SECTION FOUR

Pesticide Storage, Handling and Application

Contents

SECTION 4: Pesticide Storage, Handling And Application

KEY CONCEPTS

- Pesticide use and safety remain major concerns for the public, golfers and golf course managers.

- The effective control of pests through the use of pesticides depends on:
  - accurate pest identification;
  - selecting the most effective and environmentally friendly pesticide;
  - minimising the use of pesticides, wherever possible
  - applying the pesticide accurately; and
  - calibration of the sprayer routinely checked as part of the spray task.

- Poor pesticide handling and application can:
  - waste money
  - waste time
  - provide poor pest control
  - result in turf damage
  - pollute ground and surface waters
  - harm wildlife
  - create occupational and public health and safety risks and
  - result in golfer and neighbour dissatisfaction.

4.1 INTRODUCTION

Pesticide use and safety and the environmental risks continue to be major concerns for the public, golfers and golf course managers. Modern pesticides are generally less persistent and more target-specific than earlier preparations, but all pesticides are biologically active and due care must still be taken in their storage, handling and application.

If pesticides are used poorly, they pose risks to workers, golfers, the community and the environment. The results of carelessness can range from the contamination of ground and surface waters to fish kills, death of non-target organisms and expensive clean-ups.

All reasonable precautions and due diligence needs to be applied to :

- pesticide storage;
- pesticide application practices;
- washdown bays;
- rinsate disposal; and
- pesticide waste and pesticide container waste management.

Under the *Protection of the Environment Operations Act 1997* (POEO) it is an offence to pollute waters (Section 120). It is also an offence to cause or permit water pollution.

'Waters' means the whole or any part of:

- any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea) or
- any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water.

Under POEO it is an offence to willfully or negligently cause a substance to leak, spill or otherwise escape in a manner that harms or is likely to harm the environment. Heavy penalties apply, including up to $1 million for a corporation and $250 000 and 7 years gaol for an individual.

4.2 THE PESTICIDES ACT 1999

Most NSW golf course superintendents and their staff are regular commercial users of pesticides and have particular responsibilities for the proper use of pesticides. Pesticides include herbicides, insecticides, fungicides, nematicides and baits for vermin. Under the *Pesticides Act 1999*, the NSW Department of Environment and Climate Change (DECC) enforces the proper use of all pesticides in NSW, after the point of sale. This includes pesticides used on public lands, in agriculture and on domestic and commercial premises. There have been significant changes in pesticides legislation in NSW with the introduction of the *Pesticides Act 1999* which replaces the older *Pesticides Act 1978*.

This Act is administered by the DECC. Under the *Pesticides Act 1999* all pesticide users must:

- use only registered pesticides
- read the pesticide label prior to each application
- use the pesticide in strict accordance with label directions (unless the user has a permit issued by the Australian Pesticides and Veterinary Medicines Authority to allow specific off-label use, in which case the requirements of the permit need to be followed strictly.)
- not cause harm to people, property or non-target plants and animals as a result of their pesticide application
- not store pesticides in containers which do not bear an approved label

Due diligence: Users of pesticides must read the labels of products they intend to use, assess each application thoroughly before using the pesticide and take all reasonable actions to ensure that non-target impacts are avoided. There is a defence to the offences of causing harm to people, property or non-target plants and animals where the user can demonstrate that she/he took all reasonable precautions to prevent the offence occurring and that it was due to causes over which they had no control.

Maximum penalties for most offences are $60,000 for individuals and $120,000 for corporations. Maximum penalties for offences committed wilfully or negligently are $120,000 and $250,000 respectively. Penalty Infringement Notices (like on-the-spot fines) can be issued for minor offences. Compliance notices can also be issued for cleanup.

Information specific to golf courses in relation to pesticide use and application: Several pesticides used on golf courses, including chlorpyrifos, bifenthrin, azinphos and fenamiphos have been found to cause major fish kills and/or the deaths of native birds when disposed of or used incorrectly (e.g. not watered in directly after application). For example, special care

should be taken to ensure that wood ducks (which frequent golf courses) are not affected by pesticides even when used in accordance with the label. Areas where pesticides have been used may need to be netted or have physical barriers to prevent the wood ducks grazing on the treated greens. Timing of the pesticide use may also be important.

