

Food and Drug Administration Pesticide Program



Residue Monitoring 1998

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This is the twelfth annual report summarizing the results of the Food and Drug Administration's (FDA) pesticide residue monitoring program. Eight of the eleven previous reports were published in the *Journal of the Association of Official Analytical Chemists/Journal of AOAC International*; these presented results from Fiscal Years (FY) 1987 through 1994. Results from FY 1995 through FY 1997 were published on FDA's World Wide Web site. This current report includes findings obtained during FY 1998 (October 1, 1998-1 through September 30, 1998) under regulatory and incidence/level monitoring. Selected Total Diet Study findings for 1998 are also presented. Results in this and earlier reports continue to demonstrate that levels of pesticide residues in the U.S. food supply are well below established safety standards.

FDA Monitoring Program

Three federal government agencies share responsibility for the regulation of pesticides. The Environmental Protection Agency (EPA) registers (i.e., approves) the use of pesticides and sets tolerances (the maximum amount of a residue that is permitted in or on a food) if use of that particular pesticide may result in residues in or on food (1). Except for meat, poultry, and certain egg products, for which the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA) is responsible, FDA is charged with enforcing tolerances in imported foods and in domestically produced foods shipped in interstate commerce. FDA also acquires incidence/level data on particular commodity/pesticide combinations and carries out its market basket survey, the Total Diet Study. Since 1991, USDA's Agricultural Marketing Service (AMS), through contracts with participating states, has carried out a residue testing program directed at raw agricultural products and various processed foods. FSIS and AMS report their pesticide residue data independently.

Regulatory Monitoring

Under this approach to pesticide residue monitoring, FDA samples individual lots of domestically produced and imported foods and analyzes them for pesticide residues to enforce the tolerances set by EPA. Domestic samples are collected as close as possible to the point of production in the distribution system; import samples are collected at the point of entry into U.S. commerce. Emphasis is on the raw agricultural product, which is analyzed as the unwashed, whole (unpeeled), raw commodity. Processed foods are also included. If illegal residues (above EPA tolerance or no tolerance for that particular food/pesticide combination) are found in domestic samples, FDA can invoke various sanctions, such as a seizure or injunction. For imports, shipments may be stopped at the port of entry when illegal residues are found. "Detention without physical examination" (previously called automatic detention) may be invoked for imports based on the finding of one violative shipment if there is reason to believe that the same situation will exist in future lots during the same shipping season for a specific shipper, grower, geographic area, or country.

Domestic and import food samples collected are classified as either "surveillance" or "compliance." Most samples collected by FDA are the surveillance type; that is, there is no prior knowledge or evidence that a specific food shipment contains illegal pesticide residues. Compliance samples are taken as follow-up to the finding of an illegal residue or when other evidence indicates that a pesticide residue problem may exist.

Factors considered by FDA in planning the types and numbers of samples to collect include review of recently generated state and FDA residue data, regional intelligence on pesticide use, dietary importance of the food, information on the amount of domestic food that enters interstate commerce and of imported food, chemical characteristics and toxicity of the pesticide, and production volume/pesticide usage patterns.

Analytical Methods

To analyze the large numbers of samples whose pesticide treatment history is usually unknown, FDA uses analytical methods capable of simultaneously determining a number of pesticide residues. These multiresidue methods (MRMs) can determine about half of the approximately 400 pesticides with EPA tolerances, and many others that have no tolerances. The most commonly used MRMs can also detect many metabolites, impurities, and alteration products of pesticides (2).

Single residue methods (SRMs) or selective MRMs are used to determine some pesticide residues in foods (2). An SRM usually determines one pesticide; a selective MRM measures a relatively small number of chemically related pesticides. These types of methods are usually more resource-intensive per residue. Therefore, they are much less cost effective than MRMs.

The lower limit of residue measurement in FDA's determination of a specific pesticide is usually well below tolerance levels, which generally range from 0.1 to 50 parts per million (ppm). Residues present at 0.01 ppm and above are usually measurable; however, for individual pesticides, this limit may range from 0.005 to 1 ppm. In this report, the term "trace" is used to indicate residues detected, but at levels below the limit of quantitation (LOQ).

FDA/State Cooperation

Personnel in FDA field offices interact with their counterparts in many states to increase FDA's effectiveness in pesticide residue monitoring. In many cases, Memoranda of Understanding or more formal Partnership Agreements have been established between FDA and various state agencies. These agreements provide for more efficient monitoring by broadening coverage and eliminating duplication of effort, thereby maximizing federal and state resources allocated for pesticide activities. These arrangements vary from data sharing, joint planning, and state collection of samples for FDA examination, to FDA/State division of collection, analytical, and enforcement follow-up responsibilities for individual commodities or products of particular origin (i.e., imported vs. domestic products).

Animal Feeds

In addition to monitoring foods for human consumption, FDA also samples and analyzes domestic and imported feeds for pesticide residues. FDA's Center for Veterinary Medicine (CVM) directs this portion of the Agency's monitoring via its Feed Contaminants Compliance Program. Although animal feeds containing violative pesticide residues may present a potential hazard to a number of different categories of animals (e.g., laboratory animals, pets, wildlife, etc.), the major focus of CVM's monitoring is on feeds for livestock and poultry, animals that ultimately become, or produce, foods for human consumption.

International Activities

FDA participates in several international agreements in an effort to minimize incidents of violative residues and remove trade barriers. A standing request for information from foreign governments on pesticides used on their food exported to the U.S. exists, a provision of the Pesticide Monitoring Improvements Act.

Under the auspices of the North American Free Trade Agreement (NAFTA), the United States, Mexico, and Canada have established a NAFTA Technical Working Group on Pesticides (TWG). The NAFTA Pesticide TWG now serves as the focal point for all pesticide issues that arise among the three NAFTA countries. The TWG reports directly to the NAFTA Sanitary and Phytosanitary Committee.

One of the major goals of the TWG is to ensure that pesticide registrations and tolerances/maximum residue limits in the three countries are harmonized to the extent practical, while strengthening protection of public health and the environment. A number of projects have been undertaken by the TWG to identify differing residue limits in the NAFTA countries and to determine what steps might be taken to harmonize

the limits. While this is a difficult process, the TWG envisions eventual movement toward a “North America” pesticide registration and tolerance system so that citizens of all three countries can be assured of the safety and legality of foods produced in any one of the NAFTA countries. FDA’s activities on the TWG complement its ongoing bilateral cooperation with its counterparts in Mexico and Canada.

Beyond the North American agreements, FDA continues to collaborate with New Zealand to implement a “residue compliance assurance program.” New Zealand, historically having excellent compliance with U.S. pesticide tolerances, is implementing a plan whereby their government would provide assurances that selected commodities exported to the United States would be in full compliance with U.S. tolerances.

Total Diet Study

The Total Diet Study is the other major element of FDA’s pesticide residue monitoring program (3). In its previous annual pesticide reports, FDA provided Total Diet Study findings for 1987-1997 (4a, 4b). More detailed information, including estimated dietary intakes of pesticide residues covering June 1984-April 1986 (5) and July 1986-April 1991 (6), has been published. In September 1991, FDA implemented revisions to the Total Diet Study that were formulated in 1990 (7). These revisions primarily consisted of collection and analysis of an updated and expanded number of food items, addition of six age/sex groups (for a total of 14), and revised analytical coverage. Details of that revision are published (8, 9).

