



*2009 Agency Data*

# **Washington State Pesticide Data Report – 2010**

July 2012



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*A report to the governor, agency heads, the legislature, and the public as required by  
Chapter 380, Laws of 1989, and RCW 70.104.*

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# Introduction

*The Washington State Department of Health (Health) compiled this report on behalf of the Washington State Departments of Agriculture, Ecology, Health, and Labor and Industries. This report, which provides pesticide-related data from 2009, is slightly different than reports by the former Pesticide Incident Reporting and Tracking Panel (PIRT). The Legislature suspended the PIRT Panel in 2010. This report continues to summarize the pesticide-related data and program activity from the four contributing state agencies.*

## **Agriculture**

In 2009, the Washington State Department of Agriculture (Agriculture) investigated 148 complaints that resulted in 85 violations. This continues a trend in the last few years of Agriculture receiving fewer pesticide-related complaints.

Complaints about applications in 2009 continue to show a greater variety of pesticides than in the former PIRT Panel reports.

Pesticide drift, misuse, and use of pesticides by neighbors continue to be the most common complaints involving pesticide applications. Pesticide misuse includes applying the wrong product to control pests.

The greatest number of application complaints were due to herbicide drift. Ingredients in two herbicides – 2,4-D and glyphosate – were again the most frequent in reported complaints. This is consistent with previous years, and probably reflects the use by unlicensed and untrained applicators. It's easy to see the results of misusing these products.

## **Ecology**

Multiple programs within the Washington State Department of Ecology (Ecology) are involved in pesticide-related activities including Spill Prevention, Preparedness and Response Program (Spills Program), Toxics Cleanup Program, Water Quality Program, and Environmental Assessment Program. In the Spills Program, pesticide-related complaints from 2007 through 2009 continued to be low compared to previous years.

Since 2003 Agriculture and Ecology have carried out a monitoring study of pesticide concentrations in selected salmon-bearing streams during typical periods of pesticide use. Monitoring is conducted in six basins: two urban and four agricultural. An intensive review of pesticide results for 2009-2011 will be conducted after the 2011 monitoring season.

## **Health**

In 2009, about two-thirds of the cases investigated by Health were non-agricultural. The majority of agricultural cases were due to pesticide drift. From 2006 through 2009, drift was implicated in 51 percent of illnesses from agricultural applications.

In 2009, pesticide drift from agricultural operations contributed to more illnesses than any other source of agricultural pesticide exposure. These exposures occurred when pesticides were applied to agricultural commodities like fruit and field crops, nursery, livestock, and forest operations. In these incidents, the pesticides moved from the intended target to other locations where people were present. Of the 47 work-related cases associated with agricultural pesticide application, pesticide drift contributed to 16 work-related cases – one more than the number of cases from direct contact with pesticides during application. Drift events continue to be a troublesome source of pesticide exposure for farm workers and bystanders.

Because drift events often affect a large number of people, small reductions in the number of drift events can result in larger reductions in illnesses caused by pesticides in Washington.

## **Labor and Industries**

The Washington State Department of Labor and Industries (Labor and Industries) reported that in 2009 about 217 agricultural operations participated in cholinesterase testing, and 2,060 pesticide handlers submitted baseline testing results for cholinesterase. The number of baseline tests increased slightly from 2008. We believe this is because increasingly clinics encourage baseline testing and employers incorporate baseline testing into hiring practices.

Cholinesterase is an enzyme that removes the chemical neurotransmitter acetylcholine from the junctions between nerves cells and is essential to the normal function of the nervous system. Exposure to organophosphate or N-methyl-carbamate pesticides may lower the level of available cholinesterase. Monitoring cholinesterase levels in the blood through simple laboratory tests can detect cholinesterase depression prior to the onset of illness.

Among 2,060 pesticide handlers, 22 had depressed levels of cholinesterase relative to their baseline levels. This is the same number as in 2008. The number has steadily declined since monitoring began in 2004 with 119 handlers identified with cholinesterase level depressions.

The Division of Occupational Safety and Health (DOSH) program carried out 91 workplace safety and health inspections in 2009. This is more than double the number of inspections recorded in the previous five years. There were 43 inspections in 2004.

Labor and Industries workers claims initially related to pesticides dropped to 77 in 2009 from 138 the year before.

### **Future Pesticide Data Reports**

Health will continue to publish a multi-agency annual report. The four contributing agencies are working to streamline future reports and are considering additional ways to provide access to data and trend analysis. Agencies will meet in 2013 to identify specific data sets as indicators of the status of pesticide use issues in Washington. Such data will be available on Health's Website.



# Agriculture

*Summary of pesticide-related complaint investigations in 2009 by the Washington State Department of Agriculture.*

## Background

Agriculture's Pesticide Management Division protects human health and the environment by ensuring the safe and legal distribution, use, and disposal of pesticides in Washington.

Agriculture investigates all complaints it receives concerning possible pesticide misuse, storage, sales, distribution, applicator licensing, and building structure inspections for wood destroying organisms (WDO) such as termites.

The agency also inspects marketplaces, importers, manufacturers, and pesticide application sites for compliance with state and federal requirements.

## Complaints

During 2009, Agriculture investigated 148 complaints (Table 1). After investigation, Agriculture determined that nearly 70 percent of complaints (102) involved pesticide applications and the remaining 46 complaints were unrelated to actual applications. Examples include structural pest inspections or licensing complaints.

Agriculture found 85 violations among the 148 complaints. This continues the trend of fewer complaints about pesticides in the last few years. The highest number of complaints received in one year since 1990 was 558 in 1992.

**Table 1. Agriculture Complaints and Violations, 2004-2009**

Year	Total Complaints	Violations
2004	200	122 (61%)
2005	193	113 (59%)
2006	206	137 (66%)
2007	177	104 (59%)
2008	172	108 (63%)
2009	148	85 (57%)

## Location and Frequency of Complaints

There were significant differences in population, types of pest problems, and the nature of complaints between eastern and western portions of the state. Most complaints from western Washington were about structural pest inspections, pesticide drift complaints from homeowners, intentional misuse, and unlicensed applicators. Most complaints from eastern Washington were about agricultural applications, licenses, and drift. Drift continues to be the most frequent type of complaint involving pesticide applications. However, complaints about potential misuse – the wrong product used to control pests or complaints about a neighbor’s use – remain frequent. Licensing, records, notification, and pest inspections were the most frequent complaints other than pesticide application.

In 2009, 55 percent of 148 complaint investigations occurred in eastern Washington and 45 percent in western Washington.

Table 2 lists the counties with the most complaint investigations from 2004 through 2009.

**Table 2. Agriculture Counties with the Most Complaints, 2004-2009**

2004	2005	2006	2007	2008	2009
King 28	Spokane 22	Spokane 20	Pierce 14	King 17	Yakima 19
Grant 20	King 20	Grant 19	Grant 13	Grant 17	Whatcom 15
Spokane 17	Chelan 18	Pierce 18	Spokane 13	Benton 16	King 13
Benton 15	Grant 16	Yakima 15	Snohomish 12	Yakima 13	Spokane 11
Yakima 15	Yakima 12	King 13	King 10	Spokane 12	Thurston 9
Walla Walla 11	Douglas 11	Douglas 11	Benton 10	Skagit Walla 10	Chelan 8
Pierce 11	Pierce 10	Okanogan 10	Yakima 10	Walla Walla 8	Benton 7
Snohomish 10	Benton 8	Franklin 9	Chelan 8	Pierce 7	- -
Chelan 8	- -	Whatcom 8	Whatcom 8	Franklin 7	- -
- -	- -	- -	Whitman 8	- -	- -

## Response Time

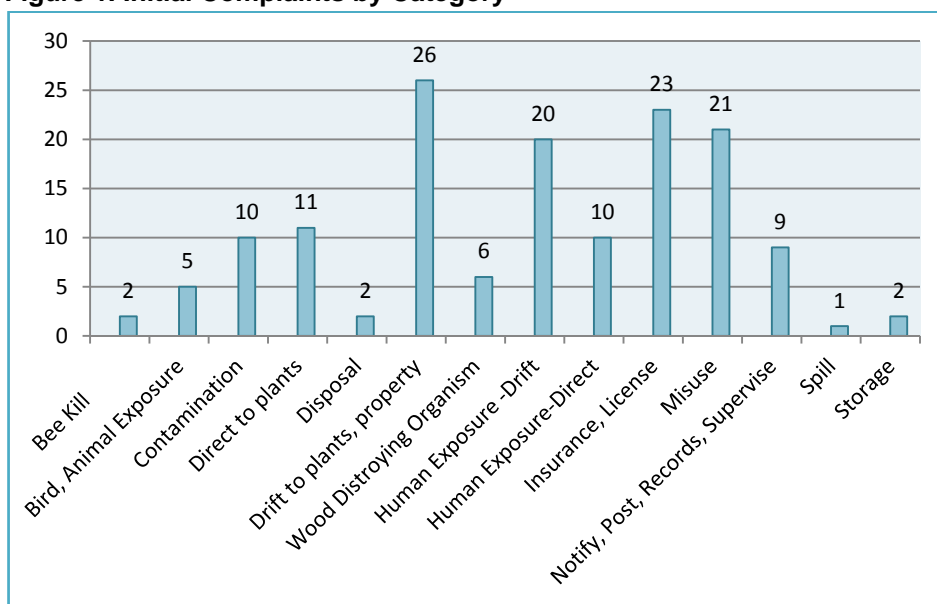
In 2009, Agriculture responded within one working day for 97 percent of complaints. Complaints about possible human exposure to pesticides are high priority with response within 24 hours.

## Nature of Complaints

Complaints for 2009 are categorized by the nature of the initial complaint – shown in Figure 1. An investigation may reveal that the complaint is not valid, substantiate the initial complaint, or find more violations. For example, Agriculture may investigate an initial complaint about drift, and find that drift did not occur. The investigator may also find that the applicator applied at the wrong rate or did not keep proper records. Although the applicator would not be cited for drift, he or she could be cited for being “faulty, careless, and negligent” or for record-keeping violations.

When complaints involve numerous possible violations, the most serious complaint is used to categorize the case. For example, a complaint involving human exposure caused by drift from application by an unlicensed applicator would be categorized as *human exposure* even if the only final outcome of the case was a *notice of correction* for record keeping. Usually the initial complaint is a fairly reliable indicator of the final outcome of the case, and reflects the concerns of the complainant.

**Figure 1. Initial Complaints by Category**



## Drift and Direct Human Exposure

In 2009, Agriculture received 26 general complaints about drift plus 20 complaints specifically about possible human exposure due to drift. Of the 20 human exposure drift complaints some evidence of exposure was found in nine cases, although one appeared to be odor only. Action was taken on 13 cases, but not necessarily for the drift complaint.

Ten human exposure cases were complaints about possible direct exposure. Three had evidence of exposure and action was taken on all. A warning letter was sent to one applicator, although evidence of exposure was inconclusive.

Sixteen of the human exposure cases were from agricultural applications – 10 were commercial applications and four were residential. Action was taken on all 16 cases; one was referred to Yakama Nation, where the incident occurred.

