

Ozark Rivers Solid Waste Management District Plan 2004 through 2013

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EXECUTIVE SUMMARY

The state of Missouri, through legislation (Senate Bill 530), mandated local governments to address solid waste in their cities/counties by developing solid waste management plans. The Ozark Rivers Solid Waste Management District was formed in November 1991 in response to the new solid waste management law with the objective of reducing the amount of solid waste generated for disposal 40 percent by 1998.

The Ozark Rivers Solid Waste Management District is made up of seven counties —Crawford, Dent, Gasconade, Maries, Phelps, Pulaski and Washington—and is located in the south central portion of Missouri. The total population for the region is 166,310, and the district encompasses 4,523.3 square miles of land.

Distinct features of this region include a mostly rural population with low-housing and low-population density. The most populous residential area in the district, the City of Rolla, located in Phelps County, has a population of 16,367. Maries County has the lowest population of all member counties in the district with a total population of 8,903 residents, all of whom are classified as rural.

Currently, solid waste is either landfilled or recycled including composting. According to the Missouri Solid Waste Diversion and Recycling Status Report for 2001, provided by the Missouri Department of Natural Resources, waste diversion rates have improved from an estimated ten percent in 1990 to an estimated 41 percent in 2001. In 1993 it was estimated that only 4 percent of the available recoverable material was being recycled through the region's recycling centers, an estimated 4,000 tons per year. In 2003 it is estimated the volume of materials being recovered through the region's recycling centers has almost doubled to an estimated 7,837 tons per year. When the plan was written, estimated generation rates were based on 3.7 pounds per person. This number was pulled from a study done in the 1980's. More recent data collected through the Missouri Waste Composition Study, completed by the Midwest Assistance Program in 1997, indicates that actual generation rates for Missourians are closer to 6.25 pounds per day. But recycling rates statewide are also high, at 3.84 pounds per day.

Solid waste that is not recycled is being collected through both private and public operations and deposited in landfills. When the plan was first written, the lack of regional markets for recovered resources made it difficult to establish successful recycling programs. Transportation costs and low volumes of materials hindered marketing efforts. However, as indicated in the statistics mentioned above, volumes have increased over the years. In the early 1990's a number of small community recy-

clinging programs opened and closed due to costs and problems with generating enough volumes to be feasible. However, the small programs that have endured are doing well by funneling their materials through larger recycling facilities in the region. St. James and Cuba both ship the materials they collect to the Rolla Recycling Center and the St. Robert Transfer Station and Recycling also receives materials from surrounding communities. Although there has been little growth in municipal yard waste composting programs in the district, there has been a strong push for backyard composting, and educational efforts have been made to encourage this activity. The composting programs in Rolla and Sullivan are very successful. Disposal alternatives for some types of items banned from landfills are still limited within the district, particularly for waste tires. There are a number of businesses in place that do accept lead acid batteries and white goods. In response to the strong need for education on proper disposal of special and household hazardous waste the district has implemented both educational and collection programs that have been well received and have raised awareness of the hazards of improper disposal and storage. Illegal dumping continues to be a persistent problem for stressed county budgets. But the district is working toward addressing illegal dumping through a survey of dumpsites as well as an education/cleanup program. Both of these projects have been funded through grants from Rural Development. The closure of landfills and reduction in the availability of service in the region, combined with the increase in disposal costs have contributed to the problem.

All seven of the landfills that were operating in the Ozark Rivers district at the time the plan was written have closed. In 1992 there were six proposed landfills in the district at varying levels of development. To date, two of those proposed landfills have been permitted –Prairie Valley in Crawford County and Timberidge (Waco) in Washington County . Three waste transfer stations are currently operating within the district in Pulaski, Phelps and Washington counties. One is privately owned and the other two are publicly owned.

Collection services are provided by both public and private waste haulers and are available to most residents in the district. Due to the consolidation of haulers in the region during the mid-1990's, many of the marginally profitable trash routes were eliminated, resulting in the loss of curbside collection services in the more rural areas of the region. The most effected areas are sparsely populated areas on gravel roads. However, as expected a number of small local haulers have cropped up in response to the demand, and it is believed that over time, these small businesses will fill the gap in services. In rural areas, haulers base the rates charged to rural households on the increased transportation costs. However, many rural residents still prefer to handle their own disposal rather than participate in the collection services available from private

waste haulers.

Based on per-capita waste generation figures, the district estimates the total residential/commercial waste generation for the region at 203,305 tons per year. Original waste generation estimates in the plan were based on 3.7 pounds per person per day. The new rate of 6.7 pounds per day dramatically increases the estimated volume of waste being generated in the region. Industrial generation results in another **29,111** tons for a total estimated generation rate of **131,609** tons per year. **Population and business projections indicate that the amount of solid waste generated will increase by 6 percent by the year 2000 and by another 2.3 percent in the following decade.** The most recent waste assessment was conducted at area waste transfer stations in 1997 to determine the waste characterization of the district. Waste assessments are used to gauge the effectiveness of the solid waste plan and to fine-tune programs to better serve the district's needs. Market development efforts can also be strengthened once the amount of recoverable materials available is known.

In designing and updating this plan, the Ozark Rivers Solid Waste Management District has emphasized the State of Missouri's policy on resource recovery and applied the integrated waste management hierarchy.

Integrated waste management is defined as the managing of waste by a combination of alternatives that include waste reduction, materials re-use, recycling, composting, incineration and landfilling. The strategy developed maximizes waste reduction and resource recovery with incineration and landfilling used only as needed for those wastes that cannot feasibly be recovered.

While meeting the mandates of the law, the plan also addresses issues central to solid waste planning and unique to the district such as the complete disappearance of landfill space and the shortage of local markets for recovered materials, as well as the lack of financial resources for solid waste management.

The plan builds upon the many strengths and the individuality of the district's rural population. The strong sense of community characteristic of the region has been helpful in the planning process and will continue to play an important role in implementation of the plan. The advanced technology being developed by the University of Missouri-Rolla in the areas of market creation and advanced disposal methods has been incorporated into the plan, as well as the marketing efforts currently under way at the Missouri Enterprise Business Assistance Center. Economic development is emphasized in the plan, with special attention given to regional market development.

The technical and education advisory committees, in conjunction with the task forces formed from those two groups, carefully studied and analyzed the components of the initial plan. The public participation element provided a plan that reflects the

needs and wants of the communities involved. These same committees have been left in place and continue to be relied upon for continued assistance and input during implementation. During the review and update process, the committees were asked to review the plan and provide input on the 2004 plan revision. By encouraging the public to participate in the planning and implementation process, the district has ensured its support and participation.

In order to determine the success of the plan, it was necessary to establish a baseline of waste being landfilled by the district. By using landfill tonnage records, making allowances for banned items and recycling programs established since the waste reduction was mandated, a baseline of 111,784 tons was been established by the district in 1993.

When the plan was written in 1993, the district designed a three-phase plan to reduce this baseline by 40 percent. The following elements, as required by MDNR, are addressed in the plan:

- Waste reduction and re-use
- Recycling
- Composting
- Household/farm hazardous waste
- Special types of waste
- Solid waste
- Education
- Public participation

The first phase emphasized education in all elements of the plan. Increasing education and improving public awareness would provide solid groundwork for further implementation of the plan. Education activities during the first phase included development of materials, curriculum, fact sheets, seminars and forums and development of media/public information campaigns. Also included in the first phase was the development of recycling and composting facilities in all member cities. Emphasis was also placed on market development and encouraging the use of recycled materials.

The second phase focused on providing technical assistance both to business and industry and to individuals. The district worked with specific businesses and industries and offered technical assistance services in waste reduction, re-use and recycling options. The second phase included the continuation of successful educational programs and activities. This phase recommended the development of economic incentives and disincentives and the development of more aggressive recycling programs in all member cities. Emphasis was to be placed on further cooperative market-

ing efforts and increased local market development. Another major task in the second stage will be the development of waste reduction, recycling and resource recovery programs for rural households.

The third phase of the original plan included encouraging regulations within the district that would allow the district to realize a 40-percent reduction in solid waste being landfilled. These regulations may include encouraging cities to renegotiate solid waste hauling contracts to include recycling programs, volume-based user fees and financial incentives for individuals and industries that participate in waste reduction and recycling programs. The third phase also promoted state and federal legislation that would provide incentives for waste reduction. A major task in phase three of the plan was to be the development of illegal dumping enforcement guidelines and a district-wide effort to discourage open burning of waste. Market development efforts were to escalate in the third phase to encourage new business and industry throughout the district.

For a number of reasons, not all of the recommendations established for the plan were achieved. Drastic funding cuts due to landfill closures resulted in the district only being able to finance their core programs--education, public awareness, technical assistance and small scale special collections. Furthermore, according to MDNR's estimates, the 40 percent reduction was achieved. Much of the measures outlined in Phase III of the plan were no longer necessary. Regulatory and legislative changes were only to be used if the goal was not reached.

During the plan revision process, the advisory committee discussed the current issues in solid waste and reviewed the district's needs. Their recommendations supported the district's decision to focus on core programs—education and awareness for both the general public and for children; technical assistance for local government, businesses, industry and residents; special collections for banned items and special wastes such as household hazardous waste and electronics waste; and the need to address illegal dumping in the region.

In many ways, the original plan has stood the test of time. The basic premises of the plan are still being followed and will continue into the future. Although the goal of reducing the amount of solid waste landfilled by 40 percent has been achieved, that goal must be maintained and there are other ongoing solid waste issues that the district must focus on, such as addressing illegal dumping and providing disposal services for banned items to all residents of the region.

The district must continue to encourage economic development throughout the seven-county district while allowing residents increased environmental protection.

The plan was to be re-evaluated every two years to gauge its effectiveness and

to determine if changes were needed. As the region's needs change, programs would be adjusted to meet those needs and provide the best services possible. However, MDNR changed the requirements and now requires a solid waste assessment to be completed every two years. The district felt that the plan was important enough to review and update again.

The plan, when implemented, will minimize the amount of solid waste generated for disposal, reduce environmental and public health threats, increase the manufacture and use of products made from recycled materials and preserve our natural resources. The plan has been developed and endorsed by the citizens of the planning area and will be implemented to the benefit of all.

BACKGROUND

PURPOSE AND SCOPE

The Ozark Rivers Solid Waste Management District completed its original solid waste management plan in 1993 to ensure compliance with Senate Bill 530, Missouri's solid waste minimization law of 1990. The Ozark Rivers District includes Crawford, Dent, Gasconade, Maries, Phelps, Pulaski and Washington counties and the cities of Bourbon, Cuba, Steelville, Sullivan, Salem, Bland, Hermann, Owensville, Belle, Vienna, Doolittle, Newburg, Rolla, St. James, Crocker, Dixon, Fort Leonard Wood, Richland, St. Robert, Waynesville and Potosi. The purpose of the Ozark Rivers Solid Waste Management District's original comprehensive solid waste management plan was to provide the strategy to implement and integrate solid waste management programs throughout the district, with the desired goal of a 40 percent reduction of the amount of solid waste generated for disposal in the seven-county district. Today, in 2004, the purpose remains the same, statewide, the 40 percent reduction has been achieved.

As dictated by the law in 1990, the plan must include the following:

- 1) Outline and take into consideration solid waste management plans already in place within the district;
- 2) Conform to the rules and regulations as outlined by the department in section RSMo. 260.200 to 260.345;
- 3) Provide for the collection of recyclable materials or collection points for recyclable materials;
- 4) Provide for the collection of compostable materials or collection points for compostable materials;
- 5) Provide for the separation of household waste and other small quantities of hazardous waste at the source or prior to disposal;
- 6) Provide for the extension of solid waste management services in a manner which minimizes water and air degradation, prevents public nuisances or health hazards, promotes recycling and waste minimization and promotes safe and sanitary management of solid waste;
- 7) Take into consideration existing comprehensive plans, population trend projections, engineering and economics in order to determine what portions of the district can reasonably be expected to be served by a solid waste management system;
- 8) Specify how the district will achieve a reduction in solid waste placed in sanitary landfills through waste minimization, reduction and recycling;
- 9) Establish a timetable, with milestones, for the reduction of solid waste placed in a landfill through waste minimization, reduction and recycling;
- 10) Establish an education program to inform the public about responsible waste management practices;
- 11) Establish procedures to minimize small quantities of hazardous waste, including household hazardous waste, into landfills;

- 12) Establish a time schedule and propose methods of financing for the development, implementation and administration of the planned solid waste management system, along with an estimation of the cost thereof;
- 13) Identify solutions to the problem of incorporating rural households into the solid waste management plan through collection services and reduction, resource recovery and recycling programs;
- 14) Include such other reasonable information as the department may require.

The plan takes into consideration the district's demography, geology, current disposal and recovery services and facilities, and waste stream characteristics. While complying with state statutes, the plan also addresses issues that are unique to the district such as existing and suitable landfill space, need for more local markets for recovered resources, the existence of prevalent waste materials such as wood waste and discarded tires, as well as the lack of financial resources for the administration and implementation of solid waste management programs. The district is predominantly rural, and this characteristic presents unique problems in providing waste recovery and disposal services to all citizens.

History of Solid Waste Management in the Ozark Rivers Region

Prior to 1970, local government officials and individual citizens were largely responsible for solid waste management. The predominant method of managing solid waste was disposal at the local dump. Town dumps were generally opened on undesirable land — wetlands, abandoned strip mines or badly eroded areas — without consideration to geology, water quality or public health.

A survey conducted by the Missouri Division of Health between 1968 and 1970 concluded that 97 percent of the authorized landfills in the state contributed to land, air and water pollution, and only 4 of 457 sites could be described as sanitary. Poor planning and operation of town dumps was resulting in serious threats to the environment and to public health. In response to these troubling statistics, the Missouri Solid Waste Management Law was enacted in 1972. At approximately the same time, Operation 5000 was enacted by the U. S. Environmental Protection Agency. This federal program closed over 5,000 dumps nationwide between 1970 and 1975. By 1975, most of the open dumps had been closed, stricter permitting regulations came into effect, and a more progressive approach to solid waste management began to evolve.

In 1986, Senate Bill 475 was passed, which significantly amended the Solid Waste Management Law of 1972 by placing more emphasis on resource recovery and enacting stronger regulations for landfill disposal to protect the environment and the public.

In the area of resource recovery, SB 475 encouraged the use of recycled products, waste to energy projects and economic development in the area of resource recovery. The bill toughened regulations for waste disposal sites by requiring closure and post-closure plans, financial guarantees for closure costs and post-closure maintenance for twenty years following closure. SB 475 also provided for mandatory leachate collection systems and groundwater testing. By 1989, all landfills were required to have a certified solid waste technician operating the facility. Not only did SB 475 make solid waste regulations more stringent, it provided for enforcement of those regulations through fines and the authority to temporarily suspend permits.

Since 1986, there have been several amendments to the Solid Waste Management Law. Although SB 475 and the legislation following it was a step in the right direction, there still were

no provisions for definitive resource recovery or integrated solid waste management planning. In 1988, Meramec Regional Planning Commission, a voluntary council involving and serving six of the seven counties in the ORSWMD and their respective cities, at a board retreat identified the most pressing issues facing its counties and cities and established priorities. At that time, commissioners identified solid waste as a priority that the commission should address.

In response to the concern over solid waste management issues, MRPC secured a grant from Missouri Department of Natural Resources to hire a Kansas City engineering firm, Burns & McDonnell, to study the region's waste stream. The analysis evaluated existing waste management systems and applicable alternatives for the region. Recommendations were made for waste reduction, recycling and composting. The importance of education to increase awareness was also stressed in the study.

In response to recommendations made in the waste assessment study as well as the need for solid waste education, local elected officials appointed volunteers, and MRPC's solid waste committee was formed in 1988. Committee membership was composed of landfill operators, business leaders, city and county personnel and elected officials, and concerned citizens from throughout a six-county area. The committee's purpose was to assist in solid waste education and to develop a plan of action to address the recommendations of the 1988 solid waste management study. The group had regular monthly meetings and activities centered around education. These efforts included publishing the findings of the waste stream assessment to promote awareness, a region-wide poster/essay contest for youngsters, a "Solid Waste Solutions" conference, Earth Day activities and the establishment of a speakers' bureau. The committee also surveyed waste haulers and landfills on their operations and made recommendations on reducing the amount of waste generated. The committee stressed public education and involvement in solid waste management.

When SB 530 was proposed, MRPC's solid waste committee hosted a public meeting on the legislation with Rep. Pat Dougherty as the guest speaker to outline and explain the law. The committee studied SB 530 and made recommendations to MRPC commissioners on the action that needed to be taken by counties and cities within the region to comply with SB 530.

The solid waste committee is credited with assisting with the smooth formation of the Ozark Rivers Solid Waste Management District. Upon formation of the district in 1991, the committee was disbanded. Many of the committee members are now members of the Ozark Rivers Solid Waste Management executive board and full council.

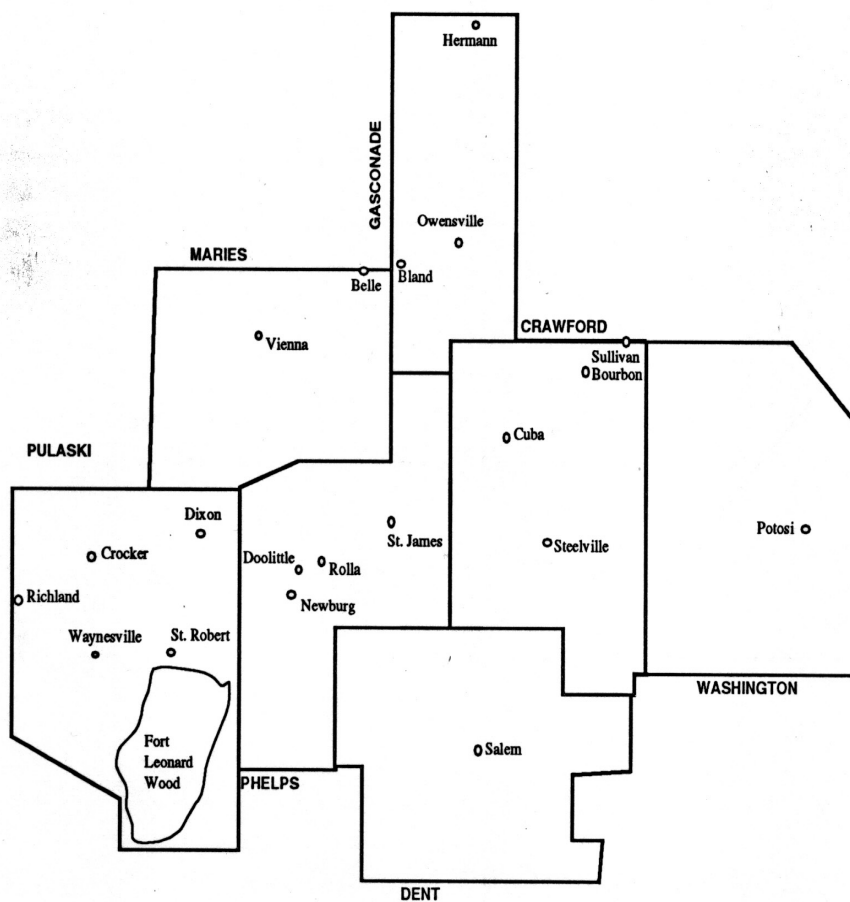
Past solid waste management actions have also included the following:

- A waste reduction audit project, funded through a DNR Division of Energy grant, and administered through MRPC, was completed in 1991. Waste reduction audits were performed in eight local government offices with an analysis of existing waste-management practices and the development of a recycling plan completed for each. The final product, a *Waste Reduction Audit Manual for Local Governments* has been distributed state-wide and was well received.
- A resource recovery study was completed in a cooperative effort by MRPC and the Missouri Enterprise Business Assistance Center in 1991. Funded by a grant from the Economic Development Administration, this study assessed the existing business climate, the types and amounts of materials recovered and reused, and the potential demand for products made from recovered materials through expanded and new markets.
- Another project that originated in the Ozark Rivers District was a statewide confer-

ence entitled "Missouri's Environment: Priority Setting Into the Next Decade." This project, funded by EPA, MRPC, the South Central Ozark Council of Governments and the Environmental Improvement and Energy Resource Authority, was a two-day, working conference involving local elected officials, interested citizens and state and federal agencies. The group identified environmental problems, suggested solutions and established priorities. The conference identified the need for a statewide comprehensive environmental plan and stressed the need for environmental education.

Many of the individual cities now a part of the Ozark Rivers District have been involved in solid waste management—ranging from trash pickup to operating landfills to offering recycling programs. Those efforts that exist today are an integral part of the Ozark Rivers District's solid waste management scheme.

Fig 1-1
Member Counties and Communities
of the
Ozark Rivers Solid Waste Management District



This map is an approximation only and is not scaled

The district plan was developed with the assistance of two advisory committees made up of representatives from the solid waste industry, local government, businesses and industries in the region, local environmental groups and interested citizens. These volunteers were divided into two working groups, an educational advisory committee and a technical advisory committee. These two committees provided input and ideas for how the plan should be developed and what types of programs would best fit the needs of the district. District staff took the recommendations from the advisory committees and created the solid waste plan, which was then reviewed and approved by each member city and county. During the review process of 2003-2004, the advisory committee was brought together again and asked to review the plan, consider the changes that had occurred over the past ten years and provide input on how to update the document to ensure that it continues to provide a viable framework for the district to follow. During the review process, it became evident that much of the original planning document was still viable—a testament to the hard work and good public participation of the original planning process. The 2003-2004 advisory committee still agreed that education, awareness and technical assistance were critical components of the plan. Changes in the plan were reflective of aspects that had not even been considered in 1992—such as the best methods for dealing with electronics waste. But the overall policies and objectives of the original plan still hold true ten years later.

District Goals, Objectives and Policies

To achieve and maintain the 40 percent reduction goal desired in SB 530, the district's original plan, approved by MDNR in 1993, sought to maximize waste reduction and resource recovery programs, explored waste-to-energy options and resorted to landfilling only those wastes that cannot feasibly be recovered. The plan worked to obtain these objectives by following the State of Missouri's policy on resource recovery, known as the Integrated Waste Management Hierarchy. The hierarchy is outlined as follows:

- First — Reduce the amount of solid waste created
- Second—Reuse, recycle and compost
- Third—Recover and use energy from solid waste
- Fourth—Incinerate or dispose of waste in a sanitary landfill

This revised plan continues many of the objectives established in the original document and takes into account changes that have occurred over the past decade. The solid waste district's policies regarding the plan take many variables into consideration. Given the district's low per capita income, economic development will continue to figure strongly in policy decisions. Due to the district's limited financial resources, the plan will have to be conservative and cost conscious, while still balancing the requirements of the law. The district will strive to turn a liability into an asset.

Public input was a critical component of the original plan and has played a major role in this plan revision. Public input will be welcomed and solicited in order to encourage public participation in the plan. Without the support of the citizenry, it will be exceedingly difficult to successfully implement the plan.

Education will continue to be a key issue in all aspects of the plan. The public, from the grade schools to government offices to nursing homes, must be educated in the importance of solid waste management. A public that is informed of solid waste issues—such as the true cost of disposal and resource recovery, the consequences of inadequate or nonexistent solid waste planning—will be better prepared to support and participate in the solid waste plan.

The goal of the district's plan is to minimize the amount of solid waste generated for disposal, reduce environmental and public health threats, increase the manufacture and use of products made from recycled materials and conserve our natural resources.

Authority and Structure of District

The Ozark Rivers Solid Waste Management District was formed in response to requirements of SB 530 and includes the counties of Crawford, Dent, Gasconade, Maries, Phelps, Pulaski and Washington. The district was officially recognized by MDNR on November 19, 1991. By forming the solid waste district, the area was able to pool resources and realize advantages in solid waste management, procurement, financing and education. Through the collaboration of local governments, everyone in the district may benefit from cooperative market development and resource recovery programs.

The district council is composed of two representatives from each county's governing body, and one representative from each city within the district with a population of over 500. The authority and responsibilities of the district council, as outlined in SB 530, are as follows:

- Elect a chairman and officers;
- Meet at least twice annually;
- Review and act upon the Solid Waste Management Plan recommended by the executive board;
- Select seven members, of which a majority are Solid Waste Management Council members, to serve on the executive board;
- Establish terms of office for the executive board members; and
- Approve the method by which the remaining members of the executive board are selected

To provide a better understanding of the structure, authority and responsibilities of the Ozark Rivers district, the bylaws are reproduced below as they stand in 2004:

BYLAWS OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT June 3, 2003

ARTICLE I NAME OF DISTRICT

The organization shall be known as the Ozark Rivers Solid Waste Management District. Herein after referred to as the district.

WHEREAS, the County Commissioners of Crawford, Dent, Gasconade, Maries, Phelps Pulaski and Washington Counties have been meeting together for several months to discuss their mutual interests with regard to solid waste management and compliance with Senate Bill 530; and

WHEREAS, the County Commissioners of each of the aforementioned counties have adopted or are expected to adopt identical ordinances establishing the Ozark Rivers Solid Waste Management District; and

WHEREAS, Senate Bill 530 allows that an agreement among three (3) or more counties establishing a joint District may provide that the membership of the Executive Board of the District and

the terms of Members of the Executive Board will be determined by the terms of an interlocal cooperation agreement entered into by the executive of each county under SB530; and

WHEREAS, the County Commissioners of each of the aforementioned counties are desirous of entering an interlocal cooperation agreement establishing the joint District and governing its operation.

ARTICLE II PURPOSE

Senate Bill 530 requires that the Board of County Commissioners of each county within the State establish by agreement and maintain a “Joint Solid Waste Management District” pursuant to Section 260.200-260.345 of the Revised Code, as amended by the Bill, for the purposes of solid waste management planning and providing for, or causing to be provided for, the safe and sanitary management of solid wastes (as defined in SB 530) within all of the incorporated and unincorporated territory of the County or joint district.

It shall be the purpose and resulting objective of the district to carry out the mandate of Senate Bill 530 (Exhibit A) or as amended by the state legislature as it pertains to Missouri counties and solid waste districts, to include:

- a. To jointly prepare and implement a solid waste management plan for the citizens of the participating Cities and all of the incorporated and unincorporated territory of each participating County for the District that complies with the provisions of SB530 or its amendments.
- b. Establishing an educational program to inform the public.
- c. Establishing procedures to minimize the introduction of hazardous waste, including household hazardous waste, into the solid waste stream.
- d. Assuring adequate capacity to manage waste which is not otherwise removed from the solid waste stream.
- e. Promoting and assisting with resource recovery and recycling.

Neither the Council nor the Executive Board shall interfere into the permitted operations and/or ownership of landfills operated or controlled by political entities or private enterprises within its district except in an advisory capacity if requested by that entity or private enterprise.

ARTICLE III MEMBERSHIP

Each county within the Missouri Department of Natural Resources designated Region K is eligible to become a member of the solid waste district and have representation on the Council and Executive Board. In order to become a member, the county commission must pass the appropriate resolution or court order so stating its desire and forward to the appropriate offices.

ARTICLE IV POWERS AND DUTIES

The District shall be a public body corporate and politic and separate legal entity exercising public and essential governmental functions to provide for the public health, safety, and welfare and

shall have the following powers:

- a. To adopt and have a common seal and to alter the same at pleasure.
- b. To sue and be sued.
- c. To acquire, hold, use and dispose of the reserves derived from the operation of its facilities and other monies of the District.
- d. To acquire, hold, use and dispose of other personal property for the purposes of the District.
- e. To acquire by purchase, gift, lease or otherwise real property and easements therein, necessary or useful and convenient for the operation of the District subject to all liens thereon, if any, and to hold and use the same, and to dispose of property so acquired no longer necessary for the purpose of this District.
- f. To accept gifts or supplies for the purposes of the District and to make and perform such agreements and contracts as may be necessary or convenient in connection with the procuring, acceptance or disposition of such gifts or grants.
- g. To make and enforce bylaws or rules and regulations for the management and operation of its business and affairs for the use, maintenance and operation of its facilities and any other of its properties, and to annul the same.
- h. To do and perform any acts and things authorized based on Section 260.305 (2) RSMo, and by this agreement, under, through or by means of its officers, agents or employees, or by contracts with any person.
- i. To enter into any and all contracts, execute any and all instruments, and do and perform any and all acts or things necessary, convenient or desirable for the purpose of the District or to carry out any powers expressly given by this agreement.
- j. To cause the disposal of solid waste material originating within each Member, pursuant to the contract between the District and each Member.
- k. To fix, establish and maintain such rates, tolls, fees, rentals and other charges for the services and facilities of the District sufficient to pay at all times the costs of maintaining, repairing and operating said facilities, to pay the principal of and interest on bonds of the District then outstanding, to provide for replacements, depreciation and necessary extensions and enlargements and to provide a margin of safety.
- l. To make or cause to be made studies and surveys necessary or useful and convenient to carrying out the functions of the District.
- m. To contract with and compensate consultants for professional services including but not limited to architects, engineers, planners, lawyers, accountants, rate specialists and all others found necessary or useful and convenient to the stated purposes of the District.
- n. To exercise such powers under the effective disposal of solid waste as are available under then existing laws to each Member as is necessary or useful and convenient to carrying out the functions of the District within such Member, as such functions are defined by the service contract entered by and between that Member and the District.

- o. To provide for a system of budgeting, accounting, auditing and reporting of all District funds and transactions, for a depository, and for the bonding of employees.
- p. To consult with representatives of Federal, State and local agencies, departments and their officers and employees and to contract with such agencies and departments.
- q. To borrow money, make and issue negotiable bonds, certificates, bond anticipation notes, refunding bonds and notes or any part thereof by a pledge of any or all of the District's net revenues and any other funds which it has a right to, or may hereafter have the right to pledge for such purposes.
- r. To provide in the proceeding authorizing such obligation for remedies upon default in the payment of principal and interest on any such obligations including but not limited to, the appointment of a trustee to represent the holders of such obligations in default and the appointment of a receiver of the District's property, such trustee and such receiver to have the powers and duties provided for the proceeding authorizing such obligations.
- s. To hire supervisors and employees, fix their compensation, benefits, personnel rules and regulations, and terminate their employment.
- t. To borrow money and accept grants, contributions or loans from and to enter into contracts, leases or other transactions with municipal, county, state or the federal government.

ARTICLE V COUNCIL

That representation on the council shall consist of:

- Two appointees from each member county appointed by the Presiding Commissioner with commission approval.
- One appointee from each city with a population of over 500 in a member county. Appointment shall be made by the chief elected official with city council approval.
- One appointee from Ft. Leonard Wood, appointed by the post commander. Any said reference to cities shall hereafter include Ft. Leonard Wood.
- Each appointee shall have one vote.
- Each appointee may have a duly authorized alternate.

By statute, no person may serve as a member of the council or executive board who is a stockholder, officer, agent, attorney or employee or who is in any way pecuniarily interested in any business which engages in any aspect of solid waste management regulated under sections 260.200 to 260.345.

Council members shall serve a term of two years and may be reappointed thereafter. In accordance with SB 530, each board member serves at the pleasure of the appointing authority.

If a member city does not make an official appointment to the full council, the mayor of that city will be considered the city's representative to the full council.

The Council shall review and act upon the solid waste management plan or the revisions thereof recommended by the executive board.

Extent of Covenants; No Personal Liability. All covenants, stipulations, obligations and agreements of a County/City contained in this Agreement are and shall be deemed to be covenants, stipulations, obligations and agreements of that County/City to the full extent authorized by law and permitted by the Constitution of the State. No covenant, stipulation, obligation or agreement of a County/City contained in this Agreement shall be deemed to be a covenant, stipulation, obligation or agreement of any present or future member, officer, agent or employee of that County/City in other than that person's official capacity.

ARTICLE VI OFFICERS

The council shall elect four officers consisting of a Chairman, Vice Chairman, Secretary and Treasurer to serve as officers of both the council and executive board.

The Chairman shall be the principal executive officer of the District and shall in general supervise the business and affairs of the District. He shall, when present, preside at all meetings of the members of the Council/Executive Board. He may sign with the Secretary or any other proper officer of the District thereunto authorized by the Council/Executive Board, all deeds, mortgages, bonds, contracts, or other instruments which the Council/Executive Board has authorized to be executed, except in cases where the signing and execution thereof shall be expressly delegated by the Council/Executive Board or by these bylaws to some other officer or agent of the District, or shall be required by law to be otherwise signed or executed; and in general shall perform all duties incident to the office of the Chairman and such other duties as may be prescribed by the Council/Executive Board from time to time. The chairman of the Council and/or Executive Board shall be entitled to vote on all matters coming before the Council/Executive Board and will serve as an ex officio member of all committees.

In the absence of the Chairman, the Vice-Chairman shall perform the duties of the Chairman, and when so acting, shall have all the powers of and be subject to all the restrictions placed upon the Chairman. The Vice-Chairman shall perform such other duties as from time to time may be assigned by the Chairman or by the Council/Executive Board.

The Secretary shall be responsible for and cause to be kept the minutes of the Council/Executive Board meetings in one or more books provided for that purpose; see that all notices are duly given in accordance with the provisions of this Agreement or as required by law; be custodian of the District records and of the seal of the District and see that the seal of the District is affixed to all documents, the execution of which, on behalf of the District, under its seal are duly authorized; shall cause to be kept a register of all members and the representative of each member and their post office address; cause to be prepared and delivered to the Secretary of the State of Missouri, on forms prescribed and furnished by the Secretary of State, between the first day of January and the first day of March of each year, an annual report in compliance with the provisions of the statutes of the State of Missouri; and in general perform all duties incident to the office of Secretary and such other duties as from time to time may be assigned by the Chairman or by the Council/Executive Board.

The Treasurer shall give a bond for the faithful discharge of his duties in such sum and with such surety or sureties as the Council/Executive Board shall determine. He shall be responsible for all funds and securities of the District; cause to be kept on file receipts for monies due and payable to the District from any source whatsoever; cause to be deposited all such monies in the name of the District in such banks, trust companies, or other depositories as shall be selected in accordance with the provisions of these bylaws; and in general perform all duties incident to the office of Treasurer and such other duties as from time to time may be assigned by the Chairman or the Council/Executive Board.

These officers shall serve one-year terms with the election to be held in July and shall take office immediately upon their election. Officers must be a current member of the Council.

Nominations for officers will be taken from the floor of the council.

The voting process will take place by secret ballot.

The officers shall serve for both the council and executive board.

If a vacancy occurs in an office position, the executive board can appoint a replacement to serve until the next full council meeting, at which time, the council using the election process will make an official appointment. That appointment shall fulfill the remainder of the unexpired term.

ARTICLE VII MEETINGS

The council shall meet at least twice annually in December and June. Special meetings can be called by the Chairman or upon the call of 30 percent of the membership with such call being a written notification with signatures and directed to the chairman. Special meeting can be called with two days written or phoned notification to the council given by the secretary.

A quorum shall consist of a majority of voting members present and voting but not less than five members.

ARTICLE VIII EXECUTIVE BOARD

The executive board shall consist of two council members from each member County and one representative from Ft. Leonard Wood. An executive board member shall be a resident of the county they represent. Ft. Leonard Wood shall be exempt from this residence requirement.

Selection of the members of the executive board will be made as follows:

- The presiding commissioner of each member county with the approval of the county commission, will select a representative from the council to serve on the executive board.
- Representatives from the cities of member counties shall caucus to select one representative to serve on the executive board.
- The council member representing Ft. Leonard Wood shall serve on the executive board.

The officers of the executive board shall be the same as those for the council.

The executive board members shall serve two-year terms with expired terms to be filled in July of each year. Initial appointees in each county will serve staggered terms with presiding commissioners determining the length of terms for first executive board members representing their respective counties. In the circumstance where executive board members are not reappointed to the full council while they are still serving their two-year terms on the executive board, their positions on the executive board will be vacated. The county authority or the cities represented by that individual must immediately make an appointment to the executive board to fill the vacancy. The new appointment will serve the length of the unexpired term.

Responsibilities of the executive board include but are not limited to:

1. Reviewing and commenting on applications for permits submitted pursuant to section 260.205 of Senate Bill 530.
2. Identifying illegal dump sites and providing available information about such sites to the appropriate county prosecutor or departments.
3. Appointing advisory committees that are geographically balanced and represent commercial generators, the solid waste management industry and two citizens unaffiliated with the operation of management of solid waste facilities to assess and make recommendations on solid waste management.
4. Preparing and recommending to the Council a solid waste management plan for the district. Including reviewing and evaluating said plan at least every 24 months.
5. Entering into contracts with any person for services related to any component of the solid waste management system.

Meetings:

Meetings of the executive board will be scheduled quarterly and at the discretion of the chairman or at the request of 30 percent or more of the executive committee. Such request is to be submitted in writing and signed by those requesting the meeting.

Quorum:

A quorum shall consist of a majority of voting members present and voting but not less than five members.

ARTICLE IX COMMITTEES

Each committee shall include one or more Council members. Said committees shall have and shall exercise such authority as is extended to it by the resolution adopted by the authorizing body establishing said committee. The membership of such committees, the term of offices for members thereof, the manner in which vacancies are to be filled, and the establishment of operating procedures for said committees, shall be established by the enabling resolution.

There shall be an Executive Committee composed of the officers of the District, and two other district representatives as selected by the board. The Executive Committee will act for the full council or executive board when there is not time or it is not practical to assemble the full council or executive board. Emergency actions of the Executive Committee will be affirmed by the district at the next regular meeting of the district.

The Council or Executive Board has the right to appoint ex officio members as deemed necessary.

ARTICLE X FISCAL YEAR

The Fiscal year of the district shall be from July 1 to June 30.

The Executive Board shall be responsible for appointing a budget committee to be responsible for preparing an annual budget to be presented to the council for approval in June. The Executive Board shall cause an audit of the district's records and shall be responsible for accepting such audit for the previous fiscal year(s) by an independent certified accountant to be prepared at a minimum of every two years.

ARTICLE XI PARLIAMENTARY AUTHORITY

Rules contained in the current edition of Robert's Rules of order shall govern the council and executive board in all cases to which they are applicable and in which they are not inconsistent with the bylaws and any special rules of order they may adopt.

ARTICLE XII AMENDMENT OF BYLAWS

The bylaws may be adopted, altered and repealed by the council with a 30-day written notice with a copy of the proposed changes and justification of changes submitted and provided.

Amendments will be made with a vote of at least 2/3 of council members present. Amendments will become effective immediately following a confirmation vote.

ARTICLE XIII FINANCING

Payment of Operating Costs & Expenses - The Counties/Cities that enter into contract with the district to provide solid waste services as set forth in Section 260.200 - 260.345 (2) RSMo shall share all planning and organizational costs and other expenses incurred by the District, including costs and expenses incurred by the Executive Board in the preparation of the District Plan, in the same proportion as the population of the respective Counties/Cities as reported in the decennial census. Any City within the District which does not contract with the District shall be responsible for their own plan at their own cost. The most recent such decennial census information and the resultant proportions in which those costs and expenses are to be shared are set forth in Exhibit B and shall be updated from time to time as new decennial census information becomes available.

In the further event that the Council or the Executive Board uses an employee of a County/City in the service of the District, including without limitation a County/City sanitary engineer or employee in its sanitary engineering department, the County/City employing that person shall provide to the Executive Board information necessary to determine the direct cost and expense to that County/City of the provision of that employee's service to the district, and the Counties/Cities shall share that cost and expense in the same proportion as operating costs and expenses paid directly by the District are shared.

All amounts advanced by a County/City to pay operating costs and expenses of the District at the direction of the Executive Board shall be deemed to be costs and expenses of the District and shall be shared by the Counties/Cities in the same proportions as operating costs and expenses paid directly by the District are shared.

Property Acquisition - The Executive Board may lease, purchase or acquire by any other means from members or from any other sources, such real and personal property as is required for the operation of the District and the carrying out of the purpose of this agreement. The district shall maintain title to all such property in the name of the District and shall require the Secretary to maintain an inventory. Property, materials and services shall be acquired or disposed of only upon a majority vote of a quorum attending a duly called Executive Board meeting, provided, however, that by the same vote the Executive Board may authorize the officers to expend such funds as the Executive Board may direct for other authorized purposes of the District.

All conveyances of real property owned or held in the name of the District shall be made and executed on behalf of the District by the Chairman or Vice-Chairman and secretary of the District.

All property acquired by the District after the formation of the District shall be held in the name of the District, and no expenditure, sale or purchase shall be made without the approval of a majority of the members of the Executive Board at a meeting where a quorum is present. The board shall comply with the provisions of the Missouri code applicable to political subdivisions relating to the acquisition and disposal of property. In the event that a participating County/City removes itself from the District, all property interests are forfeited without compensation to the County/City.

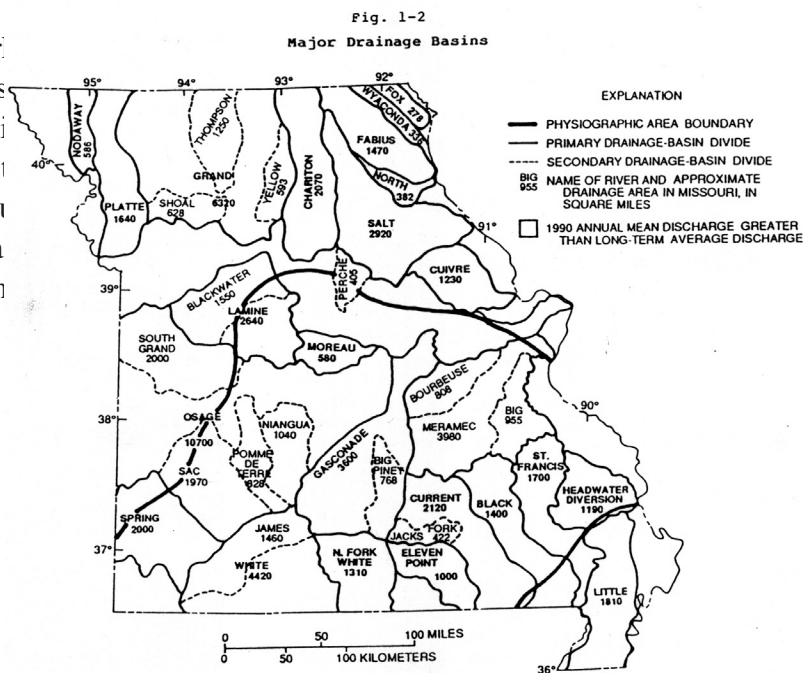
If the District shall cease to exist, the assets of the district shall be liquidated and the proceeds distributed among the current member Counties/Cities generally in proportion to each County's/ City's respective financial contribution.

ARTICLE XIV LEGAL STRUCTURE

It is expressly understood that the District is to be operated not for profit and no profit or dividend will inure to the benefit of any person.

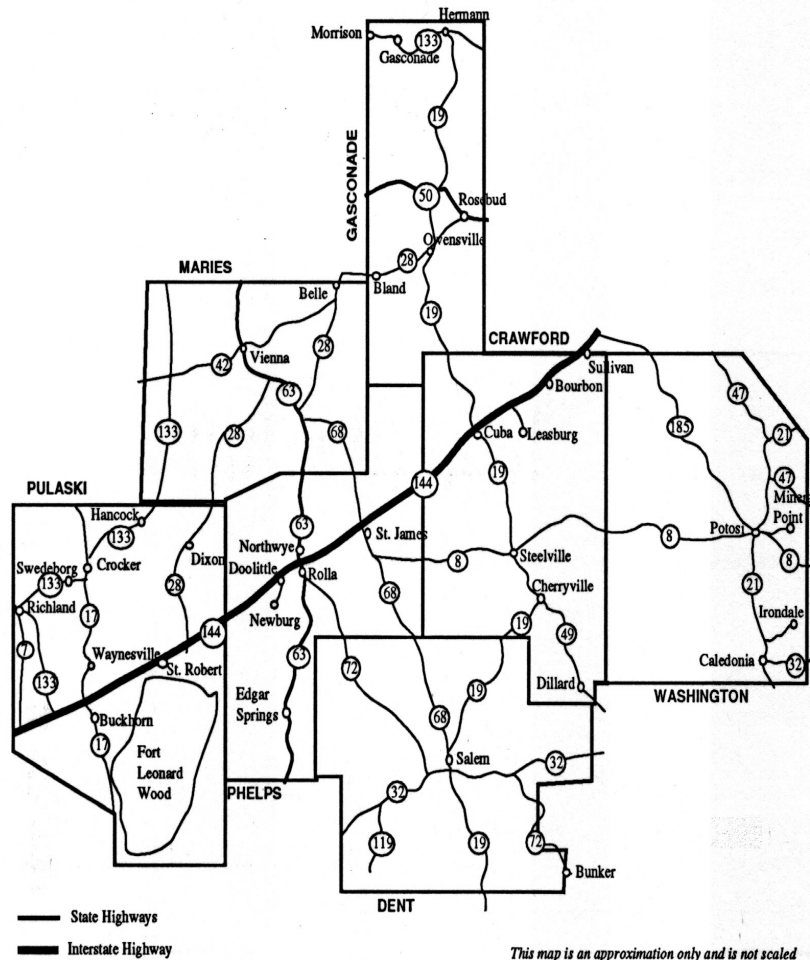
DESCRIPTION OF THE DISTRICT

The Ozark Plateau is characterized by the Salem Plateau controlled drainage. The eastern part drain



and is made up of Washington. The presence. The Salem portions of angular, joint ri River and the

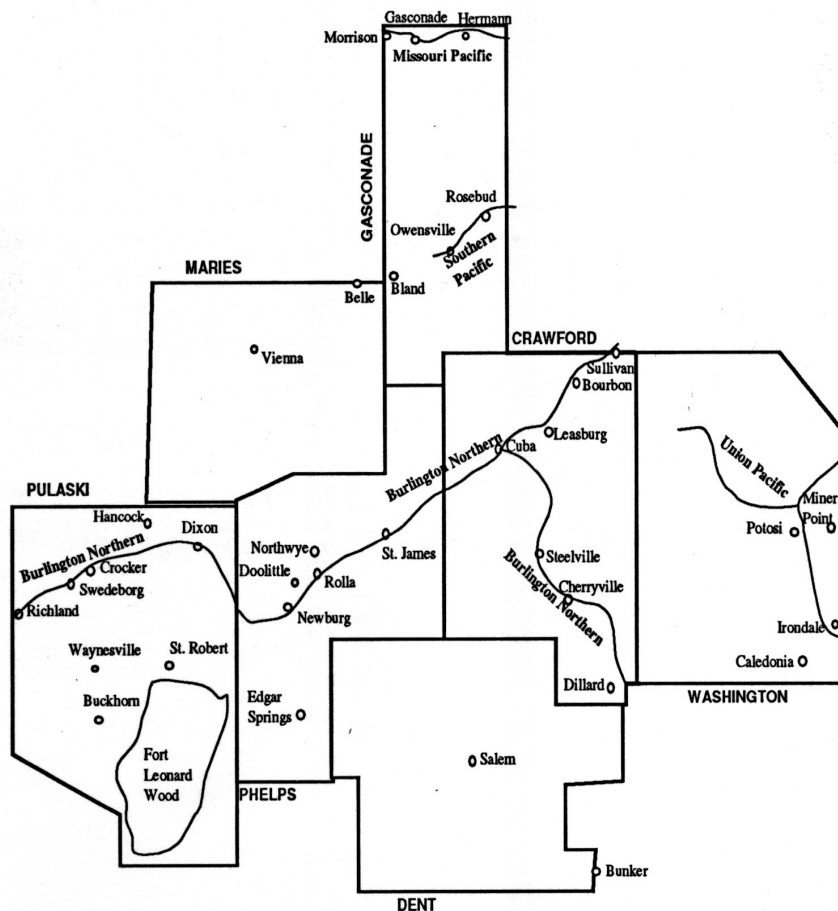
Fig 1-3
Major Highways in the
Ozark Rivers Solid Waste Management District



Major transportation routes within the district include interstate and state highways and railway systems. Interstate 44 bisects the region, running generally east-west through Crawford and Phelps counties. U.S. highways include 63 and 50. Highway 63 runs north-south through Maries, Phelps and Pulaski counties. Highway 50 runs east-west through Gasconade County. Numerous state highways intersect the area including highways 7, 8, 17, 19, 28, 32, 42, 49, 72 and 133.

