

Waste Reduction for State Parks

Concepts and Opportunities

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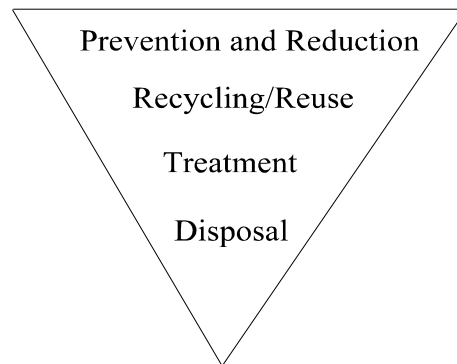
Introduction

State parks are one of the few remaining opportunities for the general public to enjoy the natural environment. Professionals working in the park system know that it's important to keep our parks clean, and free of waste materials. But there is more to keeping parks clean than picking up trash. By examining each of the operations within your own park, you can identify ways for waste to be reduced or eliminated through source reduction. This extra effort can serve as an example of environmental stewardship to park users, make their stay in your park more pleasant and enjoyable, and reduce operating costs.

This guide provides you with background information on solid and hazardous waste material, and provides suggestions on how you can reduce waste. Throughout, there is an emphasis on the term "waste reduction", i.e. all actions taken to reduce the amount and/or toxicity of waste requiring disposal. These include waste prevention or source reduction, recycling, composting, purchasing, and manufacturing goods having recycled content or that are made with less waste.

The U.S. EPA established a hierarchy for waste management that has been adopted by most states. The Pollution Prevention Act of 1990 set a national policy that parallels similar priorities for solid waste management. This system emphasizes source reduction as the most preferable method (at the top of the pyramid), with disposal at the bottom as illustrated below.

POLLUTION PREVENTION HIERARCHY



The first priority is to **reduce waste at the source**, with less material entering the waste stream. This concept has the greatest potential benefit since it directly saves raw materials costs. It also can reduce disposal, treatment, waste handling costs, and extra cost of liability and disposal of hazardous materials.

The familiar concept of **recycling**, along with composting, is a second priority. A waste is still being generated that must be recycled. It is a better resource management choice to recycle the material than to dispose of it at a landfill. However, we still pay at least twice for the recycled material. First, the recycled material is lost raw material that has to be purchased. Then, once it becomes a recyclable waste stream item, there is additional waste handling cost.

Treatment is a third priority related particularly to hazardous wastes. This approach is taken in conjunction with pollution control technologies. Incineration, treatment of sewer discharges, and chemical treatments are included. With solid waste, incineration for energy recovery would be at the same priority level.

The lowest priority is **disposal** of the final waste stream. This is the most expensive way to use our natural resources.

Benefits of Waste Reduction

A Cleaner Environment - Eliminating the need for hazardous materials is a goal we all share. By striving to use the least toxic alternative, and to conserve natural resources as much as possible, we all enjoy the benefits of a cleaner environment.

Reduced Regulatory Burden - Implementing waste reduction projects can reduce regulatory exposure, and may eliminate the need for permits, manifesting, monitoring, and reporting. The paperwork burden related to regulated waste streams is costly, often requiring a full staff position.

Reduced Operating Costs - Over time, waste reduction activities can save offsetting the cost of project development and implementation. The cost savings may be immediate or anticipated, based on avoiding future costs. Lower operating costs can result from lower disposal costs, reduced materials costs, and improved operating efficiency.

Reduced Exposure to Liability - Disposing of hazardous waste can carry long-term liability for environmental damages when a failed disposal system allows materials to enter the environment. Litigation and remediation related to environmental damages can extend well into the future. This is even true for some materials that may not be currently regulated as hazardous.

Improved Safety - Reducing toxics and hazardous materials in the workplace has a direct, positive impact on a safe work environment. There is a direct relationship between workers' compensation costs and risks, and the amount and toxicity of hazardous materials used and produced in the workplace. Reducing the potential for leaks, spills, or other releases can reduce the exposure of workers, visitors, contractors, or others in the park.

Environmental Regulations

If There are Wastes, There are Regulations - A good rule of thumb is that if any waste is generated, it is likely to be subject to an environmental regulation. The most obvious wastes subject to regulation are hazardous wastes, air emissions, sewer discharges, and solid wastes. For each of these wastes, there are a number of regulations at the local, state, and federal level.

The more dangerous the material is to the environment or human health, the more complex the regulations. Hazardous materials resulting in hazardous waste, are regulated in terms of shipping or transport, storage and labeling, employee exposure, treatment and disposal, and long-term liability. Solid wastes that have little apparent environmental hazard may still be regulated. Certain recyclable materials, for example, cannot go to a landfill. Trash that must go to a landfill cannot be disposed of or burned on-site. In special cases, materials such as waste wood or waste oil may be used as an on-site energy source.

Types of Wastes Which May Be Regulated- You must be aware of your responsibilities for proper disposal of your waste materials. This section provides information to help you determine if disposal of your waste materials is regulated by state and/or federal agencies. Understanding and correctly interpreting waste regulations can be difficult and confusing. The following list specifies the types of waste which may be subject to federal and/or state regulations. Note that for regulatory purposes these definitions may vary from state to state.

Solid Waste: Solid waste generally refers to any garbage, refuse, sludge, and other discarded or salvageable material, including solid, liquid, semisolid or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities. This does not include solids or dissolved materials in domestic sewage, dissolved or suspended solids in industrial waste water effluent, or other common water pollutants. Typical solid wastes include: paper; wood; yard debris; food wastes; plastics; leather; rubber and other combustibles; and noncombustible materials such as glass and rock.