### **Licenses, Misuse, and Actions Taken**

Agriculture received numerous complaints in 2009 about unlicensed individuals and misuse: 22 complaints about improper or no licensing and 21 about direct misapplications or other types of misuse. The number of complaints specific to faulty Structural Pest Inspections (SPI) continues to drop, with six complaints investigated (in addition to complaints about improper SPI licenses or records).

There were two reported bee kill complaints in 2009. In one case, a commercial company treating a wall for a bee nest, killed bees in a neighbor's hives. There was no violation because notification isn't required for non-crop uses. Better communication was established between the neighbors. In a second case bees died when they visited a field where an insecticide was used on a crop the week before. Application of this pesticide is restricted when crops or weeds are in bloom so as to not attract bees. There was no violation in this case as the crop was not blooming when the insecticide was applied.

To classify complaints for this report, actions taken by Agriculture may not be sufficient to determine the scope of actual pesticide incidents. Agriculture needs evidence of residue, symptoms, or actual observation to decide if drift had occurred or not. Even if drift was verified, Agriculture may not be able to take action if the source of the drift could not be proven. The number of verified drift cases may give a better idea of problem areas.

When investigation of the initial complaint yields a violation related to the complaint, the complaint is determined to be valid. However, action may not have been taken on the case even though the complaint was valid. For instance, if the violator could not be identified for a drift case, no action could be taken. In 2009, 59 percent of complaints were found to be valid.



Action was taken on 57 percent of cases with two referred to the Yakama Nation, and one to Ecology. The percentage of cases where action was taken on the original complaint appears to be leveling off to about 60 percent each year. There are fewer complaints about pesticide damage that are later found to be due to drought or insects than in the initial years of this report. It is possible that people are recognizing pesticide damage better or that damage overall is less frequent. It may also mean people have a better understanding of agency roles. The result is that Agriculture can investigate valid complaints instead of responding to complaints about non-pesticide issues.

### **Application Methods**

Agriculture received nine complaints about aerial applications, 88 complaints about ground applications, 47 complaints about other issues such as Structural Pest Inspections, and four complaints where the application method was undetermined or unknown.

### **Violations**

Complaint investigations may result in determining that state or federal laws or rules were violated. More than half of Agriculture's complaint investigations resulted in some type of violation (Figure 2). Most violations were not severe in nature (Table 4) and most violators were issued a warning or Notice of Correction rather than fines or license suspensions.

### **Type of Activity in Complaints with Violations**

Complaints are classified by Agriculture according to the following activities:

- Agricultural incidents that occur in farming, forestry, greenhouses, or Christmas tree farming.
- Commercial/Industrial incidents by licensed operators in offices, restaurants, homes, or landscapes.
- Applications or inspections for wood destroying organisms.
- Residential pesticide applications by a homeowner, resident, or neighbor.
- Right of Way applications made on public lands, roadways, electric lines, or irrigation canal banks.
- Other: includes licensing, storage, registration, records, and similar activities.

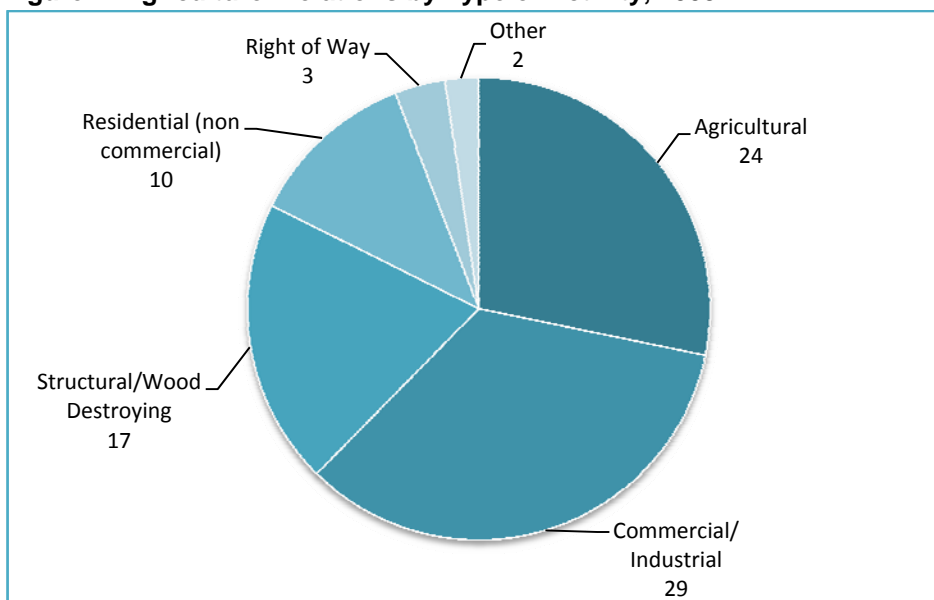
Table 3 shows complaints with violations by type of activity for 2004-2009.

**Table 3. Agriculture Violations by Type of Activity, 2004-2009\***

Activity	2004	2005	2006	2007	2008	2009
Agricultural	42	39	42	33	33	24
Commercial/Industrial	17	36	25	33	30	29
Structural/Wood Destroying	22	8	28	10	19	17
Residential (non commercial)	5	4	12	5	12	10
Right of Way	5	5	4	5	3	3
School	-	-	-	-	7	-
Forestry	-	-	-	-	2	-
Other	31	21	26	18	2	2
<b>Total Violations</b>	<b>122</b>	<b>113</b>	<b>137</b>	<b>104</b>	<b>108</b>	<b>85</b>

\* For 2008, licenses and records were included in the industry in which the complaint occurred and other is for those items not in a particular industry. Also, incidents in forestry and schools were separated out.

**Figure 2. Agriculture Violations by Type of Activity, 2009**

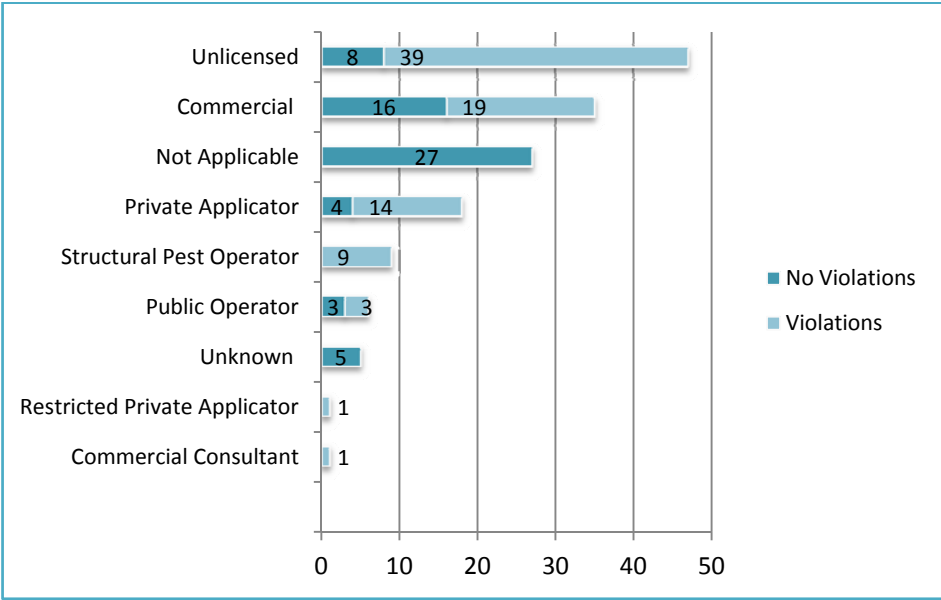


### Type of License in Complaints with Violations

Agriculture licensed about 5,470 commercial applicators and operators and 11,570 private applicators. Agriculture also issued about 8,360 other license types for a total of about 25,400 licenses. Although Agriculture licenses fewer commercial applicators than private applicators, commercial applicators have more applications per licensee and more applications on land not owned by the applicator. This increases the probability of complaints for commercial applicators.

Commercial applicators had 35 complaints with 19 violations (Figure 3). Private applicators had 18 complaints with 14 violations. Unlicensed applicators had 47 complaints with 39 violations.

**Figure 3. Agriculture Type of Licensee Involved in Cases with and without Violations, 2009**



**Severity of Reported Complaints**

Agriculture rates the severity of a case after complaint investigation is complete. Table 4 gives a detailed description of each rating. As in previous years, most complaints (79 percent) received a severity rating of 2 or less.

**Table 4. Severity Rating of Agriculture Complaint Cases, 2004-2009**

Rating	2004	2005	2006	2007	2008	2009	Criteria
0	26 14.5%	29 15%	21 10%	29 16%	18 11%	25 17%	Problem not due to pesticides and/or no cause determined; Structural Pest Inspection with no violations.
1	65 32.5%	77 40%	63 30%	54 31%	67 39%	28 19%	Pesticides involved, no residue, no symptoms occurred; possible pesticide problem, not substantiated; issues involving records, registration, posting, notification (multiple chemical sensitivity) or licensing; Health classified "unlikely" or "insufficient information".
2	83 41.5%	54 28%	92 45%	57 32%	52 30%	66 45%	Residue found, no health symptoms (human, animal); health symptoms not verified; multiple minor violations; off label use; worker protection violations; PPE violations with no health symptoms; plants with temporary or superficial damage only; Structural Pest Inspection faulty inspections; Health classified "possible".
3	18 9%	16 8%	12 6%	25 14%	21 12%	15 10%	Minor short-term health symptoms (rash, eye irritation, shortness of breath, dizzy, nausea, vomiting); bee kills of less than 25 hives; minor fish kills; economic plant damage under \$1000; evidence of deliberate economic fraud; Health classified "probable".
4	8 4%	17 9%	14 7%	10 5%	12 7%	11 8%	Short-term veterinary or hospital care; bee kills of greater than 25 hives; significant fish kills; significant economic plant damage (over \$1000); environmental damage; illness involving children; Health classified "probable".
5	-	-	4 2%	2 1%	1 1%	2 1%	Veterinary or hospital care overnight or longer; physician diagnosed children's illness as caused by pesticides; animal death due to pesticides; significant environmental damage; Health classified "definite".
6	-	-	-	-	-	-	Human death due to pesticides.
<b>Total</b>	<b>200</b>	<b>193</b>	<b>206</b>	<b>177</b>	<b>171</b>	<b>147*</b>	*(plus one case referred)

Of the 11 cases in 2009 with a severity rating 4, four were issued a Notice of Intent. One was improper pesticide disposal; two were drift to a crop, and one drift from an application to apples. In two cases, a Notice of Correction was issued for drift. No action was taken on four cases because the applicator could not be determined, the problem was caused by the complainant, or it was a neighbor-neighbor dispute with no proven violation. One case was referred to the Yakama Nation.

One case with a severity rating of 5 resulted in the death of seven turtle doves; a second case resulted in the death of a dog. In both cases a rodenticide was improperly applied to grain.

### Type of Pesticide Involved

Herbicides were responsible for 48 complaints, and insecticides in 31 complaints. There were fewer complaints about other pesticides such as fungicides (six) growth regulators (three), and rodenticides (four). Herbicides and insecticides are used more frequently, and there are more obvious detrimental effects from herbicide and insecticide misuse. Herbicides and insecticides are also generally applied at a higher frequency with power equipment over larger areas.