There are four rail lines in the region—Burlington Northern, Union Pacific, Missouri

Fig 1-4
Rail Lines in the
Ozark Rivers Solid Waste Management District



Source: Meramec Regional Planning Commission

This map is an approximation only and is not scaled

Pacific and Souther Pacific. The Burlington rail line runs through Pulaski, Phelps and Crawford counties, intersecting the cities of Crocker, Dixon, Richland, Newburg, Rolla, St. James, Cuba, Leasburg, Bourbon and Sullivan, with another line running from Cuba south through Steelville and Cherryville. The Southern Pacific rail line services Owensville and Rosebud in Gasconade County. The Union Pacific rail line is confined to Washington County, intersecting the cities of Mineral Point, Potosi and Irondale. Missouri Pacific operates in northern Gasconade County and runs through Hermann. Additionally, Amtrak makes daily stops in Hermann.

Population

These seven counties contain 4,523.3 square miles of land. The combined population of all seven counties according to the 2000 census is 166,310 people, an increase of 14,518 since 1990. The average population density is 36.7 persons per square mile. Of this population, 102,810, or 61.8 percent is rural, and 63,500, or 38.2 percent is urban. The rural to urban ratio has also changed over the last ten years, with a 5.2 percent increase in the number of people living in urban settings versus rural. The rural population is defined by the U. S. Census Bureau as all places with populations of less than 2,500 and all other areas of the county. The urban population is defined as all places with populations of 2,500 or more. Of the seven counties, Maries County has the lowest population, 8,903, all of which is classified as rural. Pulaski County is the most densely populated, with 41,165 inhabitants, and an average population density of 75.2 per square mile. Rolla, which is home to the University of Missouri-Rolla, is the most populated, with 16,3673 people and is located in Phelps County. There are 21 incorporated cities with populations over 500 within the district. Fort Leonard Wood is the second largest with a population of 13,666. Fort Leonard Wood is an active participant in the Ozark Rivers District and is recognized as a city.

Despite predictions in the late 1980's and early 1990's that the region would experience a slight decline in population, that has not been the case. The district's population has grown regionwide almost nine percent over the past decade and that growth is expected to continue.

Based on the 2000 census, the average per capita income for the region is \$14,387, an increase of almost 35 percent compared to the average of \$9,408 cited in the original plan (1990 census data). This is an increase of Gasconade County has the highest per capita income with \$17,319. Washington County has the lowest per capita income with \$12,934. Some 70.7 percent of the housing units in the district are owner occupied, while the remaining 31 percent rent. The average unemployment rate for the district is 5.9 percent. Washington County has the highest unemployment rate of 9.5 percent, while Phelps County has the lowest unemployment rate with 3.3 percent. Figures 1-5 and 1-6 show the demographic information by county of population, population density, rural and urban population, land area and per capita income for both 1990 and 2000.

Of the 166,310 residents in the district, 84,443 or 50.8 percent are male. The remaining 81,867 or 49.2 percent is female. This is slightly at variance from the national average which indicates that in general there are more females in the population than males, due for the most part to the longer life expectancy of women over men. The slightly higher percentage of males in the population can be attributed to the greater number of men living on the military base at Fort Leonard Wood, and the male dominated student body at the University of Missouri - Rolla. Figure 1-7 gives a breakdown of male/female population in the district by county and city.

For the use of the waste management plan, the age distribution of the population in the Ozark Rivers district has been broken down into four categories: age 21 and under, age 22

through 39, age 40 through 59, and age 60 and over. Figure 1-8 and 1-9 illustrate what the population figures are for each of these categories in each county, and for the district as a whole and includes both 1990 and 2000 data for comparison. The charts demonstrate that 2000 age distribution numbers are not significantly different from 1990 data. The largest group district wide is the age 21 and under grouping at 33.4 percent, followed by the age 22 through 39 group at 24.7 percent. The age 40 through 59 age group makes up 24.4 percent of the population, and the over age 60 group is 17.5 percent of the population. This latter group, those age 60 and over is expected to grow as the American life expectancy increases. Some parts of the district are also seeing an influx of older residents who choose to move here after retirement.

Fig. 1-5
POPULATION DENSITY
Ozark Rivers Solid Waste Management District

	Population	Rural Pop.	*Urban Pop.	Land Area Sq.Mile	Pop. Density Per Sq. Mile
Crawford County	22,804	13,223	9,581	8742.6	30.7
Bourbon	1,348	1,348	-	1.2	1123.3
Cuba	3,230	-	3,230	2.9	1,113.8
Leasburg	323	323	-	0.4	807.5
Steelville	1,429	1,429	-	2.6	549.6
Sullivan	6,351	-	6,351	7.7	824.8
Dent County	14,927	8,848	4,854	753.6	19.8
Salem	4,854	-	4,854	3.0	1,618.0
Gasconade County	15,342	10,168	5,174	519.5	29.5
Bland	565	565	-	0.6	941.7
Gasconade	267	267	-	0.2	1,335.0
Hermann	2,674	-	2,674	2.5	1,069.6
Morrison	123	123	-	0.5	246.0
Owensville	2,500	-	2,500	2.0	1,250.0
Rosebud	364	364	-	0.3	1,213.3
Maries County	8,903	8,903	-	527.8	16.9
Belle	1,344	1,344	-	1.3	1,033.9
Vienna	628	628	-	1.1	570.9
Phelps County	39,825	19,754	20,071	672.9	59.2
Doolittle	644	644	-	2.5	257.6
Edgar Springs	190	190	-	0.5	380.0
Newburg	484	484	-	0.6	806.7
Rolla	16,367	-	16,367	11.3	1,448.4
St. James	3,704	-	3,704	2.8	1,322.9
Pulaski County	41,165	21,232	19,933	547.1	75.2
Crocker	1,033	1,033	-	1.2	860.8
Dixon	1,570	1,570	-	1.0	1,570.0
Ft. Leonard Wood	13,666	-	13,666	97.6	140.0
Richland	1,805	1,805	-	2.3	784.8
St. Robert	2,760	-	2,760	7.2	383.3
Waynesville	3,507	-	3,507	6.2	585.7

Washington County	23,344	20,682	2,662	759.8	30.7
Caledonia	158	158	-	0.1	1,580.0
Irondale	437	437	-	0.6	728.3
Mineral Point	363	363	-	0.3	1,210.0
Potosi	2,662	-	2,662	2.2	1,210.0
District	166,310	102,810	63,500	4,523.3	36.8
District 1990 Totals	151,792	101,741	50,051	4,523.3	33.6

* Rural population is defined as all places under 2,500 and all other areas of the county.

** Urban population is defined as all places with a population of 2,500 or more.

Source: 2000 Census of Population - U.S Census Bureau

Fig. 1-6
MEDIAN HOUSEHOLD and FAMILY INCOME
for the
Ozark Rivers Solid Waste Management District

<u>Place</u>	<u>Per Capita Income</u>	<u>Median Household Income</u>	<u>Median Family Income</u>
Crawford County	\$14,825	\$30,860	\$36,558
Bourbon	12,992	30,240	35,294
Cuba	12,665	24,127	30,069
Leasburg	11,879	19,750	29,250
Steelville	12,550	19,596	26,765
Sullivan	17,518	30,046	36,260
Dent County	14,463	27,193	33,061
Salem	12,766	21,648	29,460
Gasconade County	17,319	35,047	41,518
Bland	13,102	26,667	34,659
Gasconade	13,131	27,404	27,917
Hermann	19,428	35,634	44,621
Morrison	14,193	31,607	33,750
Owensville	15,208	26,913	33,109
Rosebud	18,513	29,688	33,750
Maries County	15,662	31,925	39,187
Belle	17,785	24,091	35,982
Vienna	13,682	23,456	36,250
Phelps County	16,084	29,378	38,693
Doolittle	20,727	32,813	35,938
Edgar Springs	12,672	30,000	30,781
Newburg	11,092	18,000	21,667
Rolla	15,916	26,479	38,975
St. James	14,509	24,629	29,952
Pulaski County	14,586	34,247	37,786
Crocker	13,401	29,583	35,750
Dixon	12,405	21,821	28,693
Ft. Leonard Wood	11,652	33,891	34,354
Richland	14,209	33,891	34,354
St. Robert	17,650	33,080	37,841
Waynesville	19,117	41,250	46,205
Washington County	12,934	27,112	31,634

Caledonia	10,684	20,833	28,125
Irondale	11,819	26,250	30,156
Mineral Point	8,364	15,455	16,591
Potosi	12,417	17,702	23,958
District	14,387	27,257	33,198
District 1990 Totals	9,408	19,605	23,403

Source: 2000 Census of Population - U.S Census Bureau

Fig. 1-7
MALE/FEMALE BREAKDOWNS
for the
Ozark Rivers Solid Waste Management District

<u>Place</u>	<u>Total Persons</u>	<u>Male</u>	<u>Female</u>
Crawford County	22,804	11,245	11,559
Bourbon	1,348	669	679
Cuba	3,230	1,513	1,717
Leasburg	323	157	166
Steeleville	1,429	609	820
Sullivan	6,351	3,003	3,348
Dent County	14,927	7,246	7,681
Salem	4,854	2,181	2,673
Gasconade County	15,342	7,459	7,883
Bland	565	271	294
Gasconade	267	120	147
Hermann	2,674	1,217	1,457
Morrison	123	61	62
Owensville	2,500	1,133	1,367
Rosebud	364	174	190
Maries County	8,903	4,479	4,424
Belle	1,344	609	735
Vienna	628	278	350
Phelps County	39,825	20,225	19,600
Doolittle	644	310	334
Edgar Springs	190	94	96
Newburg	484	234	250
Rolla	16,367	8,652	7,715
St. James	3,704	1,738	1,966
Pulaski County	41,165	21,753	19,412
Crocker	1,033	489	544
Dixon	1,570	693	877
Ft. Leonard Wood	13,666	8,375	5,291
Richland	1,805	815	990
St. Robert	2,760	1,378	1,382
Waynesville	3,507	1,655	1,852
Washington County	23,344	12,036	11,308
Caledonia	158	79	79

Irondale	437	216	221
Mineral Point	363	177	186
Potosi	2,662	1,195	1,467
District	166,310	84,443	81,867
District 1990 Totals	151,792	77,929	73,863

Source: 2000 Census of Population - U.S. Census Bureau

Fig. 1 - 8
AGE DISTRIBUTION OF POPULATION

County	21 & Under	22 - 39	40 - 59	60 &Up
Crawford	7,085	5,047	5,883	4,789
Dent	4,421	3,121	3,919	3,466
Gasconade	4,452	3,154	4,060	3,676
Maries	2,709	1,958	2,364	1,872
Phelps	13,144	9,567	9,893	7,221
Pulaski	16,121	12,421	8,308	4,315
Washington	7,572	5,906	6,072	3,794
District Total	55,504	41,174	40,499	29,133
% Per Group	33.4%	24.7%	24.4%	17.5%
District 1990 Total	52,661	42,312	30,379	26,440

SOURCE: 2000 Census of Population - U. S. Census Bureau

Based on 2000 census data, the minority population in the district makes up 8.4 percent of the total population, or 13,926 out of 1166,310 people. Figure 1-10 illustrates the racial make up of the district. The distribution of the minority population varies widely from county to county. Pulaski County has a minority population of 21.7 percent or 8,911 people, Gasconade County has a minority population that comprises only 1.3 percent of residents. Figure 1-11 shows county-by-county a minority distributions chart of the district. African Americans are the largest minority group within the district, making up 44.9 percent of the minority population. African Americans are the largest minority group within the district, making up 44.9 percent of the minority population.

Fig. 1-11
RACIAL BREAKDOWN
for the
OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT

County	White	Black	Amer. IN or AK Native	Asian	Native HI or Pac. Isl.	Other	Hispanic	2 or more Races
Crawford	22,408	33	99	30	14	32	176	188
Dent	14,489	59	109	32	2	25	112	211
Gasconade	15,141	18	28	24	1	22	64	108
Maries	8,674	29	49	10	0	31	103	110
Phelps	37,132	596	236	936	25	186	485	714

Background 1.21

Pulaski	32,254	4,935	413	936	130	1,028	2,404	1,469
Washington	22,286	578	155	35	2	36	170	252
District Total	152,384	6,248	1,089	2,003	173	1,360	3,514	3,052
% of Race (2000)	91.6	3.8	0.7	1.2	0.1	0.8	2.1	1.8
% of Race (1990)	92.3	4.1	0.03	0.01	0.01	0.007	0.01	

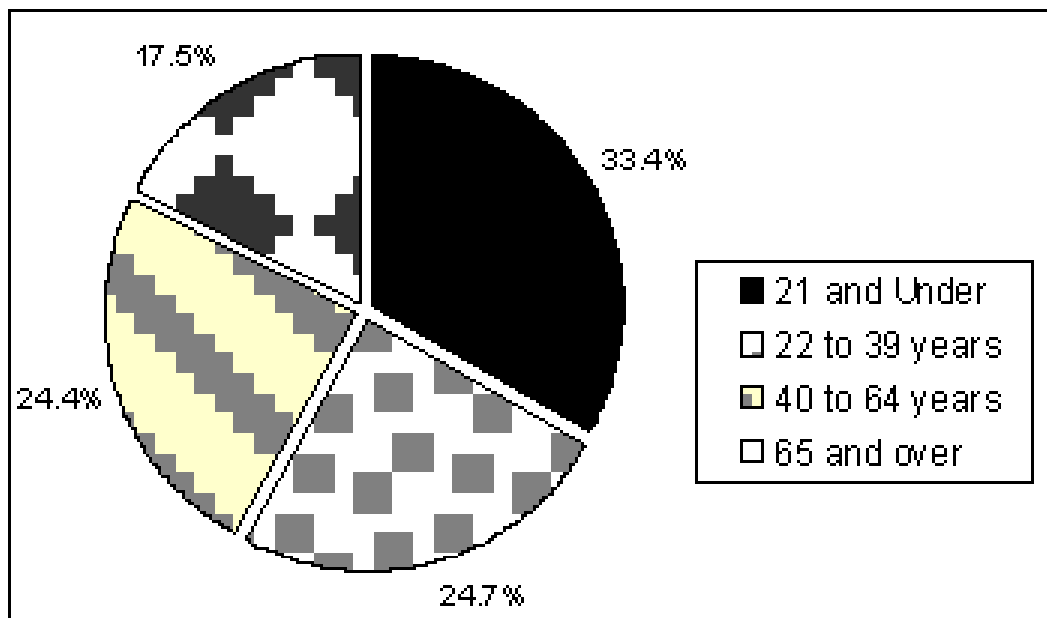
Note: Amer. IN or AK Native includes American Indian and Alaska natives; Asian includes Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese and Other Asian; Native HI or Pac. Isl. includes Native Hawaiian, Guamanian or Chamorro, Samoan and other Pacific Islanders.

SOURCE: 2000 Census of Population - U.S. Census Bureau

The level of education attained by residents within the district is illustrated in Figure 1-12. These figures were a part of the 2000 Census sampling. The number of persons included in the study for each county is in the last column. The categories are broken down into the number with: less than a high school diploma, high school graduates, some college coursework but no degree, associate's degree, bachelor's degree, and graduate degree or greater.

District-wide, 74.6 percent of the population has at least received a high school diploma,

Fig. 1-9
AGE GROUP BREAKDOWN
for the
Ozark Rivers Solid Waste Management District



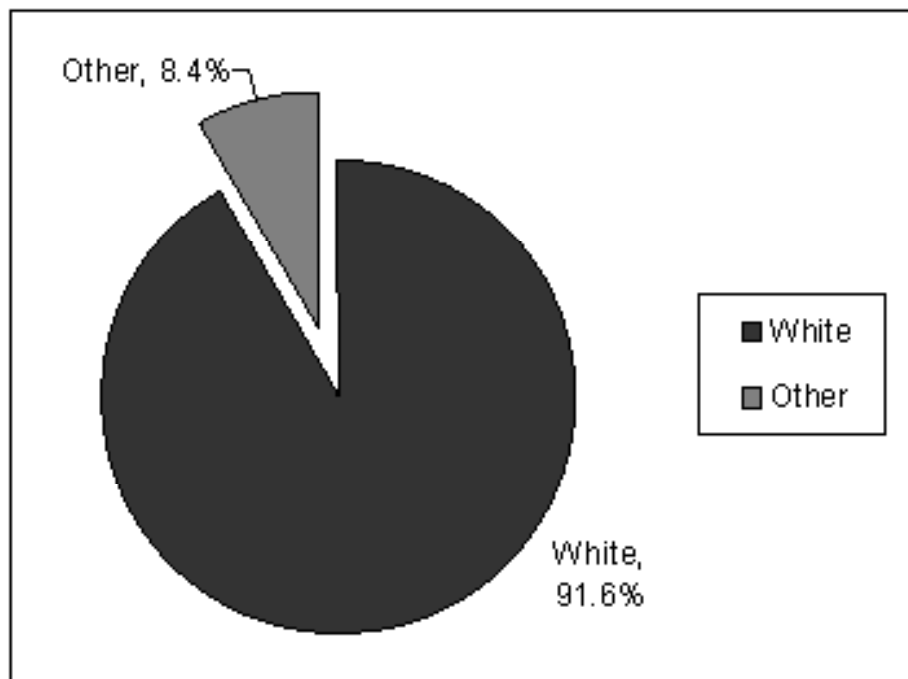
SOURCE: 2000 Census of Population - U.S. Census Bureau

with a portion of that number furthering their education with some college or an associate degree. Some 9.0 percent have at least completed their bachelor degrees, with 5.1 percent of that number finishing graduate degrees.

Fig. 1-12
EDUCATIONAL ATTAINMENT FOR
THE OZARK RIVERS SOLID WASTE DISTRICT

County	Less than High Sch.	H. S. Dipl.	Some Col. No Degree	Assoc. Degree	Bach. Degree	Grad. Degr. Or Greater	Total Surveyed
Crawford	4,606	5,897	2,641	644	815	454	15,057
Dent	3,401	3,621	1,749	304	710	313	10,098
Gasconade	2,743	4,228	1,923	540	734	364	10,530
Maries	1,521	2,518	984	290	482	174	5,969

Fig. 1-10
RACIAL BREAKDOWNS
for the
Ozark Rivers Solid Waste Management District



NOTE: Other Races include Black, American Indian, Alaskan Native, Asian, Native Hawaiian or other Pacific Islander and Other

SOURCE: 2000 Census of Population - U.S. Census Bureau

Phelps	5,171	8,123	5,045	1,134	2,934	2,258	24,665
Pulaski	3,435	7,753	5,532	2,011	2,961	1,370	23,062
Washington	5,548	5,233	2,401	503	759	352	14,796
District	26,425	37,373	20,275	5,426	9,395	5,283	104,177
By Group 2000	25.4%	35.9%	19.5%	5.2%	9.0%	5.1%	
By Group 1990	35%	34.8%	15.2%	3.9%	7.1%	4%	

SOURCE: 1990 & 2000 Census of Population - U. S. Census Bureau

Physical Description

Soils. Four general soil areas are located within the Ozark Rivers Solid Waste District: Missouri Alluvium, Central Mississippi Valley Wooded Slopes, Ozark Border, Ozarks and Ozark Dome. The Missouri Alluvium soils are in the broad, nearly level to gently sloping bottom land area of the Missouri River along the northern part of Gasconade County. These soils formed in deep silty loamy and clayey alluvium. The Missouri Alluvium includes the Haynie-Blake-Booker soil association.

The Central Mississippi Valley Wooded Slopes soils are located on thick loess covered hills with rolling narrow ridgetops and steep valley sideslopes. These soils developed in deep loess deposits on ridgetops and valley slopes near the Missouri River along the northern part of Gasconade County. Soils formed in loess and cherty limestone and dolomite are on ridges at a greater distance from the Missouri River. Deep silty loamy and clayey soils are on the benches and flood plains of small streams. The central Mississippi Valley Wooded Slopes soils include the Menfro-Winfield soil association.

The Ozark Border soils are located in an area of dissected plateau characterized by narrow ridgetops and narrow valleys. A thin mantle of loess caps the ridgetops. The steep sideslopes contain deep cherty, clayey, reddish-colored soils developed over dolomite or limestone. Sandy, loamy and gravelly alluvial soils are in the bottom lands. These soils are found throughout most of Gasconade County, northeastern Crawford County, northeastern Phelps County and parts of northern and eastern Maries County. The Ozark Border soils include the Union-Goss-Gasconade Peridge and Hobson-Clarksville-Gasconade soil associations.

The Ozarks soils are located in an area of narrow, cherty limestone ridges that break sharply to steep side slopes of narrow valleys. Loess occurs in a thin mantle or is absent. Soils formed in the residuum from cherty limestone or dolomite range from deep to shallow and contain a high percentage of chert in most places. Some of the soils formed in a thin mantle of loess are on the ridges. Soils formed in loamy, sandy and cherty alluvium are in narrow bottom-land areas. These soils are found throughout all of Pulaski County, most of Phelps, Crawford and Maries counties, the western part of Washington County and in the central part of Gasconade County. The Ozarks soils include the Lebanon-Goss-Bardley-Peridge, Needle-ey-Viration-Wilderness, Gerald-Union-Goss, Lebanon-Hobson-Clarksville, Hobson-Coulstone-Clarksville, Captina-Clarksville-Hartville-Ashton-Cedargap-Nolin soil associations. The Hartville-Ashton-Cedargap-Nolin soils association is located along the Meramec and Gasconade Rivers.

The Ozark Dome soils are located on mountainous slopes of rhyolite flows, granite domes and valley slopes on dolomite and sandstone formations. These soils are found in southeastern Washington County. The Ozark Dome soils include Knobtop-Irondale-Delassus-Syenite and Peridge-Cantwell-Gasconade soil associations. Figure 1-13 describes the various types of soil in detail.

Fig. 1-13
Major Soils Associations

Missouri Alluvium	Haynie-Blake-Booker	Deep, nearly level to gently sloping moderately well-drained to very poorly drained loamy and clayey bottom land soils on flood plains that are occasionally flooded. These soils formed in loamy alluvium.
Central Mississippi Valley Wooded Slopes	Menfro-Winfield	Deep, gently sloping to steep well drained and moderately well-drained, loamy upland soils. These soils formed in loess on ridgetops and sideslopes.
Ozark Border	Union-Goss-Gasconade-Peridge	Deep and shallow, nearly level to very steep, moderately well-drained to excessively drained, loamy and clayey upland soils. These soils formed in loess and cherty limestone residuum, cherty limestone residuum, limestone residuum, or loess and limestone residuum. Karst topography is common in some areas of Peridge soils.
	Hobson-Clarksville-Gasconade	Deep and shallow, gently sloping to very steep, moderately well-drained to somewhat excessively drained, loamy and clayey upland soils. These soils
	formed in sandstone and cherty	dolomite residuum, cherty limestone residuum or limestone residuum.
Ozarks	Lebanon-Goss-Bardley-Peridge	Well-drained and moderately well-drained, loamy, clayey and cherty, deep and moderately deep soils and soils with fragipans on gently sloping to very steep uplands. These soils formed in loess and limestone residuum\ cherty dolomite residuum, or cherty dolomite and limestone residuum.
Wilderness	Needleye-Viration-moderately well-drained, loamy	Nearly level to moderately steep, upland soils with fragipans. These soils formed

		in loess and cherty limestone residuum and loamy material and cherty limestone residuum or cherty limestone residuum.
	Lebanon-Hobson-Clarksville	Gently sloping to very steep, moderately well-drained to somewhat excessively drained, loamy and clayey soils with fragipans or soils that are cherty throughout. These soils formed in sandstone and cherty dolomite residuum, or cherty dolomite and limestone residuum.
	Hobson-Coulstone-Clarksville	Gently sloping to very steep, moderately well-drained to somewhat excessively drained, loamy soils with fragipans or soils that are cherty throughout. These soils formed in sandstone and cherty dolomite residuum or cherty dolomite and limestone residuum.
Doniphan	Captina-Clarksville- well-drained to excessively drained,	Nearly level to very steep, moderately loamy upland soils that have fragipans or soils that are cherty throughout. These soils formed in loess and cherty limestone residuum, cherty dolomite and limestone residuum, or shale, cherty dolomite and limestone residuum.
	Hartville-Cedargap-Nolin	Deep, nearly level to gently sloping, somewhat poorly drained to somewhat excessively drained, loamy bottom land soils. These soils formed in alluvium, silty alluvium or silty and cherty alluvium. These soils are located on terraces, low stream terraces and flood plains.

Source: Information provided by Foth & Van Dyke

Hydrology. The Ozark Rivers Solid Waste Management District is located in three river basins: Gasconade, Meramec and Osage. The Gasconade River and its tributaries including the Big Piney River, Beaver Creek, Little Beaver Creek and Little Piney Creek drain parts of Gasconade, Maries, Phelps and Pulaski counties. Included within this basin are 52 springs: 28 in Phelps County; 18 in Pulaski County; four in Maries County; and two in Gasconade County.

The Meramec River and its tributaries including Bourbeuse River, Dry Creek, Huzzah Creek, Courtois Creek, Hazel Creek, Big River and Mineral Fork drain parts of Maries, Gasconade and Phelps counties and all of Crawford and Washington counties. Included with this basin are 36 springs: three in Phelps County, three in Gasconade County, 23 in Crawford County and seven in Washington County. The Osage River and its tributaries, including the Maries River, drain parts of Pulaski and Maries counties. Springs are included with the study area portion of the Osage River basin.

Hydrogeology. The district is located within the Missouri River Valley and the Ozarks groundwater regions of Missouri. The northern edge of Gasconade County is located in the Missouri River Valley. The water table in this river valley is near the surface.

The water in this region is hard with a high iron content, but the overall quality of the groundwater is good.

The Ozarks groundwater region has good to excellent groundwater quality. The bedrock aquifers include the Roubidoux Formation, the Gasconade Formation, the Gunter member and the Potosi Formation. The normal and range of well yields for these aquifers is summarized in the following chart:

	Aquifer	Normal Yield (GPM*)
Range (GPM*) 10-30 15	Roubidoux	20
	Gasconade	10-20
	Gunter	40
	Potosi	20-75
	250-600	400

*Gallons Per Minute

Informa-

tion supplied by Foth & Van Dyke, 1993

The Roubidoux Formation is the most reliable shallow aquifer for farm wells in the Ozarks groundwater region. In most of the area, the Potosi is the most reliable aquifer for municipal and industrial water supplies.

Environmentally Sensitive Areas. The location and characteristics of natural areas need to be considered when adjacent land use activity is to be developed. The areas listed in Table 1-14 include state parks and forests, natural history areas, wildlife areas, national forests and natural areas.

Table 1-14
Summary of Environmentally Sensitive Areas

	County	Area
tional Forest Recreation Site Natural History Area Creek Wildlife Area Cave State Park Area and State Forest Woods Memorial Wildlife Area State Forest Area National Forest	Crawford	Red Bluff Na-
		Onyx Cave
		Blue Springs
		Onondaga
		Huzzah Wildlife
		Woodson K.
		Crooked Creek
		Richter Wildlife
		Mark Twain
	Dent	Cedar Grove

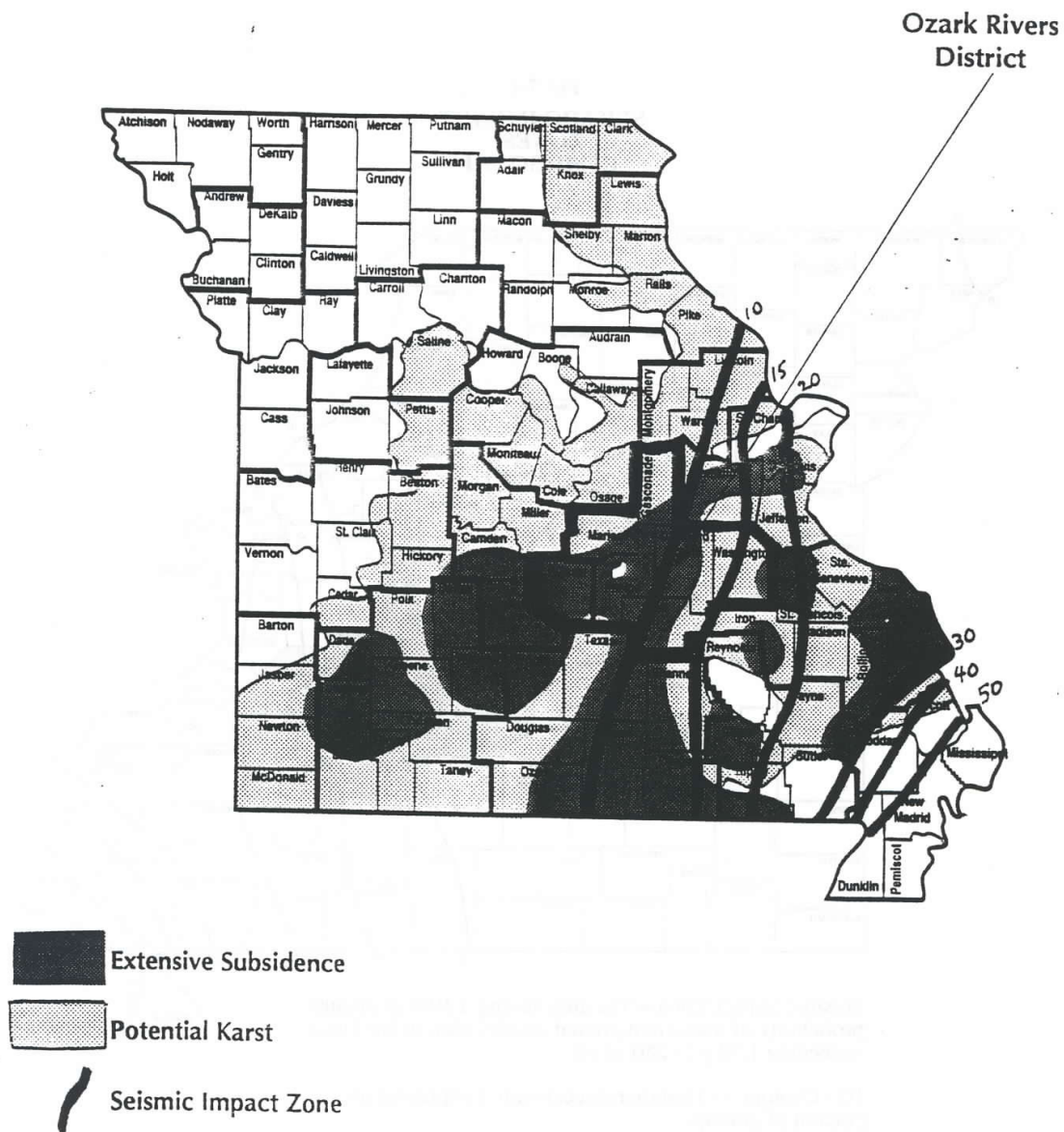
State Forest		Richard F.
Clement Memorial Forest		Hyer Woods
Natural Area		Indian Trail
State Forest		Little Scotia
Pond Recreation Site		Montauk Trout
Park		White River
Trace Wildlife Area		Mark Twain
National Forest		
Forest	Gasconade	Canaan State
Natural Area		Mint Spring
Gap State Forest	Maries	Spring Creek
Natural History Area		Clifty Creek
Community Lake		Rinquelin Trail
Spring Park And Trout Hatcher	Phelps	Maramec
National Forest		Mark Twain
Lake		Dry Fork Tract Schuman Park
Community Lake		Little Prairie
State Forest (2 areas)		Beaver Creek
National Forest Recreation Site		Lane Spring
Woods Wildlife Area		Woodson K.
National Forest	Pulaski	Mark Twain
Natural History Area		Ryden Cave
Natural Area		Great Spirit
Wildlife Area		Lone Star Tract
tain	Washington	Bismark Lake
tain Natural Area		Buford Moun-
Creek State Forest		Hughes Moun-
State Forest		Little Indian
		Pea Ridge

Other environmentally sensitive areas exist in the Ozark Rivers district because of the region's geological characteristics, primarily karst terrain and seismic zones. Karst can best be described as a land area lying on soluble rock through which a tangible amount of water moves through naturally occurring cracks and crevices. The most significant natural process occurring in karst areas is the solutional weathering of the soluble rock. This process takes place when rainwater combines with carbon dioxide in the soil or atmosphere and forms a carbonic acid. A weak acidic solution that breaks down limestone. The dissolved limestone washes away leaving cracks and crevices in the rock. These fissures in the stone formation act as conduits from surface water to groundwater.

Because of the porous nature of the underlying rock, a large amount of the rainfall in karst areas moves quickly and directly into the groundwater system. Water moves rapidly through karst and does not undergo the purification it would receive if seeping through soil and less permeable rock formations. Karst area groundwater is very susceptible to contamination, thus making it extremely difficult, if not impossible, to site landfills in karst areas under Subtitle D regulations. The state, when compared to the nation as a whole, is at a distinct disadvantage. Twenty percent of the United States is classified as karst terrane. Some 60 percent of Missouri is underlain with karst. The map in Figure 1-15 shows karst terrane in Missouri and illustrates that the Ozark Rivers district is almost entirely karst terrane.

Areas that are susceptible to seismic disturbances also present unique problems. The New Madrid Fault in southeast Missouri is significant enough to influence solid waste decisions in the Ozark Rivers Solid Waste District. Approximately two-thirds of Crawford and Dent counties and all of Washington County lie within an area that is considered a seismic impact zone. There is a 10 percent or greater probability of maximum ground acceleration in hard rock exceeding 0.10 g in 250 years. The map in Figure 1-15 also shows the seismic impact zones within the state with the outermost boundary bisecting the Crawford and Dent counties. Washington County is divided between the 10 percent and 20 percent probability zones. The probability percentages increase relative to the proximity to the New Madrid Fault.

Fig. 1- 15
LANDFILL CONSTRAINTS:
KARST TERRAIN AND SEISMIC ZONES
IN MISSOURI



Graphic provided by Foth & Van Dyke

Fault Areas. New MSWLFs and lateral expansions are banned within 200 feet of faults that have experienced displacement during the Holocene Epoch (125,000 B.C. to the present). In an approved state, a new landfill or expansion may be sited within the 200-foot zone if demonstration is made that a lesser distance will prevent damage to the structural integrity of the MSWLF unit and will be protective of human health and the environment. No such areas are known within the study area, and thus the criteria is not applicable to the Ozark Rivers Solid Waste District.

Seismic Impact Zones. New MSWLF units and lateral expansions are banned in seismic impact zones. A seismic impact zone is an area with a 10 percent or greater probability that the maximum expected horizontal acceleration in hard rock, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 250 years. However, the owner or operator may demonstrate to the director of an approved state that all containment structures, including liners, leachate collection systems, and surface water control systems are designed to resist the maximum horizontal acceleration in hard rock for the site. Approximately the southeastern two-thirds of Crawford and Dent Counties and the entirety of Washington County are within seismic impact zones.

Unstable Areas. Owners or operators of all MSWLFs located in an unstable area must demonstrate to the director of an approved state that engineering measures have been incorporated into the MSWLF unit's design to ensure that the integrity of the structural components of the unit will not be disrupted. Unstable areas include poor foundation conditions, areas susceptible to mass movements (such as landslides, avalanches, debris slides and flows, soil fluctuation, block sliding, and rock fall) and karst terrane. Throughout the study area, but especially in Crawford, Phelps and Pulaski Counties, karst terrane is pronounced. Thus, this criteria will be of critical importance in the location and design of any landfills within the district.

In an approved state, some flexibility is allowed in the permitting of lateral expansions and new units in wetlands under specific conditions. Approved states will also be given some latitude in siting landfills in seismic impact zones and extending closure of existing landfills in unstable areas for up to two years.

In the area of operating criteria, unapproved states will be required to apply six inches of earthen material cover daily, while approved states will be permitted to substitute alternate types of daily cover with alternatives for application frequency.

Under design criteria, an approved state will again be given some flexibility in leachate containment and collection systems designs, as well as in establishing alternative schedules and requirements for groundwater monitoring and corrective action requirements. Non-approved states will be required to comply with stringent groundwater testing regulations for both established landfills and proposed facilities.

In the area of financial assurance criteria, approved states are permitted some latitude to approve alternate methods of financial assurance, rather than be limited to the mechanisms listed in Subtitle D.

Missouri Solid Waste Legislation 1986 to 1990

Senate Bill 535, passed in 1988, amended not only the Solid Waste Management Law, but also the Missouri Hazardous Waste Management Law. Changes included providing:

1. Authority for DNR to attach terms and conditions to solid waste disposal area and solid waste processing facility permits, and authority for enforcement if those terms and conditions were not met;

2. Legislative veto of departmental rulemaking;
3. Requirements for many aspects of infectious waste management,
4. The "habitual violator" statute—denial of permits to solid waste facilities based on the applicant's history of compliance in the area of solid waste laws and regulations.

House Bill 1207, also enacted in 1988, amended the Solid Waste Management Law in the following ways:

1. Reduced the corporate guarantee amount formula for estimated cost of closure and post closure;
2. Defined "utility waste landfill," and made their requirements less stringent;
3. Provided that county or city orders or ordinances must be consistent with their solid waste management plan;
4. Provided that private waste haulers operating within an area annexed by the city be properly notified and compensated if the city took over service for that area.

In 1989, House Bill 438 amended the law which pertains to state purchasing and printing. The new and amended provisions encourage resource recovery and waste reduction in state government offices, the reduction and eventual elimination of polystyrene foam containers which contain chlorofluorocarbons (CFCs) and regulated the use, recycling and labeling of certain types of plastics.

Senate Bill 530, also known as Missouri's Omnibus Solid Waste Management law, was signed into law on July 9, 1990, by Gov. John Ashcroft. The purpose of the legislation is to achieve a 40-percent reduction by weight of solid waste being landfilled by 1998, reduce hazardous wastes in the waste stream and develop comprehensive solid waste management planning throughout the state.

The methods mandated to accomplish the goal of 40-percent reduction are: recycling, resource recovery, minimization and market development of recyclable materials.

SB 530 also provides for the formation of solid waste advisory boards and solid waste management districts, and outlines their membership and responsibilities. The responsibilities of the districts include the creation of comprehensive solid waste management plans for each district, which must do the following:

- Consider solid waste management plans already established within the area;
- Provide extended services suited to the district that effectuate the least damage to water and air, prevents public nuisances or health hazards, promotes recycling and waste reduction;
- Specify how the district will reduce landfilled waste;
- Address the management of plastic beverage, aluminum, glass and steel containers, newspaper and whole tires;
- Specify how the district will provide for the collection of, or collection points for recyclable and compostable materials;
- Establish public education on solid waste management; and
- Specify how the district will reduce household and farm hazardous waste from landfills.

The bill establishes and provides funding through tipping fees for a solid waste management fund. These funds are allocated to assist with planning, encourage market development for

recyclable materials, waste reduction and recycling, the elimination of illegal dumps, implementation of solid waste plans, and administrative costs incurred by DNR.

SB 530 prohibits certain items from landfills and also includes a timeline for eliminating certain items from landfills.

As of Jan. 1, 1991, the following items were banned from landfills: lead acid batteries, major appliances, waste oil and whole waste tires

As of Jan. 1, 1992, yard waste was banned from landfills.

As of Jan. 1, 1994, small quantities of hazardous waste will be banned from landfills.

SB 530, in section 2630.225, makes the following requirements of the Department of Natural Resources to do the following:

- 1) Encourage the use of alternatives to disposal;
- 2) Prepare model solid waste management plans for both rural and urban areas;
- 3) Distribute the model plan to each solid waste management district;
- 4) Coordinate with other state agencies to identify and develop markets for recovered materials, provide technical assistance, identify opportunities and initiate resource recovery programs in state government, expand state contracts for procurement of items made from recycled materials, provide a clearinghouse of consumer information on resource recovery, and identify and address barriers to resource recovery.

Since the law was enacted, there have been very few changes made to it. An amendment was passed to provide \$20,000 administration grants to each district with a twenty-five percent matching fund requirement. The percentage of the district grant fund that could be spent on district projects was changed from sixty percent to 40 percent, with the remaining sixty percent allocated to individual city and county projects. In addition, the banned items list was changed in order to allow microwaves to be landfilled as white goods recyclers would not handle them.

During the 2004 legislative session, MDNR submitted a bill to change the allocation of the solid waste management fund. The proposed bill allowed MDNR to use up to forty two percent of the fund for administration and oversight, while providing fifty-eight percent of the funds to solid waste districts. The bill also raised the minimum funding level from \$45,000 to \$75,000. That bill passed with a twelve month sunset and the establishment of an interim committee to

SOLID WASTE FLOW

There are several alternatives for processing solid waste: landfills, waste transfer stations, municipal recovery facilities, recycling centers, waste tire sites, compost sites and waste appliance sites. Each method of processing solid waste will be discussed in this chapter. The current existing conditions of the district will also be included, in order to give a better idea of the alternatives available locally and the services that should be expanded or introduced to best serve the needs of the district.

EXISTING CONDITIONS

Landfills

Landfilling is still the most economic method of disposing of solid waste. When Subtitle D went into effect, all nine of the existing landfills in the Ozark Rivers region closed. The alternative that surfaced in response to landfill closings was waste transfer stations. Three were sited in the region: one in St. Robert in Pulaski County, one near Rolla in Phelps County and one near Potosi in Washington County. Two Subtitle D landfills have opened in the region in recent years. Prairie Valley Landfill was opened in Crawford County, just north of Cuba in 2000. Timber Ridge Landfill was opened in Washington County, near Richwoods in 2003.

Despite negative public response and the continuing search for alternatives, landfills are still a necessary part of any solid waste management plan. Even with waste reduction and re-use, recycling and numerous methods of processing solid waste, a certain portion of waste cannot be used and must be disposed of properly. At this time, in our region of the country, landfills are still the most economical method of disposal.

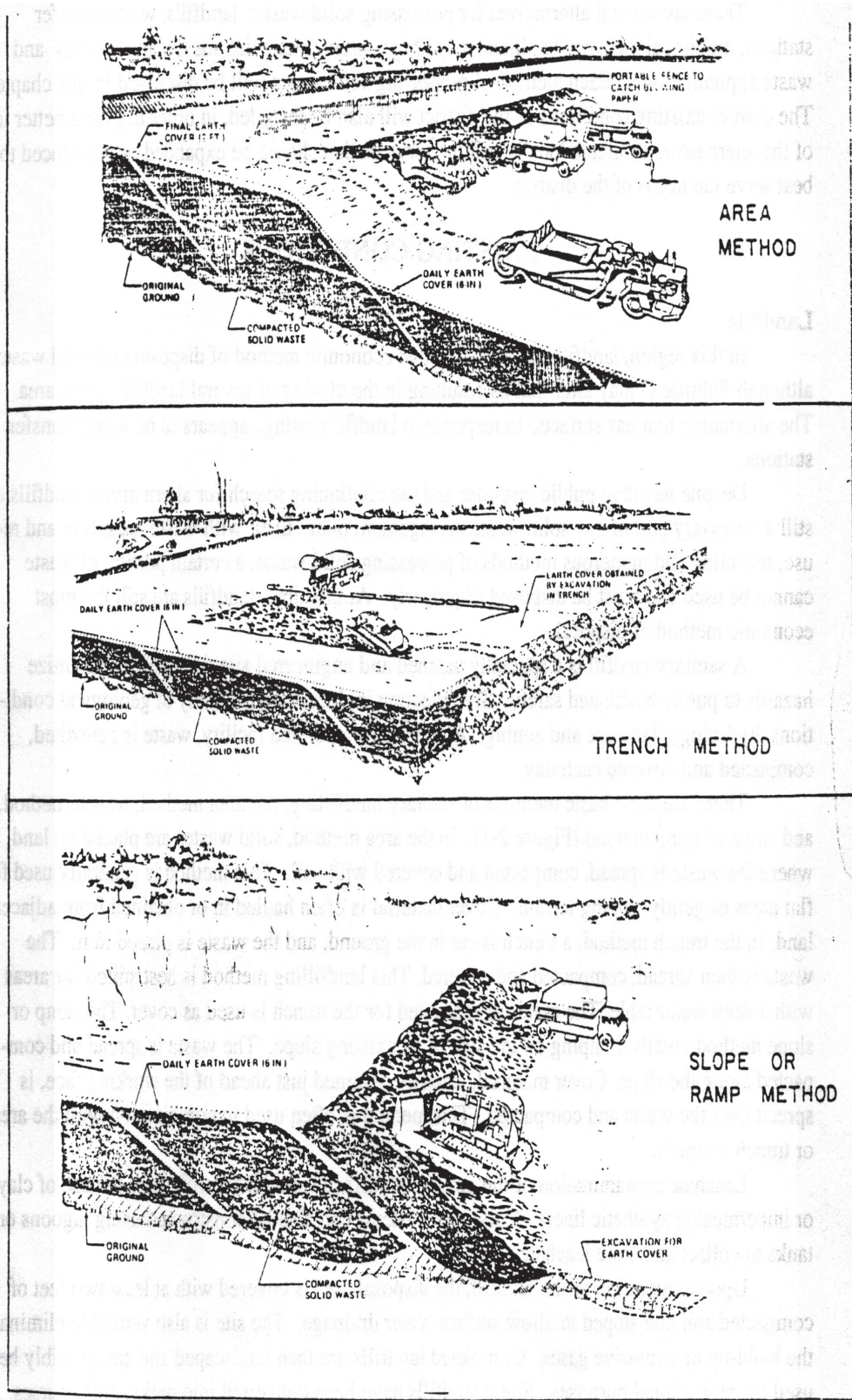
A sanitary landfill is a specially planned and engineered site designed to minimize hazards to public health and safety. Site selection includes careful study of geological conditions, hydrology, land use and zoning. At a properly operated facility, waste is deposited, compacted and covered each day.