Note: Wastes that are "solid" in their physical state are not always considered "solid wastes" from a regulatory standpoint. If a waste conforms to the above definition *and* is not considered to be hazardous (i.e. is not listed by the EPA as hazardous or doesn't have hazardous characteristics, as detailed below), then it can be categorized as a solid waste.

Hazardous Waste: Hazardous waste is any *solid waste* (see above) which is defined as hazardous. A solid waste is defined as hazardous if it is either listed as hazardous by the EPA or a state's regulatory agency; or has hazardous characteristics.

The EPA-issued hazardous wastes lists include: wastes generated by non-specific sources (e.g. spent halogenated solvents); wastes generated by specific sources (e.g., distillation bottoms from the production of acetaldehyde from ethylene); acutely hazardous commercial chemical products and manufacturing chemical intermediates which may be hazardous under certain conditions; and toxic commercial chemical and manufacturing chemical intermediates which may be hazardous in certain circumstances.

The criteria for determining whether a solid waste has hazardous characteristics include: ignitability (e.g. flash point less than 140° F); corrosivity (e.g. pH less than 2 or greater than 12.5); reactivity (e.g., reacts violently with water, normally unstable, generates toxic fumes, etc.); and toxicity (e.g. as determined by the "TCLP" laboratory test). Typical hazardous wastes include: mineral spirits; 1,1,1-Trichloroethane; toluene; xylene; methylene chloride; perchloroethylene; spent cyanide plating, cleaning and bath solutions; waste treatment sludge; spent cyanide heat treating bath solutions; and metalworking quenching waste waters.

Mixed/Contaminated Waste: Mixed/contaminated waste refers to (non-hazardous) solid waste which has been mixed with, or contaminated by, a hazardous waste or substance. Typical mixed/contaminated wastes: used motor oil, used engine coolant, paint booth filters, and empty containers

Note: If a solid waste is mixed with (or contaminated by) a "characteristic" hazardous waste it is considered hazardous only if the resulting mixture retains the hazardous characteristic. A mixture of a "listed" hazardous waste with a non-hazardous solid waste is generally considered hazardous unless certain specific criteria can be met.

Air Emissions: Air emissions refer to the release or discharge of a pollutant into the ambient air either by means of a stack, or as a fugitive dust, mist or vapor as a result inherent to the manufacturing or formulating process. Typical air emissions include: overspray and drying from painting or coating operations; evaporating solvents from parts cleaning/degreasing operations; perchloroethylene from dry cleaning operations; and aerosols containing ozone depleting compounds.

Wastewater Discharge: Wastewater discharge refers to any direct discharge of a pollutant from a "point source" (i.e. an identifiable source such as a pipe, ditch, or outfall) to surface waters, groundwaters, such as through septic systems, or to a publicly owned treatment plant (POTW). Typical wastewater discharges include: wastewater from vehicle washing operations; wastewater from food processing; spent aqueous cleaning solutions; industrial process waste waters; and boat sewage discharge.

Note: The term "pollutant" is very broadly defined and even includes heat from noncontact cooling water. Pollutants are generally characterized as either 1) "conventional," which includes such things as total suspended solids (TSS), biochemical oxygen demand (BOD), phosphorus, oil and grease, or 2) "toxic," which consists of various chemicals or chemical compounds which have toxic effects on human health, wildlife, fish or aquatic life.

Storm Water Runoff/Discharge: Storm water runoff refers to water from rainfall and snow melt that runs off buildings, sidewalks, etc., and flows over the ground surface returning to a water body, potentially collecting pollutants from air and/or land along the way. As the runoff "leaves" a particular site it is considered (for regulatory purposes) "storm water discharge." Typical storm water runoff /discharge pollutants include: oil and grease from vehicle maintenance; sediments from construction sites; pesticides from grounds keeping activities; detergents from vehicle washing; and hazardous liquids from leaking above-ground storage tanks.

Other Regulatory Concerns

Hazardous Substances: The term "hazardous substance" usually means any substance or combination of substances which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or which may pose a substantial present or potential hazard to human health or the environment because of its quantity, concentration, physical, chemical, or infectious characteristics. This term includes, but is not limited to, substances which are toxic, corrosive, flammable, irritants, strong sensitizers, or explosives as determined by a regulatory agency.

Underground Storage Tanks (USTs): An underground tank is generally defined as a tank and any associated pipes having 10 percent of its volume or more beneath the surface of the ground. USTs containing petroleum products or hazardous substances. Exceptions often include: farm or residential tanks of 1,100 gallons or less used for storing motor fuel for noncommercial purposes; tanks used for the storage of heating oil for consumptive use on the premises where stored; certain pipeline facilities; surface impoundments, pits, ponds or lagoons; storm water or wastewater collection systems; liquid traps or gathering lines related to oil or gas production; and storage tanks situated in an enclosed underground area such as a basement.

Note: See the glossary at the end of this guidebook for definitions of waste related terminology

The two waste categories most impacted by regulations are material waste and energy. Material waste is often classified by the nature of material and by the environmental medium into which it is released. The table below lists some material wastes and their potential fate in terms of the environmental medium that could receive the waste:

WASTE TYPE	AIR	LAND	WATER
Solid waste	Incineration	Landfill	Landfill leaks
Hazardous waste	Incineration	Hazardous waste landfill	Leaks/Spills
Sewered waste discharge			Direct
Smoke stacks	Direct discharge	Landfill	Precipitation
Fugitive emissions	Direct discharge		Precipitation

Although a particular waste stream may be intended for one environmental medium, it often ends up in another. This is why the U.S. EPA and state regulatory agencies are emphasizing multimedia pollution prevention. The emphasis is to reduce or eliminate waste without transferring the problem between mediums.

