United States Department of Agriculture
Agricultural Marketing Service, Science & Technology
Pesticide Data Program

SOP No.: PDP-QC-13		Page 1 of 24
Title: Required Compounds, Marker Pesticides, Process Control Compounds, and PDP Commodity Groupings		
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1. Purpose:

To provide a reference of PDP required compounds, a listing of available marker pesticides and process controls, and specification of PDP commodity groupings.

2. Scope:

This standard operating procedure (SOP) shall be followed by all analytical laboratories conducting residue studies for PDP, including support laboratories conducting stability or other types of studies that may impact the program. For multi-residue commodity specific laboratories, refer to the appropriate PDP-QC-13 addendum(s) for required testing profiles.

3. Outline of Procedure:

4. References:

- USDA/AMS PDP Conference Call, April 19, 2007
- USDA/AMS PDP Quality Assurance/Technical Meeting, March 20-22, 2007, Crystal City, VA
- USDA/AMS Combined Microbiological Data Program/PDP Technical-Quality Assurance Meeting, March 27-31, 2006, Richmond, VA
- USDA/AMS PDP Quality Assurance-Technical Meeting, March 22-24, 2005, Manassas, VA
- PDP QA/Technical Meeting, May 7-9, 2003, Manassas, VA
- USDA/AMS PDP Quality Assurance (QA)/Technical Meeting, April 9-11, 2002
- USDA/AMS PDP Quality Assurance (QA)/Technical Meeting, February 21-22, 2001
- Federal/State Meeting, October 31 – November 2, 2000
- USDA/U.S. EPA/U.S. FDA Tolerance Meeting, Minutes, September 14, 1995

- U.S. EPA, Tolerances and Exemptions from Tolerances for Pesticide Chemicals in or on Raw Agricultural Commodities, 40 CFR part 180

5. Specific Procedures:

This SOP represents minimum PDP requirements and is presented as a general guideline. Each laboratory shall have written procedures that provide specific details concerning how the procedure has been implemented in that laboratory.

5.1 Required Compounds

5.1.a Refer to applicable SOP PDP-QC-13 addenda for commodity specific testing profiles based on established tolerances.

5.1.b Priority Levels

5.1.b.1 Each analyte of interest for each assigned commodity shall be designated with a priority level by MPO. Priority levels for the individual compounds in the commodity-specific memoranda that are posted to the PDP Extranet are based on data needs identified by data users/stakeholders (e.g., U.S. Environmental Protection Agency, U.S. Food and Drug Administration, grower groups, industry, consumer/environmental groups) and current registrations. It is recognized that not all compounds/metabolites on a given list are amenable to multiresidue testing and final screening lists will be determined based on method validation and ongoing testing results.

5.1.b.2 In the various commodity-specific memoranda (separate documents posted to the PDP Extranet) compounds identified as Priority 1 compounds are the most critical and those identified as Priority 4 are the least critical. The priority level is a combination of data need and expected feasibility of current methods to recover a given compound. General priority levels are assigned according to the following protocol:

5.1.b.2.a Priority 1 compounds are required for all commodities and are critical because they are scheduled for upcoming review from 2007-2011 (refer to EPA Office of Pesticide Programs Registration Review Schedule for Conventional Pesticides

(http://www.epa.gov/oppsrrd1/registration_review/schedule_summary.pdf)). Priority 1 compounds include:

5.1.b.2.a.1 "Core" spiking compounds (i.e., endosulfan I, malathion, methomyl).

5.1.b.2.a.2 Pyrethroids [(allethrin, bifenthrin, cyfluthrin, cyhalothrin, cypermethrin, deltamethrin, fenpropathrin, fenvalerate /esfenvalerate, fluvalinate, permethrin, phenothrin, prallethrin, resmethrin, tefluthrin, tralomethrin (as deltamethrin)].

5.1.b.2.a.3 Selected organophosphates and carbamates and their associated metabolites that are multiresidue amenable (azinphos methyl and its o-analog, carbofuran and its 3-hydroxy metabolite, chlorpyrifos and its o-analog, DDVP, phosmet and its o-analog).

5.1.b.2.b Priority 2 compounds include other multiresidue-amenable compounds that are highly important because they have registrations for that commodity and have upcoming reviews scheduled (refer to EPA Office of Pesticide Programs Registration Review Schedule for Conventional Pesticides (http://www.epa.gov/oppsrrd1/registration_review/schedule_summary.pdf)), or have been identified by a stake holder as a highly important data need.

5.1.b.2.c Priority 3 compounds include other analytes with registrations or action levels (environmental contaminants/extraneous residues including aldrin, BHC, chlordane, DDD, DDE, DDT, dieldrin, endrin, heptachlor, and heptachlor epoxide) for the given commodity that are routinely analyzed by multi-residue methods. Cyphenothrin, imiprothrin, and tetramethrin are also included as Priority level 3 compounds for all commodities.

5.1.b.2.d Priority 4 compounds include pesticides that have current registrations, but likely require single analyte methods (e.g., glyphosate/AMPA, paraquat/diquat, EBDCs).

5.1.b.3 Laboratories shall attempt to include all Priority 1 compounds. Laboratories should attempt to include all Priority 2 compounds and should attempt to include as many Priority 3 compounds as possible/feasible.

5.1.b.4 In some cases, PDP will authorize the development of new methods to detect certain compounds (e.g., triazole metabolites, phenoxies, formetanate hydrochloride)

5.2 Marker Pesticides

5.2.a Assigning Compounds to Marker Groups

5.2.a.1 Compounds are placed into marker groups based on a combination of analyte chemistry and method performance behavior. Initial compound designations are made by the Technical Advisory Group (TAG), with applicable analytical laboratory input based on known method behavior, if those data are available. For new compounds, behavior data may not be available.

5.2.a.2 Final marker group assignment, and any marker group assignment changes, are based on laboratory experience. MPO maintains an "Effective Date" field that tracks initial group assignment as well as any changes in that initial assignment.

5.2.b Multi-residue Screening

5.2.b.1 A laboratory may choose to use marker groups, rotate spike mixtures between analytical sets, or spike all compounds analyzed, as long as each extraction/detection system is adequately represented within each set.

5.2.b.2 Each laboratory shall spike and run the designated core markers with each set. For laboratories that spike marker groups or rotate spike mixes, the core markers are run in conjunction with spiking marker groups or rotating spike mixes. For laboratories that spike all compounds, the core markers are included as a matter of practice.

5.2.b.3 The following compounds are designated as core markers: endosulfan I, malathion, and methomyl. Core markers are intended to provide program-wide recovery data from all PDP laboratories across all of the PDP commodities.

5.2.b.4 For laboratories using marker groups, each laboratory shall select at least one compound from each applicable group in Table 1 to serve as a marker pesticide. The core markers may be used to represent an applicable group. Applicable groups are those that contain at least one compound analyzed by that laboratory for that commodity. For each applicable group, a marker pesticide shall be included for each detection system used to analyze that group.

5.2.b.5 For laboratories rotating spike mixtures between analytical sets, each laboratory shall ensure that in addition to the core markers, each extraction/detection system is adequately represented within each set.

5.2.b.6 For laboratories analyzing multiple commodities, a single list of marker compounds may be specified to represent all commodities. The lists of required compounds for commodities analyzed should be combined and at least one compound from each applicable group chosen to serve as a marker compound.[1]

5.2.b.7 "Marginal performing analytes" are analytes which do not meet recovery and/or precision criteria during method validation or continuing quality control (QC) as specified in SOPs PDP-QC-07 (method validation) and PDP-QC-04 (continuing QC). Marginal performing analytes are determined in conjunction with MPO.

Table 1: PDP Compound Groups for Fruit and Vegetables

Group	Description
1	Phthalimides, conazoles and metabolites, carbamaldehydes, phenyl pyrroles, methoxy-acetamides, and neonicotinyls
2	Cyano/nitrile group(s) attached to double bond
3	Halogenated aromatics and chlorinated cyclics/cyclodienes
7	Dinitroanilines
8	Pyrethroids and metabolites and synergists
9	Triazines
11	Organophosphates and metabolites
14	Carbamates, thiocarbamates and metabolites

1 For laboratories analyzing multiple commodities, compounds in single groupings only need apply to that required commodity.

