

CHAPTER 04 – PESTICIDES AND CHEMICAL CONTAMINANTS

SUBJECT: TOTAL DIET STUDY		IMPLEMENTATION DATE: 07/01/2018
DATA REPORTING		
PRODUCT CODES	PRODUCT/ASSIGNMENT CODES	
INDUSTRY CODE: 37XY99 USE APPROPRIATE PRODUCT CODES	<u>REPORT COLLECTION AND ANALYSIS USING</u> 04839 (PESTICIDES, INDUSTRIAL CHEMICALS, TOXIC ELEMENTS, MYCOTOXINS, AND RADIONUCLIDES) 21839 (NUTRITIONAL ELEMENTS)	

FIELD REPORTING REQUIREMENTS:

A. Collecting Districts

There are no hard copy reports for this Compliance Program.

B. District Follow-Up

Send a brief summary of any follow-up to Total Diet Study (TDS) samples to the Center for Food Safety and Applied Nutrition (CFSAN) TDS Coordinator and the Office of Regulatory Affairs (ORA) Office of Regulatory Science (ORS) Kansas City Laboratory (KCL). Classify follow-up samples as "compliance samples." All follow-up activities related to pesticides and industrial chemicals should be reported under the Pesticides and Industrial Chemicals in Domestic and Imported Foods Program, PAC 04004A, and follow-up related to toxic elements (i.e., arsenic, cadmium, lead, mercury, nickel) and radionuclides under the Toxic Elements in Food and Radionuclides in Food Program, PACs 04019A, PAC 04019S (for elements requiring speciation), and 04019C, respectively, unless directed otherwise by the TDS Coordinator. Also, contact the TDS Coordinator for PAC assignment for follow-up related to nutritional elements.

C. Kansas City Laboratory (KCL)

Winchester Engineering and Analytical Center (WEAC)

Prepare a Total Diet Report (TDR) discussing analytical findings, and program issues for each calendar year. An Abbreviated Total Diet Report (ATDR) is to be completed after each of the twelve regional collections. Desired modifications to the TDS will be addressed in a separate memorandum and referenced in the TDR. Submit all reports and memoranda to the TDS Coordinator, with copies to the Office of Regulatory Affairs

(ORA) scientific inquiries contact. ATDRs are due 60 days after completion of all original analyses in the regional collection. The TDR is due 60 days after the completion of all analyses of all regional collections and the national collection (including outliers, unusual findings, repeat analyses, confirmations) and certification of data. All analytical results must be entered in the Field Accomplishments and Compliance Tracking System (FACTS) before submitting the TDR.

Arkansas Laboratory (ARKL)

Refer to the Pesticides and [Industrial Chemicals in Domestic and Imported Foods Compliance Program \(7304.004\)](#) for reporting requirements.

Should unusual or elevated dioxin concentrations be detected, ARKL should contact CFSAN Office of Food Safety, Plant Products Branch (Anthony Adeuya) for guidance on follow-up. Such follow-up should be reported under the Pesticides and Industrial Chemicals in Domestic and Imported Foods Compliance Program, PAC 04004D.

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PART I – BACKGROUND

FDA’s mandate to ensure the safety and wholesomeness of the food supply relies on its capacity to assess the potential risk of dietary exposure to unsafe concentrations of contaminants and the potential risk for inadequate intake of nutrients. Estimating dietary exposure requires data on the frequency and concentrations of contaminants and nutrients in the U.S. food supply. The more comprehensive the monitoring and exposure estimates are, the more useful the information is for: prioritizing food safety concerns; identifying the contributions of specific foods to health risks; and targeting food safety monitoring programs and activities. FDA’s TDS—one of FDA’s most comprehensive food safety monitoring programs—provides this information.

The TDS involves:

- Purchasing a wide range of foods that represent foods most commonly consumed by the U.S. population
- Preparing the foods as for consumption (e.g., washing, peeling, cooking)
- Analyzing foods for toxic chemicals and certain nutrients, pesticides and mycotoxins
- Using collected data to estimate total dietary exposure to assess whether specific chemicals pose a health risk, and to identify the foods that contribute most to exposure

The TDS is a comprehensive monitoring program that provides a complementary approach to and helps to inform regulatory programs.

Current TDS Methodology and Use of TDS Results

The TDS has been conducted continuously since the early 1960s. The current program involves collecting samples of about 280 different foods (including beverages) and analyzing each for toxic and nutrient elements, mycotoxins, pesticide residues, industrial chemicals, and radionuclides. A table of TDS foods and the analytes for which each food is analyzed is provided in the TDS Food/Analyte Matrix (refer to Attachment A).

Each sampling event is referred to as a “collection.” Twelve regional sample collections (two per region, one each winter/summer season) and one national collection are carried out each year. For regional collections, samples are collected from three cities within the region. The three samples are combined to form a single analytical composite for each TDS food for that collection.

A “National” collection is made once per year, varying the season when the sample is collected between years. National foods are not expected to vary regionally in analyte concentrations and are

nationally recognized brands. The National collection is performed by the Kansas laboratory staff at locations close to the laboratory or by a grocery delivery service.

Analytical results from the TDS are then combined with national food consumption data to estimate dietary exposures to these analytes for the total U.S. population and for 14 age-gender subgroups, from infants to the elderly.

Because the TDS food list covers all major components of the diet, the exposure estimates provide a measure of total exposure to these substances, as well as the contribution of each TDS food to total exposure. The estimates of total exposure are compared with toxicological reference points such as Provisional Tolerable Weekly Intake (PTWI) or an Acceptable Daily Intake (ADI) to assess the potential risk to the population of overexposure to contaminants or to inadequate intake of nutrients. Exposure estimates also identify the foods and beverages that contribute most to the total exposure; this information can be used to target samples collected in other food safety monitoring and compliance programs and to help prioritize food safety initiatives.

