

US EPA ARCHIVE DOCUMENT

# Chapter 4. Solid Waste Collection and Disposal Programs

A key component of a strong tribal solid waste management program is setting up a collection and disposal system that is compatible with the needs of your tribe or village. Through careful planning, you can ensure that your system will effectively manage your waste stream, safeguard tribal members' health, and protect the environment. Many tribes have found that developing convenient and affordable waste collection and disposal alternatives is the most effective way to stop illegal dumping.

This chapter explores the benefits and costs of different waste collection and disposal options for everyday household waste, as well as construction and demolition debris and hazardous waste. It includes case studies and tables that weigh various options in terms of criteria that are important to tribes. All materials referenced or cited in this chapter are included in the Resources section at the end of this chapter. This chapter also illustrates the key elements of a comprehensive illegal dumping prevention program—site maintenance and controls, community outreach and involvement, targeted enforcement, and measurement.

## Getting Started

“Everyone has different goals and needs. Do a feasibility study to know your needs.”

~Merlin Tafoya, Sr., Executive Director of Public Works Division, Jicarilla Apache Nation

Each tribe has a unique history, culture, financial situation, and geographic location. These key factors all will play a role in determining the collection and disposal options that are right for your tribe. Each tribe also generates a variety of types of waste in its waste stream, depending on its size, geographic location, and the activities taking place in the tribe. Waste assessments can help you develop a collection and disposal system that matches your particular waste types and generation rate. They also can help you decide whether or not to collect recyclable materials; compost organic wastes; or develop a management system for household hazardous waste, bulky items, and construction and demolition debris. The Spirit Lake Tribe in North Dakota conducted a waste sort to determine waste composition and volume before starting its waste collection program. See Chapter 2 for more exam-

ples of other tribes' experiences and information on waste stream analyses.

Decisions about what materials to collect, as well as how to collect, transport, and ultimately dispose of them, are all interrelated. Whether you are starting a solid waste management program or enhancing an existing system, thinking through the entire collection and disposal process will help guarantee your program's success.

### Collection Options

There are three basic collection systems:

- Drop-off sites
- Direct access to transfer stations
- Curbside collection

Table 2 compares some of the capital costs associated with drop-off sites and curbside collections systems in rural areas.

### Drop-off Sites and Direct Access to Transfer Stations

Drop-off sites are centrally located facilities with containers where tribal members deposit their waste. Some tribes also facilitate direct access to transfer stations so tribal members can take their trash to these larger facilities themselves. These collection options are less convenient for residents than curbside collection but keep collection costs down for the tribe. Tribes can own and operate these facilities or make arrangements with neighboring communities to use their facilities.

The Bois Forte Band has drop-off boxes at two locations on its northern Minnesota reservation. Through an agreement with the tribe, St. Louis County owns the drop-off boxes and collects trash and recyclables from the tribe.

**Table 2. Estimated Waste Collection Capital Costs**

	Waste Drop-off Sites	Curbside Collection
Site development		
Household solid waste	\$3,000–4,000	
Other solid waste	\$30,000–40,000	\$30,000–40,000
8 cubic yard drop-off container (e.g., green box)	\$4,000–5,000 each	N/A
Large plastic container (< 90 gallons)	N/A	\$50
40-cubic-yard roll-off container (for bulky items and C&D)	\$3,000–5,000	\$3,000–5,000
30-cubic-yard front loading packer/collection truck	\$100,000–110,000	\$40,000–60,000
Other equipment	\$25,000–30,000	\$0
Maintenance shop (optional)	\$40,000–50,000	\$40,000–50,000
Transfer station	\$200,000–400,000	N/A

Source: TASWER and SWANA. *Developing and Implementing Integrated Solid Waste Management Systems for Tribes*, Spring 2003, p. 50.



Recyclables collection containers used by the St. Regis Mohawk Tribe.

Members of the Red Cliff Tribe of Wisconsin take their trash directly to a tribally owned transfer station. The tribe funds transfer station operations through a Pay-As-You-Throw (PAYT) program. Tribal members must bring their trash to the transfer station in special trash bags that they can purchase from the tribe. The PAYT system encourages residents to reduce the solid waste they dispose of, as members must purchase more trash bags to throw away larger volumes of trash.

### Curbside Collection

You can customize a waste collection program to fit your tribe's or village's specific needs. With curbside collection programs, tribal members can deposit their trash in containers right outside their homes, and haulers pick it up and take it away for disposal. This system is more convenient for residents, but more expensive than other types of collection programs because it has higher transportation and labor costs. Transportation costs can add up quickly when collection trucks serve rural communities where residences are spread out over a large area.

One tribe that runs a curbside collection program is the Jicarilla Apache Nation in New Mexico, which provides free, weekly waste collection to all residents. The nation owns two 14-cubic-yard capacity compactor vehicles. The vehicles collect and transport the waste to a tribally owned and operated transfer station that handles 12 to 16 tons of waste per day.

### Combining Collection Options

Some tribes find that a combination of collection options works best. The Assiniboine and Sioux Nations of Fort Peck Reservation in Montana show that tribes can incorporate elements of several waste collection options

The St. Regis Mohawk Tribe's curbside collection program in action.



into a successful program. The reservation's population extends across six towns in Valley and Roosevelt Counties, and residents in the towns have adopted varied collection systems. The Assiniboine and Sioux Nations obtained funding from the Department of Housing and Urban Development (HUD) and IHS to build roll-off sites for five of the towns. Residential and business customers pay a monthly permit fee to dispose of waste at these sites. The nations' Operations and Maintenance (O&M) Department hauls waste from two of the sites to a landfill in Roosevelt County, where they pay a tipping fee. The nations pay for a private trucking company to haul waste from the other sites to a landfill in Valley County. Valley County charges a flat fee for using the landfill, based on the county population.

The Fort Peck Reservation also pays a private trucking company to collect materials at the curbside in two of the towns on the reservation. O&M charges residential customers a monthly fee—currently \$14, which is added to residents' utility bills—to support curbside collection service. This option worked for Fort Peck because the tribes solicited input from members before implementing the plan and gave members a choice. Before O&M instituted a rate change, the tribes held a public hearing and asked residents if they would prefer to use a roll-off container or pay a higher collection fee. Residents in one town decided to pay the higher fee. Residents in another decided to use the roll-off container, but later agreed to pay the higher fee.