There are also anecdotal reports of illegal use of mercuric and arsenic products in the greenkeeping industry. These products are no longer registered as a result of their unacceptable environmental and health risks.

Possession or use of unregistered or cancelled products is an offence, and the DECC carefully investigates all incidents involving their possible use or possession with intent to use. Ensure that you follow all label directions, including those regarding the storage of pesticides and the appropriate disposal of rinsate or excess chemicals.

NSW DECC Pesticides Officers: Pesticide officers can advise you on your legal responsibilities and other pesticides issues. Pesticides officers can be contacted on the numbers given at the end of this section. From time to time, DECC Pesticides Officers may visit golf courses to investigate complaints about a pesticide incident or to audit aspects of pesticide use. Some of these visits may occur without prior warning. DECC Pesticides Officers have powers to enter and search premises, seize products, take samples and obtain information in the course of an investigation. DECC officers should show you their authorisation before commencing inquiries.

Investigations may lead to prosecution, as described in the DECC's Prosecution Guidelines (DECC 2001). For less serious offences, the DECC may issue a penalty notice (like on-the-spot fines). Penalty notice fines are much lower than prosecution penalties and do not lead to a criminal record. The DECC may also issue clean-up and prevention notices.

The DECC may also provide advice that the action was within the law, direct pesticide users to sources of advice on best practice use of pesticides, refer the incident to another authority where appropriate, or facilitate communication among people involved.

The DECC also undertakes audit programs to check compliance with aspects of pesticide use, such as compliance with new label directions set by the National Registration Authority for a particular product. For example, a compliance audit program may be implemented now that compulsory record keeping has come into force.

Record keeping regulation: Requirements for mandatory record keeping for all commercial pesticide users, including those using pesticides on golf courses were gazetted in December 2001. The record keeping requirements commenced at the end of July 2002. A substantial period was left from gazettal to commencement to give users time to learn about the new rules. Resources providing guidance on the record keeping requirements is available on the DECC website or by phoning Environment Line on 131 555. More details are provided in section 4.3.2

Proposed training regulation: The DECC has consulted on draft proposals for mandatory training of commercial pesticides users, including greenkeepers. It is proposed that commercial users will be required to undertake competency-based training/assessment before they can use pesticides. It is also proposed that people who have already undertaken

training under the ChemCert (or former Farmcare) or SMARTtrain programs are deemed to meet the training requirements for 5 years after the date of issue of their qualifications. A phase-in period following commencement of the Regulation is also proposed to allow adequate time for users to be trained. The training proposal would give people the opportunity to have their current skills assessed and their competency certified under recognised prior learning programs rather than having to undertake formal training.

Notification: The Pesticides Implementation Committee has also been considering the use of notification in minimising the risk associated with pesticides use and in meeting community expectations of 'right-to-know'. It has recommended a multi-pronged approach that incorporates: the continued role of the Australian Pesticides and Veterinary Medicines Authority in identifying any product specific notification requirements during registration and assessment processes; the possible use of mandatory notification in certain sensitive situations such as near schools, hospitals, in common areas of multiple occupancy premises and in public places; and the development of voluntary notification principles (for pesticide use in agriculture). Consultation will occur as these issues progress.

Further information: Information sheets about the *Pesticides Act 1999* are available from the DECC's Environment Line on 131 555. These information sheets and other information about pesticides are also available on the DECC's website at www.environment.nsw.gov.au

Pesticides Officers in NSW can be contacted on the telephone numbers below :

Sydney	02 9995 5799	Dubbo	02 6884 9757
Newcastle	02 4908 6804	Tamworth	02 6766 7871
Grafton	02 6640 2511	Griffith	02 6964 1880
Queanbeyan	02 6122 3106		

4. 3 PESTICIDE APPLICATION PRACTICE

The application of plant protection chemicals is undertaken on most golf courses. Even on golf courses that have adopted an integrated pest management program, strategic spraying (in both time and location) is generally undertaken for the effective control of diseases, weeds and insects and is dependent on:

- careful monitoring of pest populations
- accurate identification of the pest
- selection of the most effective and environmentally friendly chemical
- accurate application of the pesticide

Spraying is a costly and time-consuming exercise. Being cost-effective depends on accurate application techniques. Every time the sprayer goes onto the golf course, there is always a natural suspicion of 'something nasty' being applied. Strategic spraying as part of an integrated pest management program, should reduce costs to the golf club and reduce the likelihood of causing concern to club users and neighbours.

