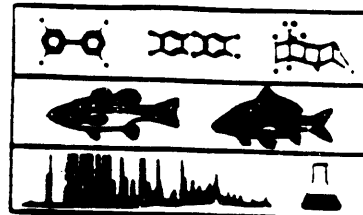




National Study of Chemical Residues In Fish Fact Sheet



What is the study?

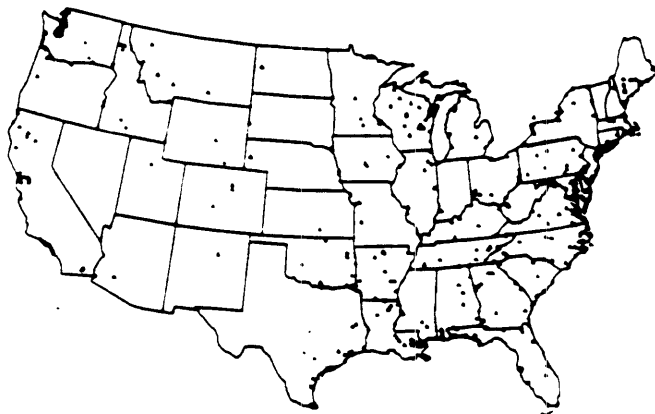
The National Study of Chemical Residues in Fish (NSCRF, formerly the National Bioaccumulation Study, or NBS) is a one-time screening investigation to determine the prevalence and sources of selected bioaccumulative pollutants in fish. Fish samples were collected at 388 sites nationwide (Figure 1, below) and analyzed for 60 pollutants including PCBs, dioxins, furans, and mercury.

The sites sampled included 314 "targeted" sites thought to be influenced by various point and nonpoint pollutant sources. Targeted sites included pulp and paper mills (chlorine and non-chlorine), wood preserving operations, certain refineries, Superfund sites, publicly-owned treatment works (POTWs), sites near industrial complexes, and sites that could be influenced by runoff from urban or agricultural areas. Other sites included 35 background locations and 39 USGS sites to provide national coverage.

Why was the study performed?

The study began in 1986 as an outgrowth of EPA's National Dioxin Study, a nationwide investigation of 2,3,7,8 tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD) contamination of soil, water, sediment, air and fish. Some of the highest concentrations of 2,3,7,8 TCDD were detected in fish. The Agency initiated the National Study of Chemical Residues in Fish to investi-

Figure 1
Location of Bioaccumulation Study
Sampling Sites



gate whether there may be other toxic pollutants bioaccumulating in fish. The NSCRF is also part of EPA's response to a petition from the Environmental Defense Fund (EDF) and the National Wildlife Federation (NWF). This petition requests EPA to conduct an aquatic monitoring survey of the occurrence of dioxins and furans.

Who performed the study?

EPA Regions and State personnel were involved in the selection of sites and sample collection. An EPA Work Group provided continuing review of the study and the final draft was sent to 62 reviewers and seven experts outside EPA for a final round of comments.

The samples were analyzed by the EPA laboratory at Duluth for 60 compounds, including 10 PCBs 15 dioxins/furans, 21 pesticides/herbicides, mercury, biphenyl, and 12 other organic compounds. Chemicals were selected for analysis based on the potential of the compound to bioaccumulate in fish, the potential for human health effects, the persistence of the chemical in the environment, and existence of analytical methods for detecting the compound in fish tissue.

When was the study performed?

The study was initiated in 1986. Fish samples were collected beginning in 1986 and continuing through 1989. Most of the samples were collected in 1987. Laboratory analyses were conducted between 1987 and 1990. States received the data as soon as QA/QC was completed on each sample. The data analyses and report preparation were conducted between 1988 and 1990.

What did the study find?

Of the 60 compounds studied, the most frequently detected pollutant was DDE found at over 98 percent of all sites sampled (Table 1). This compound is a metabolic breakdown product of DDT which was a widely used pesticide and is extremely persistent in the environment. Other compounds detected at more than 90 percent of the sites are mercury, total PCBs and biphenyl. PCBs were detected at the highest concentration with a maximum value of 124,000 parts per billion (ppb), and an average concentration of 1,890 ppb.