CFSAN maintains a website for the TDS where analytical results are posted and can be accessed by those interested in food safety and nutrition at <http://www.fda.gov/Food/FoodScienceResearch/TotalDietStudy/default.htm>. Results from the TDS are widely used by other government agencies such as the Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA), as well as by academia, the food industry and consumer groups. TDS results are also important for international food safety monitoring and standard setting activities. The World Health Organization (WHO), through its Global Environment Monitoring System (GEMS/Food) supports total diet studies as one of the most cost-effective means for assuring that people are not exposed to unsafe concentrations of toxic chemicals through food. The GEMS/Food program also maintains databases on contaminant concentrations in foods as well as exposure estimates, to which the U.S. and many other countries contribute results of their TDSs. These data are used for risk assessments conducted by the Joint FAO/WHO Expert Committee on Food Additives and Contaminants (JECFA) and for development of international food safety standards by the Codex Alimentarius Commission (Codex).

PART II - IMPLEMENTATION

1. Objective

- To determine concentrations of pesticide residues and industrial chemicals in selected TDS foods.
- To determine concentrations of the toxic and nutrient elements in selected TDS foods.
- To determine concentrations of radionuclides in selected TDS regional foods.
- To determine concentrations of mycotoxins in selected TDS foods.
- To determine moisture content of foods.
- To estimate daily dietary exposures to TDS analytes for the total U.S. population and 14 age-gender groups.
- To identify trends in the concentrations in foods and dietary exposures for all TDS analytes.
- To identify the contributions of individual TDS foods to the overall dietary exposure, which informs other monitoring programs that target specific foods/contaminants.
- To identify potential food safety hazards by comparing dietary exposures to TDS analytes with recommended intakes and toxicological reference points established by the FDA, FAO/WHO, the National Academy of Sciences, and other agencies and scientific bodies.
- To maintain a TDS website through which TDS results can be accessed by other government agencies, academia, consumer and industry groups, and individuals interested in food safety and nutrition.
- To contribute TDS results to the GEMS/Food database to be used for international risk assessments and standard setting.

2. Program Management Instructions

CFSAN Office of Analytics and Outreach, Exposure Assessment Branch will:

- Select divisions, cities, and retail stores where samples will be collected
- Submit the collection schedule that is to be sent out to the collection division offices to the CFSAN/Office of Compliance/Programs, Assignments and Monitoring Branch (PAMB)
- Review the analytical results
- Prepare reports summarizing data
- Post analytical data and reports to the TDS website

- The food list, sampling sites, analytical methods listed in this document may be changed upon agreement between CFSAN and KCL.

3. Program Interaction

Kansas City Laboratory will:

- Coordinate collection and analysis of Regional TDS foods
- Collect the National TDS foods
- Prepare shopping guides for both regional and national food list
- Notify the Director of Investigations Branch (DIB) of upcoming sample collections about 45 days prior to the scheduled sample collection
- Provide shopping guides to each collecting Division 1-2 weeks prior to the designated date for sample collection in that division
- Prepare foods for analysis-clean, wash, cook, peel, core as specified work instruction at KCL
- Perform analyses for moisture content, pesticide residues, industrial chemicals, mycotoxins, and elements in foods (refer to Attachment A)
- Forward portions of TDS food composites to other laboratories with analytical responsibilities as specified or requested

Collecting Divisions:

- Collect samples according to the shopping guides provided by KCL at the specified retailers on the specified dates.
- Ship samples to KCL within requested time frame

WEAC:

- Analyze selected TDS regional foods (refer to the Attachment A) from six regional collections each year for radionuclides

ARKL:

- Analyze selected TDS foods (refer to Attachment A) from predetermined collections each year for dioxins under the auspices of the Pesticides and Industrial Chemicals in Domestic and Imported Foods Program

PART III - INSPECTIONAL

1. Operations

For each Collection, samples will be collected over a 1-2-day period by the Divisions designated by the TDS Collection Schedule. Samples of each TDS food are collected in each of the three cities designated for that Collection. Divisions should make every effort to collect all food items listed on the shopping guides provided by KCL, visiting the designated retailers. If they are unable to procure specific food items, Division personnel should contact the TDS coordinator at KCL.

Any food item that was not collected should be noted by the collecting Division on the shopping list or in an accompanying memorandum. KCL will maintain records of foods not purchased by the collecting Division and will report this information in the ATDR. Samples are not always domestic samples.

SAMPLES DO NOT NEED TO BE OFFICIALLY SEALED. When collecting multiple containers of a food item, the same lot number is not required. Please follow instructions provided by KCL with the shopping list.

A. Inspections - N/A

B. Investigations - N/A

C. Sample Collections

Collecting Divisions should follow these guidelines when purchasing regional foods:

- Follow the guidance provided in the Investigations Operations Manual (IOM) Section 4.2.8.3.2 for the payment of samples.
- Use the Assignment Number provided by KCL to generate a Collection Report (CR) for each Collection. All samples are Investigational.
- List each store visited and the items collected from it under the “remarks” section of the CR.
- Follow the list of retail stores. Go to the first store and collect as many of the foods as possible; if not all the foods (specified brands) are available, go to the next store in the list.
- Fast-food items may be purchased at any location where the field staff feel they can get the items, provided the fast-food location is in the specified county.
- Purchase the brand(s) specified. Note that in many cases, multiple brands are requested.

- For fresh produce, if there are multiple varieties which meet the criteria, please split the weight approximately equally between the varieties (e.g. for red apple, you can get Red delicious, Jonathans, Stayman, or other red varieties).
- Do not collect less than the total quantity per food as specified in the shopping guide.
- Samples are to be collected to minimize chemical contamination, *e.g.* not touching any of the produce and ensuring all items are in bags or containers so there is no cross contamination.
- For items that may be purchased fresh or frozen, fresh items are always preferable (unless otherwise specified). The form purchased should be noted on the CR.
- Identify each item collected using the 3-digit number assigned to the product in the shopping guide. Do not deviate from the assigned item numbers. (Labels will be provided by KCL to facilitate item identification. **FDA Official seals are not required.**)

Collecting Divisions should, immediately after sample collection:

- Keep frozen foods frozen
- Freeze all meats, seafood items (except canned), butter, and margarine
- Refrigerate perishables