In conducting the Total Diet Study, FDA personnel purchase foods from supermarkets or grocery stores four times per year, once from each of four geographic regions of the country. The 261 foods that comprise each market basket represent over 3500 different foods reported in USDA food consumption surveys; for example, apple pie represents all fruit pies and fruit pastries. Each collection is a composite of like foods purchased in three cities in a given region. The foods are prepared table-ready and then analyzed for pesticide residues (as well as radionuclides, industrial chemicals, toxic elements, trace and macro elements, vitamin B6, and folic acid). The levels of pesticides found are used in conjunction with USDA food consumption data to estimate the dietary intakes of the pesticide residues.

Results and Discussion

Regulatory Monitoring

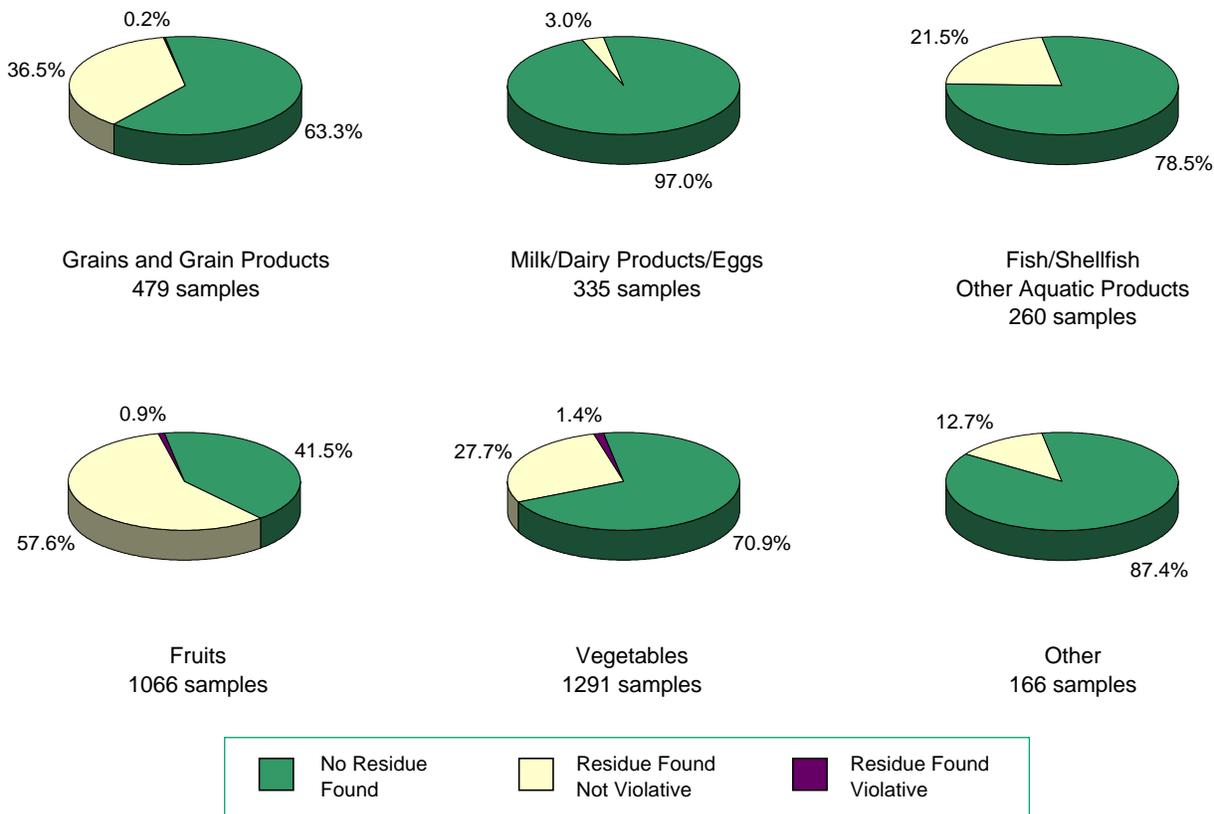
In 1998, 8594 samples (7457 surveillance and 1137 compliance) were analyzed under regulatory monitoring. Of these, 3625 were domestic and 4969 were imports.

Figure 1 shows the percentage of the 3597 domestic surveillance samples by commodity group with no residues found, nonviolative residues found, and violative residues found. (A violative residue is defined in this report as a residue which exceeds a tolerance or a residue at a level of regulatory significance for which no tolerance has been established in the sampled food.)

As in earlier years, fruits and vegetables accounted for the largest proportion of the commodities analyzed in 1998; those two commodity groups comprised 65.5% of the total number of domestic surveillance samples. In 1998, no violative residues were found in 99.2% of all domestic surveillance samples (99.1% in 1996, 98.8% in 1997).

Appendix A contains more detailed data on domestic surveillance monitoring findings by commodity, including the total number of samples analyzed, the percent samples with no residues found, and the percent violative samples. Of the 3597 domestic surveillance samples, 64.9% had no detectable residues and 0.8% had violative residues. In the largest commodity groups, fruits and vegetables, 41.5% and 70.9% of the samples, respectively, had no residues detected. 0.9% of the fruit samples and 1.4% of the vegetable samples contained violative residues (Figure 1). In the milk/dairy products/eggs group, 97.0%

Figure 1. Summary of Results of Domestic Surveillance Samples by Commodity



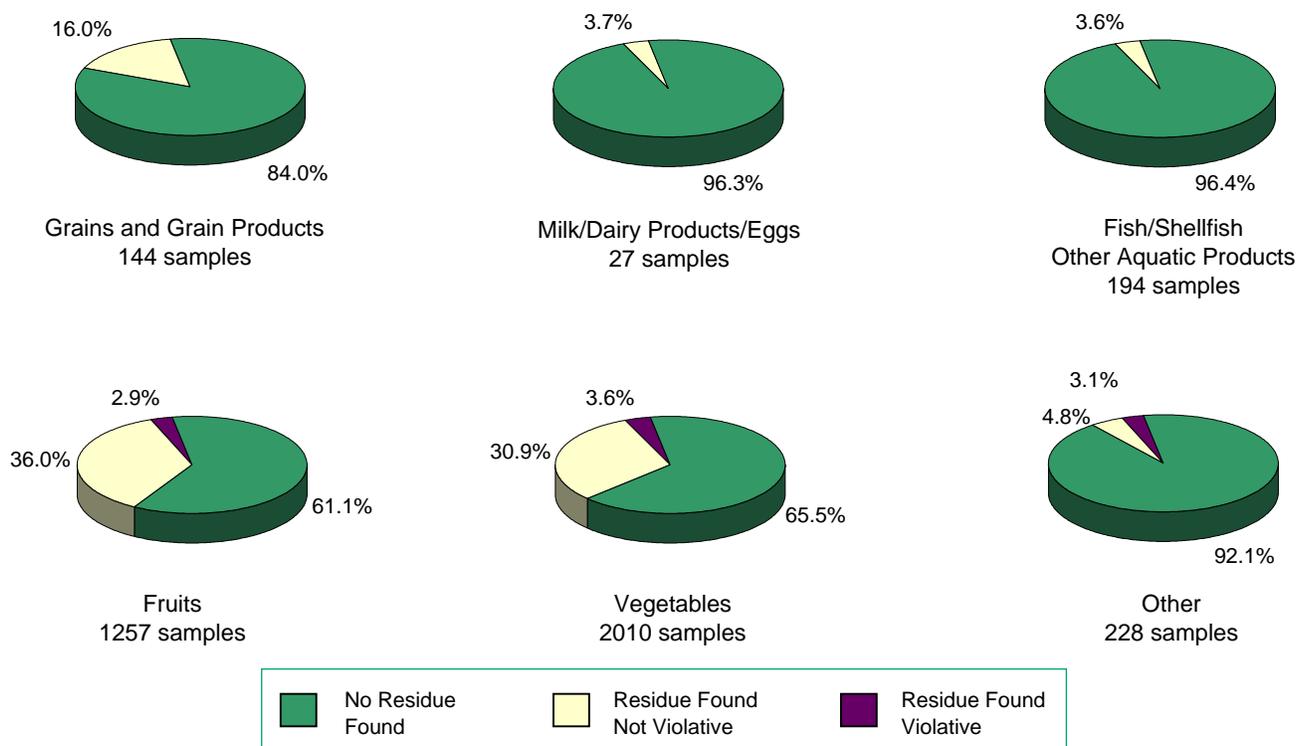
of the samples had no residues detected, and no violative residues were found. Eighty-eight samples of baby foods or formula were analyzed (see category Other) these included 34 vegetables, 32 fruits and juices, 18 cereals, and four samples of formula. None of the samples had violative residues.