Overall, complaints about applications in 2009 continue to show a greater variety of pesticides than seen in former PIRT Panel reports. There were no complaints about azinphos-methyl drift. There were six complaints about endosulfan drift. Complaints on azinphos-methyl and endosulfan continue to be minimal and are anticipated to become even fewer as use of these products decreases. The use of azinphos-methyl will be discontinued in 2012.

Applicators appear to use more pest-specific products with a greater diversity of active ingredients and place less reliance on broad-spectrum pest control products. With this change there are more products involved in complaints and fewer complaints about only one product – except for 2,4-D and glyphosate. These products probably have a high frequency of use.

Herbicide drift constitutes the greatest number of complaints. Two herbicides, 2,4-D (11 complaints) and glyphosate (17 complaints), were again the most frequently reported active ingredients for complaint investigations (Table 5). This is consistent with previous years and probably reflects frequency of use by unlicensed and untrained applicators, and the high visibility of product misuse. Many complaints involved tank mixes of several products or complaints about drift from an unspecified or unknown pesticide.

**Table 5. Active Ingredients Most Commonly Involved in Agriculture Complaints, 2009**

Active Ingredient	Number
Glyphosate	17
2,4-D	11
Triclopyr	6
Dicamba	6
Endosulfan	6
Chlorpyrifos	3

Complaints reported to Agriculture should be regarded as indicators of potential problem areas rather than a definitive summary of all misapplications. For example, drift involving products such as sulfur and kaolin (clay) may occur more often than reported. Such products are better known and people may be less worried about effects. These products have fewer health effects and minimal damage to non-target plants and property.

### Enforcement Actions

Complaint investigations may result in finding that state or federal laws or rules were violated. Generally, first offenders or minor infractions are given a Notice of Correction and a deadline to reach compliance. For more serious infractions, Agriculture follows the penalty matrix specified in WAC 16-228-1130 for any legal action. Violations of the Worker Protection Standards were classified as more serious offenses and violators issued Notices of Intent.

Cases that may be taken to court are listed as *Notice of Intent* in Table 6. The violator may pay the penalty as stated, or the violator has the right to appeal and take the case to court. The court may impose the fine and/or license suspension given by Agriculture or it might dismiss the case. As cases appealed may take several years to settle, all cases are listed as *Notice of Intent* for this report. Final settlement of these cases can be determined by contacting Agriculture.

Sometimes more than one corrective action is taken on a case. In this report, only one corrective action per category is identified. For example, if more than one *Notice of Correction* was issued, the action would be listed as one *Notice of Correction*. However, if more than one type of corrective action was taken, such as a *Notice of Correction* and a *Notice of Intent* (which could happen if several applicators were involved in the same investigation), both types are listed.

The corrective actions taken in 2009 are listed in Table 6.

**Table 6. Agriculture Agency Actions, 2004-2009**

Action Type	2004	2005	2006	2007	2008	2009
No Action Indicated	76	77	69	73	63	60
Verbal Warning	1	6	5	11	5	3
Warning Letter	4	9	12	5	13	2
Notice of Correction	98	76	93	60	72	60
Notice of Intent	20	23	22	26	18	20
Referred	2	2	0	2	1	3
<b>Total Actions</b>	<b>201</b>	<b>193</b>	<b>206</b>	<b>177</b>	<b>172</b>	<b>148</b>

## **Other Agencies Involved**

Agriculture cooperates with other state and local agencies to collect evidence and testimony. Cooperating agencies may independently investigate and report their involvement in these cases.

Agriculture consulted with other state, federal and local agencies in 39 investigations. The agencies most frequently consulted were: Health (26); Ecology (13); Yakama Nation (four); Agriculture Food Safety (two); and the United States Environmental Protection Agency (two). Three cases were referred to another enforcement agency (Yakama Nation and Ecology).





# Ecology

*Washington State Department of Ecology's summary of pesticide-related Spills Program complaints, Toxic Cleanup Program and Aquatic Pesticide Permits, and monitoring activities during 2009.*

## **Background**

Multiple programs within Ecology are involved in pesticide-related activities. Ecology works with National Marine Fisheries Service, and other federal and state agencies, to protect salmon from pesticides under the Federal Endangered Species Act. Ecology participates in the Urban Pesticide Education Strategy Team, the Washington State Healthy Schools Initiative, and other projects. Ecology oversees cleanup and monitoring of contaminated areas, including areas contaminated with pesticides. One of Ecology's goals is preventing overuse and misuse of pesticides.

This report presents data for four programs: Spill Prevention, Preparedness, and Response Program (Spills Program), Toxics Cleanup Program, Water Quality Program, and the Environmental Assessment Program. These programs track data on pesticide spills, cleanup of pesticide contamination, and the use of pesticides to protect water quality. The programs also monitor the impacts of pesticides to water quality.

## **Spill Prevention, Preparedness, and Response Program: Pesticide-Related Incidents**

The Spills Program responds to pesticide complaints and is responsible for containing damage from a spill, and cleaning it up quickly. Ecology uses data from pesticide spills and complaints to identify where more education would help reduce the affects of pesticides on human health and the environment.

In 2009 there were 11 pesticide complaints that threatened air, water, and soil. Spills Program response to complaints include follow-up by phone, referral to involved parties for voluntary cleanup, referral to another agency, or issuing a cleanup notice or requirement. Investigations require field work, research, coordination with other agencies, or technical assistance.

Ecology responded within 24 hours in all 11 complaints in 2009:

- Six were in agriculture.
- Two involved commercial or industrial activities.
- Six were reported by private citizens.
- Two resulted in potential exposure to humans.
- Six required some form of cleanup or removal of materials.

Table 7 lists the types of pesticide-related complaints received from 2001 through 2009.

**Table 7. Ecology Pesticide-Related Complaints, 2001-2009<sup>1</sup>**

Type of complaint	2001	2002	2003	2004	2007	2008	2009
Pesticides threatening ground or surface water	11	23	13	10	8	1	3
Pesticide disposal or waste concern	14	12	12	6	6	4	4
Spills and fires	1	12	5	10	9	3	4
Unsafe pesticide storage or handling	6	11	10	3	3	3	8

After Spills Program staff responds to and stabilizes the initial emergency, the case is closed if it is determined that there are no long-term effects. If there are long-term effects, the case is referred to another program within Ecology. When indicated, Ecology refers complaints to other state or local agencies. In 2009, the Spills Program referred two pesticide complaints to tribes, Washington State Department of Transportation, U. S. Environmental Protection Agency, city and county public works departments, Washington State Department of Fish and Wildlife, and Agriculture. Ecology immediately notified Health of two incidents where humans were potentially exposed to pesticides.

### **Toxics Cleanup Program: Contaminated Sites Containing Pesticides**

Ecology oversees cleanup and monitoring contaminated areas. Contamination may be from leaking underground petroleum tanks, historic or current pesticide use, spills, or industrial processes. When a contaminated site is added to Ecology's cleanup list, it remains on the list until it is cleaned up or requires no further action. A site may be on the list for more than a year. Ecology added two pesticide-contaminated sites to the cleanup list in 2009, in Kittitas and Skagit counties. Both sites are designated as awaiting cleanup.

<sup>1</sup> Complaints may involve more than one category.

There were 246 pesticide-contaminated sites in 2009. Of those, 83 sites were awaiting clean-up as of December 31, 2009. The status for all sites for 2009 is summarized in Table 8.

**Table 8. Status of Pesticide-Contaminated Sites Statewide, 2009**

<b>Pesticide-contaminated sites</b>	<b>2009</b>
Sites undergoing cleanup at year's end	83
Sites with no further action needed	88
Sites awaiting further investigation	75
<b>Total pesticide-contaminated sites for the year</b>	<b>246</b>

### **Water Quality Program: Aquatic Pesticide Permits**

EPA delegates authority to Ecology to oversee all federal water pollution control laws and regulations through the state's laws. These include issuing permits to use aquatic pesticides in ways that protect water quality. The permits require that chemicals are applied sparingly and properly to reduce exposure to natural resources and people.

Table 9 contains the pesticide use data for pesticides applied in lakes and ponds under Ecology's aquatic plant permit in 2009.

**Table 9. Aquatic Plant and Algae Management Permit, 2009**

<b>Product (active ingredient)</b>	<b>Pounds of active ingredient used</b>
2, 4-D (amine and ester)	5,512
Diquat Dibromide	3,939
Endothall (dipotassium salt and mono salt)	2,776
Fluridone	125
Glyphosate	179
Imazapyr	1
Sodium Carbonate Peroxyhydrate	275
Triclopyr TEA	5,241
<b>Total pounds of active ingredient applied</b>	<b>18,048</b>

### **Oyster Grower's NPDES Permit**

The Oyster Grower's NPDES Permit is an individual permit issued directly to the Willapa Bay/Grays Harbor Oyster Growers Association. It allows the use of carbaryl, an insecticide in the carbamate family, to control burrowing shrimp in oyster beds. The data for 2005 through 2009 are shown in Table 10.

**Table 10. Oyster Growers Permit, Carbaryl Usage, 2005-2009**

Year	Acres treated	Pounds of active ingredient used
2005	576	3,629
2006	593	4,741
2007	555	4,438
2008	458	3,660
2009	559	4,472

From 2007 to 2009 Agriculture issued an experimental use permit for use of Imidacloprid. Imidacloprid is a neonicotinoid, which is a class of neuro-active insecticides modeled after nicotine. In 2009, oyster growers applied five pounds of Imidacloprid experimentally to 10 acres in Willapa Bay.

#### Noxious Weed NPDES Permit

Ecology issues the Noxious Weed NPDES Permit to government agencies, homeowners, lake-advocacy groups, and marinas to treat fresh and saltwater bodies for noxious, non-native plants. The treated areas are located throughout the state. Product totals are listed in Table 11.

**Table 11. Noxious Weed NPDES Permit, 2009**

Product	Pounds of active ingredient used
2, 4-D (amine)	337
Diquat	159
Endothall (dipotassium salt)	85
Glyphosate	7,865
Imazapyr	1,255
Triclopyr	70
<b>Total pounds of active ingredient applied</b>	<b>9,871</b>

#### Fish Management NPDES Permit

Ecology issues the Fish Management NPDES Permit to Fish and Wildlife, which applies rotenone in lakes for fish management. In 2009, four lake systems throughout the state were treated under this permit (Table 12).

**Table 12. Fish Management NPDES Permit, 2009**

<b>Water Body</b>	<b>Pounds of active ingredient used</b>
Buck Lake	44
Hog Canyon Lake	96
Fishtrap Lake	1,540
Fourth of July Lake	1,049
West Medical Lake	1,362
Cee Cee Ah Lake	36
<b>Total pounds of active ingredient applied</b>	<b>4,127</b>

**Irrigation District NPDES Permit**

The Irrigation District NPDES Permit addresses products to control weeds and algae in irrigation systems. Ecology issued the permit to 16 of the 97 irrigation districts statewide during the 2009 application season. These 16 districts account for 81 percent of all irrigated land in Washington. Amounts of active ingredients applied in irrigation systems are listed in Table 13.