D. **Shipping Instructions** - Collecting Divisions should label, pack, and ship samples as follows:

- Attach labels provided by KCL to each sample.
- Carefully follow the instructions provided by KCL for packing and shipping the samples. (Please call KCL with any questions about these procedures.) Ensure sample integrity by keeping frozen foods frozen and cold foods cold during shipment. Frozen foods including ice cream, sherbet, popsicles, and milk shakes, should be shipped with dry ice to keep frozen.
- Ship refrigerated and frozen items within one day of sampling (see IOM section 4.5.5.5).
- Ship samples:
 - Overnight via shipper with which the district contracts

- To arrive in KCL by close of business (COB) Wednesday of sampling week

Ship samples to:
U.S. Food and Drug Administration
Attn: Sample Preparation and Collection Coordinator - Total Diet Study
11510 West 80th Street
Lenexa, Kansas 66214

After samples are shipped, Collecting Divisions should contact the TDS Sample Collection and Preparation Coordinator (see Section VI, Contacts). The following information should be provided:

- Collection date
 - Number of shipping cartons or containers
 - Name of carrier
 - Tracking number
 - Estimated date and time of arrival
 - Other relevant remarks, e.g., "Sufficient dry ice to maintain frozen condition until 8:00 A.M.", etc.
- E. Sample Sizes** - KCL will provide a document to each collector detailing the amounts of each food item to be collected.
- F. Import Sample Collections** – N/A

PART IV - ANALYTICAL

1. Analyzing Laboratories

Standard Operating Procedures (SOPs) referenced in the following sections contain all necessary analytical instructions, methods of analysis, safety and quality assurance requirements, reporting instructions, limits of quantitation (pesticides), limits of detection (elements), and lists of foods to be analyzed. Analyzing laboratories will keep SOPs updated and should notify CFSAN's Office of Analytics and Outreach (OAO), Office of Regulatory Science (ORS), and ORA/ORS of any revisions. Changes should also be reported to the TDS coordinator.

The samples will be analyzed by the following laboratories

KCL will:

- Log in food items as received
- Perform sample preparation
- Maintain reserves of all samples of TDS foods for 30 days after the Market Basket Report has been sent to CFSAN or otherwise notified by CFSAN
- Ship composites of selected TDS samples to WEAC and ARKL as notated in Attachment A.

Ship food composites to:

Winchester Engineering and Analytical Center, HFR-NE460

Attn: Sample Custodian

109 Holton Street

Winchester, MA 01890

FDA, Arkansas Regional Laboratory, HFR-SW500

Attn: Kirk Wilkes

3900 NCTR Road, Building 26

Jefferson, AR 72079

- Analyze samples for selected pesticide residues, industrial chemicals, nutrient and toxic elements as specified in Attachment A.
 - pesticides
 - mycotoxins
 - moisture content
 - toxic and nutrient elements
- Attachment A includes a current list of analytes, this list is subject to change upon notification between KCL and CFSAN.

WEAC will analyze every other regional food collection for gamma emitting radionuclides and Sr-90

ARKL will analyze specified foods for dioxins and dioxin like compounds. The targeted foods are comprised of both national and regional foods and are specified in Attachment A. Regional foods targeted for dioxin analysis will be collected with each of the twelve regional collections and are listed in Attachment A.

2. Analyses to be Conducted

A. All laboratories will:

- Follow methods as described in SOPs.
- Follow quality assurance and quality control procedures outlined in the SOPs or referenced methods.
- Refer to attachment A for complete list of analyses to be performed on each food item.

3. Methodology

A. Sample Preparation and Methods

1. General Instructions

KCL will:

- Log in food items as received, scanning and recording bar codes (if available) of each brand of food received
 - Sample Preparation: Prepare and process samples of TDS foods as outlined in KAN-LAB.152 and related worksheets
 - Store food items in refrigerator or freezer
 - Maintain reserves of all samples of TDS foods for 30 days after the Market Basket Report has been sent to CFSAN or otherwise notified by CFSAN
2. Analytical Protocol: All samples will be analyzed for the analytes per Attachment A. All methods used will have been validated with limits of detection and limits of quantification determined for that food matrix or food group.

B. Methodology

Pesticide Analysis Methods:

Extraction Method

KAN-LAB-PES.053 “Analysis of Pesticides and Industrial Chemicals by the QuEChERS Procedure” LIB 4465 - “Collaboration of the QuEChERS procedure for the Multi-Residue Determination of Pesticides by LC-MS/MS in Raw Agricultural Products”

Determination of Pesticides by LC-MS/MS

KAN-LAB-PES.072 “Determination of Pesticides and Industrial Chemicals by LC-MS/MS Using AB Sciex 4000 and 5500 QTraps.” LIB 4464 – “Development and Validation of a Multi-Residue Determination for Pesticides by LC-MS/MS”

Determination of Pesticides by GC-MS/MS

KAN-LAB-PES.075 "Determination of Pesticides and Industrial Chemicals using Agilent 7000 GC/MS Triple Quad." LIB 4521 – "GC-MS/MS Determination of Over 200 Pesticides Commonly Found in Regulatory Samples"

Determination of Acid Herbicides

KAN-LAB-PES.077 "Analysis of Acid Herbicides." LIB 4592 – "Analysis of Acid Herbicides Using Modified QuEChERS with Fast Switching ESI⁺/ESI⁻ LC-MS/MS Determination"

Elemental Analysis Methods:

Multi-element ICP-MS Method for Food

Elemental Analysis Method 4.7 "Inductively Coupled Plasma-Mass Spectrometric Determination of Arsenic, Cadmium, Chromium, Lead, Mercury, and Other Elements in Food Using Microwave Assisted Digestion" for the following elements: Arsenic, Cadmium, Chromium, Lead, Manganese, Mercury, Molybdenum Nickel and Selenium.

Multi-element ICP-AES Method for Food

Elemental Analysis Method 4.4 "Inductively Coupled Plasma-Atomic Emission Spectrometric Determination of Elements in Food Using Microwave Assisted Digestion" for the following elements: Potassium, Sodium, Calcium, Copper, Iron, Phosphorus, Zinc and Magnesium.

Multi-element ICP-MS Method for Bottled Drinking Water

Elemental Analysis Method 4.12 "Draft Method for Analysis of Bottled water for 18 Elements by ICPMS" for the following elements: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Thallium, Uranium and Zinc.

