ATTACHMENT "A" (CONTINUED)

Maintenance Checklist for Control Structure/Flow Restrictor (structure that controls rate at which water exits facility)

Frequency	Drainage Systems Feature	✓	Problem	Conditions To Check For	Conditions That Should Exist
M	Structure		Trash & debris (includes sediment)	Distance between debris buildup and bottom of orifice plate is less than 1½ feet.	All trash and debris removed.
A			Structural damage	Structure is not securely attached to manhole wall and outlet pipe structure should support at least 1,000 pounds of up or down pressure.	Structure securely attached to wall and outlet pipe.
A				Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
A				Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are watertight; structure repaired or replaced and works as designed.
M				Any holes--other than designed holes--in the structure.	Structure has no holes other than designed holes.
M,S	Cleanout gate		Damaged or missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
A				Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
M,S				Chain leading to gate is missing or damaged.	Chain is in place and works as designed.
A				Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
M,S			Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
M,S	Overflow pipe		Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.

If you are unsure whether a problem exists, please contact the Jurisdiction and ask for technical assistance.

Comments:

Key

A = Annual (March or April preferred)
M = Monthly (see schedule)
S = After major storms

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ATTACHMENT "A": MAINTENANCE PROGRAM

Maintenance Checklist for Closed Detention Systems (Pipes/Tanks)

Frequency	Drainage Systems Feature	✓	Problem	Conditions To Check For	Conditions That Shall Exist
M	Storage area (pipe tank)		Plugged air vents (small pipe that connects catch basin to storage pipe)	One-half of the end area of a vent is blocked at any point with debris and sediment. Plugged vent can cause storage area to collapse.	Vents free of debris and sediment.
M			Debris and sediment	Accumulated sediment depth exceeds 15% of diameter. Example: 72-inch storage tank would require cleaning when sediment reaches depth of 10 inches.	All sediment and debris removed from storage area. Contact City Public Works for guidance on sediment removal and disposal.
A			Joints between tank/pipe section	Any crack allowing material to leak into facility.	All joints between tank/pipe sections are sealed.
A			Tank/pipe bent out of shape	Any part of tank/pipe is noticeably bent out of shape.	Tank/pipe repaired or replaced to design. Contact a professional engineer for evaluation.
M,S	Manhole		Cover not in place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
A			Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2-inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
A			Cover difficult to remove	One Maintenance person cannot remove lid after applying 80 pounds of lift. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
A			Ladder rungs unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks.	Ladder meets design standards and allows maintenance persons safe access.

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ATTACHMENT "A" (CONTINUED)

Maintenance Checklist for Conveyance Systems (Pipes, Ditches, and Swales)

Frequency	Drainage System Feature	✓	Problem	Conditions to Check For	Conditions That Should Exist
M,S	Pipes		Sediment & debris	Accumulated sediment that exceeds 20% of the diameter of the pipe.	Pipe cleaned of all sediment and debris.
M			Vegetation	Vegetation that reduces free movement of water through pipes.	All vegetation removed so water flows freely through pipes.
A			Damaged (rusted, bent, or crushed)	Protective coating is damaged; rust is causing more than 50% deterioration to any part of pipe.	Pipe repaired or replaced.
M				Any dent that significantly impedes flow (i.e., decreases the cross section area of pipe by more than 20%).	Pipe repaired or replaced.
M				Pipe has major cracks or tears allowing groundwater leakage.	Pipe repaired or replaced.
M,S	Open ditches		Trash & debris	Dumping of yard wastes such as grass clippings and branches into basin. Unsightly accumulation of non-degradable materials such as glass, plastic, metal, foam, and coated paper.	Remove trash and debris and dispose as prescribed by City Waste Management Section.
M			Sediment buildup	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned of all sediment and debris so that it matches design.
A			Vegetation	Vegetation (e.g., weedy shrubs or saplings) that reduces free movements of water through ditches.	Water flows freely through ditches. Grassy vegetation should be left alone.
M			Erosion damage to slopes	See Ponds Checklist.	See Ponds Checklist.
A			Rock lining out of place or missing (if applicable)	Maintenance person can see native soil beneath the rock lining.	Replace rocks to design standard.
Varies	Catch basins			See Catch Basins Checklist.	See Catch Basins Checklist.
M,S	Swales		Trash & debris	See above for Ditches.	See above for Ditches.
M			Sediment buildup	See above for Ditches.	Vegetation may need to be replanted after cleaning.
M			Vegetation not growing or overgrown	Grass cover is sparse and weedy or areas are overgrown with woody vegetation.	Aerate soils and reseed and mulch bare areas. Maintain grass height at a minimum of 6 inches for best stormwater treatment. Remove woody growth, recontour, and reseed as necessary.
M,S			Erosion damage to slopes	See Ponds Checklist.	See Ponds Checklist.
M			Conversion by homeowner to incompatible use	Swale has been filled in or blocked by shed, woodpile, shrubbery, etc.	If possible, speak with homeowner and request that swale area be restored. Contact City to report problem if not rectified voluntarily.
A			Swale does not drain	Water stands in swale or flow velocity is very slow. Stagnation occurs.	A survey may be needed to check grades. Grades need to be in 1-5% range if possible. If grade is less than 1%, underdrains may need to be installed.