Seven of the 15 dioxin/furan compounds and 15 of the other 45 compounds were detected at over 50 percent

of the sites. The two most frequently detected dioxin and furan compounds were both found at 89 percent of the sites. The dioxin compound considered to be the most toxic, 2,3,7,8 TCDD, was found at 70 percent of the sites at a maximum concentration of 204 parts per trillion (ppt) and an average concentration of 6.8 ppt.

Statistical analyses of various source categories show that pulp and paper mills using chlorine appear to be the dominant (statistically significant) source category of 2,3,7,8 TCDD and 2,3,7,8 TCDF found in fish tissue. For the other dioxins/furans, the statistical correlation tests showed no dominant source category. Based on a simple comparison of median fish tissue concentrations, however, highest concentrations for penta-furans occurred near Superfund sites, highest for hexa-furans occurred near refinery/other industry sites, and highest for penta- and hexa-dioxins occurred near paper mills using chlorine. Using the same statistical correlation tests as for dioxins/furans, no single dominant source category was identified for the other 45 chemicals. However, a number of observations can be drawn from the data. For example, while the median PCB concentration was below detection at the 20 background sites where PCBs were sampled, PCB values ranged from 213 to 525 ppb for industrial urban sites, paper mills using chlorine, refinery/other industry sites, non-chlorine paper mills and Superfund sites.

Cancer risks were estimated for 106 targeted and 4 background sites having fillet data. Using EPA assumptions (i.e., upper-bound cancer potency factors, 6.5 grams/day consumption rate), PCBs are the only chemical to exceed a health risk at one in a thousand (Table 2). The cancer risk exceeded the 10^{-4} risk level (one in ten thousand) at 42 sites for PCBs and at 6 sites for dieldrin. PCB use was restricted in 1982 and dieldrin use was banned in 1985. Risks for dioxins and furans were not estimated because of the ongoing dioxin risk assessment.

What do the results mean to us?

EPA projects upper bound cancer risks to exceed one in ten thousand at 46 sites where fish are contaminated by high levels of PCBs and/or dieldrin. Three of these sites had risks above this level for more than one of these compounds. States have adopted fish bans or advisories at 41 of the 46 sites where consumption of fish could be a human health problem. Additional monitoring at the remaining 5 sites has not indicated the need for advisories to date.

General Questions and Answers

- Has EPA provided outside review of the report and peer review of the site selection process and analytical methods?

Sites were selected by EPA regional or state staff based on proximity to point/nonpoint sources. Many of the sites were targeted because of known dioxin contamination.

The NSCRF report was sent to 62 agency personnel and seven experts outside of the Agency for review. We believe that technical comments have been addressed. Analytical methods were developed by EPA's Duluth Lab and reviewed by national experts at Wright State University and Columbia Research Laboratory and found to be adequate for purposes of this study.

- Has EPA proposed stringent enough follow-up actions?

Steps EPA will take for PCBs and dieldrin are outlined below. In all cases, States are in the best position to address site-specific problems and EPA will continue to help them do so.

- Have states been provided with sufficient time to review the report prior to its public release?

States have had access to fish contamination data for several years. Additionally, the states will be provided advance copies of the report.

What should EPA do next?

Measures are being taken by EPA to protect human health and affected aquatic ecosystems. Such work includes:

- Formation of a Task Force to develop a federal action plan to assist states in monitoring fish and developing advisories.
- Adoption of water quality standards by states for pollutants of concern and approval/disapproval by EPA.
- Establishment of a national protocol for a consistent risk-based approach for issuing advisories.
- Development of EPA's sediment management strategy to prevent and remediate this source of fish contamination.
- Development of pollution prevention and control strategies for point and nonpoint sources of these pollutants.

Study Limitations

The risks presented in this report represent a national screening assessment and not a detailed local assessment of risks to specific populations. Such detailed risk assessments would consider the number of people exposed and incorporate local consumption rates and patterns. Furthermore, a detailed assessment would require a greater number of fish samples per site than collected for this screening study. Additionally, this study does not address all the bioaccumulative pollutants that may be present in surface waters.