There are three basic methods of sanitary landfilling; the area method, trench method, and slope or ramp method (Figure 2-1). In the area method, solid wastes are placed on land where the waste is spread, compacted and covered with soil. This method is generally used for flat areas or gently sloping terrain. Cover material is often hauled in or obtained from adjacent land. In the trench method, a trench is cut in the ground, and the waste is placed in it. The waste is then spread, compacted and covered. This landfilling method is best suited for areas with a deep water table. The material excavated for the trench is used as cover. The ramp or slope method entails dumping on the side of an existing slope. The waste is spread and compacted along the slope. Cover material, usually obtained just ahead of the working face, is spread over the waste and compacted. This method is often used in combination with the area or trench methods.

Leachate contamination of the ground or surface water is controlled by the use of clay or impermeable synthetic liners. Collection systems can also be constructed using lagoons or tanks to collect and store leachate.

Upon completion of the landfill, the disposal area is covered with at least two feet of compacted soil and sloped to allow surface water drainage. The site is also vented to eliminate the build-up of explosive gases. Completed landfills are then landscaped and can possibly be

Fig. 2-1
SANITARY LANDFILL METHODS



Provided by Foth & Van Dyke

used for recreational purposes. Some landfills have been converted into parks, golf courses, even ski slopes.

TABLE 2-2
PERMITTED SOLID WASTE TRANSFER STATIONS
IN THE OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT

<u>County</u> <u>(2000) Rec'd. (1992)</u>	<u>Facility Name</u>	<u>Est.</u> <u>Tons/Month</u>	<u>Est.</u> <u>Tons/Month</u> <u>Received</u>
Phelps	Phelps County Transfer Station	3,300	2,700
Pulaski	St. Robert Waste Transfer & Recycling	2,450	2,167
Washington	Gilliam Waste Transfer Station	2,004	5,500

Source: MRPC survey 1995 and 2004.

Transfer Stations

Generally, waste transfer stations are more economical than direct haul when the haul distance is greater than 10 miles. Transfer stations can vary in size from very small operations of one ton to 10 tons per day capacity, serving rural or low population density areas, to operations handling 500 tons per day, serving highly populated urban areas. Some advantages and disadvantages of transfer stations are as follows:

Advantages:

- A collection system can be provided where no other method exists;
- Indiscriminate dumps and community dumps are reduced or even eliminated;
- Operational flexibility allows for the handling of large waste volume fluctuations;
- A collection system is provided for all wastes including bulky waste;
- Compaction units can be used to increase density of transported waste;
- Limited processing, such as metal salvage, paper baling and glass recovery, is possible;
- A centralized sanitary landfill can be used;
- By reducing nonproductive use of collection, labor and equipment, costs are reduced;
- A transfer system makes the collection operation independent of the disposal facility.

Disadvantages:

- User cooperation to transport waste to sites is required;
- Unsanitary conditions may be created at sites unless properly maintained;
- Average transport distance to transfer site is longer than for small container operations;
- Site development is expensive;
- Period of time that waste is stored at residence cannot be controlled;
- Siting of waste transfer stations can be difficult and can be met with public opposition.

Currently three transfer stations are operating in the Ozark Rivers Solid Waste Management District—Phelps County Waste Transfer Station, St. Robert Transfer and Recycling Station and the Gilliam Waste Transfer Station.

The Phelps County Waste Transfer Station is owned by the Phelps County Landfill Board, and operated under contract by Waste Corps of America, Inc. The transfer station currently handles an average of 3,300 tons of waste per month, or 39,600 tons per year. The waste is shipped to the Black Oak Landfill, a Waste Corps of America, Inc. disposal site in Wright County, near Hartville, Mo. Tipping fees at the transfer station are \$34.52 per ton. For the most part, the transfer station serves Phelps County, with some waste coming from Maries, Dent and Crawford counties.

St. Robert Transfer and Recycling Station is owned and operated by the city of St. Robert. The transfer station currently handles an average of 2,450 tons of waste per month, or 29,400 tons per year. The city owns its own trailers, and contracts with a local trucking company to haul the waste to the Black Oak Landfill near Hartville, Mo., which is owned and operated by Waste Corps of America, Inc. Tipping fees at the transfer station are \$48.50 per ton for waste and \$25.00 per ton for recyclables. For the most part, the transfer station services Pulaski County.

Gilliam Waste Transfer Station is located in Washington County and is owned by CWI, an affiliate company of Republic of Missouri. CWI services communities in both the Ozark Rivers region and the St. Louis area. The transfer station currently handles an average of 2,004 tons of waste per month, or 24,050 tons per year. Tipping fees at the transfer station are \$50.65 per ton. All waste is shipped from Potosi for landfilling in DeSoto, Illinois. At one time, the station also handled mixed recyclables, but those materials are now sent directly to Southside Recycling in St. Louis.

The cost of constructing a typical waste transfer station varies depending upon the size of the facility and level of technology utilized. The estimated cost of the St. Robert waste transfer station in 1993, was \$1,000,000. This figure reflects construction, equipment and financing. In the early 1990s the city of Salem received an estimate of \$350,000 for the facility it considered building. This figure includes construction and equipment. The cost of the equipment necessary to operate the facility is generally greater than the actual construction costs of the buildings. Storage containers for the facility will range in price from \$230 for a one cubic yard container to \$11,000 for a 40-cubic-yard self-contained compactor loaded roll-off unit. Transport equipment for a transfer facility range in cost from \$70,000 for a 30-cubic-yard collection vehicle to \$83,000 for a 75-cubic-yard tractor-transfer trailer combination. The typical operating costs for this type of facility range from a low of \$2 per ton for large tonnage operations on up. The lower the amount of tonnage handled, the higher the operating costs. Transportation costs including labor and vehicle maintenance can range from \$4.50 to \$11 per ton or more depending upon transportation distances.

Waste transfer facilities are a means by which cities and counties that have operated landfills in the past can continue to provide solid waste service to their communities without drastically increasing the cost of those services. Transfer facilities will also provide communities with a source of revenue just as landfills did. Waste transfer facilities allow communities to maintain control of their solid waste services as well as collection costs, while generating revenue for those services.

Landfill Sites

When Subtitle D went into effect, all of the landfills in the Ozark Rivers region closed. The three existing transfer stations were built in response to the need for disposal options. There were several proposed landfills, and two of those have been permitted and are currently operating.

Prairie Valley Landfill. Prairie Valley landfill is owned and operated by Swinger Sanitation, a locally owned and operated solid waste hauling service. By current standards, the landfill is small, but the owners have applied for an expansion. The site is located just north of Cuba in Crawford County on Highway 19. The landfill began accepting waste in 2000 and is currently accepting an estimated 5,300 tons of waste per month, 64,000 tons per year.

Timber Ridge Landfill. Timber Ridge Landfill is owned and operated by IESI MO Corporation, a large solid waste management company. This is a large disposal site that was designed to take large volumes of waste from the St. Louis area as landfills in the metro region fill and close. The site is located near Richwoods in eastern Washington County. The landfill began accepting waste in 2003. Currently they are averaging 4,800 tons per month/and estimated 57,600 tons per year. However, the site is capable of easily handling 1,500 tons of waste a day and is expected to steadily increase its volume over the next five years.

Waste Tire Sites

Over 200 million tires are discarded every year in this country. Whole waste tires were banned from Missouri landfills Jan. 1, 1991. Waste tires that have been cut in at least four pieces or shredded can still be landfilled.

Whole tires are bulky and take up a great deal of landfill space. They also have a tendency to "rise" after being buried, breaking landfill covers as they make their way to the surface. The countryside is littered with waste tire stockpiles or open dumps. These sites also pose hazards to public health and the environment. Open accumulations of tires pose serious fire hazards. Once ignited, they create noxious smoke and are difficult to extinguish. They also provide ideal habitat for vermin and breeding grounds for mosquitoes which carry diseases such as West Nile Virus.

Waste tires provide several options for recycling, with more ideas being developed every year. The most common recycling options are:

- Retreading or recapping quality used tires for reuse;
- Using whole tires for playground equipment or reef-construction;
- Shredding tires and re-using the rubber in other rubber products, such as rubber mats, or poured athletic surfaces, or even using the ground rubber as playground surface material;
- Mixing ground tires with asphalt to produce rubberized paving materials.

Tires are also being used as fuel. Tire-derived fuel (TDF) is tires that have been shredded for the purpose of burning in boilers modified for their use. The energy value of tires is comparable to high grade coal, and some examples of facilities that might use TDF for fuel are cement kilns, pulp and paper facilities, and power plants that generate electricity. A large percentage of the waste tires processed in Missouri are used as TDF.

At this time, there are no permitted waste tire sites in the Ozark Rivers District. Figure 2-3 lists the permitted sites located in Missouri. A recent survey of illegal dumpsites in the region located 69 different dumpsites--most of these included waste tires. These sites, which are a public nuisance as well as hazards, will have to be addressed. Illegal tire dumps are ideal breeding

grounds for mosquitoes and vermin. They also pose significant fire hazards. County commissioners report a steady flow of tires being dumped along county roads. The district funds a program that helps member counties dispose of illegally dumped waste tires that have been picked up by county road crews. The grant pays for a contractor to set a trailer and then dispose of the tires. The issue has been complicated by the sunseting of the waste tire fee and the dismantling of the waste tire unit at MDNR. Attempts to reinstate the fee were made during the 2003 and 2004 legislative sessions, but neither succeeded. In order for the waste tire problem to be addressed, it is imperative that the fee be reinstated and the funds used for waste tire cleanups and enforcement.

Fig. 2-3

**MISSOURI DEPARTMENT OF NATURAL RESOURCES
SOLID WASTE MANAGEMENT PROGRAM
AUTHORIZED WASTE TIRE SITES AND PROCESSORS**

Alternative Fuel Source, Inc. 6839 Main Street/P. O. Box 467 Odessa, MO 64076 (816) 230-5475 (800) 467-7057 (Tire Derived Fuel)	Beck's Tire Service 4950 Stilwell Street Kansas City, MO 64210 (816) 241-1155 or (800) 444-8159 (Sorting tires for resale/reuse)	City of St. Joseph Sanitary Landfill 1100 Frederick Ave. St. Joseph, MO 64501 (816) 253-9025 (Cutting tires for disposal)
Missouri Vocational Enterprises Removal P. O. Box 236 Jefferson City, MO 65102 (573) 751-6663 (Tire Derived Fuel) Closed to the public	City of Rolla Sanitation Dept. 2141 Old St. James Rd. Rolla, MO 65402 (573) 364-6693 (Cutting tires for disposal)	Don's Welding and Waste Tire 5117 South 240th Road Halfway, MO 65663 (417) 267-7708 (Cutting tires for disposal)
City of West Plains Solid Waste Transfer Station 1851 Good Hard Drive West Plains, MO 65775 (Cutting tires for disposal)	Plaza Tire Service 2149 William St. Cape Girardeau, MO (573) 334-5036 (Cutting own tires for disposal) Closed to the public	Pemiscot County Transfer Station Route "Z" and U.S. Highway 412 West Hayti, MO 63851 (573) 359-1084 (Cutting tires for disposal)
Dash Recycled Rubber Products, Inc. 612 Brees Industrial Drive P. O. Box 126 Macon, MO 63552 (660) 385-7156 (Crumb Rubber/Playground Material)	Tire Shredders Unlimited P. O. Box 1485 High Ridge, MO 63049 (636) 677-8471 (Tire Derived Fuel)	TRI-RINSE, Inc. P. O. Box 15191 St. Louis, MO 63110 (314) 647-8338 (Illegal Tire Dump Cleanups) Closed to the public
Waste Tire Transportation Services, LLC 55 NE Highway 69 Claycomo, MO 64119 (816) 616-9810 (Cutting tires for disposal)		

Information provided by the Department of Natural Resources 2003

Recycling Centers

Recycling is defined as the separating, collecting, processing, marketing and ultimately re-using of a material that was thrown away. Recycling is the most recognized method of reducing solid waste for disposal, and at this time, the most popular with the general public.

At the time when the original plan was written, materials being recycled in the district represented a very small portion of what was available for recycling. Aluminum and other metals were the most common materials recycled along with small volumes of plastics, glass and paper. Little processing of recyclables was performed in the region.

Both the availability and volume of recycling has increased in the years since the plan was adopted. A telephone survey conducted by district staff in 2004 indicated that recycling had more than doubled since the first recycling survey was done in 1993. It is estimated that the district currently recycles 7,300 tons of recyclables a year. The increase can be attributed to more awareness, more opportunity and the expansion of the types of materials collected.

Recycling in the district varies from county to county. Table 2-5 lists the local resource recovery firms by county and the materials each accepts.

Miscellaneous metals, or ferrous and non-ferrous scrap, account for the highest volume of recycled material. Tens of thousands of tons are being collected and processed by salvage businesses each year, with aluminum being the metal most commonly collected by recycling firms.

When the plan was written, only three resource recovery firms in the region collected plastic. Now, most recycling programs—curbside and drop-off—include at least HDPE and PET plastics. Improved markets for plastics have greatly contributed to the growth of plastics recycling. Recovered plastics are being used in a variety of products including carpeting, clothing and construction materials.

Glass, is becoming increasingly difficult to market, several recycling programs in the region and throughout the state have stopped taking glass because of the strict specifications required by the container glass industry and a shortage of other end users. Haulers, whether private or public, who are collecting glass in their curbside programs are doing so because the transfer station in St. Robert and the Rolla Recycling Center both still accept glass. Most private industries cannot justify recycling glass with the low or non-existent profit margin. There have been some innovative projects in the Ozark Rivers region that used recovered glass. Several Glasphalt projects have been constructed in the last decade, including a test strip on Highway V, the Rolla Downtown Airport runway and the Rolla Technical Institute parking lot, all in Phelps County. Another promising development was the use of crushed glass as a filtering medium for the leachate collection system at the Prairie Valley Landfill in Crawford County. All of these were successful projects, but they are still considered pilots, and these uses for crushed glass have not gone mainstream as yet.

Several recycling programs, both curbside and drop-off, collect various grades of paper, including corrugated cardboard. Those include: Scenic River Industries in Dent County, City of Hermann in Gasconade County, Rolla Recycling Center and the City of St. James in Phelps County, Old 66 Recycling Depot, City of Cuba, City of Sullivan and the City of Bourbon in Crawford County, the City of Dixon, City of Richland, St. Robert Transfer Station and Recycling and Fort Leonard Wood drop-off in Pulaski County, and the Potosi curbside program in Washington County. All curbside programs in the region also except various grades of paper—generally newsprint and cardboard. Cardboard continues to be a cornerstone of recycling programs, even when markets are depressed, cardboard remains profitable.

Processing done to the recovered materials includes cleaning, separating, baling and size reduction. Cleaning, generally labor intensive, involves removing ferrous metal from nonferrous metals. Types of equipment currently being used to process aluminum cans range from nothing to a homemade can crusher to a more sophisticated crusher/blower system. Other equipment used in local resource recovery industries includes: glass crushers, conveyors, balers, hydraulic shears, automobile compactors, loaders, cranes, forklifts, dump trucks and tractor-trailers.

At the time the plan was written, St. Louis buyers purchased 67 percent of the region's recovered resources, with the remainder going to Indiana, Illinois, Georgia, Tennessee, Colorado or wherever the market exists. As recycling markets have improved and expanded, and local recycling coordinators have become more knowledgeable, it has become increasingly difficult to track where the region's recovered materials are going. Some recycling coordinators have a policy of not signing contracts with any one buyer and sell loads to someone different each month. The larger recycling centers—Rolla, St. Robert and Fort Leonard Wood, generate enough volume to work directly with processors. Most of the smaller recycling programs, such as St. James, Bourbon, Cuba and Hermann ship their materials to a larger recycling center, either Rolla or St. Robert, or to one outside the region, where the materials are prepared for shipping. Smaller collection programs do not have the volume required to market their own materials. In some cases they pay to take their materials to a larger facility, or are able to work out arrangements to do so for free. Recovered materials buyers generally have some type of minimum volume requirement—usually at least a semi-tractor load deliverable on a regular schedule.

Table 2-5
RESOURCE RECOVERY FIRMS
in the Ozark Rivers Solid Waste Management District
(2003)

<u>County</u>	<u>Recycler Name and Address</u>	<u>Materials Accepted</u>
Crawford	City of Cuba Cuba Industrial Park Enterprise Drive Cuba, MO 65453 (573) 885-6453	Aluminum Corrugated
	Midwest Sales Highway P Cuba, MO 65453 (573) 885-7628	Aluminum Misc. Metals
	City of Bourbon 125 North Old Hwy. 66 Bourbon, MO 65441 (573) 732-5550	#1 and #2 Plastic Mixed Paper Corrugated Newsprint
	City of Sullivan (Curbside) 210 West Washington Street	#1 and #2 Plastic Corrugated

	Sullivan, MO 63080 (573) 468-4612	Newsprint Steel Cans Aluminum
Dent	Scenic Rivers Industries 601-607 Walker Street Salem, MO 65560 (573) 729-6264	Aluminum Newsprint Corrugated
Dent cont.	Hall's Recycling Hwy. 68 North Salem, MO 65560 (573) 729-2326	Aluminum Misc. Metals
Gasconade	City of Hermann 207 Schiller Street Hermann, MO 65041 (573) 486-5400	Newsprint Corrugated Container Glass Aluminum #1 and #2 Plastics
Maries	Cook's Salvage 21646 Maries County Road 314 Belle, MO 65013 (573) 859-3335	Misc. Metals
Phelps	Jack's Recycling Rt. 6 Box 217 Rolla, MO 65401 (573) 364-1444	Aluminum Misc. Metals
	Didion-Orf Recycling & Processing 14090 Dillon (South Outer Road) St. James, MO 65559 (573) 265-1243	Aluminum Misc. Metals
.	Rolla Recycling Center 2141 Old St. James Road Rolla, MO 65401 (573) 364-6693	Aluminum Mixed Paper #1 and #2 Plastic Container Glass Corrugated Steel Cans

		Plastic Bags
	St. James (Curbside)	Aluminum
	P. O. Box 426	Mixed Paper
	St. James, MO 65559	#1 and #2 Plastic
	(573) 265-7013	Container Glass
		Corrugated
		Steel Cans
Pulaski	B & B Auction and Recycling	Aluminum
	399 Old Route 66	Misc. Metals
	St. Robert, MO 65583	
	(573) 336-3747	
	Crismon Car Crushers & Recycling	Aluminum
	24450 Red Wing Road	Misc. Metal
	Richland, MO 65556	
	(573) 765-5333	
	City of Richland	#1 and #2 Plastic
	201 S. Chestnut	Aluminum
	Richland, MO 65556	Steel Cans
	(573) 765-4421	Glass
		Corrugated
		Mixed Paper
	Fort Leonard Wood (Curbside & Drop Off)	Aluminum
	2553 Ordinance Dr.	Glass
	Fort Leonard Wood, MO 65473	Steel Cans
	(573) 596-0869	#1 and #2 Plastic
		Newsprint
		Corrugated
	Poor Boys Garage	Aluminum
	17525 Superior Rd.	Misc. Metals
	St. Robert, MO 65583	
	(573) 336-4957	
	St. Robert Waste Transfer and Recycling Station	Aluminum
	3 J H Williamson	Steel Cans
	St. Robert, MO 65583	All Plastics
	(573) 336-3358	Glass
		Mixed Paper
		Corrugated

		Newsprint
	City of Dixon City Maintenance Shed 406 S. Elm Dixon, MO 65459 (573) 759-6115	Corrugated Glass #1 and #2 Plastic Aluminum Steel Cans
Washington	Counts Metal Hwy. 8 Potosi, MO 63664 (573) 438-4522	Aluminum
	Lewis Salvage Route 1, Box 660 Cadet, MO 63630 (573) 438-2541	Aluminum Misc. Metals Batteries

Source: Surveys of Local Recyclers, MRPC 2003

Materials Recovery Facilities

Materials Recovery Facilities, also known as MRFs, are intermediate resource recovery centers that sort through solid waste and extract recoverable materials for recycling. Solid waste is picked up at residences and businesses, deposited at the MRF for separation, and shipped out for resale to commodity markets. Currently no MRFs exist in the Ozark Rivers District.

MRFs do not require that recoverable resources be separated at the generation source. Instead, the solid waste delivered to the facility is sorted, either manually or mechanically when possible, into categories of recyclables, such as aluminum, glass, plastic, paper, ferrous and non-ferrous metals. The separated materials are then baled, crushed or shredded, depending on the type of material, and shipped to markets. This sorting and processing improves the quality and value of the recovered resource. In this manner, recovered resources can be marketed in large quantities, making them more attractive to potential buyers.

The remaining solid waste can either be landfilled, composted or incinerated, if that option exists. These three options can either be part of the MRF, or the waste can be shipped to separate facilities.

MRFs can be effective options for resource recovery. Recyclable materials are pulled from the waste stream and processed into readily marketable commodities. However, these facilities are labor intensive and require a large financial investment for equipment. Careful consideration should be given to the construction and operating costs of MRFs versus the revenues generated through tipping fees and marketing of the recovered materials. It should also be noted, that as with most solid waste facilities, the siting of a MRF can result in negative public response.

Compost Sites

Composting is defined as the controlled biological decomposition of organic solid waste by bacterial microorganisms. The end result is compost or humus, an organic material commonly

used to improve soil. The process requires the presence of bacterial organisms to break down the vegetable material. Other organisms that assist in the process include worms, fungi, protozoans and insects like beetles, centipedes and millipedes. In order for these organisms to efficiently decompose the compost, sufficient amounts of oxygen and water must be present. Compost piles are typically aerated through the simple process of turning them. If the compost is oxygen or moisture deficient, the microorganisms will die, and the compost will develop a bad odor. Two other necessary components for a healthy compost pile are carbon and nitrogen at a ratio of one to two. The general rule of thumb is one part leaves to two parts grass clippings. If the material is shredded before being added to the pile, the composting process will go more quickly. The size and weight of the compost pile is also important. The volume must be large enough to develop high enough temperatures within the pile to kill weed seeds and unhealthy bacteria. The ideal size is between three cubic feet and five cubic feet.

Composting can be a simple, inexpensive backyard project, or a highly technical, labor intensive commercial business. Some large scale composting projects consist of several acres under roof with intensive monitoring of compost moisture, pH levels, temperature and oxygen content. These facilities may compost all organic material including wood waste, paper and even sewage sludge, and in many instances are becoming profitable enterprises.

Backyard composting is perhaps one of the simplest methods for reducing solid waste. The waste is processed and, in most cases, used at the point of generation. If residents can be persuaded to process yard waste at the point of generation, all costs of collection, transporting, processing and redistributing can be avoided by municipalities and, in large part, by the waste generator.

The most common type of large scale composting method is the windrow system. This method can be customized to be as simple or technically complex as the operator desires. The basic concept is creating rows of compostable material, generally leaves, that are open to the outside air. The windrows are turned to aerate the pile and encourage microorganism activity. The windrows may or may not be monitored to determine if moisture and oxygen content is maintained at levels that maximize the speed at which the compost breaks down. Windrows that receive more attention will compost more quickly than windrows that are turned infrequently and allowed to become aerobic, that is water and oxygen deficient.

In the Ozark Rivers District, yard waste accounts for less than two percent of the total waste stream in 1992-93, compared to the national average of 17.3 percent documented in studies by Franklin and Associates. This low percentage can be attributed in part to yard waste being banned in Missouri landfills effective Jan. 1, 1992. The waste assessment performed for the district was done after the yard waste ban went into effect. District planners have kept this in mind in the planning process, and the small impact of yard waste in the waste stream must be a consideration in the feasibility of composting facilities.

There are currently several compost sites within the district. The city of Hermann has a voluntary composting site where residents drop off yard waste. This facility provides minimal maintenance, but seems to be successful.

The cities of Sullivan, Rolla, St. James, Waynesville and Ft. Leonard Wood also have compost sites. These cities provide pickup service for yard waste, ranging from special days twice a year, to weekly pickup service. Ft. Leonard Wood uses its compost by applying it to eroding areas on the fort. Sullivan sells its composted material to residents.

The city of Potosi contracts with a private hauler to collect trash and the hauler also collects yard waste which is hauled to a composting facility outside the region.

The city of Rolla has a two-acre composting site. A portable tub grinder is used to shred the yard waste, and this equipment has been made available to other communities and counties within the Ozark Rivers Solid Waste Management District. Yard waste collection is part of the solid waste services provided by the city to residents. Residents must place their yard waste in compostable bags, sold through the city's solid waste department and local stores. City residents have access to the compost material free of charge. Figure 2-6 is a list of composting services available in the region.

FIGURE 2-6
Yard Waste Management Services Available in
the Ozark Rivers Solid Waste Management District

<u>County</u>	<u>Facility</u>	<u>Business Hours</u> <u>Ownership</u>	<u>Accepted</u> <u>Materials</u>
Crawford	City of Bourbon 125 Old Hwy. 66 Bourbon, MO 65441 (573) 732-5550	2nd and 4th Tues. Chipper taken to homes. By appt.	Brush Tree Trimmings
	City of Cuba 407 Highway P Cuba, MO 65453 (573) 885-6453	Curbside pickup once each spring	Leaves Grass Brush Tree Trimmings
	City of Sullivan 210 W. Washington Sullivan, MO 63080 (573) 468-5216	Drop-off M, Th, F 9-12, 1-4; W 1-4; Sat. 9-1; Pickup on Tuesdays	Leaves Grass Brush Tree Trimmings
Dent County	City of Salem 202 N. Washington Salem, MO 65560 (573) 729-4811	Curbside leaves and sticks 1st and 3rd Mondays of each month, leaf bags available 10 for \$2.50.	Leaves Grass Brush Tree Trimmings
Gasconade County	City of Hermann 207 Schiller Street Hermann, MO 65041 (573) 486-5400	Open 4-6 p.m on Mon.-Thurs. Sat. 8-12; Key available from city hall during day.	Leaves Grass Brush Tree Trimmings

Phelps County	City of Rolla 102 W 9th Street Rolla, MO 65402 (573) 364-6693	Dropoff 7-4 M-F; Curbside weekly;	Leaves Grass Brush Tree Trimmings Wood Pallets
	City of St. James 200 N. Bourbeuse St. James, MO 65559 (573) 265-7013	Leaf pickup 2 times each fall. Drop-off site by city shed.	Leaves Grass Tree Trimmings Brush
Pulaski County	Fort Leonard Wood Environmental Office 1334 First Street Ft. Leonard Wood, MO 65470	Weekly pickup	Leaves Grass Brush Tree Trimmings
	City of Richland 204 E. Washington Richland, MO 65556 (573) 765-4421	7:30-4:30 M-F Must get key from city hall	Leaves Brush Grass Tree Trimmings
	City of St. Robert 115 Plattner Ave. St. Robert, MO 65583 (573) 336-4404	Drop-off and pickup available by calling city public works	Leaves Grass Brush Tree Trimmings

Source: Survey by MRPC, 2003

Waste Appliance Sites

The term white goods refers to large household or industrial appliances that are worn-out or broken, such as refrigerators, washers and stoves. White goods were banned from Missouri's landfills Jan. 1, 1991. These items are usually recycled by scrap dealers who recover the valuable metal parts of the appliances to sell to foundries for reuse. Those appliances containing refrigeration coolant must be processed to recover the freon and avoid releasing it into the atmosphere. Some electrical components in white goods contain polychlorinated biphenyls (PCBs), and some scrap processors require that PCB components be removed before they accept the appliance for recycling. Figure 2-7 is a list of white goods collection centers in the region, business hours and conditions.

FIGURE 2-7
Major Appliance Collection Centers Located in
the Ozark Rivers Solid Waste Management District

County	Facility	Business Hours Ownership	Accepted Materials
Crawford	Midwest Sales 752 Highway P Cuba, MO 65453 (573) 885-7628	Hours: 8 - 5, Mon. - Fri. 8 - 1, Sat. Ownership: Private	Appliances Batteries \$5.00 if compressor has not been removed.
Gasconade	City of Sullivan 210 W. Washington Sullivan, MO 63080 (573) 468-4612	Curbside pick-up for city residents only. Purchase \$10 tag at city hall.	Appliances
	Doerr's Scrap Metals 2118 Hwy. E Hermann, MO 65041 (573) 237-3579	By appt. only Ownership: Private Norman Vance	White goods Batteries Scrap Metals charge to accept
Maries	Cook's Salvage 21646 Maries Co. Rd. 314 Belle, MO 65013 (573) 859-3335	Hours: Mon. - Fri. 8 - 5. Ownership: Private	Appliances Scrap Metal Fee charged if compressor not removed.
Phelps	Didion-Orf Recycling 14090 Dillon Outer Road St. James, MO 65559 (573) 265-1243	Hours: 8 - 4:30, M-F Ownership: Private	Appliances \$10 charge Nonferrous metals will pay
	Jack's Recycling Hwy. 63 South Rolla, MO 65401 (573) 364-1444	Hours: 8 - 5, M-F Ownership: Private	Appliances Charges \$20 if compressor has not been removed.
	Phelps County Transfer P. O. 501, Turner Rd. Rolla, MO 65401 (573) 364-8771	Hours: 8 - 5 M - F, 8 - 2 Sat. Ownership: Public	Appliances charge to ac-
whole/ cept	City of Rolla 200 N. Main Street Rolla, MO 65401 (573) 364-6693	Curbside pick-up for city residents. Ownership: Public	Appliances \$10 fee
	City of St. James P. O. Box 426	Curbside pick-up for city residents only	Appliances \$10 fee

St. James, MO 65559 Ownership:
(573) 265-7011 Public

Pulaski **J.K. Hill & Associates** Hours: Appliances
has 20700 Hwy. 17 7 - 4 M-F \$40 charge if freon

Waynesville, MO 65583 Ownership: not been removed.
(573) 774-6914 Private

Long Auto Salvage Hours: Appliances
Box 155, Hwy. U 8 - 5, M - Sat. Compressors must
Crocker, MO 65452 Ownership: be removed
(573) 736-2604 Private

Pulaski cont. **Poor Boy's Garage/Salvage** Hours: Appliances
VFW Road 8 - 5, M - F
Waynesville, MO 65583 8 - 2, Sat.
(573) 336-4957 Ownership: Private

St. Robert Transfer Station Accept scrap white Appliances
194 Eastlawn Ave. goods for \$25 per
St. Robert, MO ton.
(573) 336-5155 Ownership: Public

Washington **CWI Transfer Station** Accept appliances Appliances
Highway E with certification
Potosi, MO 63664 that freon has
(573) 438-7041 been removed
Ownership: Public

Lewis Salvage Hours: 8 - 4:30, Appliances
Hwy. E, Rt. 1, Box 660 M - F, 8 - 12, Sat.
Cadet, MO 63630 Accept appliances
(573) 438-2541 with compressors
removed.
Ownership: Private

Source: Survey by MRPC, 2003

Other Waste Management Programs

Other waste management options currently available in the region include a number of private businesses who accept waste oil and lead acid batteries. Those businesses are listed in Figure 2-8. In most cases the waste oil is either blended for fuel, or reprocessed and sold as a recycled motor oil. Most of the lead acid batteries that are collected in the region are sent to the Doe Run battery recycling facility in adjacent Iron County.

FIGURE 2-8
Special Waste Collection Centers and Programs in
the Ozark Rivers Solid Waste Management District

<u>County</u>	<u>Facility</u>	<u>Business Hours</u> <u>Ownership</u>	<u>Accepted</u> <u>Materials</u>
Crawford	Wal-Mart Auto Center 100 Ozark Drive Cuba, MO 65453 (573) 885-2501	Hours: 8 - 5 Sun-Sat. Ownership: Private	Batteries
Crawford cont.	Midwest Sales PO Box 2981 Cuba, MO 65433 (573) 885-7628		Batteries
	Dillon Auto Repair 589 Cedar Street Bourbon, MO 65441 (573) 732-4432		Batteries Used Oil
Dent	Wal-Mart Auto Center Hwy. 32 West Salem, MO 65560 (573) 729-6151		Batteries
Gasconade	Wal-Mart Auto Center 1208 W. Hwy. 28 Owensville, MO 65066 (573) 437-4158		Batteries
	Schneider's Repair 105 E. Sears Owensville, MO 65066 (573) 437-4533		Used Oil (clean)
	City of Hermann 514 Gutenberg Hermann, MO 65041 (573) 486-5400		Used Oil (city residents only)
	O'Reilly Auto Parts 607 E. Hwy. 28 Owensville, MO 65066		Used Oil Batteries

(573) 437-7800

Maries

Runge Oil & Tire Center

Hwy. 89 and First Street
Belle, MO 65013
(573) 859-3913

Batteries

Western Auto

Vienna, MO 65582
(573) 422-3302

Batteries

Weidinger Chevrolet

Hwy. 63
Vienna, MO 65582
(573) 422-3333

Batteries
Used Oil

Maries cont.

Plaza Service

103 Hwy. 63 South
Vienna, MO 65582
(573) 422-3300

Batteries
Used Oil

Miller's Tire Service

505 Hwy. 63 South
Vienna, MO 65582
(573) 422-3414

Batteries
Used Oil

Phelps

Whitehead Truck Service

11715 County Road 8010
Rolla, MO 65401
(573) 341-2424

Batteries

O'Reilly Auto Parts

Hwy. 63 & 2nd Street
Rolla, MO 65401
(573) 364-5252

Used Oil
Batteries

Auto Zone

505 W. State Rt. 72
Rolla, MO 65401
(573) 364-6715

Used Oil
Batteries

Eickhorst Auto Parts & Repair

124 Parker
St. James, MO 65559
(573) 265-3631

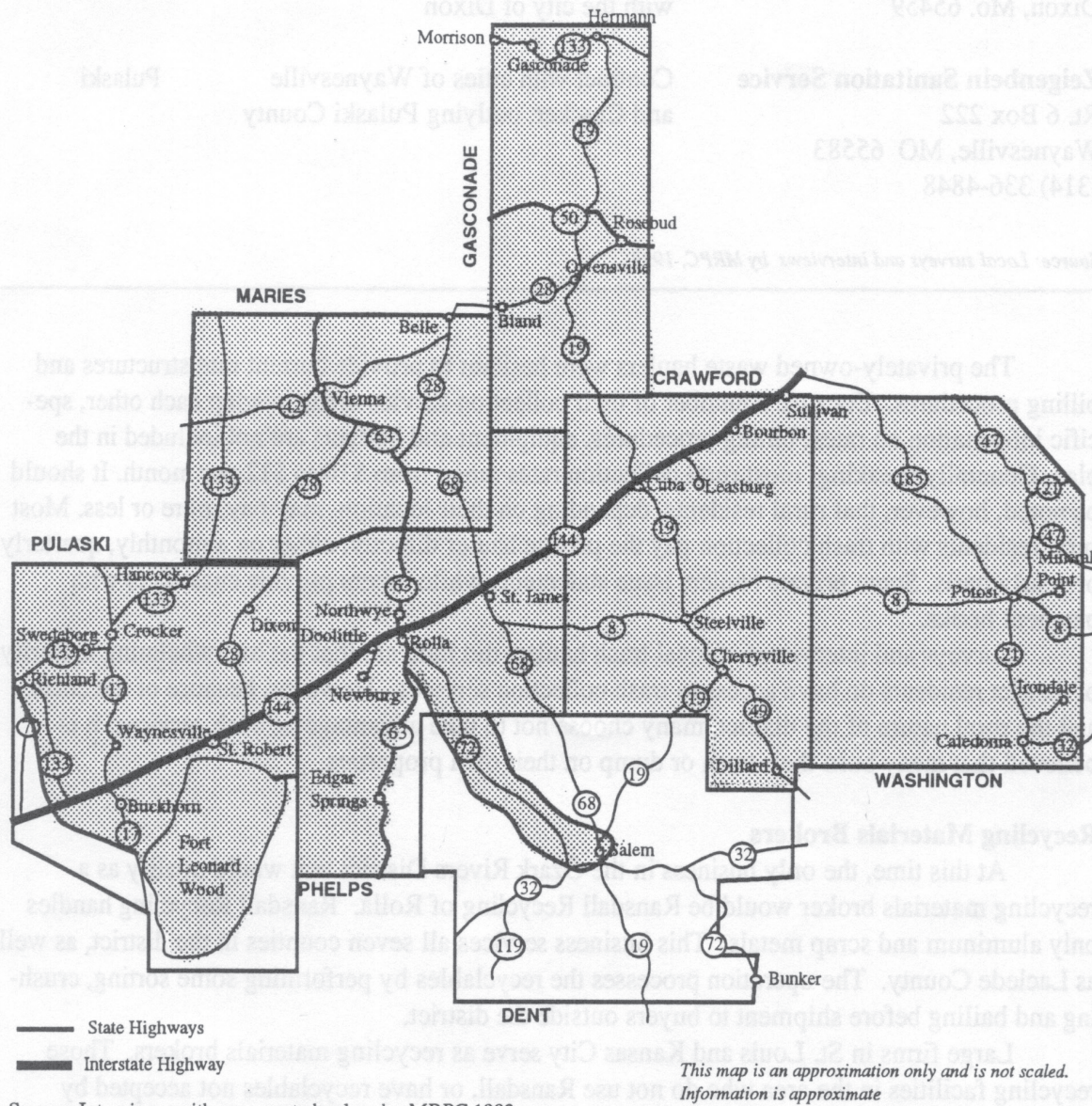
Used Oil (clean)

O'Reilly Auto parts

Used Oil

	810 N. Jefferson St. James, MO 65559 (573) 265-1732	Batteries
	Speed Lube 1001 Kingshighway Rolla, MO 65401 (573) 341-9989	Used Oil (\$3 fee)
Pulaski	Simpson Auto Parts 107 N. Commercial Crocker, MO 65452 (573) 736-2230	Batteries
Pulaski cont.	US Army 1334 First Street Ft. Leonard Wood, MO 65473 (573) 596-0882	Batteries Used Oil
	B&B Auction & Recycling 399 Old Route 66 St. Robert, MO 65583 (573) 336-3747	Batteries
	A+ Tire & Lube 615 W. Route 66 Waynesville, MO 65583 (573) 774-6771	Batteries Used Oil
	JK Hill & Associates 20700 Highway 17 Waynesville, MO 65583 (573) 774-2191	Batteries
	O'Reilly Auto Parts 999 Old Route 66 St. Robert, MO 65583 (573) 336-3030	Used Oil Batteries
	O'Reilly Auto Parts 1009 Upper Mall St. Robert, MO 65583 (573) 336-4447	Used Oil Batteries
Washington	Lewis Salvage HW E Route 1 Cadet, MO 63630	Batteries

Fig. 2-9a
AVAILABILITY OF TRASH COLLECTION
 (Trash collection is available in the shaded area.)



Source: Interviews with area waste haulers by MRPC 1993

Source: Interviews with area waste haulers by MRPC 1993

(573) 438-2541

Wal-Mart Auto Center
 Hwy 8 & Redwing Drive
 Potosi, MO 63664
 (573) 438-5441

Batteries
 Motor Oil

Auto Zone
 507 E. High Street

Batteries
 Motor Oil

Source: Survey by MRPC 2003

EXISTING COLLECTION AND DISPOSAL PRACTICES

The general method of collection and disposal of solid waste in the Ozark Rivers District is trash pickup provided by public or private haulers who then transport the waste to the most convenient landfill or transfer station. At this time, landfilling is the only disposal option available in the region, as no incineration facilities or MRFs exist. In rural areas where trash collection is not available, open dumping on one's own property is still a prevalent method of disposal. This is usually practiced in conjunction with burning at least some portion of the waste generated. Illegally dumping in trash receptacles belonging to public facilities such as city and state parks, schools, government offices, as well as using dumpsters belonging to businesses and manufacturers is also a common problem.

Recycling activities have increased since the district was formed. Some programs started in the early 1990s have been discontinued, but many have endured and flourished. When the plan was first developed, no curbside recycling programs existed in the region. Of the 21 member communities in the region, eight now have curbside services. Four of those eight also provide drop-off service. Of the remaining 13, five have drop-off centers.

The availability of municipal composting programs for yard waste have remained about the same, with some cities discontinuing the service while others have added it. In many cases, pick up service is not available. Those wishing to participate are often required to provide their own transportation of yard waste to a composting center. Consequently the majority of yard waste in the district is disposed of by burning. This method, though widespread and considered by most citizens as acceptable and practical, can be a serious fire hazard, as well as unhealthy for both the public and the environment. The district continues to work toward educating citizens on the problems with burning yard wastes and encourages them to compost instead.

While there are collection sites in the district for special wastes such as appliances, tires and batteries, many of these items are being disposed of improperly. Illegal and promiscuous dumping is still a problem throughout the region. The district has attempted to address the illegal dumping problem by developing an 800 hotline to report illegal dumps called Trash Patrol. In order to get a better handle on the number and severity of illegal dumps, the district conducted a survey of dumpsites in 2003. The survey found 69 dumpsites in the seven-county area. These dumps included not only items banned from landfills, but regular household garbage as well. Approximately 46 percent of the dumps were located on National Forest Lands, with the remainder found on or along public roadways.

The program has enjoyed some success, however, until the state of Missouri makes its dumping laws more strict and easier to interpret, illegal dumping will continue to be a problem.

Collection Practices— Urban and Rural

All cities and most rural areas of the region have some form of trash collection available.

If the city does not provide the service through a city sanitation service or contract with a private hauler, individual citizens can contract with a private company providing service in the area. The frequency varies, but once-a-week pickup is standard in most areas.

Most residents living outside of city limits can obtain collection service by contracting with a private waste hauler. However, since most of the small, local trash hauling companies have been bought out by large corporations, there are now areas of the region that do not have access to curbside collection of solid waste. As companies consolidated, the rural routes that were marginally profitable were eliminated. In addition, although private firms will provide some type of trash collection service, they will charge according to their own costs. Many rural residents do not want to pay for the service and are largely left to their own initiative to properly dispose of their solid waste. Very few go to the trouble of collecting and transporting their trash to a landfill. Most either dump on their own property or burn their garbage.

One of the greatest challenges for the solid waste district is the problem of trash collection and recycling in rural areas. The Ozark Rivers district is mostly rural, with large areas that are sparsely populated. Curbside collection for many rural areas is not feasible—especially for private waste haulers. Trash collection is available in most areas, however, not everyone uses it, in part because of the cost. There are residents in the more remote parts of the district who would pay for trash service, but cannot find a company that will provide the service in their area. In many cases, they resort to the undesirable, but legal practice of dumping on their own property. The district continues to educate the public on the problems with private dumps, burning and illegal dumping and working to find better options for residents.

Public Solid Waste Haulers

Due to the rural characteristics of the Ozark Rivers District, the majority of the residents who have trash pickup available are serviced by private haulers. There are only three member municipalities that provide city owned and operated solid waste services: Dixon, St. James and Rolla. All other member communities either contract out on a city-wide or on an individual resident basis.

St. James collects residential trash and recyclables once a week and commercial waste daily unless other arrangements are made. Fees are as follows:

<u>Type</u>	<u>Per Month</u>
Residential	\$9.40
Commercial	\$11.65
Dumpsters:	
1 cubic yard daily collection	\$87.75
1 cubic yard 3 times per week	\$60.75
1 cubic yard 2 times per week	\$45.00
2 cubic yards daily collection	\$115.05
2 cubic yards 3 times per week	\$85.90
2 cubic yards 2 times per week	\$58.35
3 cubic yards daily collection	\$141.75
3 cubic yards 3 times per week	\$107.25
3 cubic yards 2 times per week	\$72.45

Services for collection and disposal of white goods, furniture and shingles are available for additional charges. The city also picks up yard waste twice a year, provides a drop-off for yard waste and provides curbside recycling services at no additional charge. The curbside program collects aluminum, cardboard, three colors of glass, steel cans, HDPE and PET plastic, newsprint, junk mail, magazines and office paper. The recyclables are dropped off at the Rolla Recycling Center.

The city has budgeted, for 2003-2004, \$388,000 for solid waste services.

Rolla provides solid waste collection services to residents and businesses. Its fee structure is as follows:

<u>Type</u>	<u>Per Month</u>
Residential, 1 35-gallon container, and all yard waste	\$10.00
Residential, 1 90-gallon container, and all yard waste	\$12.50
Commercial, per one cubic yard, emptied once per week	\$34.10

The Rolla sanitation department also has a curbside recycling program and drop-off recycling center that accepts aluminum, three colors of glass, HDPE and PET plastic, plastic shopping bags, corrugated cardboard, steel cans, newsprint, junk mail, magazines and office paper.

The city budget for 2003-2004 shows revenues totaling \$2,447,000 million with expenditures totaling \$2.4 million. Revenues include both fees and revenues generated through the sale of recyclables.

Dixon provides solid waste collection services to residents and businesses. Its fee structure is as follows:

<u>Type</u>	<u>Per Month</u>
Residential	\$9.50
Commercial rates starting at (for one yard once a week):	\$50.00

The city budget for fiscal year 2003 shows revenues totaling \$143,400 with expenditures totaling \$132,823. Services include both trash collection and curbside recycling.

Staffing levels range anywhere from one part-time recycling employee in Cuba to five full-time sanitation workers in St. James to 27 full-time and one part-time in Rolla. Five of Rolla's employees work in its recycling operation.

Those cities that provide residents with solid waste services are fairly independent, however, there is some intergovernmental cooperation. The city of Rolla accepts recyclables from the cities of St. James, Cuba and Bourbon. The Phelps County transfer station is overseen by the Phelps County Landfill Board which has representatives from several communities within the county. For the most part, however, each community's solid waste services are exclusive of one another.