Energy consumption -Like material use, energy use can potentially generate many waste areas. Companies use energy in different forms, and like material use, it can be easy to miss energy-saving opportunities. For example, the bicycle manufacturer may use electricity and gas, the two most common energy sources. Some companies use coal, fuel oil, waste oil, wood, or diesel generators.

Lighting, building heating, process machinery, paint drying, and parts cleaning are all energy consumers and are possible waste energy sources. Companies can commonly save on energy by using more efficient lighting, heating, machinery motors, and heat recovery and reuse in processes or for building heat. Sometimes a waste reduction or prevention project results in using a technology that requires more energy. In that case, the company needs to decide what makes the most sense in terms of net cost and company priorities.

Reducing Waste

The focus here is primarily source reduction. Where options can be identified, this strategy invariably is the most cost efficient. Although recycling has sometimes been included in waste reduction discussions, recycling does not reduce the amount of waste generated on-site. Recycling does reduce the amount of waste going to landfills.

There are many cost savings examples related to waste reduction. However, it can be difficult to start projects and try to implement change in a company that is not enthusiastic about waste reduction as an important part of its business strategy. Changing old habits can be a significant hurdle, even when management and staff have shown an initial interest.

Set Priorities - Identifying options often means finding some initial opportunities that will have an obvious positive impact. This will likely gain the support of employees and management. Priority projects should meet one or more of the following criteria:

- Easy to identify and implement.
- Requires low capital investment;
- Offers a positive public image;
- Improves safety for employees;
- Reduces the regulatory burden;
- Reduces a large volume of waste;
- Lowers energy consumption; and/or
- Reduces the use of toxic or hazardous materials.

Buy only the amount and type of product needed for the job- Source reduction begins when assessing materials or equipment to be purchased. A few basic tips include buying only the amount of product needed, buying durable goods that can be repaired and maintained, and reducing or eliminating the use of toxic materials. The purchasing agent or buyer is very important in helping the business identify material and equipment sources to achieve these goals.

This strategy is often sidetracked by marketing or pricing schemes that encourage the buyer to get a larger volume of material at a lower price per unit volume. The high volume purchase promotion is a good buy if all of the product can be used. It becomes a bad deal when there is significant unused product that becomes a waste after the job is completed. Good examples of the volume purchase traps include paints, occasional use cleaning products, and industrial solvents. If three gallons will do the job, don't buy the five gallon pail.

Reduce toxicity of materials - This opportunity can be found in many operations. Material substitution is an option for reducing material toxicity or hazardous waste generation, and can be one of the most significant opportunities, whether it is finding non-toxic cleaning solutions for building maintenance, or non-solvent based cleaners for part cleaning.

Packaging reduction is a common manufacturing and retail business opportunity. While many forms of packing create a solid waste, reducing packaging costs can save in several ways. Since packaging does not add to product value, reduced packaging saves the manufacturer in terms of product cost and also saves the consumer money. For example, a maker of small auto parts was shipping parts in Gaylord boxes. The boxes were closed and mounted on wooden pallets with steel banding. This created three solid wastes for the customers, and the company had to continually buy the packaging materials. It switched to a plastic, returnable pallet. After the initial investment, the company eliminated the cost of buying disposable packaging.

Reuse of products or materials is often possible, even when products are designed for single use. Office paper is a very large volume waste stream that can be reduced by reusing the back side of papers for draft materials or creating note papers. Boxes can be sent to corrugated manufacturers for recycling, but often can be reused before being recycled.

Durable goods should be repaired and reused whenever possible. Products designed for single use that cannot be easily repaired should be avoided. For example, toner cartridges are increasingly being reclaimed and reused in offices. Equipment and tools requiring rechargeable batteries should be easily serviceable, ensuring that batteries can be replaced when no longer usable. Products designed to discourage service or repair should be avoided.

Good housekeeping practices are effective in reducing waste and preventing costly repairs. Properly maintenance will be least wasteful and will provide better operation. Whether it is an office copy machine or a widget machine, good maintenance is essential. Machines poorly maintained develop leaks that become waste problems in terms of clean up costs and replacing lost product or material.

Employee training and involvement is key. Office staff have numerous opportunities to reduce paper use, recycle materials, use returnable toner cartridges, use more computer communications and records, and make sure that equipment undergoes routine maintenance. Giving employees a chance to share their waste reduction ideas is virtually a zero-cost opportunity that can reap great benefits.

Waste Reduction Tips

This section of the guide provides suggestions for waste reduction for a variety of common operations found in state park systems. While specific examples may not apply to your situation, they can stimulate ideas that will apply.

Park Office Operations

WASTE TYPES: Shipping/Packing Materials

Choose suppliers who provide **recyclable packaging and packaging** containing recycled content; reuse shipping/packing materials;

Improve purchasing and inventory management to **prevent overstocking supplies** that are not used within one month or have limited shelf life;

Make double-sided copies, reduce **number of paper copies** of receipts, and use recycled copy and register papers;

Buy products or materials with **recycled content**; reuse materials that would have been disposed of after one use;

Make **recycling** easy for staff and office patrons:

- Provide **separate bins for trash**, one for paper/cardboard, and one for mixed recyclables;
- Create a **list of waste items**, laminate it, and hang it in clear view to tell people the destination of each item.

WASTE TYPES: Disposable Office Items, Durable Office Equipment (Photocopiers, Fax Machines, Computers, Typewriters, Coffee Makers, Light Bulbs, Furniture), and Toxic Office Materials

When mailing or shipping, **switch from disposable**, one-time use materials, to reusables:

- Ship your office's materials in **reusable/reused packaging**;
- Encourage suppliers to ship material in **reusable containers**;
- Reuse envelopes** with metal clasps;
- Use reusable envelopes for **interoffice mail**.

