



"The ABCs of C&D Debris"

Tribal Construction and Demolition Debris Management Training Course

**Tribal Association for Solid Waste Management and
Emergency Response**

TASWER

TRIBAL ASSOCIATION ON SOLID WASTE & EMERGENCY RESPONSE

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DEDICATION

THIS PILOT COURSE IS DEDICATED TO ANAN TANBOUZ, WHO, IN HIS WORK FOR U.S. EPA REGION 6, MADE GREAT STRIDES IN HIS TIRELESS EFFORT TO ASSIST TRIBES IN MANAGING SOLID WASTE. HIS EXPERIENCE AND ENGINEERING EXPERTISE BROUGHT GREAT BENEFIT TO ALL TRIBES. ANAN ENTERED THE SPIRIT WORLD ON MAY 28, 2004, JUST A FEW WEEKS BEFORE HE WAS TO TEACH A PORTION OF THIS PILOT COURSE. FOR HIS WORK AND EXAMPLE, THIS IS COURSE IS DEDICATED TO ANAN.

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Material from John T. Aquino, "Fighting Landfill Fires," *Waste Age*, October 1991, "You Only Live Once: Solid Waste Safety," *MSW Management*, July/August 2002, and "C&D Waste: A Sometimes Bumpy Road to More Attention," *MSW Management Magazine*, September/October 2003 is provided in this workbook under a license from the author. Any use of the material outside of the workbook is unauthorized and prohibited.

Session One

C&D DEBRIS OVERVIEW

Construction and Demolition (C&D) debris consists of the material generated during construction, renovation, and demolition projects. A Tribe's C&D debris management program is part of its integrated solid waste management program (ISWMP). It deals with this very specialized type of waste. And, like the ISWMP itself, the C&D options a Tribe has are,

1. reduction
2. reuse
3. recycling
4. landfilling

Reuse and recycling of C&D debris decrease the environmental impact of producing new materials. By diverting C&D waste from the municipal solid waste (MSW) that a Tribe landfills, a Tribe can also reduce its costs in tipping fees (the fee a landfill charges for "tipping" or dumping the waste in the landfill).

In addition to cost consideration, creating a plan for handling C&D debris on a regular basis or in an emergency (a house is destroyed by fire, an abandoned home collapses) will remove the alternative—unsightly and sometimes dangerous dumps of bricks and stones and pipes and sinks that will blight the land and even poison it.

And since some material that may be associated with C&D debris may be toxic and/or dangerous, leaving it alone in dumps or in abandoned homes where it can harm by exposure and entering the water table or harm when it is casually taken away and reused can have tragic consequences.

Managing C&D debris is in keeping with Native American culture, in which everything is/was used. When Native Americans would hunt bison, they would eat the meat, use the hides for clothes and shelter, and the bones for utensils. While Tribal beliefs differ from Tribe to Tribe, there appears to be a common thread: All aspects of life are interconnected and any advancement of environmental programs must meet the needs of the present generation without compromising the lives of future generations. Developing and implementing solid waste management programs is consistent with these traditional and cultural beliefs.

Abandoned homes and facilities are visually often a part of Tribal life. When these homes are torn down for new structures or simply fall down, they will

generate C&D waste. If an abandoned home or building burns, the ashes must be disposed of.

When asking why Tribes should manage C&D debris, one way of answering is to ask what happens if they do not. As this workbook will show, if C&D debris is not properly reduced, recycled, or landfilled:

1. natural resources are wasted;
2. the land is blighted with unsightly dumps;
3. groundwater may become polluted;
4. material from construction and demolition sites that is casually reused and that is toxic may harm Tribal members;
5. Tribal financial resources are wasted by costly tipping fees when heavy C&D debris is carted offsite.

This workbook presents information, ideas, and lessons on how to manage C&D debris on Tribal lands.

What is C&D Waste?

Part of the federal governance concerning C&D debris management is contained in the Resource Conservation and Recovery Act (RCRA) Subtitle D, which governs open dumps, C&D landfills, and municipal solid waste landfills. 40 CFR Part 257 defines C&D landfills as typically receiving roadwork materials, excavated materials, demolition waste, construction/renovation waste, and site clearance waste.

The broadest definition of C&D debris include waste from the construction, renovation, and removal of buildings but also Infrastructural debris from the construction and demolition of roads, bridges, and non-building structures and land-clearing debris from the clearing of rocks, trees, and dirt from sites prepared for construction. The U.S. Environmental Protection Agency's (EPA) efforts have targeted building-related debris, which is the focus of this course as well.

Materials that make up this waste stream include:

- Wood (plywood, lumber, treated wood)
- Concrete and masonry (bricks, mortar, stone)
- Drywall (sheetrock, gypsum, plaster)
- Roofing materials (wood or clay, asphalt)
- Metals (ferrous, aluminum, copper)
- Paper products, cardboard
- Plastic (buckets, PVC, plastic wrap)
- Miscellaneous (carpeting, mirrors, tile, lights, insulation, windows)

The U.S. EPA estimates that nearly half of all building-related C&D debris comes from building removals. Wood, concrete, and drywalls are the primary wastes in this waste stream. Concrete is the largest of these three components. Recycling rates for concrete have been estimated to be between 50 and 57%; wood, 26%; and drywall, 10%.