**Table 3. Estimated Annual Operating Costs for Solid Waste Management Systems\***

<b>Labor:</b>	
Administration	\$10 per hour
Other	\$5–7 per hour
Benefits	30% of salary
<b>Vehicles:</b>	
Maintenance	\$0.20–0.35 per mile
Fuel	\$0.10–0.20 per mile
Roll-off containers	\$100–300 each load
Contingency	\$10,000–30,000 per year

\*In addition, there will be annual capital costs for items such as household containers (5-year average life expectancy), roll-off containers (10-year life expectancy), buildings (25-year life expectancy), or collection trucks (150,000 miles life expectancy).

Source: TASWER and SWANA. *Developing and Implementing Integrated Solid Waste Management Systems for Tribes*, Spring 2003, p. 52.

**Outside Factors Affecting Collection Options**

Tribal collection can be affected by factors outside the scope of the tribe's control. Winter weather can make rural curbside collection impractical in some areas, particularly for Alaskan Native villages, which can be covered in snow and ice the majority of the year. The Alaskan Native Village of Kipnuk uses all-terrain vehicles to collect trash from residents twice a week during the summer. During the long winter, regular waste pickup is not possible and trash can accumulate in the village. The Kipnuk Traditional Council decided to address the problem by building 10 wooden sleds outfitted with trash dumpsters. During the winter, the sleds rest in the village near the honey bucket stations. Periodically, community members use snow machines (i.e., snowmobiles) to move the sleds out of the village to the landfill.

**Collecting Recyclables and Special Wastes**

Planning a waste collection system also should include consideration of how to manage recyclable materials and special wastes.

Collecting recyclables will be feasible for some tribes and can offer benefits such as lowering disposal costs, preserving resources, supplying the tribe with manufacturing feedstocks and materials such as compost, and generating revenue. Other tribes, however, might find that collecting recyclables is infeasible or too expensive, especially if they are located far from processing centers and markets. For more information on tribal recycling issues and resources, refer to Chapter 5.

Your tribe also should plan for proper management of special wastes—including used oil, tires, white goods, bulky goods, household hazardous waste, and construction and demolition debris. If disposed of improperly, these materials can be unsightly and even pose health threats to tribal members. They also can contaminate the tribe's waste stream and disrupt collection and disposal activities. Following you will find examples of how a variety of tribes manage special wastes.

- Employees at the Jicarilla Apache Nation's transfer station in Arizona screen waste for contaminants, such as tires and household hazardous waste, to make sure they are removed from the general waste stream and are disposed of appropriately. To help prevent contamination, you can educate your community members about proper disposal practices for these materials and develop programs to ensure their safe management.
- Some tribes designate specific collection depots for special wastes. The Alabama-Coushatta Tribe of Texas encourages residents to bring used tires and oil to a local auto shop that accepts them for a small fee. The tribe also contracts with a local salvage yard that hauls away bulky items that contain metal for free. Tribal members simply place these items in a designated location at the transfer station.
- The White Mountain Apache in Arizona took a different approach. The tribe hosts an annual "Clean Your House Day" to give tribal members an opportunity to dispose of large bulky items. The tribal Public Works Department sets out large bins at different locations on the reservation, and residents can drop off their items without having to pay a special disposal fee.
- In Minnesota, the Red Lake Band of Chippewa co-locates permanent household hazardous waste collection containers at its solid waste drop-off sites, while the Fond du Lac Band of Lake Superior Chippewa hosts household hazardous waste collection events. In addition, high school students have conducted a thermometer exchange on Fond du Lac Reservation to safely remove mercury-containing thermometers from the community.
- For many tribes, construction and demolition debris comprises a significant portion of the solid waste stream. The Fort Peck Tribes of Montana had problems with contractors placing bulky construction and demolition debris in tribal roll-off bins. The bins filled up quickly,



Scrap metal recycling pile at the Eastern Band of Cherokee Indians' transfer station.

forcing the tribes to pay thousands of dollars in landfill tipping fees. To address this issue, the tribes decided to manage construction and demolition debris separately from MSW. The Fort Peck Operation and Maintenance Department now rents construction and demolition debris dumpsters to contractors and transports their waste to a special C&D debris landfill.

- Special wastes can be particularly problematic for remote Alaskan Native villages, since transporting the wastes to an appropriate management facility is difficult. For this reason, the Native Village of Barrow-Inupiat Traditional Government has taken an active approach to educating the Inupiat people about safe storage and disposal of household hazardous wastes. The Inupiat Traditional Government identified the kinds of potentially hazardous wastes being produced in the community and then used the local radio and television networks to reach out to members with information about safe management.
- The Onondaga Nation in New York decided to make household hazardous waste disposal a priority. The nation hosts household hazardous waste collection events twice a year to educate the tribal community about proper disposal practices. In addition, the tribe provides public access to a household hazardous waste collection compartment at the transfer station. Tribal members can bring their household hazardous waste to the transfer station 24 hours a day, 7 days a week. The transfer station also includes a storage container for car batteries.

### Transfer and Disposal Options

Where does solid waste go after it is collected from residents? Reviewed below are four major transfer and disposal options for tribes:

- Using a transfer station or landfill located off the reservation
- Building a transfer station on the reservation
- Building a landfill on the reservation
- Disposing of construction and demolition debris and hazardous waste

#### Using a Transfer Station or Landfill Located Off the Reservation

For some tribes, outsourcing—contracting with a public- or private-sector facility to manage discards—is a temporary or permanent waste management solution. Tribes can hire private haulers or contract with local waste management districts to provide service for reservation residents. For tribes that are building a transfer station or landfill, there often is a gap between the time that a tribe closes its open dumps and opens a new transfer station or landfill. If residents do not have a convenient and affordable waste disposal alternative in the meantime, they might resort to illegal dumping. Your tribe can work with a private hauler or local government to provide residents with curbside collection service or access to a designated drop-off site at a nearby transfer station or landfill.

