U.S. Department of Agriculture
Rural Development
Rural Development Utilities Programs
Solid Waste Management Grant

Grantee: Missouri Department of Natural Resources
Solid Waste Management Program

Missouri Closed Landfill Technical Assistance Project

Final Report
10/1/2010 – 12/31/2011

Project Summary

Purpose

The goal of this project was to assess the condition of solid waste disposal areas, or landfills, in rural areas. Based upon these assessments, we provided training and technical assistance to counties, small municipalities, and individuals throughout the state who own these disposal areas or landfills. The guidance and training addressed landfill maintenance, upkeep activities, and future use of the landfills to ensure surrounding water resources are protected.

This Grant had two main phases: the first was to assess the selected landfills, and the second was to disseminate the compiled information for the purpose of educating the affected public. We also evaluated the effectiveness of our educational efforts through surveys. These aspects of the Grant are discussed below and a copy of the deliverables are listed in the Appendices and enclosed with this report.

Site Evaluations

In summary, staff selected a group of older closed rural landfills, developed an assessment form, and reviewed information about those facilities from all available sources to complete the form for each of the landfills. Sources included Solid Waste Management Program files, regional office files, archived files, site plans, survey plats, county-filed documentation, online maps and databases, current and historic aerial photographs, and contacts with county offices and past owners. We committed to assess at least 45 landfills as a part of the Grant. Actual on-site evaluations were made of 58 landfills in rural Missouri to assess the current condition of each of the sites (see Figure 1). Environmental sampling (landfill gas and leachate) was conducted, where appropriate. Evaluation reports (discussed below) were prepared on 51 of these landfills. The other 7 landfills that were evaluated have not yet received reports due to complicating

factors, such as determining the exact landfill owners, and other issues discovered that will require additional time. The program will be sending evaluation reports to these owners after the grant ends.

Map of all 58 Landfills Assessed

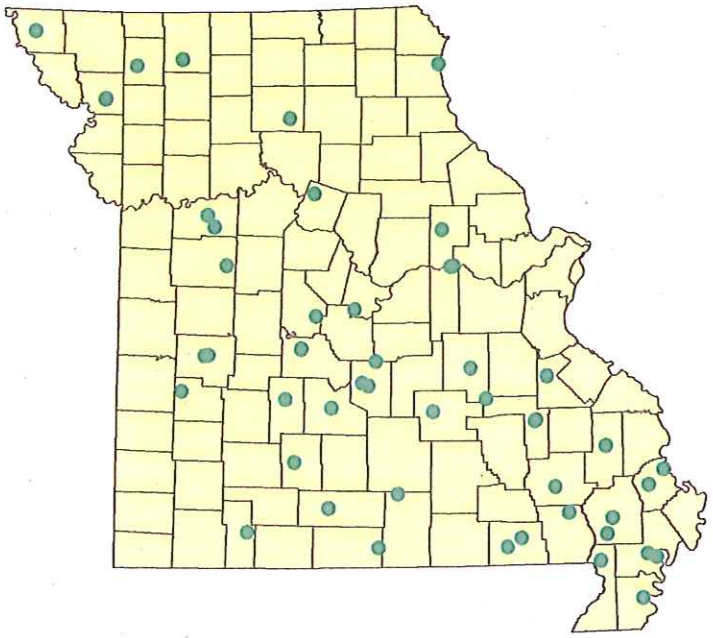

Figure 1

Results of the landfill assessments were reviewed and compiled, and the on-site concerns were divided into seven separate categories of deficiencies (see Figure 2). These are listed, defined, and discussed below:

- **Off-Site Methane Gas** – Approximately 3%, two of all (58) landfills were documented to have an off-site migration of methane gas. A total of 15 different permitted landfills were sampled for methane gas. Only 3 landfills had gas wells and those were sampled. The other 12 sites were screened for methane in buildings, conduits, groundwater wells, etc. The small percentage of landfills with migrating methane gas is, however, somewhat deceptive. Due to the regulations in place during the time these landfills operated, only 3 landfills in our list of 58 had gas wells installed, and of those, only 2 had those wells at the property boundary, where the regulatory limit applies. The gas wells at both of these sites were the ones that showed methane migration. This category of deficiency represents the highest concern of all the categories, due to the potential for methane gas to cause fires or explosions under certain conditions. One of our goals is to alert owners to the presence and dangers of migrating methane gas, so this public safety concern can be addressed.