**Table 13. Irrigation District NPDES Permit, 2009**

<b>Product</b>	<b>Pounds of active ingredient used</b>
Acrolein	182,424
Copper products	84,204
Fluoridone	33
Green Clean (sodium carbonate)	173
Xylene	50,434
<b>Total pounds of active ingredient applied</b>	<b>317,268</b>

**Mosquito General NPDES Permit**

The number of groups treating for mosquitoes in the state rapidly increased to protect people and animals from West Nile virus. Ecology allows mosquito control districts and government agencies to apply for limited agent status, under permit coverage issued to Health. Table 14 summarizes pesticide totals statewide.

**Table 14. Mosquito General NPDES Permit, 2009**

<b>Product type</b>	<b>Pounds of active ingredient used</b>
Bacillus spaericus (H-5a5b)	6,640
Bacillus thuringiensis israelensis (Bti)	69,282
Methoprene (all formulations)	211
Monomolecular surface film	539
Paraffinic white mineral oil	37,179
<b>Total pounds of active ingredient applied</b>	<b>113,851</b>

## Surface Water Monitoring

### Surface Water Monitoring Program for Pesticides in Salmon-Bearing Streams

Since 2003 Agriculture and Ecology have conducted a multi-year monitoring study to characterize pesticide concentrations in selected salmon-bearing streams during a typical pesticide-use period. Monitoring is conducted in six basins: two urban basins and four agricultural basins.

An intensive review of pesticide results for 2009-2011 will be conducted after the 2011 monitoring season.

### Other Pesticide Related Water Quality Studies Published in 2009

The results of freshwater fish tissue sampling in 2007 as part of the Washington State Toxics Monitoring Program were published in a report. Sixteen sites across the state, representing 12 resident freshwater species of fish, were sampled. Contaminants assessed include persistent, bioaccumulative, and toxic chemicals (PBTs) such as mercury, PCBs, dioxins and furans, chlorinated pesticides, and PBDE flame retardants. For pesticides, DDT and chlordane groups were detected in 63 percent and 6 percent of the 35 samples, respectively. The “Freshwater Fish Tissue Component, 2007” report can be found at: [www.ecy.wa.gov/biblio/0903003.html](http://www.ecy.wa.gov/biblio/0903003.html).

A report describing 2007-2008 monitoring of polychlorinated biphenyls (PCBs) and dieldrin at three wastewater treatment plants and two abandoned landfills in the South Fork Palouse River watershed was published. The findings indicate PCB reductions at all three treatment plants, and dieldrin reductions at the Pullman treatment plant, are needed. Soil/sediment and surface water samples from the two landfills contained the contaminants at relatively low levels. The “Palouse River Watershed PCB and Dieldrin Monitoring, 2007-2008: Wastewater Treatment Plants and Abandoned Landfills” report can be found at: [www.ecy.wa.gov/biblio/0903004.html](http://www.ecy.wa.gov/biblio/0903004.html).

A report was published that evaluated the effectiveness of copper herbicide discharge limits set for irrigation canals through the National Pollutant Discharge Elimination System (NPDES) permit. Surface water and sediment samples for copper were collected in two irrigation projects that discharge to the mid-Columbia and Wenatchee Rivers. None of the water samples exceeded state water quality standards for copper. None of the sediment samples exceeded sediment quality guidelines for copper. The "Irrigation Canal Effects on Copper Levels in Water and Sediment of the Mid-Columbia and Wenatchee Rivers" report can be found at: [www.ecy.wa.gov/biblio/0903005.html](http://www.ecy.wa.gov/biblio/0903005.html).

A report was published that described 2007 monitoring results for 12 freshwater sites sampled for persistent, bioaccumulative, toxic (PBT) chemicals. Semipermeable membrane devices (passive samplers) were deployed for a one-month period during both the spring and fall. Contaminants frequently detected were PCBs, PBDEs, DDT and endosulfan compounds, dieldrin, and pentachloroanisole. Contaminant levels for toxaphene, dieldrin, and PCBs did not meet state or EPA water quality criteria at five sites. "The Washington State Toxics Monitoring Program: Trend Monitoring for Chlorinated Pesticides, PCBs, and PBDEs in Washington Rivers and Lakes, 2007" report can be found at: [www.ecy.wa.gov/biblio/0903013.html](http://www.ecy.wa.gov/biblio/0903013.html).

"Effect of Fluridone on Macrophytes and Fish in a Coastal Washington Lake" is an article published in *The Journal of Aquatic Plant Management*. This article describes results of Loomis Lake (Pacific County) fish population and aquatic plant monitoring before and after herbicide application of fluridone to control invasive non-native aquatic plants. The herbicide treatment resulted in significant reduction of invasive plants for three years. The native submersed plant community was also significantly reduced. After herbicide treatment, the growth of largemouth bass and pumpkinseed sunfish increased, small yellow perch abundance decreased, and larger pumpkinseed sunfish increased. The article is available at: [www.ecy.wa.gov/biblio/0903033.html](http://www.ecy.wa.gov/biblio/0903033.html).





# Health

*Washington State Department of Health's summary of pesticide-related investigations during 2009.*

## **Background**

Health's Pesticide Illness Monitoring and Prevention Program investigates reports of pesticide illnesses. From these investigations, Health identifies public health problems and develops strategies to prevent exposure to pesticides. Federal and state agencies, local government, advocacy groups, and legislators also use collected data.

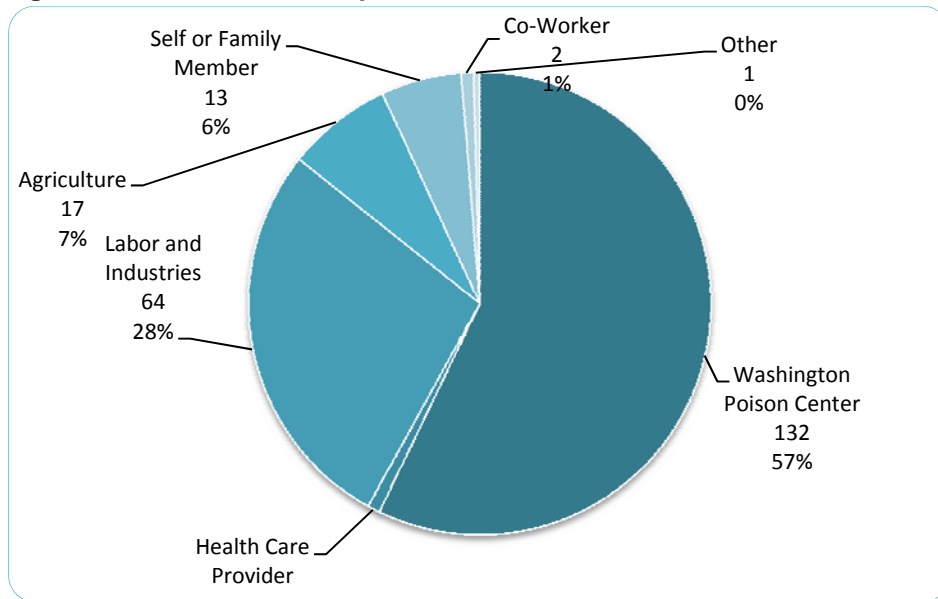
This Health report describes sources of case reports, classification and severity of cases, and the number of pesticide illness investigations conducted. Data on occupational, agricultural, and non-agricultural cases concludes with a summary of two program activities from 2009. These activities highlight the program's effective role to prevent pesticide illness.

## **Sources of Case Reports**

Pesticide-related illness is a notifiable condition in Washington under Chapter 246-101 WAC. Under this rule, health care providers must report cases of illness from pesticides to Health immediately when it leads to hospitalization, fatality, or a cluster of illnesses. Reporting within three business days is required for all other cases. Health receives reports from numerous sources including Washington Poison Center, Labor and Industries Claims Administration Program, Agriculture, health care providers, and others. More than one agency may report the same illness event. An event may involve exposure to one or more people. Each individual exposure is investigated by the pesticide program as a separate case.

Figure 4 shows the number of investigated cases, and the proportion of report sources, per case, based on the first report received.

**Figure 4. Source of Case Reports, 2009\***



\* Although some cases were reported by more than one agency or organization, Health defines source by the first entity submitting the report to Health.

More than half of reports came from Washington Poison Center, more than any other source. Washington Poison Center reports include the bulk of health care provider reporting. The second highest report source is Labor and Industries, reporting 28 percent of the cases. The reports received from Agriculture dropped from 30 percent of investigated cases in 2008, to 7 percent in 2009.

### Case Investigation Criteria

Any single event may involve multiple people who experience pesticide illness. Health reviews all referred reports, and investigates those that meet the following criteria:

- A pesticide exposure is reported.
- Symptoms are reported.
- At least one individual involved saw a health care provider.
- The pesticide exposure occurred during the last three months.
- The pesticide exposure occurred in Washington.
- The pesticide exposure was neither a suicide nor homicide attempt.

Health occasionally investigates special circumstance even if all criteria are not met. Examples are unusual exposures to children, incidents with multiple ill people, moderate to severe illness or injuries among people who didn't seek health care, and cases referred by another state agency. Although federal law regulates many disinfectants as pesticides, Health doesn't investigate disinfectant illnesses unless the product was specifically used as a fungicide (for example, sprayed on mold). In 2009 Health applied for a federal grant from the National Institutes for Occupational Safety and Health (National Institute) to investigate cases of disinfectant-related illnesses.

### **Classification of Investigated Cases**

Pesticide program investigators interview individuals who may have been exposed to pesticides, review pesticide application and medical records, and conduct field visits. Investigators use this information to determine if symptoms are related to a pesticide exposure. Investigators document exposure and health effects, and evaluate the causal relationship. Health uses the National Institute's case classification system to distinguish between *definite*, *probable*, and *possible* (DPP) cases. Minimum criteria for DPP classifications include: symptoms are characteristic of known toxicological effects of the pesticide, and the time between exposure and symptom onset is consistent. Further description of DPP cases is provided in Table 15. Other classification categories include *suspicious*, *insufficient information*, and *unlikely cases* (Figure 5).