Group	Description
16	Uracils/ureas, imidazolinones, diacylhydrazines, and sulfonyl ureas
17	Nitrogenous heterocyclics
20	Phenoxy acids, ethanesulfonic acids (ESA), and oxanilic acid s(OA)
21	Oxyhydrocarbons
22	Strobilurins
27	Tetronic acids
28	Cyclohexenone oxime

Note: Missing group numbers are attributed to the consolidation of groups. For example, Group 15, Thiocarbamates, was consolidated into Group 14, Carbamates

Table 2: PDP Multi-residue Compound Groupings for Fruit and Vegetables

Compound Name	Molecular Formula	Chemical Family	Group
1-naphthol	$C_{10}H_8O$	carbamate metabolite	14
1,2,4-triazole	$C_2H_3N_3$	triazole metabolite	1
2,4-DB	$C_{10}H_{10}Cl_2O_3$	phenoxy acid	20
2,4-D	$C_8H_6Cl_2O_3$	phenoxy acid	20
2,4,5-T	$C_8H_5Cl_3O_3$	phenoxy acid	20
3-hydroxycarbofuran	$C_{12}H_{15}NO_4$	carbamate metabolite	14
5-hydroxythiabendazole	$C_{10}H_8N_3OS$	carbamate	1
Acephate	$C_4H_{10}NO_3PS$	phosphoramidothioic acid	11
Acetamiprid	$C_{10}H_{11}ClN_4$	neonicotinyls	1
Acetochlor	$C_{14}H_{20}ClNO_2$	chloroacetanilide	1
Acetochlor ethanesulfonic acid	$C_8H_{21}NO_5S$	chloroacetanilide metabolite	20
Acetochlor oxanilic acid	$C_{14}H_{19}NO_4$	chloroacetanilide metabolite	20
Acibenzolar-S-methyl	$C_8H_6N_2OS_2$	thiadiazole	1
Acifluorfen	$C_{14}H_{21}NO_5S$	diphenyl ether	3
Alachlor	$C_{14}H_{20}ClNO_2$	acetamide	1
Alachlor ethanesulfonic acid	$C_8H_{21}NO_5S$	chloroacetanilide metabolite	20

Compound Name	Molecular Formula	Chemical Family	Group
Alachlor oxanilic acid	$C_{14}H_{19}NO_4$	chloroacetanilide metabolite	20
Aldicarb	$C_7H_{14}N_2O_2S$	carbamate	14
Aldicarb sulfone	$C_7H_{14}N_2O_4S$	carbamate	14
Aldicarb sulfoxide	$C_7H_{14}N_2O_3S$	carbamate	14
Aldrin	$C_{12}H_8Cl_6$	cyclodiene	3
Allethrin	$C_{19}H_{26}O_3$	pyrethroid	8
Ametryn	$C_9H_{17}N_5S$	triazine	9
Amitraz	$C_{19}H_{23}N_3$	amidine	2
Anilazine	$C_9H_5Cl_3N_4$	triazine	9
Atrazine	$C_8H_{14}ClN_5$	triazine	9
Azinphos ethyl	$C_{12}H_{16}N_3O_3PS_2$	organophosphate	11
Azinphos methyl	$C_{10}H_{12}N_3O_3PS_2$	benzotriazine	11
Azinphos methyl O-analog	$C_{10}H_{12}N_3O_4PS$	oxon	11
Azoxystrobin	$C_{22}H_{17}N_3O_5$	strobilurin	22
Bendiocarb	$C_{11}H_{13}NO_4$	carbamate	14
Benfluralin	$C_{13}H_{16}F_3N_3O_4$	dinitroaniline	7
Benomyl	$C_{14}H_{18}N_4O_3$	benzimidazole	14
Benoxacor	$C_{11}H_{11}Cl_2NO_2$	benzoxazine	1
Bensulfuron methyl	$C_{16}H_{18}N_4O_7S$	sulfonyl urea	16
Bensulide	$C_{14}H_{24}NO_4PS_3$	organophosphate	11
Bentazon	$C_{10}H_{12}N_2O_3S$	thiadiazinone dioxide	17
BHC alpha	$C_6H_6Cl_6$	hexane ring	3
BHC beta	$C_6H_6Cl_6$	hexane ring	3
Bifenazate	$C_{17}H_{20}N_2O_3$	hydrazine carboxylate	14
Bifenthrin	$C_{23}H_{22}ClF_3O_2$	pyrethroid	8
Bitertanol	$C_{20}H_{23}N_3O_2$	triazole	1
Boscalid	$C_{18}H_{12}Cl_2N_2O$	anilide/pyridine	1
Bromacil	$C_9H_{13}BrN_2O_2$	uracil	16
Bromoxynil	$C_7H_3Br_2NO$	phenol	20
Bromuconazole-46	$C_{13}H_{12}BrCl_2N_3O$	conazole	1
Bromuconazole-47	$C_{13}H_{12}BrCl_2N_3O$	conazole	1
Buprofezin	$C_{16}H_{23}N_3OS$	thiadiazinone	17

Compound Name	Molecular Formula	Chemical Family	Group
Butachlor	$C_{17}H_{26}ClNO_2$	chloroacetanilide	1
Butylate	$C_{11}H_{23}NOS$	thiocarbamate	14
Cadusafos	$C_{10}HOPS_2$	phosphorodithionate	11
Captafol	$C_{10}H_9Cl_4NO_2S$	phthalimide	1
Captan	$C_9H_8Cl_3NO_2S$	phthalimide	1
Carbaryl	$C_{12}H_{11}NO_2$	carbamate	14
Carbendazim	$C_9H_9N_3O_2$	benzimidazole	14
Carbofuran	$C_{12}H_{15}NO_3$	carbamate	14
Carbophenothion	$C_{11}H_{16}ClO_2PS_3$	organophosphate	11
Carboxin	$C_{12}H_{13}NO_2S$	carboxamide	1
Carfentrazone ethyl	$C_{15}H_{14}Cl_2F_3N_3O_3$	fluorophenyl triazole	1
Chloramben	$C_7H_5Cl_2NO_2$	benzoic acid	20
Chlordane cis	$C_{10}H_6Cl_8$	cyclodiene	3
Chlordane trans	$C_{10}H_6Cl_8$	cyclodiene	3
Chlorethoxyfos	$C_6H_{11}Cl_4O_3PS$	phosphorothioate	11
Chlorfenapyr	$C_{15}H_{11}BrClF_3N_2O$	pyrrole	1
Chlorfenvinphos total	$C_{12}H_{14}Cl_3O_4P$	organophosphate	11
Chlorimuron ethyl	$C_{15}H_{15}ClN_4O_6S$	sulfonyl urea	16
Chloroneb	$C_8H_8Cl_2O_2$	chlorobenzene	3
Chlorothalonil	$C_8Cl_4N_2$	phthalimide	2
Chlorpropham	$C_{10}H_{12}ClNO_2$	carbamate	14
Chlorpyrifos	$C_9H_{11}Cl_3NO_3PS$	phosphorothionic acid	11
Chlorpyrifos methyl	$C_7H_7Cl_3NO_3PS$	phosphorothionic	11
Chlorpyrifos O-analog	$C_9H_{11}Cl_3NO_4P$	oxon	11
Clethodim	$C_{17}H_{26}ClNO_3S$	cyclohexene oxime	28
Clodinafop propargyl	$C_{17}H_{13}ClFNO_4$	aryloxyphenoxypropionic acid	20
Clofentezine	$C_{14}H_8Cl_2N_4$	tetrazine	Single
Clomazone	$C_{12}H_{14}ClNO_2$	pyridazone	17
Clopyralid	$C_6H_3Cl_2NO_2$	pyridinecarboxylic acid	20
Clothianidin	$C_6H_8ClN_5O_2S$	neonicotinyl	1
Coumaphos	$C_{14}H_{16}ClO_5PS$	posphorothioate	11