Many **disposable lunchroom, breakroom, or cafeteria items** can become reusables:

- Use **nondisposable tableware** like mugs, silverware, and plates;
- Use **cloth towels** in kitchens and bathrooms;
- Buy **reusable filters** for coffee machines;
- Encourage employees to **reuse lunch bags**;
- Consider purchasing a water cooler to **replace individual bottled water**.

Typical expendables can become reusable:

Buy mechanical **pencils and refillable pens**;

Buy refillable **tape dispensers**;

Refill **laser cartridges** and re-ink typewriter ribbons;

Use *solar-powered* calculators and battery rechargers;

Use undated, erasable **wall calendars**.

Extend the life of **durable office equipment**:

Buy or lease durable and repairable equipment such as photocopiers, fax machines, computers, typewriters, and coffee makers;

Consider length and coverage of **warranties and service contracts** when selecting products;

Give or sell outdated computer systems to a **computer reconditioning/repair business**;

Recondition or repair older office furniture or **donate it to local charitable groups**;

Buy **sturdy desk supplies**, such as bookends, file holders, and staplers;

Use longer lasting **light bulbs**;

Buy cleaning **products with nontoxic content** in large reusable containers, or use homemade cleaners such as vinegar and baking soda;

WASTE TYPES: Fluorescent, Incandescent and High-intensity Discharge Lamps, Chemicals (mercury, lead, and sometimes cadmium), Glass, Aluminum, and Ballasts (PCBs)

Convert overhead four-bulb fluorescent fixtures to high-efficiency two-bulb fixtures:

Consider using **compact fluorescent table and flood lights**; be sure these units allow the bulb to be replaced separately from the ballast.

Disposing of lamps requires special handling to prevent heavy metal discharge into the environment. These types of lamps include:

Tube-style and compact globe shaped fluorescent lamps;

Many different types of **high-intensity discharge (HID)** lamps.

WASTE TYPES: Photocopy, Laser Printer, Fax, and Memo Paper, File Folders, Paper Towels, Envelopes, and Calendars

Eliminate **unnecessary copies**, notes, and memos by:

- Posting office announcements in central locations on **bulletin boards**;
- Sharing and **circulating** documents;
- Setting up **central filing systems**;
- Reformatting **faxes** to omit cover sheets;
- Editing on the computer **before printing**;

Use all paper on **two sides**; whenever possible, by:

- Increasing **two-sided copying**;
- Printing rough drafts and informal memos on the **unused side of draft paper**;
- Loading laser printer paper trays with **draft paper**;
- Reusing draft and computer paper for **notes and scrap paper**.

Further reduce paper by:

- Single space** documents, where possible;
- Setting **margins narrower** for drafts;
- Avoiding **duplication** on mailing lists.

Encourage **office managers** to buy:

- Laser printers** that can make double-sided copies;
- A program that allows **faxing from a computer** to avoid print outs;
- Fax machines that use **plain paper**;

Food Concessions

WASTE TYPES: Papers, Plastics, and Food Products

Encourage use of **washable mugs, plates, and utensils**;

Give **non-edible, perishable food** to pig farmers (consult county offices and public health officials for help in complying with all regulations).

Provide **collection of recyclables** at the store for plastic bags and aluminum cans;

Installing **low-flow nozzles** on faucets;

Maintaining refrigerators and freezers;

Purchasing new, **energy-efficient equipment**;

Lowering **water heater** temperature;

Grounds Keeping/Landscaping

WASTE TYPES: Grass Clippings, Leaves, Tree Branches, and Brush

On-site composting and “grasscycling” can reduce solid waste volumes and disposal costs by:

Leaving grass clippings lie, significantly reducing waste volume, while conserving soil nutrients and saving fertilizer costs.

Composting leaves and branches along with grass trimmings and other organic matter, creating soil additive or mulch.

Chipping other ground debris, like branches, providing mulch to reduce weeds and conserve moisture around interior plants or around landscaped trees, shrubs, and bushes.

WASTE TYPES: Chemicals

Locate tanks and storage **away from major traffic flow** areas.

Minimize distance between chemical mixing and loading areas.

Train employees in safe handling of chemicals, equipment, and wastes; laminate and post procedures as easily-read, quick references.

Develop an **emergency response plan**; train employees to handle spills and leaks; post emergency phone numbers for assistance.

Use spigots and pumps for **dispensing new materials** for more precise dispensing and less waste.

Use funnels for **transferring wastes** to storage containers.

Periodically test **overflow alarms on storage tanks**; periodically test and monitor underground tanks for leaks (monitoring wells, vapor monitoring, and automatic tank gauging systems).

Buy **only the amount you will use** in one growing season.

Store chemicals properly: seal and close, store in original containers, and protect from weather in dry, well-ventilated area.

Triple rinse all containers and empty all concentrate into sprayer tank.

Purchase chemicals in **reusable, returnable containers** (dedicated, "mini-bulk" containers).

Purchase chemicals in **containers which can be dissolved** in the tank.

Carefully **calculate the volume** you will use and load only this amount.

Keep the end of the fill hose above the fluid level in the spray tank to **prevent back-siphoning**.

Substitute less toxic, less persistent, or less "leachable" pesticides.

Use **well-timed spraying** only as needed based on accurate pest identification.

Do not exceed **recommended application rates**.

Calibrate application equipment.

Make sure **equipment is in good working order** at all times; check for leaks.

Vehicle and Equipment Maintenance

WASTE TYPES: Spent Fluids, Batteries

Separate fluids to promote potential for recycling.

Use recyclable brand of **radiator fluid** and collect flushing liquid for reuse.

Use brake fluid, transmission fluid, etc., which do not contain **chlorinated hydrocarbons**.

If unbroken, sell **batteries** to an off-site recycler.

Purchase state and locally **approved recycling equipment** to recover refrigerant.