C&D debris has also drawn interest because it offers a variety of recycling opportunities. Wood can be used for fuel, wallboard can be processed into gypsum, and concrete can be used for aggregate in road-building and other construction projects. These materials, for which there are established markets, are being separated out for recycling. Organics also are being separated out of the C&D waste stream more frequently.

Data and Classification

Data and classification concerning C&D waste have often been problems. EPA estimated that 136 million tons of building-related debris were generated in 1996. Of that, 20-30% was recovered for processing and recycling and 35-45% was sent to C&D landfills. The main sources of its generation were nonresidential demolition (33%), nonresidential renovation (21%), nonresidential new construction (3%), residential new construction (5%), residential demolition (15%), and residential renovation (23%). But William Turley, executive director of the Construction Materials Recycling Association (CMRA) in Lisle, IL, notes that the EPA figures do not include road and bridge debris, which CMRA estimates brings the total of C&D debris to 320 million tons per year (tpy). CMRA also estimates that 25% of the North American C&D waste stream is recycled. (See Figures 1 and 2.)

EPA representatives in a *Biocycle* article note that there is some dispute in state figures as to whether wood is more prominent in the C&D waste stream than concrete. It is speculated that this is because states rely on landfill disposal records and that C&D landfill disposal estimates overstate wood percentages and understate concrete percentages because of the higher recycling rates for concrete.

There is even some dispute over the number of U.S. C&D landfills. An April 2001 study conducted by R.W. Beck for the Environmental Research and Education Foundation of Washington, DC, reported that there were 600 C&D landfills--50 owned by publicly traded companies, 200 by private companies, and 400 by the public sector--but *Biocycle* magazine's April 2000 survey of the solid waste industry claimed there were 1,599 C&D landfills. "I have seen both numbers before," says Turley, "but the NADC [National Association of Demolition Contractors in Doylestown, Pennsylvania] also quotes the higher number. I think the higher one includes inert-only fills, basically just concrete, brick, and the like.

Of course, many MSW landfills also will take in C&D, so what does that push the number to?"

NADC Executive Director Michael Taylor observes that the association's 1994 survey showed 1,800 C&D landfills, but some of them, he says, "had an obviously finite life and have closed over time." He adds that data from C&D contractors, "like any entrepreneurs," are usually closely held, although NADC is beginning a new survey conducted by an outside firm.

State and local information

State figures for C&D debris generation naturally vary from state to state and even city to city. Factors contributing to this are different generation rates and types depending on location and also because states define and count materials differently.

In California, C&D materials accounts for almost 12% of the waste stream, according to sampling of solid waste disposed in California in 1999 in a California Integrated Waste Management Board (CIWMB) study. California's C&D waste stream material includes concrete, both from the foundations of homes and from highway and airport repair work; asphalt, almost exclusively from roadwork; wood, largely from building demolition and waste from new construction; gypsum, recovered from wallboard at demolition projects, left over from construction, and rejected by wallboard factories; and asphalt shingles.

Similar to California, South Carolina generated more than 1.1 million tons of C&D waste in 1999, also accounting for almost 12% of the total amount of its solid waste generated. In Florida, however, C&D materials represent from 25% to 33% of all the state's MSW. The Florida C&D debris waste stream comprises four major subcategories: land clearing, transportation-related, building construction and demolition, and disaster. Dimensional wood (44%), cardboard (11%), gypsum wallboard (8%), and roofing shingles (6%) account for more than two-thirds of C&D debris by volume. In 1998, Florida generated nearly 25 million tons of MSW, of which C&D debris accounted for 5.9 million tons, or nearly 25% of the total. However, not all C&D debris generated in the state is included in the term "municipal solid waste" as defined by Florida statute. Large fractions of the C&D debris stream, especially transportation-derived debris, are not counted as MSW. The total amount of C&D debris generated in the state from all sources in 1998, then, is estimated to be 9.4 million tons or 33% of all MSW.

In New York City, however, compared to the national trend of 25-45%, C&D accounts for more than 60% of the waste stream, according to a recent study by the New York Department of Sanitation. Part of the reason for this high number is that the figure includes clean dirt generated by excavation. When materials New York City counts but other jurisdictions do not are excluded, the percentage of

C&D falls to 39%. It is still on the high side of the national average and likely due to the fact that New York City is an old city, with older building stock and, therefore, more renovation.

