INTEGRATED WASTE MANAGEMENT

Passed in 1991, the Montana Integrated Waste Management Act, Title 75, chapter 10, part 8, MCA, established integrated waste management as the policy for the state for the purpose of managing municipal solid waste with the least adverse impact on human health and the environment. In addition to defining integrated waste management as "the coordinated use of a priority of waste management methods," the Act established priorities for waste management; set a solid waste reduction target; required state government to implement source reduction/recycling programs and procure recycled supplies and materials; and required development and implementation of a solid waste management plan.

Integrated Waste Management Hierarchy/Priorities

The integrated solid waste management policy is based on a hierarchy of prioritized approaches to managing waste, § 7510-804 MCA. These approaches, in order of priority, are:

1. **Source Reduction** (also Waste Reduction): Preventing waste in the first place.
2. **Reuse:** Giving a second life to a used product or material.
3. **Recycling:** Introducing one or more waste materials or products into a manufacturing process to produce a new product.
4. **Composting:** The controlled decomposition of organic materials by microorganisms.
5. **Landfill and Incineration:** The final destinations for most waste in United States.

Diversion Target Goals

The Act set the goal to reduce—through the hierarchy—the amount of solid waste generated in the state and established recycling and composting reduction targets Building on the work of the 1991 Legislature, the 2005 Legislature updated these target goals to better reflect the ability of DEQ to calculate waste diversion rates based on materials recycled and composted, § 75-10-803 MCA. Currently, permitted facilities report these amounts on renewal submissions, and a voluntary survey is sent to all recycling facilities that are not required to hold a permit. Because this survey is voluntary, some facilities choose not to submit recycling data. Therefore, it is likely that Montana waste diversion rates are higher than DEQ's calculated percentages.

The 2006 Integrated Waste Management Plan (IWMP) and § 75-10-803, MCA; adopted the updated target goals for recycling and composting:

- 17% of the state's solid waste by 2008,
- 19% of the state's solid waste by 2011, and
- 22% of the state's solid waste) by 2015.

To date, Montana has met diversion target goals. Individual reports can be found at http://deq.mt.gov/Recycle/recycling_statistics_Page.mcpx, a summary of diversion rates achieved since 2006 is given here.

- 2006 – 18.6%
- 2007 – 18.3%
- 2008 – 19.6%
- 2009 – 19.1%
- 2010 – 19.7%

Education and Public Outreach

DEQ staff promote the achievement of the Diversion Target Goals through distribution of information to the public, businesses, and industry on source reduction, reuse, recycling, and composting of wastes. Information is available on the DEQ website, as well as through an electronic newsletter distributed weekly to over 2,000 addresses. Additionally, DEQ staff regularly present information at various training events, conferences, and community meetings. Examples of past training events include plastics recycling, waste tire reuse/recycling, construction and demolition reuse/recycling, home composting, and community approaches for rural recycling. DEQ staff also work to expand the markets within Montana which can use recyclables and other "wastes" productively, thereby eliminating or delaying disposal in landfills. Information on upcoming training events can be found on DEQ's website at http://deq.mt.gov/Recycle/calendar.mcpx. Additionally, training and outreach events are communicated through an online newsletter.

COMMUNITY APPROACHES TO INTEGRATED WASTE MANAGEMENT

Integrated waste management programs provide communities and local governments with an increased ability to manage costs, control items accepted at landfills, and extend the useful life of landfills. Costs related to solid waste management continue to increase for most communities, regardless of whether the landfill is municipally or privately operated. For most communities the majority of resources focus on the most expensive and least-preferred management option: landfilling. An effective method of managing solid waste costs should include concepts from each step of the waste hierarchy, reducing overall the volume of waste that must be buried and monitored.

First Step: Source Reduction = avoid generating waste in the first place.
Second Step: Reuse = find an alternative use for the material
Third Step: Recycling = divert materials and products from landfill that may have value.
Fourth Step: Composting = turn yard and food waste and other organics into a valuable product while conserving landfill space.
Final Step: Landfilling = the most costly waste management choice, requiring continued monitoring after closures (when waste disposal fees are no longer generating income)..

Communities can shift focus and resources away from landfills when programs and infrastructures are built to support the alternative management concepts identified in the Montana Integrated Waste Management Act. Successful programs include actively engaging consumers and commercial businesses in source reduction, reuse, and recycling programs.

Rural Recycling

Rural recycling is a challenging but important issue for local and state government. Recycling programs must be developed with logistics of rural areas in mind. These communities are striving to meet recycling and reduction goals; however, they are hampered by their low populations and tax base, limited municipal and county budgets and personnel, low-density housing, and limited commercial development. Though they try to establish infrastructure to recycle, rural communities do not generate enough recyclables to lure large recyclers to their areas, nor do they produce enough recyclables to effectively start a full-scale recycling program of their own. Transportation costs to ship recyclables hundreds of miles to industries for processing are often cost-prohibitive, and the value of the recyclables often aren't enough to pay for the gas to ship it to market.

To fill this gap, DEQ has promoted the "Hub and Spoke" concept to help rural communities overcome these barriers. The Hub and Spoke concept is dependent on several communities working in partnership to collect and aggregate materials for recycling. For example, five communities all collect recyclables then ship the material to one central community thereby establishing a volume that economically supports the shipment to a recycling business. In May 2011, DEQ provided a rural recycling workshop to bring community representatives together to find solutions to Montana's rural recycling challenges. The outcome was to work to build on the regional recycling approach. Building on the 2011 meeting, DEQ held another rural recycling meeting in July 2012 to gather small communities together to discuss waste diversion strategies and successes.

A regional recycling approach helps to overcome the obstacles encountered by individual rural governments. Benefits of this type of approach include increased volumes of recyclables and increased marketing opportunities, as well as:

- Potential for cooperative marketing, which can substantially increase revenues,
- Conserved landfill capacity and avoided tipping fees to citizens,
- Regional economic stimulus from new collection and processing jobs, and
- Shared costs for equipment, personnel, processing, transportation, marketing, and facility capital and operating costs.

Contracts/Agreements

Contracts and legal agreements are useful tools for providing incentives to reduce tons landfilled, while rewarding and encouraging waste prevention, reuse, recycling, and composting activities. Economic incentives such as Pay-As-You-Throw, revenue sharing, bonus and penalty payments tied to goals reached, franchise fees, and similar strategies are used by communities across the country to build successful integrated waste management systems.

Getting Started 101

The framework and suggested activities below serve as basic guidelines for revising current waste management practices to include an integrated approach. Earlier versions of this plan include explanations that are more extensive; the information below includes major points and is designed with rural communities in mind.

Local Government Framework for Implementing an Integrated Waste Management System:

1. **Set up a citizen's solid waste advisory committee.** The committee should include both public and private interests as well as local experts. Committee responsibilities should be clearly outlined with specific goals or projects to be accomplished.
2. **Do an audit of the local waste stream**. The information gathered will establish a foundation for any projections, while providing a snapshot of current conditions. The DEQ Recycling and Market Development Program will provide waste audit information to communities.
3. **Write a local integrated solid waste management plan.** A local plan addresses the economic conditions and resources that are unique to each community.
4. **Implement aggressive public education.** Educational campaigns are necessary to spread awareness and encourage participation. Utilize community partners and existing businesses to help spread the message.

5. **Provide incentives for waste reduction**. Economic incentives encourage the private sector to participate in solving solid waste management problems while supporting local recycling goals. In addition to economic incentives and disincentives, communities can offer awards programs and other public recognition programs to businesses or individuals that reduce their waste.
6. **Target large industrial waste components.** Review local industry activities to identify large generators of waste material and work with them to develop alternative management strategies.
7. **Explore cooperative agreements and structures.** Small communities may be able to coordinate recycling drives, taking advantage of higher volumes of materials and lower transportation costs. Communities may be able to share mobile balers, shredders, and crushers.
8. **Build on existing programs.** When possible, build on existing programs to minimize capital costs. Save further costs by considering the use of existing container sites, landfills, and transfer stations as part of the new integrated waste management system.