Another example of outsourcing is seen on Fond du Lac Reservation in Minnesota. When the Fond du Lac Band of Chippewa began to close its open dumps, illegal dumping problems increased. The tribe recognized the need to provide residents with convenient and affordable waste disposal alternatives and allowed private waste haulers to offer curbside collection. Private haulers now pick up waste and carry it off of the reservation. They charge reasonable rates, encouraging proper waste disposal. Working with private haulers, the tribe facilitated waste removal for residents without spending tribal funds on a transfer station or landfill. The tribe is studying the feasibility of tribally

**Table 4. Weighing Waste Collection Options**

Collection Options	Criteria Important to Tribes				
	Cost-Effective		Convenience for Community Members	Minimizes Litter, Odor, Dust, Noise, and Vermin	Potential for Source Reduction and Recycling
	Cost-Effective for Tribe	Affordable for Community Members			
Curbside Collection (Individual household or shared with neighbors)	<ul style="list-style-type: none"> <li>• Cost-effective if paid for by tribal members through fees.</li> <li>• Tribally operated service can lower costs, but requires investment in collection vehicle and staff.</li> </ul>	<ul style="list-style-type: none"> <li>• Typically costs more than drop-off sites or transfer stations.</li> <li>• Tribal subsidies can make it affordable for community members.</li> <li>• Community participation increases as disposal options become more affordable.</li> </ul>	<ul style="list-style-type: none"> <li>• Extremely convenient for community members.</li> <li>• Minimal effort to place trash outside of a home or business for collection.</li> <li>• Fosters high participation rates and reduces illegal dumping incidents.</li> </ul>	<ul style="list-style-type: none"> <li>• Waste is stored outside for a short time before it is collected, reducing litter, odor, and vermin problems.</li> <li>• Noise and dust from collection vehicles are limited.</li> </ul>	<ul style="list-style-type: none"> <li>• Convenience encourages recycling.</li> <li>• Combining with PAYT waste disposal creates incentive for recycling.</li> <li>• Requires separate containers and possibly separate collection vehicles.</li> <li>• Co-mingled recyclables need to be sorted before sale to processors.</li> </ul>
Drop-off Sites	<ul style="list-style-type: none"> <li>• Costs the tribe less to transport waste to transfer stations or landfills from consolidation points (drop-off sites) than from individual homes and businesses.</li> </ul>	<ul style="list-style-type: none"> <li>• If not subsidized, tribal members will pay more for curbside collection than to use drop-off sites or transfer stations.</li> <li>• Direct access to a single, centrally located transfer station is less expensive than consolidating and transporting materials from multiple drop-off sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Less convenient than curbside pickup service, but more convenient than direct access to transfer stations.</li> <li>• Convenience increases with multiple drop-off sites.</li> <li>• As convenience increases, participation increases and illegal dumping decreases.</li> </ul>	<ul style="list-style-type: none"> <li>• Storing large quantities of waste at one site for more than a few hours can produce litter, odor, and vermin problems.</li> <li>• Litter can accumulate if sites are not cleaned frequently.</li> <li>• Staffing, fencing, or enclosing sites minimizes these problems.</li> <li>• Appropriate site selection can minimize noise and dust impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires separate collection bins, but this eliminates need to sort recyclables before sale to processors.</li> <li>• Providing free recycling with PAYT waste disposal creates incentive to recycle.</li> <li>• Convenience dependent upon number of sites, locations, and hours of operation.</li> <li>• Can arrange for direct pickup from sites by processors.</li> </ul>
Direct Access to Transfer Station	<ul style="list-style-type: none"> <li>• If the tribe does not operate its own transfer station, it can enter an agreement with a surrounding town or county.</li> <li>• Tribe can compensate surrounding town or county for direct access to a transfer station off the reservation.</li> <li>• Collection costs go up if tribe compensates town or county from tribal coffers.</li> </ul>	<ul style="list-style-type: none"> <li>• Tribe can reduce the tipping fees or solid waste fees it charges tribal members.</li> <li>• Tribe does not have to pay for transportation to a consolidation point.</li> <li>• Although these costs are not reflected in the tipping fees or solid waste fees, tribal members absorb them.</li> </ul>	<ul style="list-style-type: none"> <li>• Not convenient if transfer station is located far away from the tribal members who will be using it.</li> </ul>	<ul style="list-style-type: none"> <li>• Storing large quantities of waste at one site for more than a few hours can produce litter, odor, and vermin problems.</li> <li>• Litter may accumulate if sites are not cleaned frequently.</li> <li>• Staffing, fencing, or enclosing sites minimizes these problems.</li> <li>• Appropriate site selection can minimize noise and dust impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires separate area and containers for recyclables.</li> <li>• Combining free recycling with PAYT waste disposal creates incentive to recycle.</li> <li>• Can sort to reduce contamination, bale for easier handling, or store at facility until find acceptable market price.</li> </ul>



operated waste hauling services but meanwhile continues to move the waste directly to an off-reservation facility.

Finally, some tribes view outsourcing as a long-term solution. For example, the Assiniboine and Sioux Nations of Fort Peck Reservation in Montana annually pay Valley County \$75 per household for residents in the county to use its landfill. The nations pay for a private trucking company to perform curbside collection in Frazer, which lies in Valley County. The trucking company hauls household waste directly to the Valley County landfill. Some tribes also own or operate their own trucks and haul waste to a landfill located off of the reservation. An advantage of this approach is that the tribe retains flexibility. It also incurs minimal liability compared to owning and operating a landfill on site. The tribe also avoids the need to budget for closure and post-closure care of the landfill. Closure consists of either capping the landfill or removing the waste and any other contaminated soils or structures. Post-closure care typically includes groundwater and landfill gas (i.e., methane) monitoring and maintenance of the final cover.

### Building a Transfer Station on the Reservation

“It is important to know how much you are generating and what you are generating when you choose a transfer station design.”

~Laura Weber,  
Director of Solid Waste Management,  
St. Regis Mohawk Tribe

Some tribes find, after studying the alternatives, that collecting and managing their waste on site is safer and more economical. If such issues are important to your tribe, then you might consider building a transfer station on your reservation. A transfer station is a

facility where waste materials are taken from smaller collection vehicles and placed in larger vehicles for transport to their ultimate site of disposal—often a landfill. Although these transfer station facilities require funds for construction, they might lower your waste management costs over the long term. Typically, transfer stations are less expensive than landfills because they require less money for construction, operation and maintenance, and do not require the expensive closure and post-closure care that landfills do. Table 5 presents construction and equipment cost and the expected life for the common structures and equipment used at a transfer station.

In addition, your tribe might build a transfer station rather than a landfill because you do not generate very much waste. Consider, however, that when a tribe builds a facility on the reservation, it still does not have total control over costs, availability of trained personnel, and markets for recovered materials. Some tribes prefer to delegate, or contract out, solid waste services to reliable companies, finding that they save money and the waste is easier to manage that way.

