As of 8-17-99, EPA (Jim Colbert and Dave Monroe) is still reviewing the application of a Cooking Reduction Factor in the quantification of risk at the MRP15 site. Based upon an 8-13-99 discussion with Alcoa, the EPA will receive additional information that Alcoa has used to determine that a CRF is applicable.
Reference List


Author. The primary source of dioxins (PCDDs), dibenzofurans (PCDFs) and coplanar PCBs for the general population is food, especially meat, fish, and dairy products. However, most data on the levels of these chemicals is from food in the raw or uncooked state. We report here the effect of one type of cooking (broiling) on the levels of PCDDs, PCDFs, and coplanar PCBs in ground beef (hamburger), bacon and catfish. Samples of hamburger, bacon, and catfish were broiled and compared to uncooked samples in order to measure changes in the amounts of dioxins in cooked food. The total amount of PCDD, PCDF, and coplanar PCB TEQ decreased by approximately 50% on average for each portion as a result of broiling the hamburger, bacon and catfish specimens. The mean concentration (pg TEQ/kg, wet weight) of PCDDs, PCDFs, and coplanar PCBs, however, remained the same in the hamburger, increased by 83% in the bacon, and decreased by 34% in the catfish. On average, the total measured concentration (pg/kg) of the congeners of PCDDs, PCDFs, and coplanar PCBs increased 14% in the hamburger, increased 29% in the bacon, and decreased 33% in the catfish.


Author. A significant factor in estimating human intake of polychlorinated biphenyls (PCBs) from fish consumption is the loss of PCBs during cooking. The total amount of PCBs actually consumed in the cooked fish may be significantly lower than the PCB level present before cooking because lipids and lipophilic compounds like PCBs tend to be removed from the fish during cooking. Several studies investigating the extent of loss of PCB compounds during the cooking process have been published in the peer-reviewed literature. However, because of what is perceived as inconsistent and inadequate data on the removal of these compounds, federal and state regulators typically do not assume that cooking reduces contaminant levels (EPA, 1990; 1991). In this paper, an attempt was made to reduce the uncertainty in the findings of these studies on PCB losses
during the cooking process. This was accomplished by (1) eliminating studies that lacked statistical power to determine the degree of reduction, (2) reporting all of the results in a common format, and (3) characterizing studies by cooking method. In addition, the studies that reported increases in PCB concentration after cooking were carefully reviewed to provide a possible explanation of this occurrence. Based upon this analysis, it was concluded that cooking processes such as baking, broiling, microwave cooking, poaching, and roasting remove approximately 20 to 30% of the PCBs. Frying appears to remove more than 50%. PCB cooking losses also appears to be a function of the initial lipid concentration in the fish. Based upon this analysis, it is clear that the information from these studies do provide a reasonable basis for federal and state regulators to permit a quantitative adjust of PCB intakes.


Author. Similar levels of polychlorinated biphenyls (PCBs), pesticides, and fat were found in 20 correlated uncooked and cooked (baked) bluefish fillets. Fillets averaged 2.5 ppm PCBs as Aroclor 1254 (whole basis) before cooking; after cooking, with the oil drippings and skin discarded, the average PCB level was 2.7 ppm. Although PCBs, lipophilic pesticides, and fat were lost along with oil drippings and skin that were discarded after cooking, the moisture loss in the fillets during cooking compensated for these weight losses almost completely. After the fillets were cooked and the oil drippings and skin were discarded, the PCB content of the fillets was 27% lower on the average.


Author. Chemical contaminants in fish can be an important source of human exposure to chemicals. Assessments of the fish consumption pathway need to adjust the concentrations of the chemical to account for reductions in 1,1-bis(4-chlorophenyl)-2,2-dichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE), and dichlorodiphenyltrichloroethane (DDT) (herein collectively referred to as total DDT or tDDT) and polychlorinated biphenyls (PCBs) that can occur during cooking. The results of this analysis indicate that baking, frying, broiling, boiling, smoking, and microwaving all effectively reduce the concentrations of tDDT and PCBs in fish tissue. Average reductions in tDDT ranged from 16 to 55% depending on the cooking method. Similar
reductions in PCBs ranged from 26 to 68%. An evaluation of the factors influencing the degree of cooking loss indicated that neither initial chemical mass in the raw fillet, fillet lipid content, nor skin removal were significant predictors of the percent reduction in tDDT or PCB.


Author. This chapter presents information on the levels of environmental contaminants found in recent market basket surveys as well as the effect of processing and cooking on the reduction of these contaminants. Although consumers have expressed concern over the level of environmental contaminants in the food supply, market basket surveys involving over 8,000 analyses of foods ready-to-eat, found measurable amounts (ppb levels) of PCBs in only 24 foods. Processing/cooking has been shown to reduce PCBs by 20-100%. Although PBBs got into the food chain as the result of one incredible accident and thus are not expected to be found in foods today, cooking/processing was also effective in reducing PBBs. Dioxins are the result of combustion processes and chemical manufacturing processes. TCDD levels found in Great Lakes fish were in the low part per trillion level. Again, cooking and processing resulted in substantially less TCDD in fish as eaten.