A local integrated waste management plan might include one or more of the following:

- Recycling drop-off bins with marketing to nearest buy-back center
- Drop-off for yard waste and windrow composting
- Roll-off waste containers for disposal
- Curbside collection of yard waste and aerated static pile composting with sewage sludge and green wastes
- Waste exchanges, swap programs, yard sales, thrift stores
- Community recycling collection events
- "Buy-recycled" policy for local government
- Rate structure incentives
- Residential curbside collection of recyclables
- Reuse/repair center
- Collection programs for commercial sector recycling
- Environmentally sound landfill in the region
- Materials recovery facility/transfer station

SUBTITLE D OVERVIEW: FEDERAL REGULATIONS 40 CFR 258

Municipal solid waste (MSW) is regulated by EPA under Volume 40 of the Code of Federal Regulations, part258. Referred to as “Subtitle D” because EPA implements that subtitle of the federal Resource Conservation and Recovery Act of 1976 (RCRA); these regulations specify minimum criteria for municipal landfills, including location, operation, design, groundwater monitoring, corrective action, closure and post-closure care, and financial assurance.

Subtitle D regulations also include regulations pertaining to garbage, such as food containers and coffee grounds; non-recycled household appliances; residue from incinerated automobile tires; refuse such as metal scrap and construction materials; sludge from industrial and municipal wastewater facilities; and waste from drinking water treatment plants. Hazardous waste exempted from Subtitle C regulations—such as those from households and conditionally exempt small-quantity generators—also fall under Subtitle D.

As the regulatory agency for Subtitle D, EPA approved the State of Montana's MSW program in 1993 (as defined by ARM 17.50.501 through 17.50.542) that was adopted by DEQ's predecessor agency under the authority of the Montana Solid Waste Management Act (Title 75, chapter 10, sections 201-233). Montana's program protects public health and the environment, while providing the maximum flexibility allowed by EPA in setting alternative standards for the siting, design, operation, monitoring, and closure of municipal (class II) landfills.

The following sections summarize the criteria in 40 CFR Part and 258, and include information specific to the Montana rules.

Subpart A - Small Community Exemption

Small MSW landfills that meet all of the following criteria may be exempted by DEQ from landfill design criteria described in ARM Title 17, chapter 50, subchapters 12 and 13:

- Receive less than 20 tons of waste per day on an annual average;
- Have no evidence of existing groundwater contamination from the landfill;
- Receive 25 inches or less of precipitation per year; and
- Serve a community for which no practicable waste management alternative exists.

DEQ considers "practicable waste management alternative" to mean a complying MSW landfill, transfer station, or materials recovery facility within 100 miles of the small community landfill that can accept waste for an annual cost of less than 1% of the median household income.

If an exemption is granted, the landfill is not required to be constructed according to an EPA approved design or a design that DEQ approves as demonstrating that the uppermost aquifer will be protected from contamination. However; all location, operation, closure and post-closure care, groundwater monitoring, and corrective action requirements would still apply. These landfills must also comply with all financial assurance requirements. DEQ has the authority to revoke an exemption if any groundwater contamination is found or if any of the required conditions can no longer be met.

The small community exemption is rarely granted as there is little need for it. DEQ has the flexibility to approve alternative design criteria based on geologic features, which is more protective of the environment than exemptions based on size. In addition, many small landfills have closed over the past 21 years because of the costs associated with required groundwater monitoring, methane monitoring, and financial assurance requirements. Finally, most Montana communities have a "practicable alternative" within 100 miles.

Subpart B - Location Criteria

MSW landfills cannot be located or operated in wetlands, floodplains, fault areas, seismic impact zones or unstable areas without a DEQ-approved demonstration. . Since landfills attract seagulls, crows, vultures, and other scavenger birds, MSW landfills cannot be located with 10,000 feet of an airport that has jet aircraft landing or taking off, or within 5,000 feet of airports used by propeller aircraft. Exceptions may be made if the operator of the landfill can demonstrate that the facility does not pose a bird hazard to aircraft.

Much of western Montana lies in seismic impact zones. DEQ has the authority to approve landfills in seismic impact zones if all containment structures are designed to adequately resist the expected impact of an earthquake.

Landfills that existed in restricted areas before the 1993 adoption of the regulations were evaluated on a site-specific basis. Those sites that were designed, or which could be re-engineered, to address the issues were allowed to continue operation. Even so, 50% of Montana's landfills have closed since 1993.

Subpart C - Operational Criteria

Owners and operators of MSW landfills must comply with the following operational standards:

- Implement procedures for prohibiting the dumping of regulated hazardous wastes and PCB wastes.
- Conduct random inspections of incoming loads, maintain records of inspections, train workers to recognize hazardous waste, and notify state and/or federal officials of unauthorized materials.
- Cover disposed waste with six inches of earthen material at the end of each operating day (but more frequently if necessary).
- Prevent or control populations of disease vectors such as rodents.
- Ensure that the concentration of methane gas generated by the landfill does not exceed set limits at the facility boundary by implementing methane monitoring programs and, if methane gas concentrations do exceed those limits, take necessary steps to reduce them, while also notifying DEQ.
- Ensure that the landfill meets all applicable air quality standards.
- Conduct open burning according to applicable regulations and never burn mixed MSW.
- Control public access, prevent unauthorized traffic, and prevent illegal dumping.
- Design the landfill to prevent run-on to its active portion during the peak of a 25-year storm.
- Control runoff from the active portion of the landfill in the event of a 24-hour, 25-year storm.
- Prevent the discharge of pollutants into any water in violation of federal or state standards.
- Refuse to accept bulk, non-containerized, or large containers of liquid wastes.
- Record and retain information relating to all aspects of ARM Title 17, chapter 50, subchapters 11 and 12, which regulate landfill operation and design.
- Record a notation to the deed of the land where the facility is located that notifies any potential purchaser of the land in perpetuity that the land is being used for a solid waste management system, and that its use is restricted under ARM 17.50.1404(3)(c).

Under ARM Title 17, chapter 50, subchapters 5 and 10-14, DEQ has the authority to approve alternate daily cover that meets performance standards, provide some flexibility governing the number and location of methane monitoring wells, and approve alternate waste-screening methods if the landfill operator is able to ensure that incoming loads do not contain regulated hazardous or PCB-containing waste. Federal law, however, does not allow any state to waive random inspections for hazardous waste, methane monitoring, groundwater monitoring, run-on/runoff controls, and recording-keeping requirements.

Subpart D - Design Criteria

MSW landfills must employ design standards that have been proven to be protective of human health and the environment in most circumstances. These design standards include – for any new landfill or for the lateral expansion of an existing landfill - either a composite liner or a leachate collection system or

an alternative design approved by DEQ. The composite liner consists of a layer of compacted soil and a flexible, 30-ml, high-density polyethylene membrane. (See ARM 17.50.1204).

DEQ may accept alternative designs based on performance standards and local geological and hydro-geological conditions, and allow the use of other technology that the applicant can demonstrate is protective of the environment in site-specific circumstances. For example, in areas where natural clay soils are unsuitable, a geo-synthetic clay liner may be approved. DEQ also has the authority to approve various low-cost options for leachate collection systems and alternative landfill covers, depending on site-specific circumstances.

Subpart E - Groundwater Monitoring and Corrective Action

Under ARM Title 17, chapter 50, subchapter 13; all MSW landfills must monitor ground water. Each monitoring system must consist of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer. Each system must include sampling of wells up-gradient and down-gradient from the landfill. An operator must conduct monitoring semiannually over the life of the landfill and during the post-closure period. Samples must be analyzed for at least 15 heavy metals and 47 volatile organic compounds.