Arsenic Speciation ICP-MS Method for Juice

Elemental Analysis Method 4.10 "High Performance Liquid Chromatography-Inductively Coupled Plasma-Mass Spectrometric Determination of Four Arsenic Species in Fruit Juice" for the following arsenic species: Total Inorganic Arsenic (Sum of Arsenite, Arsenate), Monomethylarsonic Acid and Dimethylarsenic Acid.

Arsenic Speciation HPLC-ICP-MS Method for Rice and Rice Products

Elemental Analysis Method 4.11 "Arsenic Speciation in Rice and Rice Products Using High Performance Liquid Chromatography-Inductively Coupled Plasma-Mass Spectrometric Determination" to determine inorganic arsenic in two forms; arsenite (As(III) and arsenate (As(V)). Additionally, monomethylarsonic acid (MMA) and dimethylarsinic acid (DMA) are determined

Iodine ICP-MS Method for Food **Elemental Analysis Method 4.13** “Inductively Coupled Plasma-Mass Spectrometric Determination of Iodine in Food Using Tetramethyl Ammonium Hydroxide Extraction”

Mycotoxin Methods:

KCL SOP-000072, Determination of Aflatoxin M1 by UHPLC-Tandem Mass Spectrometry

KCL SOP-000066, Determination of Patulin by UHPLC-Tandem Mass Spectrometry

Accurate Determination of Multiple Mycotoxins in Food Products Using Isotope Dilution by UHPLC-Tandem Mass Spectrometry (DRAFT).

Radionuclide Methods:

Gamma Analysis

WEAC-RN-Method.3.0 “Determination of Gamma-Ray Emitting Radionuclides in Foods by High-Purity Germanium Spectrometry”

Sr-90 Analysis

WEAC-RN-Method.2.0 “Determination of Strontium-90 in Foods by Internal Gas-Flow Proportional Counting”

C. Testing Target Levels (TTL)/ Regulatory Target Level

All analytes will be tested with methods able to obtain levels necessary for monitoring purposes with the data to be used for risk and safety assessments. All methods will be validated for TDS foods with Limits of Detection and Quantification being scientifically determined for each food group.

D. Reporting

All analytical results should be reported by the analyzing laboratory into the FACTS system as follows:

- Pesticides and Industrial Chemicals (KCL): Report results in FACTS under PAC 04839 using PAF KTD.
- Toxic and Nutrient Elements (KCL): Report results in FACTS under PAC 04830 for toxic elements and PAC 21839 for nutrient elements using PAF KTE.
- Radionuclides (WEAC): Report results (in units of Bq/kg decay corrected to analysis date) in FACTS under PAC 04839 using PAF NUC. Always report results for strontium-90, cesium-137, and potassium-40. Report all gamma-ray emitting radionuclides.

PART V - REGULATORY/ADMINISTRATIVE STRATEGY

Import Compliance Actions: N/A

Domestic Compliance Actions: N/A

PART VI REFERENCES, ATTACHMENTS, AND PROGRAM CONTACTS

1. References (Use headings 1-3 as needed)

FDA/ORR Regulatory Procedures Manual (Including Updates) Investigations Operations Manual
(Most Current)

2. Attachments

A. TDS Regional Foods List and Testing Profile

3. Program Contacts

CFSAN

TDS Coordinator: Terry Councill, HFS-301, (240) 402-1180

TDS Monitor/Compliance Program Inquiries: Jeffery Sumter, HFS-615, (240) 402-3037

Food List, Sample collections: Judy Spungen, HFS-301, (240) 402-0242

Dioxins: Anthony Adeuya, HFS-317, (240)402-5759

Pesticides: Chris Sack, HFS 317, (240) 402-2464

SCIENTIFIC METHOD ANALYSIS CONTACTS:

Analytical Methods

<u>Pesticides</u>	Christine Parker	HFS-716	240-402-2019
<u>Mycotoxins</u>	Christine Parker	HFS-716	240-402-2019
<u>Elements</u>	Shaun MacMahon	HFS-706	240-402-1998
<u>Dioxin/PCB's</u>	Christine Parker	HFS-712	240-402-2019
<u>Radionuclides</u>	Bill Cunningham	HFS-716	301-975-6271

Contacts in Headquarters (ORS-ORS)

Scientific Inquiries

Pesticides Moh R. Islam (mohammed.islam@fda.hhs.gov) 240-402-0552

Mycotoxins Yanxuan (Tina) Cai (Yanxuan.Cai@fda.hhs.gov) 240-402-1369
Elements James Farrow (James.Farrow@fda.hhs.gov) 404-253-2246 x2246
Dioxin/PCB's Moh R. Islam (mohammed.islam@fda.hhs.gov) 240-402-0552
Nutritional or Toxic Metals James (Mike) Farrow, (404) 253-2246

Laboratories:

Kansas City Laboratory (HFR-SW360):

TDS Liaison: Kara Cooper, (913) 752-2730

Sample Preparations and Collections:

Jeannie Vonderbrink, (913) 752-2193

Winchester Engineering and Analytical Center (WEAC) HFR-NE460

TDS Liaison: Stephanie Healey (781) 756-9819

Arkansas Laboratory (HFR-SW500):

TDS Liaison: Sina Shojaee: (870) 543-4616

Jeffery Archer: (870) 543-4076

PART VII - CENTER RESPONSIBILITIES

Program Evaluation

The Office of Analytics and Outreach will provide subject matter expertise in the maintenance and evaluation of the TDS and provide guidance to the Office of Compliance regarding program priorities and recommended program changes. The Office of Compliance will lead the effort and work in conjunction with the Office of Analytics and Outreach to prepare summary reports for this compliance program. The summaries will outline the program office's current objectives, data, and list recommendations. The reports will be made available on FDA's intranet site:

<http://inside.fda.gov:9003/ProgramsInitiatives/Food/FieldPrograms/ucm015079.htm>