Transfer stations can be designed for versatility, to accept anywhere from 1 ton of waste per week to several hundred tons of waste per day. Communities use waste assessments to estimate waste generation rates and properly

Collection truck dumping waste at the Eastern Band of Cherokee Indians' transfer station.



**Table 5. Transfer Station Construction and Equipment Costs and Life Expectancy\***

Item	Cost	Life (years)
Ramp and retaining wall	varies with size	25
Building	\$42 per square foot	25
Fencing—Chain link (installed)	\$10 per linear foot	20–30
Rolling gate (Chain link)	\$400 each	20–30
Fencing—Wood (installed)	\$9 per linear foot	15
Crushed rock	\$10,760 per acre (\$2.25 per square yard)	5
Concrete (6 inches deep, no labor)	\$46,750 per acre (\$9.50 per square yard)	25
Concrete (4 inches deep, no labor)	\$31,540 per acre (\$6.50 per square yard)	25
Asphalt (7 inches deep, no labor)	\$62,610 per acre (\$13 per square yard)	10–15
Stabilization (8 inches deep)	\$16,940 per acre (\$3.50 per square yard)	10–15
Dumpster (6-8 cubic yards)	\$450–600	5
Roll-off boxes, 40 cubic yards, open top	\$3,200–5,000	10
Roll-off boxes, 42 cubic yards, closed top	\$4,250–6,400	10
Stationary compactor, 2 cubic yards	\$6,000–9,000	10
Roll-off truck with hoist	\$60,000–83,000	10
Yard waste chipper	\$20,000–25,000	10

\* These costs are provided as reasonable examples. The total cost can vary from a few thousand dollars to more than \$100,000.

Source: TASWER and SWANA. *Developing and Implementing Integrated Solid Waste Management Systems for Tribes*, Spring 2003, p. 76.

size transfer stations. Each of the tribes highlighted below chose to build a different type of transfer station.

*Small Roll-off Site Solves Onondaga Nation’s Waste Management Dilemma*

Sovereignty and community size were major factors in the New York-based Onondaga Nation’s decision to construct a small transfer station on the reservation. The community’s low waste generation rate and reluctance to rely on grants or loans for construction

helped tribal leaders rule out building a landfill or large transfer station. The nation decided to build a small, low-maintenance transfer station and worked with a private waste management company to develop a construction and operation plan.

Tribal leaders agreed to build the new transfer station near an old open dump site on uninhabited land between three highways. The transfer station consists of a concrete surface with two roll-off bins—one for household waste and one for recyclable



An example of the self-contained modular waste storage units used by the St. Regis Mohawk Tribe.

materials—inside a chain link fence with a gate. The first bin has a compactor powered by a hydraulic pump which is housed in a small adjacent shelter. Onondaga Nation's contractor hauls away the roll-off bin of compacted trash at least once a week.

The transfer station is only open to Onondaga Nation members. Initially, residents from surrounding counties used the transfer station to avoid paying tipping fees in their own towns. To address this problem, the tribe hired attendants to staff the collection site continually. The attendants also monitor roll-off bins and remove tires, household hazardous waste, and other unacceptable materials to minimize contamination.

#### *Self-Contained Modular System a Perfect Fit for the St. Regis Mohawk Tribe*

During the 1990s, residents of the St. Regis Mohawk Tribe in New York were seeking alternative waste management options. At the time, private waste haulers provided curbside collection services for a fee. Residents felt the fee was too high and voiced their concerns to the Tribal Council and Environmental Division. A solid waste

management feasibility study revealed that most residents wanted a tribally owned and operated waste disposal facility. The Environmental Division built upon this public sentiment and used it to help gain Tribal Council support for a transfer station. One effective tool in convincing Tribal Council members of the need for such a facility was showing them pictures of existing open dumps on the reservation and explaining how a new transfer station could eliminate such sites.

The Environmental Division conducted a waste audit and determined that the community generates between 6 and 7 tons of waste each day, half of which could be recycled. The tribe decided that its moderate waste generation rate did not warrant building a large transfer station. At the same time, outdoor roll-off containers were a poor option because they would fill up with ice during the harsh winter months. In addition, roll-off bin compactors sometimes fail in the winter. In search of a creative solution, Environmental Division staff and Tribal Council members visited other tribal facilities and trade shows. At one trade show, the tribe discovered self-contained, modular waste storage units.

The tribe purchased two 53-cubic-yard modular waste storage units, designed to withstand harsh outdoor conditions for years. Each unit is an enclosed waste collection container that is leak-, fire-, and animal-proof. Residents can access the unit manually by opening a side door. A door on top of the unit is larger and must be opened hydraulically. The tribe purchased a collection truck for curbside pickup service that can open the top door of the unit using its hydraulic system. The tribe ships its waste from the modular units to a landfill off of the reservation. The tribe also uses four 6-cubic-yard modular containers for collecting recyclable materials at its transfer station. These units are emptied regularly by a truck with a

hydraulic lift system. By diverting recyclable materials from its waste stream, the tribe hopes to keep disposal costs down.

The storage units required more start-up funds than a roll-off site, but less than a large transfer station. The St. Regis Mohawk Tribe obtained grants from IHS, HUD, and the U.S. Department of Agriculture (USDA) to build the transfer station. The tribe's use of federal funds added steps to the design and construction process—the National Environmental Protection Act requires any federal construction project to provide an environmental impact statement, including projects using federal grants. In addition, contractors must demonstrate that they meet federal bonding requirements. Some federal agencies place additional requirements on the use of their funds. For example, USDA's Rural Utility Service required the St. Regis Mohawk Tribe to work closely with a USDA engineer during the design phase. The USDA engineer had to sign off on any change to the original construction plan.

### *Large Transfer Station Spells Success for Eastern Band of Cherokee Indians*

In 1991, the Eastern Band of Cherokee Indians in North Carolina realized that it would have to close the reservation's landfill because it failed to meet the new Resource Conservation and Recovery Act (RCRA) Subtitle D regulations. Tribal members searched for a solid waste solution that would accommodate future community growth, including a planned gaming facility. The tribe decided to build a transfer station capable of handling 300 tons of waste per day. The tribe constructed the transfer station with its own waste in mind, but the facility also is large enough to handle waste from towns outside the reservation.

