



**U.S. Army
Environmental
Center**

**How to
Calculate & Report
Pounds of Active Ingredient
For
Pesticide Applications**

June 1997

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Foreword

This users guide is one of a proposed series to be published by the United States Army Environmental Center (USAEC). It addresses key Department of Defense (DoD) and Department of Army (DA) policy requirements and objectives that relate to reporting the amount of annual pesticide usage in pounds of active ingredient. This guide should be useful to pest control personnel who track and report amounts of pesticide usage within the Total Army, to include Reserve and National Guard organizations.

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How to Calculate and Report Pounds of Active Ingredient for Pesticide Applications



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1. Introduction

Background

In 1994 the Deputy Under Secretary of Defense for Environmental Security (DUSD(ES)) defined Measures of Merit (MoMs) for the Department of Defense (DoD) Pest Management Program. The DoD MoMs for pest management are as follows:

- Measure of Merit 1. Installation Pest Management Plans. By the end of Fiscal Year (FY) 1997, 100 % of DoD installations will have pest management plans prepared, reviewed, and updated annually by pest management professionals.
- Measure of Merit 2. Pesticide Use Reduction. By the end of FY 2000, the amounts of pesticides applied annually on DoD installations will be reduced by 50% from the FY 93 baseline in pounds of active ingredient.
- Measure of Merit 3. Installation Pesticide Applicator Certification. By the end of FY 98, 100 % of DoD's installation pesticide applicators will be properly certified (either by the DoD or appropriate State.) Direct hire employees have a maximum of two-years to become certified after their initial employment. Contract employees must have the appropriate State certification when the contract is awarded.

MoM #2, Pesticide Use Reduction, has supplementary guidelines. The guidelines define what the Military Departments will measure, the units in which to measure and report, and the means by which the Department will assess overall progress regarding the 50% reduction goal. The guidelines are as follows:

- Pesticide use includes all pesticide categories but does not include pesticides bought by citizens for private use at government quarters.
- Pesticide applications include
 - ◇ Commercial and agricultural applications on DoD property by government, lessee, and contract personnel.
 - ◇ Pesticides distributed under installation self-help programs.
 - ◇ Pesticides applications on DoD golf courses.

- Installations must report pesticide use as Pounds of Active Ingredient (PAI).
- The total pounds of pesticides applied during FY 1993 establish the baseline, from which to measure progress towards the 50% reduction goal.¹

Objective

The purpose of this users guide is to provide the pest management coordinator, or individual officially designated by the installation commander to coordinate and oversee the installation's pest management program, with instructions to assist with meeting the reporting requirements associated with MoM #2.

This guide is an effort to present the easiest ways of calculating and reporting the pounds of pesticides applied at your installation or activity. Instructions are provided for grouping pesticide applications volumetrically and then for calculating the PAI on the total volume. In addition, the guide describes how to calculate the PAI for dry formulations. To make the instructions relevant a series of examples are included for the most common pesticide applications.

Following the PAI calculations, illustrations are presented with respect to the proper way to report the installation annual pesticide use data.

Pest Management Program Requirements

DoD Instruction 4150.7 defines the policy, assigns responsibility, and prescribes the procedures for the DoD Pest Management Program. The DoD Pest Management Program policy applies to all DoD vector control and pest management operations performed worldwide during peacetime and during military deployments. This includes appropriated; non-appropriated fund (NAF) activities; Government-owned, contractor operated (GOCO) facilities; and DoD buildings, structures, lands, public works, equipment, aircraft, vessels, and vehicles.

The DoD pest management policy does not apply to civil works functions of the Army Corps of Engineers (ACE) or to State-owned or State-operated installations or facilities that the National Guard uses part-time or full-time. The exempt agencies may opt to incorporate provisions of the DoD pest management policy into their procedures and operations.

¹ The FY 93 baseline for an installation will be determined by the installation pest management coordinator and MACOM consultant, with respect to available data for FY 93. FY 95 may provide a more realistic baseline and more accurate set of figures, from which to measure pesticide reduction.

DoD and Army Reporting Requirements

DoD policy for reporting pesticide use requires installations to maintain complete daily pesticide application and pest management operations records using the Pest Management Maintenance Record (DD Form 1532-1) or a computer-generated equivalent. Army policy requires record-keeping for each pest management operation and pesticide application for each building, structure, and outdoor site using the Pest Management Maintenance Record DD Form 1532-1. This includes work done on golf courses, by NAF activities, by contract services, and as part of the outlease or natural resource management programs. (i.e., land, forestry, and wildlife management programs.) Installations are encouraged to maintain a monthly summary using the Pest Management Report (DD Form 1532) or a computer-generated equivalent to provide data for Federal, State, or local agency data calls, program reviews and oversight, and the DoD Measures of Merit.

Users Guide Elements

This users guide includes the following sections:

- **Section 2 - Getting Started** provides helpful hints for understanding what types of data to collect and how to use them to calculate and report pounds of active ingredient for pesticide applications.
- **Section 3 - Reporting Pesticide Use** describes the rules for calculating and reporting yearly pesticide use for an installation or activity.
- **Section 4 - Examples** illustrates how to use the information from DD Form 1532, pesticide labels, inventory records, and contractor's and grower's records to calculate and report PAI for pesticide applications.
- **Section 5 - Testing Your Ability To Calculate Pesticide Usage** includes a set of problems that test your ability to calculate and report pesticide use as pounds of active ingredient.

Appendices - include Appendix A, B, and C. Appendix A, is glossary of 1532 acronyms. Appendix B provides instructions to convert various units of measurement to pounds, acres, and gallons; Appendix C describes the Pest Tracking Management System (PTMS) that will provide the Army with a tool to support the tasks and reporting requirements associated with the DoD pest management MoMs.

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2. Getting Started

This section describes **what** information you need for calculating and reporting pesticide use; **where** you can acquire the information; and **how** you use the information to figure out how many pounds of active ingredient your installation or activity applied during a specific quarter or fiscal year.

Gather Necessary Information

Before you can gather the information needed to calculate pesticide use, you need to be familiar with where to look for data about pest control services and operations on your installation. Common sources of pesticide application data include the pest control shop, self-help programs, tenants of outleased areas, golf courses, and purchase requests associated with contracted pest control operations.

Once you know where to look for information, you need to recognize which documents to request. The major items that you will need to acquire to help you calculate pesticide use are (1) DD Form 1532 pest management report, (2) inventory data, (3) pesticide labels, (4) records such as contractor's and/or grower's records, and (5) purchase requests for contracted operations.

- **DD Form 1532 Pest Management Reports** - To calculate PAI for your installation or activity, you should begin by collecting the Pest Management DD Form 1532 reports for the relevant period. The 1532 reports are the monthly summaries of pesticide applications for an Army installation or activity and are usually found with the shop supervisor. The 1532 reports can facilitate volumetric grouping of pesticide applications, which may make the job of calculating, tallying, and reporting pesticide use much easier.

Installations with multiple contracting authorities include other sources for DD Form 1532 pest management reports. For example, the Department of Public Works (DPW), installation self-help programs, Community & Family Support Center (CFSC) golf courses, and tenant organizations that contract out their pest control operations should also be maintaining DD Form 1532 pest management reports. In addition to their pest management reports, the contracting authority should be able to provide purchase requests describing the pest control operations performed by contractors.

- **Inventory Data** - Inventory data provide the EPA registration number, product name, percent of active ingredient, and amounts of pesticides stored on a monthly basis. The information may help derive the initial concentration and formulation of a pesticide application.

- **Product Labels** - Product labels provide the product name, EPA registration number, percent of active and inert ingredient, directions for application, and most of the time the pounds of active ingredient per specified unit of measure. Product labels should be on-hand for all pesticide products.
- **Grower's Records** - To calculate PAI for installations and activities with outlease programs, you will need to acquire grower's records and copies of product labels.
- **Contractor's Records and Related Purchase Requisitions** - To calculate PAI for pest control operations performed by contractors but not recorded on the DD Form 1532 reports, you need to review the contractor's records and copies of product labels.
 To contact the contractors, you may need to review the purchase requisitions (PRs) used to acquire the contractor's services. The PRs should provide the name of the contractor and the specific tasks and reporting requirements that the contractor was obligated to follow.

Understanding Pest Management Report (DD Form 1532) Data

The Pest Management Report, DD Form 1532 or computer generated equivalent, is the traditional format for summarizing pest control operations conducted on government property. The intent of DD Form 1532 is to establish a uniform system to describe and report pest control techniques and materials. Understanding the information on DD Form 1532 is essential for accurately reporting pesticide use for your installation or activity.

Today's pest management policies require the Army to report pesticide use as pounds of active ingredient starting with fiscal year 1993. The 1532 report, as illustrated in Figure 2-1, contains much of the data needed to summarize, tally, and report pesticide use. The Army strongly encourages that all activities performing pesticide control operations on an installation summarize pesticide applications using DD Form 1532 pest management reports.

For more information about DD Form 1532 Pest Management Reports, refer to *NAVFACINST 6250.3F Department of Defense Pest Management Program: Instructions for the Preparation and Use of the Pest Management Report (DD Form 1532), February 1981*. To interpret the information on a Pest Management Report, i.e., DD Form 1532, see Appendix A, which provides descriptions of the information contained on the form.

PEST MANAGEMENT REPORT						C.D. Code 6 0	UIC W 4 Q V A A 9 3 0 P					REPORT CONTROL SYMBOL DD 1080			
1. MAJOR OR REVIEWING COMMAND						2. REPORTING INSTALLATION									
a. NAME			b. ADDRESS			a. NAME				b. ADDRESS					
No	TARGET PEST	OPERATION				PESTICIDE								TIME	
	Name	Name	Total Units Treated	Unit	Site	Name	Form	Application		Final Conc.%	Rate (per area unit)		Supply Source	Hours	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Amount (h)	Unit (i)	(j)	lb. (k)	% (l)	Enter s,n,g,c	(n)	
	13-15	17-19	20-24	25-27	28-30	31-33	34-36	37-41	42-43	44-49	50-55	56-58	68	69-71	
1	ROACHES	RESIDTR	12	MSF	BRQ	SAFROTIN	EML	12	ZGL	1.0			N	16	
2	TICKS	SPPDEQ	12	AC	OPG	DURSBAN	EML	2400	ZGL		1	100	N	20	
3	MOSQUITOES	DGHAND	6	AC	IMP	PYRENONE	SOL	6	LB	1.0			N	16	
4	MICE	INBAIT	16	MSF	FHB	ANTICOAG	BTS	16	LB	.005			N	20	
5	MXGRABDLVD	SPPDEQ	2	AC	OPG	GLYPHOSATE	EML	200	ZGL		4	100	N	40	
6	MXGRABDLVD	SPPDEQ	6	AC	OPG	MSMA		300	ZGL		2	100	N	40	
7	TICKS	SPPDEQ	14	AC	OPG	DURSBAN PRO	EML	13.1	PAI		1	100	S	50	
8	ANTS	EXBAIT	3	AC	OPG	AMDRO	BTS	2.2	PAI	0.88			S	4	
9	ANTS	INBAIT	10	MSF	BRQ	MAXFORCE	BTS	50	BTS	1.0			S	10	
10	FLEAS	RESIDTR	24	MSF	RES	DURSBAN PRO	EML	0.9	PAI	0.5			S	12	

DD Form 1532, MAY 1987

Figure 2-1. Example of DD Form 1532

A Note about Columns (k) and (l) on DD Form 1532.

Columns (k) and (l) are used together to report the rate of application per area unit of the pesticide, i.e., the number of pounds of pesticidal material in column (k) and its concentration in percent in column (l). For example, if 200 lbs of a 5% pesticide dust was used to treat 2 acres, there are two ways it can be reported. In both, the 200 pound amounts would be entered in columns (h) and (i). The differences are in reporting the pesticide concentration or rate.

In the first method, the application rate (100 lbs of dust per acre) would be entered in column (k) and the concentration (5%) would be entered in column (l) as 5.0. The second method used for reporting the same operation involves the actual amount of toxicant or active ingredient applied per acre (5 lbs) in column (k) and 100% in column (l). Either report would be correct.²

² For the purpose of this users guide, and in accordance with guidance provided by the Army Medical Department (AMEDD) Center and School, the examples that we present are based on the second method.

How Inventory Data Can Help You Calculate PAI

Army installations and activities maintain inventories of pesticides as part of their pest management plan and program requirements. Inventory data supplements the DD Form 1532-1 daily logs and DD Form 1532 reports maintained in the pest control facility. The inventory data should include the product name, EPA registration number, and the amount of a particular pesticide stored during a specific month. You can use the inventory information, along with any other information that you have about pest control operations to determine the initial concentration and formulation of a pesticide application. Always reference the inventory data if a DD Form 1532 pest management report contains unclear or incomplete information.

Understanding Pesticide Labels

When using a specific product pesticide applicators must comply with the directions on the product label. Figures 2-2, 2-3, and 2-4 are examples of pesticide labels.

Figure 2-2 is an example of pesticide label for an herbicide called Roundup™. The label contains facts about Roundup™ that are relevant to calculating and reporting PAI. One critical piece of information on the label is that Roundup™ contains four pounds of the active ingredient (i.e., isopropylamine salt of N-glycine) per U.S. gallon, which is equivalent to three pounds of glyphosate per U.S. gallon. The PAI per gallon is key for calculating the PAI for a specific application of Roundup™.

Labels also provide directions for use, warning statements, and information such as the following:

- Roundup™ is an herbicide.
- The EPA Registration Number for Roundup™ is 524-308-AA.
- Roundup™ contains 41.0% active ingredients, and 59.0% inert ingredients by weight.
- Roundup™ contains 4 pounds of the active ingredient isopropylamine salt of N-(phosphonomethyl) glycine per U.S. gallon
- Roundup™ contains 3 pounds of glyphosate per U.S. gallon.³

³ Although Roundup™ contains 3 pounds of glyphosate per U.S. gallon, the PAI is based on the 4 pounds of the active ingredient per U.S. gallon.

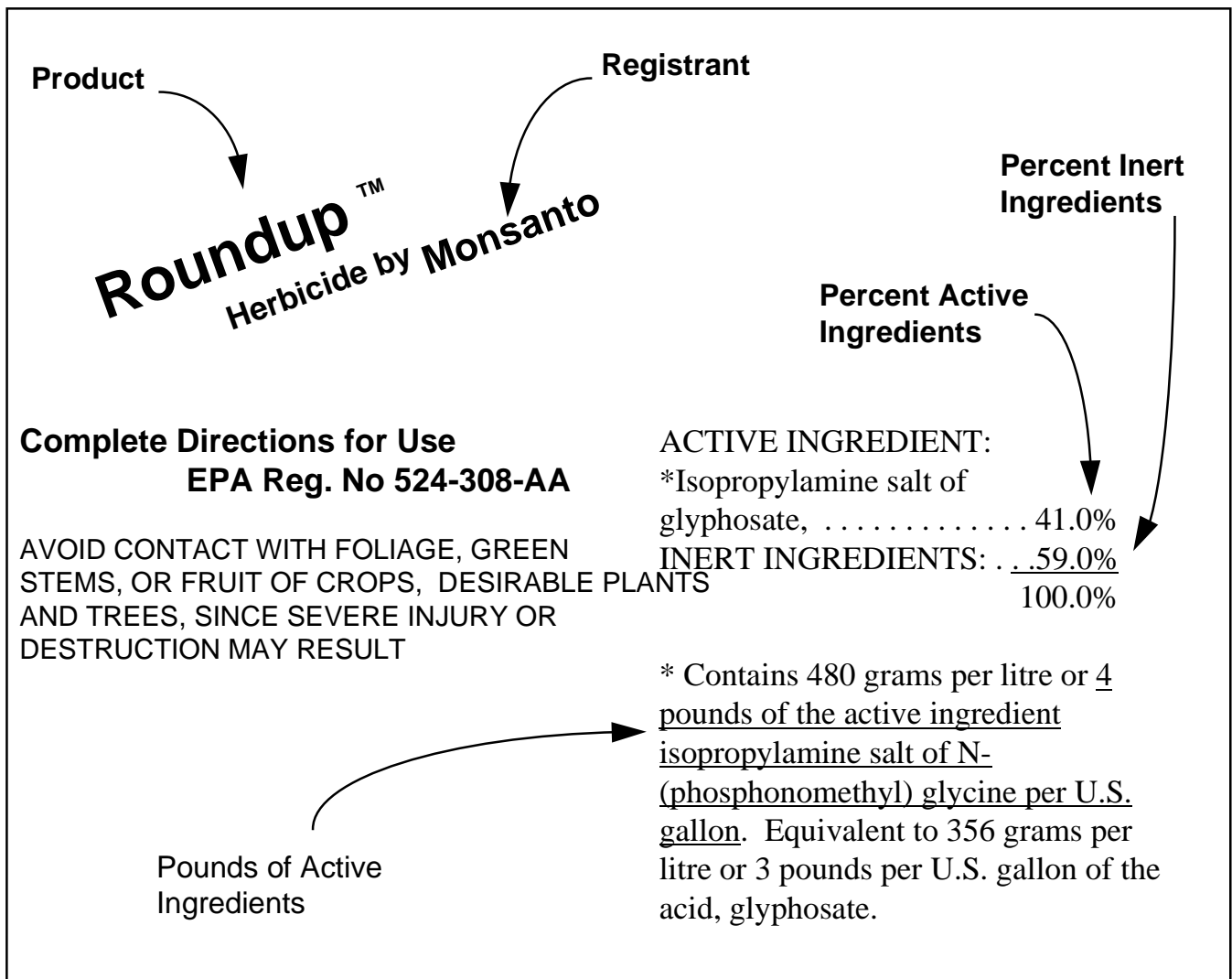


Figure 2-2. Portion of the Pesticide Label for Roundup™ Herbicide

Figure 2-3 is an example of a pesticide label for a product called Roundup™ DRYpak. Besides indicating that Roundup™ DRYpak is an herbicide, the label provides directions for safe handling and proper use, the EPA registration number, the active ingredient, and the concentration of active ingredients.