ATTACHMENT A

Regional Food List

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
1	Milk, whole, fluid	X	X	X	X	M1	X	X
2	Milk, reduced fat, fluid	X		X	X	M1	X	X
3	Milk, chocolate, reduced fat, fluid	X		X	X	M1	X	
4	Milk, skim, fluid	X		X	X	M1	X	
12	Cheese, cheddar (sharp/mild)	X		X	X	M1	X	X
13	Beef, ground, pan-cooked	X	X	X	X		X	X
17	Ham, cured (not canned), baked	X	X	X	X		X	X
18	Pork chop, pan-cooked with oil	X	X	X	X		X	X
19	Pork sausage (link/patty), pan-cooked	X	X	X	X		X	X
20	Pork bacon, oven-cooked	X	X	X	X		X	X
22	Lamb chop, pan-cooked with oil	X	X	X	X		X	X
26	Turkey breast, oven-roasted	X	X	X	X		X	X
28	Frankfurter, beef and pork, boiled	X	X	X	X		X	X
37	Eggs, hard-boiled	X		X	X		X	X
50	Rice, white, enriched, cooked	X	X	X	X	Multi-residue	X	
54	Corn, frozen, boiled	X	X	X	X	Multi-residue	X	
58	Bread, white, enriched, pre-sliced	X	X	X	X	Multi-residue	X	
62	Bread, whole wheat, pre-sliced	X	X	X	X	Multi-residue	X	
63	Tortilla, flour	X	X	X	X	Multi-residue	X	
65	Muffin, blueberry	X	X	X	X	Multi-residue	X	X
78	Apple, red, with peel, raw	X	X	X	X	Patulin	X	
79	Orange, raw	X	X	X	X		X	
80	Banana, raw	X		X	X		X	

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
81	Watermelon, raw/frozen	X		X	X		X	
83	Peach, raw/frozen	X	X	X	X		X	
85	Pear, with peel, raw	X	X	X	X	Patulin	X	
86	Strawberry, raw/frozen	X		X	X		X	
88	Grapes, seedless, red/green, raw	X	X	X	X	Patulin	X	
89	Cantaloupe, raw/frozen	X		X	X		X	
92	Grapefruit, raw	X	X	X	X		X	
97	Avocado, raw	X		X	X		X	
108	Collards, fresh/frozen, boiled	X		X	X		X	
109	Lettuce, iceberg, raw	X		X	X		X	
113	Broccoli, fresh/frozen, boiled	X		X	X		X	
114	Celery, raw	X		X	X		X	
115	Asparagus, fresh/frozen, boiled	X	X	X	X		X	
116	Cauliflower, fresh/frozen, boiled	X		X	X		X	
117	Tomato, raw	X		X	X		X	
121	Green beans, fresh/frozen, boiled	X		X	X		X	
123	Cucumber, peeled, raw	X		X	X		X	
125	Pepper, bell, green, raw	X		X	X		X	
126	Squash, winter, fresh/frozen	X		X	X		X	
128	Onion, mature, raw	X		X	X		X	
136	Potato, peeled, boiled	X	X	X	X		X	
137	Potato, with peel, baked	X	X	X	X		X	
167	Cream, half and half	X		X	X	M1	X	X
178	Cake, chocolate with chocolate icing	X	X	X	X		X	X
226	BF, peaches	X	X	X	X	Patulin	X	
236	Cheese, Swiss	X		X	X	M1	X	X
240	Chicken breast, oven-roasted, skin removed	X	X	X	X		X	X
241	Chicken nuggets, fast-food	X	X	X	X		X	X
244	Shrimp, boiled	X	X	X	X		X	X
249	Bagel, plain, toasted	X	X	X	X	Multi-residue	X	
250	English muffin, plain, toasted	X	X	X	X	Multi-residue	X	

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
258	Potatoes, French fries, fast-food	X	X	X	X	Multi-residue	X	X
263	Brussels sprouts, fresh/frozen, boiled	X		X	X		X	
264	Mushrooms, raw	X		X	X		X	
286	Ice cream, vanilla	X		X	X	M1	X	X
318	Salmon, steaks/fillets, baked	X	X	X	X		X	X
324	BF, cereal, rice, dry, prepared with water	X	X	X	X	Multi-residue	X	
334	Beef steak, loin/sirloin, broiled	X	X	X	X		X	X
336	Chicken breast, fried with skin, fast-food	X	X	X	X		X	X
337	Chicken thigh, oven-roasted, skin removed	X	X	X	X		X	X
338	Chicken leg, fried with skin, fast-food	X	X	X	X		X	X
339	Catfish, pan-cooked with oil	X	X	X	X		X	X
356	Carrot, baby, raw	X	X	X	X		X	
357	Lettuce, leaf, raw	X		X	X		X	
369	Cake, white with white icing	X	X	X	X		X	X
380	Water, bottled, mineral/spring	X	X	X	X		X	
386	Cinnamon roll, iced	X	X	X	X	Multi-residue	X	X
387	Cod, baked	X	X	X	X		X	X
388	Tilapia, baked	X	X	X	X		X	X
389	Salami, dry/hard	X	X	X	X		X	X
390	Turkey, ground, pan-cooked	X	X	X	X		X	X
391	Cheese, Monterey jack	X		X	X	M1	X	X
392	Cheese, mozzarella	X		X	X	M1	X	X
393	Ice cream, chocolate	X		X	X	M1	X	
394	Milk shake, vanilla, fast-food	X		X	X	M1	X	X
395	Yogurt, frozen, vanilla	X		X	X	M1	X	
396	Pineapple, raw/frozen	X		X	X		X	
397	Sweet potato, baked, peel removed	X	X	X	X		X	
398	Blueberries, raw	X	X	X	X		X	
399	Biscuits, fast-food	X	X	X	X	Multi-residue	X	X

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
400	Tortilla, corn	X	X	X	X	Multi-residue	X	
401	Bread, white roll/bun (hamburger/hotdog)	X	X	X	X	Multi-residue	X	
402	Rice, brown, cooked	X	X	X	X	Multi-residue	X	
403	Walnuts, shelled	X	X	X	X	Multi-residue	X	
404	Pizza, cheese, fast-food	X		X	X	Multi-residue	X	X
405	Sauce, barbecue	X		X	X		X	
406	Cabbage, raw	X		X	X		X	
408	Spinach-raw	X		X	X		X	
407	Zucchini, fresh/frozen, boiled	X		X	X		X	
410	Eggplant, Baked	X		X	X		X	