**Table 15. Classification Criteria of Definite, Probable, and Possible Cases**

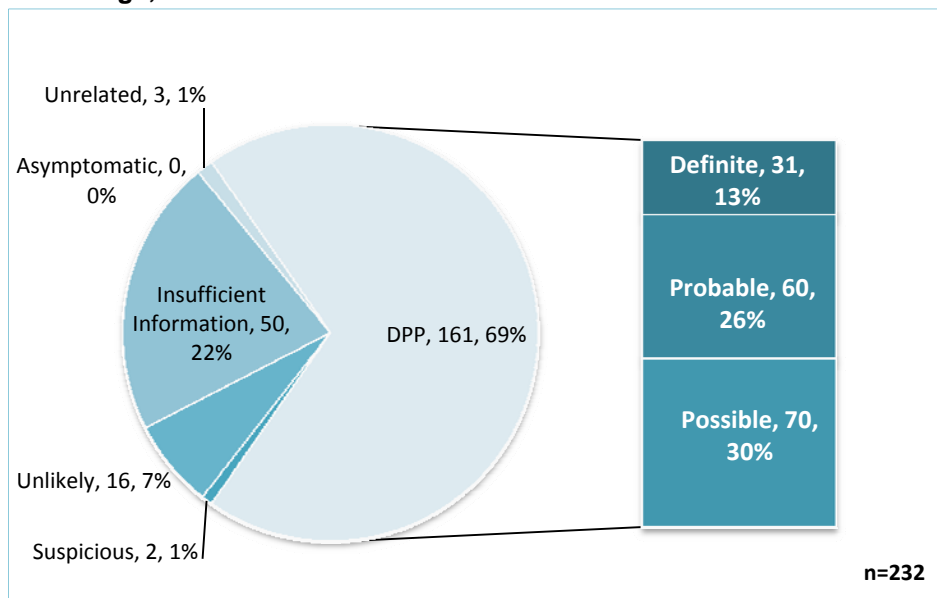
	Evidence of Exposure	Evidence of Health Effects
<b>Definite</b>	Laboratory, clinical, or environmental evidence corroborates exposure.	Two or more post-exposure health effects (one a sign*) or lab findings are reported by a licensed health care provider.
<b>Probable</b>	Laboratory, clinical, or environmental evidence corroborates exposure.	Two or more post-exposure symptoms** are reported by the individual or a health care provider.
<b>Possible</b>	Evidence of exposure is based on report from case, witness, application, observation of residue, or contamination.	Two or more post-exposure health effects (one a sign) or lab findings are reported by a licensed health care provider.
	Evidence of exposure is based on reports from case, witness, application, observation of residue, or contamination.	Two or more post-exposure symptoms** are reported by the individual or a health care provider.

\* Signs are considered objective evidence of illness and are observable on examination by a health care provider. (For example, low heart rate, cough, rash, or depressed cholinesterase activity).

\*\* Symptoms are considered subjective evidence of illness and may not be observable on examination by a health care provider. (For example, headache, nausea, or dizziness).

In 2009, investigators classified 69 percent of the 232 reported cases as DPP related to pesticide exposure. Figure 5 shows the classification of cases for 2009.

**Figure 5. Classification of Investigated Cases by Number and Percentage, 2009**

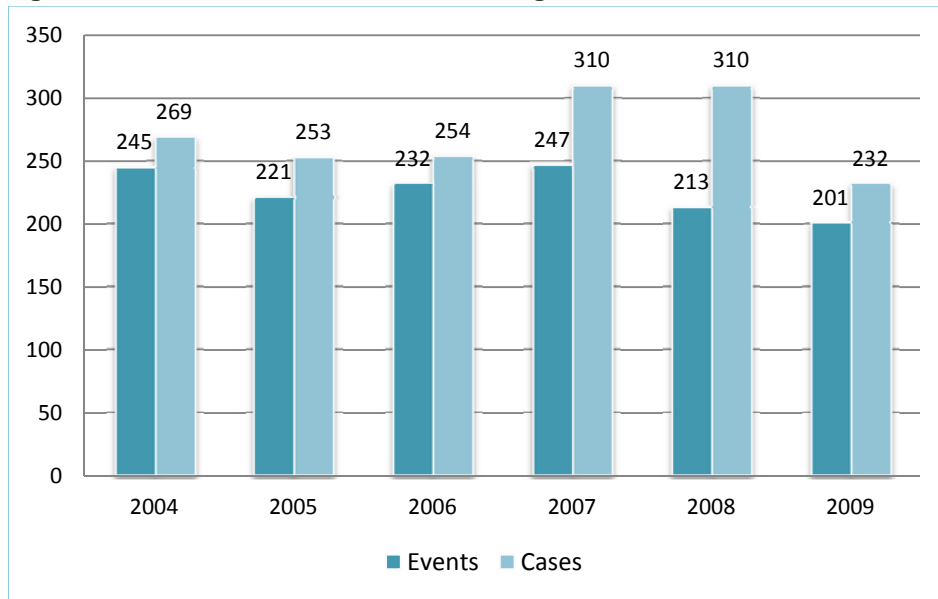


### Number of Investigations

Health investigated 201 reported events involving 232 people in 2009. While the number of investigated events was slightly lower than the previous five years, the number of cases remained fairly consistent, with the exception of 2007 and 2008.

Figure 6 shows events and investigations for 2004 through 2009.

**Figure 6. Health Events and Cases Investigated, 2004-2009**



### **Number of DPP Cases**

After staff completes an investigation, each case is classified by the likelihood that pesticide exposure contributed to the individual's reported symptoms. In 2009, there were 138 events that involved 161 DPP cases. Of the 138 DPP events, most (122) involved one case, nine involved two cases, four involved three cases, two involved four, and one involved six cases. There were no events in 2009 that involved more than six people.

Numbers of DPP cases for the years 2004 through 2009 are shown in Table 16.

**Table 16. DPP Case Classification, 2004-2009**

<b>Classification</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Definite	63	49	21	36	48	31
Probable	55	48	39	63	90	60
Possible	86	91	89	108	114	70
<b>Total DPP Cases</b>	<b>204</b>	<b>188</b>	<b>149</b>	<b>207</b>	<b>252</b>	<b>161</b>
<b>Total Cases Investigated</b>	<b>269</b>	<b>252</b>	<b>254</b>	<b>310</b>	<b>310</b>	<b>232</b>
Percent DPP	76%	75%	58%	67%	81%	69%

### Under-reporting

The actual number of pesticide-related illnesses that occur is under-reported in Washington. Health receives reports about people who seek medical care when the health care provider either calls Washington Poison Center or files a Labor and Industries insurance claim.

Many people with mild symptoms do not seek health care. Washington Poison Center data provides a limited measure of this. Most of the pesticide-related calls that the Washington Poison Center reports to Health through the Pesticide-Illness Electronic Reporting System, are from people that did not seek health care. Since the individual did not seek care, the event isn't investigated. Medical outcome of these calls were mostly coded by Washington Poison Center staff as "minor effect" or "not followed, minimal clinical effect possible."

Occupational cases in the data set also may be under-reported. Workplace exposures are generally reported through Labor and Industries, not Washington Poison Center. During 2001 focus groups with Yakima-area farm workers, workers explained that they were unlikely to take time off from work to be treated for mild to moderate symptoms. These workers were also unlikely to self-report to a government agency, voicing concerns about possible risks to their job security<sup>2</sup>.

There is under-reporting from health care providers as well:

- Providers may not recognize symptoms as being pesticide-related.
- Providers may not know to report.
- Providers may decide that other clinical responsibilities take precedent.
- The patient's employer may be self-insured, so claims wouldn't be submitted to Labor and Industries.

<sup>2</sup> See "Improving Data Quality in Pesticide Illness Surveillance" June 17, 2004, at <http://www.doh.wa.gov/Portals/1/Documents/Pubs/334-286.pdf>.

The extent of under-reporting among health care providers is currently unknown. In a study<sup>3</sup> completed in 2004, Health collected data about 60 percent of occupational illness cases that sought medical care in the Yakima area and were given a diagnosis of pesticide illness. Farming employers are primarily insured through Labor and Industries, so the percentage of health care visits for occupational pesticide injuries may be higher in this region. No studies that estimate the number of health care visits by the state's urban populations for pesticide illnesses that go unreported have been published.

Passive illness surveillance does not capture every case. The strength of this type of surveillance is to document enough cases to understand what problems are occurring and why. The focus of pesticide illness monitoring is collecting data for targeted prevention. Although it is possible that this surveillance is missing significant cases, the pesticide program is documenting sufficient problem areas to conduct prevention activities.

### **Severity of Medical Outcome**

Health uses the National Institute's severity index to classify signs and symptoms associated with pesticide illness cases. The "mild" category includes symptoms such as nausea, vomiting, shortness of breath, headache, dizziness, and skin or eye irritation. With mild severity cases, duration is relatively short: three days or less of time lost from work or normal activities.

"Moderate" illness or injury includes signs and symptoms that are pronounced and/or prolonged and in most cases must be observed by a health care provider. These include second and third degree skin burns, ocular burns, systemic symptoms (altered heart rate), slurred speech, or asthma attack. For moderate cases, time lost from work or normal activities is usually three to five days.

Cases are classified as "severe" when the illness or injury is considered life threatening; these cases typically require treatment or hospitalization to prevent death. Signs and symptoms include coma, cardiac arrest, renal failure, and/or respiratory depression. The individual often has substantial time loss (more than five days) from regular work.

Deaths classification due to pesticide exposure are infrequently reported in Health data. Intentional exposure – suicide and homicide – are not part of Health's surveillance.

Table 17 lists severity of medical outcomes for DPP cases from 2005 through 2009. In 2009, most of the 161 DPP Health cases were classified as mild. Thirteen cases were classified as moderate. There were three severe cases. No deaths due to pesticide exposure were documented in 2009.

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<sup>3</sup> See previous footnote.

**Table 17. Severity of Medical Outcome, 2005-2009**

Severity	2005	2006	2007	2008	2009
Low/Mild	161 (86%)	126 (85%)	181 (87%)	227 (90%)	145 (90%)
Moderate	26 (14%)	20 (13%)	26 (13%)	23 (9%)	13 (8%)
Severe	1 (0.5%)	2 (1%)	0 (0%)	2 (1%)	3 (2%)
Death	0 (0%)	1	0 (0%)	0 (0%)	0 (0%)
<b>Total DPP Cases</b>	<b>188</b>	<b>149</b>	<b>207</b>	<b>252</b>	<b>161</b>

**Figure 7. Type of Medical Care Sought, 2009 DPP Cases**

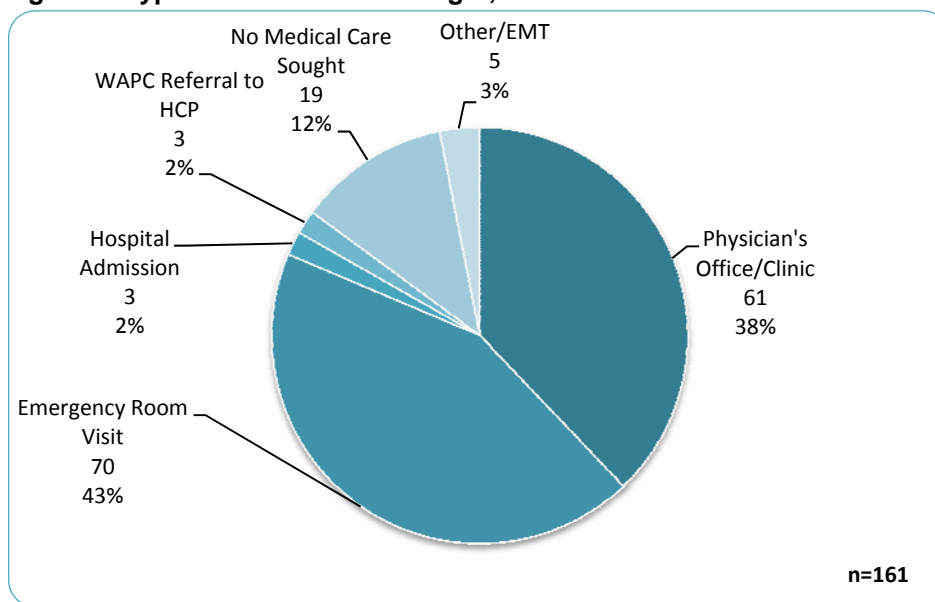


Figure 7 shows the type of medical care sought for DPP cases. Of the 161 DPP cases in 2009, 86 percent received medical care for their symptoms. Most were seen in the emergency room or in a physician's office or clinic. Five cases received care from an emergency medical technician or other type of emergency health care professional. Three cases were hospitalized.