Findings by commodity group for the 3860 import surveillance samples are shown in Figure 2. Fruits and vegetables accounted for 84.6% of these samples. Overall, no violative residues were found in 97.0% of the import surveillance samples (97.4% in 1996, 98.4% in 1997).

Appendix B contains detailed data on the import surveillance samples. Of the 3860 samples analyzed, 68.1% had no residues detected, and 3.0% had violative residues. Fruits and vegetables had 61.1 and 65.5%, respectively, with no residues detected. The fruit group and the vegetable group had 2.9 and 3.6%, respectively, with violative residues. No residues were found in 96.3% of the dairy products/eggs group and 96.4% of the fish/shellfish group, and no violative residues were found in either of those groups.

Pesticide monitoring data collected under FDA's regulatory monitoring approach in 1998 are available to the public as a text file suitable for import into computer database or spreadsheet software. These data summarize FDA 1998 regulatory monitoring coverage and findings by country/commodity/pesticide combination. Monitoring data by individual sample from which the summary information was compiled are also available. Information on how to obtain these files, as well as databases for 1992–1997 is provided at the end of this report.

Figure 2. Summary of Results of Import Surveillance Samples by Commodity



Geographic Coverage

Domestic. In 1998, the 3597 domestic surveillance samples were collected from 48 states (no samples were collected from New Hampshire or Vermont) and from Puerto Rico. The largest numbers of samples were collected from those states that are the largest producers of fruits and vegetables. Table 1 lists numbers of domestic surveillance samples from each location, in order of descending numbers of samples.

Table 1. Domestic Surveillance Samples Collected and Analyzed, by State^a, in 1998

<u>State</u>	<u># samples</u>						
CA	516	MT	88	SD	27	SC	11
WA	398	TX	87	NJ	26	AK	10
FL	352	AZ	58	MS	25	HI	10
LA	201	OH	47	NM	24	NE	5
ID	195	PA	45	KY	22	CT	2
NY	152	IA	44	AR	20	NV	2
MO	148	MD	40	TN	20	WV	2
OR	145	IN	39	AL	17	ME	1
WI	136	CO	32	WY	17	RI	1
MN	115	KS	31	GA	16		
MI	109	MA	30	NC	16		
IL	108	ND	29	OK	14		
VA	93	UT	28	DE	12		

^aOther domestic samples: Puerto Rico, 31 samples.

Import. Samples representing food shipments from 94 countries were collected. (Origin of some additional samples was unspecified.) Table 2 lists numbers of samples (surveillance and compliance) collected from 43 countries from which more than 10 samples were collected, as well as the names of 51 additional countries from which 10 or fewer samples were collected. Mexico, as usual, was the source of the largest number of samples, reflecting the volume and diversity of commodities imported from that country, especially during the winter months.

Table 2. Foreign Countries and Number of Samples^a Collected and Analyzed in 1998

Mexico	1889	Taiwan, Republic of	44
Chile	361	Peru	40
Netherlands (Holland)	260	New Zealand	35
Canada	224	Philippines	34
Guatemala	175	South Africa	34
China, Peoples Rep.	146	Unspecified	33
Thailand	129	Indonesia	28
Spain (inc. Canary Islands)	127	Pakistan	26
India	107	Egypt	25
Italy	97	Korea, Republic of (South Korea)	25
Dominican Republic	85	Brazil	23
Ecuador	82	Lebanon	23
Turkey	82	Hong Kong	21
Colombia	79	France	20
Argentina	62	Greece	20
Costa Rica	61	Japan	20
Jamaica	61	Poland	20
Viet-Nam, Republic of	50	Nicaragua	17
Australia	49	Panama	14
Israel	49	United Kingdom	12
Belgium	48	Denmark	11
Honduras	48	Germany, Federal Rep	11

Ten or fewer samples collected from the following:

Algeria	French	Mozambique	Sweden
Austria	Polynesia	Namibia (Southwest Africa)	Switzerland
Bahamas	Ghana	Netherlands Antilles	Syria
Bangladesh	Guyana	Nigeria	Tanzania
Barbados	Haiti	Norway	Tonga
Belize	Hungary	Papua New Guinea	Trinidad & Tobago
Bhutan	Ivory Coast	Portugal (inc. Azores, Madeiras)	Tunisia
Bolivia	Kenya	Saudi Arabia	United Arab Emirates
Bulgaria	Korea, Dem. Peoples	Singapore	Uruguay
Congo	Macedonia	Slovenia	U.S. Virgin Islands
Dominica	Malawi	Sri Lanka (Ceylon)	Venezuela
El Salvador	Malaysia	St. Lucia	Western Samoa
Ethiopia	Morocco		Zambia
Fiji			

^a Surveillance plus compliance samples.

Surveillance/Compliance Violation Rate Comparison

In 1998, 28 domestic compliance samples were collected and analyzed (Table 3). Typically, compliance samples are collected when a pesticide residue problem is known or suspected, and so violation rates are expectedly higher than those for surveillance samples: in 1998, a 3.6% violation rate for domestic compliance samples was noted, compared to 0.8% for domestic surveillance samples.

1109 import compliance samples were also collected and analyzed, a large increase from previous years (119 in 1997 and 391 in 1996). This unexpected jump in numbers has caused suspicion about the designation of import samples as "compliance". Several operational changes implemented in 1998 may have caused misidentification of compliance samples, and the subject will be scrutinized by the agency. In the meantime, comparisons of violations between import surveillance and compliance samples are of questionable value and are not included here.