Portland, Ore. estimates that 28% of its waste stream is C&D waste. In 1996, the city passed an ordinance requiring job-site recycling on all construction projects with value exceeding \$25,000. C&D comprises an estimated 20% of the waste stream in Seattle/King County, Wash. Since 1993, Seattle has had a construction and demolition land clearing (CDL) program, which focuses on technical and educational assistance for the building industry. The County, however, believes that the marketplace rather than government policies must drive C&D recycling and so had made it voluntary.

Just as the C&D waste generation figures vary from state to state, so do the ways states handle C&D debris management. The California Integrated Waste Management Board (CIWMB) has set a statewide target of 50% diversion by weight of all C&D waste sent to landfills. As a result, municipalities in California have established C&D ordinances. In 1999, the Town of Atherton, located in the San Francisco Bay area of northern California, imposed ordinances for C&D recycling and diversion that require every demolition project to be available for deconstruction, salvage, and recovery prior to demolition. Owners and contractors must recycle by weight 50% of demolition debris, including concrete and asphalt; 15% of debris other than concrete and asphalt; 50% of roofing shingles; and 50% of new construction materials. (Atherton is primarily residential, and C&D activities center on home improvements and new residential construction.) In Sacramento, all new commercial, institutional, and multi-family developments must provide a recycling information statement outlining a designated areas (which is sized according to a formula) to be set aside for the storage of recyclables materials, a materials flow design, and an educational program. Santa Monica requires a waste management plan and a 6)% recycling rate (no more than 20% of which can be achieved through the recycling of clean fills material) and a performance security fee that is returned in whole or in part upon full or partial demonstration that recycling targets have been met.

In early 2001, Massachusetts included a ban on recyclable C&D debris from landfills in its proposed Solid Waste Management Plan.

Tribal C&D

Tribal C&D data is even more difficult to obtain than state data since some if not most Tribes do not collect such data.

TASWER surveyed its general members in January 2004 on the issue of their management of C&D waste. Over 80% said that they do not have a C&D waste management program; of these, a little less than half responded that they are

considering initiating such a program. Of the respondents who do have a C&D management program, 80% landfill C&D waste to an off-reservation C&D landfill and 20% have their own C&D landfill. Twenty-five percent of those who have a C&D program recycle C&D debris, and 60% reuse it. See Table 1.

Until additional data is available, Tribes can only conclude that the percentage of C&D waste in waste streams approximates the high amounts of the national average of 25-40%.

An American Tragedy

Unfortunately, part of the attention C&D debris has received of late is the result of a national tragedy that has special meaning for everyone in the United States: the September 11, 2001, terrorist attacks on the World Trade Center in New York City and a portion of the Pentagon.

The tragedy brought C&D debris management to the national consciousness as this vast amount of debris had to be collected, separated, and disposed of, either through recycling or landfilling--reuse not being considered for a number of reasons.

The expertise that the United States has acquired in C&D debris management was called upon in this national crisis.

Soon after the attack, the Solid Waste Association for North America (SWANA) estimated that 1.25 million tons of demolition waste--nearly four times the amount of demolition waste generated in any one day in the U.S.--would be carted away from the World Trade Center. But within six months, the actual figure had risen to 1.8 million tons, or 108,342 truckloads. Approximately 60,000 tons of steel from the World Trade Center was shipped to recyclers around the world, mostly to South Korea and certain U.S. cities. The steel was--mundanely--to be used to make soup cans, appliances, car engines, buildings, and medallions.

Northeast contractors arrived at the World Trade Center first and contributed operators and equipment to the rescue efforts, including Yannuzzi & Sons in South Orange, NJ, and Mazzocchi Wrecking in East Hanover, NJ. Many stayed for the recovery and cleanup effort, working as subcontractors to lead contractors Turner Construction in New York, Bovis Lend Lease in London, and AMEC Inc. in London. Later, contractors from other parts of the country were brought in, including D.H. Griffin Wrecking in Greensboro, NC. All agreed that it was, emotionally and physically, an extremely difficult job. C&D recycling firm Taylor Recycling Facility LLC of Montgomery, NY, joined the effort, with its spokesmen noting that only a few companies in the U.S. were trained and had the equipment to handle this type of work.

Waste-related manufacturers played a part too. Mack Trucks of Allentown, Pa., for example, lent six equipped with 20-ton demolition dump bodies to help with the recovery effort. The trucks were operated 24 hours a day from mid-October to March 1, 2002, and performed the equivalent of three years' service in just six months.

**Tribal Case Study
Large C&D Project
Mescalero Apache Reservation**

Since 1975, the Mescalero Apache Reservation has been operating a resort property called the Inn of the Mountain Gods in the Sierra Blanca Mountains of southern New Mexico. Twenty-eight years after construction, the resort was to be torn down to make way for a new gaming casino, convention center, golf course, bars and restaurants, sporting clays course and big game hunting preserve. The reservation itself spans 720 square miles and has 4,000 Tribal residents.