WASTE TYPES: Parts Cleaning Solvent Baths

Determine **how clean** parts need to be.

Use **less hazardous solvents**

Pre-clean parts using brush or rag.

Use **detergent-based cleaning** solutions instead of solvent cleaners.

Lease rags from a **laundry cleaning service**.

Use **rags or other absorbents** to their limit.

Use good **housekeeping incentives** to reduce spills and leaks such as an award program for the worker with the cleanest bay.

WASTE TYPES: Paint Stripping Solvents and Paints

Use **mechanical paint stripping system** such as plastic blast media.

Use non-phenolic or non-acid **stripper**.

WASTE TYPES: Paint Waste, Spent Solvents

Control inventory to reduce **thinner** use.

Mix **paint** according to need.

Use **high transfer efficiency equipment** (e.g., equipment with low over-spray).

Provide **operator training**.

Use fully-enclosed **gun cleaning** station.

Reuse **cleanup solvent** in next compatible batch of paint.

Use recyclable **paint filters**.

WASTE TYPE: Spilled Fuel

Watch the fuel tank to avoid **overfilling**.

Be sure **fuel flow** has stopped before removing the fuel nozzle from the fill pipe.

Provide a **drip pan** from the fuel nozzle.

Be sure the proper type of fuel is selected to avoid **cross-contamination**.

Practice **preventive maintenance** on the entire fueling system.

WASTE TYPES: Wood Finishing Fillers, Sealers, Glazes, Topcoats, Solvents

Use **waterborne**, or “hybrid” coatings with a combination of water and conventional solvents.

Use **high volume, low pressure (HVLP) spray guns** to reduce overspray, less bounce back, and better transfer efficiency (40-70 percent).

Use **airless spray systems** to atomize the coating without introducing a pressurized air flow.

WASTE TYPES: Wood, Drywall, Packaging, Metals, Masonry, and Shingles

Coordinate with suppliers to take back or buy back unused wood, pallets, and crates.

Reduce drywall use by keeping all cutoffs in a central, dry location that is easily accessible to workers until every room is fully drywalled.

Waste Reduction Case Studies

These examples from related businesses illustrate success using the options described above.

BUSINESS: Pandl's in Bayside; Milwaukee, Wisconsin

WASTE ORIGIN: Food Preparation

WASTE TYPES: Food Wastes

COMPANY BACKGROUND

Pandl's is a family-owned 200-seat fine dining restaurant with 85 employees.

MOTIVATION

Reduce waste volumes and associated disposal costs.

STRATEGIES

Reduce the weight of the dumpster by recycling restaurant waste. Reduce energy costs.

ORIGINAL PROCESS

The restaurant threw virtually all wastes into the dumpster, creating 30 cubic yards of waste each week.

NEW PROCESS

Employee involvement through training replaces old habits with new habits focused on recycling and waste reduction. A food compost program recycles restaurant waste to an organic farmer for use as fertilizer. Compactors, bailers, and recycling bins were installed to collect various wastes. Running refrigerator Freon lines through a hot water tank saves energy by cooling the Freon line while heating the water and reducing the condenser workload.

RESULTS

In 1992, Pandl's won an award from the City of Milwaukee for the Five Star Reduction and Recycling Program.

Waste Reduction

Reduced dumpster wastes by 92 percent by recycling efforts (recycling 27.5 cubic yards of 30 cubic yards produced each week), or 832 cubic yards/year.

Food composting for fertilizer reduced dumpster weight by 1,500 pounds of food waste/pick up.

Recycled 20 to 25 percent of food waste as fertilizer.

Economics

Savings: \$1,800 to \$3,000 estimated annual disposal costs savings.

Capital Cost: \$8,000 for compactors, bailers and recycling bins.

Operating/Maintenance Cost: Information not available.

Payback Period: Information not available.

BUSINESS: Broadway of Green Bay; Green Bay, Wisconsin
WASTE ORIGIN: Auto Repair
WASTE TYPES: Parts Cleaning Solvents and Acetone

COMPANY BACKGROUND

Broadway is an automobile dealership and repair center with 180 employees.

MOTIVATION

Broadway wanted to reduce its waste generation and waste disposal costs. The company also wanted to improve its work environment and become an environmentally-friendly business.

STRATEGIES

Replace solvent cleaners with an aqueous part cleaner.

ORIGINAL PROCESS

Ten parts washers each used a 120-pound drum of solvent. Each drum was changed every two months. Dirty, spent solvent required special handling and additional disposal costs. A hazardous waste management company was contracted to supply and maintain the solvent-based cleaning system.

NEW PROCESS

Biodegradable soap and hot water is used by the new aqueous washer unit. Deposited sludge from cleaning is landfilled as solid waste. Water is reused and discharged to the local sewer system.

RESULTS

Waste Reduction

Eliminated 60 drums of waste solvent/year.

Economics

Savings: Information not available.

Capital Costs: \$4,000 for an aqueous washer unit.

Operating/Maintenance Cost: The aqueous cleaning unit is less labor intensive and costs less to operate than the solvent-based system.

Payback Period: Less than one year.

BUSINESS: Norand Corporation; Cedar Rapids, Iowa
WASTE ORIGIN: Incandescent Office Lighting
WASTE TYPES: Energy Consumption

COMPANY BACKGROUND

Norand manufactures sophisticated hand-held computer systems and related equipment. The company manufactures virtually all components and products through machining, fabrication, assembly, plating, soldering, and finishing operations.

MOTIVATION

High electricity costs.

STRATEGIES

Replace inefficient incandescent light bulbs with lower energy-consuming, longer-lived fluorescent bulbs, where possible.

ORIGINAL PROCESS

The company identified 40 locations where traditional incandescent lighting was being used in stairwells.