Table 3. Domestic Compliance Samples by Commodity Group in 1998

<u>Commodity Group</u>	<u>Total No. of Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative, %</u>
Grains and Grain Products	3	66.7	0.0
Milk/Dairy Products/Eggs	5	100.0	0.0
Fish/Shellfish/ Other Aquatic Products	4	25.0	0.0
Fruits	7	71.4	0.0
Vegetables	6	66.7	0.0
Other	3	66.7	33.3
Total	28	67.9	3.6

Pesticide Coverage

Table 4 lists the 354 pesticides (some of which represent multiple components) that were detectable by the methods used; each of the 94 pesticides that were actually found is indicated by an asterisk.

FDA conducts ongoing research to expand the pesticide coverage of its monitoring program. This research includes testing the behavior of new or previously untested pesticides through existing analytical methods, and development of new methods to cover pesticides that cannot be determined by methods currently used by FDA. The research encompasses both U.S.-registered pesticides and foreign-use pesticides that are not registered in the United States. The list of pesticides detectable for 1998 (Table 4) reflects the addition of a number of pesticides whose recovery through the analytical methods used was demonstrated as a result of ongoing research.

Table 4. Pesticides Detectable and Found () by Methods Used in 1998 Regulatory Monitoring^{a,b}*

2,4-dichloro-6-nitro benzenamine	bromopropylate	chlorpyrifos*	dinobuton
2-methoxy-3,5,6- trichloropyridine	bromuconazole	chlorpyrifos-methyl*	dinocap
(triclopyr metabolite)	bufenarb*	chlorthiophos	dioxabenzofos
3-chloro-5-methyl-4- nitro-1H-pyrazole	Bulan	clomazone	dioxacarb
4(phenylamino)phenol*	bupirimate*	coumaphos	dioxathion
4-(dichloroacetyl)-1-oxa- 4-azapiro[4.5]decane	butachlor	crotoxyphos	diphenamid
6-benzyladenine	butocarboxim	crufomate	diphenylamine*
acephate*	butralin	cyanazine	disulfoton
acetochlor	butylate	cyanofenphos	diuron
acrinathrin	cadusafos	cyanophos	edifenphos
alachlor	captafol*	cycloate	endosulfan*
aldicarb*	captan*	cycluron	endrin
aldrin	carbaryl*	cyfluthrin	EPN*
allethrin	carbofuran	cymoxanil	esfenvalerate*
allidochlor	carbophenothion	cypermethrin*	etaconazole
alpha-cypermethrin	carbosulfan	cyprazine	ethalfuralin
ametryn	carboxin	cyproconazole	ethiofencarb
aminocarb	carfentrazone ethyl ester	cyprodinil	ethion*
amitraz*	CGA 150829 (triasul- furon metabolite)	DCPA*	ethofumesate
anilazine*	CGA 171683 (primi- sulfuron-methyl metabolite)	DDT*	ethoprop
Aramite	chlorbenside	deltamethrin*	ethoxyquin*
atrazine	chlorbromuron	demeton	ethylenebisdithio= carbamates ^d
azinphos-ethyl	chlorbufam	di-allate	etridiazole
azinphos-methyl*	chlordan*	dialifor	etrimfos
bendiocarb	chlordecone	diazinon*	famphur
benfluralin	chlordimeform	dichlobenil	fenamiphos
benodanil	chlorthoxyfos	dichlofenthion	fenarimol*
benomyl/carbendazim ^c	chlorfenapyr*	dichlofluanid	fenbuconazole
benoxacor	chlorfenvinphos*	dichlone	fenfuram
bensulide	chlorflurecol methyl ester	dichlorvos	fenitrothion
benzoylprop-ethyl	chlorimuron ethyl ester	diclobutrazol	fenobucarb
BHC*	chlornitrofen	diclofop-methyl	fenoxaprop ethyl ester
bifenoxy	chlorobenzilate	dicloran*	fenoxycarb
bifenthrin*	chloroneb	dicofol*	fenpropathrin*
binapacryl	chloropropylate	dicrotophos	fenpropimorph
bitertanol*	chlorothalonil*	dieldrin*	fenson
bromacil	chloroxuron	diethatyl-ethyl	fensulfothion
bromophos	chlorpropham*	Dilan	fenthion*
bromophos-ethyl		dimethachlor	fenvalerate*
		dimethametryn	fipronil
		dimethipin	flamprop-M-isopropyl
		dimethoate*	flamprop-methyl
		dinitramine	

^a The list of pesticides detectable is expressed in terms of the parent pesticide. However, monitoring coverage and findings may have included metabolites, impurities, and alteration products.

^b Some of these pesticides are no longer manufactured or registered for use in the United States.

^c The analytical methodology determines carbendazim, which may result from use of benomyl or carbendazim.

^d Such as maneb.

Table 4 (continued)

fluazifop butyl ester	methiocarb	phosmet*	tecnazene*
fluchloralin	methomyl*	phosphamidon	tefluthrin
flucythrinate	methoprotryne	phosphine*	TEPP
fludioxinil	methoxychlor*	phoxim oxygen analog	terbacil
flusilazole	metobromuron	piperonyl butoxide*	terbufos
fluvalinate	metolachlor	piperophos	terbumeton
FOE 5043 (flufenacet)	metolcarb	pirimicarb	terbuthylazine
folpet*	metribuzin	pirimiphos-ethyl	terbutryn
fonofos	mevinphos*	pirimiphos-methyl*	tetradifon*
formothion	MGK 264*	pretilachlor	tetraiodoethylene
fosthiazate	mirex*	probenazole	tetrasul
fuberidazole	molinate	prochloraz	thiabendazole*
furilazole	monocrotophos*	procymidone*	thiazopyr
Gardona	monolinuron	profenofos*	thiobencarb
heptachlor*	myclobutanil*	profluralin	thiodicarb
heptenophos	N,N-diallyl-dichloro=	Prolan	thiometon
hexachlorobenzene*	acetamide	promecarb	thionazin
hexaconazole	naled	prometryn	thiram
hexazinone	napropamide*	pronamide*	THPI*
hexythiazox	neburon	propachlor	tolyfluanid*
imazalil*	nitralin	propanil	toxaphene
imazamethabenz	nitrapyrin	propargite*	tralomethrin
methyl ester	nitrofen	propazine	traloxydim
iprobenfos	nitrofluorfen	propetamphos	tri-allate*
iprodione*	nitrothal-isopropyl	propham	triadimefon*
iprodione metabolite	norea	propiconazole*	triadimenol*
isomer*	norflurazon	propoxur	triazamate
isazofos	nuarimol	prothiofos*	triazophos
isocarbamid	octhilineone	prothoate	tribufos*
isofenphos	ofurace	pyracarbolid	trichlorfon
isoprocarb	omethoate*	pyrazon	tricyclazole
isopropalin	ovex	pyrazophos	tridiphane
isoprothiolane	oxadiazon	pyrethrins	trietazine
isoxaben	oxadixyl*	pyridaphenthion	triflumizole
isoxaflutole	oxamyl*	pyrimethanil	trifluralin*
lactofen	oxydemeton-methyl	pyriproxyfen	triflusaluron methyl
lambda-cyhalothrin	oxyfluorfen	quinalphos	ester
lenacil	oxythioquinox	quintozene*	trimethacarb
leptophos	paclobutrazol	quizalofop ethyl ester	vamidothion sulfone
lindane*	parathion*	ronnel	vernolate
linuron*	parathion-methyl*	S-bioallethrin	vinclozolin*
malathion*	PB-9 (pyridaben	schradan	XMC
mecarbam	metabolite)	simazine	
mephosfolan	penconazole	simetryn	
merphos	pendimethalin	Strobane	
metalaxyl*	permethrin*	sulfallate	
metaldehyde*	Perthane	sulfotep*	
metasystox thiol	phenothrin	Sulphenone	
metazachlor	phenthoate	sulprofos	
methabenzthiazuron	phenylphenol, ortho-*	TCMTB	
methamidophos*	phorate*	tebuconazole*	
methidathion*	phosalone	tebupirimfos	