If you are unsure whether a problem exists, please contact the Jurisdiction and ask for technical assistance.
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ATTACHMENT "A" (CONTINUED)

Maintenance Checklist for Energy Dissipators

Frequency	Drainage System Feature	✓	Problem	Conditions to Check For	Conditions That Should Exist
A	Rock pad		Missing or moved rock	Only one layer of rock exists above native soil in area 5 square feet or larger, or any exposure of native soil.	Replace rocks to design standard.
A	Rock-filled trench for discharge from pond		Missing or moved rock	Trench is not full of rock.	Add large rock (±30 lb. each) so that rock is visible above edge of trench.
M	Dispersion trench		Pipe plugged with sediment	Accumulated sediment that exceeds 20% of the design depth.	Pipe cleaned/flushed.
M			Perforations plugged	Over 1/2 of perforations in pipe are plugged with debris and sediment.	Clean or replace perforated pipe.
M,S			Not discharging water property	Visual evidence of water discharging at concentrated points along trench (normal condition is a "sheet flow" of water along trench). Intent is to prevent erosion damage.	Trench must be redesigned or rebuilt to standard. Elevation of lip of trench should be the same (flat) at all points.
M,S			Water flows out top of "distributor" catch basin	Maintenance person observes water flowing out during any storm less than the design storm or it is causing or appears likely to cause damage.	Facility must be rebuilt or redesigned to standards. Pipe is probably plugged or damaged and needs replacement.
M,S			Receiving area over-saturated	Water in receiving area is causing or has potential of causing landslide.	Stabilize slope with grass or other vegetation, or rock if condition is severe.

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ATTACHMENT "A" (CONTINUED)

Maintenance Checklist for Fencing/Shrubbery Screen/Other Landscaping

Frequency	Drainage System Feature	✓	Problem	Conditions to Check For	Conditions That Should Exist
M	General		Missing or broken parts/dead shrubbery	Any defect in the fence or screen that permits easy entry to a facility.	Fence is mended or shrubs replaced to form a solid barrier to entry.
M,S			Erosion	Erosion has resulted in an opening under a fence that allows entry by people or pets.	Replace soil under fence so that no opening exceeds 4 inches in height.
M			Unruly vegetation	Shrubbery is growing out of control or is infested with weeds	Shrubbery is trimmed and weeded to provide appealing aesthetics. Do not use chemicals to control weeds.
A	Wire Fences		Damaged parts	Posts out of plumb more than 6 inches.	Posts plumb to within 1½ inches of plumb.
A				Top rails bent more than 6 inches.	Top rail free of bends greater than 1 inch.
A				Any part of fence (including posts, top rails, and fabric) more than 1 foot out of design alignment.	Fence is aligned and meets design standards.
A				Missing or loose tension wire.	Tension wire in place and holding fabric
A				Missing or loose barbed wire that is sagging more than 2½ inches between posts.	Barbed wire in place with less than 3/4-inch sag between posts.
A				Extension arm missing, broken, or bent out of shape more than 1½ inches.	Extension arm in place with no bends larger than 3/4 inch.
A			Deteriorated paint or protective coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.	Structurally adequate posts or parts with a uniform protective coating.
M			Openings in fabric	Openings in fabric are such that an 8-inch-diameter ball could fit through.	No openings in fabric.

If you are unsure whether a problem exists, please contact the Jurisdiction and ask for technical assistance.