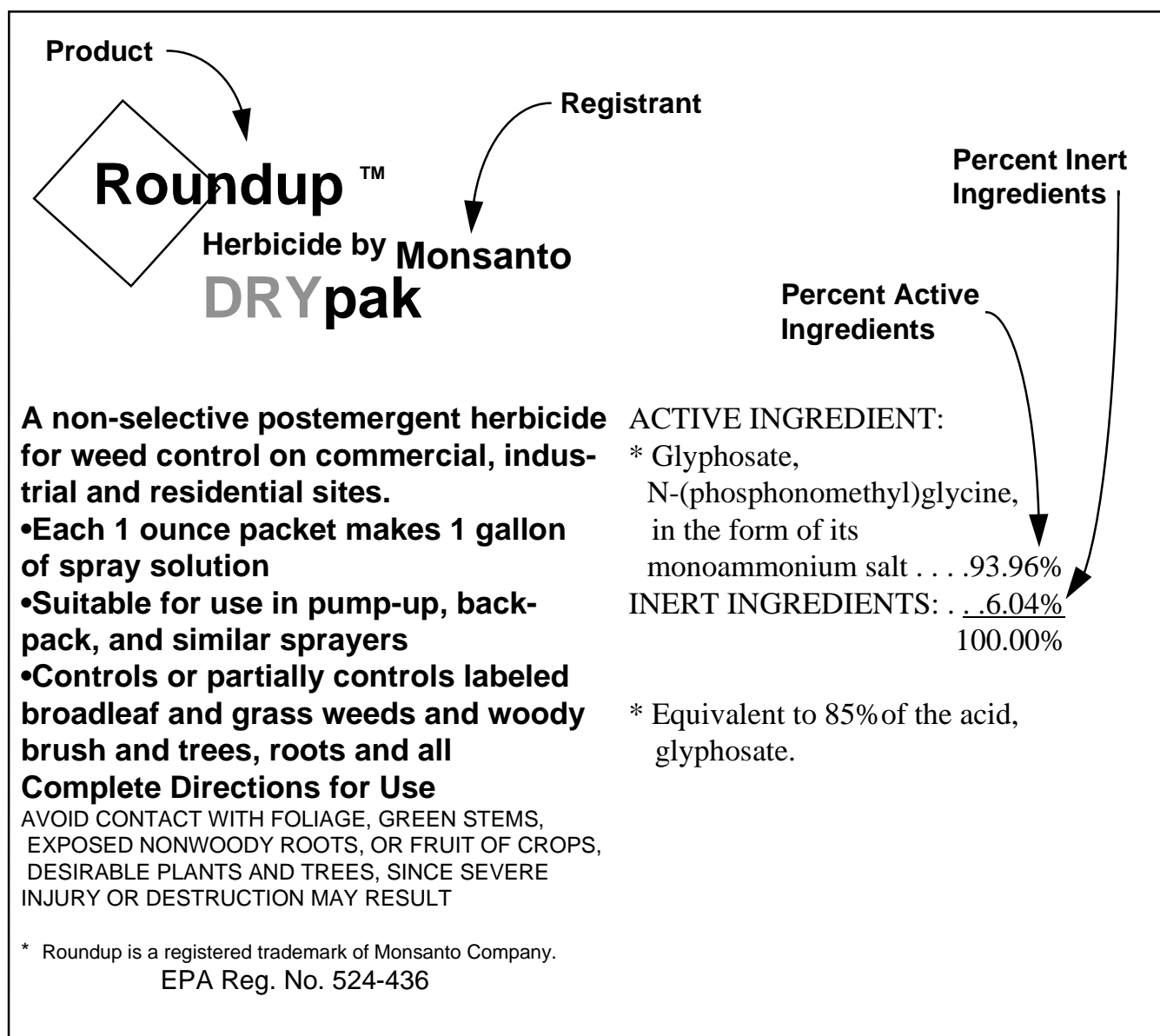


Figure 2-3. Portion of Pesticide Label for Roundup™ DRYpak

Figure 2-4 is a portion of the label for 57% Malathion™, which is a liquid insecticide. Besides the information commonly included on labels, the label for 57% Malathion™ indicates that the pounds of active ingredient are one half pound in every 13 fluid ounces of undiluted 57% Malathion™. To make your job easier you should always check to see if a product label specifies the PAI.

Table 2-1 provides definitions for the some of the information provided on a pesticide label; it may help you to use the labels easily and correctly.

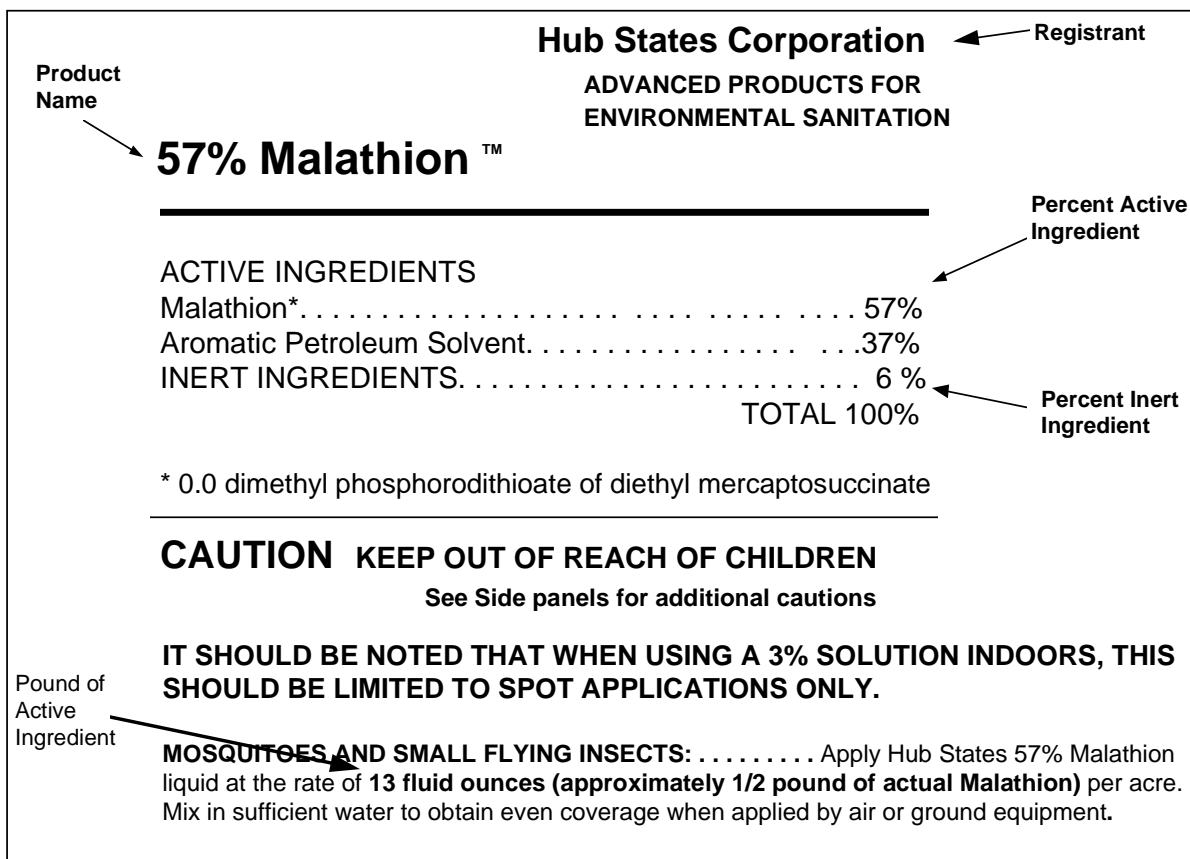


Figure 2-4. Top Portion of Pesticide Label for 57% Malathion™

If you have any questions regarding pesticide labels or PAI information you can contact the Pesticide Hotline at (410) 671-3773 or DSN 584-3773.

Table 2-1. Pesticide Labeling Terms

Term	Description
Registrant	The name of the company that produces the pesticide.
Product Name	The common name of the pesticide given by the manufacturer. (not necessarily, but may be the same as, the name of the active ingredient).
EPA Registration Number	The unique number assigned by the EPA once a pesticide is approved for use in the United States.
Pounds of Active Ingredient	The amount, measured by weight in pounds, of chemicals in a pesticide that is principally responsible for the pesticide's affects.
Percent Inert Ingredient	The ratio, measured as a percentage, of the pesticide that is non-reactive ingredient.
Percent Active Ingredient	The ratio, measured as a percentage, of chemicals in a formulated product that is principally responsible for the pesticide's affects.

Contractor's and Grower's Records

If anyone on your installation resolved their pest control issues by buying the services of a contractor, you need to acquire the contractor's records and copies of related product labels to calculate or estimate pesticide use. You only need the records for those operations not already included on the DD 1532 pest management reports.

If contractor's records are not available then review the purchase requisitions used to acquire the contractor's services. These records may describe specific pest control operations requested of the contractors, the name of the contractor, and the reporting requirements that the contractor followed.

For outlease areas, you will need to acquire the grower's records and copies of product labels to calculate or estimate pesticide use.

3. Reporting Pesticide Use

Overview

To accurately calculate and report pesticide usage for US Army installations and activities you must understand the following:

- DoD and Army pest management program policy,
- The methods to calculate and report pesticide use, and
- The reporting requirements associated with DoD pest management MoM #2.

This section briefly describes the pest management program policies and the methods to calculate and report pesticide use as pounds of active ingredient. Included is a sample of an *Installation Yearly Pesticide Use Summary* report.

Pest Management Program Requirements

Section one outlines the DoD and Army pest management program and reporting requirements. Briefly stated, all non-exempt Army installations and activities 1) must maintain complete records of daily pesticide applications using DD Form 1532-1, 2) are encouraged to produce a monthly pest management report using DD Form 1532 or a computer generated equivalent, and 3) must provide information to satisfy DoD data calls.

The DoD MoM #2 requires installations to report pesticide usage as pounds of active ingredient for all pesticide applications on DoD property, which includes golf courses and outleased areas, and pesticides distributed under installation self-help programs.

In addition, pest control personnel must organize and report pesticide use according to the following rules:

- Tally the total number of bait stations that have the same active ingredient and report the total

number of units rather than the PAI.

- Tally the monthly use into yearly totals by product/EPA registration number and formulation. Convert the data into pounds of active ingredient. Place the PAI for each pesticide into one of the following categories: 1) herbicide/fungicide, 2) insecticide, or 3) other. Compute and combine yearly PAI subtotals for each category. Report the total PAI for golf course and agricultural outlease area applications separately and as part of the three categories listed above.
- There is no requirement to report the use of biological controls, such as Bacillus thuringiensis (Bt). If you choose to report these operations include the PAI in the category called *other*.
- There is no requirement to report pesticide use for exempt pest control operations. Exempt operations are applications of growth regulators or interruptants, nematocides, molluscides, avicides, algacides used in water treatment, piscicides used to control certain fish species, and hospital use of disinfectants and microbiocides. If you choose to report these operations, include the PAI in the category called *other*.

The Easiest Way to Comply with Reporting Requirements

The reporting requirements for DoD pest management programs are identical, regardless of the complexity or simplicity of your pest control operations. If you have a computer-based system that tracks your daily operations, then you may also have the automated means to summarize monthly operations and report annual pesticide use.

Some Army locations may not have a computer-based system. Others may not receive data from their land, forestry, wildlife management or outlease programs in a format compatible with their computer-based system. If you cannot rely on a computer-based system to support all of your reporting requirements then we recommend you understand how to group pesticides volumetrically for ease of calculating the yearly PAI.

Volumetric Groupings

Volumetric groupings of pesticide applications is a very simple idea that reduces the number of calculations and the level of effort needed to generate the annual report of pesticide use. To group pesticide applications volumetrically you will need a copy of all the DD Form 1532 pest management reports, pesticide inventory data, and product labels for all the pesticide applications at your installation or activity during the fiscal year. Be sure to include information from other activities that used contractors for their pest control operations.

Using the data from the 1532 reports, or equivalent, identify all applications that used the same product, initial concentration of active ingredient, and formulation. Add up the quantities of the like formulations. Remember to maintain separate tallies for pesticides used on golf courses or outlease

areas, as these must be reported separately.

For each month, record the total quantity of pesticides used, with respect to their initial concentration and formulation. Note whether the product is a bait station, herbicide, fungicide, insecticide, or other type of pesticide and whether the application occurred on a golf course or outlease area. Repeat this procedure for each product on the monthly reports that was a liquid formulation. Repeat this for each month of the year.

For example, let's say that all pest control operations for your installation or activity are summarized on DD Form 1532 reports. Also, let's assume that you do not have a golf course or outlease program.

Your March 1996 1532 report shows one application used one half gallon of an herbicide called Roundup™, which has an initial concentration of 41%, EPA registration number of 524-308-AA, and the product contains 41% Isopropylamine salt of glyphosate or four pounds of active ingredient per U.S. gallon. April shows 2 applications of the same formulation of Roundup™; the first application used two gallons and the second application used one half gallon. The May 1532 report shows 3 gallons, June shows 5 gallons, July shows 11 gallons, and August shows 4 gallons. There were no other months reporting the use of this particular pesticide. When you add the monthly volumes of

FY 96	Product Name & Formulation:			Roundup™
	EPA Reg No:			524-308-AA
Initial Concentration:			41%	
Type of Pesticide:			Herbicide	
	<u>Golf Course</u>	<u>Outlease Areas</u>	<u>All other Operations</u>	
Jan	0.0	0.0	0.0	GAL
Feb.	0.0	0.0	0.0	GAL
March	0.0	0.0	0.5	GAL
April	0.0	0.0	2.5	GAL
May	0.0	0.0	3.0	GAL
June	0.0	0.0	5.0	GAL
July	0.0	0.0	11.0	GAL
Aug.	0.0	0.0	4.0	GAL
Sept.	0.0	0.0	0.0	GAL
Oct.	0.0	0.0	0.0	GAL
Nov.	0.0	0.0	0.0	GAL
Dec.	0.0	0.0	<u>0.0</u>	GAL
Annual Totals	0.0	0.0	26.0	GAL

Roundup™ you see that 26 gallons of Roundup™ were applied on your installation during FY 1996.