Animal Feeds

In FY 1998, 482 domestic and 60 import feed samples were collected for surveillance purposes and analyzed for pesticides by FDA. Of the 482 domestic surveillance samples, 293 (60.8%) contained no detectable pesticide residues and 8 (1.7%) contained residues which exceeded regulatory guidance (Table 5). Of the 60 import surveillance samples, 37 (61.7%) contained no detectable pesticide residues and 3 (5.0%) contained residues which exceeded regulatory guidance.

Table 5. Summary of 1998 Domestic Surveillance Feed Samples

<u>Type of Feed</u>	<u>Total # Samples</u>	<u>Without residues</u>		<u>Exceeding Guidance</u>	
		<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>
Whole/Ground Grains	196	130	66.3	5	2.6
Mixed Feed Rations	99	41	41.4	0	0.0
Plant By-products	89	55	61.8	1	1.1
Animal By-products	72	42	58.3	2	2.8
Hay & Hay Products	26	25	96.2	0	0.0
Total	482	293	60.8	8	1.7

In the 189 domestic surveillance samples of feed in which one or more pesticides were detected, there were 295 residues (208 quantifiable and 87 trace). Malathion, chlorpyrifos-methyl, and diazinon were the most frequently found and accounted for 64.1% of all residues detected (Table 6).

Nine pesticide residues exceeded regulatory guidance in eight domestic samples. Four pesticide residues exceeded a tolerance established by EPA: 2.67 ppm methoxychlor on milo, 0.096 ppm chlorpyrifos on meat meal, 1.40 ppm chlorpropham on animal fat, and 0.157 ppm diazinon on soybeans. Five pesticide residues were found on commodities for which no tolerance or action level as been established by EPA or FDA; three of these were chlorpyrifos-methyl: 0.021 ppm on peas, 0.028 ppm on corn, and 0.074 ppm on rape seed screenings. In addition, 0.037 ppm pirimiphos-methyl was reported on oats and 0.293 ppm lindane on soybeans.

Table 6. Residues Found in Domestic Feeds in 1998

Pesticide	# of Samples with		Range ^b (ppm)	Median ^b (ppm)
	Trace Amount ^a	Quantifiable Levels		
malathion	18	78	0.010–3.180	0.095
chlorpyrifos-methyl	20	43	0.012–0.732	0.052
diazinon	6	24	0.009–0.309	0.033
tribufos (DEF)	2	14	0.010–0.115	0.051
DDE, p,p'-, and DDT, p,p'-	14	2	0.050–0.095	0.073
methoxychlor, p,p'-, and o,p'-	2	10	0.020–2.738	0.082
pirimiphos-methyl	2	9	0.013–3.666	0.490
chlorpyrifos	6	4	0.035–0.280	0.082
ethion	5	5	0.010–0.050	0.028
all others ^c	12	19	0.015–98.60 ^d	0.404

^a Residue found is below that normally quantifiable, but its presence and identity are known.

^b In samples containing quantifiable levels.

^c Four reports each for iprodione and its metabolite, and lindane; two each for dicofol, p,p'-, dieldrin, imazalil, myclobutanil, and parathion; one each for Aroclor 1254, carbaryl, carbophenothion, chlorpropham, DCPA, endosulfan sulfate, ethoxyquin, Gardona, pentachlorophenyl methyl ester, terbufos, thiabendazole, tri-allate, and tributyl phosphate.

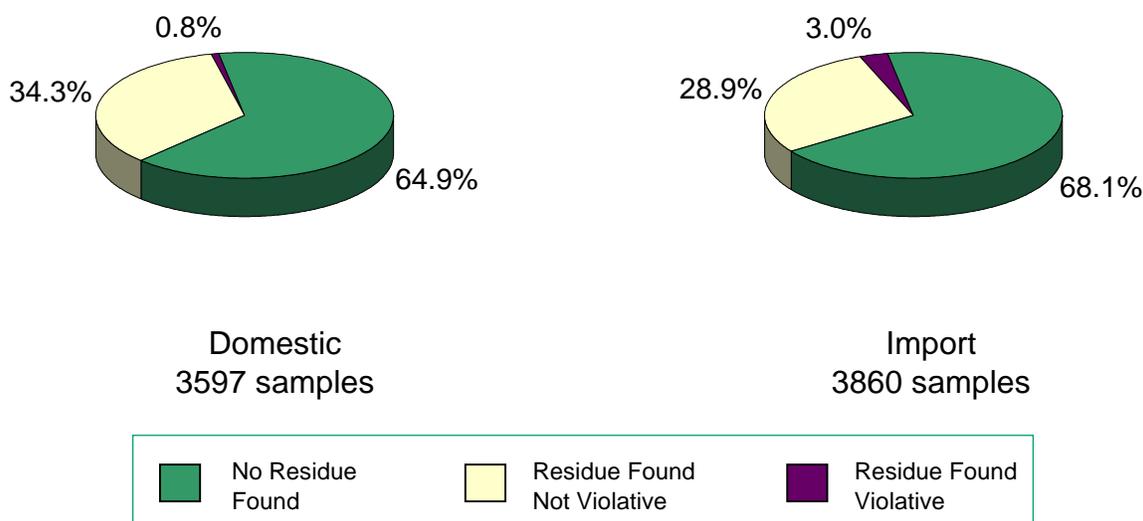
^d Residue of 98.6 ppm was ethoxyquin, which is approved as a plant growth regulator by EPA, with tolerances of up to 3 ppm (40 CFR 180.178). Ethoxyquin is also approved as an anti-oxidant feed additive at levels up to 150 ppm in a finished article (21 CFR 573.380).

Four pesticide residues exceeded regulatory guidance in three import samples from Canada. One sample of fish feed contained 194.0 ppm ethoxyquin, which exceeds all EPA established pesticide tolerances for this compound as well as the 150 ppm tolerance established for it as an anti-oxidant feed additive in a finished article. Three residues on two commodities, for which no EPA tolerances have been established, were also found: 0.016 ppm chlorpyrifos on canola fines, and 0.064 ppm chlorpyrifos and 1.43 ppm malathion on canola meal.

Summary: Regulatory Monitoring

In summary, no residues were found in 64.9% of domestic surveillance and 68.1% of import surveillance samples (Figure 3), analyzed under FDA's regulatory monitoring approach in 1998. Only 0.8% of domestic and 3.0% of import surveillance samples had residue levels that were violative. The findings for 1998 demonstrate that pesticide residue levels in foods are generally well below EPA tolerances, corroborating results presented in earlier reports (4a, 4b). Animal feed samples (482 domestic, 60 import) were analyzed. Over 60% of the domestic surveillance samples and 61.7% of the import surveillance samples contained no residues.