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ATTACHMENT "A" (CONTINUED)

Maintenance Checklist for Gates

Frequency	Drainage System Feature	✓	Problem	Conditions to Check For	Conditions That Should Exist
M	General		Damaged or missing components	Gate is broken, jammed, or missing.	Pond has a functioning gate to allow entry of people and maintenance equipment such as mowers and backhoes. If a lock is used, make sure City Stormwater Section field staff have a key.
M				Broken or missing hinges such that gate cannot be easily opened and closed by a maintenance person.	Hinges intact and lubed. Gate is working freely.
A				Gate is out of plumb more than 6 inches and more than 1 foot out of design alignment.	Gate is aligned and vertical.
A				Missing stretcher bar, stretcher bands, and ties.	Stretcher bar, bands, and ties in place.

If you are unsure whether a problem exists, please contact the Jurisdiction and ask for technical assistance.

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ATTACHMENT "A" (CONTINUED)

Maintenance Checklist for Infiltration Systems

Frequency	Drainage System Feature	✓	Problem	Conditions to Check For	Conditions That Should Exist
M,S	General		Trash & debris buildup in pond	See Maintenance Checklist for Ponds.	See Maintenance Checklist for Ponds.
M			Poisonous vegetation	See Maintenance Checklist for Ponds.	See Maintenance Checklist for Ponds.
M,S			Fire hazard or pollution	See Maintenance Checklist for Ponds.	See Maintenance Checklist for Ponds.
M			Vegetation not growing or is overgrown	See Maintenance Checklist for Ponds.	See Maintenance Checklist for Ponds.
M			Rodent holes	See Maintenance Checklist for Ponds.	See Maintenance Checklist for Ponds.
M			Insects	See Maintenance Checklist for Ponds.	See Maintenance Checklist for Ponds.
A	Storage area		Sediment buildup in system	A soil texture test indicates facility is not working at its designed capabilities or was incorrectly designed.	Sediment is removed and/or facility is cleaned so that infiltration system works according to design. A sediment trapping area is installed to reduce sediment transport into infiltration area.
A			Storage area drains slowly (more than 48 hours) or overflows	A soil texture test indicates facility is not working at its designed capabilities or was incorrectly designed.	Additional volume is added through excavation to provide needed storage. Soil is aerated and rototilled to improve drainage. Contact the City for information on its requirements regarding excavation.
M			Sediment trapping area	Any sediment and debris filling area to 10% of depth from sump bottom to bottom of outlet pipe or obstructing flow into the connector pipe.	Clean out sump to design depth.
One Time			Sediment trapping area not present	Stormwater enters infiltration area directly without treatment.	Add a trapping area by constructing a sump for settling of solids. Segregate settling area from rest of facility. Contact City for guidance.
M	Rock filters		Sediment and debris	By visual inspection little or no water flows through filter during heavy rain storms.	Replace gravel in rock filter.

If you are unsure whether a problem exists, please contact the Jurisdiction and ask for technical assistance.

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ATTACHMENT "B"

RESIDENTIAL BEST MANAGEMENT PRACTICES

July, 1992

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RESIDENTIAL BEST MANAGEMENT PRACTICES

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PURPOSE

Many products and practices commonly used in and around our houses are hazardous to both ourselves and the environment. The purpose of this chapter is to give alternatives, where possible, for those types of products and practices. There are two categories of BMPs in this chapter. The first category of BMPs includes "good housekeeping" practices that everyone should use. The second category of BMPs deals with erosion and pollution control practices for people who raise large animals.

RECOMMENDED POLLUTION CONTROL PRACTICES FOR HOMEOWNERS

It has been said that the average home today contains more chemicals than the average chemical lab of 100 years ago. When many of these chemicals are used industrially, they can be subject to various health and safety standards; yet these same substances are used freely and often carelessly in homes across the nation.

The BMPs in this section are divided into four categories: Household Hazardous Wastes, Pesticides, Remodeling, and Septic Maintenance. Each section includes information on available alternatives.

Household hazardous wastes

Many of the cleaning agents, solvents, polishes, etc. used commonly in the home are considered hazardous wastes. These products may be toxic, corrosive, reactive, flammable, and/or carcinogenic. It is critical that these products are disposed of properly. A list of some common household hazardous wastes is presented in Table 1.