In addition to the luxury resort, the Mescaleros own a wood products business, a livestock business, and a ski resort. The new resort along Lake Mescalero is scheduled to open in November 2004. An existing casino remains open during demolition and new construction, which is valued at more than \$112 million

Demolition work, which commenced in January 2003, began with stripping the old hotel building of material that could be processed in a grinder. The crew chose this method over simply demolishing the complex with a wrecking ball and hauling all debris to the local dump because the Tribe wanted to reduce the amount of waste that was taken to the landfill on the reservation. Rather than use the existing landfill, crews chose to prepare a new landfill on-site to handle the excess waste. They reduced the volume of waste by two-thirds using a Vermeer HG525 horizontal grinder. They loaded the grinder with materials permitted for safe processing, including lumber, wire, carpet and wooden window frames.

They went through the structure and removed the solid materials and heavy metals: steel doors, steel door frames, pipe, steel beams underneath the structure and bathroom fixtures. Then they used a backhoe to punch it down into piles pushed it to the grinding area with dozers. Using another backhoe, they loaded the machine, while monitoring the material to ensure it was appropriate for the machine.

Snowy weather caused some delays. Snow that fell melted in just a day or two, but the clay soil conditions made it too slick for the dozers to push debris over to the grinder; the backhoe had a tough time maneuvering also. Since the resort is on the side of a hill, it took additional time to get the material to the grinder with the dozers because the ground was uneven."

The end result of the grinding process is that almost 70 percent less volume of waste was sent to the landfill.

SESSION TWO

TRIBAL SPECIFIC ISSUES

The management of C&D debris is similar to that of other types of solid waste that Tribes typically have to confront. Based on a recent study of Tribal management circumstances, several common aspects of Tribal waste management situations were identified. These issues can vary in significance from reservation to reservation and not all of them may or may not be present at a particular reservation. However, the existence of any of the issues require special attention. These issues are summarized below and will be discussed in this session.

- 1. Jurisdictional Issues** – Dealing with how Tribal waste management is considered under federal definitions and how Tribes must interact with counties and states due to the “checkerboard” nature of land status in most reservations and the dependent sovereignty status of Tribes.
- 2. Enforcement Issues** – Relating to the virtual inability to prosecute non-members and the generally high ratio of acreage to be managed to the number of Tribal personnel.
- 3. Cultural Issues** – Including traditional dumping patterns that are no longer appropriate.
- 4. Social Issues** – Relating to beliefs on common ownership and victimization, as well as differences in ideologies between some Tribal members and some non-Indian neighbors.
- 5. Funding Issues** – Relating to the Tribe’s unique status, concerning both Tribe’s ability to tax reservation residents and ability to collect fees from non-member residents.
- 6. Technical Resource Issues** – Relating to both a “brain drain” and lack of technically-educated members.
- 7. Infrastructural Issues** – Having to do with institution inexperience, administrative structure including federal agency involvement, and the role of traditional and bureaucratic authority figures.
- 8. Internal Tribal Issues** -- Dealing with Tribal decision-makers such as Tribal Councils and governing boards.

In addition, like many rural communities, general issues such as ability of the community to pay for management of the C&D debris, lack of regional alternatives, and relatively low education levels also plague Native communities.

Jurisdictional Issues

Tribal Solid Waste Management Responsibility. An overriding jurisdictional issue has to do with Tribal solid waste management responsibility under federal law.

Certain Federal environmental laws or statutes allow Native American governments to assume program authority from the U.S. EPA to run environmental programs on their lands. RCRA, the federal statute that governs solid waste management, was enacted in 1976. RCRA defines Tribes as "municipalities" rather than as states. Under RCRA, only states can be granted solid waste management authority. This categorization of Tribes as municipalities does not allow EPA to delegate solid waste program authority to Native American governments.

Tribes can, however, be held liable for RCRA violations. In the case *Blue Legs v. United States Bureau of Indian Affairs* (1989), the court found the Oglala Sioux Tribe to be 25% responsible for the operation of an open dump on reservation lands when Mattie Bluelegs, a member of the Oglala Sioux Tribe, filed suit against the Bureau of Indian Affairs (BIA). This 25% responsibility resulted in the Tribe having to pay 25% of the clean-up costs, or \$92,000. (After this decision, the Bureau of Indian Affairs and Indian Health Services (IHS) directed that solid waste from their facilities be diverted from open dumps on Indian land. Many of these dumps had originally been open by these federal agencies, which is why the *Bluelegs* decision held them responsible as well.)