If elevated levels of any of these metals or compounds are detected, the operator must implement an assessment monitoring program as specified in ARM 17.50.1307. If groundwater monitoring shows that contamination exceeds legal limits, the regulations prescribe a corrective action program.

DEQ has the authority to suspend monitoring requirements if the landfill operator can demonstrate that there is no potential for contamination of ground water.

Subpart F - Closure and Post-closure

Under ARM Title 17, chapter 50, subchapter 14, eash MSW landfill must prepare a closure and post-closure care plan, and submit it to DEQ for approval. The closure process must include notification to DEQ of when the closure will occur, placement of a final cover over the landfill, and recording a notation on the property deed that landfilling has occurred on the property. The final cover must be designed to minimize infiltration and erosion. The design features of the final cover are specified in the rules (ARM 17.50.1403) and include minimization of infiltration and erosion; however, DEQ has the flexibility to allow an alternative final cover design based on site-specific conditions.

The post-closure plan must describe the integrity and effectiveness of the final cover, as well as the leachate collection system, groundwater monitoring system, and the gas monitoring system, and outline how all will be maintained for 30 years after closure. DEQ may choose to approve extensions of deadlines for closure, increase or decrease the post-closure monitoring period or frequency, and even allow the operator to suspend monitoring entirely.

Subpart G - Financial Assurance

Under ARM 17.50.540, landfill operators are required to provide an annual cost estimate for a third party to perform closure, post-closure care, and any corrective action. They are also required to provide and fund “financial assurance,” which will enable DEQ to pay these costs should the operators run out of

funds. The mechanism may be a trust fund, insurance policy, surety bond, letter of credit, local government financial test, or a combination of these.

Landfill Operator Training

Operational practices at MSW landfills can have a major impact on the environment and public health. Training of landfill operators improves landfilling practices and standardizes operations around the state. Prior to State Fiscal Year 2012, DEQ used fees paid by landfills to provide training through a contract with the Montana Association of Counties, Montana State University Extension Service, and the Solid Waste Association of North America (SWANA). As a result, 95% of all landfill operators in Montana are Manager of Landfill Operations (MOLO) certified by SWANA. Additional types of training offered include OSHA 40-hour and 8-hour refresher classes, landfill operator safety, hazardous household waste collection events, and composting. Beginning in State Fiscal Year 2012, DEQ conducts the landfill operator training instruction itself. Surveys of participants show that quality and value of training opportunities has remained steady or improved since training was moved to agency functions. For more information on scheduled training events, contact DEQ's Waste and Underground Storage Tank Bureau or view the training calendar at http://deq.mt.gov/solidwaste/training.mcpx.

LANDFILL STATUS OVERVIEW

As Montana continues to move forward in implementing waste reduction and a more integrated approach to solid waste management, it is obvious that landfills are and will continue to be an important part of the state's management of solid waste. As the population of Montana grows, the need for sufficient and properly operated waste disposal facilities also grows. Landfill capacity assurance is the process of planning for the future so that local governments and their citizens can be assured that they will have access to adequate solid waste disposal capacity.

Although Montana seems to have limitless space for landfills, the costs of siting, operating, and maintaining landfills are higher than ever before. These costs will continue to increase well into the future in order to monitor and control leachate from the landfills. Thirty-year monitoring and care regulations make it clear that no landfill can ever be forgotten. Nationally, communities are burdened by the cost of poorly sited, inadequately maintained, and improperly closed landfills. Montana has largely avoided such misfortune, but the missteps of others underline the importance of environmentally sound landfills. To avoid costly new permitting and the environmental impacts of new landfill units, it is important to conserve space in properly sited and operated landfills.

Because of the difficulty of siting new landfills, it is increasingly important for citizens, local governments, and DEQ to work together to plan for future landfill needs. Everyone involved must be aware of trends in population growth, waste generation rates, new rules, and other factors that influence the available landfill capacity in all regions of Montana.

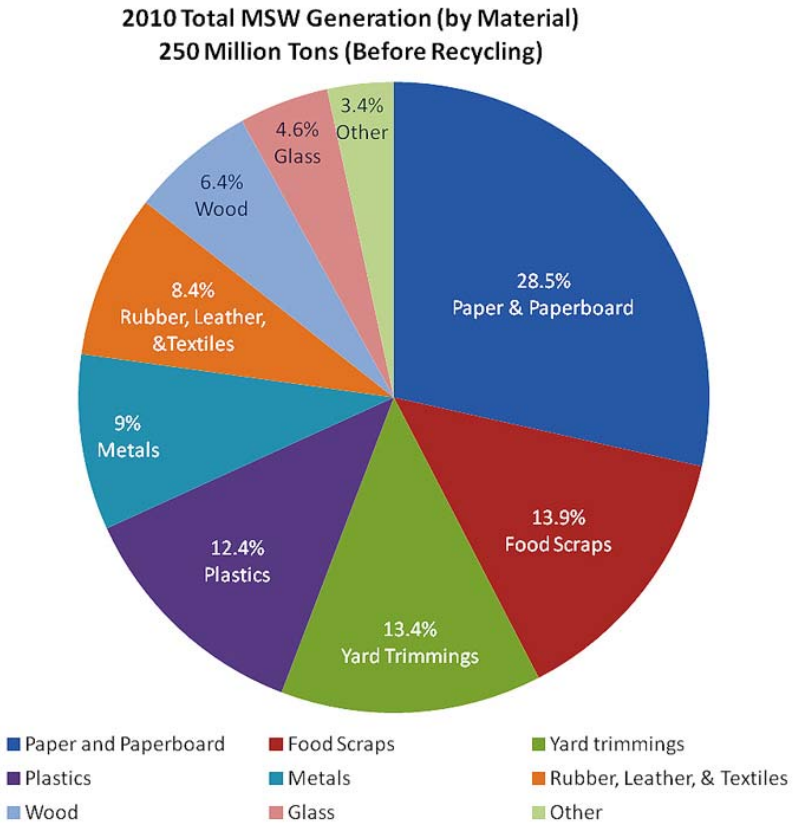
Montana Municipal Solid Waste

Municipal solid waste (MSW) refers to those materials that historically have come from municipal sources with disposal at municipal landfills. MSW may be generated in residential, commercial, institutional, or industrial settings. MSW includes packaging, newspapers, miscellaneous paper, magazines, glass and plastic bottles, cardboard, aluminum and steel cans, wood pallets, food scraps, yard waste, furniture, appliances, tires, electronics, clothing, and batteries. These materials may be characterized by product type or by material.

Waste Generation Rates

Surveys conducted by DEQ indicate that the generation of MSW in Montana increased from 1,461,542 tons in 2006to 1,693,839 tons in 2010 that per-capita waste generation increased from 8.5pounds/day/person in 2006to 9.4 pounds/day/person in 2010. Using the 2010 census estimated population of 989,414, each day every Montanan contributed an average 7.5 pounds to the state's landfills, recycled 1.47 pounds, and diverted 0.38 pounds of solid waste for a diversion rate of 19.7% (http://www.deq.mt.gov/Recycle/recycling_statistics_Page.mcpx).

Montana's per-capita waste generation statistics are also somewhat skewed as they include wastes that do not meet the standard definition of municipal solid waste. For example, industrial as well as construction and demolition wastes are not considered true -MSW, yet they often end up in Montana Class II landfills because there is no other place for them. In many instances, these wastes are disposed of and weighed with MSW, falsely elevating state totals. Because Montana does not track the percentage of type of MSW going into landfills, DEQ uses national statistics for MSW material percentages. The following chart shows EPA's estimated national breakout of MSW for 2010.



