

APPENDIX S

Median International Standards

Median International Standards

In 1982, the Food and Agricultural Organization (FAO) of the United Nations conducted a survey of standards and legal limits for metals including mercury, pesticides, and other contaminants in fishery products. This was in response to frequent inquiries from institutions and companies active in international commerce that found it difficult finding such information.

The FAO surveyed nations that were members of the FAO as well as those who were not. Most nations cooperated with the survey and, in certain other cases, the standards were drawn from other sources. The FAO took all of the responses and presented them in a report entitled "Compilation of Legal Limits for Hazardous Substances in Fish and Fishery Products" (Nauen 1983). Most of the limits were presented in a standard format and in standard units of fresh or live weight. Exceptions are clearly noted.

Nearly all of the standards for pesticides were from the United States (FDA standards). However, with the exception of mercury, the United States has no standards for trace metals in fishery products. It is this very lack of standards that makes interpretation of some of the SMWP findings difficult.

Table S-1 summarizes the standards and guidelines for metals from the FAO report. The table notes whether the standards are for freshwater fish, marine fish, shellfish, or a combination of these. When more than one standard was listed by the FAO report, those values closest to a standard for fresh weight, edible portion were chosen. Exceptions are clearly noted in the table. Standards for each element are arranged in ascending order. The country of origin and the approximate date of adoption are also noted.

As can be seen in Table S-1, some of the standards are not truly for edible portion, fresh weight. For example, some standards refer to canned products or protein. In the case of India, the standards are on a dry weight basis. If the Indian standards were stated in fresh weight terms, they would be approximately one fifth or one sixth of the stated standard.

Table S-1 has many striking features. One feature is that most of the standards are surprisingly similar. Another feature is the large number of countries that have standards for metals. Also, although many of these countries are less developed nations, the standards adopted by these nations do not differ from those of the more developed nations.

The standards were not summarized for mercury because there is a USFDA standard of 1.0 ppm for methyl mercury in the edible portions of fish and shellfish. This was, incidentally, the highest limit set by any nation in the FAO study. The great majority of nations have set a mercury standard of 0.5 ppm.

Median International Standards presented in Table 4 were calculated from the standards listed in Table S-1. The median standard was chosen for use for several reasons. The median is less influenced than the mean by outliers in the data. Also, direct comparisons of standards for fresh versus canned versus dry can be misleading. By using median standards, these misleading comparisons can be more easily avoided. In most cases, the Median International Standard is actually a standard set by one or more nations rather than an average value not actually set by any country. The median was calculated as follows. All standards or guidelines (with the exception of the Indian standards which are based on dry weight) were considered to be more-or-less equivalent. For the purposes of calculating the median, the Indian standards were divided by five. The median was calculated as the middle value of all of the standards (e.g., the fourth of seven values

arranged in ascending order). In a few cases, the number of standards was even. In this event, the two mid-values were averaged (most were not different). None of the adjusted dry-weight standards from India ended up as a median or as part of a mid-value pair.

For obvious reasons, the Median International Standards can only be used to provide a general idea of what other nations have chosen to use as a standard. The range of all values is listed in Table 4 as a reminder of this. However, with the lack of American standards, Median International Standards can provide a guidepost for those responsible for interpreting trace metal findings in fish and shellfish tissue.

