

# Supplementary Topics: Contaminants in Schools and Child Care Facilities

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## Methods

### Indicator

S4. Pesticides used inside California schools by commercial applicators, 2002-2007

### Summary

As per the Healthy Schools Act of 2000 (Assembly Bill 2260) enacted by the California legislature, all licensed pest management companies are required to maintain records of pesticide use at school and child day care facility sites and report such use to the California Department of Pesticide Regulation (DPR). The reporting requirements became effective January 1, 2002. The individual pesticide use reports are mandated to contain the following information: Name and address of the business that applied the pesticide; county where pest control was performed; date and time of pesticide use; name and address of the school or child day care facility site; location of application; pesticide, including the U.S. EPA or state registration number that is on the pesticide label; and finally, the amount used. The data contained in the individual reports of pesticide applications at school sites are aggregated by the DPR. Since each pesticide product may contain one or more active ingredients, and the use of active ingredients is of interest, the pesticide use data were combined with the data on active ingredients present in each commercially available pesticide product. These supporting data were obtained from the DPR, which maintains a database of all licensed pesticides along with names and proportion of active ingredients present in each pesticide. For each pesticide application, the pounds of each pesticide used were calculated by multiplying the amount of product used by the proportion of the active ingredient in the product and, for liquid volumes, by the density. The indicator S4 presents the annual total pounds of each pesticide group applied inside California schools and child day care facilities. Indicator S4 was computed by summing the pounds used across all schools and all pesticides in each pesticide group for each year.

### Data Summary

Indicator	S4. Pesticides used inside California schools by commercial applicators, 2002-2007.					
Time Period	2002-2007.					
Data	School pesticide use reports.					
Year	2002	2003	2004	2005	2006	2007
Total Records	26,770	23,409	22,266	20,569	30,663	24,940
Records for Applications Inside Schools	16,523	14,342	13,732	12,840	20,989	14,989
Records for Applications Inside Schools in	600	255	104	96	61	226

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Liquid Form With Unavailable Specific Gravity*						

\*Specific gravity either missing or reported as zero.

### Overview of Data Files

The following files are needed to calculate this indicator.

- XXXXSchoolPUR.xls: School pesticide use database for each year XXXX (MS Excel file for each year). The following variables were used: Product Name, Amount of Product Applied, Location Code, Unit of Measure, (Pesticide) Registration Number. The files were obtained directly from the California Department of Pesticide Regulation.<sup>1</sup>
- Pesticide product data. Product.dat. This ASCII file includes the Product Number (PRODNO), Product Name (PRODUCT\_NAME), Registration Number (SHOW\_REGNO), and the specific gravity (SPEC\_GRAVITY).
- Pesticide product ingredient data. Prod\_chem.dat. This ASCII file includes the Product Number (PRODNO), Chemical Code (CHEM\_CODE), and the percentage of each active ingredient (PRODCHEM\_PCT) in the product.
- Chemical code data. Chem\_com.dat. This ASCII file contains the Chemical code (CHEM\_CODE) and the Chemical Name (COMNAME).

### School Pesticide Use Reporting Database

California regulations require reporting of pesticide use at school sites by pest management companies on a prescribed form. These forms are then submitted to the DPR. The prescribed form<sup>2</sup> contains the following fields to be completed by the pest management company:

- Application year
- Business registration/license/certificate number, operator name and address
- School site and county
- Date and time of application
- Location code<sup>3</sup>

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<sup>1</sup> Through email correspondence with Laurie Brajkovich ([lbrajovich@cdpr.ca.gov](mailto:lbrajovich@cdpr.ca.gov)) and Basil Ibewiro ([bibewiro@cdpr.ca.gov](mailto:bibewiro@cdpr.ca.gov)) of California DPR.

<sup>2</sup> Available at <http://www.cdpr.ca.gov/docs/enforce/prenffrm/prenf117.pdf>.

<sup>3</sup> There are 19 location codes, each coding denoting a specific site inside or outside the school or child day care facility. Some records list more than one location code.