It is possible that if more gas wells were installed at older landfills, more instances of methane gas migration might be found. The presence of nearby structures at all of the landfills were identified and recorded as a part of the project. This is discussed further under Public Safety Concerns.

- **Off-Site Leachate** – Approximately 13%, six of all (58) landfills were documented to have an off-site discharge of leachate, which is water that is contaminated due to contact with solid waste. Leachate samples were collected and analyzed at 6 different permitted landfills. In-field screening for leachate was conducted at another 6 sites. Based upon those screening results, no samples were sent in for analysis from those sites. This category of deficiency is of concern as it shows some contamination is moving off of these particular landfills. If the weather had been dry at the times of the visits, some of these sites may not have had a discharge of leachate. However, several of the other landfills visited had on-site leachate that, had it been raining, may have also been discharging leachate off-site.

  A positive note is that most of the leachate discharges sampled were small and into wet weather drainages and other intermittently flowing bodies of water. All cases showed that regardless of the constituents in the leachate itself, there was little, if any, impact to the receiving body of water at the time the samples were collected. Nevertheless, one of our primary goals is to inform landfill owners of the need to properly maintain their site in such a manner that leachate generation is reduced and it is prevented from leaving the property or entering any body of water, in order to protect rural water resources.

- **Lack of Maintenance** – Approximately 91%, 53 of all (58) landfills were documented as needing proper maintenance. The condition of the landfills ranged from small problems in localized areas, to a complete lack of maintenance at the site for decades. The problems found included the following: trees and bushes overtaking the site due to the failure to routinely mow, subsidence and ponding, erosion, poor quality and thickness of the soil cap, poor vegetative cover, burning the vegetative cover, leachate outbreaks, failure to maintain environmental control systems, wells not properly abandoned, damage to the site by owners, and damage to the site by trespassers. Almost all of the sites had some degree of these deficiencies. One of our ongoing goals is to educate landowners that proper maintenance will prevent the majority of off-site problems from occurring and impacting either the environment or owners of adjacent properties.

- **Land Use Impacts** – Approximately 19%, 11 of all (58) landfills were documented to have been impacted by the owner's improper use of the site. These improper uses included grazing of livestock, row cropping, and unauthorized building on the permitted property. Our experience has shown that grazing or row cropping can cause a great deal of damage to the landfill cap, leading to loss of vegetation, erosion or rutting of the cap, and increased leachate problems. Row cropping also pulls buried waste to the surface and increases water infiltration into the buried waste. Building unauthorized structures on or near landfills may result in a danger due to methane gas or subsidence of the structure. Use of these structures can also result in other damage to the landfill cap. Another ongoing goal is to educate owners about the serious concerns brought about as a

result of building on or near a landfill, and the types of agricultural practices that have the potential to damage the site or cause other problems.

- **Monitoring Deficiencies** – 100% of the landfills that were required to conduct environmental monitoring were documented to have monitoring deficiencies. Only 6 of all (58) landfills had gas or groundwater wells that required monitoring, but all 6 had either failed to collect samples, had not submitted sample results or had not properly maintained the wells. Where sampling was required, it must be resumed. Wells that are no longer required must be properly abandoned to eliminate these direct conduits to the subsurface. Our goal is to ensure the landfill owners take appropriate actions with regard to their wells.

- **Public Safety Concerns** – Approximately 52%, 30 of all (58) landfills were observed to have public safety concerns. These concerns consisted of structures built close to landfills that could be impacted by migrating methane gas and drinking water wells installed within 300 feet of a landfill. Department regulations require that these wells have a setback distance of at least 300 feet from the landfill. If a well is installed too close to a landfill, there is an increased potential that drinking water from the well could become contaminated. If a well is installed in an area of subsurface leachate, the well could provide a pathway to allow contamination of an entire aquifer. If a well is installed in an area where methane gas is migrating, the well or its piping could transmit or collect methane gas, potentially causing a fire or explosion in the well, the well house, or other nearby structure. The same potential hazard is true if structures are built in an area of methane gas migration. Our goal is to alert the owners of nearby structures and nearby wells of the presence of the adjacent landfill. These actions are taken to assist in preventing public safety hazards.