Existing Disposal Capacity

Currently, there are 29 licensed Class II landfills in Montana, compared to 31 in 2006, 59 in 1993 and 87 in 1979. All 29 facilities must meet federal Subtitle D and Montana requirements for liner design, leachate collection, methane monitoring, and other criteria. Overall, the average remaining life of these facilities is about 43 years (2011 Summary Report: Montana Class II Capacity). However, because of the population growth occurring in Montana, landfill space is being filled at a higher rate than anticipated.

In 2011, the10 largest landfills accepted almost 71% of Montana's total landfilled MSW amount of 1291532 cubic yards. (2011 Summary Report: Montana Class II Capacity).

Future Capacity Needs

The Montana Department of Commerce Census and Economic Information Center projects a slow but steady population growth for the state throughout the next decade. The population is expected to continue to shift to the high-density centers in Gallatin, Yellowstone, and Lewis and Clark Counties and the four-county region of Flathead, Lake, Missoula, and Ravalli along the western slope of the Rocky Mountains. In 1990, these seven counties comprised less than 50% of Montana's population. By 2010 projections, they will comprise over 58%. Additionally, local governments must plan for rapid population growth — and therefore waste increase — in areas developed for oil and gas production.

Solid Waste Importation into Montana

Montana's moratorium on importation of out-of-state waste ended in 1993. Since then, states have engaged in an interstate cooperation in the management of solid waste. Given the demographics of Montana and its neighboring states, the most efficient and reasonable management of waste may very well involve transporting it across state borders. Montana imports solid waste from communities in Wyoming, North Dakota, and Washington, as well as from Yellowstone National Park. Montana exports solid waste to communities in Idaho and North Dakota.

Montana assesses a fee of $0.27 cents per ton of imported solid waste in addition to the standard tonnage-based disposal fee of $44 per ton. This additional fee is based on actual administrative costs to the State of Montana. The total imported tonnage for the five facilities accepting out-of-state waste has averaged 34,460 from 1996 through the first quarter of 2012. Although export tonnages are not tracked by DEQ, the agency estimates that exports and imports are well balanced.

Technology Alternatives

Montana has experienced limited advancements in technology in relation to waste management. In fact, those using technologies that held promise for solid waste diversion (such as the waste-to-energy incinerator, Livingston, tire-derived fuel, Holcim Cement, and product substitution-glass, at Ash Grove Cement) are currently not in operation or not taking diverted products for their processes. While not solid waste diversion, both the City of Billings and Lake County landfills are collecting biogas to use as a fuel source.

SPECIAL WASTES

By statute, the term "special waste" is defined as a solid waste that has unique handling, transportation, or disposal requirements to ensure protection of the public health, safety, and welfare and the environment (75-10-802). Special wastes are identified for specific attention because of the toxicity of the wastes and the higher possibility of contamination from small amounts of the wastes. Occasionally, materials are identified as special wastes because of special handling that is needed.

Conditionally Exempt Small Quantity Generators of Hazardous Waste

A waste is considered hazardous by DEQ and EPA if it has one or more of the following characteristics or if it appears on any list of hazardous wastes contained in 40 CFR 261.20 through 261.33.

1. Ignitable: A liquid with a flashpoint below 140˚F.
2. Corrosive: A liquid with a pH less than or equal to 2.0 or greater than or equal to 12.5. Also, a liquid that dissolves steel at an established rate.
3. Reactive: It is unstable or undergoes rapid or violent chemical reaction with water or other substances (waste bleaches and other oxidizers).
4. Toxic: It contains high concentrations of heavy metals (lead, cadmium, mercury, etc.), specific pesticides, or selected volatile organic compounds that could be released into the environment.

"Acutely hazardous" waste is a waste so dangerous in small amounts that more stringent regulation is warranted.

The Montana Hazardous Waste Rules, which adopt federal Resource Conservation and Recovery Act (RCRA) regulations, classify generators of hazardous waste according to the total amount of hazardous waste they generate in a calendar month, measured in pounds.

Conditionally exempt small quantity generators (CESQG) are allowed to dispose of their hazardous waste (HW) in a Class II landfill if they generate no more than 220 pounds of HW (100kg) in any month or no more than 2.2 pounds (1kg) of an acutely hazardous waste in any month. .

Management

Montana's "small" and "large" quantity generators of hazardous waste shipped 37,758 tons of material to out-of-state handlers in 2009 (http://www.epa.gov/wastes/inforesources/data/br09/state09.pdf). For these sizes of generators, handling, transportation, storage, and disposal of hazardous waste are regulated by stringent federal law and state law and rules. Hazardous waste must be sent to a treatment, storage, and disposal facility that is designed and permitted to accept hazardous wastes. There are no such facilities in Montana open to the public; therefore, all hazardous waste generated in Montana by large and small generators must be shipped out-of-state.

CESQGs are exempted from much of the hazardous waste rules and can dispose of hazardous waste in municipal Class II landfills if the landfill will accept it. However, the hazardous waste containers taken to a landfill must be marked "hazardous waste" and must have the accumulation start date annotated on the label. CESQGs are also

exempt from reporting to DEQ how much hazardous waste they have disposed. Therefore, the amounts of CESQG hazardous waste disposed of in Montana landfills are unknown.

Environmental Issues

Waste from CESQGs can be a safety concern to landfill personnel as wastes can cause fires, explosions, and the release of toxic fumes. Additionally, wastes can react with other landfill materials to cause an increase in production and toxicity of leachate.

Economic Issues

Proper collection, storage, transportation, and disposal of hazardous waste can be costly to generators. However, disposal of hazardous waste to municipal landfills may transfer costs to landfill budgets for the proper treatment of potential leachate toxicity.

Household Hazardous Waste

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be household hazardous waste (HHW). Products such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care for disposal.

Management

HHW in any amount is exempt from hazardous waste regulation because it is generated by households, even though the constituents of that waste might be identical to hazardous wastes generated by industry. HHW can be legally disposed of in a MSW landfill. Because HHW is exempt from hazardous waste regulation, DEQ does not collect data on amounts going into municipal landfills. However, EPA estimates that each person in the U.S. produces an average of 4 pounds per year (http://www.epa.gov/region9/waste/solid/house.html). Assuming that Montana reflects the national statistics, 1,979 tons of HHW were disposed of in Montana landfills in 2010.

In response to customer request and landfill need, several communities across Montana have either established permanent HHW take-back services or else schedule periodic collection events.DEQ uses the Earth 911 website (http://www.earth911.org/) to communicate where permanent locations for HHW collection exist. Additionally, a spreadsheet listing landfills that offer HHW collection can be found on the DEQ website (http://www.deq.mt.gov/SolidWaste/default.mcpx). For those local governments offering periodic HHW collection, DEQ will list these events on the program calendar at http://www.deq.mt.gov/Recycle/calendar.mcpx

Environmental Issues

Household products contain many of the same toxic chemicals used in industry, small businesses, and agriculture. While consumer products often come in smaller sizes or contain lower concentrations of hazardous ingredients, the shelves of grocery and hardware stores contain a wide variety of hazardous products, including some with high concentrations of hazardous ingredients. For example, certain drain-cleansing products are 100% sodium hydroxide, and mothballs are 100% naphthalene. These products exhibit all of the properties of industrial hazardous waste and need to be handled with extreme care during use, storage, and disposal to avoid potential health or environmental damage.

Economic Issues

Proper collection, storage, transportation, and disposal of HHW can be costly to generators and/or local governments. Disposal of HHW in municipal landfills may ultimately cause an increase to landfill budgets to offset costs for proper treatment of potential leachate toxicity.

Mercury-Containing Equipment, Switches, and Bulbs

Mercury can be found in pressure regulators, thermometers, thermostats, switches, appliances, clothes irons, electronics, light bulbs, and other common items. The vast majority of products contain only small amounts of mercury; however, the sheer volume of mercury-containing products that enter the waste stream raises concern about the potential pollution of natural resources and threats to human health. Many mercury-containing items can be classified as either Household Hazardous Waste (HHW) (see previous section) or as Universal Waste (UW). When mercury-containing items are handled as UW, regulations have been streamlined in an attempt to make collection and recycling of these materials easier for businesses and local governments, ARM title 17, chapter 53, subchapter 13.