Figure 3. Summary of Results of Domestic vs. Import Surveillance Samples



Total Diet Study

The Total Diet Study (TDS) is distinct from regulatory monitoring in that it determines pesticide residues in foods prepared for consumption (3). Of the nearly 200 chemicals that are validated for the analytical methods used, 104 individual residues were found in the foods analyzed in the four collections reported here (Market Baskets 97-3, 97-4, 98-1 and 98-2). Among these were 54 pesticides, including 14 which represent more than one related compound counted as a "total", 16 volatile organic compounds for which 72 TDS foods (per basket) are examined, and 10 other organic compounds. To measure the low levels of pesticides found in the TDS foods, the analytical methods used are modified to permit measurement at levels 5-10 times lower than those normally used in regulatory monitoring. In general, residues present at or above 1 part per billion can be measured.

Table 7 lists the 18 most frequently found residues (those found in >2% of the samples), the total number of findings, and the percent occurrence in the four market baskets analyzed in 1998 (1035 food items). The five most frequently observed chemicals, DDT, chlorpyrifos-methyl, malathion, endosulfan, and dieldrin, are the same as those observed for the past several years. The levels of these pesticides, as well as the others listed in Table 7, were well below regulatory limits.

Information obtained through the TDS is used to estimate dietary intakes of pesticides; these intakes are then compared with established standards. Food consumption data to be used in estimating dietary intakes for the revised food list have only recently been finalized. Therefore, dietary intake information for the market baskets collected since 1991 will be reported separately.

Table 7. Frequency of Occurrence of Pesticide Residues Found in Total Diet Study Foods in 1998^a

<u>Pesticide^b</u>	<u>Total No. of Findings</u>	<u>Occurrence, %</u>
DDT	217	21
chlorpyrifos-methyl	185	18
malathion	156	15
endosulfan	129	12
dieldrin	107	10
chlorpyrifos	89	9
iprodione	53	5
chlorpropham	49	5
permethrin	49	5
carbaryl ^c	41	4
thiabendazole ^d	37	4
methamidophos	33	3
acephate	29	3
dicloran	26	3
BHC, alpha+beta+delta	24	2
dimethoate	23	2
pirimiphos-methyl	21	2
toxaphene	21	2

^a Based on 4 market baskets analyzed in FY 1998 consisting of 1035 items. Only those found in >2% of the samples are shown.

^b Isomers, metabolites, and related compounds are not listed separately; they are covered under the “parent” pesticide from which they arise.

^c Reflects overall incidence; however only 94-96 selected foods per market basket (i.e., 378 items total) were analyzed for N-methylcarbamates

^d Reflects overall incidence; however only 65-67 selected foods per market basket (i.e., 263 items total) were analyzed for the benzimidazole fungicides thiabendazole and benomyl.

For several years, FDA has collected and analyzed a number of baby foods in addition to those covered under TDS. This adjunct to TDS included 20-21 different food items in the four baskets represented here (12 fruit juices or fruits, 4 fruit desserts, 4 grain products, and 1 vegetable). Table 8 lists the 22 pesticide residues found in four collections of these foods (83 total samples) in 1998, the percentage occurrence, and ranges of levels found.

Table 8. Frequency of Occurrence and Range of Levels of Pesticide Residues Found in Selected Baby Foods in 1998^a

<u>Pesticide^b</u>	<u>Total No. of Findings</u>	<u>Occurrence, %</u>	<u>Range, ppm</u>
chlorpyrifos	16	19	0.0004-0.005
endosulfan	14	17	0.0004-0.0046
chlorpyrifos-methyl	10	12	0.001-0.018
iprodione	9	11	0.001-0.038
malathion	8	10	0.003-0.023
dimethoate	5	6	0.001-0.005
permethrin	5	6	0.0017-0.023
carbaryl ^c	3	4	0.004-0.008
propiconazole	3	4	0.023-0.048
thiabendazole ^d	3	4	0.078-0.338
dieldrin	2	2	0.0005-0.001
ethylenethiourea ^e	2	2	0.003-0.007
azinphos-methyl	1	1	0.007
benomyl ^d	1	1	0.035
DDT	1	1	0.0004
dicofol	1	1	0.007
fenvalerate	1	1	0.005
hexachlorobenzene	1	1	0.001
methoxychlor	1	1	0.001
parathion methyl	1	1	0.004
phosmet	1	1	0.012
toxaphene	1	1	0.013

^a Based on 4 collections analyzed in FY 1998 consisting of 83 items.

^b Isomers, metabolites, and related compounds are not listed separately; they are covered under the "parent" pesticide from which they arise.

^c Reflects overall incidence; however only 14-15 selected foods per survey (i.e., 59 items total) were analyzed for N-methylcarbamates.

^d Reflects overall incidence; however only 14 selected foods per survey (i.e., 56 items total) were analyzed for the benzimidazole fungicides (thiabendazole and benomyl).

^e Reflects overall incidence; however only 12-13 selected foods per survey (i.e., 51 items total) were analyzed for ethylenethiourea.

Summary: Total Diet Study

In 1998, the types of pesticide residues found and their frequency of occurrence in TDS were generally consistent with those given in previous FDA reports (4a, 4b). The pesticide residue levels found were well below regulatory standards. An adjunct survey of baby foods in 1991-1998 also provided evidence of only small amounts of pesticide residues in those foods.

Summary

A total of 8594 samples of domestically produced food and imported food from 94 countries was analyzed for pesticide residues in 1998. Of these, 7457 were surveillance samples, which are collected when there is no evidence of a pesticide problem. No residues were found in 64.9% of domestic surveillance and 68.1% of import surveillance samples.

FDA collected and analyzed animal feed samples (482 domestic, 60 import) for pesticides. 60.8% of the domestic surveillance samples and 61.7% of the import surveillance samples contained no residues.

Most of the Total Diet Study findings for 1998 were generally similar to those found in earlier periods; details of findings will be published separately. An adjunct survey of baby foods in 1991-1998 also provided evidence of only small amounts of pesticide residues in those foods.

This report was compiled through the efforts of the following FDA personnel: Bernadette M. McMahon, Mark S. Wirtz, and Marion Clower, Jr., (Division of Pesticides and Industrial Chemicals), Young H. Lee (Division of Programs and Enforcement Policy), Office of Plant and Dairy Foods and Beverages; Sharon A. Macuci (Division of Information Resources Management), Office of Management Systems, Center for Food Safety and Applied Nutrition, Washington, DC., Randall Lovell, Center for Veterinary Medicine, Rockville, MD, Sheila K. Egan and David Graham, Kansas City District, Lenexa, KS.

Files containing the data from which this report was derived are also available from FDA's World Wide Web site, at <http://www.cfsan.fda.gov>. Databases for 1996 and 1997 are available at the same site, as are reports for 1995-1997. FDA pesticide monitoring data collected under the regulatory monitoring approach in 1992, 1993, 1994, and 1995 are available for purchase on personal computer diskettes from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (telephone 703-487-4650); order numbers are: 1992, PB94-500899; 1993, PB94-501681; 1994, PB95-503132; and 1995, PB96-503156.