The Washington Poison Center referred three cases to a health care provider, but the individuals did not seek health care. An additional 19 cases sought no medical care. Health investigated these cases because there multiple people who became ill, significant illness symptoms were documented, or the cases were referred Health by another agency. In each of these instances there was enough information about the exposure and symptoms to warrant investigating.

The proportion of mildly to moderately ill people who sought health care in the Health data set is skewed because the surveillance criteria selects cases that sought health care. In fact, the larger data set from the Washington Poison Center shows that most people with mild symptoms do not seek health care.



## Agricultural vs. Non-Agricultural Cases

Table 18 displays the distribution of cases defined as DPP by agricultural and non-agricultural setting from 2000 through 2009.

**Table 18. Annual Agricultural and Non-Agricultural DPP Cases, 2000-2009**

Year	Agricultural	Non-Agricultural	Total Cases
2000	113 (56%)	90 (44%)	<b>203</b>
2001	58 (48%)	62 (52%)	<b>120</b>
2002	75 (43%)	99 (57%)	<b>174</b>
2003	73 (40%)	111 (60%)	<b>184</b>
2004	64 (31%)	140 (69%)	<b>204</b>
2005	77 (41%)	111 (59%)	<b>188</b>
2006	44 (30%)	105 (70%)	<b>149</b>
2007	60 (29%)	147 (71%)	<b>207</b>
2008	123 (49%)	129 (51%)	<b>252</b>
2009	58 (36%)	101 (63%)	<b>161*</b>

\* The site of application was unknown in two of the total 161 cases.

Agricultural cases are pesticide applications intended for agricultural commodities such as fruit and field crops, nursery, livestock, and forest operations. Agricultural cases include exposure during pesticide handling, contact with drift or leaf residues from an agricultural application, and spills at agricultural storage facilities. There were 53 cases in 2009 involving farm applications, one case of a nursery worker, one case involving livestock production, and three at farm product warehouses.

Non-agricultural cases are commercial and residential use of pesticides. These cases may include spills or splashes while opening and pouring pesticides, or pesticide drifting off target such as being carried by wind outdoors, passing through air ducts, or seeping through living spaces indoors. Problems with foggers occur both with application mishaps, and overuse or drift of product to unintended areas of the residence or worksite.

The site of application was unknown in two cases in 2009. The first of these cases was an occupational exposure – a worker unloaded a container that had been fumigated, possibly in the Philippines. The second unknown application site concerns a licensed applicator who developed hives after applying product both at home and at work. Investigators were unable to determine if one or both sites contributed to his symptoms.

## Age and Sex

Twenty DPP cases involved children younger than 18 years old. Nine of the children were younger than six, five were between ages six and 11, and six were between 12 and 18. Table 19 lists the age and gender of 2009 DPP cases.

**Table 19. DPP Cases by Age and Sex, 2009**

Age	Female	Male	Total
0-5	2	7	9
6-11	2	3	5
12-17	2	4	6
18-29	13	28	41
30-49	29	39	68
50+	14	18	32
<b>Total</b>	<b>62</b>	<b>99</b>	<b>161</b>

Case examples of children younger than 18 years old:

- Nineteen-month-old drank algaecide. (Severity = High/Severe)
- Three-year-old vomited after drinking a small amount of repellent given to him by another child. (Severity = Low/Mild)
- Fifteen-year-old walking a dog at night was sprayed by a community mosquito control. (Severity = Low/Mild)
- A mother and her 14-year-old daughter developed symptoms after aerial application to an orchard. (Severity = Low/Mild)
- A family of four (including children ages 12 and 10) reported symptoms from orchard drift on their residence. (Severity 12 year old = Low/Mild; Severity 10 year old = Low/Mild)
- Five-year-old was burned when he played with Moss Out! in a sand box. (Severity = Low/Mild)

Table 20 shows that more males (61) reported occupational exposures than females (10). Fifty-two females were represented in non-occupational cases compared to 38 males.

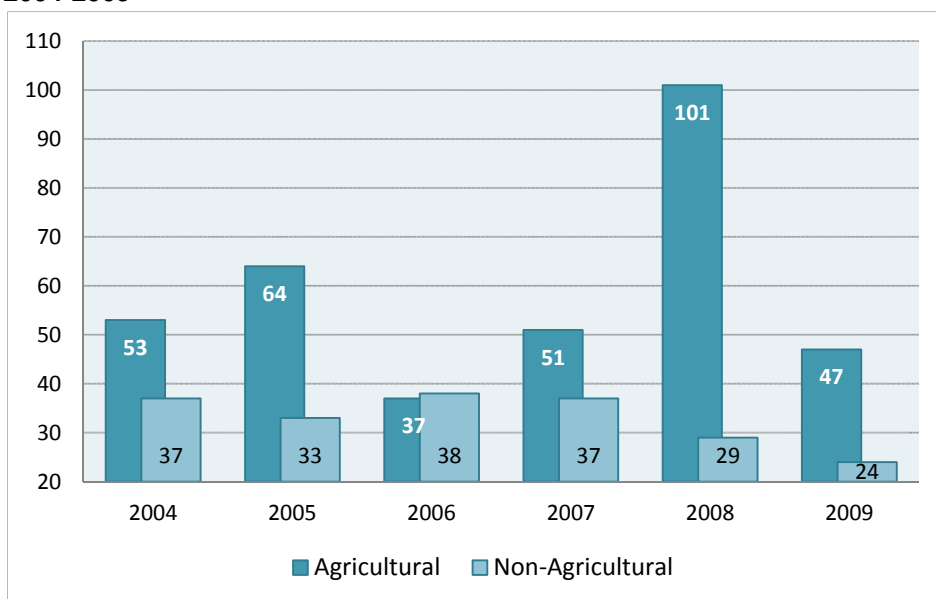
**Table 20. Occupational and Non-Occupational DPP Cases by Age and Sex, 2009**

Age	Occupational		Non-Occupational		Total
	Female	Male	Female	Male	
0-5	-	-	2	7	<b>9</b>
6-11	-	-	2	3	<b>5</b>
12-17	-	-	2	4	<b>6</b>
18-29	3	24	10	4	<b>41</b>
30-49	7	31	22	8	<b>68</b>
50+	-	6	14	12	<b>32</b>
<b>Total</b>	<b>10</b>	<b>61</b>	<b>52</b>	<b>38</b>	<b>161</b>

### Occupational Cases of Pesticide-Related Illness

There were 71 DPP cases of pesticide-illnesses from occupational exposures in 2009. This represents 44 percent of all DPP cases investigated. Forty-seven of these cases involved people working in agricultural occupations, and 24 cases involved people working in non-agricultural occupations. Nine of the non-agricultural occupational cases were licensed pest control operators or employees working under their supervision. Five workers were exposed to pesticides while working in office buildings or stores. One of the occupational cases classified as non-agricultural involved a worker who became ill while cleaning containers at a farm supply business where pesticides were formulated. The containers had held organophosphate pesticide and he was not wearing a respirator. The remaining pesticide-related illnesses were single cases of each of the following occupations: firefighter, Coast Guard employee, railroad worker, dockworker, and a golf course employee.

**Figure 8. Agricultural and Non-Agricultural Occupational DPP Cases, 2004-2009**



### Pesticide Drift Events

Table 21 shows that pesticide drift from agricultural application is a major contributor to illnesses – more than half. From 2006 through 2009, drift exposures comprise 23 percent of the 765 total DPP illnesses.

**Table 21. Type of Exposure by Agricultural or Non-Agricultural Application Site, DPP Cases, 2006-2009**

Type of Pesticide Exposure	Agricultural Applications		Non-Agricultural Applications		Total
Targeted	68	24%	187	39%	<b>255</b> <b>(33%)</b>
Drift	148	51%	29	6%	<b>177</b> <b>(23%)</b>
Indoor Air	5	2%	118	25%	<b>123</b> <b>(16%)</b>
Leak/Spill	21	7%	52	11%	<b>73</b> <b>(10%)</b>
Surface/Foliar Residues	23	8%	40	8%	<b>63</b> <b>(8%)</b>
Other	10	3%	37	8%	<b>47</b> <b>(6%)</b>
Unknown	13	5%	14	3%	<b>27</b> <b>(4%)</b>
<b>Total DPP Cases</b>	<b>288</b>	<b>-</b>	<b>477</b>	<b>-</b>	<b>765</b>

The number of drift cases tends to vary each year, as a single event can affect many people. Drift to workers usually, but not always, involves agricultural workers. Drift to non-workers generally involves people in their homes, driving on roads, visiting parks, or at schools.

Application types classified as “targeted” are the leading type of non-agricultural cases (39 percent). Targeted applications are also the leading cause of all types of exposures (33 percent) for 2006-2009. Targeted pesticide exposure is when a person is exposed to pesticide released at a target site, that does not dissipate. The pesticide may be any formulation: granular dust, aerosol, liquid. The targeted definition was expanded in 2006 to include exposure types previously called “spray” and “contact.”

Table 22 shows the number of drift events and people affected by agricultural applications for 2005 through 2009.

**Table 22. DPP Cases of Agricultural Drift to Workers and Others, 2005-2009**

Year	Events	DPP Cases	Occupational	Non-Occupational
2005	13	30	20	10
2006	12	16	9	7
2007	13	21	12	9
2008	13	83	62	21
2009	16	28	16	12
<b>Total DPP Cases</b>	<b>67</b>	<b>178</b>	<b>119</b>	<b>59</b>

There were 28 DPP pesticide illness cases in 2009 involving drift from agricultural operations, more than any other source of agricultural pesticide exposure (Table 23). Pesticide application intended for agricultural commodities such as fruit and field crops, nursery, livestock, and forest operations, moved from the intended target to other locations where people were present. Of the 47 work-related cases associated with agricultural pesticide application in 2009, drift contributed to 16 work-related cases, one more than the number of cases attributed to direct contact to pesticide spray or dust during application. Drift events continue to be a troublesome source of pesticide exposure for farm workers and bystanders.

Because drift events often affect a large number of people, any reduction in drift events can result in large reductions in pesticide-related illnesses.