Cities Contracting for Services

Some cities in the region have contracts with private waste haulers to provide services. Some pay the contractors directly while others leave collection up to the individual contractor. Some cities retain a small portion of the fees collected from residents to cover the cost of fees collection. Some cities also subsidize those fees as well. Monthly collection rates within cities range from approximately \$7.00 to \$12 per household. Some cities retain 20 cents to 30 cents per household to cover administration of fees. The City of Cuba contracts with a private waste hauler for trash collection, but covers those costs through city sales taxes and does not charge residents

for the service.

City contracts with private waste haulers are included in the appendices.

Private Solid Waste Haulers

The majority of solid waste collection services in the Ozark Rivers District are provided by privately owned and operated sanitation businesses. While a few cities offer trash collection services to residents, it is largely the responsibility of residents—especially in rural areas—to secure service from a private hauler. These companies, that serve cities and individuals alike, vary greatly in size and in the scope of services they offer to customers.

Figure 2-9 is a list of the private waste haulers in the district, and their general service areas.

FIGURE 2-9
Private Waste Haulers in
the Ozark Rivers Solid Waste Management District

<u>Private Waste Hauler</u>	<u>General Service Area</u>	<u>County</u>
Heartland Disposal (CWI) ington 18716 State Hwy. 177 Jackson, MO 63755 (800) 844-3151 (573) 438-7041 (Potosi)	Contracted with Potosi & Sullivan for residential & some commercial, also service rural areas of counties, provide curbside recycling by contract	Wash- Crawford
Waste Corporation of MO 2120 W. Bennett St. Gasconade Springfield, MO 65807 (800) 323-7548	Contracted with cities of Salem, Richland. Serve areas of Belle, Rosebud, Bland, Steelville and Owensville	Crawford Maries Phelps Dent Pulaski
Lane's Sanitation, LLC 14975 Carthage Road Dixon, MO (573) 759-2626	Rural Pulaski County	Pulaski

Mideast Services 20700 Highway 17 Waynesville, MO 65473 (573) 774-6914	Contracted with Fort Leonard Wood. Provide trash and curbside recycling services on base. Serve areas of Crocker	Pulaski
Tri-County Trucking 2096 Highway 100 Hermann, MO 65041 (573) 486-3322	Contracted with the city of Hermann.	Gasconade
Swinger Sanitation Contact: Earl Rutz 11153 Highway 19 Cuba, MO 65453 (573) 885-7596	Contracted with the cities of Cuba, Bourbon, Steelville, service rural Crawford, Gasconade, Phelps and Washington counties and areas of Belle, Owensville, Bland and Potosi	Crawford Phelps Gasconade Maries Washington
County Trash Service 14397 County Road 2030 Rolla, MO 65401 (573) 341-2190	Service rural Phelps County and southeast Maries County	Phelps Maries
Fred and Bonnie Alers 13365 Baxter Licking, MO (573) 674-4387	Service rural Phelps County	Phelps
Cliff Hance Newburg, MO 65550 (573) 762-2837	Contracted with City of Doolittle	Phelps
Family Rural Trash Service Salem, MO (573) 729-5464	Provides service to rural Dent County	Dent
Mid-State Waste 722 Dix Road, P. O. Box 1007 Jefferson City, MO 65102 (800) 455-2597	Contracted with city of Vienna, service Maries County	Maries
Zeigenbein Sanitation 114 Zeigenbein Circle St. Robert, MO 65584 (573) 336-4848	Contracted with cities of St. Robert and Waynesville, service to rural Pulaski County	Pulaski

J. K. Hill

20700 Highway 17
Waynesville, MO 65583
(573) 774-6914

Contracted with Fort Leonard Wood

Pulaski

Mac's Sanitation

ington
P. O. Box 610
Potosi, MO 63664
(573) 438-7866

Provides commercial service in Potosi

Wash-

Meramec Hauling

ington
1308 Lonedell Road
Arnold, MO 63010
(636) 296-8347

Provides commercial service in Potosi

Wash-

Source: Local surveys and interviews by MRPC, 2003/2004

The privately owned waste haulers were hesitant to provide current rate structures and billing procedures. Because a number of their collection service areas overlap each other, specific information on rates, billing procedures, equipment and budgets are not included in the plan. Generally speaking, most rural collection rates range from \$10 to \$15 per month. It should be noted, however, that rural residents, depending on their location, may pay more or less. Most rural residents with trash collection pay the private hauler directly, either on a monthly, quarterly or yearly basis. Some private haulers issue statements while others provide customers with payment books.

During the mid 1990s there was a big move toward consolidation. Most of the small local hauling companies were bought out by large solid waste corporations. At the same time, the large corporate entities were also involved in buying and selling of divisions and/or entire companies. This resulted in far less competition, and fewer options for local residents. In many areas, rural routes were bought up and then discontinued because they were marginally profitable. Many residents who were willing to pay for rural trash collection were not able to get service. This was a problem for a few years, but as in most cases where there is demand and no supply, commerce responds by filling the gap. In the past three or four years, a number of small, local trash hauling companies have emerged in the local market. Not all corners of the district are being served, but it is believed that eventually service will be restored to all the residents of the region. However, because of the costs and the rural nature of the district, there will probably always be residents who choose not to take advantage of trash services. It is believed that many burn their trash or dump on their own properties.

Recycling Materials Brokers

Recycling materials brokers are typically classified as those types of facilities that do some processing to materials before selling them to processors. Most large salvage yards would fall into this category, although all they typically handle are ferrous and non-ferrous metals. Didion-Orf, a metals broker in Phelps County, would be one example. This business services all

seven counties in the district, as well as areas outside the district. The operation processes the recyclables by performing some sorting, crushing and bailing before shipment to buyers outside the district. The Rolla Recycling Center, St. Robert Transfer Station and Recyclery and Fort Leonard Wood Recycling Center also handle large volumes of materials, perform some processing in the way of bailing or shredding and market the materials to buyers throughout the Midwest.

At the time the plan was written, large firms in St. Louis and Kansas City were the only options for brokering of materials. However, these firms generally require minimum volume shipments and that effectively eliminates many smaller recyclers from dealing directly with them. The additional cost of transporting materials to the metropolitan areas only narrows an already small margin of profit. Now however, the larger recycling centers within the region are bridging the gap and serving as centralized collection centers where smaller recycling programs can send their smaller volumes.

Residential and Rural Disposal Practices

Despite the low population density of the area, all cities in the district have some type of solid waste collection service available. In many cases residents have the option of contracting on an individual basis with private haulers if their city does not provide sanitation services for them.

Most, but not all rural residents, also have the option of trash service.

Many rural residents choose to dispose of their own solid waste. The most common practices are burning and dumping on their own property. At this time, it is not illegal for an indi-

SOLID WASTE QUANTITIES AND CHARACTERISTICS

Estimates of waste generated within the region are based on the population breakdown and an assumed generation rate in pounds per person. Generation rates are assumed at 6.2 pounds per person per day, based on the statewide average published by the Missouri Department of Natural Resources in their *Missouri Solid Waste Diversion and Recycling Status Report For Calendar Year - 2001*. This is a substantial increase from the 3.7 pounds per day figure established by the Environmental Improvement and Energy Resource Authority's (EIERA) 1987 solid waste study. The generation rate for Missourians is the highest of the nine central states that were surveyed, with the lowest generation rate being 2.3 pounds per person per day in Arkansas. However, the report published by MDNR also estimates that Missourians have the highest recycling rate of the nine states surveyed—3.8 pounds per person per day. The lowest per capita recycling rate of the nine states surveyed was .05 pounds per day or 20 pounds per year in Oklahoma.

For the purpose of solid waste planning, the solid waste generated within the district was broken down into several different classifications. First, the amounts of residential and industrial waste generated were determined. The waste stream was further classified into types of waste: paper, plastic, yard waste, glass, non-ferrous metals, ferrous metals and other wastes.

Projections for both population and waste generation must be made in order to plan accordingly. Projections must be evaluated and re-examined each time this plan is updated. Similar methods for projections should be used, when possible, in order to ensure consistency.

POPULATION PROJECTIONS

An important element of the solid waste planning process is the ability to project what changes will occur in the population of the district and making allowances in the plan for increases or decreases in population. Changes in the district populations can have significant affects on the methods by which waste is managed and reduced. (Current demographics can be found in Chapter 1.) The population projections shown were provided by the Missouri Office of Administration. The methodology used to determine population projections for this study is based on long-term migration trends. The study assumes that migration trends of previous years will continue through 2025. The formula used in this methodology also considers estimates of births and deaths within the counties.

The population projection from 2000 through the year 2025 shows an overall, steady increase of approximately 13.4 percent over 25 years for the district as a whole. (See Figure 3-1). The growth rates, or in some cases reduction rates, within individual counties, however, vary greatly.

The graphs in Figure 3-2 more clearly illustrate the upward and downward movement of population trends within each county over the 25-year period.

Crawford County will experience one of the largest overall population increases, 44.9 percent over the 25-year period. This will be a steady growth of approximately 9 percent every five years. This county is a popular area for retirees, and the population growth will probably continue to reflect a large number of people over age 65.

Dent County will also experience an overall increase in population, although at a more modest rate of 4.5 percent over the 25-year study period. The largest increase will occur early, between 2000 and 2010 and then will most likely taper off. It is possible, based on projections, that Dent County's population will stabilize or even begin to shrink after 2015.

Gasconade County will continue its steady growth of less than one percent per year, or ap-

proximately four percent every five years, with a total increase of between sixteen and seventeen percent between 2000 and 2025.

Maries County will sustain a growth rate of 11.4 percent over the 25-year study period, or less than .45 percent increase annually.

Phelps County's population will increase, but at a decreasing rate. Between 2000 and 2005, the population is expected to grow at a rate of four percent. Between 2005 and 2010, the population will grow at a rate of three percent. During the next five year period, the population will grow at the rate of two percent and between 2020 and 2025, it is estimated that Phelps County's population will stabilize or actually decrease by less than one percent. It is estimated that the population increase over the 25 year period will be approximately ten percent.

According to the revised Office of Administration population projections, Pulaski County will experience steady population decline from 2000 through 2025 at a rate of just under one percent per year and an overall loss of 16 percent. However, it should be noted that population estimates supplied by the U.S. Census Department indicates that between 2000 and 2004, Pulaski County had a growth rate of almost six percent. Due to the continuing activity of Fort Leonard Wood, it is more likely that the county will experience growth similar to the rest of the region or greater.

Washington County will have a growth rate of approximately 4.5 percent between 2000 and 2005 and similar growth between 2005 and 2010. Growth will decline to 3.5 percent between 2010 and 2015 and decline again to three percent between 2015 and 2020. From 2020 to 2025, it is estimated that Washington County's population will only grow at a rate of about 2.5 percent.

Fig. 3-1
POPULATION PROJECTIONS FOR THE
OZARK RIVERS SOLID WASTE DISTRICT

COUNTY	2000	2005	2010	2015	2020	2025
Crawford	22,804	25,081	26,864	28,479	29,943	31,229
Dent	14,673	14,655	14,584		14,927	14,454
Gasconade	15,342	15,634	16,264	16,911	17,491	17,972
Maries	8,903	8,634	8,849	9,065	9,239	9,369
Phelps	39,825	40,549	41,763	42,643	43,105	43,046
Pulaski	41,165	41,004	39,561	38,236	36,999	35,915
Washington	23,344	24,486	25,611	26,601	27,448	28,148
District	166,310	169,842	173,522		176,608	178,880
						180,263

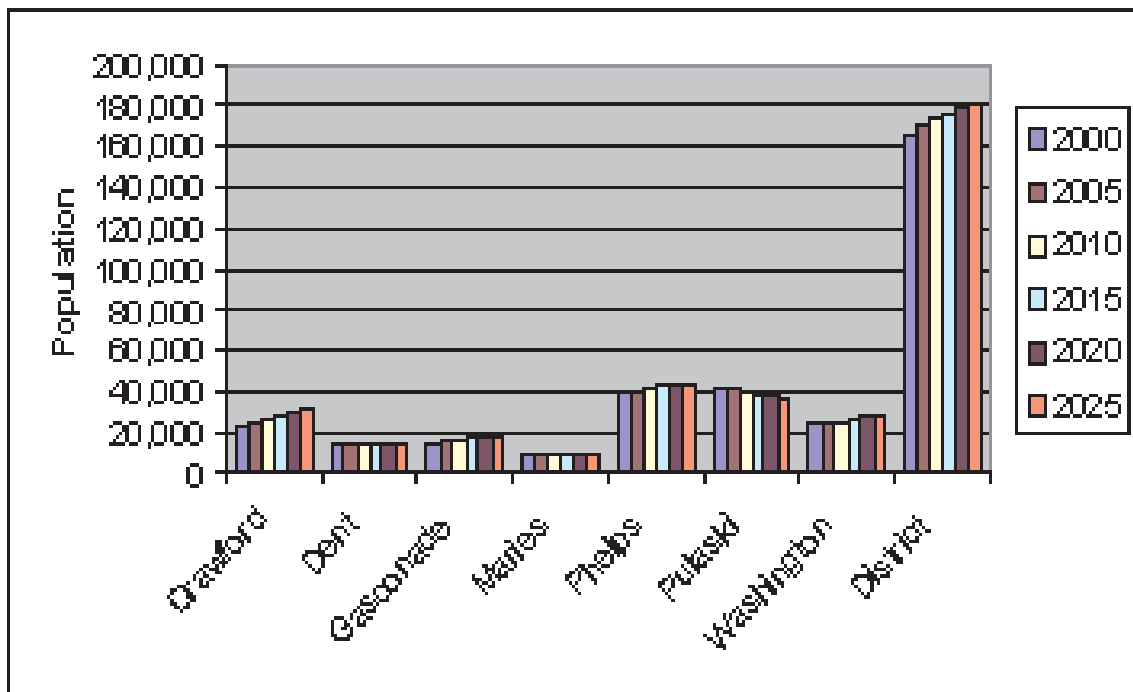
SOURCE: *Projections of the Population of Missouri Counties by Age and Sex: 1985 to 2025*, Missouri Office of Administration

2000 figures are based on 2000 U.S. Census.

WASTE STREAM ANALYSIS

Waste stream analysis is an important part of the solid waste management planning process. In order to make educated decisions regarding the future of solid waste management in the district, planners must know specifics about the current waste stream in terms of quantity, composition and generation sources. When the plan was originally written, the waste stream analysis included in the

Fig. 3-2
POPULATION PROJECTIONS
for the Ozark Rivers District and Counties



Source: Projections of Population of Missouri Counties by Age and Sex: 1985 to 2010, Missouri Office of Administration

Fig. 3-3
INDUSTRIAL PROJECTIONS FOR THE OZARK RIVERS DISTRICT
(Growth/decline stated in percentages)

SIC	Type of Industry	1990	2000	2005	2010
20	Food	1.6	1.6	1.6	1.6
22	Textiles	7.6	7.6	7.6	7.6
23	Apparel	-6.4	-6.4	-6.4	-6.4
24	Wood Products	4.8	4.8	4.8	4.8
25	Furniture	15.6	15.6	15.6	15.6
26	Paper & Allied Products	3.01	3.01	3.01	3.01
27	Printing & Publishing	4.7	4.7	4.7	4.7
28	Chemical & Allied Products	1.4	1.4	1.4	1.4
30	Rubber & Plastics	6.8	6.8	6.8	6.8
31	Leather	-22.9	-22.9	-22.9	-22.9
32	Stone, Clay	.09	.09	.09	.09
33	Primary Metals	-.08	-.08	-.08	-.08
34	Fabricated Metals	-.005	-.005	-.005	-.005
35	Non-Electrical Machinery	6.2	6.2	6.2	6.2
36	Electrical Machinery	.09	.09	.09	.09
37	Transportation Equipment	-12.9	-12.9	-12.9	-12.9
38	Prof./Scientific Equipment	-1.5	-1.5	-1.5	-1.5
39	Miscellaneous Manufacturing	1.7	1.7	1.7	1.7

Source: Projection percentages based on Missouri Employment Outlook, published by the Missouri Department of Labor and Industrial Relations. Based on number of employees. Source provided projections to 2000. Using the same methodology, percentages were expanded to 2010. Only SIC codes applicable to the Ozark Rivers District are used in this illustration.

A listing of industries in the Ozark Rivers Region can be found in the appendices.

Industrial employment projections by industry (Figure 3-3) are provided by the Missouri Department of Labor and Industrial Relations to the year 2000. Those projections were based on statistical data from 1975 through 1990, which is a relatively short time on which to base projections. Planners used the same methodology to project employment percentages through the year 2010. These projections are made by industry and on a statewide basis.

With an overall increase in population of 9.5 percent, the district will have to make long-term decisions of how to manage and control the region's solid waste, by improving and expanding solid waste programs in areas that will experience the greatest increase in the population, while still maintaining sanitation services in areas of constant or declining numbers.

plan relied partially upon the 1987 Statewide Resource Recovery Feasibility and Planning Study prepared by the Environmental and Energy Resources Authority (EIERA) which contained a Solid Waste Characterization Report that sampled sanitary landfills in Springfield, Willow Springs, Columbia and Lee's Summit. The waste stream in the Ozark Rivers District is probably very similar to at least one of the study areas in this report. However, local on-site waste stream analysis provided explicit information on the district.

To date, four on-site waste stream studies have been conducted in the Ozark River's district to provide planners with information specific to our area. The first one, done in August 1992 and February 1993 was conducted at three landfill sites. As landfills closed it became increasingly difficult to find locations to do assessments. The second waste assessment conducted by the district, done in August of 1994 and February of 1995, was done at two sites—a transfer station and a landfill. In 1996 and 1997 the Midwest Assistance Program (MAP) conducted a state-wide waste composition study. The Phelps County Transfer Station was included in the second phase of that study and the results of that waste sort are included here.

Because solid waste management is becoming increasingly complex as alternatives to land-filling are discovered and analyzed, and because the economic feasibility of those alternatives must be carefully considered, planners must know the quantity and composition of the waste stream, as well as who is generating what type of waste. Knowledge of waste generators will help in targeting certain groups or areas for specific solid waste activities and programs. Without initial and ongoing waste stream analysis, the district will not know what progress is being made in reducing solid waste. The earlier EIERA study and the latter MAP study were used for comparison in this analysis.

Methodology

During the first phase of the plan, the district chose to accomplish its waste assessment by conducting on-site sampling and sorting of solid waste at the only available waste disposal sites in the region: Kahle Landfill (Gasconade County) and St. Robert Transfer Station. Two separate assessments were conducted to account for seasonal changes in the waste stream. The first was conducted in August 1994, and the second was performed in February 1995.

Waste samples were sorted into the following categories, as detailed in the state's model plan:

PAPER:

- Corrugated Cardboard/Kraft Paper
- Office Paper
- Magazine
- Newsprint
- Non-Recyclable Paper

PLASTIC:

- HDPE (High Density Polyethylene)
- PET (Polyethylene Terephthalate)
- Other Plastics

YARD WASTE:

- Grass Clippings/Leaves
- Prunings

GLASS:

- Amber
- Green
- Clear

NON-FERROUS METALS:

- Aluminum Beverage
- Other Aluminum
- Other Non-Ferrous Metals

FERROUS METALS:

- Ferrous Food Containers
- Other Ferrous

OTHER MATERIALS:

- Food Waste
- Textiles
- Diapers
- Miscellaneous Organics
- Other Waste
- Fines
- Household Hazardous Waste

Several samples were taken at each site over a four-day period for each assessment study. The samples were sorted into categories and weighed. Then the sample results were added together for each category, all the categories were then totaled and calculations made to determine what percentage of the waste stream each category accounted for. This was done at each facility, and the results totaled to obtain district-wide averages by category. The results of the two seasonal waste assessments were then averaged to obtain a baseline and compared to the waste assessment conducted in 1992-1993.

The results of the 1992-1993 waste assessment are reflected in Figure 3-4 and 3-5. The average is documented in Figure 3-6. Data from the 1994-1995 study are similarly shown in Figures 3-7 and 3-8. The results of the MAP waste characterization study are shown in Figure 3-9. A comparison of the MAP study results and the average from the Ozark Rivers study results is shown in Figure 3-10.

Ozark Rivers Waste Stream Characterization

The waste stream of the Ozark Rivers District is categorized in Figure 3-4 through 3-8, with percentages for each type of waste, based on the findings of the waste assessment conducted. The 1992-1993 assessment was conducted at three area landfills. Due to landfill closures, the 1994-1995 assessment was conducted at one landfill and one waste transfer station. At the time the assessment was conducted, no other disposal facilities were available. Assessments were made in August and February, in order to take seasonal variations into consideration.

Figure 3-4 documents the August 1992 assessment while Figure 3-5 documents the February/March 1993 assessment. Figure 3-6 is an average of those two assessments. Figure 3-7 shows waste assessment results for both the summer and winter studies conducted in 1994-1995. Figure 3-8 compares the 1992-1993 assessment results with those of the 1994-1995 assessment.

On the average, based on the assessments, paper makes up the largest percentage of a basic category with 36.6 percent of the waste stream in 1993 and 35.6 percent in 1995. Plastics accounted for 10.6 percent of the waste stream in 1993 and jumped to 19 percent of the waste stream in 1995. Yard waste makes up less than 2 percent of the waste stream, due in large part to the ban on landfill-

ing yard waste which went into effect prior to the district's waste assessment studies. Glass accounted for a total of 5.3 percent of the waste generated in the district in 1993 and 6.4 percent in 1995. Non-ferrous metals made up 5.1 percent of the waste stream in 1993 and 6 percent in 1995. Ferrous metals made up 5.7 percent in 1993 and 5.4 percent in 1995. The other materials category, which includes food wastes, diapers, textiles, miscellaneous organics, fines, household hazardous waste and other waste, accounted for 35.6 percent of the total waste stream being landfilled in the district in 1993 and 25.6 percent in 1995.

The categories with the most dramatic changes were plastics and other materials. There was an increase of 8.4 percent in the amount of plastic being landfilled, and a drop of 25.6 percent in other materials. The jump in plastics could be attributed to the increased use of plastics in packaging and the fact that the district had to change assessment sites because two of the original survey facilities closed before the 1994-1995 assessment. The 10 percent drop in the other materials category can be partially attributed to a drop in the amount of textiles landfilled. During the 1992-1993 assessment, it was found that a large number of textile and shoe cutting operations existed in the region which produced plastic, leather, rubber and man-made fiber trimmings. These businesses landfilled the majority of their waste and this resulted in a higher than average percentage of textiles in the waste stream. The change of assessment site may have affected this number, as some of these businesses may now be using disposal sites located outside of the district. Some of the larger industries have been taking steps to reduce the amount of waste they send to landfills and in many cases, these industries have shut down. The Brown Shoe Company in Steelville closed in 1995 and many of the supporting businesses in the region closed with it.

There were few changes in the waste assessment results that could be directly attributed to seasonal variations. Tourism in the area during the summer months is most likely responsible for more aluminum and glass being generated for disposal. The amount of yard waste, which is very small to begin with, is generally elevated during the summer months. The lower percentage of yard waste could be due to diminished activities associated with gardening and lawn care during the winter months.

The MAP study used slightly different methodology, recording both weight and volumes for different types of waste, and breaking the categories of wastes down further, i.e. adding plastic film to the Plastics category, adding oil filters to the metals category, and classifying HHW as "other waste" rather than giving it its own category, as was done in the Ozark Rivers assessment.

Despite the differences in methodology, the results of the Ozark Rivers assessment and MAP's study were very similar in most categories, with less than 1.5 percent difference in paper, glass, plastic and metals categories. The most significant changes noted were in the area of food wastes, with the district study showing an average of 5.7 percent of the total waste stream being food wastes, while the MAP study showed a startling 22.1 percent. This could be a result of differences in the sorting process or simply a shift in consumer habits. National studies indicate that Americans are eating out far more frequently than they did a decade ago. Restaurants and cafeterias generate large volumes of food waste. The growth in the fast food and restaurant industry reflects the increase in food waste.

Because the MAP survey is the most recent waste characterization study done in the region, and because it is being used as the baseline study by MDNR for the state of Missouri, we will use the findings from the MAP study will be used to calculate waste projections later in this chapter.

Fig. 3-4
AUGUST 1992 WASTE STREAM CHARACTERIZATION
THE OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT

<u>Category of Waste</u>	<u>Percentage of Waste Stream</u>
PAPER	39.1
Corrugated Cardboard/Kraft Paper	15.6
Office Paper	4.3
Magazines	2.9
Newsprint	3.5
Non-Recyclable Paper	12.8
PLASTIC	10.3
HDPE	1.4
PET	4.7

Other Plastics	4.2	
YARD WASTE		1.4
Grass Clipping/Leaves	1.1	
Prunings	0.3	
GLASS		4.4
Amber	0.3	
Green	0.7	
Clear	3.4	
NON-FERROUS METALS.....		5.0
Aluminum Beverage Cans	2.2	
Other Aluminum	1.1	
Other Non-Ferrous Metals	1.7	
FERROUS METALS		7.9
Ferrous Food Containers	2.5	
Other Ferrous Metals	5.4	
OTHER MATERIALS		31.9
Food Waste	5.0	
Textiles	13.5	
Diapers	0.9	
Miscellaneous Organics	3.4	
Other Waste	3.2	
Fines	4.7	
Household Hazardous Waste	1.2	
TOTALS.....		100.0

Source: Waste Stream Assessments performed by MRPC, August 1992

Fig. 3-5
FEBRUARY/MARCH 1993 WASTE STREAM CHARACTERIZATION
THE OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT

<u>Category of Waste</u>	<u>Percentage of Waste Stream</u>
PAPER	34.0
Corrugated Cardboard/Kraft Paper	9.4
Office Paper	7.9
Magazines	1.7
Newsprint	3.4
Non-Recyclable Paper	11.6
PLASTIC	10.8
HDPE	2.4
PET	2.0

Other Plastics	6.4	
YARD WASTE		0.6
Grass Clipping/Leaves	0.6	
Prunings	0.0	
GLASS		5.9
Amber	1.9	
Green	1.0	
Clear	3.0	
NON-FERROUS METALS.....		5.2
Aluminum Beverage Cans	2.2	
Other Aluminium	0.5	
Other Non-Ferrous Metals	2.5	
FERROUS METALS		3.3
Ferrous Food Containers	3.2	
Other Ferrous Metals	0.1	
OTHER MATERIALS		40.2
Food Waste	6.9	
Textiles	9.6	
Diapers	1.8	
Miscellaneous Organics	4.7	
Other Waste	8.9	
Fines	4.5	
Household Hazardous Waste	3.8	
TOTALS.....		100.0

Source: Waste Stream Assessments performed by MRPC, February/March 1993

GENERATION RATES AND PROJECTIONS

Determination of Per-Capita (Residential/Commercial) Solid Waste Generation

For the purposes of this study, the district is basing per-capita waste generation on 2000 U. S. Census population data for the region multiplied by the statewide average solid waste generation rate of 6.25 pounds per person per day. (This rate includes residential, commercial, institutional, construction, demolition and industrial waste streams.)

The total number of district residents—166,310—multiplied by 6.25 and multiplied again by the number of days in the year results in a figure of 189,593 tons of solid waste generated within the district each year. Figure 3-11 is a chart of per-capita generation rates for the district, broken down by county.

By determining the amount of solid waste generated within the district, based on 6.25 pounds per person per day, and breaking those figures down by percentage category, the quantity of waste per category can be estimated. This assumes that the waste being landfilled in the district and included in the waste characterization studies is an accurate representation of all the waste being generated.

Fig. 3-6
1992-93 AVERAGE WASTE STREAM CHARACTERIZATION
THE OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT

<u>Category of Waste</u>	<u>Percentage of Waste Stream</u>
PAPER	36.6
Corrugated Cardboard/Kraft Paper	12.5
Office Paper	6.1
Magazines	2.3
Newsprint	3.5
Non-Recyclable Paper	12.2
PLASTIC	10.6
HDPE	1.9
PET	3.4
Other Plastics	5.3
YARD WASTE	1.1
Grass Clipping/Leaves	0.9
Prunings	0.2
GLASS	5.3
Amber	1.1
Green	1.0
Clear	3.2
NON-FERROUS METALS.....	5.1
Aluminum Beverage Cans	2.2
Other Aluminium	0.8
Other Non-Ferrous Metals	2.1
FERROUS METALS.....	5.7
Ferrous Food Containers	2.9
Other Ferrous Metals	2.8
OTHER MATERIALS	35.6
Food Waste	6.0
Textiles	11.0
Diapers	1.4
Miscellaneous Organics	4.1
Other Waste	6.0
Fines	4.6
Household Hazardous Waste	2.5
TOTALS.....	100.0

Source: Analysis of Waste Stream Assessments performed by MRPC, August 1992 and Feb./March 1992

Fig. 3-7

**COMPARISON OF AUGUST 1994 & FEBRUARY 1995 WASTE STREAM ASSESSMENT
OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT**

<u>Category of Waste</u>	<u>1994</u>	<u>1995</u>	<u>Average</u>
Paper	31	40.2	35.6
Corrugated Cardboard/Kraft Paper	8	11.4	9.7
Office Paper	4	7.9	6
Magazines	5	4.8	4.9
Newsprint	5	7.1	6
Non-Recyclable Paper	9	9	
9			
Plastic	18	20	19
HDPE	5	4.6	4.8
PET	5	3.7	4.3
Other Plastics	8	11.7	
9.9			
Yard Waste	3	1.1	2
Grass Clippings/Leaves	3	1.1	
2			
Prunings	0	0	0
Glass	8	4.7	6.4
Amber	2	1.3	1.6
Green	1	0.9	1
Clear	5	2.5	3.8
Non-Ferrous Metals	8	4.1	6
Aluminum Beverage Cans	5	3	4
Other Aluminum	2	0.1	1
Other Non-Ferrous Metals	1	1	1
Ferrous Metals	6	4.8	5.4
Ferrous Food Containers	5	4.4	4.7
Other Ferrous Metals	1	0.4	0.7
Other Materials	26	25.1	25.6
Food Waste	5	5.7	5.4
Textiles	5	7	
6			
Diapers	4	3.2	
3.6			
Miscellaneous Organics	0.2	0.7	
0.5			
Other Waste	5	6.2	5.6
Fines	3	2	

Fig. 3-8
COMPARISON OF 1992-1993 AND 1994-1995 WASTE ASSESSMENT
OZARK RIVERS SOLID WASTE MANAGEMENT DISTRICT

<u>Category of Waste</u>	<u>'92-'93</u>	<u>'94-'95</u>	<u>Difference</u>
Paper	36.6	35.6	- 1
Corrugated Cardboard/Kraft Paper	12.5	9.7	- 2.8
Office Paper	6.1	6	- 0.1
Magazines	2.3	4.9	+ 2.6
Newsprint	3.5	6	+ 2.5
Non-Recyclable Paper	12.2	9	- 3.2
Plastic	10.6	19	+8.4
HDPE	1.9	4.8	+2.9
PET	3.4	4.3	+0.9
Other Plastics	5.3	9.9	
+4.6			
Yard Waste	1.1	2	+0.9
Grass Clippings/Leaves	0.9	2	+1.1
Prunings	0.2	0	- 0.2
Glass	5.3	6.4	+ 1.1
Amber	1.1	1.6	+ 0.5
Green	1	1	NC
Clear	3.2	3.8	
+ 0.6			
Non-Ferrous Metals	5.1	6	+ 0.9
Aluminum Beverage Cans	2.2	4	+ 1.8
Other Aluminum	0.8	1	+ 0.2
Other Non-Ferrous Metals	2.1	1	- 1.1
Ferrous Metals	5.7	5.4	- 0.3
Ferrous Food Containers	2.9	4.7	+ 1.8
Other Ferrous Metals	2.8	0.7	- 2.1
Other Materials	35.6	25.6	-10
Food Waste	6	5.4	- 0.6
Textiles	11	6	- 5
Diapers	1.4	3.6	+ 2.2
Miscellaneous Organics	4.1	0.5	- 3.6
Other Waste	6	5.6	- 0.4
Fines	4.6	2.5	- 2.1
Household Hazardous Waste	2.5	2	- 0.5

Figure 3-9
Comparison of Three Waste Sorts in 1997 at the Phelps County Transfer Station
Conducted by the Midwest Assistance Program

<u>Category of Waste</u>	<u>Sort #1</u>	<u>Sort #2</u>	<u>Sort #3</u>	<u>Average</u>
Paper	36.8	34.7	33.8	35.2
Cardboard/Kraft Paper	7.0	6.6	7.1	6.9
Office/High Grade Paper	3.3	7.7	2.6	4.2
Magazines	3.5	4.2	3.9	3.8
Newsprint	8.8	5.6	7.2	7.4
Non-recyclable/Mixed	14.3	10.6	13.0	12.9
Plastic.....	13.8	13.9	15.5	14.4
PET #1	1.7	1.6	1.6	1.6
HDPE #2	1.9	2.0	2.0	2.0
Other Plastics/Film	10.4	10.3	11.9	10.8
Glass.....	6.8	5.6	5.4	6.0
Brown	2.1	1.8	0.7	1.5
Green	0.3	0.5	0.4	0.4
Clear	3.7	2.8	3.6	3.4
[Other glass]*	0.7	0.4	0.7	0.6
Non-Ferrous Metals.....	2.7	1.6	2.2	2.2
Aluminum Cans	1.7	0.9	1.2	1.3
Other Aluminum	0.8	0.4	0.9	0.7
Other Non-Ferrous Metals	0.2	0.3	0.1	0.2
Ferrous Metals.....	4.4	4.0	5.1	4.6
Ferrous Food Containers	3.4	2.9	3.7	3.4
Other Ferrous Metals	1.0	1.1	1.4	1.2
Other Materials.....	35.4	40.2	38.0	37.6
Food Waste	22.3	24.5	20.1	22.1
Textiles	1.8	5.8	4.7	3.9
Diapers	3.2	3.6	5.8	4.2
Miscellaneous Organics	4.5	2.6	1.7	3.0
Other Waste/HHW	1.0	0.2	0.7	0.7
Wood Waste	0.7	0.2	0.6	0.6
Fines	1.5	2.1	3.3	2.3
Other Inorganics	0.3	1.1	1.2	0.8

* Denotes a category that was not included in the Ozark Rivers Study.

Source: *The Missouri Waste Composition Study, Midwest Assistance Program, 1997*

Figure 3-10
Comparison of Ozark Rivers and Midwest Assistance Program Waste Assessments

<u>Category of Waste</u>	<u>Ozark Rivers Study</u>	<u>MAP Study</u>	<u>Difference</u>
Paper	36.1	35.2	- 0.9
Cardboard/Kraft Paper	11.1	6.9	- 4.2
Office/High Grade Paper	6.0	4.2	- 1.8
Magazines	3.6	3.8	+ 0.2
Newsprint	4.8	7.4	+ 2.6
Non-Recyclable/Mixed	10.6	12.9	+ 2.3
Plastic	14.9	14.4	- 0.5
PET #1	3.4	1.6	- 1.8
HDPE #2	3.4	2.0	- 1.4
Other Plastics/Film	7.6	10.8	+ 3.2
Glass	5.9	6.0	+ 0.1
Brown	1.4	1.5	+ 0.1
Green	1.0	0.4	- 0.6
Clear	3.5	3.4	- 0.1
[Other Glass]*		0.6	
Non-Ferrous Metals	5.6	2.2	- 3.4
Aluminum Cans	3.1	1.3	- 1.8
Other Aluminum	0.9	0.7	- 0.2
Other Non-Ferrous Metals	1.6	0.2	- 1.4
Ferrous Metals	5.6	4.6	- 1.0
Ferrous Food Containers	3.8	3.4	- 0.4
Other Ferrous Metals	1.8	1.2	- 0.6
Other Materials	32.1	37.6	+ 7.0
Food Waste	5.7	22.1	+16.4
Textiles	8.5	3.9	- 4.6
Diapers	2 . 4	2.5	+ 1.7
Miscellaneous Organics	2.3		
3.0	+ 0.7		
Other Waste/HHW	2.3	0.7	- 1.6
Wood Waste/Yard Waste	1.5	0.6	- 0.9
Fines	3.5	2.3	- 1.2
Other Inorganics	5.8	0.8	- 5.0

* Denotes a category that was not included in the OR study.

Quantities/Characteristics 3.15

Source: *The Missouri Waste Composition study, Midwest Assistance Program, 1997 and the Analysis of waste*

Figures 3-12 and 3-13 illustrate those determinations for the waste assessments conducted in 1997. This chart shows the total amount generated, as well as the amount being landfilled. These estimates can provide information as to the quantities of recoverable resources available in the district and demonstrate how much material is being landfilled that could conceivably be recycled or reused. From a practical standpoint, the materials being landfilled are the most accessible for recycling. If each community will make some form of recycling available to residents, a large portion of recyclable materials can be recovered.

Determination of Industrial Solid Waste Generation

Besides the per-capita solid waste generation rates, it is also necessary to determine industrial solid waste generation rates. The methodology used to determine these figures is based on the recommendations provided by the state model plan. A list of Standard Industrial Classification (SIC) codes was obtained from the Office of Statistical Standards in the Federal Bureau of the Budget. All manufacturing facilities with a two digit SIC code of 20 through 39 were identified. Those industries in the Ozark Rivers Region with those SIC codes were identified and their employment levels determined. The total number of employees in the region in each SIC was then multiplied by the waste generation rate corresponding to that code, supplied in the state model plan. Figure 3-14 illustrates the industrial solid waste generation rates used. Then these generation rates are combined with employment figures reported by SIC code for each county in the district.

The industrial generation rates for the district are reflected in Figure 3-15, as determined by the above methodology. Dent County has the highest industrial generation rate in the district, with 14,033.15 tons per year. The three categories of highest generation in Dent County are the chemical/allied products industry, stone/clay industry and wood products industry. The timber industry is predominant throughout the district, as well as the food processing industry.

Phelps County is the second largest generator of industrial waste, accounting for 7,058.78 tons per year, with 1,996.8 tons attributed to the non-electrical machinery industry in that county. Crawford County is the third largest generator with 6,339.42 tons per year. Wood products and primary metals industries account for the majority of the waste.

Fig. 3-11
PER CAPITA WASTE GENERATION
for the
Ozark Rivers Solid Waste Management District
Based on 2000 Census

Place	Total Persons	Per Capita Annual Waste Generation (Tons)
Crawford County	22,804	25,997
Bourbon	1,348	1,537
Cuba	3,230	3,682
Leasburg	323	368
Steelville	1,429	1,629
Sullivan	6,351	7,240
Dent County	14,927	17,017
Salem	4,854	5,534
Gasconade County	15,342	17,490

Bland	565	644
Gasconade	267	304
Hermann	2,674	3,048
Morrison	123	140
Owensville	2,500	2,850
Rosebud	364	415
Maries County	8,903	10,149
Belle	1,344	1,532
Vienna	628	716
Phelps County	39,825	45,401
Doolittle	644	734
Edgar Springs	190	217
Newburg	484	552
Rolla	16,367	18,658
St. James	3,704	4,223
Pulaski County	41,165	46,928
Crocker	1,033	1,178
Dixon	1,570	1,790
Ft. Leonard Wood	13,666	15,579
Richland	1,805	2,058
St. Robert	2,760	3,146
Waynesville	3,507	3,998
Washington County	23,344	26,611
Caledonia	158	180
Irondale	437	498
Mineral Point	363	414
Potosi	2,662	3,034
District	166,310	189,593

Source: 2000 Census of Population - U.S. Census Bureau, Missouri Solid Waste Diversion and Recycling Status Report, 2001

MRPC Compilation, 2004 (generation rate of 6.25 pounds per person per day)

Fig. 3-12
QUANTITIES OF WASTE GENERATED PER CATEGORY
within the Ozark Rivers District
Based on 1997 Waste Assessment and 2000 Census Figures

<u>Waste Category</u>	<u>Percentage of Waste Stream</u>	<u>Quantity Generated Per Year in District (Tons)</u>
PAPER		66,737
Cardboard/Kraft Paper	6.9	13,082
Office Paper	4.2	7,963
Magazines	3.8	7,205
Newsprint	7.4	14,030
Non-Recyclable Paper	12.9	24,457
PLASTIC		27,301
HDPE	2.0	3,792

PET	1.6	3,033
Other Plastics	10.8	20,476
GLASS		11,186
Amber	1.5	2,844
Green	0.4	758
Clear	3.4	6,446
Other Glass	0.6	1,138
NON-FERROUS METAL		4,171
Aluminum Beverage Cans	1.3	2,465
Other Aluminum	0.7	1,327
Other Non-Ferrous Metals	0.2	379
FERROUS METALS		8,721
Ferrous Food Containers	3.4	6,446
Other Ferrous Metals	1.2	2,275
OTHER MATERIALS		71,477
Food Waste	22.1	41,900
Textiles	3.9	7,394
Diapers	4.2	7,963
Miscellaneous Organics	3.0	5,688
Other Waste/HHW	0.7	1,327
Wood Waste/Yard Waste	0.7	1,327
Fines	2.3	4,361
Other Inorganics	0.8	1,517
TOTALS.....		189,593

SOURCE: Meramec Regional Planning Commission Analysis 2004, Ozark Rivers District Waste Stream Audits, Missouri Waste Characterization Study Data. MRPC Compilation, 2004.

Fig. 3-14
INDUSTRIAL SOLID WASTE GENERATION RATES

SIC Code	Industry	Waste Generation Rate (Tons/Employee/Year)
20	Food Processing	12.50
22	Textile Mills Products	0.26
23	Apparel	0.31
24	Wood Products	10.30
25	Furniture	0.52
26	Paper and Allied Products	2.00
27	Printing and Publishing	0.49
28	Chemical/Allied Products	5.00
29	Petroleum	14.80

Fig. 3-13
QUANTITIES OF WASTE GENERATED PER CATEGORY
within the Ozark Rivers District
1994

Waste Category	Percentage of Waste Stream	Quantity Generated Per Year in District (Tons)
PAPER		35,319
Cardboard/Kraft Paper	9.7	9,624
Office Paper	6.0	5,952
Magazines	4.9	4,861
Newsprint	6.0	5,952
Non-Recyclable Paper	9.0	8,930
PLASTIC		18,850
HDPE	4.8	4,762
PET	4.3	4,266
Other Plastics	9.9	9,822
YARD WASTE		1,984
Grass Clippings/Leaves	0.2	1,984
Prunings	0.0	0
GLASS		6,349
Amber	1.6	1,587
Green	1.0	992
Clear	3.8	3,770
NON-FERROUS METAL		5,952
Aluminum Beverage Cans	4.0	3,968
Other Aluminum	1.0	992
Other Non-Ferrous Metals	1.0	992
FERROUS METALS		5,357
Ferrous Food Containers	4.7	4,663
Other Ferrous Metals	0.7	694
OTHER MATERIALS		25,397
Food Waste	5.4	5,357
Textiles	6.0	5,952
Diapers	3.6	3,572
Miscellaneous Organics	0.5	496
Other Waste	5.6	5,556
Fines	2.5	2,480
Household Hazardous Waste	2.0	1,984
TOTALS		99,208

SOURCE: Meramec Regional Planning Commission Analysis, 1994-95 Ozark Rivers District Waste Stream Audits, and phone surveys.

30	Rubber and Plastic	2.60
31	Leather	0.17
32	Stone, Clay	2.40
33	Primary Metals	24.00
34	Fabricated Metals	1.70
35	Non-Electrical Machinery	2.60
36	Electrical Machinery	1.70
37	Transportation Equipment	1.30
38	Professional/Scientific Equipment	0.12
39	Miscellaneous Manufacturing	0.14

SOURCE: *Model Plan Guidelines for Comprehensive Solid Waste Management*,
Missouri Department of Natural Resource

Fig. 3-15
INDUSTRIAL GENERATION
For The Ozark Rivers Solid Waste Management District
2000

County	Type of Industry (SIC)	Tons Per Year
Crawford	Primary Metals (33)	1,449.00
	Rubber and Plastic (30)	522.60
	Wood Products (24)	2,595.60
	Non-Electrical Machinery (35)	452.40
	Transportation Equipment (37)	546.00
	Electrical Machinery (36)	170.00
	Fabricated Metals (34)	23.80
	Apparel (23)	108.81
	Stone, Clay (32)	19.20
	Leather (31)	91.80
	Printing and Publishing (27)	59.29

	Chemical/Allied Products (28)	245.00
	Petroleum (29)	29.60
	Food Processing (20)	25.00
	Professional/Scientific Equipment (38)	0.48
	Miscellaneous Manufacturing (39)	0.84
	<i>Total:</i>	<i>6,339.42</i>
Dent	Wood Products (24)	1,699.50
	Chemical/Allied Products (28)	520.00
	Apparel (23)	6.20
	Fabricated Metals (34)	144.50
	Non-Electrical Machinery (35)	23.40
	Stone, Clay (32)	573.60
	Printing and Publishing (27)	24.99
	Professional/Scientific Equipment (38)	0.96
	Primary Metals (33)	11,040.00
	<i>Total:</i>	<i>14,033.15</i>
Gasconade	Food Processing (20)	1,937.50
	Rubber and Plastic (30)	390.00
	Non-Electrical Machinery (35)	439.40
	Printing and Publishing (27)	293.02
	Stone, Clay (32)	196.80
	Primary Metals (33)	96.00
	Fabricated Metals (34)	51.00
	Furniture (25)	93.60
	Transportation Equipment (37)	4.56
Gasconade cont.	Miscellaneous Manufacturing (39)	24.92
	Apparel (23)	15.50
	Wood Products (24)	113.30
	Leather (31)	8.67
	Chemical/Allied Products (28)	15.00
	<i>Total:</i>	<i>3,679.27</i>
Maries	Chemical/Allied Products (28)	655.00
	Food Processing (20)	87.50
	Wood Products (24)	82.40
	Furniture (25)	5.20
	Paper and Allied Products (26)	20.00
	Non-Electrical Machinery (35)	13.00
	Printing and Publishing (27)	16.17
	Leather (31)	3.40
	<i>Total:</i>	<i>882.67</i>
Phelps	Food Processing (20)	1,587.50
	Wood Products (24)	1,452.30

	Chemical/Allied Products (28)	1,270.00
	Printing and Publishing (27)	49.49
	Rubber and Plastics (30)	267.80
	Stone, Clay (32)	103.20
	Non-Electrical Machinery (35)	1,996.80
	Electrical Machinery (36)	130.90
	Apparel (23)	13.95
	Transportation Equipment (37)	32.50
	Miscellaneous Manufacturing (39)	5.46
	Professional/Scientific Equipment (38)	1.68
	Furniture (25)	2.60
	Paper and Allied Products (26)	90.00
	Petroleum (29)	44.40
	Fabricated Metals (34)	10.20
	<i>Total:</i>	<i>7,058.78</i>
Pulaski	Woods Products (24)	515.00
	Apparel (23)	6.82
	Transportation Equipment (37)	167.70
	Stone, Clay (32)	69.60
	Printing and Publishing (27)	45.57
	Fabricated Metals (34)	47.60
	Primary Metals (33)	48.00
	Miscellaneous Manufacturing (39)	3.50
	Non-Electrical Machinery (35)	28.60
	Professional/Scientific Equipment (38)	1.08
	Rubber and Plastic (30)	104.00
Pulaski cont.	Furniture (25)	0.52
	<i>Total:</i>	<i>1,037.99</i>
Washington	Wood Products (24)	535.60
	Stone, Clay (32)	26.40
	Apparel (23)	0.93
	Printing and Publishing (27)	9.80
	Leather (31)	38.76
	Fabricated Metals (34)	115.60
	Miscellaneous Manufacturing (39)	2.38
	Non-Electrical Machinery (35)	83.20
	Transportation Equipment (37)	19.50
	<i>Total:</i>	<i>832.17</i>
District Total:		33,863.45

Source: Meramec Regional Planning Commission Analysis, 2004

Fig. 3 -16

INDUSTRIAL GENERATION BY INDUSTRY for the Ozark Rivers Solid Waste Management District

<u>Type of Industry</u>	<u>Tons Per Year</u>
Wood Products (24)	6,993.70
Primary Metals (33)	12,633.00
Rubber and Plastic (30)	1,284.40
Food Processing (20)	3,637.50
Chemical/Allied Products (28)	2,705.00
Non-Electrical Machinery (35)	3,036.80
Stone, Clay (32)	988.80
Printing and Publishing (27)	498.33
Apparel (23)	152.21
Transportation Equipment (37)	770.26
Fabricated Metals (34)	392.70
Electrical Machinery (36)	300.90
Leather (31)	142.63
Paper and Allied Products (26)	110.00
Furniture (25)	101.92
Petroleum (29)	74.00
Miscellaneous Manufacturing (39)	37.10
Professional/Scientific Equipment (38)	4.20
Total:	33,863.45

Source: Meramec Regional Planning Commission analysis, 2003

By studying industrial solid waste generation rates, certain industries within the district can be targeted for waste reduction and recycling programs. Figure 3-16 clearly illustrates which industries within the region generate the largest volume of solid waste. The primary metals industry is the largest generator in the region, accounting for 12,633 tons of waste per year. This would be one area that the district could research to find ways to reduce waste and improve recycling rates for these industries while reducing their costs for solid waste disposal. By-products of the wood industry are one portion of industrial generated solid waste that could provide numerous recycling opportunities. The food processing industry accounts for much of the organic industrial waste and is also an area that the district could work with to reduce the amount of solid waste being generated.