The Campo Band of Kumeyaay Indians in California intended to construct and operate a regional landfill on its lands that would have been built to standards that exceeded those of EPA's Subtitle D. The Campos applied for EPA approval in February 1994, and in April 1995 EPA, after having requested public comment and held public hearings, announced that it had approved the Campo application. A group called "Background Against Dumps (BAD)," made up of citizens living near the Campo reservation that opposed the landfill, filed suit, claiming that EPA lacked the statutory authority to approve the Campo application. In October 1996, in *Background Against Dumps v. EPA*, the U.S. Court of Appeals, D.C. Circuit, upheld a lower court's ruling in BAD's favor. Since RCRA defined tribes as "municipalities," the Court held that EPA did indeed lack the statutory authority to delegate its solid waste management authority to Campo by approving its application. The court did acknowledge EPA's legitimate concern that treating Tribes differently from states may be unfair from a policy perspective and stated that EPA could issue "site-specific" regulations so that operators of municipal solid waste landfills on Indian lands could have the same flexibility from the Subtitle D landfill requirements that a state has. A federal court in South Dakota affirmed the validity of "site-specific flexibility" within Indian country in *Yankton Sioux v. EPA*. In that case, a non-Indian owner/operator of a proposed MSW landfill on fee land within the exterior boundaries of the Yankton Sioux reservation has applied to EPA for site-specific flexibility, which EPA had approved. The court upheld EPA's approval. In August 1997, EPA's OSWER

published draft guidelines for "Site Specific Requests for Municipal Solid Waste Landfills in Indian Country."

The events and rulings in this section affect how the U.S. EPA can work with Tribes on the management of solid waste and C&D debris.

Land Jurisdiction. Although the Tribes have only limited or non-existent practical control over fee lands on their reservations, technically, under RCRA, they can be held responsible for environmentally sound solid waste management practices throughout their reservations as a whole.

In regard to state/county jurisdictional issues, the majority of reservations are comprised of land parcels falling under several types of land status. In the simplest terms, there are "fee lands" and "trust lands." Fee lands are properties that are held by either Indian or non-Indian, more generally the case, that are within the boundaries of the reservation but that have been sold off in the past. Fee lands typically fall under the jurisdiction of the county within the borders that they are located.

Lands held in trust are very rarely subject to county or state jurisdictions or controls, with some notable exceptions. In contrast, county and state agencies generally have been the governing authority over fee lands in matters of health, public safety, criminal issues, permitting, and solid waste management. However, jurisdiction over non-members and fee lands is often unclear, and is an evolving field of law. In reservation areas that are predominately Tribal lands, Tribes may have the authority to regulate at least some civil matters on fee lands.

Depending on the relationship of the Tribe with the local non-Indian governments and communities, jurisdictional problems can present significant to insurmountable obstacles to an effective solid waste management program. Exacerbating the Tribal situation in terms of jurisdictional issues is the general federal push towards regionalization of landfills and other solid waste management options, requiring cooperation and formal contracts with several different government entities.

Enforcement

One of the primary problems with enforcement of solid waste management on Indian reservations is that non-members typically cannot be prosecuted under Tribal law. While Tribal police have the authority to escort non-members off of Indian-owned land, they generally cannot arrest them. Citations can be issued, but the Tribal courts have no practical power to enforce them.

This situation presents quite an incentive for those persons inclined to dump C&D debris illegally on a reservation.

Some firms doing construction, renovation, and demolition have been known to do this.

Tribes must develop an enforcement strategy, which may or may not include asking state agencies for assistance.

Tribal Sovereignty. Tribes are sovereign nations. Tribes have the autonomy to write and implement laws within the exterior boundaries of Tribal lands, with a few exceptions. Through the Dawes Act of 1887, many Tribal lands passed into non-Tribal ownership. The Dawes Act created what we now call "checkerboard" lands. This land exchange to non-Tribal members has created challenging social and jurisdictional issues for Tribes. Fortunately for Tribes, this Act was halted when the Indian Reorganization Act of 1934 was implemented. But Tribes are left with lands within their boundaries that are very difficult to regulate environmentally as well as with other types of regulation. Unless cross deputation or less formal reciprocal and consensual agreements with the county and state occur (who have jurisdiction over these lands) a Tribe can have difficulties in implementing solid waste laws over these "checkerboard" lands. Through practical diplomacy and mutual concern for the environment, agreements can be reached with neighboring local county and municipal governments that handle solid waste management. It is a highly individualized situation that can vary from reservation to reservation.

Logistical Problems. There are logistical problems to effective enforcement as well. Most reservations have a very sparse population to land ratio, and hence a small staff to enforce Tribal solid waste management ordinances over large tracts of land. In addition, on many reservations it is often necessary to treat unauthorized solid waste management as a low priority violation due to the many other societal problems that are of more immediate threat.

Cultural Issues

Although traditional and cultural beliefs of Indian Nations may differ from Nation to Nation, there seems to be a common thread that is common to all Nations: All aspects of life are interconnected and any advancement of environmental programs must meet the needs of the present generation without compromising the lives of future generations. Developing and implementing solid waste management programs consistent with the traditional and cultural beliefs of the Indian Nations will help to instill community ownership of the program and will lead to good community decisions with respect to management of solid waste. A comprehensive solid waste management approach is the best option available to meet the needs of the present generation without compromising the lives of the future generations.