4.3.1 Sprayer calibration

To spray a liquid is in itself a simple operation, but it is important that the sprayer be operated correctly and optimally for the conditions. Equipment factors to take into account include: nozzle size, spraying pressure, spray volume rate, forward speed and equipment maintenance (including calibration).

Other conditions to consider include: weather, turf characteristics, leaf angle, and growth stage.

Good spray technique entails careful consideration of:

- spraying equipment parameters (nozzle, pressure etc.);
- use of an effective calibration method;
- personal and public safety;
- environmentally sensitive areas, (e.g. near waterways)
- effective cleaning of the sprayer.

Regular sprayer maintenance is needed to provide sufficient and even distribution of the spray liquid and achieve effective pest control. The results from two overseas studies which checked the condition of spray equipment are summarised below.

STUDY 1: North Dakota, USA

- Only 18% of the sprayers checked were in excellent condition and applying the intended application rate.
- 60% of sprayers were more than 10% off the intended application rate (43% under-applying, 17% over-applying).
- 43% of sprayers had nozzle flow more than 10% off compared to new.
- 32% of sprayers had inaccurate travel speed variation from what was predicted.
- 27% of sprayers had improper boom height.
- 13% of sprayers had inaccurate pressure gauges.
- 8% of sprayers had inadequate hose size to supply nozzles.

Source: Hardi undated

STUDY 2: Danish Government Random Check of Spray Equipment (Law No. 266, 1993)

In 1995 of 454 sprayers checked, 341 (75%) failed the test:

- 34% due to damaged or worn nozzles;
- 23% had malfunction on suction filter; and
- 20% had malfunction of pressure gauge.

In 1997, of 408 sprayers checked, 319 (75%) failed the test:

- 57% due to damaged or worn nozzles;
- 52% had malfunction of pressure gauge; and
- 28% had leakages from fittings.

Source: Hardi undated

In addition to regular maintenance, sprayers need to be calibrated to ensure good performance. Poor calibration can lead to under or over application rates. Under application may result in poor treatment efficiency and over application can lead to higher costs for spraying and chemicals and increased risk of harm to the environment and occupational and public health. Poor results from pesticide application can lead ultimately to increased turf damage and golfer dissatisfaction.

Examples of the possible costs due to misapplication are given below:

SCENARIO 1: SPRAY APPLICATION IS 15% GREATER

Rate of application:

Chemical:	Dursban®
Application rate:	6 L/ha
Area:	20 ha
Volume of product applied:	120 L
Cost of product:	$170/5 L $4,080 ($204/ha)
Application time:	2.5 hours/ha (includes fill-up, application, travel)
Labour cost:	$50/ha
Equipment:	$60/ha
Cost per hectare:	$314
Total cost (20 ha):	$6,280

If the equipment is applying 15% more than expected, the increased cost is $942, and there may be additional labour costs in refilling spray equipment, greater fuel use and time.

SCENARIO 2: SPRAY APPLICATION IS 15% LESS

If the equipment is applying 15% less than expected, there are two possible outcomes:

- Spray is completely ineffective in controlling pest (cost: $5,338).
- Spray is partially effective in controlling pest and repeat spray is required at correct rate.
- In both situations, the potential costs will be $5,338 for the initial application plus $6,280 for the repeat application at the correct rate. Total cost: $11,618.