Waste Generation Results

The 6.4 pounds per person per day figure is inclusive of commercial and industrial waste. By estimating the volumes of waste being generated by industries in the region, planners can determine how much of the 189,593 tons of waste is coming from industry. Furthermore, the types of industrial waste can be characterized and volumes of those types of waste estimated. Being aware of the type and volume of waste coming from large generators can be helpful in developing waste exchanges or designing recycling/reuse programs for specific industries. By estimating the volume of industrial/commercial waste and reducing the overall waste stream by that number a more accurate estimate of residential waste generation can be achieved. Figure 3-17 illustrates the solid waste generation

amounts for the district broken down by county and by residential/commercial and industrial.

The total waste stream generated by the district is approximately 189,593 tons per year based on 2000 population figures.

Future Solid Waste Generation

Figure 3-17 also illustrates projected solid waste generation within the district of both residential/commercial waste generation and industrial generation. The residential/commercial waste generation projections are based upon population growth and/or reduction rates multiplied by 6.4 pounds per person per day. The industrial generation rates are based on projections of employment by industry produced by the Missouri Department of Labor and Industrial Relations. The percentage of increase or decrease of employment within certain categories of industry over the next several years has been factored into the current industrial generation rate to establish estimated industrial generation projections.

Fig. 3-17
SOLID WASTE GENERATION PROJECTIONS
BASED ON POPULATION & INDUSTRIAL GROWTH PROJECTIONS
 (Base Year and Projected Tons per Year)

<u>County</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2015</u>
Crawford				
Residential	19,672	21,825	23,384	24,718
Industrial	6,339	6,783	7,258	7,766
Total	26,011	28,608	30,642	32,484
Dent				
Residential	2,221	1,472	734	-455
Industrial	14,033	15,015	16,066	17,191
Total	16,254	16,487	16,665	16,736
Gasconade				
Residential	13,820	13,896	14,339	14,782
Industrial	3,679	3,937	4,212	4,507
Total	17,499	17,833	18,551	19,289
Maries				
Residential	8,704	8,904	9,083	9,260

Industrial	882	944	1,010	1,080
Total	9,586	9,848	10,093	10,340

Phelps

Residential	38,366	38,698	39,554	39,992
Industrial	7,059	7,553	8,082	8,648
Total	45,425	46,251	47,636	48,640

Pulaski

Residential	47,516	45,659	43,936	42,341
Industrial	1,038	1,111	1,188	1,272
Total	48,554	46,770	45,124	43,613

Washington

Residential	25,795	27,039	28,260	29,323
Industrial	832	890	953	1,019
Total	26,627	27,929	29,213	30,342

District Totals

Residential	156,094	157,493	159,290	159,961
Industrial	33,862	36,233	38,769	41,483
Total	189,956	193,726	198,059	201,444
1990 District Total	131,609			

*Source: Meramec Regional Planning Commission analysis using state population and industry projections
 * Residential /Commercial figures for 1990 and 1995 are based on 3.7 pounds per person per day. Figures from 2000 forward are based on the revised 6.4 pounds per person per year*

Waste Stream Quantification Conclusions

The solid waste stream in the Ozark Rivers District will grow an estimated 4.2 percent between 2000 and 2010. The majority of this growth can be attributed to the increase in population within the district as a whole. The industrial waste stream is expected to grow at approximately the same rate but these projections can be significantly affected by changes in industrial growth or decline that are beyond the control of local planners.

For the purposes of this discussion, residential/commercial and industrial generated waste streams will be discussed as two separate entities. Different strategies and tactics will be required to address the reduction of solid waste in each of these areas.

The industrial waste stream grew an estimated 16 percent between 1990 and 2000, or at 1.6 percent per year. This was at a much larger rate than was estimated in the original plan. It was expected that declines in the apparel and shoe industry would slow down the solid waste generation rate. However, the growth of the primary metals manufacturing and food processing industries offset the expected declines. It is expected to increase at a similar rate over the next ten years will increase by 4 percent over the next two decades. This gradual increase will be due to the projected decline of several industries in the region including apparel and shoe manufacturing, which will offset projected growth in the wood products, furniture manufacturing, non-electrical machinery, textile and rubber and plastic industries in the region. Crawford County will likely experience an 8.4 percent decrease in the amount of industrial solid waste being generated. Dent and Phelps counties will experience increases in their respective industrial waste streams of nearly 14 percent.

The district intends to focus on industrial generators in its efforts to reduce the solid waste

Quantities/Characteristics 3.25

stream through waste reduction, re-use and recycling. It is hoped that by providing education and technical assistance to large generators in the region significant, long-term reductions can be accomplished.

The residential waste stream accounts for **78 percent** of the total waste stream. This waste stream will grow **2 percent by the year 2010** due to population growth alone. In order to make an impact in reducing this portion the waste stream, dedicated public education efforts and expanded recycling programs will be required.

WASTE STREAM BASELINE FOR MONITORING REDUCTION

In order to monitor progress toward a reduction in the amount of solid waste being landfilled in the district, it is necessary to determine a baseline from which to work. The district has established a baseline of 111,784 tons, which is representative of 1990 landfill tonnage figures. The Department of Natural Resources has suggested that a 1990 landfill tonnage figure be used as a baseline.

The first step taken to obtain this figure was obtaining the landfill tonnage figures from DNR. The only full year recorded was 1991. The tonnage amounts for 1990 were not complete as record keeping did not begin until October. The district wanted to use the earliest, most accurate and complete tonnage records to establish a baseline. Due to seasonal fluctuations in the amounts landfilled, determining the baseline from partial records was not acceptable. Therefore, planners determined the baseline using the 1991 figure.

The total waste landfilled within the district for 1991 was 156,120 tons. Records from the Washington County Landfill indicate that 87 percent of the waste deposited is imported from outside the district. (In 1990, no other landfills in the region were receiving significant amounts of trash, generated outside the seven-county area, to the knowledge of the planners.) By reducing the Washington County tonnage figures by 87 percent, the total tonnage figure for the district is reduced to 96,134 tons.

DNR has provided a 10-percent allowance for materials banned from the waste stream prior to 1992. The district is also adding an additional 4 percent to the baseline to account for the recycling programs developed since 1990. This percentage is based on estimates developed from surveying local recycling programs. This does not include scrap metal collected in the district. Therefore, the 1991 landfill tonnage figure should represent a 14 percent reduction over 1990 figures. Thus, the 1991 figure is 86 percent of the 1990 figure. To arrive at a 1990 figure, the 1991 figure of 96,134 is divided by 86 percent, which equals 111,784 tons.

That figure—111,784 tons—is the amount of waste landfilled in the district in 1990 and is the baseline for this plan. It is from there that the district must reduce by 40 percent. Yearly goals are set forth in Fig. 3-15. A large portion of the reduction will occur in the fifth and sixth years once the education and recycling programs are in place.

Obviously, everything is not landfilled, however, a brief explanation of the discrepancy between the amount of solid waste landfilled and the estimated amount generated is necessary. Based on waste generation rates, approximately 131,609 tons of waste was generated in 1990 while some 111,784 tons were landfilled.

Industrial generators and trash collection areas were carefully studied, and conclusions drawn as to what was happening to the waste not being landfilled.

The wood products industry is the largest generator of solid waste in the district, accounting for 9,177.67 tons per year. The majority of this waste is stockpiled at lumber mills throughout the district in the form of sawdust, bark and scrap or culled lumber. This material is sold as landscape material or firewood and very little, if any, is landfilled.

Based on survey responses from a resource recovery study conducted in 1991, it is known that the primary metal and fabricated metal industries re-use or recycle the majority of the waste generated in those industries. These account for another 7,824 tons and 413.1 tons respectively. The fourth industry in the district that is included in the industrial generation rates that does not landfill the waste generated is the stone/clay industry, which accounts for another 513.23 tons of the waste stream.

The total of the amount of industrial waste that is estimated as not being landfilled is 17,928 tons. By adding this to the baseline of 111,784, a total of 129,712 tons is determined. The remainder is a reasonable estimate of the amount of waste being burned or dumped by residents on their own property. A percentage of this figure can also be attributed to illegal or promiscuous dumping.

Phase I Update

A survey conducted by MRPC in 1995 indicated good progress was being made in the district's goals. It has been determined that the amount of solid waste landfilled by the district has dropped from an estimated 111,784 tons in 1990 to an estimated 99,208 tons in 1993. This is approximately a 12.6 percent decrease in the region's use of landfills. This decrease has occurred despite small increases in population and expanded solid waste services in the region.

Recycling activities in the region have increased significantly. In 1993 it was estimated that 4,000 tons of materials were recovered from the waste stream excluding scrap metal. The 1995 survey indicated that figure had increased to at least 15,107.3 tons—an increase of 278 percent.

Fig. 3-16
LANDFILL TONNAGE FIGURES
Ozark Rivers District

1990	111,784 tons
1991	96,134 tons
1992	n/a

Note: Represents waste generated and landfilled in the region.
Imported trash is not included in this figure.

Source: DNR tonnage records, MRPC analysis

Fig. 3-17
1990 Baseline Year
Breakdown of Waste

Total waste generated.....	131,609 tons
(residential, commercial, industrial)	
Region waste landfilled	111,784 tons
Industrial waste not landfilled	17,928 tons
(but included in generation rates)	
Unaccounted waste	1,897 tons
(includes waste that is legally burned and legally and illegally dumped.)	
MRPC analysis, 1993.....	

Fig. 3-18

Yearly Reduction Percentage Goal
Reduction 1990 to 1993

— banned items	10%
— existing recycling operations ...	4%
1993	1%
1994	2%
1995	3%
1996	6%
1997	7%
1998	7%
Total	40%

This increase can be attributed to the expansion of recycling programs. When the solid waste plan was written in 1993, there were no curbside recycling programs in the region and only a handful of drop-off centers. The following communities now offer curbside recycling services: Bourbon, Potosi, Rolla, Fort Leonard Wood, Sullivan, St. James, Crocker, Waynesville and St. Robert. The following communities have begun drop-off recycling programs or expanded existing drop-off programs: Hermann, Belle, Owensville, Vienna, Cuba, Salem, Dixon, Rolla, St. Robert, Richland and Steelville. These programs, and growing interest among the general public, have been the major contributors to the increase in recovering materials from the waste stream.

LONG-TERM LANDFILL SPACE AND NEEDS

In 1991, the average site life of the seven remaining landfills in the Ozark Rivers Solid Waste District was 5.2 years. When the plan was first written, it was believed that at least three of the seven that existed in 1992 would continue to operate at least until they reached capacity. However, by 1995, all seven landfills in the Ozark Rivers region had closed. Figure 4-1 shows all of the landfills that were active at the time the plan was written that have since closed. It also shows the location of the three operating waste transfer stations in the region and the two new landfills that opened in 2000 and 2003.

Stricter regulations of existing landfills and restrictions on expansions of landfills in areas that do not meet Subtitle D guidelines had a significant impact on the Ozark Rivers District. The 1990's were a transitional time as landfills were replaced by transfer stations. In 2000, Prairie Valley opened in Crawford County, the first landfill to be permitted and opened for operation in more than a decade in the region. In 2003, the Timber Ridge Landfill opened in Washington County.

One site in Washington County, Mill Creek Landfill, has been permitted with the stipulation that the site be cleaned up before it is developed and opened to accept more waste. To date, there has been no progress toward the development of the Mill Creek site.

CURRENT LANDFILL STATUS

There are currently two operating landfills within the district, Prairie Valley and Timberidge.

Crawford County–Prairie Valley Landfill

This landfill, owned and operated by a local, family-owned waste hauling business, Swinger Sanitation, is located in Crawford County, just north of Cuba on Highway 19. This landfill opened for business in 2000 and is considered a fairly small site with less than 15 acres permitted at this time. As with all sites, the lifespan of this landfill is dependant on the rate of volume going into it. Prairie Valley has experience steady growth and has a lifespan of at least ten years on the current footprint. There is room at the site for expansion.

Washington County–Timber Ridge Landfill

This landfill, owned and operated by IESI Corporation, is located in northeastern Washington County, near Richwoods on Highway A. The facility was opened in 2003 and is a large site, with an expected life-span of 20 years or more at a daily capacity in excess of 1,500 tons. This site is expected to take more volume from outside the district than from within.

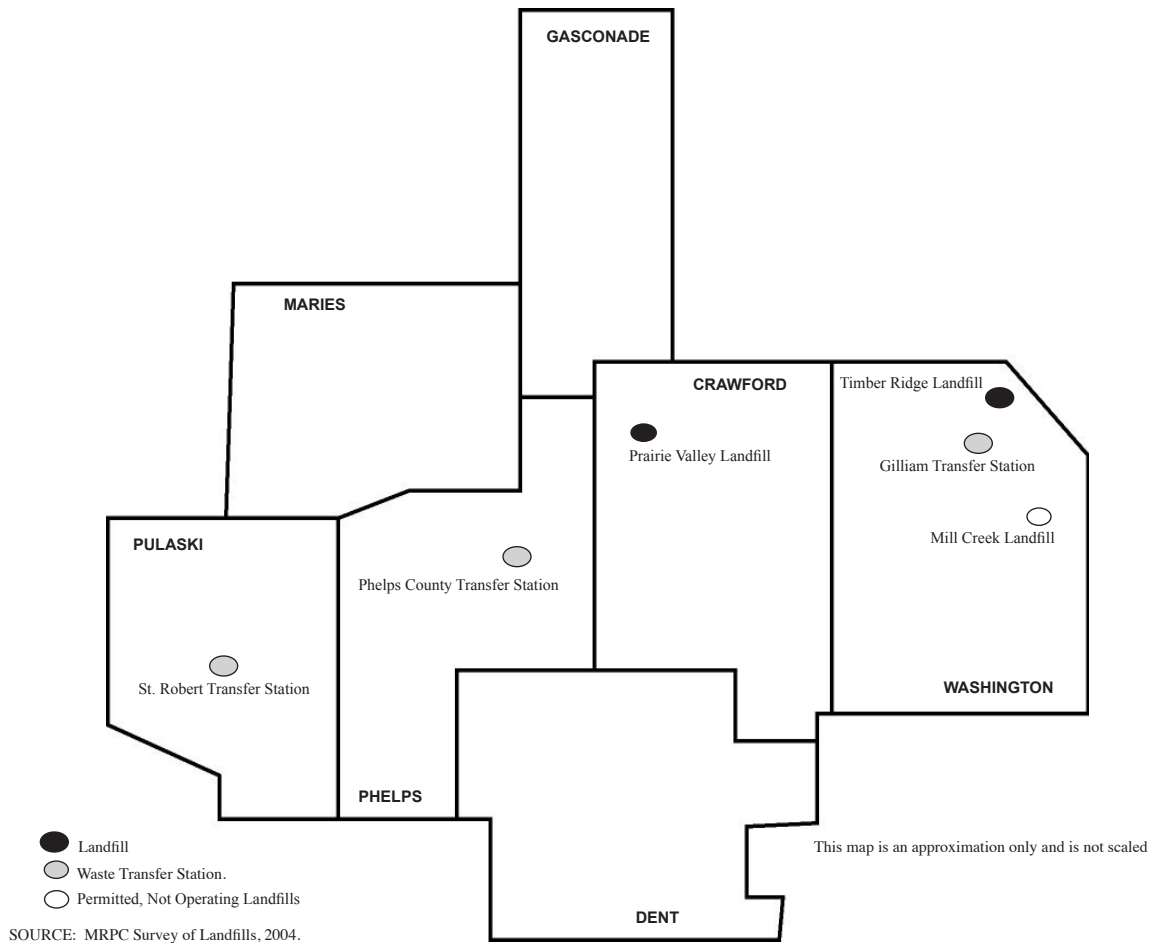
Washington County—Mill Creek Landfill

On March 11, 1993, the Missouri Department of Natural Resources approved a permit for the construction of a private landfill, known as Mill Creek. That facility was tentatively scheduled to open in August 1994, but to date, little development of the site has occurred.

Site Life of Landfills Used Outside the Region

The Phelps County Transfer Station ships waste to the Black Oak Landfill in Wright County, Missouri at the rate of 3,300 tons per month, or 39,600 tons per year. This landfill is

Figure 4-1
Existing Landfills and Active Waste Transfer Stations
In the Ozark Rivers Solid Waste Management District (2004)



owned by Waste Management of North America. This transfer station services Phelps, Dent, and parts of Maries and Crawford counties. The Black Oak Landfill is considered a large site and has an expected lifespan of 20 plus years.

The St. Robert Transfer Station and Recyclery, located in St. Robert, Pulaski County, ships waste to the Black Oak Landfill in Wright County. This landfill is owned by Waste Management of North America, Inc. St. Robert ships 2,450 tons of solid waste to Hartville per month, or 29,400 tons per year. An estimated 30 percent of this waste is demolition waste. This transfer station services all of Pulaski County, including Fort Leonard Wood and parts of Maries County.

The Gilliam Transfer Station in Washington County ships waste to the CWI landfill in DeSoto, Illinois at a rate of 2,004 tons per month or 24,048 tons per year. Much of this waste is generated outside the Ozark Rivers district. This landfill is a large site with a lifespan of ten plus years.

Future of Landfilling in the Region

The future of landfilling in the Ozark Rivers District has been heavily influenced by siting restrictions in Subtitle D. As was discussed in Chapter 1, the prevalence of karst terrain in the district, as well as seismic sensitive zones, has limited the possibility of siting landfills in much of the region. Landfills could be engineered to address both the issues of karst and seismic sensi-

Fig. 4-2
tive zones, but the cost of designing and building such a site would be prohibitive at this time. This is discussed in Chapter 6 as well.

Currently, there are no additional landfill sites being developed in the region. Mill Creek has a permit and Prairie Valley and Timber Ridge have been received permits and gone into operation. No other sites are currently being considered.

Current landfill space both in and outside of the district indicates that there is no shortage of landfill space for the district for the next ten to twenty years. After spiking in the mid 1990s, landfill tipping fees have either fallen or stayed relatively stable. The closure of at least two landfills in the St. Louis area may put some pressure on tipping prices. However, at the current time there are enough competing companies to hold prices to reasonable levels. The closure of landfills in the St. Louis area will most likely result in a large influx of solid waste to the Timber Ridge site, which is located within 30 miles of the St. Louis metro area. To date, competition from other companies has limited the volume of waste moving from the St. Louis area to the Timber Ridge Landfill, but over time that is expected to change.

RECYCLING

EXISTING RECYCLING PROGRAMS: PUBLIC AND PRIVATE

Public Facilities. There are currently several publicly operated recycling programs in the district. These programs take several different forms. At the time the plan was written, the most common was the community drop-off recycling center. In 1992, there were five cities with drop-off recycling centers. That number has increased to nine and includes: Rolla, Hermann, Cuba, Bourbon, Dixon, St. Robert, Fort Leonard Wood, Richland and Salem. These centers range substantially in size and services. The Rolla Recycling Center is a large facility with 20,000 square feet under roof and operates both drop-off and curbside services. Other sites are smaller programs administered by the city, local school, sheltered workshop, group of volunteer citizens or some combination thereof.

The recycling programs in Rolla, Hermann, Cuba, Dixon, St. Robert, Richland and Fort Leonard Wood are all subsidized and operated by city government. The Bourbon program is a cooperative effort between the city and local school. The program in Salem is operated by the local sheltered workshop.

Curbside Programs. Curbside recycling programs have experienced incredible growth in the district over the past ten years. When the plan was first written, several communities were discussing offering curbside, but no programs were actually operating. The following communities now offer curbside recycling to their residents: Rolla, St. James, Fort Leonard Wood, Dixon, Potosi, Waynesville, St. Robert and Sullivan.

Despite early hopes that recycling programs would "make money," most programs do not. If enough volume is captured and avoided costs are factored in, some of the larger programs operate in the black. In most communities, residents are charged for recycling and it is considered a service provided by the city.

Private Facilities. There are a number of privately owned and operated recycling businesses located in the district. Most of these accept aluminum and miscellaneous metals, but have not expanded their businesses to include glass, plastics or paper. Because these are private businesses, economics plays a dominant role in the decisions made by operators on the items accepted for recycling. Several of the businesses interviewed indicated they had tried various materials, including glass and paper, but had been forced to abandon those recycling programs because the profit margin was too small or nonexistent. A number of businesses also indicated that they would like to expand the types of materials they handled, but cited numerous barriers to doing so. For example, there were not consistent, established markets for some materials; or a glut of recoverable resources on the market had caused prices to drop or fluctuate dramatically for items such as newsprint; or the cost of transporting collected materials to buyers in metropolitan areas like St. Louis and Kansas City; or the price paid for materials did not cover the cost involved for labor and processing.

Aluminum Containers

It takes 95 percent less energy to make a can from recycled aluminum than from raw material. This fact alone makes aluminum the recoverable resource with the most consistent demand from aluminum products manufacturers, and consequently the material most often recycled. It

is also the most profitable. There are ready buyers of aluminum cans available throughout the district. Every recycling business located within the district, whether public or private, accepts aluminum cans.

Public recycling programs do not pay for aluminum as private recyclers do, however, they still receive a small amount of aluminum cans. Citizens donate their aluminum to these recycling centers for several reasons. Some people prefer the convenience of the public recycling centers. If they are dropping off other items such as plastic or glass, they eliminate one more trip by leaving their aluminum. Many recycle because it is the "right" thing to do, not because they are interested in making any money from the activity.

Private businesses that pay for aluminum handle the majority of this recoverable material. As mentioned, private recycling businesses that buy aluminum can be found in every county of the district. Figure 2-5 in Chapter Two gives a complete list of recyclers in the region and the materials they accept.

Aluminum is one recoverable material that can provide a profit for any individual, business or club. Many nonprofit organizations in the district collect aluminum as a money-making project, including organizations affiliated with schools, churches and youth activities.

Glass Containers

Six recycling centers are currently accepting glass. Those centers are located in Rolla, Hermann, Fort Leonard Wood, Richland, Dixon and St. Robert. All of these are publicly owned operations. Curbside recycling programs in the following communities accept glass: Sullivan, Rolla, St. James, Fort Leonard Wood, St. Robert, Waynesville and Dixon accept glass.

At least one private business has tried expanding its recycling program to include glass, but has discontinued it due to a low or nonexistent profit margin. As with many recoverable resources at this time, there is not a strong enough demand in the market to bring prices up to a level of profitability for small business operators.

In response for the need to develop markets for recycled glass, the Missouri Business Enterprise Center in conjunction with researchers at the University of Missouri-Rolla, has developed two projects that use waste glass: Glasphalt and substitution of ground glass for titanium dioxide in paint.

Glasphalt—a process by which scrap glass replaces a portion of the aggregate mixed with asphalt—is not a new technology. The idea was first developed and tested in the mid-1960s at UMR. However, at the time it was first developed, the cost of collecting and processing scrap glass was too high to make glasphalt feasible. Since that time, however, the cost of landfilling along with the popularity of recycling has increased. By factoring in the avoided cost of landfilling waste glass and the need to reduce and reuse, glasphalt becomes more appealing.

Glasphalt could provide for the disposal of all the district's waste glass. Glass can replace up to 95 percent of the aggregate (rock) used in asphalt. As an example, 50 tons of cullet (crushed glass) can be used in a 2,000 square foot asphalt area. A test strip of glasphalt was laid down on a county road in Phelps County in 1992, and was monitored for several years to determine its performance. The test strip performed exceptionally well, despite heavy truck traffic. In addition to the Highway V test strip, Glasphalt was used to pave the Rolla Downtown Airport runway and the parking lot of the Rolla Technical Institute.

No serious problems have emerged at other test sites throughout the country. Findings in other areas indicated that Glasphalt does not stand up to heavy traffic as well as regular asphalt;

traction may not be as good when speeds exceed 45 miles per hour; and some of the glasphalt will separate from the cement immediately after installation. However, Dr. Delbert Day, a professor at the UMR who is working on the project, points out that glasphalt was not developed to be superior to present-day asphalt. The goal was to make a product out of waste glass that could be used satisfactorily for parking lots, sidewalks, private drives, residential streets, shoulder material and patching material.

An estimated 11,186 tons of glass exists in the waste stream generated within the Ozark Rivers District. All of this could be used to pave one 750' by 600' parking lot. By encouraging cities and counties within the district to use glasphalt in a few small projects, the district could reuse all of the glass collected locally.

In a related study conducted at the University of Missouri-Rolla, glass was used as an additive for coatings such as paint. Researchers investigated the feasibility of substituting finely ground glass for titanium dioxide. This paint was tested at the Rolla Downtown Airport with good results. Waste glass currently sells for three to eight cents per pound, while titanium dioxide exceeds \$1 per pound. If a quality coating can be developed at a reduced cost, a market for waste glass will be created. Once a market for waste glass is developed, the price for glass will increase and recovery of this resource will improve.

Researchers believe that paints containing waste glass could be used for highway striping, road signs, bridges, architectural and maintenance purposes as well as specialty applications, such as marine, aircraft, automotive and camouflage coatings. This market, alone, is substantial.

It is hoped that these projects will lead to the development of commercial markets for waste glass and the ultimate reduction of the waste stream. If the price for glass could be increased by demand, more private recycling businesses would expand their operations to include glass, at the same time expanding the opportunities for recycling throughout the region. By promoting the use of glasphalt in local construction and maintenance projects, a full-circle recycling project could be accomplished.

Tires

There are no tire recycling businesses in the district. Tire retailers charge a fee to accept used tires, and either resell the used tires or make arrangements with businesses that shred the tires for disposal. A list of permitted waste tire sites can be found in Figure 2-3 in Chapter Two. Some disposal sites will accept waste tires and cut the tires into pieces for landfilling for a special fee.

Finding uses for waste tires is a daunting challenge. Some methods for reuse include recycling the rubber into molded materials or rubber-asphalt, retreading good quality used tires, creating artificial reefs, and developing TDF—Tire Derived Fuel used in incinerators or cement kilns. Although many of these methods work well in other parts of the country, the Ozark Rivers District probably does not generate enough waste tires to support a tire recycling industry.

Newspapers

Most recycling programs in the area accept newspapers. Scenic Rivers Industries in Dent County is the only private recycler that accepts newsprint. Most curbside programs in the district accept newsprint. Publicly owned recycling centers that accept newsprint include Hermann, Rolla, Cuba, Fort Leonard Wood, Dixon and St. Robert.

Because the recycling process weakens paper fibers and reduces the quality of recycled

paper, developing markets for the finished product can be difficult. There is a company in Springfield, Mo. that makes insulation from newsprint. One alternative market that has surfaced that may improve the demand for newsprint is the use of shredded newsprint for animal bedding. Shredded newspaper is considered superior to straw or sawdust. Once mixed with manure it makes excellent compost material.

It is hoped that increased participation in government procurement regulations that require a certain amount of purchased paper come from recycled stock will improve the markets.

Corrugated Cardboard

Thirteen recyclers in the district, two private and eleven public, accept corrugated cardboard: Old 66 Recycling Depot in Cuba, Scenic Rivers Industries in Salem, Hermann recycling, St. Robert Transfer Station and Recyclery, Waynesville curbside, Fort Leonard Wood recycling, St. James curbside program, Richland drop-off program, Bourbon recycling program, Dixon recycling program, Potosi curbside, Sullivan curbside and Rolla Recycling Center. A private businessman in Phelps County is also establishing cardboard recycling in the area with commercial businesses.

The recycling of cardboard boxes has emerged as the mainstay of the paper recycling business. The nation as a whole recycles approximately half of its corrugated cardboard. The Ozark Rivers District generates 13,082 tons of cardboard each year. At present, the district is recovering less than 10 percent of the cardboard being generated in the region.

Some 6.9 percent of the solid waste going to landfills in this district is corrugated cardboard. A significant impact could be made on the waste stream on increasing the recycling of this material.

Plastic Beverage Containers

There are currently 11 recyclers or programs in the district that accept plastic, with some accepting only certain kinds. They are Old 66 Recycling Depot of Cuba, Fort Leonard Wood drop-off and curbside, Bourbon recycling, Sullivan curbside, Rolla Recycling drop-off and curbside, St. James curbside, St. Robert Transfer and Recyclery and curbside program, Waynesville curbside, Potosi curbside, Richland drop-off and Dixon drop-off and curbside. All of these programs collect both PET and HDPE. The Rolla program also accepts plastic shopping bags.

Plastics recycling industry has experienced incredible growth over the past ten years as plastic is being used in more and more products. Some examples include carpet, polar fleece fabrics and construction materials. Currently, there are markets for plastic that can be tapped by recyclers within the district.

Steel Containers

There is a well-established network of scrap metal dealers in the district who buy and sell recovered metals ranging from wrecked automobiles to stripped down appliances to copper wire. A number of residential recycling programs now accept steel or bi-metal cans, including the following: Cuba, Bourbon, Sullivan curbside, Rolla drop-off and curbside, St. James curbside, Fort Leonard Wood drop-off and curbside, St. Robert Transfer and Recyclery and curbside, Waynesville curbside, Potosi curbside, Richland, and Dixon drop-off and curbside.

Steel containers, more commonly called tin cans, are a recoverable resource that has seen steady growth in the district over the past ten years. The steel industry has actively recycled

scrap metal for many years, and over the past decade has begun to view steel cans as a source of recoverable material. Steel cans are generally lined with thin layers of tin to preserve food flavor and quality. Tin itself can be recycled, but more than limited amounts of tin present in the steel can recycling process can produce a marred and pitted final product. "Detinning" companies are being developed to separate the tin from steel and provide a product that meets steel industry standards.

The market exists for the recycling of steel containers, as well as the desire on the part of consumers to recycle these materials.

Effects of Current Recycling on Waste Stream

Approximately 4 percent of the total waste stream generated within the district is being recycled, based on the data collected from area recycling centers. A volume of 7,837 tons. This does not take into account the materials being recycled by local industries that are not being funneled through local recycling centers, nor the amount of scrap metal that was recycled.

The scrap metal industry is well established, and these materials have never really been part of the solid waste stream. For the purposes of this study the scrap metal tonnage amount will not be included in the figures for recycled material.

It is believed that a significant volume of material is being recycled by business and industry in the region and not being reported to the district. Several businesses own balers and market their own cardboard, recovered paper, scrap metals and other materials. In many cases they do not track the amount of material that they remove from the waste stream. The district continues to strive to create closer relationships with local businesses in order to get a better idea of the volumes being captured through commercial recycling programs.

Despite a number of false starts early on in community recycling programs, a number of community operated programs have grown and thrived. Recycling has continued to be a service that residents want and expect. Since the plan was written, several communities have started or expanded their recycling programs and those programs have survived fluctuating markets and economic downturns. Compared to the estimated volume of waste generated in the region, recycling volumes appear very small. But they are growing steadily and providing a much desired service to the residents of the district. Recycling continues to be the most promoted and popular waste reduction strategy.

FEASIBILITY OF INCREASED RECYCLING PROGRAMS

Recycling opportunities continue to be somewhat limited within the district. A key to a successful recycling program is accessibility and convenience. Diehard recyclers will always find ways to recycle, even if it means packing materials into the family car and driving many miles to a drop-off center. But the average citizen will only recycle if it is convenient. Currently participation by citizens is completely voluntary. When the plan was written, the only curbside recycling program in the region was located at Fort Leonard Wood. Now there are eight curbside programs

in the region. There has been steady growth in business recycling and it is believed that increasing commercial recycling will provide a significant boost to waste reduction. However, it is very difficult to quantify. District staff continues to work with local businesses by coordinating waste audit workshops and technical assistance on how to improve the bottom line by implementing recycling programs.

Six of the seven counties offer recycling programs that accept more than just aluminum cans. Eight curbside programs provide convenience for city residents, but are not accessible to county residents. The drop-off recycling program in Gasconade County is located on the northern border of that county and is not realistically accessible to much of that county's population. The drop-off program at Fort Leonard Wood is not easily accessed by people who do not work for the base or live on base. The recycling programs in Rolla and St. Robert are more centrally located for residents in those counties to use.

A local business is working to build a commercial recycling program centered in Phelps County. Recycling Works provides balers and collection service to local businesses and collects cardboard and a variety of packing material.

A study by the Institute for Local Self-Reliance, entitled the *Economic Benefits of Recycling*, includes information estimating that as many as nine new jobs can be created for every 15,000 tons of recyclables processed per year. According to the report, processing recyclables creates more jobs than landfilling. More involved recycling operations have higher job creation rates. This study was supported by a study conducted by the National Recycling Coalition that determined that recycling is a multi-billion dollar industry in the United States.

POSSIBLE LONG-TERM IMPACT OF RECYCLING ON THE WASTE STREAM

With the assistance of the Midwest Assistance Program, Inc. (MAP), the district in 1993 formulated recycling objectives through market analysis and projections of the possible impact of population growth on waste generation. The market analysis provides projections of the possible impact the district's recycling strategy will have on the waste stream. At the time the plan was written, the district designed a three-phase recycling strategy that focused on education and awareness and market development.

The drastic reduction in district funding limited its capability to carry out all of the strategies that were initially developed. The district focused on the core programs of education and awareness and in providing technical assistance to member local governments, local businesses and residents. The advisory committee confirmed that the strategies originally outlined in the plan are still applicable and important for the district to support and implement as funding becomes available. Those strategies are outlined below:

- Develop a media/public information campaign to promote recycling that would include news releases, radio features and public service announcements.
- Promote the purchase of recycled products.
- Develop curricula on recycling and make existing curricula available.
- Provide technical assistance on recycling to communities, individuals, organizations, businesses and other large scale generators.
- Develop local markets for recovered materials.

- Encourage a cooperative marketing program for recovered materials.
- Encourage member communities to initiate curbside recycling programs.
- Expand recycling programs with a goal of extending services to rural residents.
- Encourage local industry to study ways to use recovered materials as feed stocks.
- Attract industries which use recovered materials to the district.
- Expand education programs by holding seminars to inform local community leaders of existing economic opportunities associated with recovered materials.

Education lays the groundwork for other programs to follow. By increasing knowledge of how to recycle and making people aware of the benefits of recycling, the district increases participation and improves the overall quality of the materials recovered. This include targeting specific industries and providing technical assistance in auditing operations and establishing recycling programs.

The district will continue to encourage the establishment of recycling facilities throughout the region. It will be up to each community to decide the type and degree of services provided. The district will provide technical assistance and possible funding opportunities through the district grant program. As these facilities are established, the district will encourage expansion and increased services. This could include financial incentives, which are most easily accomplished through trash collection fees. By establishing volume-based fees, the cities could encourage waste reduction and recycling. The cities will also be encouraged to renegotiate collection contracts to include volume-based fees and recycling options. The district will encourage voluntary curbside programs in those areas where this program is viable, and further expansion of drop off recycling programs in other areas.

A major obstacle for recycling programs is the lack of available markets for recovered materials. This is especially prevalent in rural areas where small recycling programs have neither the finances to do high-grade processing of recovered materials, nor the volume of materials necessary to successfully market their products.

The district will continue to encourage recycling cooperatives throughout the region. The Rolla Recycling Center and the St. Robert Transfer Station and Recyclery currently provide central collection points for smaller communities to bring their materials. This system seems to be working well and makes recycling more feasible through economies of scale.

The district will continue to work toward developing markets. The district will encourage the further development and implementation of regional recycling cooperative arrangements to serve the processing and marketing needs of the district. By pooling the amount of recovered materials and sharing processing equipment, the district can produce a more marketable product.

The district will work to include encouraging industries that use recovered materials in their manufacturing process to locate in the region. The district will continue to work to stay current on the amount and quality of recyclables being recovered in the region. The district will continue to encourage market development through district grant funds, and by searching for state and federal funding to build a full circle recycling infrastructure within the region. If industry can be developed within the region that uses recycled materials, then recycling will become much more economical.

By following these strategies, the district will reduce the amount of solid waste being disposed of in landfills.

In 1993, the Midwest Assistance Program, Inc. (MAP) has provided a *Market Analysis of*

the Recoverable Materials in the Ozark Rivers Solid Waste Management District which has been included as an appendix to this plan. This market analysis provides specific percentages for each recoverable material available within the waste stream, possible buyers and projections of how much impact the district's recycling strategies will have on the waste stream.

Estimating and projecting the waste stream is crucial to establishing recovery potential. The following information, prepared by MAP, indicates the amount of material available for recovery in the Ozark Rivers Region. In the 2004 revision of the plan, we have updated the assumptions and projections provided by that analysis have been updated, using the same methodology.

The following assumptions were made to estimate and project the waste volumes available:

- The average residential and commercial waste generation rates will remain constant at 6.25 pounds per day (1.14 tons per year) for each resident.

- The population of the district is projected to increase from 166,310 in 2000 to 178,880 in 2020 (7.1 percent).

- The current ratio of residents living in cities with a population over 500 to rural residents will remain constant (42 percent in cities, 58 percent rural).

- An increasing number of residents will participate in recycling programs, increasing to 30 percent by 2015.

Table 5-2 is the projected supply of recoverable resources available, given city populations and various rural participation levels.

Table 5-3, shown on the following pages, will provide goals for the district as it works to achieve its reduction, given the projected waste stream and various recovery rates.

Fig. 5-2
PROJECTED WASTE STREAM
for the
Ozark Rivers Solid Waste Management District

Category	2000	2005	2010	2015	2020
Total Population	166,310	169,842	173,522	176,608	178,880
City Population	63,500	67,265	68,262	69,259	70,256
Waste Per Person*	1.14	1.14	1.14	1.14	1.14
City Waste Stream*	72,390	76,682	77,819	78,955	80,092
Rural Population	102,810	102,577	105,260	107,349	108,624

Recycling 5.8

Rural Waste Stream*	117,203	116,938	119,996	122,378	123,831
Participation Rate	5%	10%	20%	30%	30%
Residents Participation	8,315	16,984	21,517	32,849	33,272
Recycling Rate Per Person*	0.7	0.7	0.7	0.7	0.7
Est. Volume Recovered*	5,821	11,888	15,062	22,994	23,290
Waste Available for Recovery* (40%)	75,837	77,448	79,126	80,533	81,569

*Tons

Source: Update & analysis by MRPC in 2004 based on methodology used by Midwest Assisatnce Program in 1993, Projections of the Population of Missouri Counties, Missouri Office of Administration, 2000.

Fig. 5-3
PROJECTED MATERIALS RECOVERY
For the Ozark Rivers Region

	2005	2010	2015	2020
Waste Available for Recovery	77,448	79,126	80,533	81,569

ALUMINUM UBCs

% in Waste Stream	1.3%	1.3%	1.3%	1.3%
Total in Waste Stream	2,517	2,572	2,617	2,651
% Recovered	10%	20%	30%	30%
Total Recovered	252	514	785	795

STEEL CANS

% in Waste Stream	3.4%	3.4%	3.4%	3.4%
Total in Waste Stream	6,583	6,726	6,845	6,933
% Recovered	10%	20%	30%	30%
Total Recovered	658	1,345	2,054	2,080

	2005	2010	2015	2020
CARDBOARD				
% in Waste Stream	6.9%	6.9%	6.9%	6.9%
Total in Waste Stream	13,360	13,649	13,892	14,071
% Recovered	10%	20%	30%	30%
Total Recovered	1,336	2,730	4,168	4,221

NEWSPAPERS

% in Waste Stream	7.4%	7.4%	7.4%	7.4%
Total in Waste Stream	14,328	14,638	14,899	15,090
% Recovered	10%	20%	30%	30%

Total Recovered	1,433	2,928	4,470	4,527
OFFICE PAPER				
% in Waste Stream	4.2%	4.2%	4.2%	4.2%
Total in Waste Stream	8,132	8,308	8,456	8,565
% Recovered	10%	20%	30%	30%
Total Recovered	813	1,662	2,537	2,570
MAGAZINES				
% in Waste Stream	3.8%	3.8%	3.8%	3.8%
Total in Waste Stream	7,358	7,517	7,651	7,749
% Recovered	10%	20%	30%	30%
Total Recovered	736	1,503	2,295	2,325
PLASTIC (PET)				
% in Waste Stream	1.6%	1.6%	1.6%	1.6%
Total in Waste Stream	3,098	3,165	3,221	3,263
% Recovered	10%	20%	30%	30%
Total Recovered	310	633	966	978
PLASTIC (HDPE)				
% in Waste Stream	2%	2%	2%	2%
Total in Waste Stream	3,872	3,956	4,027	4,078
% Recovered	10%	20%	30%	30%
Total Recovered	387	791	1,208	1,223
GLASS				
% in Waste Stream	5.3%	5.3%	5.3%	5.3%
Total in Waste Stream	10,262	10,484	10,671	10,808
% Recovered	10%	20%	30%	30%
Total Recovered	1,026	2,097	3,201	3,242

	2005	2010	2015	2020
NON-FERROUS				
METALS				
% in Waste Stream	0.9%	0.9%	0.9%	0.9%
Total in Waste Stream	1,743	1,780	1,812	1,835
% Recovered	10%	20%	30%	30%
Total Recovered	174	356	544	551
FERROUS METALS				
% in Waste Stream	4.6%	4.6%	4.6%	4.6%
Total in Waste Stream	8,907	9,099	9,261	9,380

% Recovered	10%	20%	30%	30%
Total Recovered	891	1,820	2,778	2,814
TOTAL				
% Recovered	10%	20%	30%	30%
Total Material Recovered	8,016	16,379	25,006	25,326

All figures are tons.

Does not include current recycling activity.

Source: Update & analysis by MRPC in 2004 based on methodology used by Midwest Assisatnce Program in 1993, Projections of the Population of Missouri Counties, Missouri Office of Administration, 2000.

SOLID WASTE TECHNOLOGIES

The purpose of this chapter is to review alternative solid waste technologies that the district has available to choose from for managing its solid waste. This chapter will review technologies which are widely used as well as some new technologies that are not as well known. This chapter will then evaluate the major technologies by rating each option based on a list of 16 criteria that range from cost to political support. The option ranking was accomplished by the public.

NON-ENERGY SOLID WASTE MANAGEMENT TECHNOLOGIES

Presented below is a description of non-energy producing solid waste management technologies.

Various means of processing wastes away from the point of generation are available. Three basic methods include mechanical, thermal and biological approaches. Mechanical processing utilizes shredders or balers in order to reduce the volume of the waste and converts them into an easily handled form. Thermal processing consists of incineration, reducing the volume of the wastes through combustion. Composting is a biological process whereby organic materials are broken down through bacterial action and returned to the soil.

The following discussions will provide a more detailed outline of each of the various procedures.

Shredding

Shredding is a mechanical process of solid waste size reduction. Size reduction is defined as operations or processes which reduce the size of influent materials through division into two or more subunits. This process can include shredding of tires, which are presenting a substantial problem in the district.

Advantages

- Shredding increases the homogeneity and the bulk density of solid waste with the result that waste can be more easily compacted and voids formed by bulky items are eliminated.
- Shredded solid waste when compacted in a sanitary landfill has fewer objectionable odors, does not attract vermin, reduces blowing litter problems and reduces the need for daily soil cover.
- Public appearances of landfill operations involving shredded waste may likely improve because of the above mentioned factors.

Disadvantages

-
- Shredding adds more capital and operating costs to the solid waste management system.

Baling

Baling is simply a mechanical process for reducing the volume of solid waste via compaction. In addition to its space saving attribute, baling makes waste potentially easier to handle.

Advantages

- Baling can increase the life of a sanitary landfill. In-place waste density is greater than in conventional landfills and a compactor vehicle is not needed.
- Baling can decrease the size of a new landfill site.
- Leachate flows are weaker during the first several months than for landfills where the waste is compacted in the usual manner.
- Since minimal settling occurs in bale fills, more immediate use upon completion of the disposal site is permitted.
- Baling produces less litter at the landfill.
- The baler can be used to bale recyclables.
- Baling can sometimes qualify for exemptions of daily cover requirements.

Disadvantages

- Resource recovery is precluded once the bale is formed.
- Excessive quantities of grass, yard clippings and leaves in bales can result in a loss of integrity of the bales.
- Costs are higher due to mechanical equipment requirements.
- Personnel needs may be more than for just a sanitary landfill.