Societal Issues

There are societal issues on the reservations that contribute to unique solid waste management circumstances such as (essentially) the public ownership of land. A strong belief in the (Tribal) ownership of the land is emphasized, rather than the non-ownership of the land. The incentive to dump in this case is that the

land is rightfully that of the Tribes and dumping can be perceived as a validation of ownership.

Associated with this phenomenon is the feeling by some Tribal members that their Tribe should be autonomous in regards to carrying out solid waste management. These members can feel hesitant to use county solid waste management landfills and services that are becoming the primary authorized disposal option for many Tribes.

Another societal aspect of the Tribal solid waste management situation that may be present is a bias against the Tribe or Tribal policies on the part of some non-members. These persons may purposely dump across a border onto trust land.

In general, a strong environmental ethic is pervasive throughout the reservations. However, because solid waste management education is lacking, some of these persons who dump for societal reasons do so without knowledge that they are threatening the environment or their health in a significant way.

Funding Issues

While sharing with states the ability to assume responsibility in implementing federal environmental law, Tribes often do not have the same ability as states to fund regulatory programs. Due to the reservation land status and status as a Tribe, they typically cannot collect property or income taxes. In some cases, there is a legal mechanism to enact service taxes such as gas or cigarette taxes to pay for solid waste management services, but this is not the case for all Tribal nations.

Tribes can develop a mechanism to tax members living on the reservation, but, typically, any services provided by those taxes must be made available to all reservation residents including non-members. Non-members and nonresidents generally can be taxed only indirectly by Tribal service taxes on goods sold from Tribally-owned businesses on Tribal land.

As non-members cannot be taxed directly by the Tribes or forced to pay fees for mandatory solid waste management services, an equity issue results. In addition, many members are quite poor and unable to pay taxes or solid waste management fees.

Inadequate funding, in turn, contributes to the relatively low level of available technical resources that is prevalent throughout most reservations. In reviewing solid waste management programs on a number of reservations, the estimation of the level of open dumping and relative risks of specific sites was in error by a substantial magnitude. Tribal personnel who are trained in solid waste management and its associated environmental problems are scarce. A low level of funding ability (to pay high wages) and technical capability compounds the problem of retaining or recruiting technical experts. On a positive note, Tribes

are currently building technical capacity through the U.S. EPA. Many trained Tribal members are running Tribal MSW programs.

(See Session Three for more on funding.)

Infrastructural Problems

Infrastructural problems can occur from the immaturity of Tribal solid waste management programs. It was not until 1986 that Tribes were given express statutory authority in implementing federal environmental regulations. The lack of adequate infrastructure is largely responsible for the poor to very poor awareness by case study Tribes of many circumstances that related directly or indirectly to their solid waste management situations. As mentioned above, the general perception of the extent and type of, and reasons for, open dumping on case study reservations was in substantial error.

All laws and regulations enacted on Tribal lands must have the approval of the Tribal Council or other designated governing authority. It is crucial that Tribal solid waste managers develop a working relationship with their Tribal Councils or other governing bodies to garner support for Tribal solid waste programs. Given the amount of issues that Tribal leaders manage, it is up to the solid waste manager to inform the Tribal Council of their solid waste programs and offer the Council solid, positive information so the Council will support the programs and make informed decisions on those programs. In some instances, it is difficult to work with a Tribal Council that has not properly educated on solid waste management. It is up to you, as a solid waste manager, to provide that education.

Concerning C&D debris management, the Tribal solid waste manager will have to convince the Tribal Council of the need and benefits of collecting, reusing, recycling, and disposing of C&D debris.

Classroom Exercise

1. Discuss how these Tribal-related issues can affect C&D debris management.
2. Ask those attending who have experience in managing C&D debris or in trying to get a C&D debris management program started to share their experiences.

SESSION THREE

PLANNING AND FUNDING A C&D DEBRIS MANAGEMENT PROGRAM

Planning

Step 1. Identify C&D Debris Generated Locally.

How much C&D debris does your Tribe generate? How much C&D debris is currently lying in open dumps?

To start,

1. Identify major building activities and types of building on the reservation;
2. Identify primary materials used and discarded in these activities; and
3. Identify any hazards in the material.

Obtain this information from homebuilders, homeowners, remodelers, commercial developers, building contractors, highway and street contractors, bridge builders, pavement contractors, site grading contractors, demolition contractors, roofing contractors, drywall specialists, and excavation specialists.

For example, check with a homebuilder who has built homes on the reservation-- or similar homes in a neighboring town, as to the types of material and their characteristics. Do the same with commercial developers and contractors.

Try to get as much information as possible, including tonnage estimates.

Also, check out any existing open dumps of C&D debris and estimate how much C&D may be in other open dumps in which C&D debris is mixed in.

Using this information, develop annual estimates of C&D debris generated by ton. The amount of C&D debris will vary based on the general economic conditions of the region, weather, major disasters, special projects and local regulations.

Some of the best sources of information to base future projections are zoning changes, Tribal development plans, and building plans on the reservation. Locate historical records that provide information on new construction, remodeling, and demolition. If historical records can be provided for the past two to three years, then some analysis can be made of that data to project what might be expected, on average, for the next two to three years.