- **Long-Term Stewardship Issues** – Approximately 22%, 13 of all (58) landfills were documented to have long term stewardship issues. These deficiencies included failing to file plats of survey or other documentation showing the presence of a landfill with the county recorder, incorrect legal descriptions on the documents that were filed, and failing to complete other required documentation. The importance of filing correct documents with the county recorder is that without the information those documents provide, a potential buyer may not have knowledge that they are purchasing a landfill. The buyer may be unaware that the landfill is regulated by the state and has numerous maintenance requirements and land use restrictions. The Missouri Solid Waste Management regulations require the appropriate documents be filed with the county recorder to help ensure that buyers are properly notified of a landfill on the subject property. Since landfill-containing properties have at times been abandoned, we have found the sale of these properties without the proper notification can be especially problematic during annual county tax sales. Buyers at these sales have sometimes unknowingly purchased property containing a landfill. Our goal is to ensure that interested buyers are properly informed if they are considering purchasing property containing a landfill, and that they are aware of the requirements and responsibilities that accompany such a purchase.

Percent of Landfills with Deficiencies by Category

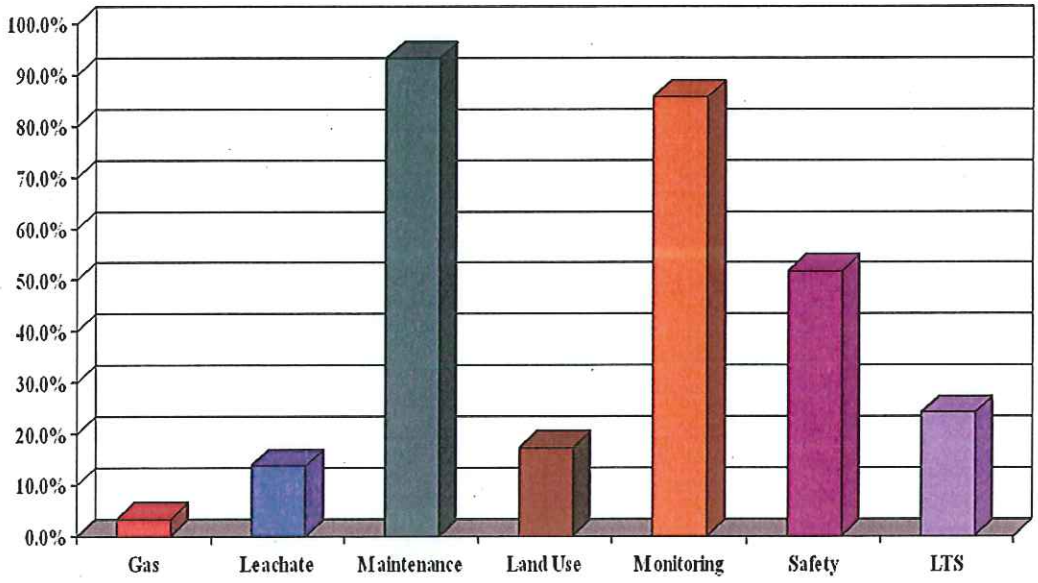

Figure 2

Educational Efforts

Fact Sheets Developed and Published: As a part of the Grant, we surveyed the program's fact sheets concerning landfills that are available to the public to determine if there was adequate educational material regarding older landfills. We determined that we needed three additional fact sheets: "Maintaining a Closed Landfill", "Acceptable Uses of a Closed Landfill", and "Requirements and Considerations When Selling or Buying a Landfill." The first fact sheet was written to specifically assist an owner of a closed landfill in becoming familiar with the need and requirements for landfill maintenance, how to conduct it, and why it is important. This fact sheet included a maintenance checklist. The second fact sheet discussed appropriate uses for closed landfills and the third explained the requirements for buying and selling a permitted landfill. These three fact sheets, along with the checklist, were published to the program's webpage (see Appendix E) and a copy included in the information sent to each owner and county collector.

Reports to Responsible Parties: All of the information gleaned from our research and site assessments was compiled into a report for each site. Reports were sent to every entity responsible for each landfill. Eleven (11) of the landfills we assessed have more than one responsible party. Some landfill properties have been subdivided and sold over the years, resulting in more than one owner. Some landfills are owned by one entity, but another entity that leased the property to operate the landfill has a continuing responsibility for the long term care of the landfill. In a few instances, the landfill operator filled outside of the permitted boundary on another person's property, causing that property owner to become the party responsible for that portion of the landfill. In total thus far, reports have been sent to 63 parties representing the 51

different landfills assessed (see Appendix I). Of the 63 reports sent, 28 were sent to individuals, 15 were sent to cities, 16 were sent to counties, and 4 were sent to corporations. (Note: We will be following up with the remaining 7 landfills, but this contact will not occur during the grant period.)