Compound Name	Molecular Formula	Chemical Family	Group
Coumaphos O-analog	$C_{14}H_{16}ClO_6P$	oxon	11
Cyanazine	$C_9H_{13}ClN_6$	triazine	9
Cyazofamid	$C_{13}H_{13}ClN_4O_2S$	imidazole	1
Cycloate	$C_{11}H_{21}NOS$	thiocarbamate	14
Cyfluthrin	$C_{22}H_{18}Cl_2FNO_3$	pyrethroid	8
Cyhalothrin (lambda)	$C_{23}H_{19}ClF_3NO_3$	pyrethroid	8
Cyhalothrin (lambda epimer R157836)	$C_{23}H_{19}ClF_3NO_3$	pyrethroid	8
Cyhalothrin total (L-cyhalothrin + R157836 epimer)	$C_{23}H_{19}ClF_3NO_3$	pyrethroid	8
Cymoxanil	$C_7H_{10}N_4O_3$	cyanoacetamide	2
Cypermethrin	$C_{22}H_{19}Cl_2NO_3$	pyrethroid	8
Cyphenothrin	$C_{24}H_{25}NO_3$	pyrethroid	8
Cyproconazole	$C_{15}H_{18}ClN_3O$	conazole	1
Cyprodinil	$C_{14}H_{15}N_3$	anilinopyrimidine	17
Cyromazine	$C_6H_{10}N_6$	triazine	9
DCPA	$C_{10}H_6Cl_4O_4$	phthalic acid	3
DCPA mono acid	$C_9H_4Cl_4O_4$	dicarboxylic acid	20
DDD o,p'	$C_{14}H_{10}Cl_4$	bridged biphenyl	3
DDD p,p'	$C_{14}H_{10}Cl_4$	bridged biphenyl	3
DDE o,p'	$C_{14}H_8Cl_4$	bridged biphenyl	3
DDE p,p'	$C_{14}H_8Cl_4$	bridged biphenyl	3
DDT o,p'	$C_{14}H_9Cl_5$	bridged biphenyl	3
DDT p,p'	$C_{14}H_9Cl_5$	bridged biphenyl	3
DEF (Tribufos)	$C_{12}H_{27}OPS_3$	organophosphate	11
Deltamethrin	$C_{22}H_{19}Br_2NO_3$	pyrethroid	8
Demeton	$C_8H_{19}O_3PS_2$	phosphorothioate	11
Desethyl atrazine	$C_6H_{10}ClN_5$	triazine metabolite	9
Desethyl-desisopropyl atrazine	$C_3H_4ClN_5$	triazine metabolite	9
Desisopropyl atrazine	$C_5H_8ClN_5$	triazine metabolite	9
Desmedipham	$C_{16}H_{16}N_2O_4$	carbamate	14

Compound Name	Molecular Formula	Chemical Family	Group
Diazinon	$C_{12}H_{21}N_2O_3PS$	phosphorothioate	11
Diazinon O-analog	$C_{12}H_{21}N_2O_4P$	oxon	11
Dicamba	$C_8H_6Cl_2O_3$	benzoic acid	20
Dichlobenil	$C_7H_3Cl_2N$	nitrile	2
Dichlorprop	$C_9H_8Cl_2O_3$	phenoxy acid	20
Dichlorvos (DDVP)	$C_4H_7Cl_2O_4P$	phosphoric acid	11
Diclofop methyl	$C_{16}H_{14}Cl_2O_4$	aryloxyphenoxypropionic acid	20
Dicloran	$C_6H_4Cl_2N_2O_2$	nitroaniline	7
Dicofol o,p'	$C_{14}H_9Cl_5O$	bridged biphenyl	3
Dicofol p,p'	$C_{14}H_9Cl_5O$	bridged biphenyl	3
Dicrotophos	$C_8H_{16}NO_5P$	organophosphate	11
Dieldrin	$C_{12}H_8Cl_6O$	cyclodiene	3
Difenoconazole	$C_{19}H_{17}Cl_2N_3O_3$	triazole	1
Diflubenzuron	$C_{14}H_9ClF_2N_2O_2$	urea	16
Diflufenzopyr	$C_{15}H_{12}F_2N_4O_3$	urea	16
Dimethenamid	$C_{12}H_{18}ClNO_2S$	acetamide	1
Dimethenamid ethanesulfonic acid	$C_{12}H_{19}NO_5S_2$	acetamide metabolite	20
Dimethenamid oxanilic acid	$C_{12}H_{17}NO_4S$	acetamide metabolite	20
Dimethenamid P	$C_{12}H_{18}ClNO_2S$	amide	1
Dimethoate	$C_5H_{12}NO_3PS_2$	phosphorodithionic acid	11
Dimethomorph	$C_{21}H_{22}ClNO_4$	chlorophenyl morpholine	3
Dinoseb	$C_{10}H_{12}N_2O_5$	phenol	20
Dinotefuran	$C_7H_{14}N_4O_3$	neonicotinyl	1
Diphenamid	$C_{16}H_{17}NO$	acetamide	1
Diphenylamine (DPA)	$C_{12}H_{11}N$	amine	3
Disulfoton	$C_8H_{19}O_2PS_3$	phosphorodithioate	11
Disulfoton sulfone	$C_8H_{19}O_4PS$	sulfone	11
Disulfoton sulfoxide	$C_8H_{19}O_3PS_3$	sulfoxide	11
Diuron	$C_9H_{10}Cl_2N_2O$	urea	16
Endosulfan I	$C_9H_6Cl_6O_3S$	cyclodiene	3

Compound Name	Molecular Formula	Chemical Family	Group
Endosulfan II	$C_9H_6Cl_6O_3S$	cyclodiene	3
Endosulfan sulfate	$C_9H_6Cl_6O_4S$	cyclodiene	3
Endrin	$C_{12}H_8Cl_6O$	cyclodiene	3
Epoxiconazole	$C_{17}H_{13}ClFN_3O$	conazole	1
EPTC	$C_9H_{19}NOS$	thiocarbamate	14
Esfenvalerate	$C_{25}H_{22}ClNO_3$	pyrethroid	8
Ethalfluralin	$C_{13}H_{14}F_3N_3O_4$	dinitroaniline	7
Ethiofencarb	$C_{11}H_{15}NO_2S$	carbamate	14
Ethion	$C_9H_{22}O_4P_2S_4$	phosphorodithioic acid	11
Ethion di oxon	$C_9H_{22}O_6P_2S_2$	oxon	11
Ethion mono oxon	$C_9H_{22}O_5P_2S_3$	oxon	11
Ethofumesate	$C_{13}H_{18}O_5S$	benzofuranyl alkylsulfonate	11
Ethoprop	$C_8H_{19}O_2PS_2$	dipropyl phosphorodithioate	11
Ethoxyquin	$C_{14}H_{19}NO$	quinoline	Single
Etoxazole	$C_{21}H_{23}F_2NO_2$	oxazole	1
Etridiazole	$C_5H_5Cl_3N_2OS$	thiadiazole	1
Famoxadone	$C_{22}H_{18}N_2O_4$	dicarboximide/oxazole	1
Fenamidone	$C_{17}H_{17}N_3OS$	imidazole	1
Fenamiphos	$C_{13}H_{22}NO_3PS$	phosphoramidate	11
Fenamiphos sulfone	$C_{13}H_{22}NO_5PS$	sulfone	11
Fenamiphos sulfoxide	$C_{13}H_{22}NO_4PS$	sulfoxide	11
Fenarimol	$C_{17}H_{12}Cl_2N_2O$	pyrimidine	3
Fenbuconazole	$C_{19}H_{17}ClN_4$	conazole	1
Fenhexamid	$C_{14}H_{17}Cl_2NO_2$	chlorocarboximide	1
Fenitrothion	$C_9H_{12}NO_5PS$	phosphorothioate	11
Fenitrothion O-analog	$C_9H_{12}NO_6P$	oxon	11
Fenoxaprop ethyl	$C_{18}H_{16}ClNO_5$	aryloxyphenoxypropionic acid	20
Fenpropathrin	$C_{22}H_{23}NO_3$	pyrethroid	8
Fenpyroximate	$C_{24}H_{27}N_3O_4$	phenoxypyrazol	1
Fenthion	$C_{10}H_{15}O_3PS_2$	phosphorothioate	11