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- Pesticide product applied and the registration number from the label
- Amount used in either LB (pounds), OZ(ounces) PT (pint), QT (quart), or GA(gallons)

The pesticide use reported using the above forms is aggregated into a database by the DPR. Each data field/record/row contains one instance of pesticide use at a school site containing all of the above fields. The pesticide use database is available for each year from the DPR.

A supplementary dataset maintained by the DPR was also obtained in order to calculate the indicator. This dataset contains the specific gravity of each pesticide product, and the percentages of each of the active ingredients present in each pesticide product.

### Calculation of Indicator

Indicator S4 displays the mass of pesticides used inside California schools by commercial applicators from 2002-2007. The pesticides were classified into the following seven categories: Pyrethrin and Pyrethroid Insecticides, Organophosphate Insecticides, Other Insecticides, Herbicides, Fumigants, Rodenticides, and Miscellaneous Pesticides.

Each instance of pesticide use in California schools or child day care facilities was first classified as an indoor or outdoor application, based on the location code. Some uses report multiple location codes; however, there are no data to apportion the total amount used for each location. Therefore, when multiple location codes are reported, the use was classified as an outdoor application only when all the location codes correspond to an outdoor location. This may result in an overestimate of the pesticides used at indoor locations. The following location codes are assumed to be outdoor applications: 2 (Athletic field), 4 (Building exterior), 8 (Hardscape— parking lot, sidewalk etc.), 10 (Outdoor landscape), and 14 (Playground). The analyses for this indicator used only the indoor application data.

After the location of the use is determined, the amount of pesticide product used was converted into the common mass unit of pounds for each record. If the pesticide was applied as a liquid and reported in volume units rather than mass units, the volume was multiplied by the density of the corresponding product (from the pesticide product data file) to obtain the pounds of pesticide product used. The density is the specific gravity (relative to distilled water) multiplied by the density of water at standard temperature and pressure, 8.34 pounds per gallon. For some pesticide products, the specific gravity data were not available or were reported as zero. In such cases, a specific gravity of 1 (for distilled water) was assumed.

The amounts of active ingredient applied for each use were determined using the pesticide product ingredient file that lists the active ingredients and their proportions in each pesticide product. The usage files, pesticide product data file, and pesticide product ingredient file were all matched using the registration code of the pesticide product. The total amount of pesticide applied was multiplied by the fractions of each active ingredient to obtain the amount of that particular active ingredient applied. The common chemical names of the active ingredients were obtained by matching the chemical codes to the chemical code data file. The total number of pounds of each active ingredient applied during the year was obtained by summing the amount

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applied over all pesticide use records. Finally, the total number of pounds applied for each pesticide category was obtained by summing the total pounds of all the pesticide active ingredients in that particular category.

### Equations

The following equations give the mathematical calculations. Let  $w(x)$  denote the amount of the pesticide product  $x$  applied indoors at a school site. Assume that  $w(x)$  has been converted into pounds for products reported in mass units and has been converted into gallons for products reported in volume units. Let  $c(i)$  denote the percentage of active ingredient  $i$  present in the product  $x$ . Further, let  $d(x)$  be the specific gravity of the pesticide product  $x$  assuming it is in the liquid form and the reported unit is in volume units. The following calculations are applied to each year and pesticide category.

1. Sum over all pesticide use records (indoor applications only) to obtain the total amount of active ingredient  $i$  applied for products reported in mass units.

$$M(i) = \sum w(x) \times c(i) / 100$$

2. Sum over all pesticide use records (indoor applications only) to obtain the total amount of active ingredient  $i$  applied for products reported in volume units. 8.34 pounds per gallon is the density of distilled water at standard temperature and pressure.

$$V(i) = \sum w(x) \times d(x) \times 8.34 \times c(i) / 100$$

3. Sum the pounds of active ingredient used in solid and liquid form.

$$A(i) = M(i) + V(i)$$

4. Sum over all active ingredients in the pesticide category  $P$  to obtain the total pounds of category  $P$  applied in each year.

$$P = \sum A(i), \text{ where the sum is over all pesticides in category } P$$

### **Questions and Comments**

Questions regarding these methods, and suggestions to improve the description of the methods, are welcome. Please use the “Contact Us” link at the bottom of any page in the America’s Children and the Environment website.