There are two main types of balers. One type, inherited from metal scrap processors, is a multi-stage baler which achieves densities that are sufficiently high so that baling may be optional. The waste is not preprocessed and is batch-fed to the baler. A second type, similar to a hay baler, is continuous push-through, horizontal-type baler. The waste must be shredded to first provide a homogenous material which will not block the hopper. The bales are secured with wires to maintain their compaction.

Composting

Composting is a controlled biological decomposition of organic material, usually in the presence of oxygen to produce humus. Composting is suitable both for food and yard wastes, as well as for paper, sewage sludge and other organic materials. Waste characterizations studies have shown that compostable materials make up 73 percent to 85 percent of the waste stream.

There are at least three levels of composting available: 1) backyard composting of food and yard wastes; 2) community composting of yard wastes; and 3) advanced composting operations, which require varying degrees of processing.

The steps required to compost depend on the composting method used and the desired rate of decomposition. In the case of backyard and neighborhood composting, the rate of decomposition and the quality of the compost produced are not critical; few steps beyond placement are required. In the case of advanced composting on a day-to-day basis, the decomposition rate and the quality of the compost are critical. In this case, it may be necessary that the composite process will require all of the following:

- Separating compostable fraction,

- Shredding for proper sizing,
- Adding nutrients (sewage sludge) and moisture,
- Mixing and aeration on a regular basis,
- Holding in a decomposition stage,
- Holding in a curing stage, and
- Additional processing to obtain a marketable product.

All three levels of composting should be considered individually because of the level of processing involved.

Advantages of Backyard & Community Composting

- Composting reduces the quantity of waste that must be transported and landfilled.
- Capital costs and the risk factor are low.
- Composting produces a useful product.
- Citizens can demonstrate a degree of independence from solid waste systems.

Disadvantages of Backyard & Community Composting

- Poorly managed compost facilities may produce odors and attract pests.
- Compost facilities may be undesirable in high population density neighborhoods.
- A supplemental disposal service is required.

Advantages of Advanced Composting Materials

- Reduces the quantity of waste that must be transported and landfilled by 68 percent when used in conjunction with source separation.
- Produces a useful product.
- Provides potential for lower costs from mechanized compost facilities.

Disadvantages

- Requires a greater degree of capital investment and risk than backyard and community compost facilities.
- Requires many process steps.
- Requires well-trained operating personnel.
- Compost markets are not well established.
- Requires source separation on non-decomposable waste to reduce facility labor.
- Poor decomposition rates in cold weather.
- Potential safety hazards with shredding and conveying equipment.
- Environmental concerns over potential heavy metals and chlorinated organic compounds in the compost.
- A supplemental disposal service is required.

Incineration (without energy recovery)

Incineration is a thermal process in which solid and liquid combustible materials are converted through controlled combustion to a residue which contains virtually no combustible matter and to gases which are released to the atmosphere. Additional end products are the particulate matter which is entrained in the gas stream and effluent process water.

Different types of incineration will be discussed later in this chapter when dealing with

energy recovery.

Advantages

- Incineration reduces the weight and volume of the solid waste.
- If the operation is carried out correctly, the residue is free of biodegradable material.

Disadvantages

- Incineration requires a high capital outlay. The capital investment required has increased significantly because strict air pollution standards necessitate the installation of expensive air pollution control equipment.
- The ash residue must be disposed of in an engineered sanitary landfill. Certain findings suggest that municipal solid waste incinerator ash from mass-burn type systems may be classified as a hazardous material.
- There is potential for toxic air contamination in the event that air pollution control devices fail.

Sanitary Landfilling

An emphasis of this study is to maximize recycling and resource recovery options, however, historically, landfills have been the preferred choice for disposing non-hazardous solid waste.

As discussed previously, landfills as a waste management option will be going through a number of changes in the future as a result of the new Subtitle D regulations. However, although landfills will be more difficult to build and, therefore, more expensive, landfilling will remain one of the most inexpensive options.

A sanitary landfill is a specially planned and engineered site designed to minimize hazards to public health and safety. After careful selection of a site based on geological conditions, hydrology, land use and zoning, and proper construction of a site, waste is deposited, compacted and covered at the end of each working day. With the use of tractor-like equipment, waste can be spread and then compacted to a minimal volume and covered to avoid problems with rodents and insects. The waste is not burned thereby preventing air pollution.

A properly designed and operating sanitary landfill can minimize leachate contamination of surface water and groundwater by the use of clay or impermeable synthetic liners or by natural attenuation, depending on the specific site conditions. Specifically designed leachate collection systems can also be utilized.

Advantages

- Landfills can handle most or all of the district's waste.
- Landfills currently exist as a waste disposal option.
- Landfills are commercially proven.
- The disposal costs for landfilling are relatively inexpensive.

Disadvantages

- Landfills can leak, causing environmental contamination.
- Landfills are unsightly and attract rodents.
- New permitting requirements (Subtitle D) will impact existing and future landfills.

- Politically, landfills are unpopular.
- Products cannot be recovered once in a landfill.

Transfer Stations

As solid waste disposal sites are forced to be located further from waste generation sources, and as the cost of transportation continues to increase, refuse haulers are continually seeking methods of reducing their hauling costs. Transfer stations present an economical way to accomplish cost reduction. Also, they present a location for accepting and sorting recyclables.

There are two basic types of transfer systems—compacted and non-compacted—and there are many different variations of each. Each type of system is widely used throughout the United States. System selection is dependent upon local conditions, equipment availability, and experience of local solid waste system personnel.

In a compacted system, the refuse is loaded in a transfer trailer from the rear with a stationary compactor. There are several manufacturers that make both the stationary compactors and/or the transfer trailers. Although each manufacturer has items unique to its own system, compaction technology is generally similar. The refuse is unloaded from the rear of the transfer trailer with a "push out blade" located in the front of the trailer. This is a relatively simple and easy way of unloading. Both the compaction into the trailer and the unloading from the trailer are dependent upon hydraulic systems.

In a non-compacted system, the refuse is loaded in its non-compacted state into the top of a transfer trailer. This loading may be accomplished with various types of equipment including a dozer, front end loader or clamshell. The refuse may also be dumped directly into the transfer trailer from the collection vehicle. In order to load into the transfer trailer, the trailer must be located at a lower elevation than the loading equipment. In addition, some piece of equipment is needed to distribute the load in the trailer and to "knock down" the refuse piles so that the top of the trailer can be closed.

Advantages of Waste Transfer Stations

- Decreasing truck traffic to the landfill resulting in minimized traffic impact and a reduction in dust and truck emissions.
- Lowering the cost per ton to transport refuse due to the lower cost of transporting larger volumes of waste in a transfer trailer vis-a-vis a packer truck.
- Increasing the productivity of the packer truck vehicles by allowing them to dedicate more time to the collection of waste instead of "wasting" time transporting the refuse to a distant landfill.
- Increasing the accessibility of the landfill to all of the district by offering regions of the district farthest away from the proposed landfill a more proximate disposal facility for the packer trucks serving their region.
- Spreading the impacts of the solid waste management system throughout the district as opposed to centralizing them in one area.

ENERGY RECOVERY

There are principally two types of technologies which recover energy from solid waste (commonly called waste-to-energy.) They are:

1. Mass Burn

- Direct combustion (field erected)
 - Waterwall incinerators
 - Refractory-lined incinerators
- Modular incinerators (shop fabricated)

2. Refuse Derived Fuel (RDF)

- Dry Processing
- Wet Processing
- RDF co-fired with conventional fuels
- RDF dedicated boiler

Mass Burn

Mass burning means the direct incineration of municipal solid waste (MSW) as it is received at the facility. That is, with the exception of oversized items (e.g., mattresses, water heaters, washers, crates, etc.), all refuse received at the facility is fed into the incinerator.

Mass burning of MSW for the recovery of energy has a longer operational history than any other resource recovery technology. Most example products are found in European countries where both landfill capacity shortfall as well as a scarcity of energy resources hastened development.

The direct incineration of MSW can be categorized into two basic technologies; direct combustion in field erected facilities, and combustion in modular, shop fabricated facilities. The facilities can be classified into two additional categories; refractory lined and waterwall units.

Refractory-Lined Furnaces — A refractory-lined furnace is so named because of the furnace lining of insulating brick called refractory. The incineration of MSW in the United States began with refractory-lined furnaces whose main purpose was waste volume reduction, not energy recovery with refractory units.

Waterwall Furnaces — Waterwall furnaces are so named because the walls of the furnace are lined with tubes filled with circulating water. The moving liquid acts as a coolant for the walls, decreasing the need for protection, or refractory lining of the entire furnace. In addition, the liquid adds to the heat recovery potential of the boiler system. The boiler for the waterwall furnace is designed as an integral part of the furnace.

Refuse Derived Fuel

Refuse derived fuel (RDF) systems convert MSW into various forms (e.g., fluff RDF, densified RDF, and powdered RDF) for co-firing with another fuel (e.g., coal or wood) in an existing modified boiler or in a dedicated boiler designed to burn the particular type of RDF produced.

RDF is produced from 60 to 80 percent (by weight) of the MSW stream. It is a highly combustible, more homogeneous fuel product than the MSW burned in a mass burn system. Since processing leads to the removal of inorganics, the heating value of RDF (6,000 to 7,000 Btu/lb) is higher than the heating value of raw MSW (4,500 to 5,500 Btu/lb.)

The primary purpose for producing RDF is to achieve a more homogeneous fuel product in order to achieve more efficient boiler operations and/or to allow for co-firing with another fuel. Front-end processing required for RDF production also has the advantage of allowing for recovery and enhanced marketability of materials (metals and glass from the MSW.) The capital

costs and extra operational and maintenance costs incurred in producing RDF must be weighed when selecting an energy recovery technology.

Fluidized Bed RDF Combustion Systems

Fluidized bed combustion has been developed in the United States primarily as a means of burning high-sulfur and low-grade coal. The advantage of burning these materials in a fluidized bed unit is that, by adding limestone to the inert bed material, the need for post combustion, acid gas scrubbing equipment is eliminated.

Fluidized bed systems utilize an inert material made up of silica sands suspended by the upward flow of gas. The fuel is combusted within the bed. The advantages of fluidized bed combustion are:

- Improved combustion due to turbulent mixing of fuel, inert material and air.
- Reduced nitrogen oxide (NO) formation, slagging, and clinkering because combustion temperatures are limited to 1,600°F or lower.
- Stabilized combustion due to the thermal flywheel effect of heat absorption by the large inventory of inert material in the bed.
- Acid gas absorption by adding limestone to the bed.

Advantages/Disadvantages of Waste-to-Energy

Advantages

- Incineration reduces the weight and volume of solid waste.
- Heat or electrical recovery will decrease the demand for other sources of energy.
- Energy can be sold adding to the financial attractiveness of the project.

Disadvantages

- Incineration requires a high capital outlay.
- Disposal costs or tipping fees are high compared to the other disposal options.
- Potential for toxic air emissions if air pollution control systems are not functioning.
- Commercial demonstration is questionable for certain technologies.

Other Energy Recovery Technologies

There are numerous technologies today which change the physical form of MSW and can be sold as a recovered product.

One such technology—known as Swept 10—accomplishes a 95 to 98 percent reduction of the waste stream through recycling and thermal processing. The recycling is designed to remove 20 to 25 percent of the waste stream; ferrous and non-ferrous metals, glass, plastic and paper are removed. Thermal processing removes the remaining waste by 85 percent. For example, 2,000 pounds of MSW (less recyclables) is processed into 300 pounds of char. This char can then be sold to utilities or industry as a source of power; normally used as a supplement to coal. Heat from the facilities' afterburner may be recovered as an additional source of revenue. Sixty to seventy million Btu's of recoverable heat may be used to produce steam. The modular design of the Swept process creates the opportunity to construct a facility based on capacity needs. Each facility can, therefore, be built to the capacity of local needs, avoiding unnecessary capital costs.

There are a number of possible variations to the Swept process. One process currently

being marketed uses thermal processing to create a wood based derived fuel (in the form of pellets) which again is sold to utilities/industries as a fuel supplement. In this case, treated wood scraps (sawdust, pallets, etc.) are being fed into the thermal processor to create the pellets.

Another example of innovative resource recovery is taking place at Northwest Missouri State University. The university has received a grant to retrofit its boilers to burn and create energy from scrap paper that has been pelletized with a mechanical pelletizer.

All three of the above referenced technologies would help the district achieve recycling/recovery goals and should be seriously considered.

ENERGY MARKET SURVEY AND INVESTIGATION

NOTE: This section of the plan was not updated in the 2003 plan revision. Information included in this section was provided by Foth & Van Dyke and is based on data collected and compiled in 1992.

The success of a waste-to-energy type facility rests solely on the demand for the energy produced. Therefore, without a previously identified market, a waste-to-energy facility should not be considered. Presented below is an assessment of the district's demand for steam and electricity, based on information gathered by Foth & Van Dyke in 1992.

Steam

As a part of the district plan development process, Foth & Van Dyke was requested to conduct an informal telephone survey designed to assess the potential needs for landfill derived steam. The steam would be derived as a result of methane off-gas burning and subsequent conversion to steam. The survey consisted of contacting representative businesses in the solid waste regional district and asking a series of questions aimed at determining the energy needs of the specific company. The questions asked included the following:

- Describe what use steam for (if any),
- What pressure/temperature steam is required,
- What do you pay for steam and,
- Would you be willing to purchase steam from a waste-to-energy plant.

The companies surveyed provided a wide variety of responses. The majority of the companies surveyed do not use steam as part of their energy requirements. Of those companies who do use steam, all generate their own steam supplies and, thus, do not have a need for additional steam at this time.

The companies contacted include the following:

Can-Tex Industries	Meramec Electrical
Rolla Publishing	Kingsford Company
Royal Camin, USA	Olin
San Val	Blanke Plastic Co., Inc.
Imperial Products Company	PlayMaster, Inc.
Kraft, Inc.	Steven Manufacturing Company
B.F. Freeman Heel Company	McGinnis Wood Products
Fleming Manufacturing	GenCorp Automotive

Initially, Fort Leonard Wood had expressed an interest in purchasing steam. However, since then, arrangements have been made to contract for natural gas. It was indicated that the Fort may have some potential use for steam; however, it would be a small amount, and any facility considered should be on a smaller scale.

Electricity

In 1978, Congress passed the Public Utility Regulatory Policies Act (PURPA.) Section 210 of PURPA requires the Federal Energy Regulatory Commission (FERC) to issue rules for the encouragement of cogeneration and small power production pursuant to the Act. Under FERC rules, a cogeneration facility that produces both electric energy and steam, or forms of useful energy (such as heat) that are used for industrial or commercial heating or cooling purposes. A small power production facility is a facility that produces no greater than 80 megawatts of electric energy solely by the use, as a primary energy source, of biomass, waste, renewable resources, or any combination thereof. These rules include assurance that qualifying cogenerators and small power producers receive prices for sales to electric utilities which are just and reasonable to the rate payers of electric utility, nondiscriminatory toward the cogenerator and small producer, and in the public interest. These prices are termed "avoided costs" and are the incremental costs the utility would have experienced if it had generated an equivalent amount of electric energy and capacity itself or had purchased it elsewhere.

In turn, the Missouri state legislature enacted, and the governor signed into law in 1986, Senate Bill 754. This bill provides a significant incentive to waste-to-energy development. The new law requires that the local electric utility purchase electric energy generated by a publicly owned waste-to-energy facility at the same rate the utility charges the governing body for electric energy used. However, it is estimated that a utility would pay three more cents per kilowatt hour (KWH) than the utility's avoided cost.

Due to the economics achievable through large-scale generation of electricity by utilities, it is difficult for small waste-to-energy facilities to compete in the production of base load power. In rural Missouri, it was found that the price received under PURPA regulations was about \$.02 per KWH during non-peak periods. This price is too low to make a resource recovery facility generating only electricity feasible.

EVALUATION OF SOLID WASTE MANAGEMENT ALTERNATIVES

NOTE: This chapter of the plan was developed and written by Foth & Van Dyke in 1992 and was not updated in 2003.

To this point in the document, various solid waste management options have been discussed. The four major options include; recycling, incineration with energy recovery, incineration without energy recovery and sanitary landfilling.

It is important to compare all options together to accurately develop a district-wide plan. An important point of interest when considering these alternatives, including recycling and reuse options, is that they should not be considered mutually exclusive. Many communities have considered and implemented a mix of alternatives to attain their waste management goals. For

example, some regions have implemented a waste management system which combines curbside recycling, waste-to-energy and landfilling.

In order to determine the most effective alternative(s), the development of appropriate and detailed criteria were used to judge the alternatives to meet district goals for effective solid waste management.

This criteria included:

- Costs (Construction, Administrative, O&M and Disposal)
- Location of Site
- Toxic Pollutants
- Aesthetics
- Commercially Demonstrated
- Ability to take waste
- Political Support
- Economic Incentives
- Liability/Risk
- Financing Options
- Recoverable-Products
- Profitability

Criteria Description

_____This section describes the criteria and how they related to the solid waste management options.

_____Costs: Presented below is a listing of estimated costs associated with the options.

Criteria	Incineration With Recovery	Incineration W/O Recovery	Landfill	
Recycling				
Construction	\$15-18 Mil.	\$12-15 Mil.	\$10-12 Mil.	\$2-3 Mil.
O&M Costs/Year	~\$1.5 Mil./Yr.	~\$1.2 Mil/Yr.	\$.5-.7 Mil.	\$.8-1 Mil.
Admin Costs (Engineering, Planning)	~\$1 Mil.	~\$1 Mil	~\$1 Mil.	~\$.4 Mil.
Collection/Disposal	\$35-40/ton	\$30-35/ton	\$22-25/ton	~\$50/ton

Assumptions

- Incineration assumes mass burn with source separation
- All options assume that facilities will be adequate to handle all of the regions waste

stream.

- Incineration with recovery and recycling costs do not include revenue from the sale of energy/recyclables.
 - The recycling option resembles a material recovery facility that separates recyclables mechanically.
-

Source: Foth & Van Dyke 1992

Toxic Pollutants: A variety of emissions are discharged into the air as a result of the solid waste combustion process (incineration) including particulates, NO_x, SO₂ and CO. The more toxic elements include lead, mercury and dioxin. The technology is available to control these pollutants to 99.9 percent removal efficiency, but there is always concern if the controls do not work. Fly ash from combustion must be landfilled, but is usually not considered to be toxic and is tested prior to being landfilled.

The new Subtitle D requirements will force landfills to be designed (with liners and leachate collection systems) so that contamination resulting from leachate to the environment is a very small possibility. Landfill developers in this area, in fact, will be forced to overdesign protection systems because of the karst topography. ~~However, some experts contend that all landfills leak eventually and because of the karst topography, a small leak can contaminate a large volume of groundwater.~~

MRFs or transfer stations will handle materials which are potentially damaging to the environment, i.e., metals, but only for short periods of time, limiting potential for contamination.

Aesthetic Conditions: Landfills are probably the least aesthetic options. Landfills are not only unsightly, but can create odors and attract birds and rodents. Also, landfills necessitate that hauling trucks occupy the area around the fill. The aesthetic value of incinerators with and without energy recovery depends on how they are constructed. Many of the new waste-to-energy facilities are actually attractive structures, but there is still a problem with the hauling.

With recycling, again it depends on the structure. Most MRFs are large Butler type structures, which are relatively attractive. Again, hauling is the biggest constraint.

Commercially Demonstrated - Does it Work? Although both landfilling and incineration are commercially demonstrated, incineration, especially with energy recovery, has had somewhat of a history of problems in regard to operations once built. Incinerators, like any other large piece of machinery go down occasionally. Recycling is demonstrated as is landfilling.

Ability to Manage the Region's Waste: A regional landfill can essentially handle the entire region's waste stream as can a regional incinerator. A waste-to-energy unit depends on its markets and the amount of the energy will be bought. For cost purposes, a unit that accepts all of the region's waste was assumed. However, if a market for the energy does not exist, a smaller unit not handling as much waste could be built. The goal for recycling is 40 percent of the waste stream, therefore, it was assumed that the recycling options can handle 40 percent of the waste.

Political Support: Historically, incineration has received very little support as a waste management alternative. In fact in many areas, it has been a political hot bed. This lack of sup-

port has been mostly a result of the public's impression that incineration creates toxic chemicals that are spewn into the environment. Landfills also experience a lack of support because of potential contamination as well as the aesthetics. This is especially the case in an area such as this that has poor geologic conditions. Everyone supports recycling for the most part.

Economic Incentives: There are some small federal tax benefits with recycling and energy recovery. Also, the state of Missouri (EIARA) issues bonds for recycling and energy recovery projects at reduced rates. Jobs will be created proportionally with construction costs. Therefore, landfills and incineration projects should create approximately four to five times the number of jobs as compared to recycling projects.

Liability/Risk: Liability/risk issues include:

- Construction delays and problems,
- Project financing falling through and varying interest rates,
- Not meeting permit requirements once it is built,
- Regulatory changes,
- O&M costs and capital costs higher than projected,
- Fluctuating demand for use of recovered product.

Incineration with energy recovery would probably have the highest risk because of fluctuating demand for product and regulatory changes affecting permitting and environmental controls. Construction delays can happen with any projects as can project financing. However, in general the bigger the project the greater the risk.

Financing Options: Financing, in part, depends on who owns the solid waste facility. For the purpose of this assessment, it was assumed that the district will be responsible for financing. The more expensive and risky a project, the harder it is to finance. Since bonds require public approval, a project which is not fully supported could be in financial danger. Incineration would be rated lower than landfilling because of higher risk and lack of public support in the case of bonds. Incineration with energy recovery would be especially risky because only one market has been located. Recycling would probably be easiest to finance just because of cost. However, in the case of recycling, if it is not found to be profitable, it may be difficult to locate investors.

Potential for Recovered Products: Based on a survey of regional industries, as discussed earlier, few sources of demand for steam (from a waste-to-energy facility) exists and production of electricity appears to be uneconomical. We will assume that there will be a demand for most products which are recovered from the district's recycling facilities eventually. However, demand for many products are currently low. Landfills and incinerators without recovery have no recoverable products.

Profitability: Profitability is an important factor in attracting potential investors and/or funding local government projects. Landfills, incinerators and waste-to-energy are all considered profitable ventures assuming the tipping fees are set high enough to maintain a profit level. However, if for some reason an energy market pulls out of the deal, a waste-to-energy project will no longer be profitable. Recycling has, to date, had difficulty being a profitable venture

mainly because of the lack of demand for recoverable products such as paper and plastics.

Avoided Costs: Instead of assessing the options from a profitability standpoint, it should be determined how much costs will be avoided by using a particular technology. Some options have advantages because costs are avoided by using them, while others will have costs built in. As an example, recycling will avoid the cost of potential contamination from landfilling or incineration.

Criteria Ranking

On Feb. 3, 1993, a public meeting was held at the Meramec Regional Planning Commission to rank the options based on the criteria identified above.

For each option, a numerical ranking was assigned for each of 16 criteria. These criteria, in essence, measure the success of an option for the district and ranges from measures dealing with quantifiable cost and financial factors to non-quantifiable factors such as the level of political support. The numerical ranking for each criteria ranges from one to five with five being the highest score and representing the best situation for the district. However, in some cases participants decided that some criteria were more important than others and deserve a higher number.

The ranking results, as determined by the citizens participating, are presented below:

Factor	Landfill	Incineration w/o Recovery	Incineration with Recovery	
Recycling				
1.1 Construction	3	2	1	5
1.2 O&M	5	3	2	4
1.3 Admin. Costs	3	3	3	5
1.4 *Collection Costs	5	4	3	3
2.1 Location of Site	2	4	3	4
2.2 Toxic Pollutants	2	2	2	7
2.3 Aesthetics	1	4	4	4
3.1 Commercially Demon.	4	3	3	5
3.2 *Ability to take waste	5	5	4	3
4.1 *Political Support	2	1	2	5
4.2 Economic Incentives	3	3	5	5
4.3 Liability/Risk	1	3	2	4
5.1 Financing Options	3	3	2	4
5.2 *Recoverable-Products	1	1	4	4
5.3 Profitability	5	5	4	3

1.5	Avoided Costs	1	1	1	5
Totals		46	47	45	70

* Most important considerations for the Ozark Rivers District

Recycling was the winning alternative partly because it received the maximum points for construction costs, level of toxic pollutants, commercially demonstrated, political support, economic incentives and avoided costs.

Landfilling was low, in part because it received minimal points for; aesthetics, liability, recoverable products, avoided costs, political support, location of site and toxic pollutants.

Incineration with and without recovery did poorly in the areas of political support, avoided costs, construction costs and toxic pollutants.

Major points made by the public at the meeting included:

- Landfills are opposed because of the potential for contamination.
- The group felt that incineration without energy recovery should not be considered.
- The group agreed that recycling is by far the best option, but may not handle all waste in the district.
- It was agreed that waste-to-energy with recyclables recovered may be the best alternative even at twice the cost.
- The group was supportive of alternative technologies that would produce recoverable products from trash.
- The group felt that ownership of solid waste facilities should involve both public and private entities.

SOLID WASTE DISPOSAL RECOMMENDATIONS AND POSSIBLE LOCATIONS

The district, according to the 2001 estimates provided by the state, has about 189,593 tons per year (TPY) of solid waste to dispose/manage. The goal of the plan is to achieve and maintain a 40 percent reduction, the majority of that being accomplished through reduction, recycling and extensive education. If the district, along with the rest of the state of Missouri, is achieving the 40 percent reduction, as MDNR states, that still leaves 113,756 tons of waste per year being generated for disposal within the district.

In 1993, an incinerator without energy recovery has been ruled out as an option by the district because of potential environmental concerns without any resource recovery. Also, the cost of such a facility in regard to construction and tipping fees would be substantial. In regard to incineration with energy recovery or waste-to-energy facility, although the public supports this type of option, the demand for energy created by such a facility is limited and, therefore, uneconomical. As discussed previously, there is little demand for steam and due to the economics achievable through large scale generation by utilities, it is not feasible to compete in the production of base load power.

In regard to recycling/resource recovery, the district has determined that the most immediate steps would involve public education, recycling drop off centers and reduction of waste from industrial generators. The 2003 advisory committee reaffirmed the continuing need for education, awareness and technical assistance for large generators. New technologies that take solid waste and create end products which can then be burned for energy purposes may present a great opportunity for the district to reduce the volume of waste being landfilled. These technologies, however, are new and relatively unproven in regard to being commercially demonstrated and having a demand for product.

Given the above, it would appear that sanitary landfills will still play a major role in waste management for the district's foreseeable future. In 2003 landfilling continues to be the most practical method of disposing of solid waste in the region.

Two Subtitle D landfills are currently operating in the district. The Prairie Valley Landfill in northern Crawford County is small by most standards, but has room for expansion and is expected to be in operation for several years. The Timber Ridge Landfill in Washington County is a large disposal site with a daily capacity of 1,500 tons and an expected lifespan of 20 plus years. A substantial portion of the region's waste is going to the Black Oak Landfill in Wright County which is also a very large site and expected to be in operation for more than 20 years.

_____At the time the plan was written in 1993, the engineering firm Foth & Van Dyke contracted to look at disposal recommendations, made the following recommendations. "Options for additional landfill space include one large regional facility for all waste with supporting transfer stations or a series of smaller landfills. A drawback of one regional landfill may be the lack of competition, promoting potentially higher tipping fees. Transfer stations can reduce transportation costs that could be experienced with having one centrally located facility. One central landfill, however, will reduce the potential of risk and liability that many of the citizens have expressed concern with. One regional landfill would also reduce overall costs because of economics of scale."

At the current time, it appears that the district has adequate landfill capacity with the two

existing sites and the landfill in Wright County. Competition between private corporate waste hauling companies who own these landfills determines where local transfer stations ship their waste and at present seem to be working to keep costs down.

Because the waste industry changes constantly, the recommendations included in the original plan are being included in this version and follow.

POSSIBLE LOCATIONS FOR SOLID WASTE FACILITIES

Locating solid waste disposal sites can only be accomplished after considering a wide variety of factors. A site should be located as close as possible to the centers of waste generation to minimize transportation costs. The site should be served by an all-weather road network. Local zoning and land use requirements must also be considered. Adequate buffer zones should be available to screen area residents. Traffic routes should be such that populated areas are avoided. The site should also be selected considering the potential for final use, such as a park or recreational facility. However, the most important aspect in locating a land disposal site is the ability of the site, through its physical characteristics (i.e., soil, topography, bedrock, groundwater conditions, etc.) to minimize or control the potential pollution and adverse environmental effects that can result from landfill operations. These physical characteristics can be used in graphically defining on a preliminary basis, areas within the district that appear to have favorable physical characteristics to support the development of solid waste land disposal sites.

The other major factor in siting is Subtitle D regulations. Subtitle D restrictions, as discussed earlier in this document, relate to airports, floodplains, unstable areas, wetlands, seismic impact zones and fault areas.

Figure 7-1 and 7-2 illustrate the major constraints affecting landfill development in the district as well as the entire State of Missouri. In the district, extensive subsidence or karst, potential karst and seismic impact zones exist. As shown, the district is heavily impacted by these constraints. Generally speaking, the only areas which are not impacted by extensive subsidence and seismic zones are the northern two-thirds of Gasconade County and the northwestern half of Maries County. However, there are isolated pockets within the area that may be suitable. From a physical aspect, therefore, these areas would be the most appropriate areas to site a landfill.

If a regional landfill is preferred over a number of small landfills, transportation costs must be considered in the siting of it. A centrally located facility would make transportation costs more equitable throughout the district. According to EPA maps of karst areas, a small number of potential landfill sites may exist in the central portion of the district.

SOLID WASTE MANAGEMENT RECOMMENDATIONS

To this point in the plan, it has been determined that:

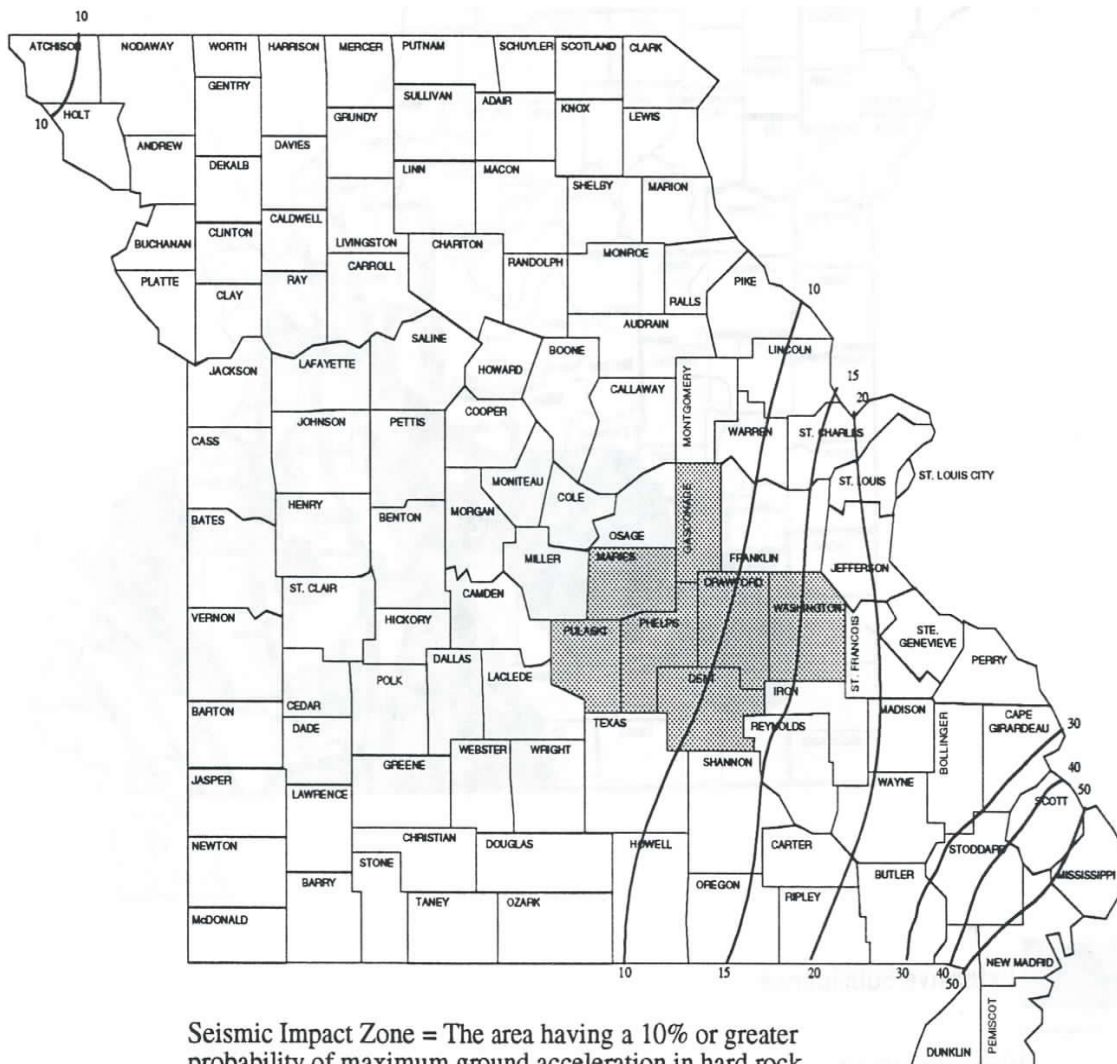
- Regional incineration is either not supported (in the case of incineration without energy recovery) or economically not feasible in the case of waste-to-energy because of a lack of demand for the energy produced. Smaller scale waste-to-energy for a particular industry may be desirable in the future.
- New sanitary landfills will be required for the district since existing capacity is limited to about three years.
- Recycling as recommended in the plan will initially accomplish less than 40 percent

reduction of waste going to a landfill.

The major goal of the plan should be the ability to manage all of the district's generated waste. There will be a hesitancy by other Missouri districts to accept outside waste. Therefore, the Ozark Rivers District first and foremost must assure that additional landfill space is developed. Since landfills under the Subtitle D regulations will be expensive and difficult to permit, a regional landfill may be the best alternative. Regardless of where this landfill will be sited, the need for transfer stations will need to be assessed. Based on the size of the district, it is recommended that four to five transfer stations be developed.

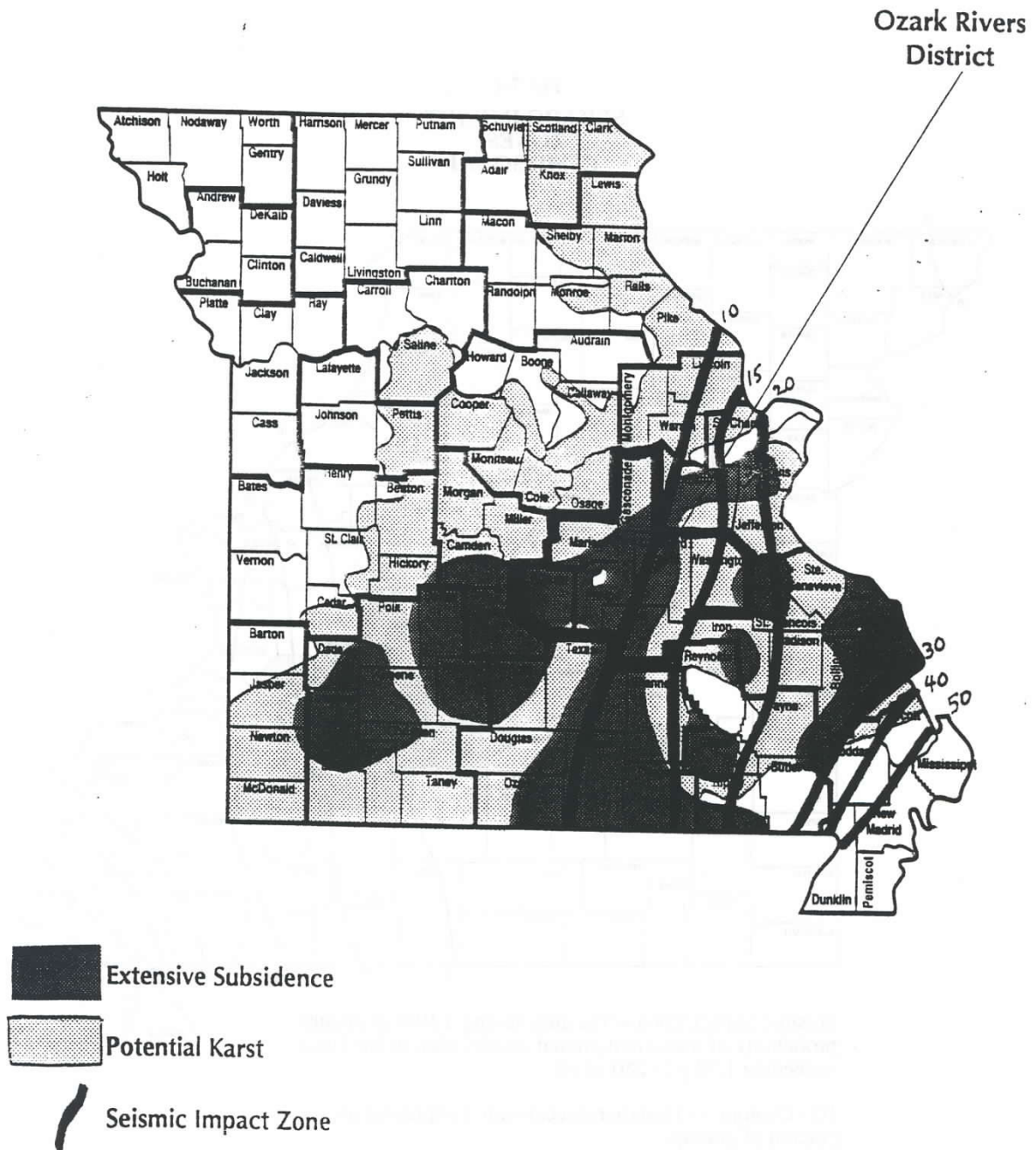
Another recommendation for the district to strongly consider—in order to achieve the 40-percent reduction—is the development of one of the new resource recovery technologies previously discussed. Approximately 40 percent of the district's waste stream is paper or related paper products. A process which converts paper to an energy source such as the one utilized in northwest Missouri could achieve a substantial reduction in what currently goes to landfills.

**Fig. 7-1
SEISMIC IMPACT
ZONES
IN MISSOURI**



MRPC Graphic
This map is an
approximation.

Fig. 7-2
KARST TERRAIN
IN MISSOURI



Graphic by Foth & Van Dyke

POLICIES FOR SOLID WASTE MANAGEMENT

The Ozark Rivers Solid Waste Management District was formed in response to the requirements of Senate Bill 530 to work toward the goal of reducing the amount of solid waste being landfilled by 40 percent, and to provide for the safe and sanitary management of solid wastes within the district's jurisdiction.

In order to fulfill that responsibility and still allow member cities and counties to maintain their autonomy, the district—by adoption of the original plan in 1993—has established the following policies:

- Neither the council nor the executive board shall interfere with the permitted operations and/or ownership of landfills operated or controlled by political entities or private enterprises within its district except in an advisory capacity.
- The district will support member counties and cities in solid waste management decisions and activities affecting those members' jurisdictions.
- The district will encourage reduction and re-use for consumers, businesses, industry, schools and government through education and demonstration.
- The district will encourage the development of a region-wide network of public and private collection points for all materials and will encourage cooperative and/or regional market development.
- The district will provide education opportunities and materials on the environmental benefits of recycling and proper collection methods.
- The district will encourage all members to establish recycling programs.
- The district will promote individual and/or community composting programs and provide education on the benefits, uses and disposal options available within the district.
- The district will increase awareness of household/farm hazardous waste and special types of waste and will provide options for proper disposal through education and will encourage special collections.
- The district will encourage all member cities with populations of 500 or more, who have not already done so, to become involved in their cities' solid waste management services. Involvement may range from working more closely with local private haulers to assuming responsibility for the collection of service fees. By becoming more involved and by developing public/private partnerships, cities can play a larger role in the management of their solid waste and help bring about policy changes, as neces-

sary. For example, cities may be able to work with local haulers to establish twice-a-year white good and yard waste collections or even to establish volume-based fees to encourage recycling.

- All member counties and cities will take steps to realize and maintain a significant reduction in the amount of solid waste being landfilled.
- All member cities with populations of 500 or more will be encouraged to pass ordinances minimizing open burning of solid waste and yard waste.
- The district will support through resolution and communication with state legislature the uniform regulation of all businesses engaged in the collection, transportation, processing and disposal of solid waste.
- The district will support through resolution and communication with state lawmakers sound solid waste management legislation that will assist in achieving the goal of a 40 percent reduction.
- All member counties and cities will work toward the elimination of promiscuous dumping by working with DNR, local law enforcement and judicial systems to locate and prosecute guilty parties in a timely manner.
- The district will encourage all member counties and cities to establish cleanup programs for illegal dumps in their areas with the assistance of DNR and the solid waste district.
- The district will continue to solicit public participation in the solid waste planning process through committee appointments, public meetings and educational efforts.
- The district will establish a comprehensive education and public awareness program to address solid waste issues and provide technical assistance to district residents and businesses.
- The district will rely upon the member counties, cities and residents to provide evaluation of the solid waste plan and related programs in order to improve or adjust those programs to better serve the district.
- The district will reduce the amount of solid waste being landfilled by 7 percent through its waste reduction education efforts.
- The district will reduce the amount of solid waste being landfilled by 23 percent through intensive recycling efforts.

SOLID WASTE SYSTEM PLAN

PROPOSED PROGRAMS FOR SOLID WASTE MANAGEMENT PLAN

Introduction

The state of Missouri made a commitment to improved solid waste management and through legislation created new responsibilities for local government. The Ozark Rivers Solid Waste Management District has enthusiastically met the challenges of the law to date and is committed to meeting and maintaining the 40 percent reduction goal.

The planning process undertaken by the district focused on Missouri's Policy on Resource Recovery and the integrated waste management hierarchy. Considerations were given to reducing environmental and public health threats, increasing the manufacture and use of products made from recycled materials and preserving the district's natural resources.

To most effectively accomplish the necessary reduction and address the concerns and existing conditions of the district, maximum public input and involvement was solicited by the district during the planning and plan review process.

The district invited and appointed members of the general public to participate in the planning process by serving on two advisory committees: the education advisory committee and technical advisory committee. These committees continue to serve as advisory committees during implementation of the plan.

During the 1992-93 planning process, the committees were divided into four task forces to discuss options and formulate recommendations for the district in the following areas: recycling, composting, waste reduction and re-use and household/farm hazardous waste and special wastes.

The task forces met monthly to discuss the various options for each element of the plan. Activities were suggested and prioritized by the individual groups and then presented to the executive board of the Ozark Rivers Solid Waste Management District. Common themes were repeated in each of the task forces as to the need for the district to provide education and technical assistance. When the plan was reviewed for update in 2003, the advisory committees came to the same conclusion—the district needed to continue to provide education and technical assistance.

The executive board approved the recommendations made by the task force groups, and determined that those recommendations would be used as guidelines for the plan and would be phased in over a length of time. An outline of the three phases originally conceived for the plan are as follows:

The first phase included an emphasis on education in all elements of the plan. Increasing education and improving public awareness provided groundwork for further implementation of the plan. Planned education activities included development of materials, curriculum, fact sheets, seminars and forums and development of media/public information campaigns. Also included in the first phase was the encouragement by the district for the development of recycling and composting facilities in all member cities. Emphasis on market development and the use of recycled materials has also been prevalent in plan implementation. The advisory committee that provided input into the 2004 update of the plan further emphasized the need to continue education and technical assistance programs.

A primary focus of phase II of plan implementation was providing technical assistance

both to business and industry and to individuals. The district worked with specific businesses and industries and offered technical assistance services in waste reduction, reuse and recycling options. The second phase also included increased educational programs and activities, the development of economic incentives and disincentives and the development of more aggressive recycling programs in all member cities—specifically, the push for curbside recycling. Emphasis was to be placed on further cooperative marketing efforts and increased local market development. A major task in the second stage will be the development of waste reduction, recycling and resource recovery programs for rural households. The last of the region's landfills closed during Phase II and the district was faced with major reductions in funding from tipping fees. District staff was able to secure some grants from Rural Development and the EPA, but it was still necessary to scale back district programs outlined in the plan. Focus was placed on core programs centered on education and technical assistance.

The third phase of the overall plan was to include encouraging regulations within the district that would allow the district to realize a 40 percent reduction in solid waste being landfilled. These regulations might have included encouraging cities to renegotiate solid waste hauling contracts to include recycling programs, volume-based user fees and financial incentives for individuals and industries that participated in waste reduction and recycling programs. This third phase of the plan was also going to promote state and federal legislation that would provide incentives for waste reduction. A major task in phase three of the plan was to be the development of illegal dumping enforcement guidelines and a district-wide effort to discourage open burning of waste. Market development efforts would escalate in the third phase, and programs will be planned that encouraged new business and industry throughout the district. Again, funding was down to the minimum of \$45,000 per year for the district, and there was simply not enough resources to accomplish the additional programs proposed for Phase III. According to reports released by MDNR, good progress was being made toward the 40 percent reduction state-wide, and it was not necessary to take the more drastic steps to reach the reduction goal.

The 1993 plan set a goal of reducing the waste being landfilled by at least 7 percent through education, waste reduction and re-use activities, and at least 23 percent through recycling activities. The Department of Natural Resources established a 10-percent reduction for items banned from landfills. Then and now, district intends to encourage economic development throughout the seven-county district while allowing residents increased environmental protection.

The 2004 plan update retains much of the previous plan elements. Some solid waste issues have changed over the past decade. The term 'e-waste' had not been heard of ten years ago. But strategies for dealing with solid waste issues have not changed. Providing education, technical assistance and needed services to the region's citizens, businesses and local governments is still the primary goal of the district.

Initially, MDNR required that the district plans be updated every two years. The Ozark Rivers plan was updated in 1995. However, only two district plans ever received MDNR approval throughout the state. In lieu of plan updates, MDNR now requires a solid waste assessment be completed by each solid waste district every two years. District staff received a grant from Rural Development to complete the 2004 update. Regular reviews of the plan will be conducted on at least a five year basis to gauge its effectiveness and to determine if changes are required. The district will continue to study other solid waste management options and keep informed of new technology that may be suitable to district needs. The district considers this plan a blueprint

that will be redrawn to suit the needs of the region. As those needs change and as programs are evaluated to determine their effectiveness, the plan will be adjusted to provide the best services possible.