Compound Name	Molecular Formula	Chemical Family	Group
Fenthion O-analog	$C_{10}H_{15}O_4PS$	oxon	11
Fenuron	$C_9H_{12}N_2O$	urea	16
Fenvalerate	$C_{25}H_{22}ClNO_3$	pyrethroid	8
Fipronil	$C_{12}H_4C_{l2}F_6N_4OS$	phenyl pyrazole	1
Flonicamid	$C_9H_6F_3N_3O$	nicotinoid	1
Fluazifop butyl	$C_{15}H_{12}F_3NO_4$	pyridine	17
Fluazinam	$C_{13}H_4C_{l2}F_6N_4O_4$	pyridine	17
Fludioxonil	$C_{12}H_6F_2N_2O_2$	phenyl pyrrole	1
Flufenacet	$C_{14}H_{13}F_4N_3O_2S$	anilide	1
Flufenacet ethanesulfonic acid	$C_{11}H_{14}FNO_4S$	anilide metabolite	20
Flufenacet oxanilic acid	$C_{11}H_{12}FNO_3$	anilide metabolite	20
Flumioxazin	$C_{19}H_{15}FN_2O_2$	N-phenylphthalimide	1
Flumetsulam	$C_{12}H_9F_2N_5O_2S$	pyrimidine	1
Fluometuron	$C_{10}H_{11}F_3N_2O$	urea	16
Fluoxastrobin	$C_{21}H_{16}ClFN_4O_5$	strobilurin	22
Fluridone	$C_{19}H_{14}F_3NO$	pyridine	17
Fluroxapyr-1-methylheptyl ester	$C_{15}H_{22}Cl_2FN_2O_3$	pyridine	17
Flutolanil	$C_{17}H_{16}F_3NO_2$	caboxamide	1
Fluvalinate	$C_{26}H_{22}ClF_3N_2O_3$	pyrethroid	8
Folpet	$C_9H_4Cl_3NO_2S$	phthalimide	1
Fonofos	$C_{10}H_{15}OPS_2$	phosphorodithioic acid	11
Fonofos O-analog	$C_{10}H_{15}O_2PS$	oxon	11
Forchlorfenuron	$C_{12}H_{10}ClN_3O$	phenyl urea	16
Formetanate	$C_{11}H_{15}N_3O_2$	formamidine	Single
Halosulfuron	$C_{12}H_{13}ClN_6O_7S$	sulfonyl urea	16
Halosulfuron methyl	$C_{12}H_{13}ClN_6O_7S$	sulfonyl urea	16
Heptachlor	$C_{10}H_5Cl_7$	cyclodiene	3
Heptachlor epoxide	$C_{10}H_5Cl_7O$	cyclodiene	3
Hexachlorobenzene (HCB)	C_6Cl_6	benzene ring	3
Hexaconazole	$C_{14}H_{17}Cl_2N_3O$	conazole	1

Compound Name	Molecular Formula	Chemical Family	Group
Hexazinone	$C_{12}H_{20}N_4O_2$	triazine	9
Hexythiazox	$C_{17}H_{21}ClN_2O_2S$	thiazolidine carboxamide	1
Hydroprene	$C_{17}H_{30}O_2$	oxyhydrocarbon	21
Hydroxy atrazine	$C_8H_{15}N_5O$	triazine metabolite	9
Imazalil	$C_{14}H_{14}Cl_2N_2O$	conazole	1
Imazamethabenz acid	$C_{15}H_{18}N_2O_3$	imidazolinone	16
Imazamethabenz methyl	$C_{16}H_{20}N_2O_3$	imidazolinone	16
Imazamox	$C_{15}H_{19}N_3O_4$	imidazolinone	16
Imazapic	$C_{14}H_{17}N_3O_3$	imidazolinone	16
Imazapyr	$C_{13}H_{15}N_3O_3$	imidazolinone	16
Imazaquin	$C_{17}H_{17}N_3O_3$	imidazolinone	16
Imazethapyr	$C_{15}H_{19}N_3O_3$	imidazolinone	16
Imidacloprid	$C_9H_{10}ClN_5O_2$	neonicotinyl	1
Indoxacarb	$C_{22}H_{17}ClF_3N_3O_7$	carbamate	14
Iprodione	$C_{13}H_{13}Cl_2N_3O_3$	dicarboximide	1
Iprodione metabolite isomer	$C_{13}H_{13}Cl_2N_3O_3$	dicarboximide	1
Isofenphos	$C_{15}H_{24}NO_4PS$	organophosphate	11
Isofenphos O-analog	$C_{15}H_{24}NO_5P$	oxon	11
Isoxaflutole	$C_{15}H_{12}F_3NO_4S$	cyclopropylisoxazole	17
Kresoxim methyl	$C_{18}H_{19}NO_4$	strobilurin	22
Lactofen	$C_{19}H_{15}ClF_3NO_7$	flurodiphenyl ether	3
Lindane (BHC gamma)	$C_6H_6Cl_6$	hexane ring	3
Linuron	$C_9H_{10}Cl_2N_2O_2$	urea	16
Malathion	$C_{10}H_{19}O_6PS_2$	phosphorodithioate	11
Malathion O-analog	$C_{10}H_{19}O_7PS$	oxon	11
MCPA	$C_9H_9ClO_3$	phenoxy	20
MCPB	$C_{11}H_{13}ClO_3$	phenoxy acid	20
Mecoprop (MCPP)	$C_{10}H_{11}ClO_3$	phenoxy acid	20
Mepanipyrim	$C_{14}H_{13}N_3$	pyrimidine	17
Metalaxyl	$C_{15}H_{21}NO_4$	acylalanine	1
Methamidophos	$C_2H_8NO_2PS$	phosphoramidothioic acid	11
Methidathion	$C_6H_{11}N_2O_4PS_3$	phosphorodithioate	11
Methidathion O-analog	$C_6H_{11}N_2O_5PS_2$	oxon	11

Compound Name	Molecular Formula	Chemical Family	Group
Methiocarb	$C_{11}H_{15}NO_2S$	carbamate	14
Methomyl	$C_5H_{10}N_2O_2S$	carbamate	14
Methoprene	$C_{19}H_{34}O_3$	oxyhydrocarbon	21
Methoxychlor olefin	$C_{16}H_{14}Cl_2O_2$	bridged biphenyl	3
Methoxychlor p,p'	$C_{16}H_{15}Cl_3O_2$	bridged biphenyl	3
Methoxychlor Total	$C_{16}H_{15}Cl_3O_2$	bridged biphenyl	3
Methoxyfenozide	$C_{22}H_{28}N_2O_3$	diacylhydrazine	16
Methyl pentachlorophenyl sulfide (MPCPS, metabolite of PCNB)	$C_7H_3Cl_5S$	benzene ring	3
Metolachlor	$C_{15}H_{22}ClNO_2$	acetamide	1
Metolachlor ethanesulfonic acid	$C_{15}H_{23}NO_5S$	chloroacetanilide metabolite	20
Metolachlor oxanilic acid	$C_{15}H_{21}NO_4$	chloroacetanilide metabolite	20
Metribuzin	$C_8H_{14}N_4OS$	triazines	9
Metsulfuron methyl	$C_{14}H_{15}N_5O_6S$	sulfonyl urea	16
Mevinphos E/Z	$C_7H_{13}O_6P$	butenoic acid	11
MGK-264	$C_{17}H_{25}NO_2$	synergist	8
MGK-326 (Dipropyl isocinchomeronate)	$C_{13}H_{17}NO_4$	synergist	8
Mirex	$C_{10}Cl_{12}$	cyclodiene	3
Molinate	$C_9H_{17}NO_5$	thiocarbamate	14
Monocrotophos	$C_7H_{14}NO_5P$	phosphoric acid	11
Monuron	$C_9H_{11}ClN_2O$	urea	16
Myclobutanil	$C_{15}H_{17}ClN_4$	triazole	1
Napropamide	$C_{17}H_{21}NO_2$	amide	1
Naptalam (Alanap)	$C_{18}H_{13}NO_3$	amide	1
Neburon	$C_{12}H_{16}C_{l2}N_2O$	urea	16
Nicosulfuron	$C_{15}H_{18}N_6O_6S$	sulfonyl urea	16
Nitrapyrin	$C_6H_3Cl_4N$	pyridine	17
Norflurazon	$C_{12}H_9ClF_3N_3O$	pyridazinone	17