Management

Depending on the generator and handling procedure, mercury-containing devices can fall under the CESQG, HHW, or UW categories. Although many different types of products can contain mercury, this section focuses on thermostats, vehicle switches, and fluorescent tubes/cfls.

Thermostats. Montana passed the Mercury-Added Thermostat Collection Act in 2009 Title 75, chapter 10, part 15, MCA. This law requires thermostat manufacturers to offer a take-back program within the state and mandates that wholesalers in Montana accept mercury-containing thermostats for recycling. Since passage of the law, the Thermostat Recycling Corp. (TRC) has increased its outreach effort to Montana wholesalers, inviting them to participate in its mercury-containing thermostat collection program for a one-time fee of $25. TRC is a nonprofit financed by Honeywell, White-Rodgers, and General Electric, which all manufacturer thermostats. The law also encourages local government to participate in the program and offer thermostat recycling at municipal landfills. TRC has limited collection points in Montana, which can be found at www.thermostat-recycle.org.

Vehicle switches. Mercury-containing switches were used in many vehicles manufactured before 2003. Given that vehicles are the most recycled item in America, recovering the mercury-containing switches before the vehicles are melted down to make new steel significantly reduces mercury emissions resulting from that process. To that end, EPA established the National Vehicle Mercury Switch Recovery Program (NVMSRP) in 2006 in collaboration with industry, environmental groups, auto dismantlers, and state officials. The program's goal is to reduce up to 75 tons of mercury emissions from steel electric-arc furnaces (EAF) by 2017, which is when EPA expects that the majority of vehicles with mercury-containing switches will no longer be in service. To support NVMSRP, the automotive industry established the End of Life Vehicle Solutions Corp. (ELVS), which assists program participants in implementing the switch recovery program. ELVS initially offered financial incentives for participants as well, but those funds are no longer available.

Fluorescent Tubes/CFLs. Few community recycling opportunities for compact fluorescent lights (CFLs) exist in Montana, although the issue is getting more attention nationally and more companies are

offering take-back programs. In Montana and elsewhere, high energy costs are driving consumer and business interest in CFLs, which are highly energy efficient. CFLs save about $30 in electricity costs over the lifetime of the bulb and last ten times longer than incandescent bulbs. Montana utility companies, along with state and local governments and private businesses, are working together to increase awareness and acceptance of CFLs.

Environmental Issues

Mercury cannot be created or destroyed; it occurs naturally in air, water, and soil in several forms: elemental (metallic) mercury, inorganic mercury compounds, and organic mercury compounds. Mercury can affect the human nervous system and harm the brain, heart, kidneys, lungs, and immune system.

Economic Issues

EPA continues to develop stringent regulations limiting the use of mercury in consumer products. It is unclear how the financial costs of managing mercury in compliance with federal regulations will be addressed by industry and government stakeholders. EPA also works with industry to develop voluntary and mandated take-back programs for some mercury-containing equipment. Over the long term, EPA predicts that mercury will have little value as a commodity due to the success of global efforts to successfully decrease industrial use

Medical /Infectious Waste

Medical, or infectious waste, is any waste capable of transmitting a disease to humans. It includes the blood-soaked wastes from patients with infectious diseases, certain laboratory wastes, and used healthcare items designed to cut or puncture. Examples include bandages, lancets, syringes, microbiological cultures, blood and tissue specimens, and personal care items. Most medical or infectious waste is generated in hospitals; however, it may be generated in numerous other settings, including clinics, dental offices, veterinary offices, nursing homes, laboratories, and private homes.

Management

In 1991, the Montana legislature passed the Infectious Waste Management Act, Title 75, chapter 10, part 10, MCA. to set standards for the storage, transportation, treatment, and disposal of infectious waste. The Act requires that generators separate infectious waste from regular waste at the point of origin and that it be stored in specially marked containers in a secured area until it is rendered noninfectious.

Sharp waste, such as hypodermic needles, must be placed in rigid “Sharps” containers. Infectious waste that has been treated and rendered noninfectious by incineration, steam sterilization, or chemical sterilization may be disposed of in a Class II municipal solid waste landfill. The Infectious Waste Management Act requires the state licensing board of any profession or facility that generates infectious waste to ensure compliance with the provisions of the Act. DEQ is charged with regulating the transportation and disposal of infectious waste.

Incineration waste managers may treat and dispose of infectious waste through “incineration with complete combustion that reduces infectious waste to carbonized or mineralized ash” (75-10-1005). Two medical waste incinerators operate in Montana, treating wastes generated by their facilities. DEQ regulates both air emissions from these incinerators and solid waste aspects of the facilities. In addition, there is one commercial autoclave in the state that treats infectious waste from Montana and surrounding states. In 2008, this facility collected and treated 1,611.77 tons of infectious waste. After being autoclaved at 290 degrees and 45 PSI for 38 minutes, the now noninfectious waste is transported to a landfill where it is placed in a specially designated area for disposal.

It is immediately covered. All medical waste containers are cleaned at the company's warehouse/processing facility by heat and chemical sterilization. They are then stored and distributed for reuse by customers.

Environmental Issues

When burned, hospital waste and medical/infectious waste can emit various air pollutants, including hydrochloric acid, dioxin/furan, and the toxic metals lead, cadmium, and mercury. However, 85% to 90% of hospital waste is not infectious. Perhaps the greatest environmental impact medical facilities have on the waste stream is the large volume of waste they generate. These facilities commonly use disposable items, some of which may be necessary to control infection. Nonetheless, medical facilities should examine the opportunities for source reduction, reuse, and recycling of all their waste streams.

Economic Issues

Following the adoption of stricter air emission rules, all but two medical incinerators in Montana have ceased operation due to the cost of environmental compliance. The remaining two incinerators handle only their own waste. Two other medical facilities autoclave and landfill their own waste. The remainder of medical waste generated in Montana is stored and transported to the one commercial autoclave, which is located in Butte.

Waste

Tires

EPA estimates that the U.S. generates approximately 290 million waste tires per year or approximately on tire per person per year (http://www.epa.gov/waste/conserve/materials/tires/faq.htm). Although DEQ does not track tire disposal rates specific to Montana, tire dealers estimate a replacement rate of 0.75 tires per person per year. Even using conservative estimates, Montana generates approximately 727,500 waste tires per year.

Management

In many parts of the U.S., diverting tires from the waste stream through recycling efforts has become big business. Scrap tires are used whole as well as chipped, shredded, and ground. Productive and environmentally safe applications range from playground cover and landscaping mulch to asphalt additives. Retreading also saves millions of scrap tires from being disposed of as scrap each year. EPA figures show that, from 1990 through 2003, the number of waste tires recycled nationally increased from 11 million (24.5% of the 223 million generated) to 233 million (80.4% of 290 million generated).

Unfortunately, in Montana developing alternative uses for waste tires has lagged due to the low production of waste tires and lack of local recycling facilities.

Environmental Issues

Piles of waste tires pose health threats. Disease-carrying pests such as rodents may live in and among the tires, while mosquitoes will breed in the stagnant water that collects inside them. Several varieties of mosquitoes can carry deadly diseases, including West Nile, Encephalitis and Dengue Fever. Short of removing the piles, mosquito control and eradication programs are difficult.

Burning waste tires may also pose a risk to human health. Chemical composition tests on waste rubber show that it contains numerous toxic and hazardous pollutants. Although combustion of tires for energy recovery provides an inexpensive energy source, the properties that make tires suitable for energy recovery combustion also make them susceptible to unwanted and uncontrolled combustion. Open, uncontrolled tire fires are difficult to extinguish and can release large amounts of toxins into the air, soil, and ground water.