**Table 23. Agricultural Occupational and Non-Occupational DPP Cases by Source, 2009**

Source of Pesticide Exposure	Occupational	Non-Occupational	Total
Drift	16	12	<b>28</b>
Targeted	15	1	<b>16</b>
Leak/Spill	6	0	<b>6</b>
Surface/foliar residues	5	1	<b>6</b>
Indoor Air	0	0	<b>0</b>
Other	2	0	<b>2</b>
<b>Total DPP Cases</b>	<b>44</b>	<b>14</b>	<b>58</b>

Table 24 shows the pesticide active ingredients for DPP cases involving agriculture pesticides. Since pesticides are commonly tank-mixed with other active ingredients, the number of total cases involving exposure to a specific chemical is often higher than indicated in the table.

**Table 24. DPP Agricultural Cases by Pesticide Ingredient, 2009**

<b>Pesticide</b>	<b>Ag Handlers</b>	<b>Other Ag Workers</b>	<b>Bystanders, Including Non-Ag Workers</b>	<b>Total</b>
<b>Cholinesterase Inhibitors</b>				
Azinphos-methyl	2	1	-	<b>3</b>
Carbaryl	1	2	-	<b>3</b>
Chlorpyrifos	2	-	-	<b>2</b>
Dimethoate	-	1	-	<b>1</b>
Malathion	-	4	-	<b>4</b>
<b>Other Insecticide</b>				
Acetamiprid	-	1	-	<b>1</b>
Imidacloprid	1	-	-	<b>1</b>
Kaolin	-	-	1	<b>1</b>
Endosulfan	2	-	-	<b>2</b>
Propargite	1	-	-	<b>1</b>
Pyrethroid (Lamda-cyhalothrin)	-	5	1	<b>6</b>
<b>Herbicides</b>				
Glyphosate, isopropylamine salt	2	1	3	<b>6</b>
2,4-D	1	-	3	<b>4</b>
Dicamba	-	-	3	<b>3</b>
Imazamox, Ammonium Salt	-	-	1	<b>1</b>
Oxyfluorfen	1	-	-	<b>1</b>
Paraquat dichloride	3	-	-	<b>3</b>
Sethoxydim	1	-	-	<b>1</b>
<b>Fungicides</b>				
Fenarimol	-	-	1	<b>1</b>
Mancozeb	-	1	-	<b>1</b>
Myclobutanil	2	1	-	<b>3</b>
Sulfur and Lime-sulfur	5	3	4	<b>12</b>
Tebuconazole	-	1	-	<b>1</b>
Triflumizole	1	3	-	<b>4</b>
Quinoxifen	-	1	-	<b>1</b>
Ziram	1	2	-	<b>3</b>
<b>Fumigants</b>				
Aluminum phosphide	1	-	-	<b>1</b>
<b>Other</b>				
Insect Growth Regulator	1	-	-	<b>1</b>
Potassium 1-naphthaleneacetate	-	1	-	<b>1</b>
Petroleum distillate, oils, solvent, or hydrocarbons	5	1	5	<b>11</b>
Biopesticides (Microbials)	2	2	1	<b>5</b>
Disinfectant	1	-	-	<b>1</b>
Cytokinin (Kinetin)	1	-	-	<b>1</b>
Fenpyroximate	-	1	-	<b>1</b>
Classified as multiple classes (Copper sulfate)	-	1	-	<b>1</b>
<b>Totals</b>	<b>37</b>	<b>33</b>	<b>23</b>	<b>93</b>

## Non-Agricultural Pesticide Events

Ninety-one percent of the 76 non-occupational exposures were in the home. This represents single family homes, apartments, and mobile homes. Twenty-six of these home exposures were classified as “private residence, type not specified”. Twenty-eight of the non-occupational exposures occurred in single family homes. Fifteen of the remaining non-occupational exposures occurred in multiunit housing.

**Table 25. Exposure Site for Non-Agricultural, Occupational, and Non-Occupational DPP Cases, 2009**

Exposure Site	Occupational	Non-Occupational	Total
Manufacturing and other industrial facilities	6	-	6
Office, retail, or service business	5	1	6
Park, camp, golf course	2	1	3
Residential building or grounds (home, apartment)	6	69	75
Road, right of way or vehicle	1	2	3
School, prison, hospital/clinic, institutions	3	2	5
Other	3	1	4
Unknown	1	0	1
<b>Total Cases</b>	<b>27</b>	<b>76</b>	<b>103</b>

Examples of non-occupational exposures in single family homes include:

- Homeowner seriously injured as fumigant mole bomb exploded.
- An insecticide application by a pest control operator drifts to neighbor.
- Homeowner sprayed insecticide and developed symptoms.
- Corneal abrasion from lice treatment.

Examples of non-occupational exposures in multiunit housing (apartments) include:

- Upstairs application of bifenthrin sickens neighbor below.
- Adult has breathing problems two hours after fogger is activated.
- Landscapers apply herbicides creating dust in townhouse and ventilation system.
- Resident reentered fogged space too early.



## **Highlights of 2009 Health's Pesticide Program Activities**

### **Health Pesticide Program Investigation Uncovers Illegal Pesticide Sales**

In 2009, pesticide program staff reviewed an investigation reported by the Washington Poison Center in 2008, involving a 30-year-old female who developed symptoms consistent with Organophosphate poisoning after using three products throughout one day. She used ant killing granules she purchased online inside her home. She also sprayed an herbicide and applied pyrethroid granules outside her home. She went to the emergency room about a half hour after using the pyrethroid granules.

Health notified Agriculture staff about the suspicious ant killing product. Agriculture referred the incident to EPA Region 10. EPA purchased the product from the website and submitted samples for laboratory testing. The ant granules contained the active ingredient Mirex, an Organochlorine that was banned in the United States in 1976. Health contacted the woman and advised her about safely cleaning up the granules. EPA launched a criminal investigation to shut down the illegal Internet site.

### **Health's Pesticide Illness Surveillance Identifies a Pesticide Product of Concern**

In 2007, pesticide program staff reviewed a case involving a 46-year-old male who was exposed to a product called 30-Seconds Outdoor Cleaner with active ingredients: sodium hypochlorite and trisodium phosphate. The exposure resulted in acute dermatitis. Subsequent conversations with EPA and Agriculture about the product revealed that it was being marketed by the company as a pesticide that "kills mold and mildew," rather than as just a cleaner. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), if advertised and sold as a pesticide, the product must be registered with the EPA. Currently the product is not registered in the United States as a pesticide.

This issue highlights the fact that although a product may not be considered a pesticide, it can still pose significant health hazards when used improperly. During the investigation, Health noted numerous pesticide product warning and labeling deficiencies. Health made specific recommendations for improvements, which if adopted, will hopefully reduce the number of injuries in the future.

These two activities highlight how the pesticide program works with community, state, and federal organizations to effectively use information gained from illness surveillance activities. In both of these incidents the Washington Poison Center and Agriculture contributed to the program's success. The pesticide program was able to identify specific issues of concern and work constructively with EPA to address the issues. Understanding the root causes of pesticide illness gained from illness surveillance activities helped reduce potential for similar exposures and prevent pesticide-related illnesses.

# Labor and Industries

*Washington State Department of Labor and Industries's summary of pesticide-related activity for 2009.*

The following data encompasses Labor and Industries' cholinesterase monitoring program, compliance inspection visits, and workers' compensation claims related to pesticide exposure. The cholinesterase monitoring program and compliance inspection visits are administered through the Division of Occupational Safety and Health (DOSH). The workers' compensation claim data is managed through Insurance Services.

## **DOSH Cholinesterase Monitoring Program**

Cholinesterase is an enzyme that removes the chemical neurotransmitter acetylcholine from the junctions between nerves cells. Cholinesterase serves as the nervous system's "off switch" and is essential to the normal function of the nervous system. Exposure to organophosphate or N-methyl-carbamate pesticides may lower the level of available cholinesterase.

Agricultural employers are required to offer each employee who may handle covered pesticides for 30 or more hours in any consecutive 30-day period the opportunity to participate in the cholinesterase blood monitoring program. Monitoring of cholinesterase levels in both red blood cells and blood serum can detect cholinesterase levels before the onset of illness. Employees are provided an annual baseline test prior to use of targeted pesticides. Cholinesterase levels are determined periodically during the application season and are compared to baseline levels. A decrease from baseline by 20 percent or more indicates potential pesticide over-exposure. Cholinesterase level depression is an indicator of pesticide exposure that Labor and Industries uses to investigate pesticide handling practices.

## **Cholinesterase Monitoring Results**

From January 21 to October 11, 2009, nearly 217 agricultural operations participated in cholinesterase monitoring. Samples from 2,060 handlers were collected. Baseline submissions increased slightly from 2008. This appears to be related to clinics encouraging baseline testing as a risk management strategy and employers incorporating baseline testing into hiring practices.

**Table 26. Comparison of Employer and Handler Cholinesterase Testing and Cholinesterase Depressions, 2004-2009**

Years	2004	2005	2006	2007	2008	2009
Employers participating in testing	380	316	244	226	218	217
Handlers submitting baseline tests	2,630	2,263	1,889	1,857 <sup>4</sup>	2,013	2,060
Handlers with at least one periodic test	580	611	471	386	314	249
Periodic tests	911	970	692	532	495	286
Handlers with Cholinesterase depression to work evaluation level	97 (16.7%)	49 (8.0%)	50 (10.6%)	49 (12.6%)	21 (6.7%)	15 (6.1%)
Handlers with Cholinesterase depression to exposure removal level	22 (3.8%)	10 (1.6%)	7 (1.5%)	18 (4.6%) <sup>5</sup>	1 (0.1%)	7 (2.8%)
<b>Total # handlers with Cholinesterase depression</b>	<b>119 (20.5%)</b>	<b>59 (9.6%)</b>	<b>57 (12.1%)</b>	<b>67 (17.3%)</b>	<b>22 (7.0%)</b>	<b>22 (8.8%)</b>

Of the 249 handlers who received at least one periodic test, 22 received at least one periodic test result with a greater than 20 percent cholinesterase depression from baseline (the action level for cholinesterase depression) requiring the employer to evaluate pesticide handling practices for possible deficiencies. Of these 22 pesticide handlers, seven were temporarily removed from handling covered pesticides. The 22 pesticide handlers with action level cholinesterase test results worked for 12 different employers. Two employers accounted for 12 of the action level cholinesterase depressions. One of the pesticide handlers also experienced an action level cholinesterase depression in 2008. No handlers were identified with pesticide illness related symptoms.

This summary is an excerpt from “Cholinesterase Monitoring of Pesticide Handlers in Agriculture: 2009 Report.” The full report is available along with the cholinesterase monitoring data on the Labor and Industries DOSH cholinesterase monitoring website:

[www.lni.wa.gov/Safety/Topics/AtoZ/Cholinesterase/files/ChEMonitoringReport09.pdf](http://www.lni.wa.gov/Safety/Topics/AtoZ/Cholinesterase/files/ChEMonitoringReport09.pdf).

Cholinesterase Program:

[www.lni.wa.gov/Safety/Topics/AtoZ/Cholinesterase/default.asp](http://www.lni.wa.gov/Safety/Topics/AtoZ/Cholinesterase/default.asp).