Compound Name	Molecular Formula	Chemical Family	Group
Norflurazon desmethyl	$C_{11}H_7ClF_3N_3O$	pyridazinone	17
Novaluron	$C_{17}H_9ClF_8N_2O_4$	benzoyl urea	16
Omethoate	$C_5H_{12}NO_4PS$	phosphorothioate	11
o-Phenylphenol	$C_{12}H_{10}O$	biphenyl	3
Oryzalin	$C_{12}H_{18}N_4O_6S$	dinitroaniline	7
Oxadiazon	$C_{15}H_{18}Cl_2N_2O_3$	oxadiazon	1
Oxadixyl	$C_{14}H_{18}N_2O_4$	oxazolidine	1
Oxamyl	$C_7H_{13}N_3O_3S$	carbamate	14
Oxamyl oxime	$C_5H_{10}N_2O_2S$	carbamate	14
Oxychlordane	$C_{10}H_4Cl_8O$	cyclodiene	3
Oxydemeton methyl	$C_6H_{15}O_4PS_2$	organophosphate	11
Oxydemeton methyl sulfone	$C_6H_{15}O_5PS_2$	phosphorothioate	11
Oxyfluorfen	$C_{15}H_{11}ClF_3NO_4$	diphenyl ether	3
Parathion ethyl	$C_{10}H_{14}NO_5PS$	phosphorothionic acid	11
Parathion methyl	$C_8H_{10}NO_5PS$	phosphorothionic acid	11
Parathion methyl O-analog	$C_8H_{10}NO_6P$	oxon	11
Parathion O-analog	$C_{10}H_{14}NO_6P$	oxon	11
Pebulate	$C_{10}H_{21}NOS$	thiocarbamate	14
Pendimethalin	$C_{13}H_{19}N_3O_4$	dinitroaniline	7
Pentachloroaniline (PCA)	$C_6H_2Cl_5N$	aniline	3
Pentachlorobenzene (PCB)	C_6HCl_5	benzene ring	3
Permethrin cis	$C_{21}H_{20}Cl_2O_3$	pyrethroid	8
Permethrin total	$C_{21}H_{20}Cl_2O_3$	pyrethroid	8
Permethrin trans	$C_{21}H_{20}Cl_2O_3$	pyrethroid	8
Phenmedipham	$C_{16}H_{16}N_2O_4$	carbamate	14
Phenothrin	$C_{23}H_{26}O_3$	pyrethroid	8
Phenthoate	$C_{12}H_{17}O_4PS_2$	organophosphate	11
Phorate	$C_7H_{17}O_2PS_3$	phosphorodithionic acid	11
Phorate O-analog	$C_7H_{17}O_3PS_2$	oxon	11
Phorate sulfone	$C_7H_{17}O_4PS_3$	sulfone	11
Phorate sulfoxide	$C_7H_{17}O_3PS_2$	sulfoxide	11
Phosalone	$C_{12}H_{15}ClNO_4PS_2$	phosphorodithionic acid	11

Compound Name	Molecular Formula	Chemical Family	Group
Phosalone O-analog	$C_{12}H_{15}ClNO_5PS$	oxon	11
Phosmet	$C_{11}H_{12}NO_4PS_2$	phosphorodithionic acid	11
Phosmet O-analog	$C_{11}H_{12}NO_5PS$	oxon	11
Phosphamidon	$C_{10}H_{19}ClNO_5P$	dimethyl phosphate	11
Picloram	$C_6H_3Cl_3N_2O_2$	carboxylic acid	20
Piperonyl butoxide	$C_{19}H_{30}O_5$	benzodioxole	8
Pirimicarb	$C_{11}H_{18}N_4O_2$	carbamate	14
Pirimiphos methyl	$C_{11}H_{20}N_3O_3PS$	phosphorothioate	11
Prallethrin	$C_{19}H_{24}O_3$	pyrethroid	8
Prochloraz	$C_{15}H_{16}Cl_3N_3O_2$	imidazole	9
Procymidone	$C_{13}H_{11}Cl_2NO_2$	dicarboximide	1
Profenofos	$C_{11}H_{15}BrClO_3PS$	phosphorothioate	11
Prometon	$C_{10}H_{19}N_5O$	triazine	9
Prometryn	$C_{10}H_{19}N_5S$	triazine	9
Pronamide (propyzamide)	$C_{12}H_{11}Cl_2NO$	amide	1
Propamocarb HCl	$C_9H_{20}N_2O_2$	carbamate	14
Propachlor	$C_{11}H_{14}ClNO$	chloroacetanilide	1
Propachlor oxanilic acid	$C_{11}H_{13}NO_3$	chloroacetanilide metabolite	20
Propanil	$C_9H_9Cl_2NO$	anilide	1
Propargite	$C_{19}H_{26}O_4S$	sulfite	Single
Propazine	$C_9H_{16}ClN_5$	triazine	9
Propetamphos	$C_{10}H_{20}NO_4PS$	phosphorothioate	11
Propham	$C_{10}H_{13}NO_2$	carbamate	14
Propiconazole	$C_{15}H_{17}Cl_2N_3O_2$	conazole	1
Propoxur	$C_{11}H_{15}NO_3$	carbamate	14
Pymetrozine	$C_{10}H_{11}N_5O$	azomethine	9
Pyraclostrobin	$C_{19}H_{18}ClN_3O_4$	strobilurin	22
Pyraflufen ethyl	$C_{15}H_{13}Cl_2F_3N_2O_4$	phenoxypyrazole	1
Pyrazon (Chloridazon)	$C_{10}H_8ClN_3O$	pyridazinone	17
Pyrethrins	$C_{21}H_{27}O_4$	pyrethrum, botanical	8
Pyridaben	$C_{19}H_{25}ClN_2OS$	pyridazinone	17

Compound Name	Molecular Formula	Chemical Family	Group
Pyrimethanil	$C_{12}H_{13}N_3$	pyrimidine	17
Pyriproxyfen	$C_{20}H_{19}NO_3$	pyridine	17
Quinoxyfen	$C_{15}H_8Cl_2FNO$	pyridine	17
Quintozene (PCNB)	$C_6Cl_5NO_2$	benzene ring	3
Resmethrin	$C_{22}H_{26}O_3$	pyrethroid	8
RH 9129	$C_{19}H_{16}N_3ClO_2$	fenbuconazole metabolite	1
RH 9130	$C_{19}H_{16}N_3ClO_2$	fenbuconazole metabolite	1
S-(2-hydroxy)propyl EPTC	$C_9H_{19}NOS$	thiocarbamate	14
Sethoxydim	$C_{17}H_{29}NO_3S$	cyclohexene oxime	28
Siduron	$C_{14}H_{20}N_2O$	urea	16
Simazine	$C_7H_{12}ClN_5$	triazine	9
Spinosad	$C_{41}H_{65}NO_{10}$ + $C_{42}H_{67}NO_{10}$	antibiotic insecticide	Single
Spirodiclofen	$C_{21}H_{24}Cl_2O_4$	tetronic acid	27
Spiromesifen	$C_{23}H_{30}O_4$	tetronic acid	27
Sulfentrazone	$C_{11}H_{10}Cl_2F_2N_4O_3S$	triazole sulfonamide	1
Sulfometuron methyl	$C_{15}H_{16}N_4O_5S$	sulfonyl urea	16
Sulfotep	$C_8H_{20}O_5P_2S_2$	organophosphate	11
Sulprofos	$C_{12}H_{19}O_2PS_3$	organophosphate	11
Sulprofos O-analog	$C_{12}H_{19}O_3PS_2$	oxon	11
TCMTB	$C_9H_6N_2S_3$	benzothiazole	17
Tebuconazole	$C_{16}H_{23}ClN_3O$	conazole	1
Tebufenozide	$C_{22}H_{28}N_2O_2$	diacylhydrazine	16
Tebupirimfos	$C_{13}H_{23}N_2O_3PS$	organophosphate	11
Tebupirimfos O-analog	$C_{13}H_{23}N_2O_4P$	oxon	11
Tebuthiuron	$C_9H_{16}N_4OS$	urea	16
Tecnazene	$C_6HCl_4NO_2$	nitrobenzene	3
Tefluthrin	$C_{17}H_{14}ClF_7O_2$	pyrethroid	8
TEPP	$C_8H_{20}O_7P_2$	organophosphate	11
Terbacil	$C_9H_{13}ClN_2O_2$	uracil	16
Terbufos	$C_9H_{21}O_2PS_3$	phosphorothioate	11
Terbufos O-analog	$C_9H_{21}O_3PS_2$	oxon	11