NEW PROCESS

Incandescent bulbs were replaced with compact fluorescent bulbs that screw directly into existing incandescent fixtures in the stairwells.

RESULTS

Waste Reduction

Reduced energy consumption.

Economics

Savings: Reduced electricity costs by \$2,954 per year. Reduced maintenance costs of replacing shorter-lived incandescent.

Capital Cost: Information not available.

Operating/Maintenance Cost: Information not available.

Payback Period: Information not available.

Waste Reduction Checklists:

Use this list to review any potential waste reduction situations.

(* = cause for concern)

Underground Storage Tanks -

Are there any unused bulk storage tanks such as for fuels or chemicals, either above ground or below ground, and

Yes _____* No _____ Don't Know _____*

Have they been properly cleaned and removed?

Yes _____ No _____*

Has the property been subject to soil testing or site inspections?

Yes _____ No _____* Don't Know _____*

Have fuel storage tanks in use been properly registered?

Yes _____ No _____* Don't Know _____*

Waste Water -

If there are wastewater discharges, have the discharges been analyzed, quantified, and documented?

Yes _____ No _____*

If there are wastewater discharges to the municipal wastewater treatment facility, are the discharges in compliance with all pre-treatment requirements or discharge limits?

Yes _____ No _____* Don't Know _____*

If there is any direct discharge of wastewater into groundwater or to the surface such as a stream, lake or drainage ditch, Do you have a permit to do so?

Yes _____ No _____*

Recycling -

Do you recycle materials as required by local ordinance and state law?

Yes _____ No _____ * Don't Know _____ *

Do you generate any large amount of waste material that has been difficult to recycle or that creates a substantial waste cost?

Yes _____ * No _____

Do you dispose of any wastes on its property or store solid waste on-site for an indefinite period of time?

Yes _____ * No _____

Do you generate oil and other vehicle wastes that may not be considered hazardous waste?

Yes _____ * No _____

Are wastes generally segregated for recycling and disposal?

Yes _____ No _____ * Don't Know _____ *

Solid and Hazardous Waste -

Do you burn solid waste at its site or facility?

Yes _____ * No _____

Has the business conducted hazardous determinations for all potentially hazardous waste streams?

Yes _____ No _____ * Don't Know _____ *

Are regulated hazardous wastes generated from the business properly hauled and disposed, or treated by certified operators who meet state and federal requirements?

Yes _____ No _____ * Don't Know _____ *

Are hazardous wastes properly segregated from other wastes, including other hazardous wastes and solid waste or non-hazardous liquid waste?

Yes _____ No _____ * Don't Know _____ *

Are hazardous wastes properly stored, including appropriate fire and explosion isolation and ventilation for volatile materials?

Yes _____ No _____ * Don't Know _____ *

Do you have clearly defined procedures for preventing spills and leaks, and for dealing with any spill or leak that does occur?

Yes _____ No _____ * Don't Know _____ *

Do you maintain a complete file of Material Safety Data Sheets (MSDS) for all hazardous materials on site, and are the MSDS sheets available at a convenient location for employees?

Yes _____ No _____ * Don't Know _____ *

Are containers with hazardous materials labeled with proper warnings, and are containers kept closed or secured in proper storage facilities?

Yes _____ No _____ *

A Glossary of Solid and Hazardous Waste Terminology

This glossary is intended as a quick reference to the basic terminology of solid and hazardous waste issues.

Acute - Severe, often dangerous, conditions in which rapid changes occur over a brief period of time as a result of exposure to a toxic material. Acute reactions can be reversed more easily than chronic effects.

Acutely Hazardous Waste - Waste designated by the U.S. EPA to present such a danger to human health and/or the environment so as to require regulation of small amounts (1 kilogram, or 2.2 pounds). Examples of these wastes include pesticides and dioxin-containing wastes.

Catalyst - A substance that increases or decreases the speed of a chemical reaction without undergoing a chemical change itself.

Caustic - Something that strongly irritates, burns, corrodes, or destroys living tissues.

Chemical Additive - Substances used in product formulations to provide certain characteristics to the product. These characteristics might include color, elasticity, durability, viscosity, and others.

Chemical Substitution - Replacement of hazardous chemicals with nonhazardous or less hazardous ones in both production and non-production processes.

Chemical Specific - Applying to individual chemicals, versus broad classes of chemicals.

Chronic - An adverse condition that results from repeated exposure to a substance over a prolonged period of time.

Code of Federal Regulations (CFR) - The general and permanent rules promulgated under U.S. law, published in the Federal Register and actually in force at the end of a calendar year. The Code is divided into 50 titles which represent broad areas subject to federal regulation. Each title is divided into chapters according to the issuing agency and subdivided into parts covering specific regulatory areas.

Compaction - A reduction in volume. This waste management technique uses mechanical pressure to physically reduce the volume of waste after generation.

Compatibility - The ability of two or more materials to exist in close association for long periods with no adverse affect of one on the other.

Compressed Gas - Any material or mixture having in the container an absolute pressure exceeding 40 psi at 70°F or, regardless of the pressure at 70°F, having an absolute pressure exceeding 104 psi at 130°F; or any liquid flammable material having a vapor pressure exceeding 40 psi at 100°F.

Conditionally Exempt Generators - Generators of less than 100 kilograms (220 pounds) per month of non-acutely hazardous waste or less than 1 kilogram (2.2 pounds) per month of acutely hazardous waste.

Consolidation (of waste) - Packaging technique used to minimize the volume of waste.

Contingency Plan - Management tool that projects potential emergency situations and outlines the appropriate response actions to ensure the health and safety of employees, response personnel, and the environment.

Cooperative Waste Shipments - Arrangement between businesses generating similar wastes and a transport firm to provide a coordinated pickup of waste from each participating business. This arrangement can be formal or informal and usually results in a decrease in the transportation costs for each business.