Tires occupy a large space in landfills. They are not easily compressed and nearly 75% of the space occupied by a whole waste tire is dead space, or air.

Economic Issues

Although recycling/reuse of waste tires is a business opportunity, it is one that is still in the development stage in Montana, and the costs associated with it are generally too onerous for a company without some type of subsidy. That said, any business interested in starting a waste tire reuse/recycle program should evaluate the following issues.

- The number of waste tires available within a 200 mile radius.
- The types of tires available—passenger tires, light truck, or both.
- The amount that can be charged to collect the tires.
- Potential customers for the recycled material.
- The ultimate end-market—such as TDF, landscaping material, playground cover, or engineering grade powders.
-

Typically, startups will need access to about 500,000 tires per year for a successful business model. Anything less than this will not justify the initial capital investment required.

Waste Carpet

Carpets are manufactured to withstand years of wear and are difficult to manage as scrap. Because carpets consume large amounts of petroleum-based materials, industry efforts are leading the way in carpet recycling. Carpet recycling began in Georgia, when Interface Carpet started to decrease its use of nonrenewable fuels and increase sustainability. It grew into an industry-wide effort through the Memorandum of Understanding for Carpet Stewardship, a voluntary agreement among EPA, industry, NGOs, and state governments. The MOU set a national goal to divert 40% of scrap carpet by 2012, through reuse, recycling, cement kilns, and waste-to-energy. A third-party organization, Carpet America Recovery Effort (CARE), was established to coordinate carpet recovery efforts. The market for scrap carpet is driven by industry in recognition of the material's value as a recycled commodity and, in some cases, an alternative fuel for the recycling operations.

Management

Montana does not have well-established carpet recycling activities at this time, and the majority of waste carpet is generally transported and disposed of in a municipal landfill. One known carpet recycling program available to Montana consumers is offered by Pierce Flooring and Design, a regional retailer with eight stores in the state. A semi-trailer is located at each store to provide temporary storage and final transport of the used carpets to an out-of-state recycling processor. Pierce generally ships to a processor located in either Washington or California. Pierce pays the freight charges and also pays the processor to accept the scrap material. Pierce staff state that the recycling program is a budget item and does not generate revenue for the retailer. The company is able to save money by avoiding landfill tipping fees and expects the program to become cost-neutral as it matures.

Environmental Issues

Carpet manufacturing is an energy-intensive process that creates a petroleum-based final product. Scrap carpet can be recycled into commodity-grade resins and fibers, which then have market value. Scrap carpet in landfills is somewhat difficult to manage due to its weight and bulkiness.

Economic Issues

There are collection and consolidation activities for carpet in Montana, but there are no processors. Processors for carpet are paid to accept the material and separate the carpet into padding, backing, and other materials, which are then sold back to industry. More retailers could participate, but while landfill tipping fees are relatively low in Montana, there is little incentive to avoid the fees through recycling.

Construction and Demolition Waste

Construction and demolition (C&D) waste consists of the waste generated during construction, renovation, and demolition projects. C&D waste often contains bulky, heavy materials, including concrete, wood, asphalt, gypsum, metal, brick, and plastic, as well as salvaged building components such as doors, windows, and plumbing fixtures. The vast majority of C&D waste (approximately 92%) comes from building demolition and renovation, with the remainder generated by new construction. EPA estimates that the commercial and residential building sectors produce 61% and 39% of C&D waste, respectively. (www.epa.gov/epaoswer/non-hw/debris/about.htm)

The estimated C&D debris generated during demolition of a single-family house is 111 pounds per square foot of dwelling. While the majority of debris from new construction is wood, the majority of debris from demolition is concrete.

Management

It is uncertain how much of Montana's C&D debris is disposed of with municipal solid waste. Significant quantities of building material, particularly renovation scraps, are discarded in the municipal waste stream. C&D waste can be discarded in Class II or IV landfills, and although Montana has two licensed Class IV C&D landfills in operation, most C&D waste is discarded at Class II landfills. Operators may separate C&D waste from the rest of the waste stream, but they are not required to do so.

Non-friable, or non-airborne, asbestos waste, such as cement asbestos siding, floor tile, linoleum, asphalt roofing, and so on can be disposed of as construction demolition waste if it remains intact and is non-friable. Non-friable asbestos waste should not be compacted or treated using waste minimization techniques. Additional information on Asbestos Waste can be found in the next section.

Environmental Issues

Demolition debris in particular may contain hazardous components. Lead is present in solder, flashing, and some old paint. Treated wood also contains chromium, copper, arsenic, mercury, barium, and cadmium. Drywall and plaster consist of gypsum, which contains high levels of sulfate. Asphalt, roofing tar, and tarpaper contain leachable petroleum products. All these products are commonly found in C&D waste and have the potential to contaminate the water supply if disposed of improperly. In properly sited, designed, and operated landfills, C&D waste likely does not pose a significant threat to ground water. DEQ interprets the solid waste laws to prohibit unlicensed on-site disposal of C&D waste on private land.

Economic Issues

The most significant contributing factor in the amount of C&D waste that ends up in landfills is the high cost of material separation. Time and space to separate the wastes, the lack of demand for the materials, and the ease/low cost of landfilling are all deterrents to recycling and reuse.

Asbestos Waste

Regulated asbestos-containing material (RACM) is defined in DEQ rules and EPA regulations as materials that contain more than 1% of either friable ACM and non-friable ACM that is or may become, friable during demolition or renovation activities. Friable means that the asbestos can be crumbled or reduced to powder by hand pressure. 40 CFR § 61.141.

Management

State rules and federal asbestos regulations require RACM to be removed from public and commercial buildings prior to demolition or renovation activities. RACM can be disposed of only at state-licensed Class II landfills and is regulated under the Administrative Rules of Montana (ARM) Title 17, Chapter 74, Subchapters 3 and 4, and Subpart M of Part 61 of title 40 of the Code of Federal Regulations (CFR). Subpart M of Part 61 is the asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) regulation. NESHAP governs building demolitions, renovations, active and inactive asbestos landfills, and other sources of asbestos emissions. Before demolition or renovation of a public or commercial building, a trained and DEQ-accredited asbestos inspector must conduct an asbestos inspection. The asbestos inspector must be accredited through DEQ (Asbestos Control Program). Disposal site operators are strongly encouraged to screen waste loads for asbestos-containing waste materials and ask for proof of an asbestos inspection before accepting C&D waste. Additionally, the generator and transporter are required to obtain an asbestos abatement project permit from DEQ if three or more linear or square feet of friable or potentially friable ACMs are abated, transported, or disposed of. Furthermore, only trained and accredited asbestos abatement contractors can perform asbestos activities or handle RACM, including handling the waste at a landfill. A Waste Shipment Record (WSR) must accompany the waste from generator to disposal site. In Montana, asbestos abatement project contractors - accredited by DEQ - handle most of the legally abated ACM.

Disposal site operators are required to report information to DEQ regarding asbestos waste disposal operations. They must include a description of the waste disposal site, a description of the method to be used to comply with the asbestos NESHAP if warranted, and methods to be used to prevent asbestos emissions. Disposal site operators are also required to retain records on waste shipments and the location of asbestos waste.

Environmental Issues

Since the early 1970s, EPA and OSHA have been concerned about the potential health hazards relating to the generation, handling, and disposal of asbestos waste. Serious respiratory diseases and cancers, such as asbestosis and mesothelioma, can appear several years after asbestos inhalation exposure. Renovation and demolition of asbestos-containing properties pose significant health hazards to construction, transportation, and waste disposal workers as well as persons who might be exposed in their home or workplace.

Economic Issues

The removal and disposal of asbestos-containing materials from residential and commercial properties may involve the services of numerous specialties at significant cost. Handling, transportation, and disposal of RACM must be performed in accordance with federal, state, and local rules and regulations.