Compound Name	Molecular Formula	Chemical Family	Group
Terbufos sulfone	$C_9H_{21}O_4PS_3$	sulfone	11
Tetrachlorvinphos	$C_{10}H_9Cl_4O_4P$	chlorethylene phosphate	11
Tetraconazole	$C_{13}H_{11}Cl_2F_4N_3O$	conazole	1
Tetradifon	$C_{12}H_6Cl_4O_2S$	bridged biphenyl	3
Tetrahydrophthalimide (THPI)[2]	$C_8H_9NO_2$	phthalimide	1
Tetramethrin	$C_{19}H_{25}NO_4$	pyrethroid	8
Thiacloprid	$C_{10}H_9ClN_4S$	neonicotinyl	1
Thiabendazole	$C_{10}H_7N_3S$	benzimidazole	1
Thiamethoxam	$C_8H_{10}ClN_5O_3S$	neonicotinyl	1
Thiazopyr	$C_{16}H_{17}F_5N_2O_2S$	pyridine	17
Thifensulfuron	$C_{11}H_{11}N_5O_6S_2$	sulfonyl urea	16
Thiobencarb	$C_{12}H_{16}ClNOS$	thiocarbamate	14
Thiodicarb	$C_{10}H_{18}N_4O_4S_3$	carbamate	14
Thiophanate methyl	$C_{12}H_{14}N_4O_4S_2$	carbamate	14
Tolclofos methyl	$C_9H_{11}Cl_2O_3PS$	organophosphate	11
Tolyfluanid	$C_{10}H_{13}Cl_2FN_2O_2S_2$	phenylsulfamide	Single
Tralomethrin	$C_{22}H_{19}Br_4NO_3$	pyrethroid	8
Triadimefon	$C_{14}H_{16}ClN_3O_2$	conazole	1
Triadimenol	$C_{14}H_{18}ClN_3O_2$	conazole	1
Triallate	$C_{10}H_{16}Cl_3NOS$	thiocarbamate	14
Triasulfuron	$C_{14}H_{16}ClN_5O_5S$	sulfonyl urea	16
Triazole acetic acid	$C_4H_6N_3O_2$	triazole metabolite	1
Triazole alanine	$C_5H_8N_4O_2$	triazole metabolite	1
Trichlorfon (as dichlorvos)	$C_4H_8Cl_3O_4P$	phosphate	11
Triclopyr	$C_7H_4Cl_3NO_3$	acetic acid	20
Trifloxystrobin	$C_{20}H_{19}F_3N_2O_4$	strobilurin	22
Triflumizole	$C_{15}H_{15}ClF_3N_3O$	conazole	1
Trifluralin	$C_{13}H_{16}F_3N_3O_4$	dinitroaniline	7
Triforine	$C_{10}H_{14}Cl_6N_4O_2$	formamide	1
Triticonazole	$C_{17}H_{20}ClN_3O$	conazole	1

2 Metabolite of captan and captafol.

Compound Name	Molecular Formula	Chemical Family	Group
Vernolate	$C_{10}H_{21}NOS$	thiocarbamate	14
Vinclozolin	$C_{12}H_9Cl_2NO_3$	dichloroanilide	1
Zoxamide	$C_{14}H_{16}Cl_3NO_2$	benzamide	1

5.2.c Selected/single analyte residue studies utilize the selected analyte as the marker pesticide.

5.3 Process Control Compounds

Process controls should be chosen to adequately represent each extraction/detection system. The laboratory shall make every effort to choose a compound that is not expected to be an incurred residue.

5.4 PDP Commodity Groupings

Fruits/Juices/Processed Products: Apples (AP), Apple Juice (AJ), Applesauce (AC), Bananas (BN), Blueberries (BB), Cranberries (CA), Grapes (GR), Grape Juice (GJ), Nectarines (NE), Peaches (PC), Pears (PE), Pear Juice (PJ), Plums (PU), Strawberries (ST), Sweet Cherries (CH)

Citrus and High Acid Fruits/Juices: Grapefruit (GF), Oranges (OG), Orange Juice (OJ), Pineapples (PN)

Cucurbits, Fruiting Vegetables, and Leafy Vegetables: Asparagus (AS), Cantaloupe (CN), Celery (CE), Cucumbers (CU), Eggplant (EP), Green Beans (GB), Greens (GS), Honeydew Melons (HD), Lettuce (LT), Mushrooms (MU), Peas (PS), Spinach (SP), Summer Squash (SS), Sweet Bell Peppers (PP), Tomatoes (TO), Watermelon (WM), Winter Squash (WS)

High Starch/Root and Tuber Vegetables: Canned Beans (BC), Carrots (CR), Potatoes (PO), Sweet Corn (CS), Sweet Potatoes (SW)

High Sulfur: Broccoli (BR), Cabbage (CB), Cauliflower (CF), Green Onions (GO), Onions (ON)

Cereal Grains (Low Oil): Barley (BY), Corn Grain (CO), Oats (OA), Rice (RI), Wheat (WH), Wheat Flour (WF)

Cereal Grains (High Oil): Almonds (Al), Peanut Butter (PB), Soybeans (SY),

Animal Tissue/High Protein: Beef (adipose – BA, liver – BL, muscle – BM), Eggs (EG), Pork (adipose – KA, muscle – KM), Poultry (adipose – PA, liver – PL, muscle – PM, breast – PR, thigh – PT)

Dairy Products: Butter (BU), Heavy Cream (CM), Milk (MK)

Water: Untreated Drinking Water (WU), Treated Drinking Water (WR), Bottled Water (WB), Groundwater (WG)

Single Commodities: For example, Corn Syrup (CY), Raisins (RA), Tomato Paste (TP).

5.4.1 Based on their experience with a commodity, a laboratory may request changes to the assigned commodity groupings from the PDP Technical Director.

5.4.2 Environmental Protection Agency (EPA), Codex, and Food and Drug Administration (FDA) Pesticide Analytical Manual (PAM) commodity grouping information can be found in attachments 1 and 2 of this SOP.

Chris Pappas 12/29/08

Revised By: Chris Pappas Date
PDP Document Control Officer, Monitoring Programs Office
8609 Sudley Road, Suite 206
Manassas, VA 20110
(703) 330-2300

Gail Parker 12/30/08

Reviewed By: Gail Parker Date
Presiding Member of PDP Technical Advisory Group
Colorado Department Agriculture and Consumer Services
Chemical Residue Laboratory
3125 Conner Boulevard, Building 3
Tallahassee, FL 32399-1650
(850) 410-3057

Diana Haynes 1/2/09

Approved By: Diana Haynes Date
PDP Technical Director, Monitoring Programs Office
8609 Sudley Road, Suite 206
Manassas, VA 20110
(703) 330-2300

Martha Lamont 01/05/09

Approved By: Martha Lamont Date
PDP Program Administrative Director, Monitoring Programs Office
8609 Sudley Road, Suite 206
Manassas, VA 20110
(703) 330-2300

- Added diflufenzopyr

Revision 23
- Added canned beans to the high starch/root and tuber vegetable commodity group
- Added green onions to the high sulfur commodity group
- Added canned beans (black, garbanzo, kidney, and pinto) and green onions information to Attachments 1 and 2