4.3.2 Record keeping

Good record keeping is an essential part of improving pesticide use efficiency and complying with the *Pesticides Act 1999*. The New South Wales Golf Course Superintendents Association has designed an excellent pesticide applicators log book for recording key information on the application of pesticides and calibration of equipment. Excerpts from the log book are provided below:

Date / /

Spray Licensee Name & contact details_____

Pesticide Applied (complete product name)
(Tick appropriate box then detail chemical used)

- ❑ Fungicide _____
- ❑ Insecticide _____
- ❑ Herbicide _____
- ❑ PGR _____
- ❑ Other _____

Rate: quantity of concentrate used; total volume of spray applied; areas of application_____

Rate 2_____

Spray Unit Calibration A B C Other (see over)

Spreader Setting_____**Helicone Setting**_____
Irrigation _____**Rainfall**_____
Other Additives_____
Target Organism_____

Area Treated (Tick appropriate box and/or specify area's sprayed)

- ❑ Greens ALL 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 PG CG NY
- ❑ Tees ALL 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 PG CG NY
- ❑ Fairways ALL 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 PG CG NY
- ❑ Other ALL 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 PG CG NY

Time Application Commenced_____**Completed**_____

Weather Conditions_____**Wind Speed**_____

Changes noted to wind strength and direction:

Additional Comments_____

Diligent responsibility and care was enacted to ensure that the appropriate safety equipment was used during the course of chemical application and mixing.

Operators Name_____Signature_____

Spray Unit Calibration Settings

Equipment Information

A

Equipment Type:	______	Nozzle Type:	______
Operating Speed:	______ Kph	Nozzle Size:	______
Operating Pressure:	______ kPa	No. Nozzles:	______
Swath Width:	______ m	Nozzle Output:	______ L/min
Boom Height:	______ cm	No. Droplets:	______ /cm²
Water Volume:	______ /ha or /plant	Calibration Date:	______

Previous Sprayer/Boom use: ______

Method of Cleaning Sprayer: ______

Equipment Information

B

Equipment Type:	______	Nozzle Type:	______
Operating Speed:	______ Kph	Nozzle Size:	______
Operating Pressure:	______ kPa	No. Nozzles:	______
Swath Width:	______ m	Nozzle Output:	______ L/min
Boom Height:	______ cm	No. Droplets:	______ /cm²
Water Volume:	______ /ha or /plant	Calibration Date:	______

Previous Sprayer/Boom use: ______

Method of Cleaning Sprayer: ______

Equipment Information

C

Equipment Type:	______	Nozzle Type:	______
Operating Speed:	______ Kph	Nozzle Size:	______
Operating Pressure:	______ kPa	No. Nozzles:	______
Swath Width:	______ m	Nozzle Output:	______ L/min
Boom Height:	______ cm	No. Droplets:	______ /cm²
Water Volume:	______ /ha or /plant	Calibration Date:	______

Previous Sprayer/Boom use: ______

Method of Cleaning Sprayer:

4.4 STORAGE FACILITIES

In addition to general maintenance buildings, a facility dedicated to the storage of pesticides and fertilisers is required by Workcover NSW. This facility should be self-contained to minimise risk from spillage or fire. When constructing a chemical storage facility a Development Application should be submitted to the local council for approval.

If storing products that are classified under the *NSW Dangerous Goods Act 1975*, store in a manner which complies with the requirements of this Act. Depending upon the quantity stored, licensing by WorkCover NSW may be required.

When designing a storage facility, the following actions must be considered:

- Refer to information in material safety data sheets (MSDS).
- Check local council fire regulations for entry/exit positions in the building, wall and ceiling construction material and any other requirements.
- Locate the facility away from other maintenance buildings.
- Store fertilisers and pesticides separately (i.e. in separate rooms).
- Provide positive ventilation, containment area for spills, emergency shower, eyewash and first aid kit in pesticide storage room.
- Have no outgoing drains from the facility.
- Develop and practise emergency response plans.

4.5 PESTICIDE SPRAY TANK FILLING AND MACHINERY WASHDOWN BAYS

4.5.1 Spray tank filling facility

It is recommended that the filling and emptying of spray tanks, emptying of spray lines and equipment and triple or pressure rinsing of spray equipment take place on a separate facility to the machinery washdown bay. This will help prevent pesticide waste contaminating the larger volume of water, soil, vegetation and other waste that is generated by the washing of machinery on a golf course.

