

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

SOP No.: PDP-QC-13		Page 1 of 16
Title: Required Compounds, Marker Pesticides, Process Control Compounds, and PDP Commodity Groupings		
Revision: 13	Replaces: 01/01/04	Effective: 07/01/04

1. Purpose:

To provide a reference to 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:

- 5.1 Required Compounds
- 5.2 Marker Pesticides
- 5.3 Process Control Compounds
- 5.4 PDP Commodity Groupings

4. References:

- 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
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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

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

5.2 Marker Pesticides

a. Multi-residue Screening

Each laboratory shall select at least one compound from each applicable group in Table 1 to serve as a marker pesticide. Applicable groups are those that contain at least one compound analyzed by that laboratory for that commodity. For each applicable group, each detection system used to analyze that group shall be represented by a marker pesticide.

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 Additionally, a laboratory may choose to spike all compounds analyzed by rotating spike mixtures between analytical sets, as long as each extraction/detection system is adequately represented within each set.

“Problem compounds” are analytes which do not meet acceptable recovery or precision criteria during method validation or continuing quality control.

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

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Acceptance criteria for these compounds should be determined based on available QA data and documented in internal laboratory documentation.

Table 1: PDP Compound Groups for Fruit and Vegetables

Group	Description
1	Phthalimides
2	Cyano/nitrile group(s) attached to double bond
3	Halogenated aromatics
4	Conazoles and metabolites
5	Chlorinated cyclics/cyclodienes
6	Carbamaldehydes
7	Dinitroanilines
8	Pyrethroids and metabolites
9	Triazines
10	Phenyl pyrroles
11	Organophosphates and metabolites
14	Carbamates and metabolites
15	Thiocarbamates
16	Uracils/ureas
17	Nitrogenous heterocyclics
18	Methoxy-acetamides
19	Imidazolinones
20	Phenoxy acids
21	Oxyhydrocarbons
22	Strobilurins

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

Compound Name	Molecular Formula	Chemical Family	Group
1-naphthol	C ₁₀ H ₈ O	carbamate metabolite	14
1,2,4-triazole	C ₂ H ₃ N ₃	triazole metabolite	4
2,4-D	C ₈ H ₆ Cl ₂ O ₃	phenoxy acid	20

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Compound Name	Molecular Formula	Chemical Family	Group
3-hydroxycarbofuran	C ₁₂ H ₁₅ NO ₄	Carbamate metabolite	14
5-hydroxythiabendazole	C ₁₀ H ₈ N ₃ OS	carbamate	4
Acephate	C ₄ H ₁₀ NO ₃ PS	phosphoramidothioic acid	11
Acibenzolar-S-methyl	C ₈ H ₆ N ₂ OS ₂	thiadiazole	4
Alachlor	C ₁₄ H ₂₀ ClNO ₂	acetamide	6
Aldicarb	C ₇ H ₁₄ N ₂ O ₂ S	carbamate	14
Aldicarb sulfone	C ₇ H ₁₄ N ₂ O ₄ S	carbamate	14
Aldicarb sulfoxide	C ₇ H ₁₄ N ₂ O ₃ S	carbamate	14
Aldrin	C ₁₂ H ₈ Cl ₆	cyclodiene	5
Allethrin	C ₁₉ H ₂₆ O ₃	pyrethroid	8
Ametryn	C ₉ H ₁₇ N ₅ S	triazine	9
Amitraz	C ₁₉ H ₂₃ N ₃	amidine	2
Anilazine	C ₉ H ₅ Cl ₃ N ₄	triazine	9
Atrazine	C ₈ H ₁₄ ClN ₅	triazine	9
Azinphos methyl	C ₁₀ H ₁₂ N ₃ O ₃ PS ₂	benzotriazine	11
Azoxystrobin	C ₂₂ H ₁₇ N ₃ O ₅	strobilurin	22
Bendiocarb	C ₁₁ H ₁₃ NO ₄	carbamate	14
Benfluralin	C ₁₃ H ₁₆ F ₃ N ₃ O ₄	dinitroaniline	7
Benomyl	C ₁₄ H ₁₈ N ₄ O ₃	benzimidazole	Single
Benoxacor	C ₁₁ H ₁₁ Cl ₂ NO ₂	benzoxazine	6
Bentazon	C ₁₀ H ₁₂ N ₂ O ₃ S	thiadiazinone dioxide	17
BHC alpha	C ₆ H ₆ Cl ₆	hexane ring	5
BHC beta	C ₆ H ₆ Cl ₆	hexane ring	5
Bifenazate	C ₁₇ H ₂₀ N ₂ O ₃	hydrazine carboxylate	14
Bifenthrin	C ₂₃ H ₂₂ ClF ₃ O ₂	pyrethroid	8
Bromacil	C ₉ H ₁₃ BrN ₂ O ₂	uracil	16
Buprofezin	C ₁₆ H ₂₃ N ₃ OS	thiadiazinone	17
Butylate	C ₁₁ H ₂₃ NOS	thiocarbamate	14
Cadusafos	C ₁₀ HOPS ₂	phosphorodithionate	11
Captafol	C ₁₀ H ₉ Cl ₄ NO ₂ S	phthalimide	1
Captan	C ₉ H ₈ Cl ₃ NO ₂ S	phthalimide	1
Carbaryl	C ₁₂ H ₁₁ NO ₂	carbamate	14