In addition, many hazardous household chemicals persist for long periods of time in the environment. Manufacturers may truthfully state that a product is "biodegradable"; most products are biodegradable, but what is important is the rate at which they are broken down and the products they are broken down into. The term "biodegradable" on its own is thus rather meaningless unless the product is rapidly degraded into harmless breakdown products.

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It is important to note here that the term "biodegradable" currently has no legal definition in this state. This means that any product can use this term according to the manufacturer's own definition. This definition may not be at all similar to the consumer's perception.

Household product management

1. Buy only those detergents that contain little or no phosphorus. Phosphorus can cause algae blooms if it is washed into lakes, streams, bays or from septic systems into ground water. Most detergents which are low or phosphate free are labeled as such.

2. Use only the manufacturer's suggested amount of any cleaner. More is not necessarily better.

3. Products such as oven cleaner, floor wax, furniture polish, drain cleaners, and spot removers often contain chemicals that are toxic. Buy the least toxic product available, and use a non-toxic substitute if one can be found. Ovens, for example can be cleaned by applying table salt to spills, then scrubbing with a solution of washing soda and water. Table 2 lists some substitutes for commonly used household cleaners.

   If it is necessary to use a product that contains toxic chemicals, then use the product only as directed. Do not combine products, as they may become more dangerous when mixed (such as chlorine bleach and ammonia). Use protective clothing and rubber gloves.

   Contact the Hazardous Substance Hotline at 1-800-633-7585 if you have any questions regarding how to dispose of a product or empty container. Many areas now have either hazardous waste collection days, or permanent facilities where residents can bring hazardous wastes. Call your county's environmental health department for further information.

4. Chemicals left over from such hobbies as photography are hazardous and should not be flushed down the sink. This is especially important if your home is hooked up to a septic system. Toxic chemicals can kill the bacteria in the tank that treat sewage.

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5. Buy toxic products in small quantities. If you cannot use all of the product, try to give it away instead of disposing of it.

6. Be sure that the contents of all containers are clearly marked.

7. Common (not automobile) batteries are one of the worst sources of heavy metals found in landfills. Instead of throwing them away, dispose of them at a hazardous waste collection site.

AUTOMOTIVE USAGE, CARE AND MAINTENANCE

1. Cars should be serviced regularly. Any leaky lines or valves should be replaced. Dumping oil, degreasers, antifreeze, and other automotive liquids into a stream or a storm drain is illegal. Do not dump them onto the ground because they will end up in stormwater runoff once it rains. Do not use oil to reduce dust levels on unpaved areas.

2. If possible, recycle used oil and antifreeze. Keep them in separate containers. Call the Recycling Hotline at 1-800-RECYCLE for the location of the nearest recycling center or call your local gas stations.

3. Wrap empty oil or antifreeze containers in several layers of newspaper, tie securely and place in a covered trash can. Antifreeze is sweet-tasting, but poisonous to people, fish, pets and wildlife.

4. Sweep your driveway instead of/or before hosing it down. Many toxicants and heavy metals associated with automobiles can build up on driveway surfaces and be washed into local surface water when driveways are hosed down.

5. When washing vehicles, direct soapsuds onto the lawn or another vegetated area to keep the soap from washing into the local surface water.

6. Small spills of oil and other fluids can be absorbed by using materials such as kitty litter or sawdust. Wrap the used kitty litter and any contaminated soil in a plastic bag and then place it in the garbage. If a spill reaches surface water, you must notify the nearest regional office of the Department of Ecology:

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Northwest Region - Redmond 867-7000 (24-hour)
Southwest Region - Olympia 753-2353 (24-hour)

There are fines for failure to notify the appropriate agency when a spill occurs.

7. Deicing chemicals (most commonly salt) are often used on private sidewalks and driveways during cold winter weather. These chemicals can harm concrete less than three years in age, and burn vegetation. They are also corrosive to cars and other metal objects. Not only are the deicing chemicals pollutants, but the additives are often pollutants as well. Cyanide is formed from the breakdown of a common anti-caking agent used in deicing chemicals.

   Urea salts have been proposed as an alternative to other types of salt deicers, but great care must be used in applying them. These salts contain large quantities of nitrogen, which can severely burn plants if over-applied.

   The use of these chemicals should be minimized or avoided if possible. While deicing chemicals are more effective in removing snow from roads than are grits such as sand, they cause much worse pollution and if used at all should be used in moderation.