Corrosivity - A solid waste characterized as either an aqueous material with a pH less than or equal 2.0, or greater than or equal to 12.5, or a liquid that corrodes steel at a rate greater than 6.35 mm per year at a test temperature of 55° C (130°F).

Dewatering - A reduction in waste volume through evaporation or separation processes that remove aqueous components.

Discharge - A release or flow of stormwater or other substance from a conveyance or storage container.

Distillation - A separation process in which a liquid is converted to vapor and the vapor then condenses back to a liquid.

Emergency Planning and Community Right-to-Know Act (EPCRA) - Title III of the Superfund Amendments and reauthorization Act (SARA), passed by Congress in 1986. This major law gave the public significant new rights to find out about the dangerous chemicals stored, used, and released throughout the country. In particular, Section 313 of Title III created the Toxics Release Inventory (TRI) to provide public data on “routine” chemical releases from industries across the nation. See also: Toxic Release Inventory.

Emission - Pollution discharges into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities and from motor vehicle, locomotive, or aircraft exhausts.

Equipment Changes - Modifications of and additions to equipment used in any stage of the manufacturing process (e.g., equipment used for storing, moving, mixing, or reacting chemicals) in order to reduce the amount of waste generated.

EPA Identification Number - A 12-character, site specific identification number used by the U.S. EPA and states to maintain a national data base on hazardous waste activities. Generators of more than 100 kilograms (2200 pounds) of hazardous waste in any calendar month and transporters and facilities that treat, store or dispose of regulated quantities of hazardous waste are required, by law, to have an EPA Identification Number.

Explosive - Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with a substantially instantaneous release of gas and heat.

Federal Register - Publication of U.S. government documents officially promulgated under the law, documents required to be published by an act of Congress and other federal agency documents of public interest. It is published each day following a government work day. In effect, it is a daily supplement to the Code of Federal Regulations.

Flammable - Any solid, liquid or gaseous material that will ignite easily and burn rapidly. Flammable liquids are defined by the National Fire Protection Association and the Department of Transportation of having a flash point of 100°F (37.7°C) and a vapor pressure of not over 40 psi at 100°F. The most common flammable gases are hydrogen, carbon monoxide, acetylene, and other hydrocarbon gases.

Fugitive Air Emissions - Air pollution releases through leaky valves, evaporation from tanks, and other unintentional release points.

Full Cost Accounting - An accounting process that identifies all costs with a process or product.

Hazardous Waste - Any solid waste that is characterized as ignitable, corrosive, reactive or toxic and/or has been listed in the RCRA regulations.

Heavy Metal - Metallic elements such as mercury, chromium, copper, zinc, lead, and cadmium having high molecular weights. These elements tend to be associated with negative health effects in humans above certain dose levels.

Housekeeping - General management and operational practices that can greatly impact worker safety and hazardous waste management. Examples of good housekeeping practices include recycling waste, reducing the amount of waste you generate, and strict use of appropriate personal protection equipment.

Ignitability - A solid waste characterized as a non-aqueous liquid having a flash point less than 140°F (60°C), or a non-liquid capable under standard temperature and pressure of causing fire through friction, absorption of moisture, or spontaneous chemical changes and when ignited, burns so vigorously and persistently that it creates a hazard, or an ignitable compressed gas or an oxidizer.

Incineration - Thermal destruction of solid or hazardous waste through oxidation.

Incompatible - Materials that could cause dangerous reactions from direct contact with one another.

Inorganic Chemical - In general, chemicals that do not contain the element carbon. The exceptions include certain simple carbon-containing compounds such as oxides (carbon monoxide, carbon dioxide), carbonated and bicarbonates (such as baking soda, baking powder and chalk), cyanides and cyanates, and carbon disulfide).

Large Quantity Generators - Facilities that generate 1000 kilograms (2200 pounds) or more of hazardous waste, or more than 1 kilogram (2.2 pounds) of acutely hazardous waste in any month. Generators of hazardous waste are regulated under the Resource Conservation and Recovery Act (RCRA). See also: RCRA.

Materials Safety Data Sheet (MSDS) - Part of the Hazard Communication Standards (HCS) set up by the U.S. Occupational Safety and Health Administration (OSHA) to protect workers from chemical hazards. The MSDS provides the chemical composition of the substance being used, its trade name and name of the manufacturer, hazards associated with the substance, and precautions that workers should take to avoid such hazards.

Materials Balance - A quantitative assessment of chemical inputs and outputs for individual processes that aims to account for every pound of a chemical that is: shipped to the process; created or destroyed in the process; delivered as a product from the process; or wasted (irrespective of whether it is an air, water, or solid waste). If the amount of wastes identified does not equal the difference between the amount of the chemical entering (or being created in) and leaving (or being consumed in) the process, then other sources of waste must exist and need to be identified.

Milk Runs - A term used to refer to cooperative waste shipments. (See Cooperative Waste Shipments)

Multimedia - Applying to all environmental media: land, water, and air.

Operational Changes - Changes in the way hazardous materials are handled at a plant (e.g., careful observations and control of materials, process conditions, and employee habits in order to minimize spills, process upsets, or the use of excessive amounts of chemicals) that can reduce generation of waste.

Organic Chemical - Chemical compounds containing carbon, except for certain simple ones. See also: Inorganic Chemical.

Oxidizer - A substance such as chlorate, permanganate, inorganic peroxide, or a nitrate that yields oxygen readily to stimulate the combustion of inorganic matter.

Personal Protective Equipment (PPE) - Devices such as respirators, gloves, shoes, and ear protectors that are worn to protect against hazards in the work environment.