Electronics Scrap

Innovations in technology have led to increased use of electronics, which in turn has increased electronic scrap (e-scrap) being generated when the electronic products reach the end of their useful life. E-scrap includes phones, computers, business equipment, entertainment and communications equipment, and thousands of other products used in homes and businesses today. E-scrap contains plastic, toxic chemicals, and heavy and rare earth metals, and can contribute to pollution if not properly managed.

Management

The number of unwanted electronics generated by the desire or need for technical upgrades is growing, and there is a good reuse market for these products. For example, markets for used cell phones are very strong, offering fundraising opportunities for Montana schools and other organizations. Cellular telephone companies gladly accept back any scrap cell phone, regardless of the brand.

Due to the rare earth metals, gold, and other recoverable metals found within most products, recycling opportunities for e-scrap have grown substantially. Even products such as televisions and computer monitors, which contain fewer valuable metals, can be recycled. Many electronics can be recycled for free or for very little cost, but other equipment carries a recycling fee. Electronic recycling is one of the fastest areas of growth within the scrap recovery industry. There are no processors of e-scrap in Montana, but several recycling businesses collect, consolidate, and prepare e-scrap for shipment to processors elsewhere. These e-scrap "recyclers" are licensed by DEQ as solid waste systems. DEQ began to partner with communities in 2006 to organize electronic collection events. Several communities now offer events annually or have started permanent collection programs. Montana citizens have recycled nearly 3 million pounds of electronics since 2006.

EPA estimates that electronics make up nearly 2% of the municipal waste stream and that the sheer volume of electronics in the waste stream will greatly increase as personal electronic use continues to expand. EPA estimates that over 80% of electronics are disposed of in landfills across the U.S. The majority of electronic waste in Montana is landfilled, partly because access to e-scrap recycling is limited to annual events, and partly because access to retail programs may require transporting the e-scrap long distances to stores. A handful of municipal and private solid waste companies offer year-round recycling opportunities. (http://www.epa.gov/waste/conserve/materials/ecycling/index.htm)

Environmental Issues

Although small amounts of heavy metals may be used in each electronic product, the volume of e-scrap in landfills raises concerns about potential leaching and cumulative effects. Mercury, lead, cadmium, and PCBs can leach when circuit breakers, cathode ray tubes, and monitors are exposed to acid waters, as can happen in landfills. EPA states that 80% of the recycling operations in the U.S. operate within the confines of national and international laws regarding the shipment of hazardous waste. As a regulator of the e-scrap industry, EPA has issued enforcement actions and fines to a small number of e-scrap recyclers caught in violation of federal law and international laws and treaties. Working with industry watchdogs and trade organizations, EPA is addressing the illegal export of e-scrap to countries with primitive recycling practices and lax environmental protections.

Economic Issues

The electronics recycling industry has been growing rapidly, and companies are now merging and consolidating operations, as well as developing methods of recycling hard-to-handle materials (e.g., cathode ray tubes that were used in older televisions and monitors). These activities are expected to lower recycling service fees but may not eliminate them.

Waste
Batteries

Batteries convert chemical energy to electrical energy to power electronic equipment. As small, portable electronic items increasingly become part of everyday life, battery usage continues to increase. EPA estimates that nearly 3 billion household dry-cell batteries are purchased in the United States each year, along with 99 million wet-cell lead-acid car batteries and an unknown number of heavy-duty batteries for industrial applications. (http://www.epa.gov/waste/hazard/wastetypes/universal/batteries.htm)

Management

Source reduction for batteries occurs at the point of purchase, where businesses, government agencies, and consumers can choose to purchase rechargeable batteries rather than disposable alkaline batteries. Purchasing rechargeable batteries reduces the need for on-going replacement of alkaline batteries and greatly increases opportunities to recycle. Free recycling programs exist for rechargeable batteries.

Currently, household alkaline batteries may be recycled through limited programs that charge handling and processing fees. Rechargeable batteries contain more heavy metals than alkaline batteries, but because many of those metals trade at costs that attract private enterprises, collection programs are becoming more widespread and well known. Home improvement stores, electronic stores, and battery retailers often offer collection services for discarded rechargeable batteries. The Call2Recycle program (formerly the Rechargeable Battery Recycling Corp., http://www.rbrc.org) is an industry-funded nonprofit organization that offers free recycling of all rechargeable batteries that weigh less than 11 lbs. (www.call2recycle.org). Postage-paid collection boxes are provided at no charge to retailers, public agencies, and other interested parties. Consumers can visit www.Earth911.org to find the nearest collection center. Car batteries contain lead and sulfuric acid, which, when disposed of, warrant the designation of hazardous waste. Fortunately, lead has inherent value and is recyclable. In the U.S., over 95% of all automotive batteries are recovered and recycled. Virtually any place that sells car batteries will accept used ones in trade.

Environmental Issues

Although the chemistry of household batteries has changed to contain fewer heavy metals and no mercury, public perception has not changed. Household alkaline batteries can be safely disposed of in landfills, but DEQ receives many requests for household battery recycling programs. Because battery manufacturers started phasing out the use of mercury in alkaline batteries in 1989, the dry-cell battery types that continue to require it are now made with much less mercury than in the past. Research continues into alternatives that would allow reduced use of heavy metals in other battery types.

Of more concern, however, are the NiCd and sealed lead-acid (SLA) batteries that contain significant amounts of cadmium, copper, zinc, lead, manganese, nickel, and lithium. NiCd and SLA batteries may create a hazard to human health when disposed of incorrectly. In landfills, heavy metals have the potential to leach slowly into soil, ground water, and surface water, aided by the corrosive activity of the battery electrolyte.

Economic Issues

Although all batteries can be recycled to some extent, the NiCd rechargeable-type batteries are the most desirable and profitable to recycle. Unfortunately, this type of battery is initially costs significantly more than traditional alkaline batteries. Due to the costs involved, alkaline battery recycling programs are rarely established.

Pharmaceutical Waste

Pharmaceutical waste encompasses discarded prescription and over-the-counter therapeutic drugs, veterinary drugs, diagnostic agents, and supplements such as vitamins. It also includes personal care products (PPCPs) such as fragrances, cosmetics, and sun-screen products.

The pharmaceutical industry estimates that 3% of the prescriptions written in the U.S. are filled but never used. The preferred disposal option for these prescriptions is through take-back programs when available.

Management

The Montana Department of Justice (DOJ) launched Operation Medicine Cabinet in 2010 to assist local law enforcement agencies in establishing permanent prescription drug drop-off locations. Though developed primarily to prevent illegal use of prescription drugs, this program has the added advantage of ensuring the proper disposal of pharmaceutical waste.

Several Montana communities have established permanent drop-off locations. DOJ also sponsored a "take-back tour" in spring 2011, which collected hundreds of pounds of unused prescription medicine. See www.doj.mt.gov/rxabuse/storagedisposal.asp for more information on the DOJ program.

When a take-back program is not available, the preferred method of disposal is to place medication in a sealed container and place into the landfill. These products should never be flushed into sewer or septic systems.

Environmental Issues

The two greatest concerns related to improper disposal of pharmaceutical waste are hormone disruption in fish and other animals, and the creation of bacteria resistant to antibiotics. EPA has added 13 pharmaceutical products to its Contaminant Candidate List to be considered for inclusion under the Safe Drinking Water Act (www.epa.gov/ogwdw/ccl/indix.html). The National Toxicology Program is also researching the effects on human health of low-dose exposure to pharmaceuticals in drinking water.

Economic Issues

Drug take-back programs require money for collection and processing. The programs rely on donations or grants and may not be sustainable.

Animal Waste (tissue/offal)

Animal waste is primarily derived from the agricultural sector—i.e., farms, ranches, and livestock holding areas—but it can also include wild game and animals from managed game farms. Animal waste includes whole and parts of carcasses from butchering or veterinary medical procedures.