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Compound Name	Molecular Formula	Chemical Family	Group
Carbendazim	C ₉ H ₉ N ₃ O ₂	benzimidazole	Single
Carbofuran	C ₁₂ H ₁₅ NO ₃	carbamate	14
Carboxin	C ₁₂ H ₁₃ NO ₂ S	carboxamide	6
Carfentrazone ethyl	C ₁₅ H ₁₄ Cl ₂ F ₃ N ₃ O ₃	fluorophenyl triazole	4
Chlordane cis	C ₁₀ H ₆ Cl ₈	cyclodiene	5
Chlordane trans	C ₁₀ H ₆ Cl ₈	cyclodiene	5
Chlorethoxyfos	C ₆ H ₁₁ Cl ₄ O ₃ PS	phosphorothioate	11
Chloroneb	C ₈ H ₈ Cl ₂ O ₂	chlorobenzene	3
Chlorothalonil	C ₈ Cl ₄ N ₂	phthalimide	2
Chlorpropham	C ₁₀ H ₁₂ ClNO ₂	carbamate	14
Chlorpyrifos	C ₉ H ₁₁ Cl ₃ NO ₃ PS	phosphorothionic acid	11
Chlorpyrifos methyl	C ₇ H ₇ Cl ₃ NO ₃ PS	phosphorothionic	11
Clofentezine	C ₁₄ H ₈ Cl ₂ N ₄	tetrazine	Single
Clomazone	C ₁₂ H ₁₄ ClNO ₂	pyridazone	17
Coumaphos	C ₁₄ H ₁₆ ClO ₅ PS	posphorothioate	11
Cyanazine	C ₉ H ₁₃ ClN ₆	triazine	9
Cycloate	C ₁₁ H ₂₁ NOS	thiocarbamate	15
Cyfluthrin	C ₂₂ H ₁₈ Cl ₂ FNO ₃	pyrethroid	8
Cyhalothrin (lambda)	C ₂₃ H ₁₉ ClF ₃ NO ₃	pyrethroid	8
Cyhalothrin (lambda epimer R157836)	C ₂₃ H ₁₉ ClF ₃ NO ₃	pyrethroid	8
Cyhalothrin total (L-cyhalothrin + R157836 epimer)	C ₂₃ H ₁₉ ClF ₃ NO ₃	pyrethroid	8
Cymoxanil	C ₇ H ₁₀ N ₄ O ₃	cyanoacetamide	2
Cypermethrin	C ₂₂ H ₁₉ Cl ₂ NO ₃	pyrethroid	8
Cyprodinil	C ₁₄ H ₁₅ N ₃	anilinopyrimidine	17
Cyromazine	C ₆ H ₁₀ N ₆	triazine	9
DCPA	C ₁₀ H ₆ Cl ₄ O ₄	phthalic acid	3
DDD o,p'	C ₁₄ H ₁₀ Cl ₄	bridged biphenyl	3
DDD p,p'	C ₁₄ H ₁₀ Cl ₄	bridged biphenyl	3