A large transfer station can bring traffic, noise, odors, debris, and animals to an area. To minimize impacts on the community, the



Scale house at the entrance to the Eastern Band of Cherokee Indians' transfer station.

tribe chose to site the transfer station next to the old landfill, where tribal members were accustomed to bringing their waste. The tribe already owned the property, and the tribal council quickly approved the location.

At the Eastern Band of Cherokee Indians' transfer station, a scale for weighing trucks is located at the entrance. Trucks enter the transfer building and dump their loads onto a tipping floor. A front-end loader then pushes the waste into a trailer that sits on a truck one level below. Before leaving the facility, transfer station operators check to make sure that the truck does not exceed the 20 to 21 tons of waste limit set by state and federal transportation regulations. The waste is then hauled to a landfill in South Carolina, where the tribe pays tipping/disposal fees.

### **Building a Landfill on the Reservation**

Finally, a tribe might decide to site a landfill on the reservation. An onsite landfill can be a technically and economically feasible option for a tribe under certain circumstances, such as if the tribe is located far from available waste management facilities

or generates enough waste to make an onsite facility viable. An important factor to remember when making this decision is that costs for a Subtitle D compliant landfill include not only construction and operation and maintenance, but also closure and post-closure care expenses.

Many tribes, however, have decided that landfills require too much land, funding, maintenance, and waste volume to be a viable waste management option. It often is difficult to find enough land on the reservation to build a landfill. In addition, tribal members often object to siting a landfill close to their homes or businesses.

In 1991, the federal government developed more stringent design, construction, operation, and closure criteria for landfills under RCRA Subtitle D. These criteria protect health, safety, and the environment but can make it difficult to control landfill costs. Regulations require that all landfills include a composite liner (a flexible membrane liner above a layer of compacted clay). Other federal requirements that lower risks, but increase costs, include leachate collection systems, groundwater monitoring, and landfill gas management. Building an economically viable small landfill that meets these requirements can be a chal-

The Alaskan Native Village of Klawock's solid waste landfill.



lenge, and most tribes do not generate enough waste to make building a large landfill worth the cost and effort. In their joint training, TASWER and SWANA estimate that the typical cost of construction per acre of landfill space is between \$150,000 and \$250,000. At these costs, TASWER and SWANA believe that tribes generating less than 100 tons of waste per day will find building and operating a Subtitle D compliant landfill is not an economically feasible option.

The federal government recognizes that small, unlined landfills are the only viable waste management option for some communities, including tribes. Consequently, it created two exemptions—one for small communities in cold regions and one for small communities in dry regions. Alaskan Native villages, for example, can be exempt from the federal landfill design and groundwater monitoring requirements if they cannot access a regional waste management facility for several months. These villages qualify for the exemption if they generate less than 20 tons of waste daily and experience an annual interruption of at least 3 consecutive months of surface transportation because of snowfall.

Some tribes in the Southwest also can be exempt from federal landfill requirements. Tribes qualify for the exemption if they generate less than 20 tons of waste daily, have no practical waste management alternative, and are located in an area that receives 25 inches or less precipitation annually.

Though most tribes do not qualify for the exemptions listed above, they can apply to EPA for site-specific flexibility. If a tribe can demonstrate that its landfill will adequately protect human health, safety, and the environment without a composite liner or groundwater monitoring, it can apply for site-specific flexibility or exemption from the federal requirements. Several tribes, including the Oglala Sioux Tribe of the Pine Ridge

Reservation in South Dakota, have taken advantage of this exemption to lower their landfill construction and operation costs.

#### *Landfill Completes Waste Management Strategy for Pine Ridge Reservation*

In 1994, members of the Oglala Sioux Tribe (OST) met with representatives from SWANA and the state of Nebraska to discuss hauling trash from Pine Ridge Reservation, located in South Dakota, to a state landfill in Nebraska. Based upon this meeting, the OST decided that operating a transfer station would be too expensive because the state landfill was too far away. A full-scale, Subtitle D landfill seemed to be the best solution because the tribe wanted to retain complete control of its waste and tipping fees. The tribe acquired a \$561,000 grant from EPA to plan a landfill and bale building (a building where waste is compacted into bales).

The OST applied for site-specific flexibility and asked the federal government to waive the composite liner requirement. Pine Ridge Reservation contains very dense clay soils, and the tribe demonstrated that the clay performs the equivalent role of an engineered composite liner and would prevent liquids from leaching out of the landfill into the reservation's groundwater supply. EPA granted the Oglala Sioux a waiver.

Environmental Protection Program staff worked closely with regional representatives from each federal agency to fill out grant applications and obtain funding for the project. The tribal council placed solid waste at the top of its Sanitation Deficiency System priority list. Consequently, IHS awarded the tribe \$724,000 for landfill construction. The tribe also received \$1.2 million from USDA's Rural Development Service.

#### **Disposing of Construction and Demolition Debris and Hazardous Waste**

Managing construction and demolition (C&D) debris presents a major challenge for many tribes. C&D debris includes concrete, asphalt, wood, metals, gypsum wallboard (sheet rock), and roofing generated from the construction, renovation, or demolition of structures (e.g., buildings, roads, bridges). Some tribes and states include land clearing debris such as stumps, rocks, and dirt in this category of waste. Most C&D debris is classified as nonhazardous and therefore can be managed with normal waste and disposed of in an MSW landfill.

Due to the size and weight of much of this debris, co-managing C&D debris with MSW can be cost prohibitive. Many tribes have found that managing C&D debris separately is the most cost-effective approach. Since C&D debris materials are typically inert, many states have established special criteria for C&D debris landfills. Siting, design, construction, operation, monitoring, and closure of landfills containing nonhazardous C&D debris are still regulated under RCRA Subtitle D (see 40 CFR part 257), but many of the requirements are much less restrictive than those for MSW landfills.

One major difference for C&D debris landfills is that in most cases they do not require a liner or groundwater monitoring systems. Cover requirements typically are less stringent as well. Air emissions from C&D debris landfills are generally not a concern either, since C&D debris does not contain large volumes of putrescible organic matter that produce landfill gas (methane). If gypsum wallboard is present in C&D debris, however, the landfill might produce hydrogen sulfide, with its distinctive rotten-egg odor, particularly if moisture is introduced into the waste. Tribes operating landfills that manage large amounts of these materials might need to install gas control systems to reduce odors.