National Food List

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
10	Cheese, American, processed	X		X	X	M1		
29	Luncheon meat, bologna	X		X	X			
34	Fish sticks or patty, frozen, oven-cooked	X		X	X			
39	Pork and beans, canned	X		X	X			
42	Lima beans, immature, frozen, boiled	X		X	X	Multi-residue		
46	Peas, green, frozen, boiled	X		X	X			
47	Peanut butter, creamy	X	X	X	X	Multi-residue		
48	Peanuts, dry roasted, salted	X		X	X	Multi-residue		
51	Oatmeal, plain, quick, cooked	X	X	X	X	Multi-residue		

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
52	Cream of wheat (farina), enriched, cooked	X	X	X	X	Multi-residue		
53	Corn/hominy grits, enriched, cooked	X	X	X	X	Multi-residue		
55	Corn, canned	X		X	X			
60	Cornbread, homemade	X	X	X	X	Multi-residue		
66	Crackers, saltine	X		X	X	Multi-residue		
67	Chips, tortilla	X	X	X	X	Multi-residue		
69	Noodles, egg, enriched, boiled	X		X	X	Multi-residue		
71	Cereal, corn flakes	X	X	X	X	Multi-residue		
74	Cereal, bran with raisins	X	X	X	X	Multi-residue		
75	Cereal, crisped rice	X	X	X	X			
77	Cereal, oat ring	X	X	X	X	Multi-residue		
84	Applesauce, bottled	X		X	X	Patulin		
87	Fruit cocktail, canned in light syrup	X		X	X			
95	Raisins	X		X	X	Multi-residue		
99	Juice, apple, bottled	X		X	X	Patulin		
100	Juice, grapefruit, bottled/cartoned	X		X	X			
122	Green beans, canned	X		X	X			
138	Chips, potato	X	X	X	X			
145	Chili con carne with beans, canned	X		X	X			
146	Macaroni and cheese, prepared from boxed mix	X	X	X	X			
152	Chicken potpie, frozen, heated	X		X	X			
155	Soup, chicken noodle, canned	X		X	X			
156	Soup, tomato, canned	X		X	X			
161	Pickles, dill, cucumber	X		X	X			
162	Margarine, salted	X		X	X			
164	Butter, salted	X		X	X	M1		
166	Mayonnaise	X		X	X			
168	Cream substitute, non-dairy, liquid	X		X	X			

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
169	Sugar, white, granulated	X		X	X			
170	Syrup, pancake	X		X	X			
172	Honey	X		X	X			
173	Ketchup, tomato	X		X	X			
183	Cookies, chocolate chip	X	X	X	X	Multi-residue		
184	Cookies, sandwich, with crème filling	X		X	X			
185	Pie, apple, fresh/frozen	X		X	X	Patulin		
186	Pie, pumpkin, fresh/frozen	X	X	X	X			
187	Candy bar, milk chocolate, plain	X		X	X			
190	Gelatin dessert, strawberry	X		X	X			
191	Carbonated beverage, cola, regular	X		X	X			
193	Fruit drink, from powder	X		X	X			
194	Carbonated beverage, cola, diet	X		X	X			
197	Tea, brewed from tea bag	X		X	X			
198	Beer	X	X	X	X			
200	Alcohol, distilled, whiskey/scotch	X		X	X			
205	BF, beef and broth/gravy	X		X	X			
211	BF, vegetables and beef	X		X	X			X
212	BF, vegetables and chicken	X		X	X			X
214	BF, chicken noodle dinner	X		X	X			X
215	BF, pasta, tomato and beef	X		X	X	Multi-residue		
216	BF, turkey and rice	X	X	X	X	Multi-residue		
218	BF, carrots	X		X	X			
219	BF, green beans	X		X	X			
220	BF, mixed vegetables	X		X	X			
221	BF, sweet potatoes	X	X	X	X	Multi-residue		
223	BF, peas	X		X	X			
225	BF, applesauce	X		X	X	Patulin		

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
227	BF, pears	X		X	X	Patulin		
230	BF, juice, apple	X		X	X	Patulin		
235	Yogurt, lowfat, fruit-flavored	X		X	X	M1		
237	Cream cheese	X		X	X	M1		
239	Luncheon meat, ham	X		X	X			
251	Crackers, graham	X		X	X			
252	Crackers, butter-type	X		X	X			
256	Juice, pineapple, canned	X		X	X			
257	Juice, grape, bottled	X		X	X	Patulin		
268	Mixed vegetables, frozen, boiled	X		X	X			
288	Popsicle, fruit-flavored	X		X	X			
290	Doughnut, cake-type, plain	X	X	X	X	Multi-residue		
291	Brownie	X	X	X	X	Multi-residue		
292	Cookies, sugar	X		X	X			
293	Candy, hard	X		X	X			
294	Pretzels, hard, salted	X	X	X	X	Multi-residue		
295	Syrup, chocolate-flavored	X		X	X			
296	Jelly, grape	X		X	X	-		
298	Mustard, yellow, plain	X		X	X			
299	Olives, black, pitted	X		X	X			
300	Sour cream	X		X	X	M1		
305	Coffee, brewed from ground	X	X	X	X	Multi-residue		
307	Fruit drink (5% - 25% juice), canned or bottled	X		X	X			
313	BF, bananas	X		X	X			
317	BF, teething biscuits	X	X	X	X	Multi-residue		
320	BF, squash	X		X	X			
323	BF, cereal, oatmeal, dry, prepared with water	X		X	X	Multi-residue		
328	BF, turkey and broth/gravy	X		X	X			
332	Cottage cheese, creamed, reduced fat	X		X	X	M1		