Revision 22
- Updated prioritization scheme to reflect current practices and data needs in Section 5.1.b
- Removed reference to problem compounds from Section 5.2.b.7 and replaced with marginal performing analyte
- Combined Groups 1, 4, 6, 10, 18, and 23 into Group 1
- Combined the high sugar fruits commodity group into the fruits/juices/processed products commodity group
- Added FDA pH information to Attachment 2
- Renamed Attachment 2, "Food and Drug Administration Information

Revision 21
- Added new section 5.2.a, Assigning Compounds to Marker Groups and renumbered remaining sections
- Added requirements for core markers to section 5.2.b
- Combined the following Group 19 compounds into Group 16: imazamethabenz acid, imazamethabenz methyl, imazamox, imazapic, imazapyr, imazqaquin, and imazethapyr
- Combined the following Group 24 compounds into Group 16: methoxyfenozide and tebufenozide
- Combined the following Group 26 compounds into Group 16: bensulfuron methyl, chlorimuron ethyl, halosulfuron, halosulfuron methyl, metsulfuron methyl, nicosulfuron, sulfometuron methyl, thifensulfuron, and triasulfuron
- Combined the following Group 5 compounds into Group 3: aldrin, BHC, chlordane, dieldrin, endosulfans, endrin, heptachlor, heptachlor epoxide, lindane, mirex, and oxychlordane
- Combined the following Group 25 compounds into Group 20: acetochlor ethanesulfonic acid (ESA), acetochlor oxanilic acid (OA), alachlor ESA, alachlor OA, diemthenamid ESA, dimethenamid OA, flufenacet ESA, flufenacet OA, metolachlor ESA, metolachlor OA, and propachlor OA
- Combined the following Group 15 compounds into Group 14: cycloate, molinate, and pebulate
- Moved single compounds benomyl and carbendazim to Group 14
- Moved single compounds piperonyl butoxide, MGK-264, and MGK-326 to Group 8
- Added note explaining missing group numbers to the end of Table 1
- Added almonds to the cereal grains (high oil) commodity group

Revision 20

- Added azinphos ethyl, bitertanol, clethodim, clodinafop propargyl, diclofop methyl, disulfoton sulfoxide, ethofumesate, fenoxaprop ethyl, flonicamid, fluoxastrobin, fluroxapyr-1-methylheptyl ester, flutolanil, isoxaflutole, MGK-264, MGK-326, mirex, novaluron, phosmet oxygen analog, pyraflufen ethyl, pyrethrins, RH 9129, RH 9130and TCMTB
- Added new group, 28 cyclohexenone oxime
- Changed sethoxydim marker group from single to 28

Revision 19

- Added blueberries and cranberries to the fruits/juices/processed products commodity group

Revision 18

- Corrected triflumizole marker group from 9 to 4
- Changed chemical family designation for clopyralid, mepanipyrim, and oxadiazinon
- Added greens to Cucurbits, Fruiting Vegetables, and Leafy Vegetables group

Revision 17

- Added reference to 2006 Combined MDP/PDP Technical-Quality Assurance Meeting to subsection 4
- Added Attachment 1: EPA, Codex, and FDA Pesticide Analytical Manual (PAM) Commodity Groupings
- Added Attachment 2: PAM Information
- Realigned commodity groups in subsection 5.4
- Added 2,4-DB; 2,4,5-T; acetochlor; acetochlor ESA; acetochlor OA; acifluorfen; alachlor ESA; alachlor OA; Azinphos methyl O-analog; bensulfuron methyl; bromoxynil; bromuconazole-46; bromuconazole-47; butachlor; chloramben; chlorimuron ethyl; chlorpyrifos O-analog; clopyralid; cyphenothrin; cyproconazole; DCPA mono acid; DEF (tribufos); desethyl atrazine; desethyl-desisopropyl atrazine; desisopropyl atrazine; dicamba; dichlorprop; dicrotophos; dimethenamid ESA; dimethenamid OA; dimethenamid P; dinoseb; epoxiconazole; etoxazole; fenthion O-analog; fenproximate; fenuron; fipronil; fluazinam; flufenacet; flufenacet ESA; flufenacet OA; flumetsulam; fluometuron; formetanate; halosulfuron; hydroxy atrazine; imazamethabenz acid; imazamethabenz methyl; imazapic; imazaquin; isofenphos; isofenphos O-analog; MCPB; mecprop (MCPP); mepanipyrim; methidathion O-analog; metolachlor ESA; metolachlor OA; metsulfuron methyl; molinate; monuron; neburon; nicosulfuron; oxadiazinon; phenthoate; phosalone O-analog; picloram; prometon; propachlor; propachlor OA; propanil; propazine; pyrimethanil; S-(2-hydroxy)propyl EPTC; siduron; spirodiclofen; sulfometuron methyl; sulfotep; sulprofos O-analog; tebupirimfos; tebupirimfos O-analog; tebuthiuron; Terbufos O-analog; thifensulfuron; tolclofos methyl; tralomethrin; triasulfuron; triclopyr; and triticonazole
- Changed fluazifop butyl marker group from 20 to 17

Revision 16

- Added bensulide, cyazofamid, fenamidone, methoxyfenozide, propamocarb, propham, pyrazon, quinoxyfen, sethoxydim, and spiromesifen
- Added new Group 24, diacylhydrazines
- Changed tebufenozide group from single to 24
- Updated prioritization scheme to reflect current data needs
- Added watermelon to the fruiting vegetable and cucurbits PDP Commodity Groupings

EPA, Codex, and Food and Drug Administration (FDA) Pesticide Analytical Manual (PAM) Commodity Groupings

Commodity	EPA	Codex	PAM
Almonds	Tree nuts	Tree nuts	N/A
Apples	Pome fruits	Pome fruits	Non-fatty; Med. Sugar
Apple Juice	Pome fruits	Fruit juice	Non-fatty; Med. Sugar
Applesauce	Pome fruits	Manufactured food single ingredient	Non-fatty; High Sugar
Asparagus	Miscellaneous	Stalk & stem vegs.	Non-fatty; Low Sugar
Bananas	Miscellaneous	Tropical & subtropical fruits - inedible peel	Non-fatty; Low Water; High Sugar
Barley	Cereal grains	Cereal grains	Non-fatty; Low Water
Beef	Meat	Meat	N/A
Black Beans	Legume vegs.	Legume vegs.	Non-fatty; Low Water
Blueberry	Berries	Berries & other small fruits	Non-fatty; Med. Sugar
Broccoli	Brassica veg.	Brassica vegs.	Non-fatty; Low Sugar
Butter	Dairy	Derived milk products	Fatty; Low Water
Cabbage	Brassica veg.	Brassica vegs.	Non-fatty; Low Sugar
Cantaloupe	Cucurbits	Cucurbits	Non-fatty; Med. Sugar
Carrots	Root & tuber vegs.	Root & tuber vegs.	Non-fatty; Med. Sugar
Cauliflower	Brassica veg.	Brassica veg.	Non-fatty; Low Sugar
Celery	Leafy vegs.	Stalk & stem vegs.	Non-fatty; Low Sugar
Cherries	Stone fruits	Stone fruits	Non-fatty; Med. Sugar
Collard greens	Brassica veg.	Leafy vegs. (including Brassica leafy vegs.)	Non-fatty
Corn, grain	Cereal grains	Cereal grains	Fatty; Low Water
Corn, sweet	Cereal grains	Fruiting vegs.→ Cereal grains	Non-fatty; Med. Sugar

EPA, Codex, and Food and Drug Administration (FDA) Pesticide Analytical Manual (PAM) Commodity Groupings