**Table 6. Weighing Your Waste Disposal Options**

<b>Disposal Option</b>	<b>Short-Term Startup Costs</b>	<b>Long-Term Operation/Maintenance Costs</b>	<b>Costs for Individual Tribal Members</b>	<b>Minimizes Controversy Over Siting</b>	<b>Minimizes Liability</b>	<b>Minimizes Litter, Odor, Dust, Noise, and Vermin</b>
<b>Outsourcing: Using a transfer station or landfill located off the reservation</b>	Low. No funds required for planning or construction.	Low. No equipment for the tribe to maintain.	Low to High. Tribe has no control over transfer station or landfill tipping fees, unless it has a long-term contract.	Tribe does not have to site a transfer station or landfill on tribal land.	The town, county, state, or company that operates the facility is liable for any health and environmental problems.	Outsourcing reduces potential health, environmental, and aesthetic problems associated with storing large quantities of waste in a single location on the reservation.
<b>Building a transfer station</b>	Moderate. Tribe must obtain funding for transfer station equipment. Building a transfer station costs less than building a landfill.	Moderate. Requires continuous funding for operation and maintenance.	Low to Moderate. Tribe sets disposal rates for residents; however, tribe is subject to tipping fee increases because it transports trash to a landfill or incinerator.	Requires less space and is easier to site than a landfill. Residents sometimes object to siting a transfer station close to their community.	Tribe liable for any problems that might occur at the transfer station. People may leave hazardous waste or start fires at small, un-staffed transfer stations.	Trucks entering and leaving can produce dust and noise. Waste can produce foul odors and attract vermin. Tribes can reduce these problems by paving nearby roads and building an enclosed facility and fencing the site.
<b>Building a landfill</b>	High. Even if tribe obtains a waiver from some federal requirements, costs can be high.	High. Unless tribe obtains a waiver from some federal requirements, it is expensive to operate and maintain a landfill both while open and after closure.	Low to High. Tribe dictates disposal rates for residents. If the landfill is expensive to operate and maintain, then higher rates might be needed.	Typically, residents object to siting a landfill near their community. Requires so much space that it is difficult to find enough land to build one.	Tribe assumes liability for problems associated with the landfill during both active life and the post-closure care period.	Building the landfill and disposing waste on a daily basis produces dust, noise, odors, and litter. It also attracts birds, animals, and vermin. Paving nearby roads and covering waste at the end of each day prevents some of these problems.
<b>Building a C&amp;D debris landfill</b>	Low to moderate. Need to acquire adequate land and do minor excavation to prepare site. If liner or monitoring systems are required, cost will increase.	Moderate. Requires operation and maintenance funding. If need to maintain liner and monitoring systems, costs will increase.	Low to moderate. Tribe establishes disposal rates. Increases in operating costs will affect disposal rates.	Requires significant amount of space. Residents might object to siting near their community (but should be less opposition than msw landfill).	Tribe assumes liability for problems associated with the landfill during both active life and the post-closure care period.	Dust and noise can be a problem. Odors and vermin typically not a problem. Litter is not a likely problem, but could be some wind-blown paper materials.

## Funding a Collection and Disposal Program

After choosing a waste collection and disposal option, your tribe must figure out how to finance it. A variety of financing mechanisms are available to your tribe:

- **Subsidizing the program from the tribal general fund.**  
The Gila River Indian Community in Arizona subsidizes curbside collection by public works to make waste disposal cheap and convenient for tribal members.
- **Charging residents a flat fee.**  
The Fort Peck Tribes in Montana charge residents \$15 per month to use tribal roll-off sites. Community members drop off their trash at a few bins scattered throughout the reservation. The tribes are considering switching to a Pay-As-You-Throw system. The Shoshone-Paiute Tribes of Duck Valley, which straddles land in Idaho and Nevada, charges residents a solid waste fee, which appears on their monthly electrical bills.
- **Asking residents to work directly with a private hauler or local government.**  
Members of the Delaware Nation in Oklahoma pay a private hauler for curbside collection.
- **Instituting a Pay-As-You-Throw (PAYT) program.**  
Communities with PAYT programs charge residents for solid waste collection based on the amount they throw away, creating a direct economic incentive to recycle more and to generate less waste. The St. Regis Mohawk Tribe of New York charges residents based on how much they throw out. Under this PAYT program, tribal members purchase 30-gallon blue disposal bags from the tribe. The blue bags are picked up weekly by the tribe.

For more information on financing a tribal solid waste management program, refer to Chapter 7.

If your tribe decides to build and operate a C&D debris landfill, you can finance the operation in several ways. One approach is to charge a flat fee per load of C&D debris dumped. Another approach is to create a “pay-as-you-use” system where by tribal members are charged per pound of material disposed. Using this type of per weight system will require a scale house and an attendant at the landfill entrance. A simple method of operation is to weigh incoming vehicles and then weigh them again on the way out. The hauler would pay based on the difference in the two weight measurements.

Some C&D debris may be classified as hazardous waste because it contains hazardous materials, such as lead or chromium, or has been contaminated by other hazardous waste. Hazardous C&D debris must be disposed of in a hazardous waste landfill. Other

Tribal members cleaning up an open dump on the White Earth Band of Chippewa’s reservation.







Before and after photographs of an open dump cleaned and restored by the Shosone-Paiute Tribes of Duck Valley.

toxic materials, such as asbestos and polychlorinated biphenyls (PCBs), must also be managed in accordance with federal regulations, as spelled out by the Toxic Substances Control Act (TSCA).

Increased new home construction on the Bois Forte Band of the Minnesota Chippewa Tribe reservation, coupled with the demolition or refurbishing of old buildings, necessitated the development of a landfill for C&D debris. IHS helped the tribe locate and design a 25,000-cubic-yard landfill based on

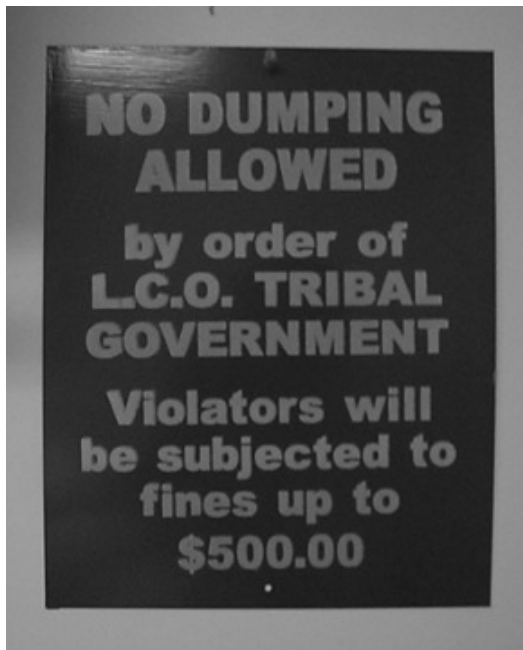
federal and state regulations. In addition to providing disposal for C&D debris, the landfill, which opened in 1998, generates income from disposal charges levied on building contractors.