The chemical handling and spray tank filling area needs to be able to contain all spills that may occur and be isolated from the stormwater and sewer systems, streams, water bodies etc. Beard (2002) recommends that there be 37–84 square metres allocated for equipment cleaning. The minimum dimensions suggested are 6 x 6 metres with 9 x 9 metres preferred. However, the minimum area would need to adequately accommodate the largest machine.

There needs to be a containment area (e.g. concrete tank) that is capable of containing at least the volume of the entire largest application tank or pesticide container (whichever is the largest), plus some space for washdown, and provision for prior content. This containment area can be designed to service both the spray tank fill area and the chemical storage facility. The containment facility is designed to hold the spillage until a company that is accredited to handle, remove and dispose of chemicals can pump it out for appropriate hazardous waste disposal.

4.5.2 Machinery washdown facility

While many golf courses have a designated storage area for pesticides, only a few have dedicated washdown bays and even fewer treat the wastewater generated. The traditional washdown facility on many golf courses in Australia is at best a concrete washdown pad and pesticide mixing area, with a drain that discharges into a soakage pit, stormwater drain or directly to surface waters. Allowing contaminated wastewater from washdown bays to drain directly into stormwater or surface waters would be an offence and could lead to fines and/or notices being imposed on operators. Local councils regulate pollution of waters provisions applicable to golf courses under the *POEO Act*, unless that council is the golf course operator/owner (in which case the DECC becomes the regulator).

Washdown facilities also have to cope with clippings, oils and other contaminants. Of particular concern is the spillage of pesticide concentrates that could enter local waterways. Such an occurrence is not only environmentally unacceptable, but will also reinforce any community perceptions of golf courses being environmental polluters.

Washdown facilities are recommended to be separate from spray tank filling facilities to reduce the likelihood of a spill from mixing pesticides or filling or cleaning spray tanks and equipment lines. If such activities were conducted on the machinery washdown facility loading, it could lead to pesticide contamination of the greater volume of washdown water and render that waste water to be hazardous waste. Factors to consider when designing such a machinery washdown facility are listed below.

GENERAL CONSIDERATIONS FOR A MACHINERY WASHDOWN FACILITY

- The likely composition and volume of the wastewater.
- Characteristics of the local environment (e.g. natural surface and ground waters, endangered species and their habitats, remnant vegetation, adjacent land uses), that may be at risk from any releases or will receive any current or proposed stormwater or other discharges that have been appropriately treated.
- Legislative requirements including preventing water pollution (*POEO Act*).
- Installation and maintenance costs.
- Sufficient containment area/holding pit for washdown water.
- Collection and storage facility for washdown water for current or future use.
- Screen and settling pit fitted to trap solids such as soil and grass clippings.
- Interceptor pits to remove grease and oil.
- Facility to treat wastewater to reduce biological oxygen demand.
- Facility to reuse wastewater on site for irrigating turf areas (If appropriate and compliant with environmental and public health requirements).
- Water quality that meets requirements for approval of local sewage service provider for disposal of treated wastewater to sewer (if wastewater is to be disposed of in this manner).
- Regular cleaning and servicing of facility.
- Regular testing of wastewater and treated water to check treatment effectiveness.

Discharge to sewer as trade waste

In NSW, trade waste is controlled either under the legislation of the local water authority (e.g. Sydney Water) or, when a council is the water authority, under the *Local Government Act* and Regulations.

Council or the water authority sets the conditions under which trade waste may be discharged into the sewer:

- by setting charges for the collection, disposal and treatment; and
- by instituting trade waste permits, administration and inspection procedures

It is possible for wastewater to be discharged as trade waste to the sewer providing it meets the controlling authority's sewer admission limits. This often involves storing the wash water in a tank, to be discharged in a batch to the sewer once it has been tested by the sewerage authority.