How many homes have been demolished on the reservation in the past ten years? Commercial buildings? How many are set to be demolished? Based on the information you have received, how much debris will result?

If hard data is available regarding the types and nature of buildings that are expected to occur, then estimates of C&D debris expected from such activities can be calculated accordingly. In the absence of such data, or to use as a check against the hard data, EPA's report "Characterization of Building-Related Construction and Demolition Debris in the United States" by Franklin Associates provided the following suggestions for such calculations:

Residential Construction Debris. Types of houses, building practices, and regulations vary widely. U.S. EPA used an average of 4.38 pounds per square foot (ppsf) of floor space for their estimates. Therefore, a 1,200 sq. ft. house, during construction, would result in 5,256 lbs. of C&D debris or 2.62 tons (5,256 divided by 2,000).

Non-residential Construction Debris. Nonresidential buildings vary in C&D debris generated even more widely than residential structures. U.S. EPA used an average generation rate of 3.89 ppsf, slightly less than a residential construction.

Residential Demolition Debris. Assuming an average of 1,600 square feet for single-family houses and 1,000 square feet for multifamily houses, EPA used 61 ppsf for single-family and 115 ppsf for multifamily houses. Consequently, a single-family house of 1,600 sq. ft., when brought down, would result in 97,600 lbs. of C&D debris or 488 tons. Obviously, there is more debris in demolishing a house than in building one.

Nonresidential Demolition Debris. Assuming an average building size of 13,300 square feet for buildings built between 1920 and 1969, EPA used 155 ppsf for nonresidential buildings. A 13,300 sq. ft warehouse, for example, would produce 2,061,500 lbs. of C&D debris or 103,075 tons when demolished.

Renovation/Remodeling Debris. EPA analyzed the amount of material produced by major remodeling projects and the number of those projects expected each year from the housing stock. EPA found that 68 percent of renovations were for improvements and 32 percent were for repairs. After extensive calculations, the total of residential and non-residential debris approximately equaled the amount of demolition debris estimated. A rough estimate of remodeling debris could be obtained by using such a calculation.

Estimating existing C&D debris dumps. Mark off a manageable percentage of the dump (make sure it is a representative area) as to types of debris. Weigh the debris in that area. Divide the weight by the appropriate percentage. For example, if the debris weighs 100 lbs. and is 2% of the total dump area, divide

100 by .02 to get a total weight for the dump area of 5,000 lbs. Use that as a ballpark.

Classroom Exercise

Calculate the C&D debris produced from this annual activity on a reservation.

- | | |
|--|-------|
| 1. 10 1,200 sq. ft. homes built. | _____ |
| 2. 4 10,000 sq. ft. warehouses (non-residential) built | _____ |
| 3. 10 1,600 sq. ft. homes torn down | _____ |
| 4. 4 13,300 sq. ft. warehouses demolished | _____ |
| 5. 4 residential townhouses remodeled | _____ |
| 6. 4 C&D dumps cleaned up, debris from
1/10 of each weighs 400 lbs. | _____ |
|
Total annual weight of C&D debris | _____ |

C&D debris generation is calculated in tons. But from a collection and landfill perspective, weight is not the issue, volume is the issue as the debris fills a truck and landfill space. The density of C&D materials can vary, depending on the dominant component. On the average, C&D debris usually runs between 500 and 675 lbs./cubic yd. Most trucks or rolloff containers have designated volumes - 20 yds., 40 yds., etc. C&D haulers will give you an estimate based on volume.

Classroom Exercise

Take the calculations in tons you did in the previous exercise and convert it to volume, dividing it by 500-675 lbs. per cubic yd. Conversions between weight and volume will vary greatly depending on the density.

Step 2. Collection and Disposal Analysis

The second step is an evaluation of the collection infrastructure.

1. Identify local landfills that may be receiving C&D debris; and
2. Identify local recyclers and reusers (check, for example, the "Jobs through recycling" network at www.epa.gov, which can direct you to state recycling contacts.) primary materials used and discarded in these activities; and
3. Contact waste haulers who collect C&D debris for data needed to evaluate current operations and assess future needs. Use the

figures you gathered in step 1 to obtain collection cost estimates. The information should include the equipment and services they have available and the rates for those services.

Recyclers generally fall into the following categories:

- * General
- * Asphalt
- * Concrete
- * Brick
- * Appliances
- * Flooring
- * Wood
- * Drywall/Sheetrock
- * Metal
- * Paint
- * Plastic
- * Other

For reuse, recycling, and composting companies, questions should also include:

1. Is there a fee for services provided? Is there a payment for the sale of recycled materials?
2. Is there a minimum quantity of materials to be collected?
3. Are there specifications for the amount of contamination allowed? What happens if there is more contamination?