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Compound Name	Molecular Formula	Chemical Family	Group
DDE o,p'	C ₁₄ H ₈ Cl ₄	bridged biphenyl	3
DDE p,p'	C ₁₄ H ₈ Cl ₄	bridged biphenyl	3
DDT o,p'	C ₁₄ H ₉ Cl ₅	bridged biphenyl	3
DDT p,p'	C ₁₄ H ₉ Cl ₅	bridged biphenyl	3
Deltamethrin	C ₂₂ H ₁₉ Br ₂ NO ₃	pyrethroid	8
Demeton	C ₈ H ₁₉ O ₃ PS ₂	phosphorothioate	11
Desmedipham	C ₁₆ H ₁₆ N ₂ O ₄	carbamate	14
Diazinon	C ₁₂ H ₂₁ N ₂ O ₃ PS	phosphorothioate	11
Diazinon O-analog	C ₁₂ H ₂₁ N ₂ O ₄ P	oxon	11
Dichlobenil	C ₇ H ₃ Cl ₂ N	nitrile	2
Dichlorvos (DDVP)	C ₄ H ₇ Cl ₂ O ₄ P	phosphoric acid	11
Dicloran	C ₆ H ₄ Cl ₂ N ₂ O ₂	nitroaniline	7
Dicofol o,p'	C ₁₄ H ₉ Cl ₅ O	bridged biphenyl	3
Dicofol p,p'	C ₁₄ H ₉ Cl ₅ O	bridged biphenyl	3
Dieldrin	C ₁₂ H ₈ Cl ₆ O	cyclodiene	5
Difenoconazole	C ₁₉ H ₁₇ Cl ₂ N ₃ O ₃	triazole	4
Diflubenzuron	C ₁₄ H ₉ ClF ₂ N ₂ O ₂	urea	16
Dimethenamid	C ₁₂ H ₁₈ ClNO ₂ S	acetamide	6
Dimethoate	C ₅ H ₁₂ NO ₃ PS ₂	phosphorodithionic acid	11
Dimethomorph	C ₂₁ H ₂₂ ClNO ₄	chlorophenyl morpholine	3
Diphenamid	C ₁₆ H ₁₇ NO	acetamide	6
Diphenylamine (DPA)	C ₁₂ H ₁₁ N	amine	3
Disulfoton	C ₈ H ₁₉ O ₂ PS ₃	phosphorodithioate	11
Disulfoton sulfone	C ₈ H ₁₉ O ₄ PS	sulfone	11
Diuron	C ₉ H ₁₀ Cl ₂ N ₂ O	urea	16
Endosulfan I	C ₉ H ₆ Cl ₆ O ₃ S	cyclodiene	5
Endosulfan II	C ₉ H ₆ Cl ₆ O ₃ S	cyclodiene	5
Endosulfan sulfate	C ₉ H ₆ Cl ₆ O ₄ S	cyclodiene	5
Endrin	C ₁₂ H ₈ Cl ₆ O	cyclodiene	5
EPTC	C ₉ H ₁₉ NOS	thiocarbamate	14
Esfenvalerate	C ₂₅ H ₂₂ ClNO ₃	pyrethroid	8