References

- (1) Code of Federal Regulations (1996) Title 40, U.S. Government Printing Office, Washington, DC, Parts 180, 185, and 186.
- (2) Pesticide Analytical Manual Volume I (3rd Ed., 1994 and subsequent revisions) and Volume II (1971 and subsequent revisions), Food and Drug Administration, Washington, DC (available from National Technical Information Service, Springfield, VA 22161).
- (3) Pennington, J.A.T., Capar, S.G., Parfitt, C.H., & Edwards, C.W. (1996) History of the Food and Drug Administration's Total Diet Study (Part II), 1987-1993. *J. AOAC Int.* 79, 163-170.
- (4a) Food and Drug Administration (1995) Food and Drug Administration pesticide program - residue monitoring - 1994. *J. AOAC Int.* 78, 117A-143A (and earlier reports in the series).
- (4b) Food and Drug Administration (1996) Food and Drug Administration pesticide program - residue monitoring - 1995, 1996, 1997. Available from FDA's World Wide Web site at <http://www.cfsan.fda.gov>.
- (5) Gunderson, E.L. (1995) Dietary intakes of pesticides, selected elements, and other chemicals: FDA Total Diet Study, June 1984-April 1986. *J. AOAC Int.* 78, 910-921.
- (6) Gunderson, E.L. (1995) FDA Total Diet Study, July 1986-April 1991, dietary intakes of pesticides, selected elements, and other chemicals. *J. AOAC Int.* 78, 1353- 1363.
- (7) Pennington, J.A.T. (1992) Total Diet Studies: the identification of core foods in the United States food supply. *Food Addit. Contam.* 9, 253-264.
- (8) Pennington, J.A.T. (1992) The 1990 revision of the FDA Total Diet Study. *J. Nutr. Educ.* 24, 173-178.
- (9) Pennington, J.A.T. (1992) Appendices for the 1990 revision of the Food and Drug Administration's Total Diet Study. PB92-176239/AS, National Technical Information Service, Springfield, VA 22161.

Appendix A. Analysis of Domestic Surveillance Samples by Commodity Group in 1998

<u>Commodity Group</u>	<u>Total Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative^a, %</u>	<u># over tolerance</u>	<u># no tolerance</u>
A. Grains and Grain Products					
Corn & corn products	45	68.9	0.0		
Oats & oat products	28	92.9	0.0		
Rice & rice products	74	90.5	0.0		
Soybeans & soybean products	26	92.3	0.0		
Wheat & wheat products	235	44.3	0.4	1 ^b	
Other grains & grain products	24	50.0	0.0		
Breakfast cereals	30	90.0	0.0		
Bakery products, crackers, etc.	11	54.5	0.0		
Pasta and noodles	6	100.0	0.0		
Total	479	63.3	0.2		
B. Milk/Dairy Products/Eggs					
Cheese & cheese products	59	94.9	0.0		
Eggs	75	100.0	0.0		
Milk/cream & milk products	201	96.5	0.0		
Total	335	97.0	0.0		
C. Fish/Shellfish/Other Aquatic Products					
Fish and Fish Products	187	73.3	0.0		
Shellfish & Crustaceans	71	91.5	0.0		
Other Aquatic Animals & Products	2	100.0	0.0		
Total	260	78.5	0.0		
D. Fruits					
Blackberries	4	25.0	75.0		3
Blueberries	36	72.2	5.6		2
Cranberries	10	20.0	0.0		
Grapes, raisins	15	60.0	0.0		
Raspberries	8	25.0	0.0		
Strawberries	71	25.4	2.8		2
Other berries	5	80.0	0.0		
Grapefruit	35	14.3	0.0		
Lemons	7	42.9	0.0		
Limes	1	0.0	0.0		
Oranges	119	31.9	0.0		
Other citrus fruit	20	25.0	0.0		

^a Includes samples with residues over tolerance or action level and samples with residues with no tolerance.

^b Residue in sample exceeded an action level rather than a tolerance.

Appendix A. (continued)

<u>Commodity Group</u>	<u>Total Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative^a, %</u>	<u># over tolerance</u>	<u># no tolerance</u>
Apples	219	31.1	0.5		1
Pears	49	44.9	2.0		1
Apricots	9	0.0	0.0		
Avocados	1	100.0	0.0		
Cherries	35	17.1	0.0		
Nectarines	19	21.1	0.0		
Olives	2	100.0	0.0		
Peaches	148	33.1	0.0		
Plums	7	42.9	0.0		
Bananas, plantains	5	100.0	0.0		
Kiwi fruit	4	75.0	25.0		1
Cantaloupe	26	65.4	0.0		
Honeydew	1	0.0	0.0		
Watermelon	31	90.3	0.0		
Other melons	1	100.0	0.0		
Apple juice	95	67.4	0.0		
Citrus juice	42	83.3	0.0		
Other fruit juices	13	76.9	0.0		
Fruit jams/jellies/pastes/toppings	28	39.3	0.0		
Total	1066	41.5	0.9		
E. Vegetables					
Corn	107	97.2	0.0		
Peas (green/snow/sugar/sweet)	45	93.3	0.0		
String beans (green/snap/pole/long)	92	67.4	1.1		1
Other beans & peas & products	58	82.8	0.0		
Cucumbers	46	47.8	0.0		
Eggplant	13	84.6	7.7		1
Okra	2	100.0	0.0		
Peppers, hot	9	66.7	11.1		1
Peppers, sweet	34	64.7	0.0		
Squash/pumpkins	71	59.1	0.0		
Tomatoes	93	55.9	2.1		2
Asparagus	37	94.6	0.0		
Bok choy & Chinese cabbage	7	57.1	14.3		1
Broccoli	13	100.0	0.0		
Cabbage	47	89.4	0.0		
Cauliflower	16	87.5	0.0		
Celery	22	31.8	4.5		1

Appendix A. (continued)

<u>Commodity Group</u>	<u>Total Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative^a, %</u>	<u># over tolerance</u>	<u># no tolerance</u>
Collards	7	42.9	14.3		1
Endive	2	50.0	0.0		
Kale	3	100.0	0.0		
Lettuce, head	39	53.9	0.0		
Lettuce, leaf	31	41.9	0.0		
Mustard greens	5	60.0	0.0		
Spinach	22	50.0	4.5		1
Other leaf & stem vegetables	25	92.0	4.0		1
Mushrooms and Truffles	7	71.4	0.0		
Carrots	133	51.9	1.5	1	1
Onions/leeks/scallions/shallots	23	95.7	0.0		
Potatoes	141	67.4	3.5		5
Radishes	4	100.0	0.0		
Red beets	5	100.0	0.0		
Sweet potatoes	33	93.9	0.0		
Turnips	1	100.0	0.0		
Other root & tuber vegetables	8	75.0	0.0		
Vegetables with sauce	14	57.1	0.0		
Vegetables, dried or paste	58	81.0	1.7	1 ^b	
Other vegetables/vegetable products	18	88.9	0.0		
Total	1291	70.9	1.4		
F. Other					
Peanuts & peanut products	13	69.2	0.0		
Other nuts & nut products	2	100.0	0.0		
Edible seeds	2	50.0	0.0		
Vegetable oil, crude	4	100.0	0.0		
Vegetable oil, refined	1	100.0	0.0		
Spices & condiments & flavors	2	50.0	0.0		
Honey & other sweeteners	52	90.4	0.0		
Baby foods/formula	88	88.6	0.0		
Other food products, incl. prepared foods	2	100.0	0.0		
Total	166	87.3	0.0		
Total A-F	3597	64.9	0.8		