Commodity	EPA	Codex	PAM
Corn syrup	Cereal grains	Derived edible plant products	N/A
Cranberry	Miscellaneous	Berries & other small fruits	Non-fatty
Cream, heavy	Dairy	Derived milk products	Fatty; Low Water; Low Sugar
Cucumbers	Cucurbits	Cucurbits	Non-fatty; Low Sugar
Eggplant	Fruiting vegs.	Fruiting vegs.	Non-fatty; Low Sugar
Garbanzo Beans (Chick pea)	Legume vegs.	Legume vegs.	Fatty; Low Water; Low Sugar
Grapefruit	Citrus fruits	Citrus fruits	Non-fatty; Med. Sugar
Grapes	Miscellaneous	Berries & other small fruits	Non-fatty; High Sugar
Grape Juice	Miscellaneous	Fruit juice	Non-fatty; Med. Sugar
Green Beans	Legume vegs.	Legume vegs.	Non-fatty; Low Sugar
Green Onions	Bulb vegs.	Bulb vegs.	Non-fatty; Low Sugar
Kale	Brassica veg.	Leafy vegs. (including Brassica leafy vegs.)	Non-fatty; Low Sugar
Kidney Beans	Legume vegs.	Legume vegs.	Non-fatty; Low Water
Lettuce	Leafy vegs.	Leafy vegs.	Non-fatty; Low Sugar
Milk, whole	Dairy	Milks	Fatty; Low Sugar
Mushrooms	Miscellaneous	Fruiting vegs.	Non-fatty; Low Sugar
Nectarines	Stone fruits	Stone fruits	Non-fatty; Med. Sugar
Oats	Cereal grains	Cereal grains	Fatty; Low Water
Onions	Bulb vegs.	Bulb vegs.	Non-fatty; Low Sugar

EPA, Codex, and Food and Drug Administration (FDA) Pesticide Analytical Manual (PAM)
Commodity Groupings

Commodity	EPA	Codex	PAM
Oranges	Citrus fruits	Citrus fruits	Non-fatty; Med. Sugar
Orange Juice	Citrus fruits	Fruit juice	Non-fatty; Med. Sugar
Peaches	Stone fruits	Stone fruits	Non-fatty; Med. Sugar
Peanut Butter	Miscellaneous	Manufactured food single ingredient	Fatty; Low water; Med sugar
Pears	Pome fruits	Pome fruits	Non-fatty; Med. Sugar
Pear Juice	Pome fruits	Derived edible plant products	N/A
Peas	Legume vegs.	Legume vegs.	Non-fatty; Low Sugar
Peppers, bell	Fruiting vegs.	Fruiting vegs.	Non-fatty; Low Sugar
Pineapples	Miscellaneous	Tropical & subtropical fruits - inedible peel	Non-fatty; Med. Sugar
Pinto Beans	Legume vegs.	Legume vegs.	Non-fatty; Low Water
Plums	Stone fruits	Stone fruits	Non-fatty; Med. Sugar
Pork	Meat	Meat	N/A
Poultry	Meat	Poultry meat	N/A
Potatoes	Root & tuber vegs.	Root & tuber vegs.	Non-fatty; Low Sugar
Raisins	Miscellaneous	Dried fruits	Non-fatty; Low water; High sugar
Rice	Cereal grains	Cereal grains	Non-fatty; Low Water; Low Sugar
Soybeans	Legume vegs.	Legume vegs.	Fatty; Low wWter; Med Sugar
Spinach	Leafy vegs.	Leafy vegs.	Non-fatty; Low Sugar
Squash, winter	Cucurbits	Cucurbits	Non-fatty; Low Sugar
Strawberries	Miscellaneous	Berries & other small fruits	Non-fatty; Med. Sugar

EPA, Codex, and Food and Drug Administration (FDA) Pesticide Analytical Manual (PAM)
Commodity Groupings

Commodity	EPA	Codex	PAM
Sweet Potatoes	Root & tuber vegs.	Root & tuber vegs.	Non-fatty; Med. Sugar
Tomatoes	Fruiting vegs.	Fruiting vegs.	Non-fatty; Low Sugar
Tomato Paste	Fruiting vegs.	Manufactured food single ingredient	N/A
Watermelon	Cucurbits	Cucurbits	Non-fatty; Med. Sugar
Wheat	Cereal grains	Cereal grains	N/A
Wheat flour	Cereal grains	Cereal grains, milling fraction	N/A

Food and Drug Administration Information

Commodity	% Fat[1]	% Water[1]	% Sugar[1]	pH[2]
Almonds				
Apples	0.36	83.93	11.5	3.30 -4.00
Apple Juice	0.11	87.93	10.9	
Applesauce	0.18	79.58	16.5	
Asparagus	0.22	92.25	2.1	6.00-6.70
Bananas	0.48	74.26	18.4	4.50-5.20
Barley	1.16	10.09	N/A	5.19-5.32
Beef				
Black Beans	1.42	11.02		5.78-6.02
Blueberry	0.38	84.61	7.3	3.12-3.33
Broccoli	0.35	90.69	1.6	6.30-6.52
Butter	81.11	17.94	N/A	
Cabbage	0.18	92.52	2.7	5.20-6.80
Cantaloupe	0.28	89.78	8.1	6.13-6.58
Carrots	0.19	87.79	6.6	5.88-6.40
Catfish	4.26	76.39	0	
Cauliflower	0.18	92.26	2.2	5.60
Celery	0.14	94.64	1	5.70-6.00
Cherries	0.96	80.76	14.6	4.01-4.54
Collard greens	0.22	90.55	N/A	
Corn, grain	2.08	10	N/A	
Corn, sweet	1.18	75.96	5.4	5.90-7.30
Corn syrup				
Cranberry	0.2	86.54	N/A	
Cream, heavy	37	57.71	2.8	6.50-6.68
Cucumbers	0.13	96.05	2.3	5.12-5.78
Eggplant	0.1	91.93	3.4	5.50-6.50
Garbanzo Beans (Chick pea)	6.04	11.53	3.8	6.48-6.80
Grapefruit	0.1	90.89	6.2	3.00-3.75
Grapes	0.35	81.3	16.4	2.90-3.82
Grape Juice	0.08	84.12	14.2	
Green Beans	0.12	90.27	2.6	5.60
Green Onions	0.19	89.83	3.2	6.20
Honey	0	17.2	81.9	3.70-4.20
Kale	0.7	84.46	2.2	6.36-6.80
Kidney Beans	1.06	11.75		5.40-6.00
Lettuce	0.19	95.89	1.8	5.80-6.15
Milk, whole	3.66	87.69	4.9	6.40-6.80
Mushrooms	0.42	91.81	1.8	6.00-6.70
Nectarines	0.46	86.28	8.5	3.92-4.18
Oats	6.9	8.22	N/A	
Onions	0.16	89.68	4.1	5.30-5.85

Food and Drug Administration Information

Commodity	% Fat[1]	% Water[1]	% Sugar[1]	pH[2]
Oranges	0.12	86.75	8.9	3.60-4.34
Orange Juice	0.2	88.3	10.2	3.30-4.19
Peaches	0.09	87.66	8.7	3.30-4.05
Peanut Butter	49.98	1.42	7.8	6.28
Pears	0.4	83.81	10.5	3.50-4.60
Pear Juice				
Peas	0.4	78.86	4.5	5.70-6.70
Peppers, bell	0.19	92.19	2.5	5.20-5.93
Pineapples	0.43	86.5	11.9	3.20-4.00
Pinto Beans	1.13	10.95		
Plums	0.62	85.2	7.5	2.80-4.30
Pork				
Poultry				
Potatoes	0.1	78.96	1.0	5.40-5.90
Raisins	0.46	15.42	61.7	3.80-4.10
Rice	0.58	12.89	0.5	6.0.-6.70
Soybeans	19.94	8.54	6.6	
Spinach	0.35	91.58	0.4	5.50-6.80
Squash, summer	0.21	93.68	2.2	5.79-6.10
Squash, winter	0.23	88.72	2.2	5.18-6.49
Strawberries	0.37	91.57	5.7	3.00-3.90
Sweet Potatoes	0.3	72.84	5.0	5.30-5.60
Tomatoes	0.33	93.76	3.0	4.30-4.90
Tomato Paste				3.50-4.70
Watermelon	0.43	91.51	9	5.18-5.60
Wheat				
Wheat flour				

1 = Pesticide Analytical Manual (PAM) data

2 = Center for Food Safety and Applied Nutrition data

Data not avalilable

Fatty (>2% fat)

Non-fatty (<2% fat)

Low H_2O (<75%)

Low sugar (<5%)

Med sugar (5-15%)

High sugar (>15%)