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Ethalfuralin	C ₁₃ H ₁₄ F ₃ N ₃ O ₄	dinitroaniline	7
Ethiofencarb	C ₁₁ H ₁₅ NO ₂ S	carbamate	14
Ethion	C ₉ H ₂₂ O ₄ P ₂ S ₄	phosphorodithioic acid	11
Ethion di oxon	C ₉ H ₂₂ O ₆ P ₂ S ₂	oxon	11
Ethion mono oxon	C ₉ H ₂₂ O ₅ P ₂ S ₃	oxon	11
Ethoprop	C ₈ H ₁₉ O ₂ PS ₂	dipropyl phosphorodithioate	11
Ethoxyquin	C ₁₄ H ₁₉ NO	quinoline	Single
Etridiazole	C ₅ H ₅ Cl ₃ N ₂ OS	thiadiazole	4
Fenamiphos	C ₁₃ H ₂₂ NO ₃ PS	phosphoramidate	11
Fenamiphos sulfone	C ₁₃ H ₂₂ NO ₅ PS	sulfone	11
Fenamiphos sulfoxide	C ₁₃ H ₂₂ NO ₄ PS	sulfoxide	11
Fenarimol	C ₁₇ H ₁₂ Cl ₂ N ₂ O	pyrimidine	3
Fenbuconazole	C ₁₉ H ₁₇ ClN ₄	conazole	4
Fenhexamid	C ₁₄ H ₁₇ Cl ₂ NO ₂	chlorocarboximide	6
Fenitrothion	C ₉ H ₁₂ NO ₅ PS	phosphorothioate	11
Fenitrothion O-analog	C ₉ H ₁₂ NO ₆ P	oxon	11
Fenpropathrin	C ₂₂ H ₂₃ NO ₃	pyrethroid	8
Fenthion	C ₁₀ H ₁₅ O ₃ PS ₂	phosphorothioate	11
Fenvalerate	C ₂₅ H ₂₂ ClNO ₃	pyrethroid	8
Fluazifop butyl	C ₁₅ H ₁₂ F ₃ NO ₄	phenoxy acid	20
Fludioxonil	C ₁₂ H ₆ F ₂ N ₂ O ₂	phenyl pyrrole	10
Fluridone	C ₁₉ H ₁₄ F ₃ NO	pyridine	17
Fluvalinate	C ₂₆ H ₂₂ ClF ₃ N ₂ O ₃	pyrethroid	8
Folpet	C ₉ H ₄ Cl ₃ NO ₂ S	phthalimide	1
Fonofos	C ₁₀ H ₁₅ OPS ₂	phosphorodithioic acid	11
Fonofos O-analog	C ₁₀ H ₁₅ O ₂ PS	oxon	11
Forchlorfenuron	C ₁₂ H ₁₀ ClN ₃ O	phenyl urea	16
Halosulfuron methyl	C ₁₂ H ₁₃ ClN ₆ O ₇ S	sulfonyl urea	Single
Heptachlor	C ₁₀ H ₅ Cl ₇	cyclodiene	5
Heptachlor epoxide	C ₁₀ H ₅ Cl ₇ O	cyclodiene	5

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Compound Name	Molecular Formula	Chemical Family	Group
Hexachlorobenzene (HCB)	C ₆ Cl ₆	benzene ring	3
Hexaconazole	C ₁₄ H ₁₇ Cl ₂ N ₃ O	conazole	4
Hexazinone	C ₁₂ H ₂₀ N ₄ O ₂	triazine	9
Hexythiazox	C ₁₇ H ₂₁ ClN ₂ O ₂ S	thiazolidine carboxamide	6
Hydroprene	C ₁₇ H ₃₀ O ₂	oxyhydrocarbon	21
Imazalil	C ₁₄ H ₁₄ Cl ₂ N ₂ O	conazole	4
Imazamox	C ₁₅ H ₁₉ N ₃ O ₄	imidazolinone	19
Imazapyr	C ₁₃ H ₁₅ N ₃ O ₃	imidazolinone	19
Imazethapyr	C ₁₅ H ₁₉ N ₃ O ₃	imidazolinone	19
Imidacloprid	C ₉ H ₁₀ ClN ₅ O ₂	nitroguanidine	Single
Indoxacarb	C ₂₂ H ₁₇ ClF ₃ N ₃ O ₇	carbamate	14
Iprodione	C ₁₃ H ₁₃ Cl ₂ N ₃ O ₃	dicarboximide	6
Iprodione metabolite isomer	C ₁₃ H ₁₃ Cl ₂ N ₃ O ₃	dicarboximide	6
Kresoxim methyl	C ₁₈ H ₁₉ NO ₄	strobilurin	22
Lactofen	C ₁₉ H ₁₅ ClF ₃ NO ₇	flurodiphenyl ether	3
Lindane (BHC gamma)	C ₆ H ₆ Cl ₆	hexane ring	5
Linuron	C ₉ H ₁₀ Cl ₂ N ₂ O ₂	urea	16
Malathion	C ₁₀ H ₁₉ O ₆ PS ₂	phosphorodithioate	11
Malathion O-analog	C ₁₀ H ₁₉ O ₇ PS	oxon	11
MCPA	C ₉ H ₉ ClO ₃	phenoxy	20
Metalaxyl	C ₁₅ H ₂₁ NO ₄	acylalanine	18
Methamidophos	C ₂ H ₈ NO ₂ PS	phosphoramidothioic acid	11
Methidathion	C ₆ H ₁₁ N ₂ O ₄ PS ₃	phosphorodithioate	11
Methiocarb	C ₁₁ H ₁₅ NO ₂ S	carbamate	14
Methomyl	C ₅ H ₁₀ N ₂ O ₂ S	carbamate	14
Methoprene	C ₁₉ H ₃₄ O ₃	oxyhydrocarbon	21
Methoxychlor olefin	C ₁₆ H ₁₄ Cl ₂ O ₂	bridged biphenyl	3
Methoxychlor p,p'	C ₁₆ H ₁₅ Cl ₃ O ₂	bridged biphenyl	3
Methoxychlor Total	C ₁₆ H ₁₅ Cl ₃ O ₂	bridged biphenyl	3