Figure 3-1. Volumetric Groupings Worksheet

The major advantage of volumetric groupings is that you do not have to calculate PAI for each

application entered on a 1532 report. Nor do you have to perform a separate calculation for each monthly total of pesticide application. Instead, you calculate PAI based on the yearly total.

How to Calculate and Report Pesticide Use

To ensure that you accurately calculate and report pesticide use for your location, we recommend that you follow these general steps.

- **Step One - Gather Information**, such as DD Form 1532 Pest Management Reports, inventory data, product labels, grower's records, and contractor's records;
- **Step Two - Group Liquid Formulations Volumetrically**, with respect to product name/EPA registration number, initial concentration, and formulation;
- **Step Three - Calculate Pesticide Use**; and
- **Step Four - Report Pesticide Use**.



Calculate Pesticide Use

To calculate pesticide use in pounds of active ingredient you need to know the formulation of the pesticide application. Formulation categories include liquid, dry (rate), or bait stations. Figure 3-2 illustrates how to select the appropriate equation, based on the pesticide formulation.

When you know which equation to use apply the equation to the volumetric groupings using the annual totals.

If you have a Golf Course or Participate in the Agriculture Outlease Program

As you convert the golf course and the outlease area data into pounds of active ingredient maintain their subtotal separately from the other pest control operations using the same three categories, i.e., 1) herbicide/fungicide, 2) insecticide, and 3) other.



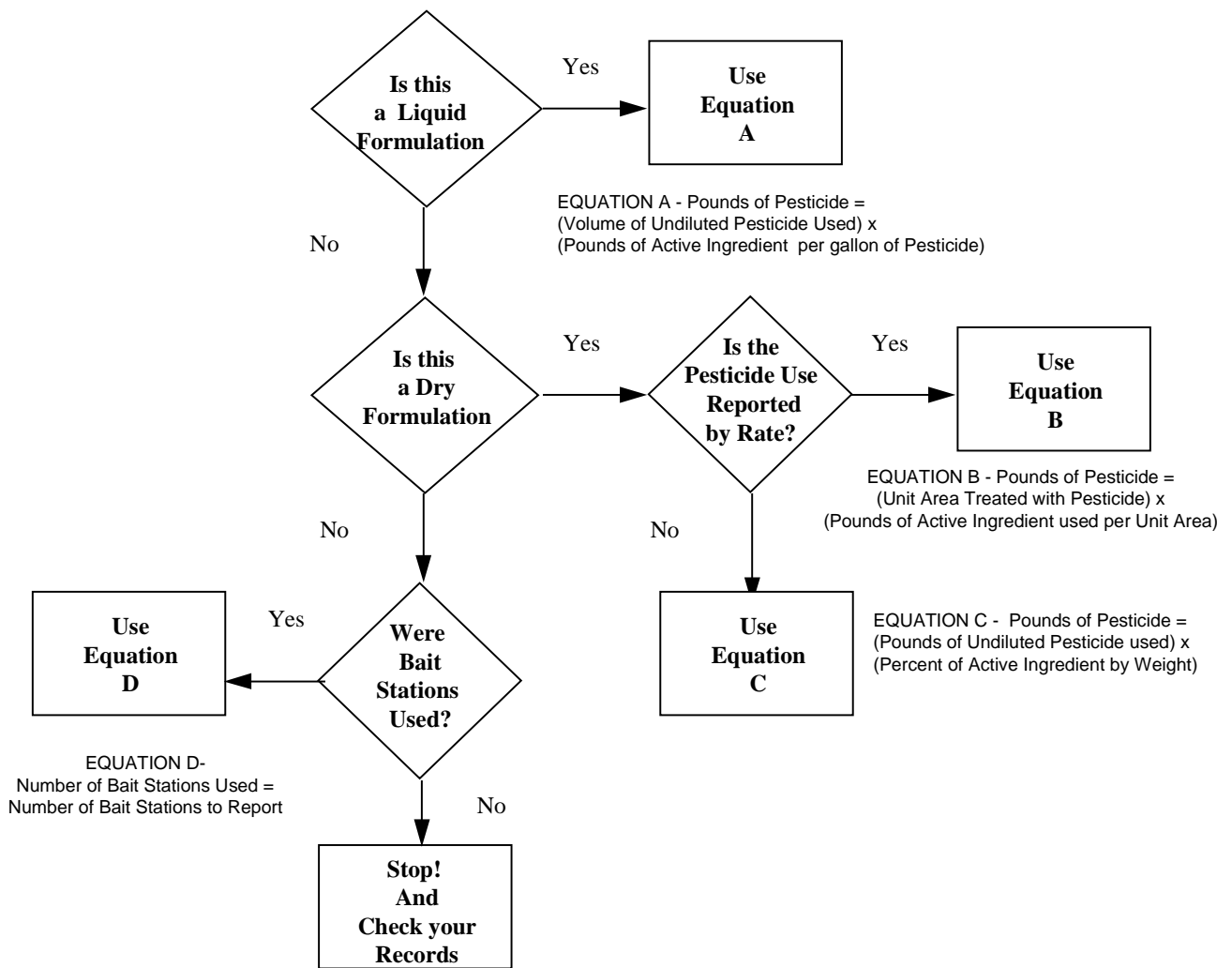


Figure 3-2. Equation Decision Tree

Report Pesticide Use

Once you calculate pesticide use, you will have the information to summarize and report annual pesticide use by category. Figure 3-3 provides you with an example of the format for reporting yearly PAI figures.

The annual reporting categories shown in Figure 3-3 include herbicides/fungicides, golf courses, agriculture outlease areas, insecticides, and other. Presently, there is no requirement to include biological controls, algacides, piscicides, or other exempt operations in the annual summary, even though your records may include entries for them. If you elect to report these include their PAI in the category called *other*. The *other* category is also used to report growth regulators or interruptants, nematocides, molluscicides, avicides, and rodenticides.

INSTALLATION YEARLY PESTICIDE USE SUMMARIES

TITLE: Pesticide Use Summary, FY 95
Name of Installation, COUNTRY

1. Pesticide Use for		FY 95
a) Total:		3020 PAI
b) Herbicides and/or Fungicides:	2456 PAI	(= ca 82% of total PAI)
c) Golf Courses:	700 PAI	(= ca 23 % of total PAI)
d) Agricultural Outleases	0 PAI	(= ca 0 % of total PAI)
e) Insecticides	282 PAI	(= ca 9 % of total PAI)
f) Other	282 PAI	(= ca 9 % of total PAI)

(Copies of 1532 reports for FY 95 enclosed)

2. Pesticide use for FY 93		(DoD Baseline year)
a) Total:		2000 PAI
b) Herbicides and/or Fungicides:	1400 PAI	(= ca 70% of total PAI)
c) Golf Courses:	850 PAI	(= ca 42 % of total PAI)
d) Agricultural Outleases	0 PAI	(= ca 0 % of total PAI)
e) Insecticides	400 PAI	(= ca 20 % of total PAI)
f) Other	200 PAI	(= ca 10 % of total PAI)

3. Explanations. Flooding during FY 93 decreased herbicide use on weeds in training areas and along firebreaks; Gypsy moth outbreak in FY 93 resulting in higher than normal levels of insecticides. The golf course started their new scout surveillance program in FY 95, which helped reduce applications of preemergence and other herbicides by over 100 PAI.

Pesticide use reports are satisfactory from all installation users, except for one unreported contract application for indoor nuisance pests at an on-post housing area.

4. Goal to Reduce Pesticides. We will begin to implement a state IPM program for range land pest control that should reduce herbicide use in training areas by 15-20%. Herbicide X, although more expensive than herbicide Y, requires 60% less product per acre. The golf course intends to expand the turf grass pest scouting system to include greens. The goal of the scouting system is to reduce yearly fungicide use by 10%.

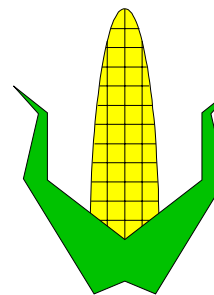
If successful, we should reduce pesticide PAI by 15% during FY 96 and by at least 35% by FY 2000.

Miscellaneous (Optional). FY 95 pest control operations were much more typical than those occurring during FY 93. For a more realistic baseline and more accurate pesticide reduction figures, installation XXXX recommends using the FY 95 figures as the baseline.

Figure 3-3 Example Summary Report of Pesticide Use

If you have a Golf Course or Participate in the Agriculture Outlease Program

As you tally the pounds of pesticide into yearly totals, you need to keep a separate tally for all pesticides applied to golf courses or outleased areas. Combine the golf course PAI subtotals of the three categories to get the total PAI for the golf courses. Then combine the agriculture outlease area PAI subtotals to get the total PAI for the agriculture outlease areas. Report the PAI figures, according to the format shown in Figure 3-3.



Tallying the PAI for Herbicides/Fungicides

Combine the PAI for all of the pest control operations using herbicides and fungicides, including those applied to the golf courses and agricultural outlease areas. Do not include the PAI figures for insecticides or the *other* category. Report the total PAI for herbicides/fungicides in row (b) under item one, as shown in Figure 3-3.

Tallying the PAI for Insecticides

Combine the PAI for all of the pest control operations using insecticides, including those applied to the golf courses and agricultural outlease areas. Do not include the PAI figures for herbicides, fungicides, or the *other* category. Report the total PAI for insecticides in row (e) under item one, as shown in Figure 3-3.

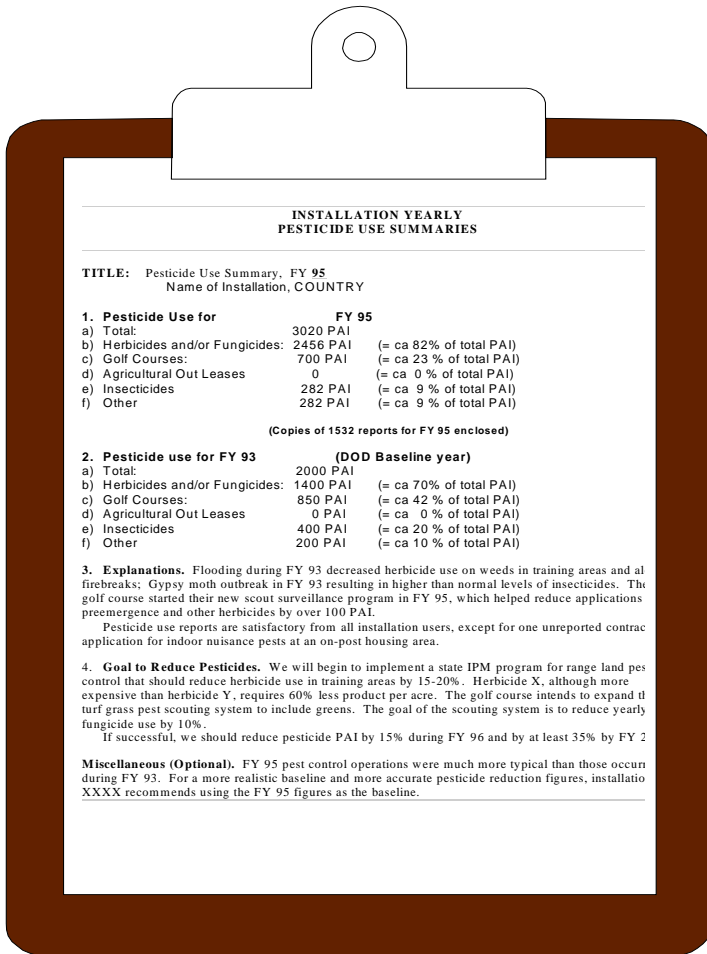
Tallying the PAI for the *Other* Category

Combine the PAI for all of the pest control operations using products that fall into the *other* category, including those applied to the golf courses and agricultural outlease areas. Do not include the PAI figures for herbicides, fungicides, or insecticides. Report the total PAI in row (f) under item one, as shown in Figure 3-3.

Tallying the Total PAI for a Fiscal Year

To calculate the Total PAI for a fiscal year, combine the herbicides/fungicides (row b) plus the insecticides (row e) plus the *other* PAI figures (row f). The result is the total PAI for a fiscal year (row a).

If you have a golf course or participate in the agricultural outlease program, you should notice that the yearly PAI total does not add up to the values in rows (b) through (f).



Remember that the figures in rows (b) through (f) were not combined to calculate the total figure shown in row (a). Instead, the PAI figures from rows (b), (e), and (f) were added. (i.e., the PAI figures for the herbicides/fungicides plus insecticides plus other.)

The reason that the values in rows (c) and (d), i.e., the PAI for golf courses and outlease areas, were not included is because those figures were already included in the PAI values for the herbicides/fungicides, insecticides, and other categories.

4. Examples

Overview

Section 3 illustrated how to calculate and report pesticide usage accurately and according to the DoD and Army reporting requirements. Once you read through and understand the practical application examples in this section, you will be able to report the annual PAI for your installation.

If you should have questions or comments about any of the guidance in this section, please contact the pest management consultant for your Major Army Command (MACOM) or the authors of this document. For assistance with pesticide formulations or labels contact or call the DoD Pesticide Hotline at 410-671-3773; DSN 584-3773.

Sources to Help Verify the Product Formulation and PAI

There are four sources of information that may help you to clarify or complete the information about a pest control product. The sources of information are inventory data, pesticide labels, contractor's and grower's records, and the DoD Pesticide Hotline. Refer to section two of this document for an explanation of each.



Monthly Pest Management Reports

The figures in this section contain the examples for which you will calculate and report the annual pesticide use in pounds of active ingredient. Figures 4-1 and 4-2 illustrate DD Form 1532 pest management reports.

PEST MANAGEMENT REPORT										C.D. Code 6 0	UIC W 4 Q V A A 9 3 0 P				REPORT CONTROL SYMBOL DD 1080	
1. MAJOR OR REVIEWING COMMAND					2. REPORTING INSTALLATION											
a. NAME			b. ADDRESS			a. NAME				b. ADDRESS						
No	TARGET PEST	OPERATION					PESTICIDE								TIME	
	Name	Name	Total Units Treated	Unit	Site	Name	Form	Application		Final Conc.%	Rate (per area unit)		Supply Source	Hours		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Amount (h)	Unit (i)	(j)	lb. (k)	% (l)	Enter s,n,g,c	(n)		
	13-15	17-19	20-24	25-27	28-30	31-33	34-36	37-41	42-43	44-49	50-55	56-58	68	69-71		
1	ALLVEG	SPPDEQ	2	AC	OPG	GLYPHOSATE	EML	200	ZGL		1.5	100	S	12		
2	LEAGRHO	DGPEQ	53.97	MSF	OPG	SEVIN 5	DUS	25	PDW		5.0	100	S			
3	LEAGRHO	DGPEQ	19	AC	OPG	SEVIN 5	DUS	475	PDW		25	100	S	11		
4	ROACHES	INBAIT	1	MSF	RES	Combat	BTS	12	EA	1.65			S	12		
5	MXBRABDLVD	SPPDEQ	25	AC	GFG	GLYPHOSATE	EML	5000	ZGL	1.5			C	86		
6	BDLVDWEEDS	SPPDEQ	2	AC	GFG	GLYPHOSATE	EML	200	ZGL	1.5			C	12		
7	SPIDERS	RESIDTR	25	MSF	RES	FICAM W	SUS	10	PDW	0.25			S	10		
8	MOSQUITOES	SPPDEQ	76	AC	MOS	MALATHION	EML	12	ZGL	3.0			S	24		
9	RATS	EXBAIT	6	AC	OPG	ANITCOAG	BTS	4	PDW	0.05			S	1		
10	TURF	SPPDEQ	16.45	MSF	GFG	DACONIL2787	EML	6	FLO		6	100	C	24		

DD Form 1532, MAY 1987

Figure 4-1. August DD Form 1532 Pest Management Report

PEST MANAGEMENT REPORT										C.D. Code 6 0	UIC W 4 Q V A A 9 3 0 P				REPORT CONTROL SYMBOL DD 1080	
1. MAJOR OR REVIEWING COMMAND					2. REPORTING INSTALLATION											
a. NAME			b. ADDRESS			a. NAME				b. ADDRESS						
No	TARGET PEST	OPERATION					PESTICIDE								TIME	
	Name	Name	Total Units Treated	Unit	Site	Name	Form	Application		Final Conc.%	Rate (per area unit)		Supply Source	Hours		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Amount (h)	Unit (i)	(j)	lb. (k)	% (l)	Enter s,n,g,c	(n)		
	13-15	17-19	20-24	25-27	28-30	31-33	34-36	37-41	42-43	44-49	50-55	56-58	68	69-71		
1	TERMITES	RESIDTR	54	MSF	RES	DURSBAN	EML	99	ZGL	1.0			S	9		
2	SPIDERS	RESIDTR	5	MSF	RES	Ficam W	SUS	2	ZGL	0.25			S	7		
3	LEAGRHO	DGPEQ	38	AC	OPG	CARBARYL	DUS	25	PDW		1.25	100	S	12		
4	ROACHES	INBAIT	1	MSF	RES	Combat	BTS	12	EA	1.65			S	2		
5	GYPSYMO	DGAIR	7,800	AC	WOO	DISPARLURE	GRN		PDW				C	86		
6	BDLVDWEEDS	SPPDEQ	2	AC	GFG	GLYPHOSATE	EML	200	ZGL	1.5			S			
7	LEAGRHO	DGPEQ	54	MSF	OPG	SEVIN	DUS	.625	PDW		25	100	S	6		
8	MOSQUITOES	SPPDEQ	38	AC	MOS	MALATHION	EML	6	ZGL	3.0			S	12		
9	WOB	RESIDTR	2	MSF	OFF	PERMETHRIN	AER	400	SLN	0.3			N			
10	ALGAE	DGHAND	5	AC	IMP	COPPERSULF	GRN	14	PDW	100			C	3		

DD Form 1532, MAY 1987

Figure 4-2. September DD Form 1532 Pest Management Report

Contractor's Records

If you or anyone on your installation acquires pest control services from a contractor you need to make sure that you account for the pesticide applications that the contractors provided. This means that you will need to get the contractor's records for any pest control application not already included on an existing DD Form 1532 report. Figure 4-3 is a simple example of a contractor's record of pesticide applications.