Montana landfills need to carefully dispose of animal waste, as well as be prepared to handle an incident (e.g. disease outbreak) should it occur. In the event of an outbreak of a highly contagious animal disease, special measures must be taken to ensure the disease agent is eradicated, both to contain the outbreak and to prevent its reoccurrence at a future time. In some cases, the agent will not survive long after the death of the infected organism, and proper burial is sufficient for the animal carcass. Other diseases require incineration for eradication. Determination of the correct option is addressed on a case-by-case basis by state agencies. It is the owner's responsibility to properly dispose of animals known to be sick.

Management

Animals found on public roadways are handled by the Montana Department of Transportation (DOT), which usually removes the carcasses and takes them to maintenance facilities to be composted. Animal carcasses found in the wild can typically be left to naturally decompose, unless they appear to have died from a threatening disease. In that case, the animal should be reported to the Montana Department of Fish, Wildlife and Parks (FWP).

Entrails and other organic remnants from hunting can typically be disposed of with regular household waste, while hides can often be sold to "hide and fur" locations throughout the state. An animal corpse can also be disposed of on private property with the consent of the owner if meeting requirements and restrictions state in § 75-10-213, MCA.

DEQ regulates some aspects of the disposal of dead animals under §§ 75-10-212 and 213, MCA, and provides guidelines for proper burial of animals. For animals that did not die from a contagious disease, the primary disposal method is to bury them in a high and dry location to protect state water and wells. Animals buried on site must be covered with a minimum of two feet of soil. The Montana Department of Livestock provides guidelines for the disposal of animals from agricultural operations.

Environmental Issues

There are two primary concerns with disposal of animal waste: the effect it may have on water quality in the process of natural decomposition, and the potential of spreading disease. Anthrax, foot and mouth disease, chronic wasting disease (CWD), and bovine spongiform encephalopathy are just a few of the diseases that could be spread by inadequate disposal of sick animals. While these diseases do not currently pose a threat in Montana, a few national and international incidents have occurred.

Economic Issues

Images of cowboys driving cattle across the range and families living off the land remain more truth than myth in Montana. Livestock, mainly cattle and sheep, continue to graze the vast federal, state, and private lands throughout the state, while dairy and other animal products are produced in all corners. Hunting draws a large group of visitors to the state each year. Thus, the health of animal-related industries is vital to the image, economy, and environment of the state.

Rendering plants are the main source for recycling dead animals, slaughterhouse wastes, and supermarket waste into various products known as recycled meat, bone meal, and animal fat. These products are sold as a source of protein and other nutrients. Currently, there is no rendering plant in Montana.

Contaminated Soils

When petroleum products, solvents, or other toxic chemicals leak or spill onto soils, action must be taken to prevent the migration of the contaminants into ground water or surface water. Contaminated soils are considered solid waste when two conditions are met: first, the corrective action plan for cleaning the site requires the removal of the contaminated soils from the site rather than "*in-situ* treatment;" and secondly, the soils are not hazardous. Contaminated soils as well as sump solids from vehicle service centers and car washes are regarded as Group II solid waste; these are handled as contaminated soils, provided that they are not RCRA listed or characteristic hazardous waste. If soils are determined to be hazardous, they are regulated under hazardous waste rules. Waste managers must ensure environmentally sound treatment and disposal.

Management

In 2010, six facilities in Montana were licensed as soil treatment facilities, and five Class II Landfills were licensed to include soil treatment facilities. Contaminated soils are typically landfarmed on-site in Montana or taken to a licensed facility. Numerous sites may have been licensed as "one-time" landfarms for *in situ* remediation.

Environmental Issues

While treatment and disposal methods may provide greater protection than leaving the soils untreated on-site, they raise some environmental concerns. Depositing large amounts of petroleum-contaminated soil in a landfill takes up valuable space and introduces contaminants that may eventually leach from the landfill. Landfarming also releases volatile organic chemicals into the air, which may be of concern to surrounding residents. Petroleum products generally contain more than 100 different constituents that possess a wide range of volatility. The volatility of contaminants proposed for treatment by landfarming is important because volatile constituents tend to evaporate from the landfarm, particularly during tilling or plowing operations, rather than being biodegraded by bacteria. In general, gasoline, kerosene, and diesel fuels contain constituents with sufficient volatility to evaporate from a landfarm. Lighter (more volatile) petroleum products (gasoline) tend to be removed by evaporation during landfarm aeration processes. Heavy precipitation increases the danger of leachate formation. Landfarms must regularly monitor air, water, and soil contaminants.

Economic Issues

Landfarming is a cost-competitive treatment for contaminated soils, running between $30 and $60 per ton (www.epa.gov/oust/cat/landfarm.htm). If contaminated soils are shallow (less than 3 feet below ground surface), it may be possible to effectively treat the contamination without excavating the soils.

Implementation Strategy for Plan Elements

Likely, the most valuable portion of the IWMP is the strategy section for increasing the yearly waste diversion rate through recycling/composting and developing recommendations for improved handling of "Special Wastes." Emphasizing those products in the waste stream that may have monetary value shall be the focus for increasing the waste diversion rate. These products include aluminum, cardboard, paper, metal cans, glass, plastic, textiles, yard trimmings, and food waste. Following are the identified barriers and recommendations for improving Montana's waste diversion rate by commodity, as well as methods for moving Special Wastes higher within the Waste Management Hierarchy.

WASTE DIVERSION (RECYCLING/COMPOSTING)

Aluminum

Barriers to Recycling:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Cardboard

Barriers to Recycling:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Paper

Barriers to Recycling:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Metal Cans

Barriers to Recycling:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Glass

Barriers to Recycling:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Plastic

Barriers to Recycling:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Textiles

Barriers to Recycling:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Yard Trimmings

Barriers to Composting:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

Food Waste

Barriers to Composting:

1.
2.
3.
4.

Recommendations:

1.
2.
3.
4.

SPECIAL WASTES

Conditionally Exempt Small Quantity Generators of Hazardous Waste

Barriers to Better Management Practices:

1.
2.
3.
4.

Recommendations for Better Management Practices:

1.
2.
3.
4.

Household Hazardous Waste

Barriers to Better Management Practices:

1.
2.
3.
4.

Recommendations for Better Management Practices:

1.
2.
3.
4.

Mercury Containing Equipment, Switches and Bulbs

Barriers to Better Management Practices:
1.
2.
3.
4.

Recommendations for Better Management Practices:
1.
2.
3.
4.

Medical/Infectious Waste

Barriers to Better Management Practices:
1.
2.
3.
4.

Recommendations for Better Management Practices:
1.
2.
3.
4.

Waste Tires

Barriers to Better Management Practices:
1.
2.
3.
4.

Recommendations for Better Management Practices:
1.
2.
3.
4.

Construction and Demolition Waste

Barriers to Better Management Practices:
1.
2.
3.
4.

Recommendations for Better Management Practices:
1.
2.
3.
4.

Asbestos Waste

Barriers to Better Management Practices:
1.
2.
3.
4.

Recommendations for Better Management Practices:
1.
2.
3.
4.

Electronics Scrap

Barriers to Better Management Practices:
1.
2.
3.
4.

Recommendations for Better Management Practices:
1.
2.
3.
4.

Waste Batteries

Barriers to Better Management Practices:
1.
2.
3.
4.

Recommendations for Better Management Practices:

1.
2.
3.
4.

Pharmaceutical Waste

Barriers to Better Management Practices:

1.
2.
3.
4.

Recommendations for Better Management Practices:

1.
2.
3.
4.

Animal Waste (tissue/offal)

Barriers to Better Management Practices:

1.
2.
3.
4.

Recommendations for Better Management Practices:

1.
2.
3.
4.

Contaminated Soils

Barriers to Better Management Practices:

1.
2.
3.
4.

Recommendations for Better Management Practices:

1.
2.
3.
4.