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Compound Name	Molecular Formula	Chemical Family	Group
Methyl pentachlorophenyl sulfide (MPCPS, metabolite of PCNB)	C ₇ H ₃ Cl ₅ S	benzene ring	3
Metolachlor	C ₁₅ H ₂₂ ClNO ₂	acetamide	6
Metribuzin	C ₈ H ₁₄ N ₄ OS	triazine	9
Mevinphos E/Z	C ₇ H ₁₃ O ₆ P	butenoic acid	11
Monocrotophos	C ₇ H ₁₄ NO ₅ P	phosphoric acid	11
Myclobutanil	C ₁₅ H ₁₇ ClN ₄	triazole	4
Napropamide	C ₁₇ H ₂₁ NO ₂	amide	6
Nitrapyrin	C ₆ H ₃ Cl ₄ N	pyridine	17
Norflurazon	C ₁₂ H ₉ ClF ₃ N ₃ O	pyridazinone	17
Norflurazon desmethyl	C ₁₁ H ₇ ClF ₃ N ₃ O	pyridazinone	17
Omethoate	C ₅ H ₁₂ NO ₄ PS	phosphorothioate	11
o-Phenylphenol	C ₁₂ H ₁₀ O	biphenyl	3
Oryzalin	C ₁₂ H ₁₈ N ₄ O ₆ S	dinitroaniline	7
Oxadixyl	C ₁₄ H ₁₈ N ₂ O ₄	oxazolidine	18
Oxamyl	C ₇ H ₁₃ N ₃ O ₃ S	carbamate	14
Oxamyl oxime		carbamate	14
Oxychlorane	C ₁₀ H ₄ Cl ₈ O	cyclodiene	5
Oxydemeton methyl	C ₆ H ₁₅ O ₄ PS ₂	organophosphate	11
Oxydemeton methyl sulfone	C ₆ H ₁₅ O ₅ PS ₂	phosphorothioate	11
Oxyfluorfen	C ₁₅ H ₁₁ ClF ₃ NO ₄	diphenyl ether	3
Parathion ethyl	C ₁₀ H ₁₄ NO ₅ PS	phosphorothionic acid	11
Parathion methyl	C ₈ H ₁₀ NO ₅ PS	phosphorothionic acid	11
Parathion methyl O-analog	C ₈ H ₁₀ NO ₆ P	oxon	11
Parathion O-analog	C ₁₀ H ₁₄ NO ₆ P	oxon	11
Pebulate	C ₁₀ H ₂₁ NOS	thiocarbamate	15
Pendimethalin	C ₁₃ H ₁₉ N ₃ O ₄	dinitroaniline	7
Pentachloroaniline (PCA)	C ₆ H ₂ Cl ₅ N	aniline	3
Pentachlorobenzene (PCB)	C ₆ HCl ₅	benzene ring	3
Permethrin cis	C ₂₁ H ₂₀ Cl ₂ O ₃	pyrethroid	8