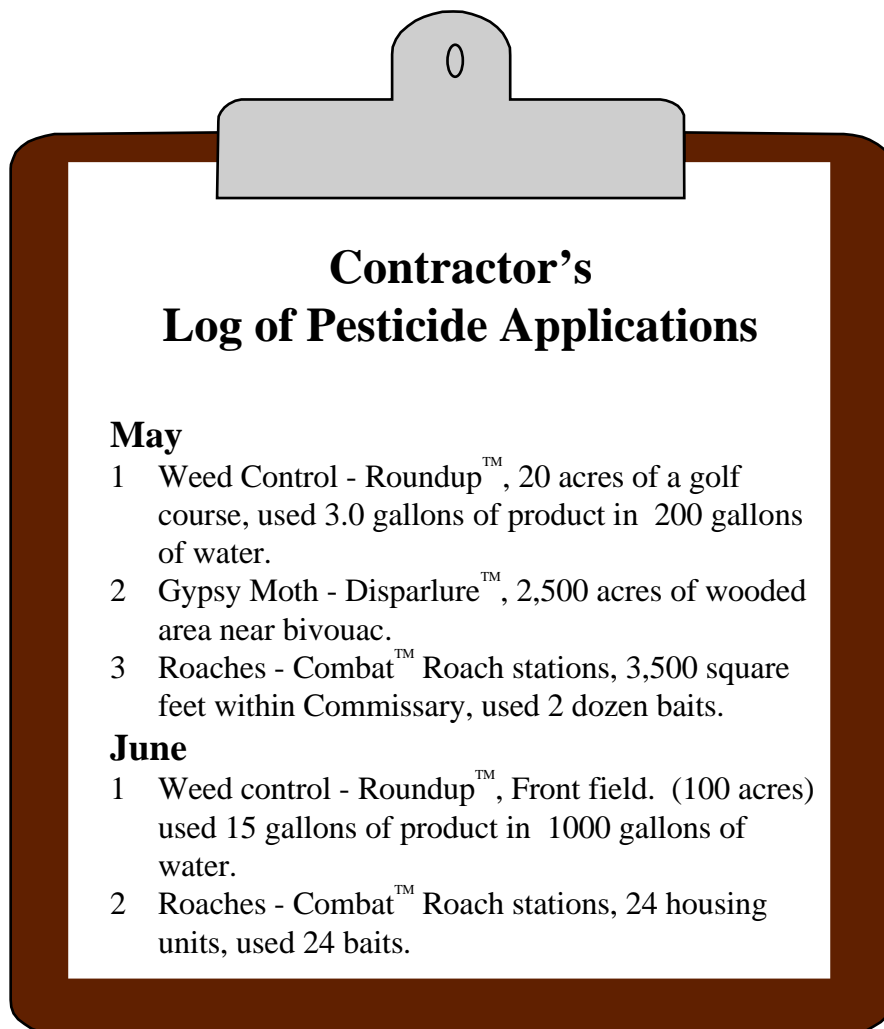


Figure 4-3. Contractor's Records

Outlease Records

If you participate in the outlease program you need to account for pesticide applications that occur on the leased property. As the Installation Pest Management Coordinator you will have used the monthly pest management reports to calculate annual pesticide use. Occasionally, you may find that the outlease data are not fully represented on the reports. To acquire the outlease data you can

research the active and completed contractor PRs and outlease records. Figure 4-4 is a simple example of an outlease record.

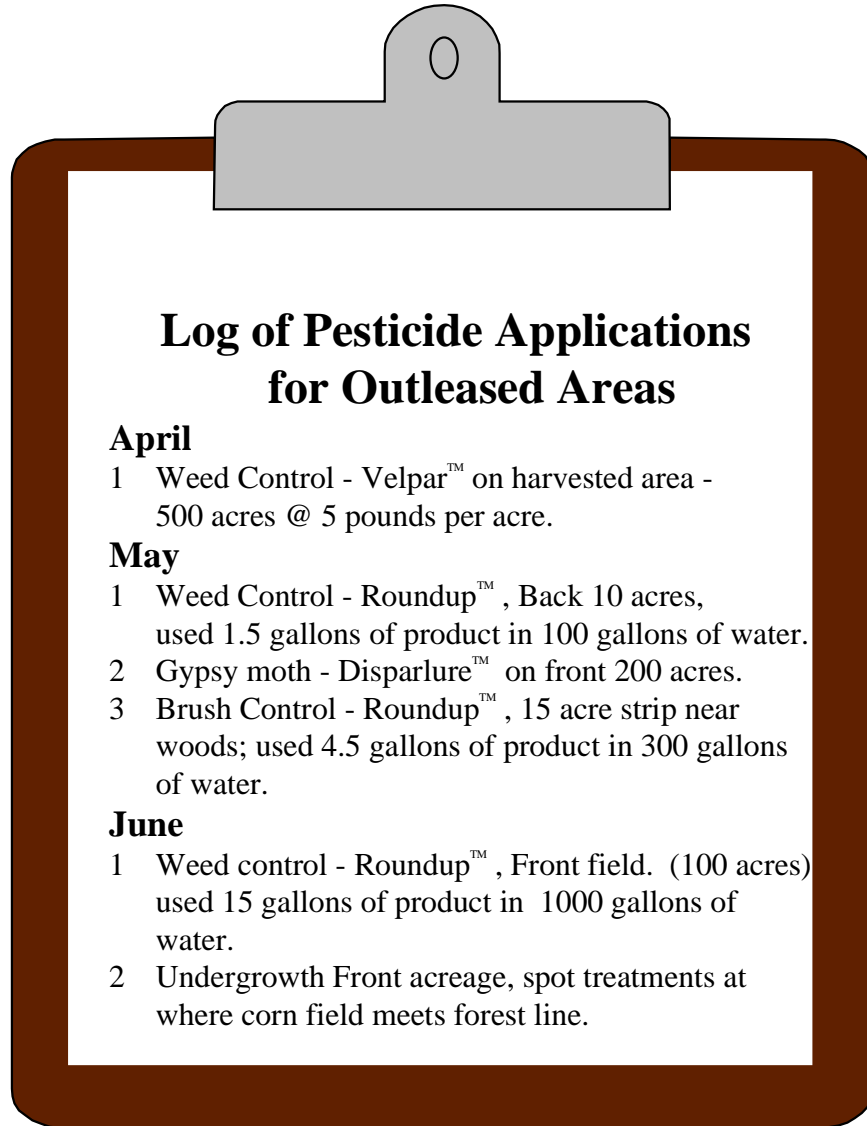


Figure 4-4. Outlease Records

Practical Applications

In this section you will see how to use the information from figures 4-1 through 4-4 to calculate and report the pounds of active ingredient for the pest control operations on your installation. The examples illustrate how to calculate the PAI by using the pest control records, inventory data, and product labels. The examples also describe how to use the results of your calculations in your annual report.

Group Liquid Formulations Volumetrically

Volumetric groupings of pesticide applications reduce the number of calculations and level of effort needed to generate the annual report of pesticide use. To group pesticide applications volumetrically use the data obtained from monthly pest management reports, contracting records, and outlease records.

You will need a means to record the pesticide quantities by group; we recommend a worksheet similar to the one in Figure 4-5. Remember to maintain a separate column for golf course and outlease pesticide applications.⁴

To show you how to group annual applications of a product volumetrically we will group the liquid formulations of Roundup™ using the data from Figure 4-1 through 4-4.

FY XX	Product Name & Formulation:			GAL
	EPA Reg No:			
Initial Concentration:				
Type of Pesticide:				
	<u>Golf Course</u>	<u>Outlease Areas</u>	<u>Garrison Operations</u>	
Jan	0.0	0.0	0.0	GAL
Feb.	0.0	0.0	0.0	GAL
March	0.0	0.0	0.0	GAL
April	0.0	0.0	0.0	GAL
May	0.0	0.0	0.0	GAL
June	0.0	0.0	0.0	GAL
July	0.0	0.0	0.0	GAL
Aug.	0.0	0.0	0.0	GAL
Sept.	0.0	0.0	0.0	GAL
Oct.	0.0	0.0	0.0	GAL
Nov.	0.0	0.0	0.0	GAL
Dec.	0.0	0.0	0.0	GAL
Totals	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	GAL

Figure 4-5. Sample Worksheet for Volumetric Grouping

Since the data in the figures are only for the months of April through June and August through September, we will add data for March, July, and October. Therefore, you should assume that no applications of Roundup™ occurred during January, February, November, or December.

⁴ Please refer to section three of this document for a further explanation of why you need to separate the golf course and outlease applications.

Create Your Worksheet

First, fill in the fiscal year, product name & formulation, EPA registration number, initial concentration, and type of pesticide for the Roundup™ applications. Using your data, make a month by month list of the gallons of Roundup™ applied to either a golf course or outlease area.

Make sure that the list represents Roundup™ with the same EPA registration number and final concentration. In this case, you are grouping applications with a final concentration of 1.5% and that have the EPA number of 524-308-AA. (Remember, the amounts for the months of March, July, and October, are not illustrated in the Figures.) The first cut of your list will look like the one below.

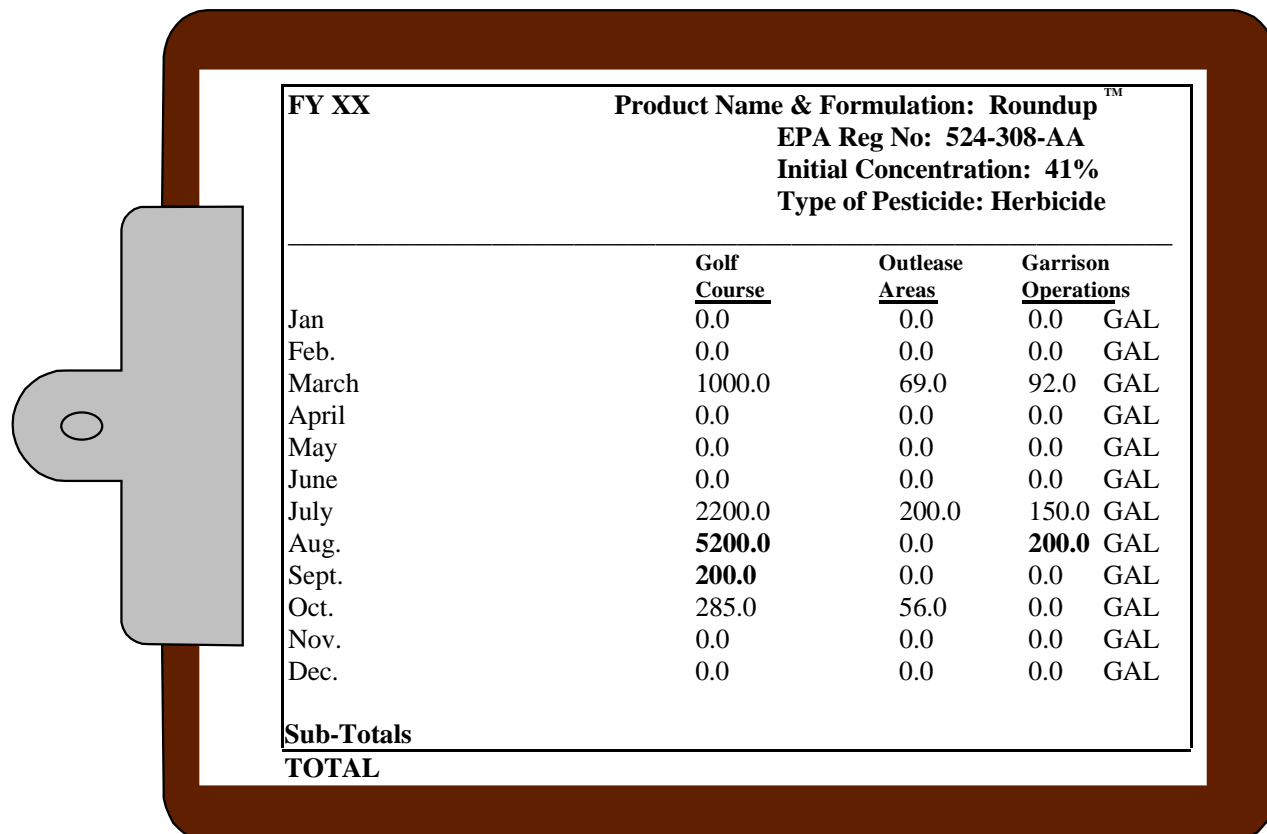
FY XX	Product Name & Formulation: Roundup™			
	EPA Reg No: 524-308-AA			
	Initial Concentration: 41%			
	Type of Pesticide: Herbicide			
	Golf Course	Outlease Areas	Garrison Operations	
Jan	0.0	0.0	0.0	GAL
Feb.	0.0	0.0	0.0	GAL
March	1000.0	69.0	92.0	GAL
April	0.0	0.0	0.0	GAL
May	0.0	0.0	0.0	GAL
June	0.0	0.0	0.0	GAL
July	2200.0	200.0	150.0	GAL
Aug.	0.0	0.0	0.0	GAL
Sept.	0.0	0.0	0.0	GAL
Oct.	285.0	56.0	0.0	GAL
Nov.	0.0	0.0	0.0	GAL
Dec.	0.0	0.0	0.0	GAL
Sub-Totals				
TOTAL				

Figure 4-6. Create Your Worksheet

Verify the Product Formulation

Verify that all applications of Roundup™ are the same formulation, EPA registration number, and percent active ingredient, it may be helpful to cross reference your pesticide inventory to ensure that all applications are the same.