SMALL BOAT USAGE, CARE AND MAINTENANCE

1. In narrow creeks and coves boat wakes can contribute to shoreline erosion. To minimize erosion, boats should not produce wakes within 500 feet of shore. A speed greater than 8 knots can cause a wake with great erosive force.

2. When washing a boat, use low phosphate or phosphate free detergent. Using a brush and scrubbing the boat down after each use can minimize the need for washing. When possible, avoid stain-removing products as they are generally toxic.

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Table 1 Hazardous Household Substances List

Repair and Remodeling

1. Adhesives, glues, cements.
2. Roof coatings, sealants.
3. Caulking and sealants.
4. Epoxy resins.
5. Solvent-based paints.
6. Solvents and thinners.
7. Paint removers and strippers.

Cleaning Agents

1. Oven cleaners
2. Degreasers and spot removers
3. Toilet, drain and septic tank cleaners
4. Polishes, waxes and strippers
5. Deck, patio and chimney cleaners
6. Solvent cleaning fluids

Pesticides

1. Insecticides
2. Fungicides
3. Rodenticides
4. Molluscicides
5. Wood preservatives
6. Moss retardants
7. Herbicides
8. Fertilizers

Auto, Boat and Equipment Maintenance

1. Batteries
2. Waxes and cleaners
3. Paints, solvents and thinners
4. Additives
5. Gasoline
6. Flushes
7. Auto repair materials
8. Motor oil
9. Diesel oil
10. Antifreeze

Hobby and Recreation

1. Paints, thinners and solvents
2. Chemicals (photo and pool)
3. Glues and cements
4. Inks and dyes
5. Glazes
6. Chemistry sets
7. Bottled gas
8. White gas
9. Charcoal starter fluid

Miscellaneous

1. Ammunition
2. Asbestos
3. Fireworks

Source: Guidelines for Local Hazardous Waste Planning, Ecology, No. 87-18, 1987.

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Table 2 Non-Toxic or Less Toxic Alternatives to Toxic Products

Hazardous Product	Alternative(s)
Air fresheners	Set out a dish of vinegar or simmer cinnamon and cloves or set out herbal bouquets or potpourri in open dishes or burn scented candles.
Bleach	Borax or oxygen bleaches or reduce bleach by ½ and add ¼ - ½ C. baking soda, or let clothes dry in the sun.
Brass polish	Worcestershire sauce.
Chrome polish	Apple cider vinegar or a paste of baking soda and water or a lemon peel.
Coffee stains	Moist salt paste.
Coffee pot cleaner	Vinegar.
Copper cleaner	Mix lemon juice and salt or use tomato catsup.
Drain cleaner	Use a plunger followed by ½ C. baking soda mixed in ½ C. vinegar. Let sit 15 minutes, pour down 2 qts. boiling water.
Furniture polish	Linseed, olive or almond oils or a mixture of 3 parts olive oil to 1 part white vinegar or a mixture of 1 Tbsp. lemon oil and 1 pint mineral oil.
Garbage disposal deodorizer	Used lemon rind or baking soda.
Glass cleaner	Mix 2 Tbsp. vinegar with 1 quart water.

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Grease remover	Make a paste of borax on a damp cloth.
Ink stain remover	Spray with leftover non-aerosol hairspray before washing.
Laundry soap	Borax, baking soda or washing soda.
Linoleum floor cleaner	1 C. white vinegar in 2 gals. water.
Mildew remover	Equal parts vinegar and salt.
Mothballs	Cedar chips or blocks, or use dried tansy, lavender or peppercorns in drawers and closets.
Oil spills	Kitty litter, sawdust.
Oil stain removal	White chalk rubbed into the stain prior to washing.
Over cleaner	Pour lots of salt on fresh spills and scrape off after the oven cools. A soda water solution will cut grease. Paint ammonia on spills with a paintbrush, then rinse off.
Paint brush softener	Hot vinegar.
Paint/grease remover	Wear gloves or use baby oil.
Paint stripper	Use mechanical sanding instead of chemical strippers.
Pet odor removal	Cider vinegar.
Pitch or sap remover	Butter, margarine or vegetable shortening.
Porcelain stain remover	Baking soda.