See Pesticide Incident Review Tracking Panel reports for data on pesticide illness in Washington State on Health’s website at:

[www.doh.wa.gov/DataandStatisticalReports/EnvironmentalHealth/Pesticides.aspx](http://www.doh.wa.gov/DataandStatisticalReports/EnvironmentalHealth/Pesticides.aspx).

<sup>4</sup> 120 handlers submitted “working baselines” this is an increase from 48 in 2006.

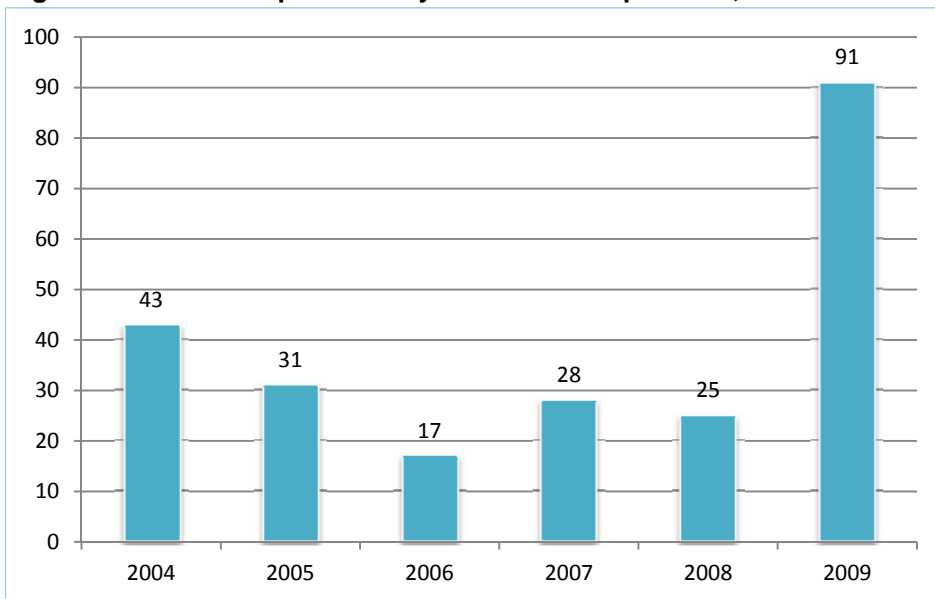
<sup>5</sup> One handler experienced simultaneous cholinesterase depressions to both the evaluation and removal levels.

## DOSH Enforcement and Consultation

To enforce safety and health requirements in the workplace, Labor and Industries DOSH staff may issue citations requiring employers to make changes in their workplace programs. Washington Industrial Safety and Health Act (WISHA) violations are typically categorized as either “serious” or “general”. All violations require employers to make changes in the workplace and confirm these corrections with DOSH. Inspections by DOSH can result in citing several different violations which may be classified as either serious or general.

This section summarizes the results of pesticide safety and health inspections conducted by Labor and Industries DOSH. The number of pesticide-related inspections increased in 2009.

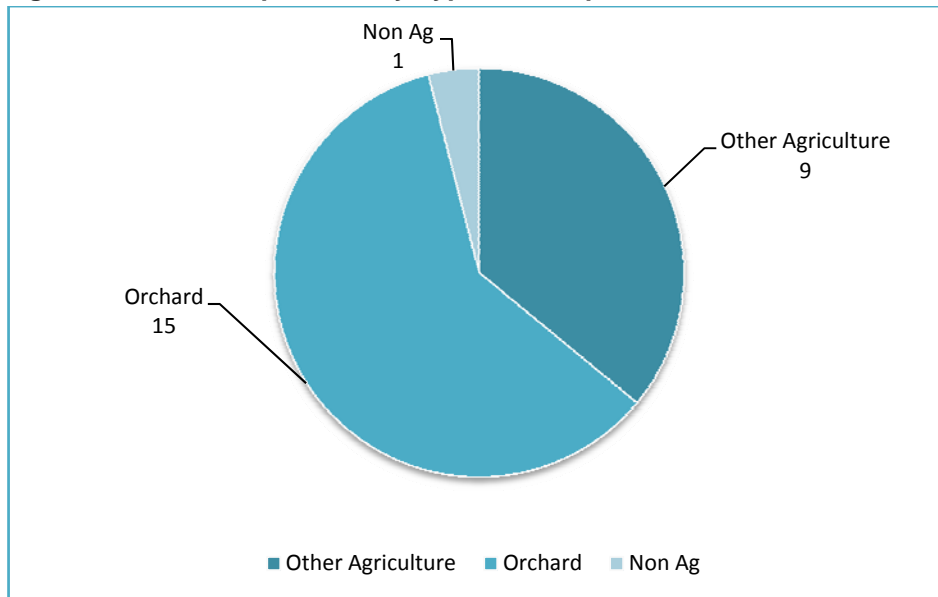
**Figure 9. DOSH Workplace Safety and Health Inspections, 2004-2009**



Of the 91 inspections conducted in 2009 related to pesticide issues, most (78 percent) were in eastern Washington and 22 percent were in western Washington. Of the 91 inspections, 37 were referrals from state agencies, health care providers, or the public. Two of the inspections were follow-ups; the remaining 52 inspections were unannounced and initiated by DOSH.

Eighty-two of the 2009 inspections occurred in agricultural environments. Nine inspections occurred in non-agricultural settings. Figure 10 shows the inspections by type of work place.

**Figure 10. DOSH Inspections by Type of Workplace, 2009**



### **DOSH Inspections Involving Violations**

In 2009, Labor and Industries DOSH conducted 91 inspections involving citations related to pesticides use. Penalties totaling \$13,020 were assessed for 43 serious pesticide violations from 20 of the 91 total inspections. There were 75 general pesticide violations with no assessed penalties; these were cited on 55 of the 91 inspections.

The 43 serious violations resulted in a total monetary penalty of \$13,020 with an average penalty of \$303.

There were 39 serious violations and 175 general violations in 2009. The most frequent types included:

- Respirator deficiencies, including no respirator program, improper storage or cleaning of respirators, no medical evaluations of worker's ability to wear a respirator, or no respirator fit-testing.
- Hazard communication deficiencies in safety programs, including: missing written programs, chemical inventories, or material safety data sheet; no employee training; or insufficient chemical labeling.
- Accident prevention program deficiencies.
- Employees not trained about pesticides, their hazards, or field sanitation.
- No emergency eyewash provided.
- Deficiencies in appropriate personal protective equipment.
- No hand-washing facilities or toilet.
- No required safety committee or safety meetings.
- Not posting safety, emergency, or pesticide spray information as required.

- Incomplete pesticide inventory.
- No decontamination supplies.
- Inadequacies in the Cholinesterase Monitoring program.
- Improper use of product as directed by the label.

## **Labor and Industries Claims Insurance Services Division, Claims Administration Program**

The Insurance Services Division, Claims Administration Program processes workers' compensation claims for on-the-job injuries and illnesses. In 2009, Labor and Industries received 77 claims where the injury or illness initially appeared to be related to pesticide exposure (Table 27). The number of pesticide-related claims decreased in 2009 by about 27 percent from 2008.

Labor and Industries either accepts or rejects claims based on whether or not a work-related injury or illness is diagnosed. Compensation is decided based on the following definitions:

*Medical Only/Non-Compensable Claim:* A worker experiences symptoms believed to result from exposure on-the-job and seeks medical evaluation. The claim is allowed when a physician finds that symptoms are related to the exposure and there is objective evidence of injury. The medical evaluation and any follow-up medical care and treatment costs are paid. In this type of claim, the employee misses less than three days of work. Lost workdays are not reimbursed to the employee.

*Time Loss/Compensable Claim:* A worker has an allowable claim and misses more than three days of work immediately following an exposure on the job. The worker is paid a portion of salary while unable to work. All related medical costs are covered.

*Rejected Claims:* Initial diagnostic and medical evaluation costs are covered. However the claim is rejected because there is no objective evidence relating symptoms to the workplace exposure. Claims may be rejected because:

- symptoms have resolved by the time treatment is obtained,
- there is no objective evidence of injury,
- the worker may not yet have symptoms of illness from the exposure, or
- exposure cannot be confirmed or documented.

A rejected status can be appealed and is often re-evaluated. Once final, though, the worker can no longer reopen a claim based on original symptoms. Illness claims may be either opened or re-opened up to two years after the onset of delayed symptoms. Costs of initial medical visits are usually paid.

*Pending:* Additional information is being collected on the claim before a determination can be made.

*Kept on Salary:* The employer elects to pay the claimant's salary instead of Labor and Industries paying time loss payments while the employee is recovering from an injury or illness.

**Table 27. Status of Labor and Industries Claims Initially Related to Pesticides, 2004-2009**

Labor and Industries Claims Status	2004	2005	2006	2007	2008	2009
Medical Only Non-compensable	70	62	68	82	108	53
Time Loss/ Compensable	4	2	4	2	5	1
Rejected	26	29	36	20	24	23
Pending/Unknown	1	-	1	-	-	-
Kept on Salary	-	-	1	1	1	-
<b>Total</b>	<b>101</b>	<b>93</b>	<b>110</b>	<b>105</b>	<b>138</b>	<b>77</b>

Claims categorized as *medical only* and *time loss* are compensated as work-related injuries. Of the 77 claims in 2009, 54 were compensated by Labor and Industries as being work-related injuries. Labor and Industries paid either time-loss or medical benefits for a total of \$43,432 in 2009.

As noted above, most rejected claims were compensated for initial diagnostic and medical evaluations costs even if a determination could not be made to relate the symptoms to the work place.



### Labor and Industries Claims Reported to Health

Criteria applied by Labor and Industries and Health are independent and distinctly different from each other, because they are used for different purposes. At Health's request Labor and Industries provides claim information involving pesticides to Health. For 2009 Health investigated 96 Labor and Industries workers' compensation claims. Of the 96 claims investigated by Health, Labor and Industries found 77 claims to be work-related. Of the 77 claims that Labor and Industries found them to be valid work-related injuries, Health classified 59 as *definitely, probably, or possibly* (DPP) related to pesticides. Health classified 27 cases as having insufficient evidence to find the link to pesticides, suspicious, or unlikely to be related to pesticide exposure. Of the 23 claims that Labor and Industries rejected, Health classified 14 as likely to be associated with pesticide exposure.

Table 28 illustrates the difference in evaluation criteria and perspective between the two agencies.

**Table 28. Comparison of Labor and Industries Claims and Health Classification Status, 2009**

Labor and Industries Claim Determination	Health Classification							Total
	Definite	Probable	Possible	Insufficient Information	Suspicious	Unlikely	Unrelated	
Medical Only Non-compensable* Time Loss	12	16	16	6	1	-	1	<b>52</b>
Compensable	1	-	-	-	-	-	-	<b>1</b>
Rejected	-	5	9	7	-	2	1	<b>24</b>
Pending/Unknown	-	-	-	-	-	-	-	<b>-</b>
Kept on Salary	-	-	-	-	-	-	-	<b>-</b>
<b>Total</b>	<b>13</b>	<b>21</b>	<b>25</b>	<b>13</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>77</b>

\* Occupational exposures are described in detail in the Health Section under Occupational Cases of Pesticide-Related Illness.