Gather Your 1532 Data



FY XX	Product Name & Formulation: Roundup™				
	EPA Reg No: 524-308-AA			Initial Concentration: 41%	
			Type of Pesticide: Herbicide		
	<u>Golf Course</u>	<u>Outlease Areas</u>	<u>Garrison Operations</u>		
Jan	0.0	0.0	0.0	GAL	
Feb.	0.0	0.0	0.0	GAL	
March	1000.0	69.0	92.0	GAL	
April	0.0	0.0	0.0	GAL	
May	0.0	0.0	0.0	GAL	
June	0.0	0.0	0.0	GAL	
July	2200.0	200.0	150.0	GAL	
Aug.	5200.0	0.0	200.0	GAL	
Sept.	200.0	0.0	0.0	GAL	
Oct.	285.0	56.0	0.0	GAL	
Nov.	0.0	0.0	0.0	GAL	
Dec.	0.0	0.0	0.0	GAL	
Sub-Totals					
TOTAL					

Figure 4-7. DD Form 1532 Data

Using the information in Figure 4-1, you can see that the pest control operations in rows one, five, and six used Roundup™.

1. Treated weeds on two acres with an emulsion of Roundup™. We applied 200 gallons using 1 gallon of product per 100 gallons of water. The final concentration was 1.5%.
5. A contractor treated brush and broad leaf weeds on 25 acres of a golf course with 5000 gallons of Roundup™. The final concentration was 1.5%.
6. A contractor treated broad leaf weeds on 2 acres of a golf course, with an emulsion of 200 gallons of Roundup™. The final concentration was 1.5%.

Using the information in Figure 4-2, you can see that the Garrison pest control operation in row six used Roundup™:

6. Treated broad leaf weeds on 2 acres of a golf course, using an emulsion of 200 gallons of Roundup™. The final concentration was 1.5%.

Use the data from Figures 4-1 and 4-2 to fill in the worksheet, as shown in Figure 4-7.

Next check the applications performed by the contractors and included in Figure 4-3. The first thing you should do is find the agreement between the installation and the contractor so that you can find out if the contractor provided the pesticide or if they acquired it from the installation's inventory.

FY XX	Product Name & Formulation: Roundup™		
	EPA Reg No: 524-308-AA Initial Concentration: 41% Type of Pesticide: Herbicide		
	<u>Golf Course</u>	<u>Outlease Areas</u>	<u>Garrison Operations</u>
Jan	0.0	0.0	0.0 GAL
Feb.	0.0	0.0	0.0 GAL
March	1000.0	69.0	92.0 GAL
April	0.0	0.0	0.0 GAL
May	200.0	0.0	0.0 GAL
June	1000.0	0.0	0.0 GAL
July	2200.0	200.0	150.0 GAL
Aug.	5200.0	0.0	200.0 GAL
Sept.	200.0	0.0	0.0 GAL
Oct.	285.0	56.0	0.0 GAL
Nov.	0.0	0.0	0.0 GAL
Dec.	0.0	0.0	0.0 GAL
Sub-Totals			
TOTAL			

Figure 4-8. Contractor Data

Using the information in Figure 4-3, you can see that the contractor provided pest control operations used Roundup™. Use this data to fill in the worksheet, as shown in Figure 4-8.

1. May - Treated 20 acres of a golf course with 200 gallons of Roundup™, containing 3.0 gallons of product.
2. June - Treated 100 acres of a golf course, with 15 gallons of Roundup™ in 1000 gallons of water.

You should update your worksheet to include these applications.

Now you need to check the applications performed on the outleased areas. The first thing you should do is to see if the lessee attached copies of the pesticide labels to the log of pesticide applications, as requested by the installation.

FY XX	Product Name & Formulation: Roundup™			
	EPA Reg No: 524-308-AA			
Initial Concentration: 41%				
Type of Pesticide: Herbicide				
	<u>Golf Course</u>	<u>Outlease Areas</u>	<u>Garrison Operations</u>	
Jan	0.0	0.0	0.0	GAL
Feb.	0.0	0.0	0.0	GAL
March	1000.0	69.0	92.0	GAL
April	0.0	0.0	0.0	GAL
May	200.0	400.0	0.0	GAL
June	1000.0	1000.0	0.0	GAL
July	2200.0	200.0	150.0	GAL
Aug.	5200.0	0.0	200.0	GAL
Sept.	200.0	0.0	0.0	GAL
Oct.	285.0	56.0	0.0	GAL
Nov.	0.0	0.0	0.0	GAL
Dec.	0.0	0.0	0.0	GAL
Sub-Totals				
TOTAL				

Figure 4-9. Outlease Data

The labels show that the lessee used Roundup™ with an EPA registration number of 524-308-AA and containing 41% active ingredient in a 1.5% mixture. You should update your worksheet to include three of the four Roundup™ applications.

Using the information from Figure 4-4, you can see that the following pest control operations, occurring on agriculture outleased property, used Roundup™. Use this data to fill in the worksheet, as shown in Figure 4-9.

1. May - Treated weeds on 10 acres of an outleased area with 100 gallons of Roundup™, containing 1.5 gallons of product.
2. May - Treated brush on 15 acres of an outleased area, using 300 gallons of Roundup™, which contained 4.5 gallons of product.
3. June - Treated weeds on 100 acres of an outleased area with 1000 gallons of Roundup™, containing 15 gallons of product.
4. June - Spot treated front acreage where corn field meets the forest line. No other information is available.

Before you can include the fourth pesticide application you need to find out more about the application. The record indicates that the lessee “Spot treated with Roundup™.” Unfortunately, you do not know the formulation, percent active ingredient, EPA registration number, final concentration, or how many acres or gallons of product was applied.

You can reasonably assume that the Roundup™ product has the same EPA registration number and percentage of active ingredient as the other applications since this is the only Roundup™ label that the lessee included in the yearly records. Now you should either find out or estimate the number acres and gallons that were treated and used.

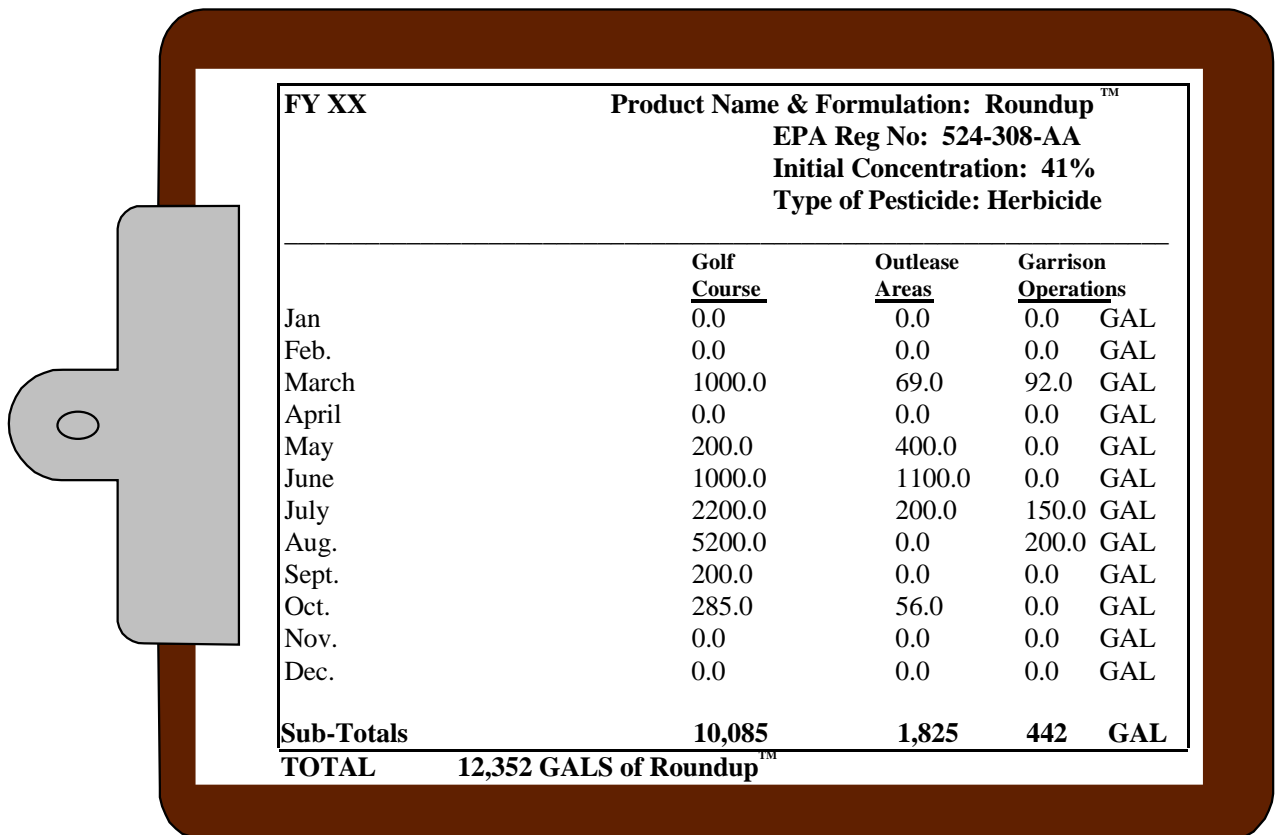
When you contact the lessee you find out that the area is approximately 10 acres. Unfortunately, the lessee can't provide you with how much product was used during the specific operation. In light of this, you assume that the lessee probably used the same 1.5% final concentration reported for all the other applications of Roundup™. In fact, if you review the records, you would see that prior applications on 10 acre areas, using a 1.5% final concentration, require 100 gallons of Roundup™. Now you can update your worksheet to include the additional 100 gallons, as shown in Figure 4-10.

FY XX	Product Name & Formulation: Roundup™ EPA Reg No: 524-308-AA Initial Concentration: 41% Type of Pesticide: Herbicide			
	<u>Golf Course</u>	<u>Outlease Areas</u>	<u>Garrison Operations</u>	
Jan	0.0	0.0	0.0	GAL
Feb.	0.0	0.0	0.0	GAL
March	1000.0	69.0	92.0	GAL
April	0.0	0.0	0.0	GAL
May	200.0	400.0	0.0	GAL
June	1000.0	1100.0	0.0	GAL
July	2200.0	200.0	150.0	GAL
Aug.	5200.0	0.0	200.0	GAL
Sept.	200.0	0.0	0.0	GAL
Oct.	285.0	56.0	0.0	GAL
Nov.	0.0	0.0	0.0	GAL
Dec.	0.0	0.0	0.0	GAL
Sub-Totals				
TOTAL				

Figure 4-10. Additional Outlease Data

Tally the Number of Gallons

After you complete your month-by-month worksheet, add the number of gallons of Roundup™ applied to a golf course. Mark your worksheet with this figure. Make sure to record the figure in the column labeled *golf course*. Repeat this procedure for the number of gallons in the other two columns. Then, add the figures in each column to calculate the total number of gallons of Roundup™ applied during the year on your installation. Figure 4-11 illustrates the completed worksheet.



FY XX	Product Name & Formulation: Roundup™			
	EPA Reg No: 524-308-AA			
	Initial Concentration: 41%			
	Type of Pesticide: Herbicide			
	<u>Golf Course</u>	<u>Outlease Areas</u>	<u>Garrison Operations</u>	
Jan	0.0	0.0	0.0	GAL
Feb.	0.0	0.0	0.0	GAL
March	1000.0	69.0	92.0	GAL
April	0.0	0.0	0.0	GAL
May	200.0	400.0	0.0	GAL
June	1000.0	1100.0	0.0	GAL
July	2200.0	200.0	150.0	GAL
Aug.	5200.0	0.0	200.0	GAL
Sept.	200.0	0.0	0.0	GAL
Oct.	285.0	56.0	0.0	GAL
Nov.	0.0	0.0	0.0	GAL
Dec.	0.0	0.0	0.0	GAL
Sub-Totals	10,085	1,825	442	GAL
TOTAL	12,352 GALS of Roundup™			

Figure 4-11. Tally the Number of Gallons

Calculate the PAI

Now that you have verified the product formulation and interpreted the data from the pesticide application records, you are ready to calculate the PAI for each pesticide application or volumetric grouping.

- **Select the Correct Equation** - To calculate the PAI you need to know the formulation for each application or volumetric grouping. Based on the formulation, use the equation decision tree in Section three (i.e., Figure 3-1) to identify the correct equation for calculating the PAI.
- **Solve the Equation** - The examples are grouped in this section by formulation type. To calculate the PAI for any formulation, all you need to do is to insert the necessary data about each application into the correct equation and then solve the equation.

Liquid Formulations

1. Volumetric Groupings Follow this example when you calculate the PAI for a volumetric grouping. You will need to know the a) formulation, b) active ingredient, c) final concentration, d) volume of undiluted pesticide used, and e) pounds of active ingredient per gallon of undiluted pesticide.

The example below calculates the PAI for the volumetric groupings of Roundup™ illustrated in Figure 4-11. Figure 4-11 shows you that a total of 12,352 gallons of a finished spray of Roundup™ were applied to the installation during FY 96. You will also see that of that total, 10,085 gallons of Roundup™ were applied to the golf course; 1,825 gallons were applied to outlease area; and 442 gallons were applied to other areas of the installation.

1. Based on the information that you have on the product, you know the following about Roundup™:
 - The formulation has 41% active ingredients.
 - A mix of 1.5 gallons of undiluted Roundup™ with 100 gallons of water results in a 1.5% final concentration.
 - There are 4 pounds of active ingredient per gallon.

Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for a liquid formulation. The equation that you will use is as follows:

$$\text{PAI} = (\text{Volume of Undiluted Pesticide Used}) \times (\text{Pounds of Active Ingredients per gallon of Pesticide})$$

2. Add the gallons of Roundup™ to calculate the pounds of glyphosate, applied during FY 96.

$$\text{PAI} = \frac{(1.5 \text{ Gal Roundup}^{\text{TM}})}{100 \text{ Gal Diluted Pesticide}} \times \frac{(12,352 \text{ Gal Diluted Pesticide}) \times (4 \text{ Lbs})}{1 \text{ Gal Roundup}^{\text{TM}}}$$

3. Solve the equation by eliminating the like units of measurement.

$$\text{PAI} = \frac{(1.5 \text{ Gal Roundup}^{\text{TM}})}{100 \text{ Gal Diluted Pesticide}} \times \frac{(12,352 \text{ Gal Diluted pesticide}) \times (4 \text{ Lbs})}{1 \text{ Gal Roundup}^{\text{TM}}}$$

4. Calculate the PAI by multiplying and dividing the figures in the equation.

$$\text{PAI} = \frac{(1.5) \times (12,352) \times (4 \text{ Lbs})}{100 \times 1}$$

$$\text{PAI} = \frac{74,112 \text{ Lbs}}{100} = 741.12 \text{ Lbs}$$

5. If we repeated this example for the Roundup™ applied to the golf course, outlease areas, and Garrison operations, then the calculations would appear as follows.