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Refrigerator deodorizer	Open box of baking soda.
Rug/carpet cleaner (general)	Use a soap-based non-aerosol rug shampoo, vacuum when dry.
Rug/carpet cleaner (spots)	Pour on club soda or sprinkle cornmeal or cornstarch on the rug, let sit at least 30 mins. then vacuum.
Rust removal	Lemon juice plus salt plus sunlight.
Rusty bolt remover	Carbonated beverage.
Scorch mark remover	Grated onion.
Spot remover	Club soda, lemon juice or salt or rub with a cornstarch paste, brush off when dry.
Scouring powder	Baking soda or a non-chlorine scouring powder.
Silver polish	Soak silver in warm water with 1 Tbsp. soda, 1 Tbsp. salt and a piece of aluminum foil.
Stainless steel polish	Mineral oil.
Toilet bowl cleaner	Past of borax and lemon juice.
Tub and tile cleaner	¼ C. soda and ½ C. white vinegar mixed with warm water.
Upholstery spot remover	Club soda.
Water mark remover	Toothpaste.
Water softener	¼ C. vinegar.

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3. Boat hulls may have been repainted with tributyltin (a paint) to prevent fouling. This type of paint is extremely toxic to marine life. When scraping the boat bottom, catch the scrapings with a drop cloth. Compress the scrapings into as small a can as possible, label the can and turn it in to the nearest household hazardous waste collection center. Repaint the hull using a copper-based paint. Copper-based paints are less toxic (although not non-toxic) to marine life.

PESTICIDES[1] AND FERTILIZERS

Pesticides (such as insecticides and herbicides) and fertilizers are commonly used by homeowners in their quest for bigger, healthier plants. These chemicals are easily overused. Homeowners often do not know just how much fertilizer is necessary in their soil. Often, people assume that more is better. These chemicals are easily introduced into stormwater runoff and can cause algae blooms (fertilizers) or kill off aquatic organisms (pesticides).

Fertilizer management

1. Before fertilizing, test your soil. This can be easily done by using kits that are available, or through tests provided by the County Cooperative Extension office in your area. Use only the recommended amount of fertilizer.

2. Use fertilizers that are appropriate for your area, and for the type of plants you are growing. Work the fertilizer into the soil directly around the plant's drip line. By incorporating the fertilizer into the soil, there will be less likelihood of contaminated runoff.

3. Water before fertilizing. Water enough to dampen the ground thoroughly, but not enough to cause surface runoff.

4. Many soils can benefit from the use of organic fertilizers such as compost or peat. Not only do these substances add nutrients to soil, they also increase the porosity of the soil and increase its ability to hold water.

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[1] As used here, the word pesticide can mean any herbicide, insecticide, rodenticide, miticide or other types of chemicals used in the same manner.

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5. Slow release fertilizers (which are generally resin-coated) can be used in addition to organic fertilizers. They are not mobile in the soil, and are only applied once, which saves work.

Integrated pest management

Rather than bringing out the sprayer whenever a pest infestation occurs in the garden, consider using Integrated Pest Management (also known as IPM). IPM emphasizes the evaluation of all factors including environmental effects before chemicals are applied. Pesticides should only be used as a last resort. IPM maximizes the use of natural pest controls. Some of the tactics that can be used to decrease or eliminate the use of pesticide sprays include:

- Use of Natural Predators, Pathogens: Because sprays generally kill many beneficial insects instead of just the target pest, it may be necessary to introduce natural predators back into the garden. Ladybugs, lacewings, predatory wasps, and nematodes are all commercially available. Garter snakes and toads are also predators and should not be eliminated from the garden.

  There are some bacteria, viruses, and insect parasites that are specific to pests and will not harm other insects or animals. A commonly used bacterium in the Puget Sound area is *Bacillus thuringiensis* (Bt), which is intended to control infestations of tent caterpillars.

- Habitat Changes: Many times a change of habitat can control pest infestations. Removal of old tires can cut down on the mosquito population by removing a convenient water-filled location that they can breed in. Crop rotation, even in a small garden can reduce the number of pest infestations. Removing last year's leaves from under rose bushes can cut down on the incidence of mildew and blackspot, as these fungi overwinter in dead leaves.

- Timing: Crops that can overwinter (such as leeks or carrots) should be planted in the fall. This gives them the time to become established before pests appear in the spring.

- Mechanical: Many eggs, larvae, cocoons, and adult insects can be removed by hand. Be sure that the insect is properly identified prior to removing it so that

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