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
340	Tuna, canned in water, drained	X		X	X			
341	Beans, refried, canned	X	X	X	X	Multi-residue		
343	Seeds, sunflower, shelled, salted, roasted	X		X	X	Multi-residue		
344	Pancakes, frozen, heated	X	X	X	X	Multi-residue		
345	Breakfast tart/toaster pastry	X		X	X	Multi-residue		
347	Spaghetti, enriched, boiled	X		X	X	Multi-residue		
350	Fruit juice blend (100% juice), canned/bottled	X		X	X			
351	Juice, cranberry cocktail, bottled	X		X	X	Patulin		
352	Juice, orange, bottled/cartoned	X		X	X			
359	Salsa, tomato, bottled	X		X	X			
367	Soup, ramen noodles, prepared with water	X		X	X			
371	Candy bar, chocolate, nougat, with nuts	X		X	X			
372	Popcorn, microwave, butter-flavored	X	X	X	X			
374	Brown gravy, canned or bottled	X		X	X			
377	Salad dressing, Italian, regular	X		X	X			
378	Oil, olive	X		X	X			
379	Oil, vegetable	X		X	X			
385	Sorbet, fruit-flavored	X		X	X			
500	Alcohol, distilled, vodka	X		X	X			
501	Wine, red	X		X	X			
502	Wine, white	X		X	X			
503	Beverage, almond (non-dairy)	X		X	X			
504	Beverage, coconut water	X		X	X			
505	Beverage, energy	X		X	X			
506	Beverage, soy (non-dairy)	X	X	X	X			
507	Beverage, sports	X		X	X			
508	Carbonated beverage, lemon-lime, regular	X		X	X			

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
509	Meal replacement, liquid RTD, vanilla	X		X	X			
510	Powder, protein	X		X	X	M1		
511	Candies, fruit snacks	X		X	X			
512	Cereal, granola	X	X	X	X	Multi-residue		
513	Cereal, oat ring, honey	X	X	X	X	Multi-residue		
514	Cereal, shredded wheat, frosted	X	X	X	X	Multi-residue		
515	Cereal, whole wheat, cooked	X	X	X	X	Multi-residue		
516	Salad dressing, ranch, low-calorie	X		X	X			
517	Salad dressing, ranch, regular	X		X	X			
518	Sauce, soy	X	X	X	X			
519	Sauce, tomato, canned	X		X	X			
520	Sauce, tomato, pasta	X		X	X			
521	Yogurt, lowfat, vanilla	X		X	X			
522	Quinoa, cooked	X		X	X	Multi-residue		
523	Granola bar	X	X	X	X	Multi-residue		
524	Juice, lemon	X		X	X			
525	Juice, tomato-vegetable	X		X	X			
526	Nuts, almonds	X		X	X	Multi-residue		
527	Beans, black, canned	X	X	X	X	Multi-residue		
528	Beans, kidney, canned	X	X	X	X	Multi-residue		
529	Beans, pinto, canned	X	X	X	X	Multi-residue		
530	Beans, white, canned	X	X	X	X	Multi-residue		
531	Crackers, cheese	X		X	X			
532	Broth, chicken, carton	X		X	X			
533	Soup, broccoli cheese, canned	X		X	X			
534	Soup, clam chowder, New England, canned	X		X	X			
535	Soup, cream of mushroom, canned	X		X	X			
536	Soup, cream of, potato, canned	X		X	X			

Food No	Food Description	Multi-Residue Pesticide Screen	Acid Herbicides	Elements	Iodine	Mycotoxins	Radionuclides	Dioxin
537	Soup, vegetable beef, canned	X		X	X			
538	Soup, vegetable, canned	X		X	X			
539	Pasta, rice noodles, cooked	X		X	X			
540	Pasta, whole wheat, cooked	X		X	X			
541	Pie crust	X	X	X	X	Multi-residue		
542	Pudding, ready-to-eat, chocolate	X		X	X			
543	Luncheon meat, turkey	X		X	X			
701	BF, cereal, mixed, dry, prepared with water	X		X	X	Multi-residue		
711	BF, juice, pear	X		X	X	Patulin		
712	BF, juice, grape	X		X	X	Patulin		
721	BF, fruit yogurt dessert	X		X	X			X
728	BF, vegetables and turkey	X		X	X			X
731	BF, apples with fruit other than berries	X		X	X	Patulin		
732	BF, macaroni and cheese with vegetables	X		X	X	m1 + Multi-residue		X
733	BF, finger foods, puffed snack	X		X	X			
734	BF, infant formula, milk-based, powdered, prepared with water	X		X	X	M1		X
735	BF, infant formula, soy-based, powdered, prepared with water	X	X	X	X			X
736	BF, prunes	X		X	X			
737	BF, ravioli, cheese-filled, with tomato sauce	X		X	X			X
738	BF, water, baby, bottled	X		X	X			
900	Flour, white, all-purpose	X	X	X	X	Multi-residue		
903	Breadcrumbs	X	X	X	X	Multi-residue		

ANALYTES

Tables listing target analytes as of issuance of this document. Any alterations to these lists will be based on joint communication between CFSAN and the performing laboratory.

Elements		Element Speciation	Radionuclides	Mycotoxins
Ca	As	As(III)	137-Cs	Patulin
Mg	Cd	As(V)	134-Cs	Aflatoxin M1
Na	Cr	Monomethylarsonic acid (MMA)	103-Ru	Aflatoxin B1
K	Hg	Dimethylarsinic acid (DMA)	106-Ru	Aflatoxin B2
Sr	MN		131-I	Aflatoxin G1
Cu	Mo		90-Sr	Aflatoxin G2
Fe	Ni		40-K	Deoxynivalenol
P	Pb			Fumonisin B1
Zn	Se			Fumonisin B2
	V			Fumonisin B3
	U			Ochratoxin A
				Zearalonone
				T2 Toxin
				HT2 Toxin

Acid Herbicides Compounds

2,3,6-TBA	Imazamox	Dalapon
2,4,5-T	Imazapic	Dicamba
2,4,5-TB	Imazapyr	Dichlorprop
2,4,5-TBA	Imazethapyr	Diclofop
2,4-D	Picloram	Fenac
2,4-DB	Quinclorac	Haloxypop
4-CPA	Quizalofop	MCPA
Aminocyclopyrachlor	Diflufenzopyr	MCPB
Aminopyralid	Acifluorfen	Mecoprop
Clopyralid	Bromoxynil	PCP
Fluroxypyr	Bromoxynil	Silvex
Imazamethabenz	Chloramben	Triclopyr

Pesticides and Industrial Chemicals Targeted Compounds in Multi-Residue Screen.