Golf Course

$$\text{PAI} = \frac{(1.5 \text{ Gal Roundup}^{\text{TM}})}{100 \text{ Gal Diluted Pesticide}} \times \frac{(10,085 \text{ Gal Diluted Pesticide}) \times (4 \text{ Lbs})}{1 \text{ Gal Roundup}^{\text{TM}}}$$

$$\text{PAI} = \frac{(1.5 \text{ Gal Roundup}^{\text{TM}})}{100 \text{ Gal Diluted Pesticide}} \times \frac{(10,085 \text{ Gal Diluted pesticide}) \times (4 \text{ Lbs})}{1 \text{ Gal Roundup}^{\text{TM}}}$$

$$\text{PAI} = \frac{(1.5) \times (10,085) \times (4 \text{ Lbs})}{100 \quad 1}$$

$$\text{PAI} = \frac{60,510 \text{ Lbs}}{100} = \mathbf{605.1 \text{ Lbs}}$$

Outlease Areas

$$\text{PAI} = \frac{(1.5 \text{ GAL Roundup}^{\text{TM}})}{100 \text{ Gal Diluted Pesticide}} \times \frac{(1,825 \text{ Gal Diluted Pesticide}) \times (4 \text{ Lbs})}{1 \text{ GAL Roundup}^{\text{TM}}}$$

$$\text{PAI} = \frac{(1.5 \text{ GAL Roundup}^{\text{TM}})}{100 \text{ GAL Diluted Pesticide}} \times \frac{(1,825 \text{ GAL Diluted pesticide}) \times (4 \text{ Lbs})}{1 \text{ GAL Roundup}^{\text{TM}}}$$

$$\text{PAI} = \frac{(1.5)}{100 \text{ GAL Diluted Pesticide}} \times \frac{(1,825 \text{ GAL Diluted Pesticide}) \times (4 \text{ Lbs})}{1}$$

$$\text{PAI} = \frac{(1.5) \times (1,825) \times (4 \text{ Lbs})}{100 \quad 1}$$

$$\text{PAI} = \frac{10,950 \text{ Lbs}}{100} = \mathbf{109.5 \text{ Lbs}}$$

Garrison

$$\text{PAI} = \frac{(1.5 \text{ Gal Roundup}^{\text{TM}})}{100 \text{ Gal Diluted Pesticide}} \times \frac{(442 \text{ Gal Diluted Pesticide}) \times (4 \text{ Lbs})}{1 \text{ Gal Roundup}^{\text{TM}}}$$

$$\text{PAI} = \frac{(1.5 \text{ Gal Roundup}^{\text{TM}})}{100 \text{ Gal Diluted Pesticide}} \times \frac{(442 \text{ Gal Diluted pesticide}) \times (4 \text{ Lbs})}{1 \text{ Gal Roundup}^{\text{TM}}}$$

$$\text{PAI} = \frac{(1.5)}{100 \text{ Gal Diluted Pesticide}} \times \frac{(442 \text{ Gal Diluted Pesticide}) \times (4 \text{ Lbs})}{1}$$

$$\text{PAI} = \frac{(1.5) \times (442) \times (4 \text{ Lbs})}{100 \quad 1}$$

$$\text{PAI} = \frac{2652 \text{ Lbs}}{100} = \mathbf{26.52 \text{ Lbs}}$$

2. When You Do Not Have the Pounds of Active Ingredient per Gallon. Follow this example anytime you have a liquid formulation and all the information listed below, but do not have the pounds of active ingredient for a gallon of undiluted product, but rather smaller units of measure. The other information that you should have includes the a) percent of active ingredient, b) final concentration, and c) volume of undiluted pesticide.

The example below calculates the PAI for row eight of Figure 4-1. Row eight in Figure 4-1 shows you that **12 gallons** of a **3.0% concentration** of **Malathion™** were applied to 76 acres to control **mosquitoes**. The pesticide applicator got the pesticide from the shop inventory.

1. Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for a liquid formulation. The equation that you will use is as follows:

PAI = (Volume of Undiluted Pesticide Used) x (Pounds of Active Ingredient per gallon of Pesticide)

2. Next, consult the shop's inventory records to find out more about the Malathion™ product and to determine the EPA Registration number. You will find out that the installation stocks a **product called 57% Malathion™**. The 57% Malathion™ pesticide label states that **for a 3% solution, mix 6.5 ounces with one gallon of water**. It also states that **13 fluid ounces of 57% Malathion™** contains approximately **one half pound of actual Malathion™**. Before you can calculate PAI, you need to determine the pounds of active ingredient per gallon of pesticide (Pv) based on one half pound or 8 ounces per 13 fluid ounces of 57% Malathion™.

$$Pv = \frac{8 \text{ ounces Malathion}^{\text{TM}}}{13 \text{ fl oz 57\% Malathion}^{\text{TM}}} \times \frac{128 \text{ fl oz of 57\% Malathion}^{\text{TM}}}{1 \text{ Gal of 57\% Malathion}^{\text{TM}}} \times \frac{1 \text{ pound}}{16 \text{ ounces}}$$

$$Pv = \frac{8 \text{ ounces Malathion}^{\text{TM}}}{13 \text{ fl oz 57\% Malathion}^{\text{TM}}} \times \frac{128 \text{ fl oz of 57\% Malathion}^{\text{TM}}}{1 \text{ Gal of 57\% Malathion}^{\text{TM}}} \times \frac{1 \text{ pound}}{16 \text{ ounces}}$$

This results in the following equation.

$$Pv = \frac{8}{13} \times \frac{128}{1 \text{ Gal of 57\% Malathion}^{\text{TM}}} \times \frac{1 \text{ pound}}{16}$$

$$Pv = 4.92 \text{ pounds per gallon of 57\% Malathion}^{\text{TM}}$$

The **pounds of active ingredient per gallon of pesticide = 4.92 pounds**.

3. Since the pest control operator **applied 12 gallons of mixture** based on a three percent concentration containing 6.5 fluid ounces of undiluted pesticide per gallon, you now need to determine the volume of undiluted (Vu) pesticide in gallons. The number of gallons of undiluted pesticide is based on 6.5 ounces per gallon in the 12 gallon mixture.

$$Vu = \frac{12 \text{ Gal}}{128 \text{ ounces per Gal}} \times \frac{6.5 \text{ ounces per Gal}}$$

$$Vu = \frac{12 \text{ Gal}}{128 \text{ ounces per Gal}} \times \frac{6.5 \text{ ounces per Gal}}$$

128 ounces per Gal

$$Vu = 0.609 \text{ Gal}$$

4. Calculate the PAI for the 12 gallons pesticide application.

$$\text{PAI} = Vu \times Pv$$

$$\text{PAI} = 0.609 \text{ Gal} \times \frac{4.92 \text{ Lbs}}{1 \text{ Gal}}$$

$$\text{PAI} = 0.609 \text{ Gal} \times \frac{4.92 \text{ Lbs}}{1 \text{ Gal}}$$

$$\text{PAI} = 2.99 \text{ Lbs}$$

3. When You Only Have the Number of Fluid Ounces of Product Applied. Follow this example anytime you have a liquid formulation, but do not have the pounds of active ingredient for a gallon of undiluted product, the active ingredient, or initial concentration. The information that you do have includes the a) volume of diluted pesticide and b) the final concentration. The information that you have tells you that 12,352 gallons of a 1.5 solution of Roundup™ were applied.

1. Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for a liquid formulation. The equation that you will use is as follows:

PAI = (Volume of Undiluted Pesticide Used) x (Pounds of Active Ingredient per gallon of Pesticide)

You know that the **volume of diluted pesticide = 12,352 gallons.**

2. Next, review pesticide labels to find out more about the Roundup™ product and to determine the EPA registration number. You should find a product called Roundup DRYpak™. The Roundup DRYpak™ label states that the EPA registration number is 524-436, **for a 1.5% solution, mix one ounce of the product for each gallon of pesticide applied.** It also states that there are 0.85 ounces of active ingredient per gallon.
3. Calculate the PAI for the 12,352 gallons of pesticide application.

$$\text{PAI} = (12,352 \text{ Gal Roundup}^{\text{TM}}) \times \frac{(0.85 \text{ ounces glyphosate})}{1 \text{ Gal Roundup}^{\text{TM}}}$$

$$\text{PAI} = (10,499.2 \text{ ounces glyphosate})$$

Use Appendix B to convert the 10,499.2 ounces of glyphosate to 656.2 pounds.

PAI = 656.2 pounds glyphosate

Before completing the annual report, you find out that the installation does not stock Roundup DRYpak™. Instead, the installation keeps one or five gallon containers of liquid formulations of Roundup™. (NOTE: If you had checked the inventory records, rather than

looking at the pesticide labels, you would have known this.)

These formulations have 41% active ingredient and the label reports that this is 4 pounds of active ingredient per gallon of use. The label also states that 1.5 gallons of Roundup™ are needed to make 100 gallons of a 1.5% solution. Now your PAI calculation must be volume of undiluted pesticide, or Vu, times the pounds of active ingredient per gallon of pesticide, or Pv, found on the pesticide label.

When you develop the annual report of pesticide usage, do not include the 741.12 pounds of Roundup™, as you have already included it as part of volumetric grouping for Roundup™

$$PAI = Vu \times Pv$$

$$PAI = \frac{1.5 \text{ Gal of Roundup}^{\text{TM}}}{100 \text{ gallons of diluted pesticide}} \times \frac{12,352 \text{ Gal of diluted pesticide}}{1 \text{ Gal of Roundup}^{\text{TM}}} \times 4 \text{ Lbs}$$

$$PAI = \frac{1.5 \text{ Gal of Roundup}^{\text{TM}}}{100 \text{ Gal of diluted pesticide}} \times \frac{12,352 \text{ Gal of diluted pesticide}}{1 \text{ Gal of Roundup}^{\text{TM}}} \times 4 \text{ Lbs}$$

$$PAI = 741.12 \text{ Lbs of glyphosate}$$

4. When You Only Have the Percent of Active Ingredient. Follow this example anytime you have a liquid formulation and the information listed below, but do not have the pounds of active ingredient for a gallon of undiluted product and is not on the label. The information that you should have includes the a) percentage of active ingredient, b) final concentration, and c) volume of undiluted pesticide.

The example below calculates the PAI for row nine of Figure 4-2. Row nine in Figure 4-2 shows us that **400 units** of a **0.3% concentration** of **permethrin** were applied to 2,000 square feet to control **wasps**. The pesticide applicator got the pesticide from the shop inventory.

1. Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for a liquid formulation. The equation that we will use is as follows:

$$PAI = (\text{Volume of Undiluted Pesticide Used}) \times (\text{Pounds of Active Ingredient per gallon of Pesticide})$$

2. Next, consult the shop's inventory records to find out more about the permethrin product and to determine the EPA registration number. You learn that the installation stocks a **product called Wasp Freeze™** that comes in an **aerosol can**. The pesticide label states that **each can is a 0.3% solution, and contains 14 fluid ounces**. The label does not tell you how many pounds of active ingredient there are in a gallon of product.

You realize that this is a liquid application, but you have no information concerning the weight of active ingredient per gallon of Wasp Freeze™. You must assume that the weight of the Wasp Freeze™ is the same as water, which is 8.34 pounds per gallon. You must now determine the volume of undiluted pesticide (Vu) used in a gallon.

Since the pest control operator **applied 400** cans of Wasp Freeze™, and each can contains **14 fluid ounces**, the operation required **5,600 fluid ounces of Wasp Freeze™**, which is the undiluted product.

$$Vu = \frac{14 \text{ fl ounces}}{1 \text{ can}} \times \frac{1 \text{ Gal}}{128 \text{ fl ounces}} \times 400 \text{ cans}$$

$$Vu = \frac{14 \text{ fl ounces}}{1 \text{ can}} \times \frac{1 \text{ Gal}}{128 \text{ fl ounces}} \times 400 \text{ cans}$$

$$Vu = \frac{14}{1} \times 1 \text{ Gal} \times 400 = 43.75 \text{ Gal}$$

$$Vu = 43.75 \text{ Gal}$$

- Next, develop the part of the equation to figure out the pounds of active ingredient per gallon of pesticide.

Since one gallon of water weighs 8.34 pounds, you can multiply the 43.75 gallons by 8.34 pounds per gallon.

$$\text{Weight} = 43.75 \text{ Gal} \times \frac{8.34 \text{ Lbs}}{1 \text{ Gal}}$$

$$\text{Weight} = 43.75 \text{ Gal} \times \frac{8.34 \text{ Lbs}}{1 \text{ Gal}} = 364.88 \text{ Lbs}$$

- Calculate the PAI for the 400 cans of Wasp Freeze™. you know the weight of the undiluted pesticide and that the pesticide is a 0.3% solution. You are now able to compute the PAI for his application. Use the PAI of Wasp Freeze™ as part of the total pounds of insecticide (row 1-e) applied on your installation.

$$\text{PAI} = \text{Weight} \times \text{Concentration.}$$

$$\text{PAI} = 364.88 \text{ Lbs} \times \frac{0.3}{100}$$

$$\text{PAI} = 1.1 \text{ Lbs}$$

Dry Formulations

1. When you have complete information. Complete information means that you know the a) formulation, b) active ingredient, c) final concentration, d) amount of undiluted pesticide used, and e) pounds of active ingredient by weight of undiluted pesticide.

Follow this example anytime you have a dry formulation and all the other information listed above.

The example below calculates the PAI for row seven of Figure 4-1. Row seven in Figure 4-1 shows us that a **0.25% final concentration of Ficam W™** was applied to 25 housing units. The pesticide applicator got the pesticide from the shop inventory.

1. Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for a dry formulation. The equation that you will use is as follows:

$$\text{PAI} = (\text{Pounds of Undiluted Pesticide Used}) \times (\text{Percent of Active Ingredient by weight})$$

2. First, consult the shop's inventory records to find out more about the Ficam W™ product and to determine the EPA registration number. You will learn that the installation stocks Ficam W™ with an EPA registration number of 45639-1. You realize that this is a dry application using a wettable powder, so you first determine the percent of active ingredient by weight of pesticide (P_w) using the pesticide label.

The Ficam W™ label states that it is a 76% wettable powder, or 0.76 pounds of active ingredient per pound of Ficam W™.

$$P_w = 0.76$$

3. Next determine the pounds of undiluted (P_u)Ficam W™ used

$$P_u = \frac{.4 \text{ ounces Ficam W}^{\text{TM}}}{1 \text{ Gal}} \times 25 \text{ Gal}$$

$$P_u = \frac{.4 \text{ ounces Ficam W}^{\text{TM}}}{1 \text{ Gal}} \times 25 \text{ Gal}$$

$$P_u = 10 \text{ ounces Ficam W}^{\text{TM}} \times \frac{1 \text{ Lb}}{16 \text{ ounces}}$$

$$P_u = 10 \text{ ounces Ficam W}^{\text{TM}} \times \frac{1 \text{ Lb}}{16 \text{ ounces}}$$

$$P_u = 0.625 \text{ pounds Ficam W}^{\text{TM}}$$

- Calculate the PAI by converting the part of the equation to figure out the pounds of active ingredient.

$$\text{PAI} = (0.625 \text{ pounds Ficam W}^{\text{TM}}) \times \frac{(0.76 \text{ pounds bendiocarb})}{1 \text{ pound Ficam W}}$$

$$\text{PAI} = (0.625 \text{ pounds Ficam W}^{\text{TM}}) \times \frac{(0.76 \text{ pounds bendiocarb})}{1 \text{ pound Ficam W}}$$

$$\text{PAI} = 0.475 \text{ pounds bendiocarb}$$

- * Use the 0.475 pounds of bendiocarb as part of the total pounds of insecticide (row 1-e) applied on your installation.

2. When you treat an area measured in acres. Follow this example anytime you have a rate application for an area measured in acres and you know the a) formulation, b) number of acres treated, and c) pounds of active ingredient by weight of undiluted pesticide.

The example below calculates the PAI for row three of Figure 4-2. Row three in Figure 4-2 shows us that **carbaryl** was applied to **38 acres**, at the rate of **25 pounds per acre**. The application was to control **grasshoppers**. The pesticide applicator got the pesticide from the shop inventory.

- Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for a dry formulation for an area. The equation that you will use is as follows:

$$\text{PAI} = (\text{Unit Area Treated with Pesticide}) \times (\text{Percent of Active Ingredient used per Unit Area})$$

- Next, consult the shop's inventory records to find out more about carbaryl and to determine the EPA registration number. You find out that the installation stocks **Sevin 5 DustTM** that has an EPA registration number of 239-9349-AA. The pesticide label states that Sevin 5 DustTM is **5% carbaryl by weight**.
- Using the information from the label and 1532 report you first calculate the percentage of active ingredient used per unit area.

$$\text{Percent of active ingredient per unit area} = \frac{(25 \text{ pounds of Sevin 5}^{\text{TM}})}{1 \text{ acre}} \times \frac{(5 \text{ pounds carbaryl})}{100 \text{ pounds of Sevin 5}^{\text{TM}}}$$

$$\text{Percent of active ingredient per unit area} = \frac{(25 \text{ pounds of Sevin 5}^{\text{TM}})}{1 \text{ acre}} \times \frac{(5 \text{ pounds carbaryl})}{100 \text{ pounds of Sevin 5}^{\text{TM}}}$$

$$\text{Percent of active ingredient per unit area} = \frac{(125 \text{ pounds carbaryl})}{100 \text{ acres}}$$

$$\text{Percent of Active Ingredient used per Unit Area} = \frac{(125 \text{ pounds carbaryl})}{100 \text{ acres}} = \underline{1.25 \text{ pounds carbaryl}} \text{ acre}$$

4. Complete the calculation and figure out the PAI for the application.

Since you are dusting 38 acres, your second step is to calculate the Pounds of Active Ingredient or PAI for the application. The PAI equals the pounds of active ingredient used per area or Pa multiplied by the area treated. Remember, the unit of measurement for each entry must be the same (i.e., acres and acres, square feet and square feet, not square feet and acres).

$$\text{PAI} = \frac{1.25 \text{ pounds carbaryl}}{1 \text{ acre}} \times 38 \text{ acres}$$

$$\text{PAI} = \frac{1.25 \text{ pounds carbaryl}}{1 \text{ acre}} \times 38 \text{ acres}$$

PAI =- 47.5 pounds of carbaryl

- * Use the 47.5 pounds of carbaryl as part of the total pounds of insecticide (row 1-e) applied on your installation.