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Permethrin total	C ₂₁ H ₂₀ Cl ₂ O ₃	pyrethroid	8
Permethrin trans	C ₂₁ H ₂₀ Cl ₂ O ₃	pyrethroid	8
Phenmedipham	C ₁₆ H ₁₆ N ₂ O ₄	carbamate	14
Phenothrin	C ₂₃ H ₂₆ O ₃	pyrethroid	8
Phorate	C ₇ H ₁₇ O ₂ PS ₃	phosphorodithionic acid	11
Phorate sulfone	C ₇ H ₁₇ O ₄ PS ₃	sulfone	11
Phorate sulfoxide	C ₇ H ₁₇ O ₃ PS ₂	sulfoxide	11
Phosalone	C ₁₂ H ₁₅ ClNO ₄ PS ₂	phosphorodithionic acid	11
Phosmet	C ₁₁ H ₁₂ NO ₄ PS ₂	phosphorodithionic acid	11
Phosphamidon	C ₁₀ H ₁₉ ClNO ₅ P	dimethyl phosphate	11
Piperonyl butoxide	C ₁₉ H ₃₀ O ₅	benzodioxole	Single
Pirimiphos methyl	C ₁₁ H ₂₀ N ₃ O ₃ PS	phosphorothioate	11
Prallethrin	C ₁₉ H ₂₄ O ₃	pyrethroid	8
Prochloraz	C ₁₅ H ₁₆ Cl ₃ N ₃ O ₂	imidazole	9
Procymidone	C ₁₃ H ₁₁ Cl ₂ NO ₂	dicarboximide	6
Profenofos	C ₁₁ H ₁₅ BrClO ₃ PS	phosphorothioate	11
Prometryn	C ₁₀ H ₁₉ N ₅ S	triazine	9
Pronamide (propyzamide)	C ₁₂ H ₁₁ Cl ₂ NO	amide	6
Propargite	C ₁₉ H ₂₆ O ₄ S	sulfite	Single
Propetamphos	C ₁₀ H ₂₀ NO ₄ PS	phosphorothioate	11
Propiconazole	C ₁₅ H ₁₇ Cl ₂ N ₃ O ₂	conazole	4
Pymetrozine	C ₁₀ H ₁₁ N ₅ O	azomethine	9
Pyraclostrobin	C ₁₉ H ₁₈ ClN ₃ O ₄	strobilurin	22
Pyridaben	C ₁₉ H ₂₅ ClN ₂ OS	pyridazinone	17
Pyriproxyfen	C ₂₀ H ₁₉ NO ₃	pyridine	17
Quintozene (PCNB)	C ₆ Cl ₅ NO ₂	benzene ring	3
Resmethrin	C ₂₂ H ₂₆ O ₃	pyrethroid	8
Simazine	C ₇ H ₁₂ ClN ₅	triazine	9
Spinosad	C ₄₁ H ₆₅ NO ₁₀ + C ₄₂ H ₆₇ NO ₁₀	antibiotic insecticide	Single
Sulfentrazone	C ₁₁ H ₁₀ Cl ₂ F ₂ N ₄ O ₃ S	triazole sulfonamide	4

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Compound Name	Molecular Formula	Chemical Family	Group
Tebuconazole	C ₁₆ H ₂₃ ClN ₃ O	conazole	4
Tebufenozide	C ₂₂ H ₂₈ N ₂ O ₂	diacylhydrazine	Single
Tecnazene	C ₆ HCl ₄ NO ₂	nitrobenzene	3
Tefluthrin	C ₁₇ H ₁₄ ClF ₇ O ₂	pyrethroid	8
Terbacil	C ₉ H ₁₃ ClN ₂ O ₂	uracil	16
Terbufos	C ₉ H ₂₁ O ₂ PS ₃	phosphorothioate	11
Terbufos sulfone	C ₉ H ₂₁ O ₄ PS ₃	sulfone	11
Tetrachlorvinphos	C ₁₀ H ₉ Cl ₄ O ₄ P	chlorethylene phosphate	11
Tetradifon	C ₁₂ H ₆ Cl ₄ O ₂ S	bridged biphenyl	3
Tetrahydrophthalimide (THPI) ²	C ₈ H ₉ NO ₂	phthalimide	1
Tetramethrin	C ₁₉ H ₂₅ NO ₄	pyrethroid	8
Thiabendazole	C ₁₀ H ₇ N ₃ S	benzimidazole	4
Thiamethoxam	C ₈ H ₁₀ ClN ₅ O ₃ S	neonicotinyl	17
Thiazopyr	C ₁₆ H ₁₇ F ₅ N ₂ O ₂ S	pyridine	17
Thiobencarb	C ₁₂ H ₁₆ ClNOS	thiocarbamate	14
Thiodicarb	C ₁₀ H ₁₈ N ₄ O ₄ S ₃	carbamate	14
Thiophanate methyl	C ₁₂ H ₁₄ N ₄ O ₄ S ₂	carbamate	14
Tolyfluanid	C ₁₀ H ₁₃ Cl ₂ FN ₂ O ₂ S ₂	phenylsulfamide	Single
Triadimefon	C ₁₄ H ₁₆ ClN ₃ O ₂	conazole	4
Triadimenol	C ₁₄ H ₁₈ ClN ₃ O ₂	conazole	4
Triallate	C ₁₀ H ₁₆ Cl ₃ NOS	thiocarbamate	14
Triazole acetic acid	C ₄ H ₆ N ₃ O ₂	triazole metabolite	4
Triazolyl alanine	C ₅ H ₈ N ₄ O ₂	triazole metabolite	4
Trichlorfon (as dichlorvos)	C ₄ H ₈ Cl ₃ O ₄ P	phosphate	11
Trifloxystrobin	C ₂₀ H ₁₉ F ₃ N ₂ O ₄	strobilurin	22
Triflumizole	C ₁₅ H ₁₅ ClF ₃ N ₃ O	conazole	9
Trifluralin	C ₁₃ H ₁₆ F ₃ N ₃ O ₄	dinitroaniline	7
Triforine	C ₁₀ H ₁₄ Cl ₆ N ₄ O ₂	formamide	6