2,3,5,6-Tetrachloroaniline	2,6-Dichlorobenzamide	2,6-DIPN (2,6-Diisopropyl-naphthalene)	3-Hydroxycarbofuran
Acephate	Acetamiprid	Acetochlor	Acibenzolar-S-methyl
Alachlor	Aldicarb	Aldicarb Sulfoxide	Aldoxycarb
alpha-BHC	Ametoctradin	Ametryn	Amicarbazone
Amitraz	Atrazine	Avermectin	Azinphos methyl
Azoxystrobin	Benalaxyl	Bendiocarb	Benfluralin
beta-BHC	Bifenazate	Bifenthrin	Bitertanol
Boscalid	Bromopropylate	Bromuconazole	Bupirimate
Buprofezin	Butachlor	Butocarboxim	Butralin
Cadusafos	Captan	Carbaryl	Carbendazim
Carbetamide	Carbofuran	Carboxin	Chlorantraniliprole
Chlorfenapyr	Chlorfenvinphos	Chlorfluzuron	Chlorimuron-ethyl
Chlorothalonil	Chlorotoluron	Chlorpropham	Chlorpyrifos
Chlorpyrifos-methyl	cis-Chlordane	cis-Permethrin	Clethodim
Clofentezine	Clothianidin	Coumaphos	Cumyluron
Cyazofamid	Cycloate	Cycloxydime	Cyfluthrin
Cymoxanil	Cypermethrin	Cyproconazole	Cyprodinil
Cyromazine	Dacthal (chlorthal-dimethyl)	Daimuron	DEF
delta-BHC	Deltamethrin	Desmedipham	Diafenthiuron
Diazinon	Dichlobenil	Dichlofluanid	Dichlorvos
Dicloran	Dicrotophos	Dieldrin	Diethofencarb
Difenoconazole	Diflubenzuron	Dimethachlor	Dimethoate
Dimethomorph	Diniconazole	Dinitramine	Dinotefuran
Dioxacarb	Diphenylamine	Dithianon	Diuron
DMST	DNOC	Dodine	Doramectin
Emamectin-Benzoate	Endosulfan I	Endosulfan II	Endosulfan sulfate
Endrin	EPN	Epoxyconazole	Eprinomectin
Ethiofencarb sulfoxide	Ethiolate	Ethion	Ethiprole
Ethirimol	Ethofumesate	Ethoprop	Ethoxyquin
Etofenprox	Etoxazole	Etridiazole	Famoxadone
Fenamidone	Fenamiphos	Fenarimol	Fenazaquin
Fenbuconazole	Fenbutatin oxide	Fenhexamid	Fenitrothion
Fenobucarb	Fenoxycarb	Fenpropathrin	Fenpropimorph
FenpyroximateE	Fenthion	Fenuron	Fenvalerate
Fipronil	Flonicamid	Flubendiamide	Flucythrinate
Fludioxonil	Fluensulfone	Flufenoxuron	Fluopicolide
Fluopyram	Fluoxastrobin	Fluquinconazole	Fluridone

Flusilazole	Flutolanil	Flutriafol	Fluvalinate
Fluxapyroxad	Folpet	Fomesafen	Forchlorfenuron
Formetanate	Fuberidazole	Furalaxyl	gamma-BHC (lindane)
Halofenozide	Heptachlor Epoxide	Hexachlorobenzene	Hexaconazole
Hexythiazox	Imazalil	Imazaquin	Imzasulfuron
Imidacloprid	Indoxacarb	Iprobenfos	Iprodione
Iprovalicarb	Isocarbamid	Isocarbophos	Isoprocab
Isoprothiolane	Ivermectin	Karbutilate	Kresoxim-methyl
lambda-Cyhalothrin	Linuron	Lufenuron	Malathion
Mandipropamide	Mepanipyrim	Mepronil	Metaflumizone
Metalaxyl	Metaldehyde	Metconazole	Methamidophos
Methfuroxam	Methidathion	Methiocarb	Methomyl
Methoprene	Methoxyfenozide	Methyl Parathion	Metolachlor
Metoxuron	Metrafenone	Metribuzin	Metsulfuron-methyl
Mevinphos	MevinphosE	Mexacarbate	MGK-264
Monocrotophos	Moxidectin	Myclobutanil	Napropamide
Nitenpyram	Nitrofen	Novaluron	Nuarimol
o,p'-DDE	o,p'-DDT	o,p'-Methoxychlor	Omethoate
o-Phenylphenol	Oxadixyl	Oxamyl	Oxyfluorfen
p,p'-DDE	p,p'-DDT	p,p'-Dicofol	p,p'-Methoxychlor
Pacllobutrazol	Parathion	Penconazole	Pencycuron
Pendimethalin	Pentachloroaniline	Pentachloroanisole	Pentachlorobenzene
Pentachlorobenzonitrile	Pentachlorothioanisole	Penthiopyrad	Phenmedipham
Phorate sulfone	Phosalone	Phosmet	Phoxim
Picoxystrobin	Piperonyl Butoxide	Pirimicarb	Pirimiphos-ethyl
Pirimiphos-methyl	Prallethrin	Prochloraz	Procymidone
Profenofos	Prometryn	Pronamide (propyzamide)	Propamocarb
Propanil	Propargite	Propiconazole	Propoxur
Proquinazid	Prothiofos	Pymetrozine	Pyraclostrobin
Pyridaben	Pyrimethanil	Pyriproxyfen	Quinalphos
Quinoxifen	Quintozene	Resmethrin	Rotenone
Siduron	Simazine	Spinetoram	Spinosad
Spirodiclofen	Spiromesifen	Spirotetramat	Spiroxamine
Tebuconazole	Tebufenozide	Tebufenpyrad	Tebuthiuron
Tecnazene	Teflubenzuron	Temephos	Tepraloxydim
Terbutylazine	Tetraconazole	Tetradifon	Tetramethrin
Thiabendazole	Thiacloprid	Thiamethoxam	Thiobencarb
Thiodiarb	Thiophanate-methyl	THPI (Tetrahydrophthalimide)	Tolclofos-methyl
Tolyfluanid	trans-Chlordane	trans-Permethrin	Triadimefon
Triadimenol	Triallate	Triazophos	Trichlorfon
Tricyclazole	Tridemorph	Trifloxystrobin	Triflumizole

Trifluralin	Triflusulfuron methyl ester	Triticonazole	Vinclozolin
Zoxamide			