Table 6 summarizes how the four disposal options—1) using a transfer station or landfill located off of the reservation, 2) building a transfer station, 3) building a landfill, and 4) building a C&D debris landfill—measure up to several criteria that are important to tribes.

### Addressing Open and Illegal Dumps

For years, Native American communities used open dumps, burn pits, and burn barrels to dispose of their waste. In 1991, the federal government passed regulations making open dumping illegal. Many open dumps attract vermin, contain materials that are dangerous to curious children or wildlife, pose a fire threat, contaminate surface water and groundwater supplies, and interrupt natural drainage patterns. Burning waste in pits, piles, or barrels releases smoke containing pollutants harmful to human health and the environment. Open burning of waste has been illegal since the passage of the Resource Recovery and Conservation Act of 1976.

Tribes are closing open dumps and banning open burning to protect both the health of their members and the environment. Many tribes, however, continue to experience illegal dumping problems, even after they set up new collection and disposal programs. To successfully deal with the problem, tribes need to adopt a multifaceted approach to illegal dumping prevention that includes **site maintenance and controls, community outreach and involvement, targeted enforcement, and measurement**. The examples included below illustrate the four components of a strong illegal dumping prevention program.



The Lac Courte Oreilles Chippewa Tribe's no dumping signs help deter illegal dumpers.

**Site Maintenance and Controls**

Site maintenance and controls include planning and implementing cleanup projects and maintaining cleaned sites to prevent continued illegal dumping. Proper planning is often a decisive factor in determining the degree of success of an open dump cleanup effort. In addition to securing the proper equipment and labor, you will need to arrange for the transportation and disposal of the removed waste.

On the Cherry Lake Road cleanup project at the White Earth Band of Chippewa in Minnesota, the tribe hired a contractor that used heavy equipment to clean up large items, and hired local residents to pick up remaining items by hand. Other tribes have partnered with local governments or worked with IHS and BIA staff to clean

up sites. For example, the Pawnee Nation in Oklahoma partnered with BIA to clean up most of its open dump sites. The Seminole Nation of Oklahoma also works with neighboring Seminole County to clean up illegal dump sites.

Once cleanup is complete, signs, lighting, barriers to limit access, and landscaping can be used to keep a site clean and discourage future dumping at the site. The Red Lake Band of Chippewa in Minnesota post "No Dumping" signs at cleaned areas that state illegal dumping is punishable by fine and cite the tribal resolution banning illegal dumping. The Wyandotte Nation in Oklahoma installed a fence at one cleaned dump site to limit access and prevent future dumping. At the Cherry Lake Road cleanup, the White Earth Band of Chippewa planted more than 1,000 trees donated by the state to beautify the area and discourage illegal dumping.

**Community Outreach and Involvement**

Educating community members about waste reduction, recycling, and proper waste disposal can help limit future illegal dumping

Burning waste at the Kokhanok Village (Alaska) landfill.



incidents. Tribal members are more likely to support solid waste management programs if they understand the new waste disposal options and the dangers of open and illegal dumping. To educate tribal members about proper waste disposal, the Keweenaw Bay Indian Community in Michigan developed an illegal dumping pamphlet that details the environmental problems associated with illegal dumping and directs residents to proper waste disposal facilities. The tribe distributes the pamphlet in public buildings on the reservation and at public events such as the annual pow-wow.

### Targeted Enforcement

The foundation of any enforcement program is strong and clearly worded solid waste codes or ordinances. Codes or ordinances prohibiting open dumping typically include some sort of penalty or consequence for the illegal dumper. Some penalties used by tribes include fines, collecting the cost of cleanup, community service, or vehicle impoundments. Some tribes, such as the Seminole Nation of Oklahoma, give an illegal dumper the opportunity to clean up the mess before a citation is issued.

For a code or ordinance to be effective, it must be enforced consistently and equitably. The Gila River Indian Community of Arizona developed an aggressive strategy to deter illegal dumping. Under the tribe's Solid Waste Ordinance, tribal rangers and police officers can fine illegal dumpers up to \$10,000. Law enforcement officials also have the power to confiscate vehicles involved in illegal dumping incidents. A strong enforcement program can be a powerful illegal dumping deterrent.

One difficulty many tribes experience when attempting to enforce illegal dumping ordinances is the inability to prosecute non-tribal members for illegal acts. Checkerboard land patterns and Indian lands being sur-

rounded by multiple jurisdictions further complicates enforcement issues. A few tribes, such as the Pawnee Nation in Oklahoma, have worked out mutually beneficial enforcement agreements with their neighboring communities. Under agreements with Pawnee and Payne Counties, tribal rangers and the Pawnee Environmental Regulatory Commission share enforcement and prosecution duties with the Pawnee and Payne County courts.

### Measurement

Measurement is the final component of a multifaceted illegal dumping program. Measurement can help build community support by quantifying cleanup and closure success. It also can help justify program spending to tribal leaders. The Pawnee Nation Department of Environmental Conservation and Safety in Oklahoma performs a yearly site assessment to identify dump sites. In 1996, department staff identified 40 illegal dumping sites on the reservation. The most recent assessment shows that only four illegal dump sites remain.

EPA Region 5 created the IDEA (Illegal Dumping Economic Assessment) Cost Estimating Model to assess and measure the costs of illegal dumping activities. The model allows tribes to compare the cost of different cleanup methods, equipment investments, and surveillance and prevention techniques. Tribes can apply the model to a single dump site, specific groups of sites, or all of the sites on a reservation.