² Metabolite of captan and captafol.

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Compound Name	Molecular Formula	Chemical Family	Group
Vernolate	C ₁₀ H ₂₁ NOS	thiocarbamate	14
Vinclozolin	C ₁₂ H ₉ Cl ₂ NO ₃	dichloroanilide	6

- b. Selected/single analyte residue studies utilize the selected analyte as the marker pesticide.

5.3 Process Control Compounds

- a. Process control compounds established for multi-residue screens:

Process controls should be chosen to adequately represent each extraction/detection system (e.g., aldrin, chlorpyrifos methyl, ronnel, or tolclofos methyl for organohalogens determined by ECD, ELCD, XSD; chlorpyrifos methyl, isazophos, ronnel, or tolclofos methyl for organophosphates analyzed by FPD; chlorpyrifos methyl for organonitrogens/organosulfurs determined by NPD; carfentrazone ethyl, chlorpyrifos methyl, isazophos, propetamphos, propoxur, or tolclofos methyl for compounds screened using GC/MS or GC/MS-MS systems; propoxur or BDMC for carbamates determined by post-column HPLC systems; and propoxur for compounds analyzed by LC/MS or LC/MS-MS).

- b. Process control compounds established for selected/single residue screens:

Acid herbicides: 2,4,5-T, 3,4-D, or silvex

Avermectin: ivermectin

Benzimidazoles (HPLC): mebendazole

Formetanate: not applicable

Triazoles: tetraconazole

Vendex: cyhexatin

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5.4 PDP Commodity Groupings

Leafy vegetables (including brassica) and legume vegetables: Asparagus (AS), Broccoli (BR), Cabbage (CB), Cauliflower (CF), Celery (CE), Green Beans (GB), Lettuce (LT), Peas (PS), Spinach (SP)

Pome, stone, and other fruits: Apples (AP), Apple Juice (AJ), Applesauce (AC), Bananas (BN), Grape Juice (GJ), Grapes (GR), Peaches (PC), Pears (PE), Pear Juice (PJ), Plums (PU), Strawberries (ST), Sweet Cherries (CH)

Citrus fruits: Grapefruit (GF), Oranges (OG), Orange Juice (OJ), Pineapples (PN)

Root and tuber vegetables: Carrots (CR), Potatoes (PO), Sweet Potatoes (SW)

Sweet corn: Sweet Corn (CS)

Cereal grains: Barley (BY), Corn Grain (CO), Oats (OA), Rice (RI), Soybeans (SY), Wheat (WH), Wheat Flour (WF)

Milk: Milk (MK)

Fruiting vegetables and cucurbits: Cantaloupe (CN), Cucumbers (CU), Eggplant (EP), Honeydew Melons (HD), Summer Squash (SS), Sweet Bell Peppers (PP), Tomatoes (TO), Winter Squash (WS)

Corn syrup: Corn Syrup (CY)

Peanut butter: Peanut Butter (PB)

Concentrated/Dried Cucurbits/Fruiting Vegetables: Tomato Paste (TP)

Mushrooms: Mushrooms (MU)

Bulb vegetables: Onions (ON)

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Poultry: Poultry (adipose – PA, liver – PL, muscle – PM)

Beef: Beef (adipose – BA, liver – BL, muscle – BM)

Pork: Pork (adipose – KA, muscle – KM)

Butter: Butter (BU)

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Gail Parker

6-16-04

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6-18-04

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April 2004

Monitoring Programs Office

- Modified Table 2, PDP Multi-residue Compound Groupings for Fruit and Vegetables, by adding ethion di oxon, thiazopyr, and trifloxystrobin
 - Added cauliflower and eggplant to PDP Commodity Groupings in Subsection 5.4
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