WASTE REDUCTION AND RE-USE PLAN

A goal of the Missouri Policy on Resource Recovery is to incorporate solid waste reduction into solid waste management activities of state and local government, industries and citizens. The district has established similar goals and targeted programs aimed at citizens, local government and business and industry.

Purpose and Goals

The waste reduction and re-use task force formulated the following mission statement for the Ozark Rivers Solid Waste Management District:

The Ozark Rivers Solid Waste Management District should encourage reduction and re-use for consumers, businesses, industry, schools and government through education and demonstration.

Numerous ideas for methods of reducing and re-using waste were studied and discussed by the task forces before final recommendations were determined. Volunteers recommended that the district do the following:

- Encourage consumer-oriented educational activities;
- Encourage educational information/activities aimed at businesses, manufacturers, designers and retailers;
- Promote at the local, state and federal levels the need for waste reduction legislation;
- Develop a monitoring program and economic analysis for waste reduction activities;
- Develop a model implementation program of waste reduction initiatives for a "pilot" community;
- Encourage voluntary implementation of public, private and governmental procurement policies;
- Develop volume-based user fees (per bag or per can rate for trash collection);
- Encourage extended product warranties;
- Provide seed money/grants to assist manufacturers in implementing recycling processes or programs.

From these, the task force provided recommendations and suggested activities in the following three areas: education and awareness, economic incentives and disincentives and regulations and legislation. The district will provide a strong education and public awareness program to make the residents aware of the need to reduce and re-use waste and to provide technical assistance and education to assist the public in learning how to reduce and re-use. This education program will be followed up by a program to reduce and re-use waste through economic incentives and disincentives. A major task will be encouraging local businesses and industries that generate large volumes of waste to incorporate waste reduction and reuse programs into their

operations. This would include finding alternative uses for waste by-products and decreasing the waste created by evaluating current manufacturing processes. If the first two programs do not achieve the desired results, the task force recommended that a third program be implemented that will encourage regulations and legislation that would assist with waste reduction.

Specific Waste Reduction and Re-Use Programs to be Developed

Develop an education and public awareness program with the following guidelines and activities:

- To encourage consumer oriented education:
 - Develop a fact sheet on waste reduction and re-use tips;
 - Develop media/public information and awareness campaigns;
 - Promote the recyclability and environmental soundness of materials packaging;
 - Offer technical assistance and information to consumers requesting waste reduction information;
 - Encourage consumers to request appropriate packaging;
 - Promote bulk purchasing;
 - Promote and encourage the purchase of durable goods and the improved maintenance of goods;
 - Work to make existing waste reduction curricula available and develop new curricula.
- Encourage education information/activities aimed at local government, businesses, manufacturers, retailers, schools and others:
 - Meet with local governments to help determine the individual needs of cities and counties in the area of waste reduction and reuse and provide assistance in goal setting and implementation of local programs;
 - Develop a monitoring program and economic analysis program for small businesses, etc. and assisting with them;
 - Encourage waste stream audits of businesses and industries;
 - Assist with and/or develop and distribute a clearinghouse waste exchange;
 - Develop a public recognition program for industries, businesses, schools, local governments, communities, students, citizens, etc, for achievements in solid waste management with one criteria being waste reduction and reuse.
 - Encourage on-site/in-house waste reduction task forces and programs;
 - Provide technical assistance for waste reduction.
- Work to encourage extended product warranties;
- Encourage volume-based user fees;
- Provide seed money/grants to assist manufacturers in implementing recycling processes or programs;

If the desired result of a reduction in the generation of solid waste through these programs is not achieved, the district will consider pursuing changes in local, state and federal regulations and legislation in order to promote waste reduction and re-use.

To promote the need for waste reduction legislation at the local, state and federal levels, three different tax options were considered and placed in order of preference:

- Tax credits to manufacturers/consumers;
- Excise taxes;
- Subsidies.

Responsible Parties

The district has chosen to contract with MRPC to provide administrative support and to carry out implementation of the solid waste management plan. The MRPC environmental programs staff will be responsible for the programs outlined in this portion of the plan.

Waste Reduction and Re-use Timeline

Date	Activity
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Jan. 2004 (on-going)	Maintain updated educational materials, fact sheets, presentations and curriculum on waste reduction and reuse the environmental resource center.
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	Distribute public service announcements on waste reduction and reuse to local radio stations.
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	Prepare articles for solid waste management news column on waste reduction and reuse.
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	Provide technical assistance to large generators (such as
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reduction and re-use at the annual Earth Day Celebration.

Dec. 2004 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2005 Solid waste assessment due to MDNR.

April 2005 District wide poster and essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including waste reduction and re-use at the annual Earth Day Celebration.

June - Dec. 2005 Develop and provide a seminar to local industries and businesses which would include segments devoted to waste reduction and reuse. Seminar would include economic analysis and monitoring programs, waste stream audits, how-tos on estab-

lishing in-house waste reduction task forces and programs and provide technical assistance for waste reduction.

Dec. 2005 Annual district awards banquet for public recognition of achievements in solid waste management.

Jan.- June 2006

Periodically schedule meetings with local communities, cities and counties that would include determining the individual needs of these entities in the area of waste reduction and re-use and providing assistance in goal setting and implementation of local programs.

April 2006 District wide poster and essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including waste reduction and re-use at the annual Earth Day Celebration.

July - Dec. 2006 Follow ups will be conducted with local businesses, industries and other large generators to determine the success of waste reduction and reuse programs and encourage participation.

Dec. 2006 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2007 Solid waste assessment due to MDNR.

April 2007 District wide poster and essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including waste reduction and re-use at the annual Earth Day Celebration.

Jan. - June 2007 Develop and distribute a quarterly newsletter targeting large generators that includes articles on waste reduction and reuse as well as a section for a waste exchange.

Oct. 2007
Distribute a quarterly newsletter for large generators.

Dec. 2007
Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2008
Distribute quarterly newsletter for large generators.

April 2008
Distribute newsletter for large generators.

District wide poster and essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including waste reduction and re-use at the annual Earth Day Celebration.

August 2008
Distribute newsletter for large generators.

Oct. 2008
Distribute newsletter for large generators.

Dec. 2008

Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2009 Solid waste assessment to MDNR.

Distribute newsletter for large generators.

Jan. - June 2009 Periodically schedule meetings with local communities, cities and counties that would include determining the individual needs of these entities in the area of waste reduction and reuse and providing assistance in goal setting implementation of local programs.

April 2009 Distribute newsletter for large generators.

District wide poster and essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including waste

reduction and re-use at the annual Earth Day Celebration.

June 2009
Develop and provide a seminar targeting large generators of solid waste, such as local industries and businesses, or schools and hospitals, which would include segments devoted to waste reduction and reuse. Seminar would include economic analysis and monitoring programs, waste stream audits, how-tos on establishing in-house waste reduction task forces and programs and provide technical assistance for waste reduction.

Oct. 2009
Distribute newsletter for large generators.

Nov. 2009
Follow ups will be conducted with local businesses and industries and other large generators to determine the success of waste reduction and reuse programs and encourage participation.

Dec. 2009
Annual district awards banquet for public recognition of

achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2010
Distribute quarterly newsletter for large generators.

April 2010
Distribute newsletter for large generators.

District wide poster and essay contest for school children held
in conjunction with Earth Day.

Distribute information on solid waste issues, including waste
reduction and re-use at the annual Earth Day Celebration.

August 2010
Distribute newsletter for large generators.

Oct. 2010
Distribute newsletter for large generators.

Dec. 2010
Annual district awards banquet for public recognition of
achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Distribute information on solid waste issues, including waste reduction and re-use at the annual Earth Day Celebration.

Oct. 2012 Distribute newsletter for large generators.

Dec. 2012 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. - June 2013 Periodically schedule meetings with local communities, cities and counties that would include determining the individual needs of these entities in the area of waste reduction and reuse and providing assistance in goal setting implementation of local programs.

Jan. 2013 Solid waste assessment to MDNR.

Distribute newsletter for large generators.

April 2013

Fiscal Year	Personnel*	Travel	Materials	Marketing	Total
2004-05	\$2,200	\$100	\$200	\$400	\$2,900
2005-06	\$2,310	\$105 \$210	\$420	\$3,045	
2006-07	\$2,425	\$110 \$220	\$440	\$3,195	
2007-08	\$2,546	\$115 \$231	\$462	\$3,354	
2008-09	\$2,673	\$120 \$243	\$485	\$3,521	
2009-10	\$2,807	\$126 \$255	\$509	\$3,697	
2010-11	\$2,947	\$132 \$268	\$534	\$3,881	
2011-12	\$3,094	\$139 \$281	\$560	\$4,074	
2012-13	\$3,249	\$146 \$295	\$588	\$4,278	

* Personnel costs include salaries, fringe, direct and indirect costs.

RECYCLING PLAN

In accordance with the state of Missouri's policy on resource recovery, an emphasis has been placed on this element in the Ozark Rivers' solid waste management plan. The planned efforts will be directed at all aspects necessary to ensure successful recycling programs including collection, processing, market development and procurement of products with recycled content.

Purpose and Goals

The recycling task force formulated the following mission statement for the Ozark Rivers Solid Waste Management District:

The Ozark Rivers Solid Waste Management District should encourage the development of a region-wide network of public and private collection points for all materials and should encourage cooperative and/or regional market development. The district should also provide education opportunities and materials on the environmental benefits of recycling and proper collection methods.

Several ideas for recycling technology options, participation, education and public awareness programs, collection methods and marketing strategies were discussed by the task force before final recommendations were determined. They included:

- Education and Awareness:
 - Develop a media/public information campaign to promote recycling;
 - Promote the purchase of recycled products;
 - Develop and distribute curricula on recycling;
 - Develop a clearinghouse of information on recycling;
 - Develop and maintain updated information for the public on collection centers;
 - Provide technical assistance on recycling to those requesting assistance;
 - Develop a speaker's bureau of people to make presentations to community groups on the benefits of recycling;
 - Develop a fact sheet on recycling: what can be recycled, proper collection and processing methods;
 - Promote the need to manufacture and purchase products with recycled content.
- Types of recycling facilities:
 - material recovery facilities,
 - drop-off boxes,
 - buy-back programs,
 - waste transfer facilities,
 - curbside collection,
 - commercial/industrial collection;
- Types of participation:
 - voluntary
 - mandatory
- Types of marketing:
 - Developing regional markets for recovered materials
 - Developing cooperative marketing programs within the district

Of these, the task force provided recommendations and suggested activities for those recommendations in the following three areas: education and awareness, recycling facility options and market considerations.

In the 1993 planning process, and again emphasized in the 2003 update, it was determined that the district should provide a strong education and public awareness program and assist in the development of recycling programs in the district's communities. Technical assistance will be made available to communities in establishing recycling programs. Market development

will be stressed, and assistance provided to communities as needed. Cooperative marketing will be explored and recommended as an effective option. Local governments in the district will be strongly encouraged to follow procurement guidelines that give a preference for materials with recycled content. Recommendations will be made to all member cities and counties to consider the use of glassphalt and road signs made from recycled plastic. Further product development and new technology will be encouraged and supported by the district.

In the 1993 plan, the second phase of the recycling element was to take the planned programs another step. All member communities would be encouraged to develop more aggressive recycling programs, such as voluntary curbside recycling with economic incentives to encourage people to participate. By providing public education and awareness of the benefits of recycling the groundwork would be laid to make curbside programs a viable option, and the public would be more willing to participate. The past decade has shown that in most cases, recycling programs have expanded to include more types of materials and recycling volumes have increased steadily. Cooperative marketing was also a goal for the second phase of the plan and in many cases this has occurred. The Rolla Recycling Center accepts materials from St. James, Cuba and Bourbon as well as services rural residents of the region. The St. Robert Transfer and Recycling also serves several communities in Pulaski County. The consolidation of materials collected has been a natural progression of the recycling infrastructure in the region and the need for improving economies of scale will be a continuing goal of the plan. Technical assistance continues to be provided to communities by the district to assist with recycling programs. There is still a need to make recycling opportunities more convenient for rural residents of the region.

Market development and the encouragement of local markets for collected materials is still an important aspect of the plan that can be improved. Technical assistance will be provided in this area, and it is hoped that increases in district grant funds will also provide much needed seed money. Utilizing a combination of all proposed recycling programs, the district plans to maintain a reduction in the waste stream of 40 percent.

Specific Recycling Programs to be Developed

Education and Awareness

The district developed education and public awareness programs with the following guidelines and activities in order of priority:

- Develop a media/public information campaign to promote recycling
 - News releases
 - Radio features
 - Public service announcements
 - Recognition programs
- Promote the purchase of recycled products;
- Work to develop curricula on recycling and serve as a clearinghouse of available curricula;
- Develop and maintain updated information on collection centers;
- Provide technical assistance on recycling to those requesting assistance.
- The district will continue to provide technical assistance to large solid waste generators by auditing operations and suggesting methods for waste reduction, re-use and recycling.

Recycling Opportunities

In adopting this plan, member communities are agreeing to provide recycling opportunities to their citizens. Efforts should be made to establish centrally located collection areas. It is suggested that corrugated cardboard, newspaper, aluminum, plastic and steel be accepted initially with other materials added as needs and feasibility dictate. The task forces made the following recommendations, in order of preference, of recycling facilities that would be the most feasible for the district.

- Drop-off centers;
- Waste transfer facilities;
- Material recovery facilities.

Member cities have the option of determining what type of recycling opportunity they wish to provide. The district encourages communities to participate in existing programs and cooperate in providing services to improve economies of scale. Technical assistance will be provided to communities in established recycling facilities.

A major task remaining for the district is providing recycling opportunities to rural citizens. Due to the rural nature of the region, this continues to be a difficult goal to achieve. Although a number of drop-off centers exist, not all parts of the region are realistically serviced by these facilities. Designing recycling programs that serve all residents of the region will continue to be a goal of the plan. The advisory committees will be involved in planning these programs.

Market Considerations

Market development has been stressed throughout the recycling element of the plan. Completing the recycling loop is essential to the long-term success of recycling programs. The task force determined that both the development of local markets for recovered materials and cooperative marketing within the region should be pursued.

The advantages cited for developing a cooperative marketing system for the district include providing larger volumes of products to market, encouraging more competitive prices for materials, and opening large volume markets up to small communities that do not produce enough recyclables to command the attention of buyers.

Suggestions made in the area of developing local markets were:

- Finding buyers of shredded paper to be used for animal bedding and compost;
- Recycling plastic to make road signs;
- Using the glass collected in the district in local glasphalt projects;
- Using finely ground glass as an additive for paint;
- Local governments adopting procurement policies that give preference to materials with recycled content.

The district could make significant progress toward maintaining its goal of a 40 percent reduction if collected materials could be used locally. Using waste glass in glasphalt and recycling plastic into road signs or other locally used products are examples of how local markets could be developed to use recovered resources. All of these programs are either currently available within the district, or have been done in pilot projects in the district in the past.

Further product development and new technology will be encouraged and supported by the district.

The development of local industries using recycled materials will be encouraged. District

portunities.

Procurement Policies

be further encouraged as demand for products with recycled content increases.

Business/Industry Recycling

content and finding uses for a waste by-product.

Regional Marketing

attract new businesses to the district.

Responsible Parties

grams staff will be responsible for the programs outlined in this portion of the plan.

[illegible]

Recycling Timeline

[illegible][illegible]

Activity

tions and curriculum on recycling in the environmental resource ·&·&·&·&·&·&·&·&·&·

Distribute public service announcements on recycling to local radio stations.

Develop and implement a public information campaign to promote recycling including news releases, advertisements in local papers, radio features, posters and public service announcements. This would include the benefits of recycling, updated information on area recycling businesses, a buy recycled campaign and promoting recycling industries within the district.

Develop and make available for distribution a fact sheet on recycling.

Provide technical assistance to large generators (such as schools, businesses, industry) on recycling that emphasizes the economic benefits.

Develop speaking presentations on current recycling issues.

Schedule periodic meetings with local communities, cities and counties that would include determining the individual needs of these entities in the area of recycling and providing assistance in goal setting and implementation of local programs. Procurement policies of local governments would also be evaluated and buying recycled encouraged.

The district will work with member counties to establish recycling opportunities for rural residents who may not be serviced under current programs.

The district will continue to work toward establishing regional marketing centers for recyclables and encourage the siting of industries that use recycled materials.

Follow ups will be conducted with local businesses and industries to determine the success of recycling programs and encourage

age participation.

The district will encourage the expansion of existing recycling programs to accept more materials and provide technical assistance in market development.

Encourage development of local markets for recycled products. District grants will be used to attract new recycling based industries and enable established industries to incorporate post consumer materials into their manufacturing processes.

Continue to encourage regional marketing efforts. Cooperative marketing will serve to attract recycling businesses to the district.

April 2004 District-wide poster/essay contest for school children, held in conjunction with Earth Day, that includes recycling as one possible topic.

Provide educational materials on recycling at the annual Earth Day Celebration.

Dec. 2004 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2004 Annual solid waste assessment due to MDNR.

Jan. - June 2005 Develop and provide a seminar to local industries and businesses which would include segments devoted to recycling. Seminar would include economic analysis and monitoring programs, waste stream audits, how tos on establishing in-house recycling task forces and programs and provide technical assistance.

April 2005 District-wide poster/essay contest for school children held in

conjunction with Earth Day.

Provide educational materials on recycling at annual Earth Day Celebration.

Dec. 2005
Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. - June 2006
Follow up with local businesses, industries and other large generators to determine the success of waste reduction and reuse programs and encourage participation.

April 2006
District-wide poster/essay contest for school children held in conjunction with Earth Day.

Provide educational materials on recycling at annual Earth Day Celebration.

Dec. 2006
Annual district awards banquet for public recognition of

Distribute quarterly newsletter for large generators.

Dec. 2007
Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2008
Distribute quarterly newsletter for large generators.

April 2008
Distribute quarterly newsletter for large generators.

District wide poster/essay contest for school children held in conjunction with Earth Day.

Distribute information on recycling at the annual Earth Day Celebration.

July - Sept. 2008
Develop and provide a seminar for local economic developers, elected officials, bankers and business leaders on economic development opportunities in the area of recycling.

August 2008
Distribute quarterly newsletter for large generators.

Oct. 2008
Distribute quarterly newsletter for large generators.

Dec. 2008
Annual district awards banquet for public recognition of achievements in solid waste management.
Annual evaluation of effectiveness of district programs.

Jan. 2009
Solid waste assessment due to MDNR.

Distribute newsletter for large generators.

April 2009
Distribute quarterly newsletter for large generators.

District wide poster/essay contest for school children held in conjunction with Earth Day.

Distribute information on recycling at the annual Earth Day Celebration.

June 2009

Develop and provide a seminar targeting large generators of solid waste, such as local industries and businesses, or schools and hospitals, which would include segments devoted to waste reduction and reuse. Seminar would include economic analysis and monitoring programs, waste stream audits, how-tos on establishing in-house recycling task forces and programs and provide technical assistance for recycling.

July 2009
Distribute quarterly newsletter for large generators.

Oct. 2009
Distribute quarterly newsletter for large generators.

Nov. 2009
Follow up will be conducted with local businesses, industries and other large generators to determine the success of waste reduction and reuse programs and encourage participation.

Dec. 2009
Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2010
Distribute quarterly newsletter to large generators.

April 2010
Distribute quarterly newsletter for large generators.

District wide poster/essay contest for school children held in
conjunction with Earth Day.

Distribute information on recycling at the annual Earth Day
Celebration.

July 2010
Distribute newsletter for large generators.

Aug. 2010
Distribute newsletter for large generators.

Oct. 2010
Distribute newsletter for large generators.

Dec. 2010
Annual district awards banquet for public recognition of achieve-
ments in solid waste management.

[illegible][illegible]

Distribute information on recycling at the annual Earth Day
 Celebration.

Distribute newsletter for large generators.

Annual evaluation of effectiveness of district programs.

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these entities in the area of recycling and providing assistance in
~~goal setting implementation of local programs.~~

Jan. 2013
Solid waste assessment to MDNR.

Distribute newsletter for large generators.

April 2013
Distribute newsletter for large generators.

District wide poster and essay contest for school children held
in conjunction with Earth Day.

Distribute information on solid waste issues, including recycling
at the annual Earth Day Celebration.

Oct. 2013
Distribute newsletter for large generators.

Dec. 2013
Annual district awards banquet for public recognition of
achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Recycling Program Budget

Fiscal Year	Personnel *	Travel	Materials	Marketing	Total
2004-05	\$18,000	\$280	\$400	\$1,000	\$19,680
2005-06	\$18,900	\$300	\$420	\$1,050	\$20,670
2006-07	\$19,845	\$315	\$441	\$1,103	\$21,704
2007-08	\$20,837	\$331	\$463	\$1,158	\$22,789
2008-09	\$21,879	\$348	\$486	\$1,216	\$23,929
2009-10	\$22,973	\$365	\$510	\$1,277	\$25,125

2010-11	\$24,122	\$383	\$536	\$1,341	\$26,382
2011-12	\$25,328	\$402	\$563	\$1,408	\$27,701
2012-13	\$26,594	\$422	\$591	\$1,478	\$29,085

*Personnel costs include salaries, fringe, direct and indirect costs.

COMPOSTING PLAN

In accordance with the state of Missouri's solid waste management law, yard waste was banned from landfills effective January 1992. Due to the rural nature of the district, yard waste does not make up a large percentage of the district's waste stream. Through the planned programs, the district shall provide citizens with alternatives that allow proper disposal and treatment of yard waste.

Purpose and Goals

The composting task force formulated the following mission statement for the Ozark Rivers Solid Waste Management District:

The Ozark Rivers Solid Waste Management District should promote individual and/or community composting programs and provide education on the benefits, uses and disposal options available within the district.

The composting task force made recommendations in three separate categories: education and awareness, composting methods and types of composting facilities. It was determined that the district should provide education and increase public awareness of the benefits of composting, and encourage the public to do backyard composting. Overall, small facilities and programs were looked upon more favorably than large, technical composting programs that currently do not exist in the district. The district does encourage the cooperative use of composting equipment. Several communities in the region have small scale composting programs that could benefit from equipment sharing. Future needs of the district may dictate the development of larger scale composting programs.

Specific Composting Programs to be Developed

Education and Awareness

The district developed an education and public awareness program that includes the following:

- Provide information to the public on composting alternatives available in the region;

- Encourage backyard composting; and
- Encourage and educate the public on mulching and the use of composted materials;
- Discourage burning and improper disposal;
- Develop new markets for composted materials.

Composting Technologies

The district encouraged and promoted the following methods of composting in order of preference:

- Backyard composting — Minimal facilities: backyard or small scale projects;
- Community composting facilities — Low-level facilities: small, community oriented projects that require little maintenance; and
- County composting facilities — Intermediate facilities: county sized programs where composted is processed, turned and monitored to some degree.

Member communities will provide their residents with one of the selected alternatives and shall promote the service. All cities and counties that collect yard waste are required to manage the collected material in a proper manner and in accordance with state regulations. The district provides technical assistance to communities in developing the composting program appropriate for them.

The district will encourage the development of composting demonstration sites in each county. The demonstration plots should include composting bins, mulching techniques and landscape designs. The district can also provide backyard composting classes for interested citizens.

Equipment sharing

The district will provide assistance to member communities in organizing equipment sharing and will provide other technical assistance. In smaller operations, large pieces of equipment such as shredders and tub grinders can be used by a number of different communities.

Market Development

The district shall provide technical assistance to communities in finding markets for compost and mulch and will work with other individuals and organizations focusing on such efforts. Local markets will be emphasized with new markets developed. The development of local industry that utilizes composted materials will be encouraged and resources available to the district targeted to attract this industry. Economic developers in the district will be kept abreast of all opportunities.

Responsible Parties

The district has chosen to contract with MRPC to provide administrative support and to carry out implementation of the solid waste management plan. The MRPC environmental programs staff will be responsible for the programs outlined in this portion of the plan.

Composting Timeline

[illegible]

Activity

Jan. 2004 (ongoing) Maintain updated educational materials, fact sheets, presentations and curriculum on composting in the environmental resource center.

Develop and make available for distribution a fact sheet on composting.

Develop speaking presentations on composting for the solid waste district's speakers bureau.

Develop and implement a public information campaign to promote composting including news releases, advertisements in local papers, radio features, presentations, posters and public service announcements. This would include the benefits of composting, updated information on area composting businesses and promoting composting within the district.

Schedule meetings with local communities, cities and counties that would include determining the individual needs of these entities in the area of composting and providing assistance in goal setting and implementation of local programs.

Develop articles for a solid waste management news column on composting.

The district will encourage the development of compost demonstration sites in each county that will include composting bins, mulching techniques and landscape designs. The district will promote the use of these demonstration sites through public awareness campaigns.

The district will provide upon request, technical assistance in developing compost programs and provide backyard composting.

The district will encourage equipment sharing among communities that provide yard waste collection to assist in the development of community compost facilities.

Promote the Master Composter program to encourage backyard composting and train volunteers to provide composting education in their neighborhoods and communities.

The district will work with member counties and communities to develop a program to discourage burning and improper disposal of yard waste.

The district will work to develop new markets for composted materials.

Increasing emphasis will be placed on local market development. The development of local industry that utilizes composted materials will be encouraged and resources available to the

district targeted to attract this type of industry.

April 2004
Distribute information on solid waste issues, including composting at the annual Earth Day Celebration.

Dec. 2004
Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2005
Solid waste assessment due to MDNR.

April 2005
Distribute information on solid waste issues, including composting at the annual Earth Day Celebration.

Dec. 2005
Annual district awards banquet for public recognition of achievements in solid waste management.

April 2006
Distribute information on solid waste issues, including composting at the annual Earth Day Celebration.

Dec. 2006

Annual district awards banquet for public recognition of achievements in solid waste management.

Jan. 2007
Solid waste assessment due to MDNR

April 2007
Distribute information on solid waste issues, including composting at the annual Earth Day Celebration.

Dec. 2007
Annual district awards banquet for public recognition of achievements in solid waste management.

April 2008
Distribute information on solid waste issues, including composting at the annual Earth Day Celebration.

Dec. 2008
Annual district awards banquet for public recognition of achievements in solid waste management.

Jan. 2009
Solid waste assessment due to MDNR.

April 2009
Distribute information on solid waste issues, including composting at the annual Earth Day Celebration.

Annual district awards banquet for public recognition of achievements in solid waste management.

Jan. 2013 Solid waste assessment due to MDNR

Composting Program Budget

Fiscal Year	Personnel*	Travel	Materials	Marketing	Total
1004-05	\$6,900	\$100	\$150	\$300	\$7,450
2005-06	\$7,245	\$150	\$158	\$315	\$7,868
2006-07	\$7,607	\$175	\$166	\$331	\$8,279
2007-08	\$7,987	\$184	\$174	\$348	\$8,693
2008-09	\$8,386	\$193	\$183	\$365	\$9,127
2009-10	\$8,805	\$203	\$192	\$383	\$9,583
2010-11	\$9,245	\$213	\$202	\$402	\$10,062
2011-12	\$9,707	\$224	\$212	\$422	\$10,565
2012-13	\$10,192	\$235	\$223	\$443	\$11,093

* Personnel costs include salaries, fringe, direct and indirect costs.

HOUSEHOLD HAZARDOUS WASTE PLAN

In accordance with Missouri's solid waste law, the district's solid waste management plan for household hazardous waste shall:

- Delineate provisions for the separation of household hazardous waste and other small quantities of hazardous waste at the source or prior to disposal; and
- Establish procedures to minimize the introduction of small quantities of hazardous waste, including household hazardous waste, into the solid waste stream.

Further, the law requires that individual households and small family farms manage all hazardous waste they generate in a manner that does not adversely affect the health of humans or pose a threat to the environment or create a public nuisance.

Because of the sparsely populated, rural nature of the entire region, the management of household hazardous waste is particularly challenging. With financial assistance from district and federal grants and local businesses, the district has held one-day paint collections in every county in the region and in addition, has held full-scale HHW collections in Phelps, Crawford and Pularski counties. A local business, Brewer Science, in cooperation with the City of Rolla and the Phelps County Landfill Board, has been coordinating annual HHW collections for Phelps County residents since 2002.

Developing full-scale collection programs, whether one-day special collections or permanent collection sites, is difficult due to the expense and liability involved. It has been the district's experience that one-day full-scale HHW collections can cost anywhere from \$13,000 to \$40,000 depending upon the volume collected. This is significantly less than the original estimates of \$100,000 included in the 1993 draft of the plan, but for a district that receives an average of \$50,000 per year total for district grants, the figures are still daunting. During the 1993 planning process, it was evident that many local government officials were uncomfortable with the liability issues involved in hosting household hazardous waste collections, and it was believed that small rural communities simply did not have the resources available to conduct large scale collections. Experience has shown that neither of these two concerns have held true. Professional contractors shoulder the burden of liability for the collections they conduct and the local community only has to provide a location, which can be as simple as a parking lot. The only major obstacle remaining is cost.

There are some who believe that this problem requires the combined resources and technical expertise that only a statewide program can mobilize. The 1993 version of the plan stated that the district's first priority in the household hazardous waste element of its plan would be to work with legislators and MDNR to develop a statewide household hazardous waste collection program. With the current state government budget problems and a shortfall in funding for MDNR, this solution is not likely to occur in the near future. The state solid waste plan, developed by MDNR, also lays the responsibility for HHW collections on the districts. Funding HHW collections with grants and donations appears to be the most obvious course of action.

The 1993 plan stated that paint collections would be held in each member county and that has been accomplished. In addition, full-scale HHW collections have been held in three of the district's counties. As funding becomes available, either through district grants or other sources,

the district will work to provide some type of special collection (either just paint or full scale HHW) each year, rotating through the member counties.

The district will continue to encourage all member cities and counties to establish or provide for their own collection programs. The district, drawing upon resources available through the Missouri Department of Natural Resources and the Household Hazardous Waste Project among others, will offer technical assistance.

Waste stream assessments indicate that household hazardous waste makes up about 1 percent of the materials landfilled. This is a small percentage of the waste stream but the seriousness of even a small amount is recognized. The exact amount of household hazardous waste stored or illegally dumped in the region is unknown. However, estimates can be made, based on information provided by the Household Hazardous Waste Project. It is estimated that the average household has 120 pounds of household hazardous waste in storage. There are 53,853 households in the region. This indicates that there are an estimated 3,231 tons of household hazardous waste stored in the region.

The district recognizes the tremendous risk and liability that accompanies household hazardous waste. Every effort will be made to meet the requirements of the law and provide increased environmental protection through the planned programs in this element.

Purpose and Goals

The household/farm hazardous waste task force formulated the following mission statement for the Ozark Rivers Solid Waste Management District:

The Ozark Rivers Solid Waste Management District should increase awareness of household/farm hazardous waste and will provide options for proper disposal through education and special collections.

Various methods of handling the disposal of and reducing the amount of household hazardous waste was discussed by the task force before final recommendations were made. They included:

- Develop media/public information campaigns;
- Promote purchase of alternative products;
- Develop a promotional campaign to encourage safe disposal practices;
- Develop a waste exchange of household hazardous products;
- Work to develop curricula and make available existing curricula to teachers;
- Develop a fact sheet on household hazardous waste tips;
- Develop seminars and forums for public officials and citizens;
- Provide one-day collections for household hazardous waste;
- Provide a permanent collection area for household hazardous waste;
- Provide a portable collection unit that could be moved around the district.

Of these, the 1993 task force provided recommendations in the following areas: education and public awareness and methods of collection. The task force stated that education was the key to managing household/farm hazardous waste. The individual household has to begin to understand the risks associated with household hazardous waste and be motivated to take responsibility for their proper disposal. An inventory of local disposal alternatives will be compiled and distributed throughout the district.

The high cost of district-sponsored special collections and the subsequent cost of proper disposal were areas of major concern. Because of the sparsely populated nature of the district, it can be more difficult to get people to participate. Also, the liability involved in collecting and transporting the waste coupled with the regulations concerning the handling and transport of large amounts of hazardous materials were also studied. Because of all of these concerns, the task force recommended that the district initially concentrate on education and public awareness. However, the past decade has shown that given enough financial resources, the district can provide collections for HHW. The 2003 advisory group recommended more collections for special wastes such as HHW.

In response to the need for basic household hazardous waste education, the district worked with the Household Hazardous Waste Project of Springfield to provide the *From Awareness to Action!* workshop in the Ozark Rivers district. Participants were asked to share the knowledge gained from the workshop in their own communities. Attendees were also strongly encouraged to make presentations on household hazardous waste.

In the years since the plan was written, the district has successfully experimented with organizing one-day HHW collections and will continue to provide these services as funding allows. Additionally, a long-term goal of the district will be to study the feasibility of a permanent collection site with a portable collection unit that can be moved around the district.

Of the methods of collection discussed by the task force, the following were recommended and are listed in order of priority, to be developed or offered by the district:

- Short-term goal — one-day collections of reusable or recyclable household hazardous waste, such as paint, and/or one-day collections with a contracted collector;
- Long-term goal — permanent collection area with a portable collection unit. This service would be provided only after conducting a more in-depth study of the liability and regulations involved.

Specific Household Hazardous Waste Programs to be Developed

Education and Public Awareness

The district developed an education and public awareness program that included the following activities:

- Develop a networking/information center for students and educators, to develop curricula and make existing curricula available;
- Develop a fact sheet on household hazardous waste on alternative products and proper disposal methods; and
- Develop media/public information campaigns that would promote the purchase of alternative products and encourage safe disposal.
- Develop an inventory of local disposal alternatives to be distributed around the district.
- Provide educational materials to special collection participants.
- Develop seminars and forums for public officials and citizens; and
- Assist with and/or develop a waste exchange for household/farm hazardous waste.

Collection

The district has set a goal of providing at least one HHW related collection each year as

funding allows. The collection may be restricted to only reusable or recyclable materials such as latex paint, but the goal will be to provide full-scale HHW collection. This program will be used to gather information on household hazardous waste and collection needs through surveys of participants. A collection event will also be an excellent opportunity to provide educational materials to participants. The district will provide technical assistance in organizing efforts to communities interested in providing one-day collections on their own. Technical assistance could involve helping communities locate qualified contractors or working with local haulers to properly dispose of the waste.

The district will study the possibility of establishing a permanent collection site with a portable collection unit that can be moved around the district. This would be a district-wide project and could be accomplished through a public-private partnership.

Responsible Parties

The district has chosen to contract with MRPC to provide administration support and to carry out implementation of the solid waste management plan. The MRPC environmental programs staff will be responsible for the programs outlined in this portion of the plan.

Household/Farm Hazardous Waste Timeline

Date	Activity
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Jan. 2004 (on-going)	Maintain updated educational materials, fact sheets, presentations and curriculum on household hazardous waste in the environmental resource center. This includes updated information on local facilities that process special wastes and how the materials should be prepared prior to disposal.
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	Implement a public information campaign to inform residents about household hazardous waste and promote alternatives and
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proper disposal methods, including news releases, advertise-
ments in local papers, radio features, posters and public
service announcements.

Work with local businesses that generate household hazardous
waste such as motor oil and anti-freeze to determine if they
would be willing to serve as collection sites to accept these
specific wastes from household generators as a public service or
for a small fee.

Schedule periodic meetings with local communities, cities and
counties that would include determining the individual needs of
these entities in the area of household hazardous wastes and
providing assistance in goal setting and implementation of local
programs.

Coordinate at least one special collection for HHW in the region

as funding allows.

Encourage member cities and counties to work with local businesses and organizations to provide special collections with local donations.

April 2004
Host a district-wide poster contest for school children, held in conjunction with Earth Day, that includes household hazardous wastes as one possible topic.

Distribute information on solid waste issues, including HHW at the annual Earth Day Celebration.

Dec. 2004
Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2005
Solid waste assessment due to MDNR.

April 2005

achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2007 Solid waste assessment due to MDNR.

April 2007 District wide poster/essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including HHW at the annual Earth Day Celebration.

Dec. 2007 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

April 2008 District wide poster/essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including HHW at the annual Earth Day Celebration.

Dec. 2008 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2009 Solid waste assessment due to MDNR.

April 2009 District wide poster/essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including HHW at the annual Earth Day Celebration.

Dec. 2009 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

April 2010 District wide poster/essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including HHW at the annual Earth Day Celebration.

Dec. 2010 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2011 Solid waste assessment due to MDNR.

April 2011 District wide poster/essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues, including HHW at the annual Earth Day Celebration.

Dec. 2011 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

April 2012

[illegible]

Fiscal Year	Personnel*	Travel	Materials	Marketing	Contractor	Total
2004-05	\$6,600	\$200	\$150	\$300	\$15,000	\$22,250
2005-06	\$6,930	\$210	\$158	\$315	\$15,750	\$23,363
2006-07	\$7,277	\$220	\$166	\$331	\$16,538	\$24,532
2007-08	\$7,641	\$231	\$174	\$348	\$17,365	\$25,759
2008-09	\$8,023	\$243	\$183	\$365	\$18,233	\$27,047
2009-10	\$8,424	\$255	\$192	\$383	\$19,145	\$28,399
2010-11	\$8,845	\$268	\$202	\$402	\$20,102	\$29,819
2011-12	\$9,287	\$281	\$212	\$422	\$21,107	\$31,309
2012-13	\$9,751	\$295	\$223	\$443	\$22,162	\$32,874

*Personnel costs include salaries, fringe, direct and indirect costs.

SPECIAL TYPES OF WASTE PLAN

Special types of waste include major appliances, waste oil, lead-acid batteries and tires. All of these items have been banned from Missouri landfills. To promote wise management of these wastes and discourage illegal dumping, the following programs are planned.

Purpose and Goals

The special types of waste task force formulated the following mission statement for the Ozark Rivers Solid Waste Management District:

The Ozark Rivers Solid Waste Management District should increase awareness of special types of waste and will provide options for proper disposal through education and special collections.

Various ideas for reduction, education and collection were discussed by the task force before final recommendations were chosen. It was suggested that the district:

- Develop media/public information campaigns;
- Promote purchase of alternative products;
- Promote promotional campaign to encourage safe disposal practices;
- Develop curricula and make available existing curricula to educators;
- Develop a fact sheet on special types of waste;
- Develop seminars and forums for public officials and citizens;
- Develop seminars and forums for retailers selling items that when discarded are banned from landfills;
- Discourage illegal dumping and dumping on own property;
- Develop and distribute waste exchange publications;
- Encourage sellers of banned products to become collection sites and make arrangements with vendors to recover materials;
- Encourage community special collection days with disposal provided as part of the service;
- Promote information resource center that would act as a clearinghouse for solid waste information.

Of the ideas discussed, the task force provided recommendations and suggested activities for those recommendations in the following areas: education and awareness and collection options. During the 1993 writing of the plan, it was determined that the district should focus on education of the proper disposal of items that are banned from landfills and the hazards of illegal dumping or dumping on one's own property. Proper disposal is readily available within the district for banned items. The need is to make people aware of where and how to properly dis-

pose of these materials. The 1993 task force determined that the only feasible method of a mass collection of special wastes would be community collection days. However, by 2003, the advisory committee had come to the conclusion that education alone was not effective and the district should also work to provide collections for special wastes. By 2003 the list of special wastes had grown to include electronics waste like personal computers, which had not even been considered when the plan was written.

Encouraging communities to provide special collections through their waste hauling services is one way of providing this service, but it requires some planning on the part of the communities involved. Markets for the collected materials have to be found, and the community has to absorb the cost of the program or calculate the cost into the monthly solid waste services fee. If the district's funding situation improves, district grant funds could be used for community based or district-wide collection programs.

An area of some concern for the district is the cleanup of illegal dump sites. The Ozark Rivers District has sixty-nine documented illegal dump sites scattered throughout the region. At this time, local governments do not have the resources available to handle this problem alone. The district implemented the Trash Patrol program in the mid-1990's, which provides a toll-free number to call to report illegal dumping. The information on the incident is passed on to the appropriate county's law enforcement. However, illegal dumping is a low priority for most law enforcement agencies and difficult for prosecutors to press charges. MRPC secured a grant in 2004 from Rural Development to address illegal dumping through education and dumpsite cleanups and monitoring. If the project is successful, the district will seek additional funding to carry out the program throughout the district. In addition, a feasibility study was conducted to determine the most feasible method for collecting and managing banned items. The study found that periodic one-day collections could be held throughout the region on a regular schedule for a reasonable cost. These collections could be coordinated either by individual local governments, or by the district. The district will continue to work with DNR and local law enforcement to find solutions to this problem and the funding necessary to effectively eliminate these sites.

Specific Special Types of Waste Programs to be Developed

Education and Awareness

The district will develop an education and public awareness program. The district will embark upon activities to:

- Discourage illegal dumping and dumping on own property;
- Develop media/public information campaign;
 - Programs should be designed for both adults and children
 - Information resource center that would provide updated information to district residents and businesses on facilities that accept materials and how they should be prepared.

Collection Efforts

One-day collection efforts will be encouraged in member communities as funding allows. This effort would increase education and help to eliminate illegal dumping of collected materials. The district will provide technical assistance in planning collection day and finding markets for collected materials. The programs could be funded through grants or donations.

Responsible Parties

The district has chosen to contract with MRPC to provide administrative support and to carry out implementation of the solid waste management plan. The MRPC environmental programs staff will be responsible for the programs outlined in this portion of the plan.

Special Types of Waste Timeline

<u>Date</u>	<u>Activity</u>
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Jan. 2004 (on-going)	Continue operation of the Trash Patrol program by monitoring phone calls, advertising the availability of the hot-line number and working with local law enforcement and prosecutors to apprehend and prosecute offenders.
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	Maintain updated educational materials and curriculum on special types of waste to become part of the environmental resource center. This includes fact sheets, presentations and updated information on local facilities that process special wastes and how the materials should be prepared prior to disposal.
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	Develop and implement a public information campaign to pro-
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note the proper disposal of special types of waste including news releases, advertisements in local papers, radio features, posters and public service announcements. This would include proper disposal methods, updated information on area businesses that recycle special types of waste and the problems associated with improper disposal.

Work with local businesses that generate special types of waste such as motor oil and anti-freeze to determine if they would be willing to serve as collection sites to accept these special wastes from household generators as a public service or for a small fee.

Periodically schedule meetings with local communities, cities and counties that would include determining the individual needs of these entities in the area of special wastes and providing assistance in goal setting and implementation of local programs.

The district will work with member counties and communities to develop programs to provide special one day collections for special wastes in order to discourage illegal dumping. The district will provide technical assistance in planning and finding markets for collected materials. The goal would be to provide at least one special collection in each county per year.

~~The district will work to encourage the development of businesses and industries that recycle and/or use special wastes.~~

April 2004 District-wide poster contest for school children, held in conjunction with Earth Day, that includes special wastes as one possible topic.

Distribute information on solid waste issues, including special wastes at the annual Earth Day Celebration.

May 2004

Establish an advisory committee to make recommendations for the best methods of educating the public on the problems with illegal dumping, developing a watershed approach to dealing with illegal dumping and cleaning up dumps in the region.

July - Aug. 2004 Hold public meetings on illegal dumping in the Gasconade River Watershed to raise awareness, develop partnerships and recruit local residents to help cleanup and monitor dumpsites.

Develop and implement an Adopt-A-Dump program.

July - Oct. 2004 Cleanup at least four dumpsites in the Gasconade River Watershed with the assistance of local residents and partner agencies.

Oct. 2004 - Mar. 2005 Monitor dumpsites that have been cleaned up.

Dec. 2004 Annual district awards banquet for public recognition of achievements in solid waste management.

Solid waste assessment due to MDNR.

April 2011
District wide poster/essay contest for school children in
conjunction with Earth Day.

Distribute information on solid waste issues, including
special wastes at the annual Earth Day Celebration.

Dec. 2011
Annual district awards banquet for public recognition of
achievements in solid waste management.

April 2012
District wide poster/essay contest for school children in
conjunction with Earth Day.

Distribute information on solid waste issues, including
special wastes at the annual Earth Day Celebration.

Dec. 2012
Annual district awards banquet for public recognition of
achievements in solid waste management.

Jan. 2013
Solid waste assessment due to MDNR.

April 2013 District wide poster/essay contest for school children in conjunction with Earth Day.

Distribute information on solid waste issues, including special wastes a the annual Earth Day Celebration.

Dec. 2013 Annual district awards banquet for public recognition of achievements in solid waste management.

Special Types of Waste Program Budget

Fiscal Year	Personnel*	Travel	Materials	Marketing	Contractor	Total
2004-05**	\$2,400	\$200	\$300		\$500	\$1,500
\$7,300						
2005-06	\$10,900	\$500	\$500	\$700	\$20,500	\$33,100
2006-07	\$5,450	\$400	\$350	\$600	\$21,525	\$28,325
2007-08	\$5,450	\$400	\$350	\$600	\$21,525	\$28,325
2008-09	\$5,723	\$420	\$368	\$630	\$22,600	\$29,741
2009-10	\$6,308	\$441	\$386	\$662	\$23,730	\$31,527
2010-11	\$6,623	\$463	\$405	\$695	\$24,917	\$33,103

2011-12	\$6,954	\$486	\$425	\$730	\$26,163	\$34,758
2012-13	\$7,302	\$510	\$446	\$767	\$27,471	\$36,496

*Personnel costs include salaries, fringe, direct and indirect costs.

** Does not include costs associated with Rural Development grant (total grant budget \$117,000), but does include estimated costs for seven special collections per year starting in 2005 for white goods, tires, e-waste, motor oil and batteries.

SOLID WASTE PLAN

The district will attempt to provide the safest, most feasible method of handling solid waste. After all waste reduction and re-use, recycling, composting, there will still be residual waste that will have to be disposed of within the district. This plan element will address how the district plans to dispose of the solid waste that cannot be re-used, recycled or composted.

The Ozark Rivers Solid Waste Management District, as a part of the initial planning process, hosted a public meeting to gather input on various solid waste management options. Task force members and concerned citizens participated. The engineering firm Foth and VanDyke made presentations of existing solid waste facilities, proposed solid waste facilities and other options not currently available in the region. Foth and VanDyke established a set of criteria on which to base the evaluation and presented their own appraisal of each option. The analysis completed by the engineering firm is discussed in Chapter 6.