TABLE S-1

International Standards for Trace Elements in Fish and Molluscs

Element	Standard	Freshwater Fish	Marine Fish	Molluscs/ Shellfish	Country	Approximate Date of Adoption
Antimony	1.0 ppm	x	x	x	Hong Kong	1983
	1.0 ppm	x	x	x	New Zealand	1971
	1.5 ppm	x	x	x	Australia	1982
Arsenic	0.1 ppm	x	x	x	Venezuela	-
	1.0 ppm	x	x	x	Chile	-
	1.0 ppm	d	d	x	India	-
	1.0 ppm	x	x	x	New Zealand	1971
	1.0 ppm	e	e	e	United Kingdom	1959
	1.4 ppm	x			Hong Kong	1983
	1.5 ppm	x	x	x	Australia	1982
	1.5 ppm	c	c	c	Thailand	1982
	3.5 ppm	p	p		Canada	1976
	5.0 ppm	x	x	x	Finland	1980
	5.0 ppm	x	x	x	Zambia	1976
Cadmium	0.05 ppm	x	x		Netherlands	-
	0.1 ppm	c	c	c	Switzerland	1982
	0.1 ppm	r	x		Venezuela	-
	0.2 ppm	x	x		Australia	1982
	0.3 ppm	r	r		Finland	-
	0.5 ppm	x			W. Germany	1979
	1.0 ppm	x			Netherlands	-
	1.0 ppm	x	x		New Zealand	1971
	2.0 ppm	x			Australia	1982
	2.0 ppm	x	x	x	Hong Kong	1983
Chromium	1.0 ppm	x	x	x	Hong Kong	1983
Copper	10.0 ppm	x	x	x	Chile	-
	10.0 ppm	d	d		India	-
	10.0 ppm	x	x		Venezuela	-
	20.0 ppm	c	c	c	Thailand	1982
	20.0 ppm	g	g	g	United Kingdom	1956
	30.0 ppm	x	x	x	Australia	1982
	30.0 ppm	x	x	x	New Zealand	1971
	100.0 ppm	x	x		Zambia	1976
Fluoride	150.0 ppm	p	p		Canada	1979
Fluorine	10.0 ppm	x	x		New Zealand	1971
	25.0 ppm	x	x		Zambia	1976

p - in protein
e - except where natural levels are higher
c - in metal containers

g - recommended guideline
d - dry weight basis
r - revised limit (proposed)

TABLE S-1 (continued)

International Standards for Trace Elements in Fish and Molluscs

Element	Standard	Freshwater Fish	Marine Fish	Molluscs/ Shellfish	Country	Approximate Date of Adoption
Lead	0.5 ppm	p	p		Canada	1979
	0.5 ppm	x			W. Germany	1979
	0.5 ppm	x	x		Netherlands	-
	1.0 ppm	x	x	x	Sweden	1979
	1.0 ppm	c	c	c	Switzerland	1982
	1.0 ppm	c	c	c	Thailand	1982
	2.0 ppm	x	x		Australia	1982
	2.0 ppm	x	x	x	Chile	1982
	2.0 ppm	x			Finland	1980
	2.0 ppm	x			Italy	1978
	2.0 ppm	x			Netherlands	-
	2.0 ppm	x	x		New Zealand	-
	2.0 ppm	l	l		Sweden	1979
	2.0 ppm	x	x		United Kingdom	1980
	2.0 ppm	x	x		Venezuela	-
	2.5 ppm	x			Australia	1982
	5.0 ppm	d	d		India	-
6.0 ppm	x	x	x	Hong Kong	1983	
10.0 ppm	x	x		Zambia	1976	
Mercury	International Standards for Mercury range from 0.1 ppm to 1.0 ppm. Twenty-eight countries have established standards for Mercury. The U. S. Food and Drug Administration has set an action level of 1.0 ppm in the edible portion of fish and molluscs. The median international standard is 0.5 ppm.					
Selenium	0.3 ppm	x	x	x	Chile	1982
	2.0 ppm	x	x		Australia	1982
	2.0 ppm	x	x		New Zealand	1971
Tin	50.0 ppm	x	x		Australia	1982
	100.0 ppm	x	x		Venezuela	-
	150.0 ppm	c	c	c	Finland	1979
	150.0 ppm	x	x		New Zealand	1977
	230.0 ppm	x	x	x	Hong Kong	1983
	250.0 ppm	d	d		India	-
	250.0 ppm	x	x		Thailand	1982
250.0 ppm	g,c	g,c	g,c	United Kingdom	1973	
Zinc	40.0 ppm	x	x	x	Australia	1982
	40.0 ppm	x	x		New Zealand	1971
	50.0 ppm	d	d		India	-
	50.0 ppm	g	g		United Kingdom	1953
	100.0 ppm	x	x	x	Chile	1982
	100.0 ppm	x	x		Zambia	1976

p - in protein
e - except where natural levels are higher
c - in metal containers
l - in liver

g - recommended guideline
d - dry weight basis
r - revised limit (proposed)