3. When you treat a fraction of an acre. Follow this example for a rate application of an area not measured in acres and when you know the a) formulation, b) number of square feet treated, and c) pounds of active ingredient by weight of undiluted pesticide.

The example below calculates the PAI for row ten of Figure 4-1. Row ten in Figure 4-1 shows you that **Daconil 2787™** was applied to **16,450 square feet on the golf course**, at the rate of **6 fluid ounces per thousand square feet**. The application was to control **fungus on turf grass**. The pesticide applicator was a contractor.

1. Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for a dry formulation for a fraction of an area. The equation that you use is as follows:

$$\text{PAI} = (\text{Unit Area Treated with Pesticide}) \times (\text{Percent of Active Ingredient used per Unit Area})$$

2. Next, consult the contractor's records to find out more about Daconil 2787™, and to determine the EPA registration number. You find out that the contractor did not provide any further information, so you need to locate the label.

You learn that Daconil 2787™ contains **4.17 pounds of Chlorothalonil per gallon of undiluted pesticide**, and that the product is a fungicide. Use the information in the equation.

$$\text{PAI} = (\text{Unit Area Treated with Pesticide}) \times (\text{Percent of active ingredients used per Unit Area})$$

$$\text{PAI} = (16,450 \text{ square feet}) \times (\text{Percent of Active Ingredient used per Unit Area})$$

3. Next, determine the percent of active ingredient used per unit area and multiply by the unit area treated with pesticide to calculate the PAI.

$$\text{PAI} = (16,450 \text{ sq ft}) \times \frac{(6 \text{ ounces of Daconil 2787}^{\text{TM}})}{1000 \text{ sq ft}} \times \frac{(4.17 \text{ pounds Chlorathalonil})}{(1 \text{ Gal of Daconil 2787}^{\text{TM}})}$$

We use Appendix B to convert the gallons of Daconil 2787TM to ounces.

$$\text{PAI} = (16,450 \text{ sq ft}) \times \frac{(6 \text{ ounces of Daconil 2787}^{\text{TM}})}{1000 \text{ sq ft}} \times \frac{(4.17 \text{ pounds Chlorathalonil})}{(128 \text{ ounces of Daconil 2787}^{\text{TM}})}$$

$$\text{PAI} = (16,450 \text{ sq ft}) \times \frac{(6 \text{ ounces Daconil 2787}^{\text{TM}})}{1000 \text{ sq ft}} \times \frac{(4.17 \text{ pounds Chlorathalonil})}{(128 \text{ ounces Daconil 2787}^{\text{TM}})}$$

$$\text{PAI} = (98.7) \quad \times \quad \frac{4.17 \text{ pounds Chlorathalonil}}{(128)}$$

PAI = 3.22 pounds Chlorathalonil

- * Use the 3.22 pounds of Chlorathalonil as part of the total pounds of fungicide (row 1-b and 1-c) applied on your installation.

Bait Stations

The example below uses the information from row four of Figure 4-1. Row four in Figure 4-1 shows you that twelve **Combat bait stations** were used to treat **1,000 square feet** of residential area on post. Each bait station has a final concentration of 1.65%.

1. Use the Decision Tree from chapter three to identify the appropriate equation for calculating the PAI for bait stations. The equation that you will use is as follows:

Number of Bait Stations Used = Number of Bait Stations to Report

Since the Combat bait stations used the same active ingredient, complete the equation as follows:

Number of Bait Stations Used = 12

Develop the Installation Yearly Pesticide Use Summary Report

Once you complete all of the calculations, you are ready to develop the annual report. We used the answers to the examples to show you how to complete the report. Refer to section three of this guide for more detailed instructions.

The list below extracts the answers to the questions from the examples presented in this section. We number the examples as “L1” for the first example under the liquid formulation category, “D1” for the first example under the dry formulation category, etc. We excluded L4, as it was part of the volumetric

grouping in L1.

L1 = PAI = 741.12 pounds Glyphosate - Herbicide

10,085 gallons glyphosate applied to the golf course = 605.1 pounds

1,825 gallons glyphosate applied to outlease areas = 109.5 pounds

442 gallons applied to all other operations = 26.52 pounds

L2 = PAI = 2.99 pounds Malathion™ - Insecticide

L4 = PAI = 1.1 pounds Permethrin - Insecticide

D1 = PAI = 0.475 pounds bendiocarb - Insecticide

D2 = PAI = 47.5 pounds carbaryl - Insecticide

D3 = PAI = 3.22 pounds Chlorathalonil - Fungicide

B1 = Number of Bait Stations Used = 12

**INSTALLATION YEARLY
PESTICIDE USE SUMMARIES**

TITLE: Pesticide Use Summary, FY 96
Name of Installation, COUNTRY

1. Pesticide Use for	FY 96	
a) Total:	796.405 PAI	
b) Herbicides and/or Fungicides:	744.34 PAI	(= ca x% of total PAI)
c) Golf Courses:	605.1 PAI	(= ca x % of total PAI)
d) Agricultural Outleases	109.5 PAI	(= ca x % of total PAI)
e) Insecticides	52.065 PAI	(= ca x % of total PAI)
f) Other	0 PAI	(= ca x % of total PAI)

(Copies of 1532 reports for FY 96 enclosed)

2. Pesticide use for FY 93	(DoD Baseline year)	
a) Total:	2000 PAI	
b) Herbicides and/or Fungicides:	1400 PAI	(= ca 70% of total PAI)
c) Golf Courses:	850 PAI	(= ca 42 % of total PAI)
d) Agricultural Outleases	0 PAI	(= ca 0 % of total PAI)
e) Insecticides	400 PAI	(= ca 20 % of total PAI)
f) Other	200 PAI	(= ca 10 % of total PAI)

3. Explanations. Flooding during FY 93 decreased herbicide use on weeds in training areas and along firebreaks; Gypsy moth outbreak in FY 93 resulting in higher than normal levels of insecticides. The golf course started their new scout surveillance program in FY 95, which helped reduce applications of pre-emergence and other herbicides by over 100 PAI.

Pesticide use reports are satisfactory from all installation users, except for one unreported contract application for indoor nuisance pests at an on-post housing area.

4. Goal to Reduce Pesticides. We will begin to implement a state IPM program for range land pest control that should reduce herbicide use in training areas by 15-20%. Herbicide X, although more expensive than herbicide Y, requires 60% less product per acre. The golf course intends to expand the turf grass pest scouting system to include greens. The goal of the scouting system is to reduce yearly fungicide use by 10%.

If successful, we should reduce pesticide PAI by 15% during FY 96 and by at least 35% by FY 2000.

Miscellaneous (Optional). FY 95 pest control operations were much more typical than those occurring during FY 93. For a more realistic baseline and more accurate pesticide reduction figures, installation XXXX recommends using the FY 95 figures as the baseline.

Figure 4-12. Completed Annual Report

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APPENDIX A: DD FORM 1532 DATA

Appendix A contains a glossary of the acronyms used in the Department of Defense Form 1532 Pest Management Report. For more information about DD Form 1532 Pest Management Reports, refer to *NAVFACINST 6250.3F Department of Defense Pest Management Program: Instructions for the Preparation and Use of the Pest Management Report (DD Form 1532), February 1981*.

Table A-1 provides a description of the data included on DD Form 1532.

Table A-1 Description of Fields on DD Form 1532

Column	Field Name	Description
a	Name	Contains the most appropriate report term for the pest being controlled. Examples of report term values are FILTHFLIES, ANTS, FLEAS, SPIDERS, JPBEETLES, FOODPESTS, OWI, OTP, BDLVDWEEDS, BRUSH, TURF, OPD, etc.
b	Operation Name	Contains the most appropriate term for the pest control operation; operation names are paired with area units from column (d). Examples of report term values are FOGGING, MISTING, DGHAND, DGPEG, SOILFUM, BARRIER, EXBAIT, INBAIT, etc.
c	Total Units Treated	Contains the area, volume, or individual item treated. The numerical value must be reported as a whole number. Fractions of a unit (i.e., 1/8 acre) are combined with subsequent treatments.
d	Area Unit	Contains the area, volume, of individual item unit associated with the total units treated, column (c). Values include AC, EA, MSF, MLF, CF, CY, MCY, MLF, and MBF.
e	Site	Contains the most appropriate report term for the site where the control operation occurred. Examples of report term values include EXC, OFF, RES, IMP, TRE, WAW, UTL, GRH, KEN, GRG, REC, OPB, CRP, and GRZ.
f	Name	Contains the most appropriate report term for the applied pesticide. If two or more pesticides are simultaneously applied, you must report them as separate entries. This column remains blank for control operations that do not involve pesticides. Examples of report term values are ROUNDUP, DUSWETSULF, PYRETHRUM, KELTHANE, DURSBAN, ETHOPROP, CARBARYL, FICAM, DIAZINON, GLUE, ZNPH, HCN, VAPAM, CAPTAN, DACONIL, etc.
g	Form	Contains the formulation if the pest controller used a pesticide used in the operation
h	Application Amount	Contains the amount (a whole number) of the pesticide applied in the finished or diluted form. This column is left blank for control operations that do not involve pesticides.
i	Application Unit	Contains the unit associated with the application amount from column (h). PDW is pounds, ZGL is gallons, FLO and FLOZ are fluid ounces.
j	Final Conc. %	Contains the final concentration percent of the pesticide used in the control operation.
k and l	Rate lb. and %	Used together, columns (k) and (l) reflect the rate of application per unit of the pesticide. The data in columns (k) and (l), reflect either (a) the pesticide concentration per unit area or (b) the actual pounds of active ingredient, i.e., rate, per unit area.
m	Supply Source	Contains the most appropriate report term for the location from where the pesticide was obtained. Values include S, N, G, or C.
n	Time	Contains the number of hours devoted to all aspects of the pest control operation.

TABLE OF DESCRIPTIVE AND REPORT TERMS

CATEGORY 1—TARGET PESTS

Descriptive Terms

Report Terms

Col (a)

Group I Disease Vectors—Flies, Gnats and Mosquitoes

1. Culicoids (Sand Flies, Punkies, No-See-Ums).....	CULICOIDS
2. House Flies and Other Filth-Flies	FILTHFLIES
3. Mosquitoes (Culicids)	MOSQUITOES
4. Filter Flies, Drain Flies (Psychodids).....	PSYCHODA
5. Black Flies, Buffalo Gnats (Simuliids)	SIMULIIDS
6. Stable Flies, Dog Flies, Siting House Flies (Stomoxys)	STOMOXYs
7. Horse Flies, Deer Flies (Tabanids).....	TABANIO
8. Midges, Gnats (Chironomids)	CHIRONOMID
9. Other Diptera (Miscellaneous Flies, Gnats, etc)	OTH (add name)

Group II Household, Nuisance, and Miscellaneous Arthropod Pests

1. Ants, Other (Carpenter Ants--See wood Destroying Pests)	ANTS
2. Fire Ants	FIREANTS
3. Bedbugs.....	SEDBUG5
4. Centipedes	CENTIPEDE5
5. Clover Mite	CLOMITES
6. Crickets.....	CRICKETS
7. Cockroaches	ROACHES
8. Earwigs.....	EARWIGS
9. Fleas	FLEAS
10. Lice.....	LICE
11. Mites and Chiggers (See also Clover Mites above)	MITES
12. Pillbugs and Sowbugs	PILLBUGS
13. Scorpions.....	SCORPIONS
14. Silverfish, Millipedes, Psocids, Firebrats.....	SLVRSOCID
15. Spiders.....	SPIDERS
16. Ticks	TICKS
17. Urticating Insects (Caterpillars, etc.).....	URTICATING
18. Wasps, Bees, and Hornets	WOB
19. Other Disease Vectors or Venomous Arthropods	ODV (add name)
20. Other Arthropod Pests	OAR (add name)

Target Pests (continued)

Descriptive Terms

Group III Plant Pests

1. Arthropod Plant Pests Infesting Roots and Soil (White Grubs, etc.) ROO (add name)
2. Sap-Sucking Arthropods (Thrips, Aphids, etc.)..... SAP (add name)
3. Leaf-Chewing or Defoliating Insects (Leaf Miners, Tent Caterpillars) LEA (add name)
4. Boring & Girdling Insects (Attacking Plants Above Ground) SRG (add name)
5. Japanese Beetles JPBEETLES
6. Gypsy Moth GYPSYMOTH

Group IV Stored Product Pests

1. Arthropod Pests of Stored Foods FOODPESTS
2. Arthropod Pests of Fibers and Fabrics RIBFABPST

Group V Wood-Destroying Pests

1. Termites, Subterranean..... SUBTERMS
2. Termites, Drywood..... DRYWDTERM
3. Termites, Dampwood DAMPWDTERM
4. Powder-Post Beetles (Lyctids, Anobiids, etc.)..... BEETLESPP
5. Old House Borers OLDHOUSEBR
6. Carpenter ants..... CARPENTANT
7. Other Wood-Destroying Insects OWI (add name)
8. Wood-Destroying Fungi..... FUNGIWD
9. Marine Borers (Shipworms and Gribbles) MARINEBOR
10. Other Wood-Destroying Pests..... OWD (add name)

Group VI Vertebrate and Miscellaneous Pests Other Than Arthropods

1. Rats..... RATS
2. Mice..... MICE
3. Ground Squirrels GRDSQURLS
4. Other Rodents..... RODENTSOTH
5. Bats..... BATS
6. Birds BIRDS
7. Fish..... FISH (add name)
8. Other Vertebrate Pests (Rabbits, Moles, Mongooses, etc.)..... OVE (add name)
9. Snails and Slugs SNAILSLUGS
10. Snakes..... SNKES
11. Nematodes..... NEMATODES
12. Other Miscellaneous Pests OTP (add name)

Group VII Weed Pests

- 1. Algae ALGAE
- 2. Other Aquatic Weeds AQUATICWDS
- 3. Grassy Weeds GRASSYWEED
- 4. Herbaceous Broad-Leaved Weeds BOLVOWEEDS
- 5. Mixed Grassy and Broad-Leaved Weeds MXGRABDLVO
- 6. Woody Vegetation, Brush BRUSH
- 7. Mixed Herbaceous and Woody Weeds MXBDLBRUSH
- 8. Soil Sterilization (Eradication of All Vegetation)..... ALLVEG

Group VIII Plant and Turf Diseases

- 1. Turf Diseases (Dollar Spot, Anthracnose, Brown Spot, Smut, Rust, etc.). TURF (add name)
- 2. Ornamental Plant or Tree Diseases (Flux, Wilts Blight
Dutch Elm Disease)..... ORN (add name)
- 3. Other Plant Diseases..... OPD (add name)