The options discussed included landfills, waste transfer facilities with recycling programs and materials recovery facilities, incineration with energy recovery and incineration without energy recovery. Each option was discussed and evaluated by the public participants using the following criteria provided by Foth and VanDyke:

- Construction costs;
 - Operation and maintenance costs;
 - Administration costs;
 - Collection/disposal costs,
 - Location of site;
 - Amount of toxic pollutants;
 - Aesthetic conditions of facility;
-
- Commercially demonstrated;
 - Ability to manage region's waste;
 - Political support;
 - Economic incentives—jobs, grants, etc.;
 - Liability/risk concerns;
 - Financing options;
 - Potential for recoverable products;
 - Profitability;
 - Avoided costs.

Facilities that included recycling, such as MRFs and waste transfer stations, ranked high-

est with the public, receiving high scores in construction costs, level of toxic pollutants, commercially demonstrated, political support, economic incentives and avoided costs. However, these types of facilities do not address the problem of residual waste other than reducing it. Even MRFs that process waste into Refuse Derived Fuel (RDF) have residuals that must be disposed.

Incineration with and without energy recovery scored poorly in the areas of political support, avoided costs, construction costs and toxic pollutants. The public had some reservations about incineration, but felt that it would be acceptable if it included a program to pull out recyclables and produced energy. Mass burn without energy recovery was not viewed favorably. Again, even incineration does not completely dispose of waste. The ash produced by incinerators must still be dealt with, and the most common method is landfilling. Landfills scored poorly in the areas of aesthetics, liability, recoverable products, avoided costs, political support, location of site, and toxic pollutants. Landfills were unpopular primarily because of the potential for contamination.

Purpose and Goals

The district will work to provide acceptable facilities for the disposal of solid waste. At this time, the most economically feasible method in this region is to landfill that waste. The district is aware of the need to find alternative methods of disposal and will work towards the goal of reducing the volume of solid waste being landfilled. At the same time, other avenues will be studied.

The district would like to provide a favorable climate for private industry and/or member communities and counties to develop alternative solid waste facilities such as MRFs, waste transfer stations and waste-to-energy facilities. The district grant programs will be one way in which the district can assist with the development of alternative facilities.

However, until landfill tipping fees increase or other technologies become more economical, residual waste in the Ozark Rivers district will continue to be landfilled. The district will work with landfill operators and DNR to ensure that landfill facilities are operating within the guidelines established by federal and state regulations.

Specific Solid Waste Programs to be Developed

The district will establish and follow policies to accomplish the guidelines established by the model plan. The major areas of focus in the solid waste element will be to provide technical assistance to member cities and counties and to private waste haulers and to continuously investigate alternative methods of solid waste disposal. During Phase I the district developed a program to meet with all members individually and review the solid waste management policies included in the district's plan. Together, the district members and district staff determined how each member can begin implementation of the necessary programs and identify the technical assistance necessary. The district further explained the importance of taking responsibility for trash disposal, extending collection services to rural areas and uniform regulation of waste haulers and disposal facilities. The district offered to assist members in the minimization of nuisances and health hazards and work toward a safer and more sanitary management of solid waste. This program will be continued throughout plan implementation.

The district also developed a program in Phase I for the waste haulers in the district. The purpose of this program is to encourage the waste haulers in the district to participate in the implementation of the solid waste plan and to promote a good relationship between the district

and the solid waste haulers. The program began as a conference held at the beginning of Phase I. It provided an opportunity for the district to outline the activities of plan implementation and the areas that affect the haulers. The district also offered technical assistance to all district haulers and encouraged their participation in planning and implementation.

The search for feasible alternatives to landfilling is an integral part of the solid waste plan element. The district will continue to seek out and investigate alternative technologies for solid waste disposal.

Specific programs and provisions will be developed to address proper and safe storage, collection and transportation and processing and disposal of solid waste. Those programs are as follows:

Storage Provision

The state's Model Plan requires that cities address the following storage provisions by ordinance:

- Containers should provide for the complete enclosure of solid waste in durable, leak-resistant containers which protect the contents from weather, scattering by animals and inhibit the attraction of vectors.
- Reusable containers must be clean and durable, and single service containers must be durable enough to withstand a single use.
- Containers to be manually lifted should not exceed 35 gallons in capacity or weigh more than 75 pounds when full.
- Regular cleaning and maintenance of community containers such as bulk containers provided by local governments or a private contractor for the use of several families or businesses must be provided.

The district requires that all member cities, at a minimum, meet these requirements. MRPC as planner for the district, has reviewed all cities ordinances to assure compliance and made necessary recommendations.

Unincorporated areas within the district that receive solid waste services have no existing mechanisms to ensure compliance with these storage provisions. The requirements that do exist are strictly the individual requirements of the waste hauler servicing the area. The district continues to pursue storage provisions in the unincorporated areas by working with the individual waste haulers and encouraging them to implement storage provisions in their rural service area. Technical assistance will be provided in establishing policies and implementing new provisions.

Collection and Transportation

The Model Plan lists several provisions that are to be addressed under collection and transportation. Each provision, as well as the district's strategy to address the requirements, are discussed in the following paragraphs.

This plan must assure that all solid waste within the district will be collected and transported in an environmentally sound manner to a processing or disposal facility which has a valid Missouri Department of Natural Resources' operating permit. All member cities have existing ordinances that ensure compliance with this requirement. Unincorporated areas within the district have no mechanisms available to them to regulate this provision. The district continues to work with private waste haulers to meet the requirements of this provision as it relates to rural areas.

This plan also must provide for the local regulations of persons and names of persons

engaged in the business of collection and transportation of solid waste for all areas of jurisdiction in the district. All member cities should have an established regulatory policy for collection and transportation within their jurisdiction. A district model will be developed, and member cities will be required to have a policy in place.

The State's Model Plan states that all member cities should ensure universal collection service within their jurisdiction. Currently in the Ozark Rivers District, most cities do not have mandatory collection within city limits. The district will work with all member cities that do not have mandatory collection and will strongly encourage members to adopt some form of mandatory collection. Member cities will be encouraged to take responsibility for the collection of service fees for solid waste whether services are provided by public or private haulers. Once this has been done, cities will have more control of the solid waste management system for their locale and the following policies can be established. The district will encourage the following:

- Volume-based user fees to help reduce waste generation; and
- Curbside recycling programs

County-wide mandatory collection in unincorporated areas in rural Missouri at this time is not enforceable. The member counties of the Ozark Rivers Solid Waste Management District are all third class counties. Third-class counties cannot implement planning and zoning without a vote of the people.

In this district it is very unlikely that planning and zoning will ever be put on a ballot, much less voted into law by the citizens. With the absence of county planning and zoning, mandatory collection is extremely unlikely and not enforceable. The district will continue to investigate alternatives that would allow district-wide mandatory collection. A viable option may be state legislation requiring state-wide mandatory collection.

Provisions should state how unincorporated areas, where it is not feasible to provide universal collection of solid waste, will have opportunity to properly dispose of waste, specifically small unincorporated towns, trailer parks and subdivisions. The district will encourage all member counties to ensure the availability of collection service to all county residents. The district will work with counties to investigate options to enable counties to participate in rural collection services that are technically and economically feasible.

It has been determined that collection services are available in all parts of the district. However, many residents do not want to pay for the service. The district will continue to work to ensure that services continue to be available and to encourage residents to take advantage of them.

Provisions should state the frequency of solid waste collection service. A minimum of once per week collection should be provided for household solid waste and other solid waste which contains putrescibles. Community bulk container systems should receive at least twice per week service. Commercial establishments should receive once per week collection. Provisions should indicate the type of collection/transportation vehicles used. Acceptable solid waste vehicles have covered bodies which are leakproof, cleanable and prevent blowing and scattering of refuse. All member cities' ordinances have been reviewed and this requirement has been met with all in compliance. Unincorporated areas within the district have no existing regulations and currently have no mechanisms available to them to enforce any kind of restrictions.

Processing and Disposal

Provisions must provide for processing and disposal of residual solid waste in a manner which will not cause public health and safety hazards, nuisances, air and water pollution, degraded land values and unsightliness. All member cities within the district have ordinances that address the above stated provisions. Unincorporated areas within the district have no existing mechanisms to use to meet the requirements. The district will work with waste haulers and encourage them to establish processing and disposal requirements in the areas they service.

As directed by the model plan, the district will work to minimize open burning of solid waste. In areas where open burning of household solid waste is not a violation of air pollution control regulations and where house-to-house collection service is provided or planned, the solid waste plan shall discourage residential open burning of solid waste.

Member cities' ordinances, in most cases, are very general in regard to open burning. The district will develop a model city ordinance that prohibits open burning in areas where collection service is available. Member cities will be expected to adopt this ordinance. Minimization of open burning in rural areas will be extremely difficult to achieve. Education is really the only alternative available in unincorporated areas in the district as member counties have no regulatory power over open burning of solid waste.

The district is already considering ways of dealing with illegal dumping and has identified illegal dumping as a growing concern and a priority for the district. An illegal dumping committee was been formed when the plan was first written and the group proposed the Trash Patrol program which is still being used by the district. Another committee is being formed to provide input into the illegal dump cleanup program being funded through a grant from Rural Development.

The Trash Patrol program has been established to give citizens in the area a 1-800 number to call to report illegal dumping activities. The district provides technical assistance to all counties on the legal recourse allowable and has provided a seminar to all members on illegal dumping.

Currently in the Ozark Rivers District, the majority of processing and disposal facilities are outside city limits. In most cases, these facilities fall under state regulations only as local ordinances or rules have not been established. The unincorporated areas within the district have little legal authority to adopt any form of an order limiting facilities located in the member counties.

In order to evaluate the progress of solid waste reduction, the district will rely upon the state solid waste report, and the state solid waste characterization study, both of which are provided by MDNR. If the district feels that it is necessary, additional waste assessments will be done. The waste assessment will provide information on the characteristics of the waste stream and help the district determine if any changes need to be made to the plan to better serve the needs of the region and accomplish the district's objectives.

ROLES, RESPONSIBILITIES AND FINANCING FOR IMPLEMENTING THE REGIONAL STRATEGY

SERVICE AREAS DEFINED

Each entity within the Ozark Rivers Solid Waste Management District has certain roles and responsibilities to fulfill in order for the plan to be successfully implemented. In order to better determine those responsibilities, it is necessary to define service areas. When the plan was developed in 1993, roles, responsibilities and financing for implementing the plan were carefully studied and developed. These have not changed in the 2003 revision other than the financing section has been updated with current cost estimates.

For the most part, service areas are defined by jurisdiction. Cities have jurisdiction within the boundaries of their city limits, and counties have jurisdiction over all those areas not considered part of incorporated cities. These service areas may seem simple enough to define, however, in reality, roles and responsibilities of member entities are not so easily determined. In many instances in solid waste management, cities and counties will have to work together to accomplish overall goals.

Cities carry the majority of the responsibility for establishing recycling programs. At this time, rural drop off boxes in remote areas of the county are not feasible. For the most part, county residents will be serviced by recycling drop-off programs established by cities. Cities are responsible for providing yard waste composting alternatives to their residents. Counties are encouraged to participate in this effort.

Some cities also provide collection services to people living outside their city limits, and those residents will benefit from any improvements in the solid waste management system of those towns.

County officials will be faced with enforcement of illegal dumping laws and the cleanup of illegal dump sites which are generally located out in the counties rather than within city limits. Residents from both rural and urban areas contribute to these dumps, but because of their locations, they are a county responsibility.

The counties will also be responsible for providing rural residents with collection services and opportunities to participate in waste reduction, recycling, composting and other solid waste programs. This will be a challenging task for the district's county governments, which do not have the advantages of zoning laws, ordinances and concentrated populations.

The district recommends that cities and counties cooperate in their solid waste management efforts and find ways to accomplish their goals together. By pooling their respective resources, much more could be accomplished.

STRUCTURE AND DEFINITION OF ROLES BY SERVICE AREA

Responsibilities of Member Cities and Counties

The member cities and counties that adopt this plan as their own will be responsible for implementing the recommendations contained within. The district will have no ownership in any local facilities and will not interfere in their operation. The following requirements will be made of members:

- Provide recycling opportunities to all residents.
- Provide residents with a yard waste composting alternative. This may be either in the form of education activities on backyard composting or a community composting facility.
- Host special collections for household hazardous waste and other wastes such as tires, white goods and electronics as funding allows.
- Work to discourage illegal dumping, through education and legal means.
- Work to cleanup and monitor illegal dumpsites.

City and County Financial Responsibilities

All member cities and counties will be financially responsible for the programs developed in their individual city and county. The district will provide educational and technical assistance as needed and described in Chapter 9. The city and county financial responsibility for the district's activities and programs will be determined by the executive board and council.

Responsibilities of the Ozark Rivers Solid Waste Management District

The Ozark Rivers Solid Waste Management District has committed to the implementation of the regional solid waste management plan through adoption by the district's council and executive board. The district has the responsibility of ensuring the necessary reduction in waste being landfilled through the programs planned. The duties included in these programs were recommended by the advisory committees, researched by district staff and include:

Educational Responsibilities

- Develop educational materials on various solid waste issues and disseminate these throughout the region. Examples could include:
 - Waste reduction and reuse;
 - Recycling;
 - Composting;
 - Household/farm hazardous waste; and
 - Special types of waste.
 - Information on disposal and recycling options.
- Provide presentations on solid waste issues on request.
- Develop seminars and forums for public officials, citizens, businesses, industries;
- Develop media/public information and awareness campaigns for waste reduction and reuse; recycling; composting; household hazardous waste and special types of waste. This would include:
 - News releases
 - Radio features
 - Public service announcements
 - Recognition programs
 These programs should be designed for both adults and children.
- Develop a waste exchange;
- Encourage education information/activities aimed at local government, businesses, manufacturers, retailers, schools, etc.;
- Assist in the development of a statewide clearinghouse waste exchange newsletter;

- Assist local business, industry and government in promoting the purchase of recycled products;
- Work to develop curricula on waste reduction, reuse and recycling and serve as a clearing house of available curricula and develop a networking/information center for students and educators, to develop curricula and make existing curricula available;
- Develop and maintain updated information on collection centers;
- Develop a program designed to discourage burning and improper disposal.
- Develop a program to discourage illegal dumping and dumping on own property;
- Develop an information resource center that would provide updated information to district residents and businesses.
- Keep economic developers in the district abreast of all market development opportunities;
- Plan seminars to educate local community leaders on existing economic development opportunities; and
- Develop programs that target specific audiences with an emphasis on programs for civic organizations and school-age children.

Technical Assistance Responsibilities

- Provide technical assistance to individuals, schools, businesses, industries, etc. on ways of reducing the amount of solid waste going to the landfill through waste reduction and re-use, recycling, composting, waste exchanges, etc.;
- Develop on-site/in-house waste reduction task forces and programs;
- Develop a monitoring program and economic analysis program for small businesses, etc. and assisting with them;
- Contact businesses and industries and encourage waste stream audits;
- Provide technical assistance to communities in establishing recycling and composting facilities and special collections for household hazardous waste and special waste;
- Encourage market development of recycled products;
- Assist in developing a cooperative marketing system for the district;
- Assist communities in finding local markets for collected materials.
- Assist the district in identifying opportunities for further product development and new technology; and
- Encourage and promote composting methods.
- Develop procurement guidelines for use by member cities and counties;
- Encourage extended product warranties;
- Assist communities in developing volume-based user fees;
- Assist manufacturers in implementing recycling processes or programs;
- Provide assistance to industries and businesses with waste audits and suggestions for waste reduction;
- Organize the development of demonstration areas. The demonstration plots will include composting bins, mulching techniques and landscape designs;
- Assist member communities in organizing equipment sharing;
- Provide technical assistance to communities in finding markets for compost and mulch. Local markets will be emphasized with new markets developed; and
- Assist member communities in one-day collection efforts of household hazardous

waste and special waste. Technical assistance in planning, organizing and finding markets for collected material will be provided.

- Assist in encouragement of local market development.
- Encourage increased regional marketing efforts with the development of cooperative marketing.
- Assist the district in examining the need for new local, state and federal legislation.
- Assist the district in evaluating the establishment of a permanent special waste collection site with a portable collection unit that can be moved around the district.

Overall District Responsibilities Throughout Plan Implementation:

- Work toward the goal of reducing the volume of solid waste being landfilled;
- Continue to study existing waste management options and new technologies that may be applicable to the Ozark Rivers District in the future;
- Encourage private industry and/or member communities and counties to develop alternative solid waste facilities such as MRFs, and waste to energy facilities;
- Work with landfill operators and DNR to ensure landfill facilities are operating within the guidelines set down by federal and state regulations;
- Ensure that solid waste is being properly collected and transported to permitted processing or disposal facilities and encourage the use of appropriate collection vehicles to transport solid waste. Vehicles should have covered bodies which are leakproof, cleanable and prevent the blowing or scattering of waste during transport. Compactor units are preferable to allow for the hauling of more waste;
- Encourage uniform regulation of businesses engaged in the collection and transportation of solid waste;
- Encouraging both public and private haulers to extend collection services to rural areas that are currently not receiving solid waste services;
- Assist cities in the district to take responsibility for the collection of service fees for solid waste whether services are provided by public or private haulers. Once this has been done the city will have more input on the operation of the solid waste management system for their locale, and the following policies can be established. The district will encourage the following:
 - Volume-based user fees to help reduce waste generation;
 - Curbside recycling programs.
- Organize and coordinate advisory committees meetings.
- Organize and supervise monitoring and evaluation of programs and reduction. This will include:
 - Surveying area recyclers, waste haulers, landfills, businesses, industries and local governments; and
 - Assisting in updating of plan.
- Carry out budget and fiscal responsibilities;
- Investigate and pursue financing options.

Financing

DISTRICT FINANCING RESPONSIBILITIES

In 1993, the district was not yet aware that all of the landfills in the region would eventually close and that funding would be reduced to the minimum of \$45,000. The lack of tipping fee revenue had a profound effect on the district's ability to carry out all aspects of the plan. It became necessary to focus on the basics of education, awareness and technical assistance. Those bare bones programs were supplemented with grant funds from the U. S Environmental Protection Agency and the U.S. Department of Agriculture-Rural Development. These additional grants allowed the district to pursue programs like Master Composter classes, a seminar on household hazardous waste, an electronics waste collection, two household hazardous waste collections and the Less is More program which targeted business and industry with technical assistance on improving their bottom line through waste reduction and recycling. These grants were not received every year, but they did provide much needed seed money to develop programs outlined in the plan.

Administrative costs—those expenses associated with the general day-to-day operations of the district—coordinating meetings, completing reports and documentation for MDNR, providing representation at Solid Waste Advisory Board meetings, handling correspondence, phone calls and requests for information—have grown over 10 years from an initial \$14,000 per year to the current rate of \$19,500. The district applies for an administrative grant of \$20,000 each year from MDNR to cover the costs of the administration contract with MRPC.

Implementation costs—carrying out district programs including Trash Patrol, regular press releases, Earth Day activities, technical assistance, the environmental education library, special collections for paint, and the annual poster/essay contest—are funded each year through small district grants of less than \$20,000. MRPC submits the grants and carries out the district programs based on the level of funding provided through the local grant program.

At the time the plan was first developed in 1993, the establishment of a district office was a major concern and area of discussion. Several alternatives were considered and this section of the plan reflects those alternatives and their respective costs. The costs have been updated to reflect current salaries and office expenses. Although the district has contracted for these services from MRPC since 1993, it was felt that this background information on how that decision was reached was important to include in this revision.

The Ozark Rivers Solid Waste Management District will be financially responsible for implementing all planned programs and activities as outlined in Chapter 9. The district has different options available to them in accomplishing the required tasks. These would include establishing an office, renting office space in an office building or contracting out programs. Outlined below is an estimation of staffing requirements and the cost of establishing an office and renting office space. The costs shown are estimations made by comparing costs incurred by other solid waste management districts throughout the country and comparing wage rates of similar positions in the district. District administration—the day-to-day operations—is not a part of the costs discussed in this chapter.

A financial task force consisting of city administrators, local economic developers, mayors and district members considered the options outlined and made a recommendation to the district before final approval and adoption of the plan.

IMPLEMENTING THE DISTRICT PLAN: OPTIONS CONSIDERED

The district considered two options as to how it could implement the programs and services outlined in its original plan, that being (1) establishing its own office and staff or (2) contracting for services. Those options still exist today and a discussion of each follows:

Establishing a District Office

Staffing Requirements

The following positions are recommended and considered necessary to accomplish the programs and duties included in the district's plan. Salary ranges are estimated and based on salaries paid by other solid waste management districts and comparing wage rates of similar positions. Total annual salary costs based on the lowest salary range would be \$83,000 annually.

<u>Position</u>	<u>Salary Range</u>
District Solid Waste Manager	\$25,000-\$40,000
Education Coordinator	\$20,000-\$28,000
Environmental Specialist	\$22,000-\$28,000
Secretary/Receptionist	\$16,000-\$24,000

Other expenses that will need to be considered in personnel will include retirement, insurance, workman's compensation, unemployment and FICA. An average benefit package can add 25 percent to the base salary expense. Based on the lowest salary range of the listed positions, the total expense for the benefit package would be approximately \$20,750.00 annually.

Personnel Duties

The district's staff will be required to accomplish all tasks necessary to implement the district's solid waste management plan. Listed below is a breakdown of the responsibilities of each employee.

District Solid Waste Manager

- General oversight of all activities;
- Marketing, design and material development;
- Media/public information and awareness campaigns;
- Specific program development.

Education Coordinator

- Develop and disseminate curriculum;
- Coordinate education advisory committee;
- Assist with all educational programs.

Environmental Specialist

- Provide all technical assistance necessary;
- Coordinate technical advisory committee;
- Serve as contact and information resource person.

Secretary/Receptionist

- Perform general office operations; and
- Assist program coordinators.

Office Requirements

Listed below are two separate options available to the district in establishing an office. Estimated costs have been included and were obtained by surveying average costs in the district. The first scenario is setting up an office by renting space and buying/leasing furniture and equipment. The second situation involves leasing space in a business incubator-type setting where the furnishings and office equipment would be provided and/or shared for an additional cost.

Establishing own office for implementation

Average costs include:

- Rent \$450 to \$750 per month for office space for 2-3 people
- Utilities Cost included in rent
- Telephone \$300 - Average monthly cost for business telephone/
internet
- Janitorial Service \$300 per month
- Unknowns Per item cost for copies and faxes, and cost of needed
office equipment

All office furniture is included in rent expense. Copying and FAX service is usually available for a price per item cost. All other necessary equipment would be negotiated.

Contracting for Implementation

Another option available to the district would be contracting the implementation programs out to private and/or public organizations. By contracting the services, the district should realize cost savings in office and equipment expense due to economies of scale. Other advantages to contracting would include:

- Immediate access to trained and qualified personnel
- Allow district to utilize more defined areas of expertise
- Support staffing requirements only as needed for programs planned
- No hiring and training responsibilities
- Less district responsibility in areas of personnel and office needs
- Lower personnel cost
- Expertise in securing supplemental funding through federal, state and private grants

Recommended Option

The 1992 financial task force formed to discuss the alternatives available to the district for implementation of the plan, met twice and discussed both establishing a district office and contracting services. It was the recommendation of the task force that for the first few years, the cost of establishing a district office would be a tremendous financial burden. It was noted that the district should consider establishing its own office when the demands upon it for services increase to the point of financially justifying a separate office.

The option of contracting for the necessary services was considered the best alternative. The Meramec Regional Planning Commission was asked to develop specific programs that would be implemented and submit a cost to the task force for that scope of work. The submitted costs follow later in this report.

Below is the cost estimate for contracted services as established in the original plan. These esti-

mates were based on the scope of work outlined in the plan for this time period.

Contracting Costs - First Year - July 1, 1993 through June 30, 1994

Personnel Costs \$43,612.19

Direct Costs \$ 5,563.01

Indirect Costs \$18,803.80

Travel \$ 1,000.00

Supplies \$ 2,000.00

Contractual \$ 6,000.00

Total \$76,977.00

Due to cuts in the district's funding, implementation programs funded by the district, are currently being operated on a budget of less than \$20,000 per year. District staff have obtained a number of grants to supplement district activities over the years, including funds from Rural Development and the U. S. Environmental Protection Agency. Salaries and benefits reflect the part-time services of seven employees. Also included in this lease is building, computer and office equipment rent; copies and telephone; supplies and materials. A scope of work for district implementation of the plan follows:

Education and Awareness Programs

General Public

- Media/public information campaigns

[illegible]

News releases

[illegible]

Radio features

[illegible]

Public service announcements

[illegible]

Fact sheets

[illegible]

Posters

[illegible]

Recycling Guide

These, in many instances, need to be specific to the community. Elements included are waste reduction and reuse, recycling, composting, household hazardous waste, **& & & & & & &** special types of waste, open burning and illegal dumping.

- Develop public recognition programs.
- Develop and maintain an information resource center.
- Develop and maintain current solid waste issues presentations.
- Develop programs/presentations to be used around the district.
- Develop seminars and forums for public officials, citizens, businesses and industries.
- Develop a display and outreach material to be used throughout the district.

Specific

- Serve as a clearinghouse of existing curricula and share with school systems, develop new curricula.
- Develop a monitoring program and economic analysis program for businesses.
- Encourage waste stream audits of business and industry.
- Assist with development of waste exchange newsletter.

Technical Programs

- Offer technical assistance to citizens requesting information on any plan element.
- Provide technical assistance to member cities in establishing recycling programs in their communities.
- Assure compliance of all member cities and counties with plan and plan requirements—serve as liaison between members and district executive board.
- Pursue market development and plan economic development programs.
- Assist members in finding local markets for collected materials.
- Assist with development of cooperative marketing.
- Develop procurement guidelines and work with local governments to incorporate.
- Provide technical assistance to member cities and/or counties in establishing composting programs.
- Offer technical assistance to schools, individuals, businesses, industries on ways of

reducing the amount of solid waste going to the landfill through the plan elements.

- Conduct a waste stream assessment.
- Survey area recyclers, waste haulers, landfills, businesses, industries and local governments.
- Offer assistance to members on financing options available.

Public Participation

- Organize the advisory committees and work with them to develop programs and evaluate plan.

Other

- Monitor waste reduction and evaluate programs.
- Serve as the liaison between the district, DNR, and local waste management facilities to ensure compliance.
- Encourage uniform regulation of businesses engaged in collection and transportation.
- Continuously investigate and pursue financing options and apply for grants.

Continued funding opportunities through EPA, Rural Development and DNR will be pursued. A portion of district grant monies are used for district projects and activities. Market development grant money could also be applied for to support market development activities.

Financing alternatives available to solid waste management districts are listed below with a brief discussion given. Alternatives that are feasible in the Ozark Rivers Solid Waste Management District will be evaluated by the financial task force and district staff. As in all of the plan, financing alternatives will need to be continually explored and will be a large task for the district.

• District Tipping Fee: Tipping fees can provide a stable source of revenue, but may prove difficult to implement. The fee would have to be voted on and approved by the city or county hosting the facility, and then that city or county would transfer the funds, or some portion, to the district.

• Tax Assessments: To use this option at this point in time, a tax measure would have to pass in each member city and county voting on the issue in order for it to be adopted. This may be something that the district would want to pursue through the legislature in the future.

• Membership Dues: Membership dues may be a feasible option for costs. Each member county and city would be responsible for determine its own method of funding their share.

• Solid Waste Management Fund: State law provides \$20,000 per year to each solid waste district for administrative costs. This \$20,000 is distributed in the form of a grant and requires a three-to-one match.

• District Grant Funds: 50 percent of the state solid waste management fund is allocated to the solid waste management districts for district grants. This fund is generated from the state tipping fee. A minimum \$45,000 per district assures that all districts will receive some funding regardless of whether they have disposal sites or not. The district does

have the option of utilizing a portion of the district grant funds for district-wide activities.

- Fee Generating Facility: Although not currently planned, the district can own and operate its own facility, or own and contract out the operations of one or more regional solid waste management facilities. Detailed intergovernmental agreements would be necessary for this to occur, and given the current wording of the solid waste management law, would most likely require voter approval by each city and county of the debt financing instruments needed to construct facilities. There would likely be much public and private opposition to district owned facilities.

- Revenue Generation Through Contract Service Provision: A district could provide solid waste management services directly to member cities and counties on a contract basis.

- Host Community Benefit Fees: Under this type of arrangement, the district could generate administrative funds through a host benefit agreement for a regional disposal facility. A district, could, for example, negotiate such an arrangement as a condition of a positive recommendation on a permit application.

- Other Grants and Foundation Support: Grants should not be considered the only method of funding, but can be used to supplement other sources of revenue.

The district has concluded that it will follow the finance committee's recommendation to contract implementation and administrative services.

ECONOMIC IMPACT OF IMPLEMENTING DISTRICT PLAN AND REDUCING THE AMOUNT OF WASTE LANDFILLED

It is extremely difficult to gather all the information necessary for a seven county-21 city area in order to evaluate the actual costs of solid waste services as well as the economic impact of various proposed programs.

Each city budgets and keeps books in slightly different ways. Additionally, much of the solid waste services in rural areas are provided by private haulers, and they are not willing to supply their budget information, listings of equipment or prices structures, due to the increasing competition from larger firms. Due to this lack of information, the figures provided are in most cases estimations based on various assumptions.

Actual Disposal Costs

Because of lacking district-wide information, budget information from three cities within the district has been evaluated and the per ton cost of waste disposal derived. From there, the economic impact of recycling—the crux of the Ozark Rivers' plan—was analyzed.

The three cities studied were Rolla, one of the largest cities in the district; Dixon, a smaller community in the northwestern portion of the district; and St. James, a mid-sized community in the central portion of the district.

The following information was considered. In most cases, data is from the 2003-2004

budget year.

City of St. James—population 3,704

- Total city annual expenses—\$326,893
- Total city annual revenue—\$389,921
- 3,222 tons of solid waste handled per year

Actual cost per ton disposed—\$101.46

Revenue generated per ton—\$121.02

- Based on this information, St. James is profiting at a cost of \$19.56 per ton.

City of Dixon—population 2,754

- Total city annual expenses—\$164,438
- Total city annual revenue—\$141,023
- 1,178 tons of solid waste handled per year

Actual cost per ton disposed—\$139.59

Revenue generated per ton—\$119.71

- Based on this information, Dixon is subsidizing disposal at a cost of \$19.88 per ton.

City of Rolla—population 16,367

- Total city annual expenses—\$1,105,301
- Total city annual revenues—\$1,016,241
- 13,151 tons of solid waste handled per year.

Actual cost per ton disposed—\$84.05

Revenue generated per ton—\$77.27

- Based on this information, Rolla is subsidizing disposal at a cost of \$6.78 per ton.

District Average—Cost of Disposal

- Average expenses of \$89.91 per ton disposed
- Total cost of disposal for the district of \$10,050,499 per year.

This cost reflects only the true cost of disposal and does not include any type of revenue or subsidy. The final figure is based on the 111,784 tons baseline established for the district.

Cost of Recycling

One community within the district submitted a budget that broke out figures on their recycling operations. Because little data is available at this time, this information is used to consider the economic impact of recycling and reuse. Economic impact will be considered for the district's program as a whole and not broken out by program element.

The city of Rolla operates a recycling center. Other communities operate recycling services, but the budgets are maintained in the sanitation budget. The following information was

derived from their budgets and other surveys.

City of Rolla

- _____ • Recycling Expenditures—\$106,527
- Sale of Recyclables—\$30,000
- 1,861.2 tons recycled

Actual cost of recycling—\$57.24 per ton

Cost of recycling given revenues—\$41.12 per ton

Total avoided cost (1,861.2 tons X \$22.55 per ton tipping fee)—\$41,970

Per ton cost of recycling given revenues and avoided cost—\$18.56

District Average—Cost of Recycling

- Average cost of recycling of \$46.96 per ton

This is based on the average costs for the two cities listed. This does not include avoided costs or sale of recyclables.

IMPLEMENTATION OF SOLID WASTE MANAGEMENT PLAN

The Ozark Rivers district has designed a three-phase schedule to implement the solid waste management plan as outlined in Chapter 9. The implementation timeline is for a period of ten years and will be updated periodically to reflect additions or changes in the solid waste management plan.

IMPLEMENTATION TIMELINE

Date	Activity
Jan. 2004	Maintain updated educational materials, fact sheets, presentations and curriculum on solid waste issues in the environmental resource center.
	Distribute public service announcements on solid waste issues to local radio stations.
	Prepare articles for solid waste management news column on various solid waste issues.
	Provide technical assistance to large generators (such as schools, businesses, industry) on waste reduction and re-use that emphasizes the economic benefits.

Encourage local large generators to apply for grants (through MDNR) for waste audits and waste audit implementation programs.

The district will investigate and encourage volume based user fees for solid waste collection as a method of waste reduction.

The district will work to encourage extended product warranties through consumer organizations, industries and if necessary, legislation.

Develop and implement a public information campaign to promote recycling including news releases, advertisements in local papers, radio features, posters and public service announcements. This would include the benefits of recycling, updated information on area recycling businesses, a buy recycled campaign and promoting recycling industries within the district.

Develop and make available for distribution a fact sheet on recycling.

Develop speaking presentations on current recycling issues.

Schedule periodic meetings with local communities, cities and

counties that would include determining the individual needs of these entities in the area of recycling and providing assistance in goal setting and implementation of local programs. Procurement policies of local governments would also be evaluated and buying recycled encouraged.

The district will work with member counties to establish recycling opportunities for rural residents who may not be serviced under current programs.

The district will continue to work toward establishing regional marketing centers for recyclables and encourage the siting of industries that use recycled materials.

Follow ups will be conducted with local businesses and industries to determine the success of recycling programs and encourage participation.

The district will encourage the expansion of existing recycling programs to accept more materials and provide technical assistance in market development.

Encourage development of local markets for recycled products. District grants will be used to attract new recycling based industries and enable established industries to incorporate post consumer materials into their manufacturing processes.

Continue to encourage regional marketing efforts to attract recycling businesses to the district.

Promote the Master Composter program to encourage backyard composting and train volunteers to provide composting education in their neighborhoods and communities.

Coordinate at least one special collection for HHW in the region as funding allows.

Encourage member cities and counties to work with local businesses and organizations to provide special HHW collections with local donations.

Continue operation of the Trash Patrol program by monitoring phone calls, advertising the availability of the hot-line number and working with local law enforcement and prosecutors to apprehend and prosecute offenders.

Ongoing process of investigating alternative methods of disposal for solid waste. This program will be determined by developing technologies and will include information gathering and touring of new facilities.

Work with local waste haulers to implement the goals of the solid waste management plan.

The district will investigate alternatives that would enforce

district-wide mandatory collection.

The district will work with member cities and counties to encourage the adoption of policies that will encourage volume-based user fees and curbside recycling, and will provide technical assistance in establishing these programs.

The Education Advisory Committee meets regularly to continue implementation planning and prioritize programs.

A monthly newspaper column that features articles on solid waste issues.

April 2004
District wide poster and essay contest for school children, held in conjunction with Earth Day, that includes solid waste topics.

Distribute information on solid waste issues at the annual Earth Day Celebration.

May 2004 Establish an advisory committee to make recommendations for the best methods of educating the public on the problems with illegal dumping, developing a watershed approach to dealing with illegal dumping and cleaning up dumps in the region.

July - Aug. 2004 Hold public meetings on illegal dumping in the Gasconade River Watershed to raise awareness, develop partnerships and recruit local residents to help cleanup and monitor dumpsites.

Develop and implement an Adopt-A-Dump program.

July - Oct. 2004 Cleanup at least four dumpsites in the Gasconade River Watershed with the assistance of local residents and partner agencies.

Oct. 2004 - Mar. 2005 Monitor dumpsites that have been cleaned up.

Dec. 2004 Annual district awards banquet for public recognition of

achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan. 2005 Solid waste assessment due to MDNR.

Jan. - June 2005 Develop and provide a seminar to local industries and businesses which would include segments devoted to recycling. Seminar would include economic analysis and monitoring programs, waste stream audits, how tos on establishing in-house recycling task forces and programs and provide technical assistance.

April 2005 District wide poster and essay contest for school children held in conjunction with Earth Day.

Distribute information on solid waste issues at the annual Rolla Earth Day Celebration.

June - Dec. 2005 Develop and provide a seminar to local industries and busi-

nesses which would include segments devoted to waste reduction and reuse. Seminar would include economic analysis and monitoring programs, waste stream audits, how-tos on establishing in-house waste reduction task forces and programs and provide technical assistance for waste reduction.

Oct. 2005 - Mar. 2006 Develop regulatory policy for collection and transportation of solid waste and present to member cities.

Develop a model ordinance on open burning and present to member cities.

Dec. 2005 Annual district awards banquet for public recognition of achievements in solid waste management.

Annual evaluation of effectiveness of district programs.

Jan.- June 2006

Periodically schedule meetings with local communities, cities and

counties that would include determining the individual needs of these entities in the area of waste reduction and re-use and providing assistance in goal setting and implementation of local programs.

EXECUTIVE SUMMARY

The state of Missouri, through legislation (Senate Bill 530), mandated local governments to address solid waste in their cities/counties by developing solid waste management plans. The Ozark Rivers Solid Waste Management District was formed in November 1991 in response to the new solid waste management law with the objective of reducing the amount of solid waste generated for disposal 40 percent by 1998.

The Ozark Rivers Solid Waste Management District is made up of seven counties —Crawford, Dent, Gasconade, Maries, Phelps, Pulaski and Washington—and is located in the south central portion of Missouri. The total population for the region is 166,310, and the district encompasses 4,523.3 square miles of land.

Distinct features of this region include a mostly rural population with low-housing and low-population density. The most populous residential area in the district, the City of Rolla, located in Phelps County, has a population of 16,367. Maries County has the lowest population of all member counties in the district with a total population of 8,903 residents, all of whom are classified as rural.

Currently, solid waste is either landfilled or recycled including composting. According to the Missouri Solid Waste Diversion and Recycling Status Report for 2001, provided by the Missouri Department of Natural Resources, waste diversion rates have improved from an estimated ten percent in 1990 to an estimated 41 percent in 2001. In 1993 it was estimated that only 4 percent of the available recoverable material was being recycled through the region's recycling centers, an estimated 4,000 tons per year. In 2003 it is estimated the volume of materials being recovered through the region's recycling centers has almost doubled to an estimated 7,837 tons per year. When the plan was written, estimated generation rates were based on 3.7 pounds per person. This number was pulled from a study done in the 1980's. More recent data collected through the Missouri Waste Composition Study, completed by the Midwest Assistance Program in 1997, indicates that actual generation rates for Missourians are closer to 6.25 pounds per day. But recycling rates statewide are also high, at 3.84 pounds per day.

Solid waste that is not recycled is being collected through both private and public operations and deposited in landfills. When the plan was first written, the lack of regional markets for recovered resources made it difficult to establish successful recycling programs. Transportation costs and low volumes of materials hindered marketing efforts. However, as indicated in the statistics mentioned above, volumes have increased over the years. In the early 1990's a number of small community recy-

clinging programs opened and closed due to costs and problems with generating enough volumes to be feasible. However, the small programs that have endured are doing well by funneling their materials through larger recycling facilities in the region. St. James and Cuba both ship the materials they collect to the Rolla Recycling Center and the St. Robert Transfer Station and Recycling also receives materials from surrounding communities. Although there has been little growth in municipal yard waste composting programs in the district, there has been a strong push for backyard composting, and educational efforts have been made to encourage this activity. The composting programs in Rolla and Sullivan are very successful. Disposal alternatives for some types of items banned from landfills are still limited within the district, particularly for waste tires. There are a number of businesses in place that do accept lead acid batteries and white goods. In response to the strong need for education on proper disposal of special and household hazardous waste the district has implemented both educational and collection programs that have been well received and have raised awareness of the hazards of improper disposal and storage. Illegal dumping continues to be a persistent problem for stressed county budgets. But the district is working toward addressing illegal dumping through a survey of dumpsites as well as an education/cleanup program. Both of these projects have been funded through grants from Rural Development. The closure of landfills and reduction in the availability of service in the region, combined with the increase in disposal costs have contributed to the problem.

All seven of the landfills that were operating in the Ozark Rivers district at the time the plan was written have closed. In 1992 there were six proposed landfills in the district at varying levels of development. To date, two of those proposed landfills have been permitted –Prairie Valley in Crawford County and Timberidge (Waco) in Washington County . Three waste transfer stations are currently operating within the district in Pulaski, Phelps and Washington counties. One is privately owned and the other two are publicly owned.

Collection services are provided by both public and private waste haulers and are available to most residents in the district. Due to the consolidation of haulers in the region during the mid-1990's, many of the marginally profitable trash routes were eliminated, resulting in the loss of curbside collection services in the more rural areas of the region. The most effected areas are sparsely populated areas on gravel roads. However, as expected a number of small local haulers have cropped up in response to the demand, and it is believed that over time, these small businesses will fill the gap in services. In rural areas, haulers base the rates charged to rural households on the increased transportation costs. However, many rural residents still prefer to handle their own disposal rather than participate in the collection services available from private

waste haulers.

Based on per-capita waste generation figures, the district estimates the total residential/commercial waste generation for the region at 203,305 tons per year. Original waste generation estimates in the plan were based on 3.7 pounds per person per day. The new rate of 6.7 pounds per day dramatically increases the estimated volume of waste being generated in the region. Industrial generation results in another **29,111** tons for a total estimated generation rate of **131,609** tons per year. **Population and business projections indicate that the amount of solid waste generated will increase by 6 percent by the year 2000 and by another 2.3 percent in the following decade.** The most recent waste assessment was conducted at area waste transfer stations in 1997 to determine the waste characterization of the district. Waste assessments are used to gauge the effectiveness of the solid waste plan and to fine-tune programs to better serve the district's needs. Market development efforts can also be strengthened once the amount of recoverable materials available is known.

In designing and updating this plan, the Ozark Rivers Solid Waste Management District has emphasized the State of Missouri's policy on resource recovery and applied the integrated waste management hierarchy.

Integrated waste management is defined as the managing of waste by a combination of alternatives that include waste reduction, materials re-use, recycling, composting, incineration and landfilling. The strategy developed maximizes waste reduction and resource recovery with incineration and landfilling used only as needed for those wastes that cannot feasibly be recovered.

While meeting the mandates of the law, the plan also addresses issues central to solid waste planning and unique to the district such as the complete disappearance of landfill space and the shortage of local markets for recovered materials, as well as the lack of financial resources for solid waste management.

The plan builds upon the many strengths and the individuality of the district's rural population. The strong sense of community characteristic of the region has been helpful in the planning process and will continue to play an important role in implementation of the plan. The advanced technology being developed by the University of Missouri-Rolla in the areas of market creation and advanced disposal methods has been incorporated into the plan, as well as the marketing efforts currently under way at the Missouri Enterprise Business Assistance Center. Economic development is emphasized in the plan, with special attention given to regional market development.

The technical and education advisory committees, in conjunction with the task forces formed from those two groups, carefully studied and analyzed the components of the initial plan. The public participation element provided a plan that reflects the

needs and wants of the communities involved. These same committees have been left in place and continue to be relied upon for continued assistance and input during implementation. During the review and update process, the committees were asked to review the plan and provide input on the 2004 plan revision. By encouraging the public to participate in the planning and implementation process, the district has ensured its support and participation.

In order to determine the success of the plan, it was necessary to establish a baseline of waste being landfilled by the district. By using landfill tonnage records, making allowances for banned items and recycling programs established since the waste reduction was mandated, a baseline of 111,784 tons was been established by the district in 1993.

When the plan was written in 1993, the district designed a three-phase plan to reduce this baseline by 40 percent. The following elements, as required by MDNR, are addressed in the plan:

- Waste reduction and re-use
- Recycling
- Composting
- Household/farm hazardous waste
- Special types of waste
- Solid waste
- Education
- Public participation

The first phase emphasized education in all elements of the plan. Increasing education and improving public awareness would provide solid groundwork for further implementation of the plan. Education activities during the first phase included development of materials, curriculum, fact sheets, seminars and forums and development of media/public information campaigns. Also included in the first phase was the development of recycling and composting facilities in all member cities. Emphasis was also placed on market development and encouraging the use of recycled materials.

The second phase focused on providing technical assistance both to business and industry and to individuals. The district worked with specific businesses and industries and offered technical assistance services in waste reduction, re-use and recycling options. The second phase included the continuation of successful educational programs and activities. This phase recommended the development of economic incentives and disincentives and the development of more aggressive recycling programs in all member cities. Emphasis was to be placed on further cooperative market-

ing efforts and increased local market development. Another major task in the second stage will be the development of waste reduction, recycling and resource recovery programs for rural households.

The third phase of the original plan included encouraging regulations within the district that would allow the district to realize a 40-percent reduction in solid waste being landfilled. These regulations may include encouraging cities to renegotiate solid waste hauling contracts to include recycling programs, volume-based user fees and financial incentives for individuals and industries that participate in waste reduction and recycling programs. The third phase also promoted state and federal legislation that would provide incentives for waste reduction. A major task in phase three of the plan was to be the development of illegal dumping enforcement guidelines and a district-wide effort to discourage open burning of waste. Market development efforts were to escalate in the third phase to encourage new business and industry throughout the district.

For a number of reasons, not all of the recommendations established for the plan were achieved. Drastic funding cuts due to landfill closures resulted in the district only being able to finance their core programs--education, public awareness, technical assistance and small scale special collections. Furthermore, according to MDNR's estimates, the 40 percent reduction was achieved. Much of the measures outlined in Phase III of the plan were no longer necessary. Regulatory and legislative changes were only to be used if the goal was not reached.

During the plan revision process, the advisory committee discussed the current issues in solid waste and reviewed the district's needs. Their recommendations supported the district's decision to focus on core programs--education and awareness for both the general public and for children; technical assistance for local government, businesses, industry and residents; special collections for banned items and special wastes such as household hazardous waste and electronics waste; and the need to address illegal dumping in the region.

In many ways, the original plan has stood the test of time. The basic premises of the plan are still being followed and will continue into the future. Although the goal of reducing the amount of solid waste landfilled by 40 percent has been achieved, that goal must be maintained and there are other ongoing solid waste issues that the district must focus on, such as addressing illegal dumping and providing disposal services for banned items to all residents of the region.

The district must continue to encourage economic development throughout the seven-county district while allowing residents increased environmental protection.

The plan was to be re-evaluated every two years to gauge its effectiveness and

to determine if changes were needed. As the region's needs change, programs would be adjusted to meet those needs and provide the best services possible. However, MDNR changed the requirements and now requires a solid waste assessment to be completed every two years. The district felt that the plan was important enough to review and update again.

The plan, when implemented, will minimize the amount of solid waste generated for disposal, reduce environmental and public health threats, increase the manufacture and use of products made from recycled materials and preserve our natural resources. The plan has been developed and endorsed by the citizens of the planning area and will be implemented to the benefit of all.