Trade waste may be accepted into the sewerage system if it complies with council's or the water authority's requirements and only under the terms and conditions of a council trade waste permit/agreement. The permit controls the quality and quantity of trade waste, allowing it to be transported without having any adverse effects on the sewerage system, wastewater purification process, the safety of the workers or the environment. Wherever trade waste is generated, the property owner must apply to council or water authority on a prescribed form for a permit/agreement that allows the discharge of trade waste. A trade waste permit/agreement will have standard conditions as well as specific requirements for the particular demands of the activity. The agreement is negotiated on a case-by-case basis.

If a trade waste discharge is to be considered, it is important that the waste stream is analysed for the various contaminants that can be in the waste stream. Each council or water authority is responsible for setting its own limits and needs to be consulted locally for requirements.

During the compilation of this manual there were several site visits undertaken to inspect suitable washdown and storage facilities including Avondale GC, Camden Lakeside GC and Nelson Bay GC. The general set up of these washdown facilities was as follows:

- A concrete pad that slopes inwards towards a central pit. The design is such that all washdown water is contained and that no stormwater can enter the facility (the washdown pad is roofed to prevent rainwater entering).
- The water enters a pit in which there is a mesh screen to catch grass clippings. An appropriate lifting device (e.g. a gantry lift) is often needed to remove the grass screen as it can become very heavy.
- Water passes through the grass screen and then through a sand/silt trap to trap all soil particles.
- Water is then pumped through a triple interceptor pit to separate the oil/grease from the water.
- The clean water is then discharged to the sewer or other approved location. It may be possible to filter the water through a constructed wetland or to irrigate adjacent turf or garden areas.

- Most facilities minimize the amount of debris (grass, soil etc.) by dry blowing the machines before washing.
- The washdown facility is only used for washing machinery and not for pesticide mixing, filling or emptying spray tanks, or cleaning pesticide containers, spray tanks or spray equipment lines.

In terms of the size of the washdown facility, the minimum area would need to be adequate for taking the largest machine. At golf courses with larger numbers of machines it will be necessary to set up the facility so that multiple machines can be washed at the same time. This is important in ensuring that staff are not waiting unnecessarily until they can access the washdown facility. Beard (2002) recommends that there be 37–84 square metres allocated for equipment cleaning. (The minimum dimensions suggested are 6 x 6 metres with 9 x 9 metres preferred).

4.6 WASTE MANAGEMENT

4.6.1 Pesticide waste and pesticide container waste

It is best to not generate pesticide waste in the first place. This starts by ensuring that pesticides are only purchased that will be used within the year.

ChemClear is an industry-run and industry-funded scheme to collect and manage future agricultural chemical wastes. The scheme will provide for the collection and destruction of rural chemicals, (i.e. pesticides used on farms, forestry, or for pest or weed control on public, industrial and recreational land). Industry has advised that it will operate a pilot *ChemClear* chemical collection in NSW in 2003, and commence full-scale operation in 2004. More information can be obtained on *ChemClear* by contacting Agsafe, the chemical industry body that is managing the scheme, on: (02) 6230 4799.

In the absence of *ChemClear*, there are licensed hazardous waste contractors who will remove pesticide waste for disposal at a cost. The cost of such disposal is a strong incentive to manage the pesticide so that waste is not generated.

Pesticide containers should be triple or pressure rinsed after the container is emptied by being poured into the spray tank. This cleans the containers so that they are eligible for *drum*Muster, which is a national scheme for the collection and recycling of chemical containers. This program is funded by a levy of 4 cents per litre/kilogram of products sold in chemical containers over 1 litre/kilogram in content that are not otherwise returnable.

Such appropriately rinsed containers should be stored in a safe place pending delivery to *drum*Muster collection centres on designated collection days.

More information can be obtained from the drumMuster website, www.drummuster.com.au or contact drumMuster on (02) 6230 6712 and from Agsafe-accredited resellers.

4.6.2 Pesticide rinsate waste

Pesticide rinsates can be generated from the rinsing of emptied pesticide containers and the washing out of spray tanks and spray equipment lines. The production and disposal of rinsates is of the greatest concern as this will potentially contain a range of contaminants.