END OF TARGET PEST CATEGORY

CATEGORY 2—OPERATIONS

<u>Descriptive Terms</u>	<u>Report Terms</u>		<u>Use Columns</u>
	<u>Col (b)</u>	<u>Col (d)</u>	
<u>Group I</u> Exterior Control Operations			
1. Fogging, Thermal or Nonthermal and ULV, Outdoor	FOGGING	AC	j or k and l
2. Misting (Use EA for Tree Applications Only)	MISTING	AC, EA	j or k and l
3. Spraying, Hand (Use EA for Tree Applications Only).....	SPHAND	AC, EA	j or k and l
4. Spraying, Power (Use EA for Tree Applications Only).....	SPPDEQ	AC, EA	j or k and l
5. Spraying, Aerial	SPAIR	AC	k and l
6. Dust/Granule Application, Hand	DGHAND	AC	k and l
7. Dust/Granule Application, Power.....	DGPEQ	AC	j or k and l
8. Dust/Granule Application, Aerial	DGAIR	AC	j or k and l
9. Systemic Application to Trees (Other Than Above)	SYSTEMAPP	EA	j
10. Receptacle Treatment (Catch Basins, Barrels, Grease Traps, Transportable Garbage Containers [TGCs] and Other Individual Receptacles).....	RECEPTREAT	EA	
11. Residual or Spot Treatment to Building Exteriors (Spraying, Dusting, etc.).....	EXTRESIDTR	MSF, MLF	j
12. Baiting (Report Area Protected)	EXBAIT	AC	j or k and l
13. Barrier, Chemical.....	CHEMBAR	MLF	j
<u>Group II</u> Interior Control Operations			
1. Indoor Residual Treatment (Report Area Treated); for Crack-and-Crevise Treatment (Report Area Protected).....	RESIDTR	MSF, MLF	j or k and l
2. Space Treatment (Bug-Bombs, Flitguns, Aerosol Generators, and ODVP Strips) (Report Area Treated).....	SPCTR	MSF, MLF	j or k and l
3. Baiting (Chemical or Biological Control Only) (Report Area Protected)....	INBAIT	MSF, MLF	j or k and l

OPERATIONS (Continued)

<u>Descriptive Terms</u>	<u>Report Terms</u>		<u>Use Columns</u>
	<u>Col (b)</u>	<u>Col (d)</u>	
<u>Group III Fumigation</u>			
1. Vacuum Chamber Fumigation.....	VACUUMFUM		j or k and l
2. Atmospheric Fumigation (Stack, Car, Ship, Equipment, etc.).....	ATMOSFUM		j or k and l
3. Structural Fumigation	STRUCFUM		j or k and l
4. Soil Fumigation (for weed seeds, nematodes, or plant diseases, etc.) Burrow fumigation (Report Area Protected)	SOILFUM	SY	j or k and l
5. Deactivation of Fumigants Received from Intransit Fumigation of Railroad Cars (Report RRC as site and enter time only)	DEACTIVATE		

Group IV Soil Treatment for Termite Control

1. Surface Soil Treatment (Surface Pretreatment or Corrective Treatment, Subslab Injection, Horizontal Rodding)...	SURSOILTR	MSF, MLF	j
2. Trench Treatment (Digging, Vertical Rodding) (Convert linear feet or trench directly to cubic feet)	TRNSOILTR	CF	j
3. Rodding (Vertical or Horizontal) and Subslab Injection (Convert linear feet of rodding directly to cubic feet of soil)...	INJECTSOIL	CF	j

Group V Physical and Mechanical Control of Pest Organisms

1. Earthwork, Sanitary Landfill.....	SANITFILL	CY	
2. Earthwork, Hydraulic Landfill	HYDRAFILL	MCY	
3. Earthwork, Ditching (New and Maintenance).....	DITCHING	MLY	
4. Clearing (Wee, Brush, and Selective Tree removal).....	CLEARING	AC	
5. Barrier Construction (Screening, etc.)	BARRIER	MSF, MLF	
6. Trapping, Exterior.....	EXTRAP	AC	
7. Trapping, Interior	INTRAP	MSF, MLF	

OPERATIONS (Continued)

<u>Descriptive Terms</u>	<u>Report Terms</u>		<u>Use Columns</u>
	<u>Col (b)</u>	<u>Col (d)</u>	
8. Steam Cleaning Trucks, Transportable Containers, or Garage Bins	STEAMCLEAN	EA	
9. Other Mechanical Control (Manual Removal of Pests, Nests, or Infested Materials)	OMCONTROL	AC, MSF or EA	
10. Grazing (for weed control).....	GRAZING	AC	

Group VI Wood Protection from Wood Decaying Organisms

1. Treated Lumber Installed (Pressure Treated)	TRLUMBINST	MBF	
2. In-Place Treatment, Structural or Dimension Materials	STINPLTER	MSF, MLF	j
3. In-Place Treatment, Piles	POLEINPLTR	EA	j
4. In-Place Treatment, Piles	PILEINPLTR	EA	j
5. Poles Installed (Pressure Treated).....	POINSTALTR	EA	
6. Piles Installed (Pressure Treated).....	PIINSTALTR	EA	
7. Dip/Soak Treatment-Lumber & Plywood	DOPTRLUMB	MBF	j
8. Dip/Soak Treatment-Pallets	PALLDIPTR	EA	j

Group VII Inspection and Survey of Pest Problems. Not a direct part of control operations. Indicate operational area in column e and the hours in column o. Leave columns c, d, and f through m blank.

1. Inspection or Survey by Medical Department Personnel	MEDDINSSUR		
2. Inspection or Survey by Public Works Department Other Than for Contract Performance	ENGDINSSUR		
3. Inspection or Survey of Stored Products by Veterinary Personnel	VETINSUR		

OPERATIONS (Continued)

<u>Descriptive Terms</u>	<u>Report Terms</u>		<u>Use Columns</u>
	<u>Col (b)</u>	<u>Col (d)</u>	
4. Timber Survey by Forestry Personnel for Forest Insect Pests (Report this operation only for timber or ornamental trees and include acres inspected).....		TIMBSURVEY	

Group VIII Program Administration and Maintenance. Not a direct part of control operations. Report time only.

- | | | | |
|--|--|-------------|--|
| 1. Program Planning, Estimating, Scheduling, Coordinating, and Reporting..... | | PROGRAMMING | |
| 2. Training (includes on-the-job, correspondence, in-service, and formal courses to establish or improve competency in pest control) | | TRAINING | |
| 3. Maintenance, Calibration, and Cleanup of Equipment, Vehicles, and Shop Facilities..... | | MAINTENANCE | |
| 4. Nonprogram Functions Supporting Pest Control (Medical Examinations, Blood Tests, Annual, Sick and Administrative Leave, and Indirect Training)..... | | NONPROGRAM | |
| 5. Quality Assurance Evaluation or Inspection of Contractor Performance (Enter on line following report of the pest control operation evaluated) | | QAEVALUATE | |
| 6. Decontamination of Areas, Materials, or Equipment Resulting from Pesticide Contamination (Use "Deactivate" for residue disposal from intransist fumigation operations)..... | | DECONTAMIN | |

<u>Descriptive Terms</u>	<u>Report Terms</u>		<u>Use Columns</u>
	<u>Col (e)</u>	<u>Col (d)</u>	

Group IX Outdoor Sites (Terrestrial)

- | | | | |
|--|-----|----|--|
| 1. Wooded Areas (including forest lands) ... | WOO | AC | |
|--|-----|----|--|

OPERATIONS (Continued)

<u>Descriptive Terms</u>	<u>Col (e)</u>	<u>Report Terms</u>	
		<u>Col (d)</u>	<u>Use Columns</u>
2. Open Areas with Brush.....	OPB	AC	
3. Open Areas with Grass, May Have Some Trees and Shrubs (Lawns, Parade Grounds) (omit lands).....	OPG	AC	
4. Golf Course Fairways and Greens	GFG	AC	
5. Landfills, Refuse Dumps.....	LDF	AC	
6. Open Areas with No Vegetation, Mostly Paved or Barren	OPX	AC	
7. Trees or Ornamental Shrubs Treated Individually (Report only with Hand Spraying, Mist Power Spraying, or Systemic Operations).....	TRE	EA	
8. Croplands (areas under outlease).....	CRP	AC	
9. Grazing Land (areas under outlease).....	GRZ	AC	

<u>Descriptive Terms</u>	<u>Col (e)</u>	<u>Report Terms</u>	
		<u>Col (d)</u>	
<u>Group X Outdoor Sites (Aquatic)</u>			
1. Marsh/Swamp (Do not include temporary pools or flooded areas).....	MOS	AC	
2. Waterway (Moving water such as ditches, streams, rivers, harbors).....	WAW	AC	
3. Impoundment (Standing water such as lakes, ponds, temporary pools)	IMP	AC	
4. Underground Sewer Lines (If operation is RESIDTR, SPCTR, or INBAIT, use MLF as area unit).....	UGS	MLF	
5. Receptacles, Manholes, Catch Basins, Barrels, or Water Containers.....	REC	EA	

Group XI Indoor Sites and Structures

1. Food Handling Buildings (Preparation and Serving Only).....	FHB	MSF	
2. Residential and Family Quarters.....	RES	MSF	
3. Barracks and BOQs.....	BRQ	MSF	

OPERATIONS (Continued)

<u>Descriptive Terms</u>	<u>Report Terms</u>	
	<u>Col (e)</u>	<u>Col (d)</u>
4. Hospitals and Medical Laboratories	HOL	MSF
5. Recreation Buildings and Chapels	RCH	MSF
6. Office and Administrative Buildings	OFF	MSF
7. Industrial Buildings, Shop Areas, and Nonmedical Laboratories	IND	MSF
8. Storage Buildings and Warehouses.....	WHS	MSF
9. Utility Buildings.....	UTL	MSF
10. Waterfront Structures (Pier, wharf, with or without buildings).....	WAT	MSF
11. Greenhouses	GRH	MSF
12. Exchanges and Commissaries.....	EXC	MSF
13. Kennels and Stables	KEN	MSF
14. Brigs or Prison Cells	BRG	MSF

Group XII Miscellaneous Sites

1. Ships or Barges in Port or Drydock	SIP	MSF
2. Railroad Cars	RRC	MSF
3. Trucks and Vans	TRV	MSF
4. Aircraft.....	ACF	MSF
5. Transportable Garbage Containers (Dumpsters).....	TGC	EA

END OF OPERATIONS CATEGORY

CATEGORY 3—PESTICIDES

Descriptive Terms

Report Terms

Col (a)

Group I Inorganic Insecticides and Acaricides

1. Boric Acid Crystals	BRICACID
2. Copper Sulfate Formulations	COPPERSULF
3. Sulfur Dusts and Wettable Powders.....	DUSWETSULF
4. Lime Sulfur	LIMESULFUR
5. Lead Arsenate.....	LDARSENATE
6. Paris Green	PRISGREEN
7. Silica Aerogels (Dry-Die).....	SILICAAERO
8. Silica Aerogel and Pyrethrins (Drione).....	DRIONE
9. Sodium Fluoride.....	SODIUMFLD
10. Other Inorganic Insecticides and Acaricides	OII (add Name)

Group II Natural Organic and Biological Insecticides and Acaricides

1. Pyrethrum (including Synergized Formulations).....	PYETHRUM
2. Pyrethrum and Silica Aerogel.....	DRIONE
3. Rotenone, All Forms	ROTENONE
4. Nicotine Compounds.....	NICOTINE
5. Miscible Oils (Summer and Dormant).....	MISCOIL
6. Flit MLO	FLITMLO
7. Oils, Minerals (Including Fuel and Diesel).....	MINOILS
8. Other Natural organic Materials.....	ONE (add name)
9. Milky Spore Dust (Bacillus popilliae).....	MILKYSPORE
10. Bacillus Thuringiensis (Thuricide, Dipel).....	BACTHURING
11. Mosquito Fish (Gambusia and Top Feeding Minnows).....	MOSQFISH
12. Other Biological Insecticides and Acaricides.....	OBI (add name)

Group III Chlorinated Hydrocarbon Insecticides and Acaricides

1. Aldrin	ALDRIN
2. Chlordane	CHLORDANE
3. DDT.....	DDT
4. Dieldrin.....	DIELDRIN
5. Heptachlor	HEPTACHLOR
6. Lindane.....	LINDANE
7. Benzene Hexachlor	BHC
8. Kelthane (Dicofol).....	KELTHANE
9. Kepone	KEPONE
10. Methoxychlor	MTHOXYCHL
11. Mirex	MIREX
12. Other Chlorinated Hydrocarbon Insecticides & Acaricides	OCH(add name)

CATEGORY 3—Pesticides

Descriptive Terms

Report Terms

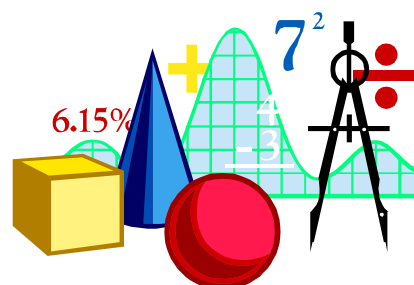
1. Boric Acid Crystals	BRICACID
2. Cooper Sulfate Formulations	COPPERSULF
3. Sulfur Dusts and Wettable Powders.....	DUSWETSULT
4. Lime Sulfur	LIMESULFUR
5. Lead Arsenate.....	LDARSENATE
6. Paris Green	PRISGREEN
7. Silicon Aerogels (Dry-Die)	SILICAAERO
8. Silica Aerfel and Pyrethrins (Drinoe).....	DRIONE
9. Sodium Fluoride.....	SODIUMFLD
10. Other Inorganic Insecticides and Acaricides	OII (add name)

Group II Natural Organic and Biological Insecticides and Acaricides

1. Pyrethrum (Including Synergized Formulations).....	PYRETHRUM
2. Pyrethrum and Silica Aerogel	DRIONW

APPENDIX B: How to Convert to Common Units of Measurement

Appendix B lists the multiplication/division factors for converting units of measure from one unit of measure to another. Conversion factors are provided in exact numbers to enable precise conversions. Should you wish to approximate a conversion, you can round a conversion factor to fewer decimal places.



Tables B-1 and B-2 include the conversion factors needed to support calculation of the PAI for pest control operations. By using the conversion tables, you will be able to convert data as follows:

- Volume - Fluid ounces, pints, and quarts, to gallons;
- Weight - Dry ounces to pounds; and
- Area - Square feet, square yards, and square miles to acres.

TABLE B-1. Conversion Values for Volume and Weight

UNIT OF MEASUREMENT	IS THE SAME AS
1 gallon	4 qt 8 pt 128 fl oz
1 quart	.25 gal 2 pt 32 fl oz
1 pint	.125 gal .50 qt 16 fl oz
1 fluid ounce	.00781255 gal .003125 qt .00625 pt
16 ounces	1 pound

UNIT OF MEASUREMENT	IS THE SAME AS
1 acre	43,560 ft ² 4,840 yd ² .001563 mi ²
1 square foot (ft ²)	.000023 acres, 0.11 yd ² .000095 mi ²
1 square yard (yd ²)	.000207 acres 9 ft ² .000285 mi ²
1 square mile (mi ²)	640 acres 10,560 ft ² 3,520 yd ²

Appendix C: The Pest Tracking Management System

All Department of Defense (DoD) components must comply with Executive Order 12856, Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), U.S.C. Section 137, Deputy Under Secretary of Defense (Environmental Security) memorandum of 23 September 1994, Pest Management Measures of Merit.

The Pest Tracking Management System (PTMS) is a personal computer program used by installation pest managers to track information pertaining to the application of pesticides. PTMS can store information that determines if pesticide applicators and pesticide application programs are properly certified and in compliance with federal, state and local laws. The software can report the status of certifications, application rates, and inventories, and maintain historical records of application events.

The PTMS package includes an on-line system and a user's manual. The types of information that the PTMS on-line system tracks include:

- Installation Information
- Pest Management Plans
- Pest Management Operations Information
 - ⇒ Tasks
 - ⇒ Pesticides used
 - ⇒ Quantity used
- Inventory Information
- Safety Information
- Personnel and Certification Information
- Personnel locations
- Contract and Contractor Information
- Historical information

Specific PTMS features include simple and logical input screen design, report capabilities that include screen viewing and printing, Ad hoc querying, and data import and export functions. PTMS is a Windows application that can operate in a stand-alone or networked environment.

To install and operate the PTMS system minimally requires the following hardware and software:

- IBM compatible PC
- 386 or higher processor
- MS-DOS 5.0 or higher
- RAM requirements depend on the Windows system in use.
- Hard disk storage requirements are 10 MB for executable and static data files plus 5 MB for a single installation's database and up to 50 MB for a PTMS databases used at major command and Headquarters levels.

The PTMS system includes a built-in help system that should make it easy to use. Additional training will be available through the DESCIM Program Management Office.

For more information on the PTMS, contact the DESCIM Program Manager's Office at (703) 325-0002, DSN 221-0002.