Recycling collection has its costs. Recycling C&D debris can also bring in revenue—See Session 5 for more on C&D debris recycling—but because this will vary wildly with the markets, conservative or no revenue estimates from recycling are wise. As noted in the next paragraph, taking C&D debris out of the material sent to a MSW landfill can save money regardless of any additional revenue it brings. On the other hand, if the C&D debris is presently going to open dumps, then disposing of it properly will result in additional costs.

Finally, there is the cost of landfilling the C&D. Since few Tribes have their own landfills, shipping C&D waste to an off-reservation C&D landfill is a common option. (See Session 6 for more on landfilling and the cost of a Tribal C&D landfill.)

C&D tipping fees will vary from state to state and can rise and fall with the markets. The average C&D landfill tipping fee for the state of Georgia in 2001 was \$25.94/ton, but it fell to \$21.47 in 2002 because of an increase in the volume of C&D debris which resulted in more competitive pricing among the landfills. In the Minnesota-St. Paul area, the C&D landfill tipping fees can range from \$36-69/ton.

The consulting firm of Draper Aden Associates surveyed C&D and MSW landfill tipping fees in six eastern states:

	NC	VA	MD	TN	SC
C&D landfill residential tipping fee	\$25.05	\$27.36	\$40.13	\$23.00	\$19.67
MSW landfill residential tipping fees	\$33.79	\$36.87	\$44.25	\$34.23	\$27.67

Commercial C&D tipping fees vary slightly from residential. As you can see, MSW landfill tipping fees tend to be higher than C&D landfill tipping fees. C&D debris is heavy and can add significantly to disposal costs if included in MSW landfill disposal. Separating the C&D debris from the MSW—for reuse, recycling, or to ship separately to a C&D landfill—can reduce landfilling costs.

So, in your estimates of costs, include

1. Total debris generated
2. Amount removed from total by reuse
3. Amount removed from total by recycling
4. Remainder total to be disposed
5. Cost of collection
6. Cost of separating C&D—labor, storage space, etc.
7. Cost of recycling, including collection
8. Profit from recycling—if any
9. Cost of off-site or on-reservation landfilling
10. Savings in reduction of MSW landfilling cost

Step 3. Evaluation of Tools and Strategies

Once you obtain background information for your area, you should evaluate the tools and strategies needed.

The analysis of the most appropriate options is primarily based on your availability of staff resources, an understanding of local economic conditions, and an assessment of Tribal political realities. The more involved the requirements, the more staff time necessary to review, monitor, and enforce those requirements.

Establishing the “threshold level” for your reservation depends on Tribal economic conditions and how much C&D material is created by different types of projects. High thresholds are appropriate if most of the C&D work anticipated is from commercial, institutional, and industrial projects. A lower threshold—but simpler—process is more appropriate if the majority of C&D debris anticipated will be from individual homeowners and small commercial business remodeling projects.

Step 4. Recommendations, Budget, and Timeline

Once you have identified which of the tools and strategies will work best for your Tribe, they should be drafted in a coherent, clear plan for adoption by your Tribal Council. The recommended plan should be presented with a budget and timeline for implementation. The budget should provide sufficient resources for education and training of involved city staff and all the stakeholders who were involved in the planning process. The timeline should outline particularly what will happen in the first year, because during that time many details may need to be addressed for a smooth implementation.

Where To Pursue Funding

There is no single funding source for all of a Tribe's solid waste management needs. A number of sources, however, exist and, when combined, can provide significant resources for Tribes.

Programs that provide solid waste funding for Tribes generally offer assistance in one of two ways:

- For planning purposes—development of a solid waste management plan, development of a solid waste management code, etc. This funding usually includes money for personnel, supplies, equipment, travel, and training, or
- For construction/implementation purposes—transfer station or landfill construction, dump closures, purchase of waste collection equipment.

Potential sources of funding for planning Tribal solid waste management problems include:

- EPA's Indian Environmental General Assistance Program (GAP), Environmental Justice Grant Program, Pollution Prevention Grant Program, and Jobs Through Recycling Program.
- Grant Funds and technical training provided by organizations like the Tribal Association for Solid Waste & Emergency Response (TASWER), the Inter Tribal Council of Arizona (ITCA) and the National Tribal Environmental Council (NTEC).
- Department of Health and Human Services, Administration for Native American (ANA) grant funds through both the Social and Economic Development Strategies (SEDS) program, and the Indian Environmental Regulatory Enhancement Program.

Potential sources of funding for constructing and implementing tribal solid waste management systems include:

- **Department of Housing and Urban Development (HUD) Community Development Block Grants.**
- **Department of Agriculture (USDA), Rural Development Agency's combination grant/loans for Waste and Waste Disposal Systems for Rural Communities.**
- **Indian Health Service Sanitation Facilities Construction Program funds.**
- **Bureau of Indian Affairs Waste management Program Funds, used directly by the BIA or provided to Tribes for their use through P.L. 93-638 contracts or cooperative agreements.**