Given the range of pesticide products and the range of chemicals and their different degradation pathways, it is recommended that advice be sought from the manufacturer of each chemical product on the appropriate methods for managing the waste from their products. It is not an option to discharge pesticides into the sewer. Pesticides will inhibit biological sewage treatment systems which can be problematic where biological treatment systems are used to treat domestic sewage and trade waste.

Burte (2000) has described several disposal methods that can be used including:

- **Evaporation pit:** relies on evaporation and UV degradation to degrade the pesticides in the rinsate. It is constructed with an impervious liner (e.g. HDPE). This has the potential to be a relatively unsightly and untidy facility and is the least preferred option.
- **Biodegradation:** some biological systems that use microbial action to treat pesticide residues are available. Other systems use UV degradation and composting to manage the waste. This facility requires an impervious surface, and must be roofed, and include a means of leachate collection. The final system uses only a compost heap to degrade the wash waters.
- **Rinsate spraying:** Rinsate spraying involves applying the rinsate water at no greater than the label rates and in accordance with label directions. The following points must be considered:
  - A large area is required to dispose of the rinsate, e.g. practice fairway. This allows maximum uptake and degradation of the pesticide.
  - As this is effectively pesticide use, records must be kept.
  - Rinsate must not be applied to saturated soils.
  - Soils ideally would have a high organic matter content to ensure maximum uptake and degradation of the pesticide.
  - A sampling program is recommended to ensure that there is no accumulation of pesticides in soils and groundwater. The process of disposing of rinsates is time-consuming. In fact, it may take longer than the application of the pesticide.
- **Rinsate as batch make-up water:** The use of rinsate water from previous sprayings is recommended by the DECC and the pesticide product label directions specify the rinsate that can be added to the next spray mix. The rinsate water is stored in individual containers in a bunded area to be used as batch make-up water when the pesticide is next used. Issues to consider using this procedure are:
  - Ensuring that the concentration of pesticide does not exceed the label rate.
  - Possible degradation of the product in storage and its effects on the new batch.
  - Amount of management required to ensure safe storage and handling.

CONSIDERATIONS FOR GOLF COURSES WHO WISH TO DISPOSE OF TRADE WASTE

- Identify waste streams
- Describe treatment facility (plans etc.)
- Demonstrate waste minimisation strategies including reuse and recycling
- Include analysis results for wastes generated
- Determine volume of waste
- Obtain and submit appropriate application forms
- Have a written waste management plan
- Have a staff training program for the operation of the treatment facility.

The specific requirements for each individual council must be established as part of the planning process.

4.7 DECIDING ON HOW TO DISPOSE OF WASTE GENERATED AROUND MAINTENANCE FACILITIES

In keeping with the philosophy of cleaner production, the overall approach should be to focus on eliminating waste rather than on how to dispose of the waste. Whenever an activity generates wastes, a decision must be made on how to eliminate or reduce the generation of such waste in future, what opportunities are available for on-site reuse or recycling, whether and how the waste will be treated, how extensive any treatment will be and where the treated or untreated waste will be disposed of.

Some waste can be pre-treated and disposed of as trade waste. This will often require investment in new technology and a change in management procedures. For washdown facilities, the best practice design is a facility that enables recycling of pesticide wash waters without generating secondary waste streams that are extremely hard and costly to manage (Burte 2000).

On more sophisticated facilities, sand and activated carbon filters are used to remove particulate matter and pesticides but the filters themselves will then require disposal as hazardous waste. It is also important to have a written management plan for the facility. The following checklist (Table 4.1) can be used as a guide in determining waste streams and options for treatment.

TABLE 4.1: Checklist — Waste Streams and Options for Treatment

	Grease, oils etc.	Grass clippings	Wastewater from machinery washdown bay	Wastewater from spray tank filling facility	Rinsate from pesticide spraying	Pesticide waste	Pesticide container waste
1. What wastes are generated?							
2. Quantity of waste currently stored?							
3. Where is waste currently stored?							
4. How is waste disposed of?							
5. Options • use on site • trade waste pick-up • recycle • compost • treat/discharge on site • licensed trade waste disposal • Industry scheme drumMUSTER, ChemClear.							

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