and the remaining carcass, so that our data can still serve to determine if there is a methyl mercury problem.

This information should be made available to the State so that they can make a complete assessment of the contaminant problem. We hope our final interpretive report will be available sometime in early 1987.

At this point, however, the State of Maryland, Office of Environmental Programs (OEP) believes a more comprehensive contaminant study is needed. In a letter dated 14 August 1986, which you have provided us, OEP outlined the type of study they thought would determine if any human health risk was present at Indian Head from eating fish or shellfish.

The first aspect is to choose two indigenous finfish to assess metal uptake. OEP states the species should be selected based on abundance in the creek, feeding habits, size, and bioaccumulation potential. Based on our 1985 survey we would recommend using white perch (Morone americana) and the channel catfish (Ictalurus punctatus). Both species are relatively abundant throughout Mattawoman, are commercially and recreationally important, and attain suitable size to have the potential for bioaccumulation of metals. In addition these fish have different food habits, white perch being carnivorous feeders in open water (pelagic) while channel catfish are omnivorous feeders on the bottom (demersal).

There are no data on bioaccumulation of methyl mercury in these species. What little data exist in the literature are for brook trout (Salvelinus fontinalis), fathead minnow (Pimephales promelas), and the oyster (Crassostrea virginica), none of which are found in Mattawoman Creek. The bioconcentration values for these species ranged from 12,000X for the brook trout to 63,000X for the fathead minnow. We would anticipate our recommended species would be within this range.

We concur with OEP in that two stations should be established, one at the Indian Head facility and one upstream. The general locations used in our study should probably be satisfactory. The control was located as far upstream as was navigable with a small 16 foot boat, which was about 1/2 mile below the Route 225 bridge. Our other station was located in the vicinity of Marsh Island. We have collected both channel catfish and white perch at these locations. Blue crabs (Callinectes sapidus), the shellfish species OEP recommended, were not sampled for during our study but we do not anticipate a problem collecting them.

OEP has recommended that sampling be conducted in the first year during the spring and fall. We believe this is a good recommendation. The spring sampling should be conducted between April and June, fall sampling between September and November.

Since OEP is interested in human health impacts, only edible portions (including the hepatopancreas in the crab) will be analyzed. FDA specific techniques and protocols for sampling edible tissue are specified in the handbook for the Association of Official Analytical Chemists (AOAC).

The six specific metals to be analyzed, cadmium (Cd), lead (Pb), mercury (Hg), silver (Ag), zinc (Zn), and arsenic (As), are based on previous discharge data. Since FDA only has an action level for Hg, OEP needs to clarify what is to be done with data on the other metals. Will a significant difference between contaminant body burdens at the control and Indian Head constitute a human health risk? It must be understood that there is

some movement of fish, especially white perch and blue crab, along Mattawoman Creek, so data interpretation will be important.

The FDA action level for mercury in seafood is based on only the methyl forms. However, we recommend that total mercury be analyzed, since the analytical techniques are more involved and expensive for methyl mercury. FDA staff has also recommended this as a good screening technique and if total levels are above or near the action level, specific tests for methyl mercury can be used. This is a conservative approach and should be acceptable to OEP.

In conversations with Mr. Woo of your office we understand that this study would be performed under contract. The Annapolis Field Office of the Fish and Wildlife Service would be interested in conducting the study. We have done other contract work for the Navy in the Chesapeake Division, which has dealt with wildlife management plan development. We are doing similar collecting work relative to the Superfund program and also in relation to the Chesapeake Bay Program.

Cost for the study will depend on which lab does the analytical work and how many samples will be collected per station. If your facility has the analytical capability to do metal body burdens in seafood, the costs would be reduced. If not, our Patuxent Wildlife Research Center in Laurel, Maryland, has an excellent facility and could analyze the samples.

We recommend that two composite samples consisting of a minimum of three to a maximum of five individuals, be collected for each species for each station. This would total 12 samples to be analyzed during each sampling period. Our Patuxent lab would charge \$163.50 per sample for the required analysis.

The specified analyses and detection limits are as follows:

- Cd, Graphite Furnace Atomic Absorption Spectroscopy (GFA), 0.05 ppm
- Ag, HGA, 0.01 ppm
- Zn, Flame Absorption Spectroscopy (FA), 0.1 ppm
- As, Hydride Generation Atomic Absorption (AAS), 0.05 ppm
- Hg, Cold Vapor Reduction Atomic Absorption (CV), 0.02 ppm
- Pb, HGA, 0.05 ppm

All these analyses would be total metal expressed on a wet weight basis. The cost of analysis for the first year would be \$3924.00 This includes all sample preparation, sample digestions, and quality assurance/quality control. The other years when only one period will be sampled will cost approximately \$2000.00. The total costs associated with the study are summarized in the following table.

PROPOSED BUDGET FOR BIOACCUMULATION STUDY AT
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

ANALYTICAL COST

<u>1st year</u>	<u>Spring</u>	<u>Fall</u>
white perch	(3-5)* (3-5)	(3-5) (3-5)
channel catfish	(3-5) (3-5)	(3-5) (3-5)
blue crab	(3-5) (3-5)	(3-5) (3-5)
Total Samples	3 + 3	+ 3 + 3 = 12
	12 x \$163.50 = \$1962.00	
<u>2nd year</u>	<u>Only One Sampling Period</u>	
	1/2 x 12 = 6 x \$163.50 = \$981.00	
<u>3rd year</u>	"	= \$981.00
<u>4th year</u>	"	= \$981.00
<u>5th year</u>	"	= \$981.00
	TOTAL COST	\$5886.00

MANPOWER

<u>1st year</u>	Collecting Samples	10 days
	Report Writing	6 days
		16 days at \$265.00 = \$4240.00
<u>2nd year</u>	<u>Only One Sampling Period</u>	
	1/2 x 16 days = 8 days at \$265.00 = \$2120.00	
<u>3rd year</u>	"	= \$2120.00
<u>4th year</u>	"	= \$2120.00
<u>5th year</u>	"	= \$2120.00
	TOTAL MANPOWER COST	\$12,720.00

EQUIPMENT

Special Pre Clean Glass Jars For Samples \$1000.00

TOTAL FIVE-YEAR PROJECT COST \$19,606.00

Numbers in parentheses are number of individuals per composite sample

Please keep in mind that this budget is based on certain assumptions, i.e. that only two composite samples per station will be taken. All dollar figures are 1986 figures and some inflation of this should be expected. For money transferred to the Fish and Wildlife Service, there would be a 15% administrative surcharge. We are willing to discuss any concerns you have. Please feel free to contact Mr. Steven Goodbred of my staff or myself at 301-269-5448.

Thank you for the opportunity to provide these comments.

Sincerely yours,



Glenn Kinsey
Supervisor
Annapolis Field Office