Plasticizer - A chemical additive used in natural and synthetic polymers that imparts characteristics such as flexibility, elasticity, workability, color, etc.

Point Source Air Emissions - Air pollution released through smokestacks, vents, and other intentional release points.

Polymer - Compounds of very high molecular weight make up of a large number of simple molecules (monomers) that have been caused to combine with each other through chemical reaction. Polymers can be naturally occurring, such as rubber, cellulose, starch, and proteins, or synthetic, such as polystyrene, nylon, polyethylene, and polypropylene.

POTWs (Publicly Owned Treatment Works) - Public sewage piping and facilities.

Priority Pollutants - A list of 126 specific chemicals regulated by the Clean Water Act amendments of 1977 as toxic chemicals. Included are volatile substances, acidic, basic and neutral compounds, pesticides, metals, cyanides, and phenolic compounds.

Process Changes - Any change in the production process that reduces the generation of waste, ranging from simple alterations of process conditions, such as temperature and pressure, to discovery of new chemical pathways and production technologies.

Product Changes - Changes in the product itself that can be achieved without changing the fundamental manufacturing process and that reduce the generation of waste (e.g., creating a chemical product in the form of pellets rather than as a powder can reduce the generation of waste dusts as the material is transferred during final packaging operations).

Reactive - A solid waste characterized as unstable and which readily undergoes violent change without detonating. Forms potentially explosive mixtures with water, generating toxic gases, vapors or fumes so as to present a danger to human health or the environment.

Recycling - Reuse of by-products, or components of by-products, that might otherwise be disposed of in the environment.

Resin - A special category of polymers characterized by a tendency to harden upon heating (thermosetting), whereas other polymers soften (thermoplastic).

Resource Conservation and Recovery Act (RCRA) - Federal "cradle-to-grave" regulations affecting hazardous and nonhazardous (garbage) solid waste.

Resource Recovery - The beneficial reuse of a waste products in ways different from their original use.

Reuse - In general, reuse refers to a substance that is reintroduced at the front end of a production process from which it was originally generated as a by-product.

Right-to-Know - A term usually referring to a series of laws, regulations, or databases that provide industry-related information to the public.

SARA - See Superfund Amendments and Reauthorization Act.

Small Quantity Generator (SQG) - A facility that generates more than 100 kilograms (220 pounds) and less than 1000 kilograms (2200 pounds) of hazardous waste in any month. Generators of hazardous waste are regulated under the 1986 amendments to the Resource Conservation and Recovery Act (RCRA).

SIC Codes - Standard Industrial Classification codes, the system the federal government uses to classify US companies according to the products they produce (e.g., the chemical and allied products industry is assigned SIC code 28, with individual industries in this category having four-digit codes that begin with 28).

Sludge - A semi-solid residue from any of a number of air or water treatment processes. Sludge can be a hazardous waste.

Solvent - A substance, usually in liquid form, that serves as a medium in which other substances (solids, liquids, or gases) may be undissolved but does not react with those substances. The ability of solvents to dissolve other substances allows them to be used for cleaning purposes, as the major component of products such as paints and adhesives, or as the medium in which the dissolved chemicals may react with each other.

Source Reduction - A strategy for reducing pollution that involves preventing the generation of waste in the first place rather than cleaning it up, treating it, or recycling after it has been produced.

Stormwater - Runoff from a storm event, snowmelt runoff, surface runoff and drainage.

Superfund Amendments and Reauthorization Act (SARA) - A 1986 federal law amending the original "Superfund" law. Title III of this law is called the Emergency Planning and Community Right-to-Known Act (EPCRA). Section 313 of EPCRA contains the Toxics Release Inventory (TRI) requirements. See also: Toxic Release Inventory.

Surfacewater - All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, wetlands impoundments, seas, estuaries, etc.); also refers to springs, wells, or other collectors which are directly influenced by surface water.

Toxicity - The ability of a substance to cause damage to living tissue, impairment of the central nervous system, severe illness, or in extreme cases, death when ingested, inhaled or absorbed by the skin.

Toxic Release Inventory (TRI) - The U.S. EPA's annual inventory of the pounds of about 320 chemicals released to the land, air, or water, or transferred off-site from the 20,000 or so largest manufacturing facilities using or manufacturing these chemicals in the United States. The TRI provisions are found in Section 313 of the Emergency Planning and Community Right-to-Know Act, which is Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA).

Toxic Pollutants - Any pollutant listed as toxic under the Clean Water Act, Section 501 (a)(1) or, in the case of "sludge use of disposal practices," any pollutant identified in regulations implementing Section 405 (d). Refer to 40 CFR Part 122 for more details.

Toxicity Characteristic Leaching Procedure (TCLP) - A test used to classify materials as hazardous based upon the concentration of heavy metals (such as mercury, cadmium or lead) and pesticides in an extract of that material and the potential for environmental contamination.

Underground Storage Tanks (USTs) - Any storage tank with at least 10 percent or more of its storage capacity underground. See 40 CFR Part 280.12 for the complete regulatory definition.

Very Small Quantity Generator (VSQG) - A facility that generates no more than 100 kilograms (220 pounds) of hazardous waste and no more than 1 kilogram (2.2 pounds) of acutely hazardous waste in any calendar month. Also called a conditionally exempt small quantity generator under the Resource Conservation and Recovery Act (RCRA).

Waste Audit - A formalized inventory of types and quantities of waste generated at a given facility in a given period of time.

Waste Minimization - See Waste Reduction.

Waste Reduction - Practices or techniques which reduce or eliminated the volume and/or toxicity of wastes generated. This includes in-plant practices that reduce, avoid, or eliminate the generation of hazardous waste so as to reduce risks to health and environment. This includes only actions taken during the waste generating process. Treatment, concentration or recycling of wastes after they are generated is not included.