Appendix B. Analysis of Import Surveillance Samples by Commodity Group in 1998

<u>Commodity Group</u>	<u>Total Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative^a, %</u>	<u># over tolerance</u>	<u># no tolerance</u>
A. Grains and Grain Products					
Corn & corn products	7	85.7	0.0		
Oats & oat products	1	100.0	0.0		
Rice & rice products	50	86.0	0.0		
Soybeans & soybean products	1	100.0	0.0		
Wheat & wheat products	5	40.0	0.0		
Other grains & grain products	7	85.7	0.0		
Breakfast cereals	4	75.0	0.0		
Bakery products, crackers, etc.	18	100.0	0.0		
Pasta and noodles	51	80.4	0.0		
Total	144	84.0	0.0		
B. Milk/Dairy Products/Eggs					
Cheese & cheese products	22	100.0	0.0		
Eggs	5	80.0	0.0		
Total	27	96.3	0.0		
C. Fish/Shellfish/Other Aquatic Products					
Fish and Fish Products	161	95.7	0.0		
Shellfish & Crustaceans	32	100.0	0.0		
Other Aquatic Animals & Products	1	100.0	0.0		
Total	194	96.4	0.0		
D. Fruits					
Blackberries	45	55.6	2.2		1
Blueberries	21	61.9	0.0		
Cranberries	4	75.0	0.0		
Grapes, raisins	67	19.4	1.5		1
Raspberries	42	33.3	2.4		1
Strawberries	75	26.7	5.3		4
Other berries	3	100.0	0.0		
Clementines	8	12.5	12.5		1
Grapefruit	5	100.0	0.0		
Lemons	10	40.0	0.0		
Limes	12	75.0	0.0		
Oranges	26	92.3	3.9		1
Other citrus fruit	6	50.0	0.0		

^a Includes samples with residues over tolerance or action level and samples with residues with no tolerance.

Appendix B (continued)

<u>Commodity Group</u>	<u>Total Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative^a, %</u>	<u># over tolerance</u>	<u># no tolerance</u>
Apples	44	45.5	0.0		
Pears	40	45.0	0.0		
Other pome fruit	2	50.0	50.0		1
Apricots	18	77.8	0.0		
Avocadoes	39	94.9	0.0		
Cherries	9	88.9	0.0		
Dates	3	100.0	0.0		
Nectarines	15	40.0	0.0		
Olives	35	88.6	0.0		
Peaches	37	37.8	2.7	1	
Plums	34	23.5	0.0		
Other pit fruit	3	100.0	0.0		
Bananas, plantains	113	57.5	0.0		
Guavas	2	100.0	0.0		
Kiwi fruit	8	50.0	12.5		1
Mangoes	45	91.1	0.0		
Papaya	46	76.1	6.5		3
Pineapple	46	82.6	2.2	1	
Other sub-tropical fruit	31	77.4	9.7		3
Cantaloupe	50	26.0	8.0	1	3
Honeydew	30	16.7	0.0		
Watermelon	20	70.0	0.0		
Other melons	17	41.2	47.1		8 ^c
Other fruits	6	83.3	16.7		1
Apple juice	48	93.8	2.1		1
Citrus juice	13	100.0	0.0		
Other fruit juices	65	89.2	0.0		
Fruit jams/jellies/pastes/toppings	114	86.8	3.5		4
Total	1257	61.1	2.9		
E. Vegetables					
Corn	32	100.0	0.0		
Mung beans and bean sprouts	10	80.0	10.0	1 ^b	
Peas (green/snow/sugar/sweet)	67	76.1	9.0		6
String beans (green/snap/pole/long)	103	41.8	9.7	1	9
Other beans & peas & products	57	80.7	3.5	1 ^b	1
Cucumbers	94	42.5	2.1		2
Eggplant	42	66.7	0.0		

^b Residue in sample exceeded an action level rather than a tolerance.

^c Samples were bittermelon, a type of squash rather than a fruit.

Appendix B (continued)

<u>Commodity Group</u>	<u>Total Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative^a, %</u>	<u># over tolerance</u>	<u># no tolerance</u>
Okra	17	70.6	5.9		1
Peppers, hot	214	46.7	6.1	2	11
Peppers, sweet	171	64.9	2.9	1	4
Squash/pumpkins	148	50.7	4.0		6
Tomatoes	310	68.1	1.0		3
Other fruiting vegetables	39	69.2	12.8		5
Artichokes	25	92.0	0.0		
Asparagus	42	90.5	2.4	1	
Bamboo shoots	9	100.0	0.0		
Bok choy & Chinese cabbage	17	41.2	5.9		1
Broccoli	36	61.1	0.0		
Cabbage	17	94.1	0.0		
Cauliflower	9	100.0	0.0		
Celery	20	20.0	0.0		
Endive	16	81.2	0.0		
Kale	8	37.5	25.0		2
Lettuce, head	16	75.0	0.0		
Lettuce, leaf	23	52.2	0.0		
Mustard greens	3	33.3	33.3		1
Radicchio	10	90.0	0.0		
Spinach	32	43.8	3.1		1
Other leaf & stem vegetables	55	63.6	9.1		5
Mushrooms and Truffles	46	97.8	0.0		
Carrots	29	82.8	0.0		
Cassava	10	100.0	0.0		
Onions/leeks/scallions/shallots	50	74.0	0.0		
Potatoes	21	81.0	19.1		4
Radishes	9	33.3	0.0		
Red beets	5	100.0	0.0		
Sweet potatoes	22	90.9	0.0		
Turnips	1	0.0	0.0		
Water chestnuts	12	91.7	0.0		
Other root & tuber vegetables	50	96.0	2.0		1
Vegetables with sauce	8	75.0	0.0		
Vegetables, dried or paste	57	79.0	3.5	2 ^b	
Other vegetables/vegetable products	48	72.9	2.1		1
Total	2010	65.5	3.6		
F. Other					
Cashews	34	85.3	0.0		
Coconut & coconut products	5	100.0	0.0		
Peanuts & peanut products	43	97.7	0.0		
Other nuts & nut products	18	100.0	0.0		

Appendix B (continued)

<u>Commodity Group</u>	<u>Total Samples</u>	<u>Samples without Residues, %</u>	<u>Samples Violative^a, %</u>	<u># over tolerance</u>	<u># no tolerance</u>
Edible seeds	20	80.0	20.0		4
Vegetable oil, refined	7	100.0	0.0		
Spices & condiments & flavors	25	80.0	8.0		2
Beverages & water	10	100.0	0.0		
Beverage bases	6	83.3	0.0		
Coffee/tea/wine	10	90.0	0.0		
Cocoa beans & chocolate products	2	100.0	0.0		
Honey & other sweeteners	33	100.0	0.0		
Baby foods/formula	3	100.0	0.0		
Other food products, incl. prepared foods	8	100.0	0.0		
Nonfood items	4	75.0	25.0		1
Total	228	92.1	3.1		
Total A-F	3860	68.1	3.0		