Most tribal members will stop using burn barrels and open dumps if their tribe provides convenient and affordable waste disposal alternatives. Members of the Alabama-Coushatta Tribe of Texas stopped using burn pits when the tribe built and promoted its new transfer station. The tribe subsidizes disposal costs for members who bring their waste to the transfer station. The

White Earth Band of Chippewa in Minnesota started a tribal curbside collection service for residents to discourage illegal dumping. The tribe collects a small fee from households that subscribe to this service. Residents that can not afford to pay this fee use one of five small drop-off sites for a smaller fee. These collection options have contributed to the success of White Earth's illegal dumping prevention program.

## Chapter Highlights

- Understand your tribe or village's waste stream and collection and disposal needs.
- Design your collection and disposal programs to meet your tribe or village's specific needs (including political and cultural needs) and that are in line with your financial and technical resources.
- Involve community members in the decision-making process, especially when deciding services or siting a facility.
- Provide convenient and affordable alternatives to open dumping, and educate community members on their proper use.
- Use a multifaceted approach to open dump clean up and control.

## Resources

These three EPA publications (available at the Web sites listed below or by contacting the RCRA Call Center at 800 424-9346) provide detailed guidance on transfer station design, siting, construction, operation, and maintenance:

- *Tribal Waste Journal*: "Against All Odds: Transfer Station Triumphs" (EPA530-N-02-002), May 2003, <[www.epa.gov/epaoswer/non-hw/tribal/pdf/twj-2.pdf](http://www.epa.gov/epaoswer/non-hw/tribal/pdf/twj-2.pdf)>.
- *Waste Transfer Stations: A Manual for Decision-Making* (EPA530-R-02-002)

<[www.epa.gov/epaoswer/non-hw/muncpl/pubs/r02002.pdf](http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/r02002.pdf)>.

- *Waste Transfer Stations: Involved Citizens Make the Difference* (EPA530-K-01-003) <[www.epa.gov/epaoswer/non-hw/muncpl/pubs/wtsguide.pdf](http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/wtsguide.pdf)>.
- EPA's *Criteria for Solid Waste Disposal Facilities: A Guide for Owners/Operators* (EPA530-SW-91-089), summarizes the major requirements of the federal municipal solid waste landfill regulations. Available on the Web at <[www.epa.gov/epaoswer/non-hw/muncpl/landfill/index.htm](http://www.epa.gov/epaoswer/non-hw/muncpl/landfill/index.htm)> or by contacting the RCRA Call Center at 800 424-9346.
- EPA's *Safer Disposal for Solid Waste: The Federal Regulations for Landfills* (EPA530-SW-91-092), summarizes the federal municipal solid waste landfill regulations. Available on the Web at <[www.epa.gov/epaoswer/non-hw/muncpl/landfill/index.htm](http://www.epa.gov/epaoswer/non-hw/muncpl/landfill/index.htm)> or by contacting the RCRA Call Center at 800 424-9346

Code of Federal Regulations, Title 40, Part 258 (40 CFR Part 258)—Criteria for Municipal Solid Waste Landfills, available on the Web at <[www.epa.gov/epaoswer/non-hw/muncpl/disposal.htm](http://www.epa.gov/epaoswer/non-hw/muncpl/disposal.htm)>.

EPA's *Site-Specific Flexibility Requests for Municipal Solid Waste Landfills in Indian Country Draft Guidance* (EPA530-R-97-016), helps tribes apply for site-specific flexibility. Available on the Web at <[www.epa.gov/epaoswer/non-hw/muncpl/landfill/indian/siteflex.pdf](http://www.epa.gov/epaoswer/non-hw/muncpl/landfill/indian/siteflex.pdf)> or by contacting the RCRA Call Center at 800 424-9346.

EPA's *Seminar Publication: Design, Operation, and Closure of Municipal Solid Waste Landfills* (EPA625-R-94-008), available from the National Service Center for Environmental Publications at <[www.epa.gov/ncepihom/ordering.htm](http://www.epa.gov/ncepihom/ordering.htm)>.

EPA Region 5 has the *Illegal Dumping Prevention Guidebook* <[www.epa.gov/region5/illegaldumping](http://www.epa.gov/region5/illegaldumping)> and information on the IDEA (Illegal Dumping Economic Assessment) cost estimating model. Contact the EPA Region 5 Illegal Dumping Prevention Project at 312 886-7598.

EPA's *Tribal Waste Journal*, "Respect Our Resources: Prevent Illegal Dumping" (EPA530-N-02-001), includes additional case studies and is available on the Web at <[www.epa.gov/epaoswer/non-hw/tribal/pdf/twj-1.pdf](http://www.epa.gov/epaoswer/non-hw/tribal/pdf/twj-1.pdf)> or by contacting the RCRA Call Center at 800 424-9346.

The Bureau of Indian Affairs' (BIA) *Manual for Assessment of Open Dumping on Indian Lands: Site Closure and Maintenance*, available from your regional BIA representative.

The Central Council of Tlingit and Haida Indian Tribes' *A Guide to Closing Solid Waste Disposal Sites in Alaska Villages*. Available on the Web at <[www.zender-engr.net](http://www.zender-engr.net)>.

The following periodicals provide articles and reviews of innovative and successful waste collection and disposal strategies, practices, and technologies. Advertisements in these periodicals also contain information on new technologies, collection and disposal equipment, and engineering and consulting services that can help you meet your tribe or village's solid waste management needs.

- *Waste Age* — <[www.wasteage.com](http://www.wasteage.com)>  
Phone: 866 505-7173 Fax: 402 293-0741  
Mailing address: Waste Age, 2104 Harvell Circle, Bellevue, NE 68005 E-mail: [wecs@pbsub.com](mailto:wecs@pbsub.com)
- *Waste News* — <[www.wastenews.com/headlines.html](http://www.wastenews.com/headlines.html)> Phone: 800-678-9595 or 313-446-0450 Fax: 313-446-6777  
Mailing address: Waste News, 1725 Merriman Road, Akron, Ohio 44313 E-mail: [subs@crain.com](mailto:subs@crain.com)
- *MSW Management* — <[www.forester.net/msw.html](http://www.forester.net/msw.html)> Phone: 805 682-1300  
Fax: 805 682-0200 Mailing address: Forester Communications, Inc, P.O. Box 3100, Santa Barbara, CA 93130
- *Resource Recycling* — <[www.resource-recycling.com](http://www.resource-recycling.com)> Phone: 503 233-1305  
Fax: 503 233-1356 Mailing address: Resource Recycling, P.O. Box 42270, Portland, OR 97242-0270 E-mail: [info@resource-recycling.com](mailto:info@resource-recycling.com)