Each report contained a written narrative that provided information on the background and purpose of the grant; the landfill's locational information; ownership information; permit history; compliance history; the site evaluation; explanatory photographs; results of sample analyses for leachate and/or methane gas, where applicable; required actions; and maintenance recommendations. The appendices included an aerial photograph of the landfill and map of site features; GPS data for the site and its features; a compact disc containing all of the photographs taken during each site evaluation; leachate and/or methane gas sampling analyses, where sampled; a regional office inspection report, where applicable; a closed landfill maintenance guide consisting of seven landfill fact sheets and a checklist (this includes the fact sheets developed through the Grant and discussed above); and a guide to the design and operation of landfills, "Landfill Design and Operation", a document provided by the Government Engineering Journal. Staff from the journal gave us permission to disseminate this document. The appendices also included historical documents concerning the site, such as statements of closure, letters explaining closure requirements, plats of survey, as-built plans, design plans, closure and post closure plans, and executed Easement, Notice, and Covenant. All of this information was placed into a binder and mailed to each responsible party with a cover letter. The letter stated that if the landfill property is ever sold, the binder, or a copy of it, should be provided to the buyer in order to inform the buyer about the landfill and preserve the site documentation.

Follow-up Calls to Responsible Parties: After the reports were mailed and a sufficient period of time had elapsed to allow for their review, we made contact with as many of the responsible parties as possible. To date, 43 parties have been contacted. We went through the report with them, discussed the findings and actions that were needed at each of the sites, responded to any questions they asked, and conducted a short survey to gauge their knowledge about landfills. We received a very positive response from these owners. They were very interested in the information provided and were overwhelmingly responsive to the program's requests for corrective actions needed at their sites. In fact, some parties had already begun the corrective actions requested to improve their sites. It was encouraging to know the owners took the work completed during the Grant seriously and that, through this project, improvements have and will continue to be made to positively impact the rural environment and protect the safety and health of rural citizens.

Reports to County Collectors: An informational packet was developed and sent to each county collector in the counties where landfills were evaluated. This packet included the locations of all landfills in their county, both by map and list of locational data; a closed landfill maintenance guide consisting of seven landfill fact sheets and a checklist (this included the fact sheets developed through the Grant and discussed above); and a guide to the design and operation of landfills (see Appendix J). The purpose of this packet was to educate the collectors about the landfills in their particular county. We also compiled an abbreviated set of informational documents that the county collector could hand out to any party interested in purchasing a landfill property as part of a tax sale. This shorter set of documents included an informational

letter, the three fact sheets developed through the Grant and discussed above, and a guide to the design and operation of landfills. Three copies of this shorter set were included in the informational packet sent to each county collector.

In all, informational packets were sent to 37 rural county collectors in Missouri. One hundred eleven (111) shorter sets were also provided to these counties to hand out to potential buyers. Additional copies of these documents may be copied by the counties and distributed as needed. Through these efforts, we hope to help educate all parties involved with the sale of landfills in order to prevent sales of these properties to uninformed people who may be unprepared for the responsibilities of owning one of these sites, or who mistakenly believe they can build homes, install wells, row crop, graze, or use these sites in any manner that is not compatible with protecting the integrity of these landfills.

To date, six counties have called to discuss the contents of the informational packet.

Press Releases:

- An initial press release about the Grant was released on February 22, 2011.
- A follow-up press release about the completed Grant will be released after the Grant ends.

Webpage Publications:

- The initial press release was published on the department's webpage (http://dnr.mo.gov/newsrel/data.asp?param=029).
- Three fact sheets developed during the Grant were published on the program's webpage (http://www.dnr.mo.gov/pubs/pub2431.pdf, http://www.dnr.mo.gov/pubs/pub2430.pdf, and http://www.dnr.mo.gov/pubs/pub2429.pdf).
- Information describing the Grant was published to the program's webpage (http://www.dnr.mo.gov/env/swmp/techproj.htm). At the end of the Grant, the Final Report and its Appendices will be published on the program's webpage, along with a final press release about the completed Grant.

Conference Presentations:

- A presentation about the Grant project, including a summary of its findings was presented June 21, 2011 at the Missouri Waste Control Coalition's (MWCC's) annual conference at Lake Ozark, Missouri (see Appendix K). The majority of the conference attendees were from the solid waste management industry, environmental consultants, county governments, municipalities, regulators, and other interested parties. A positive response to the information presented was received from the conference attendees. In addition to the presentation, an exhibit booth describing the Grant and the site assessment findings was developed and made available to conference attendees.

- The same presentation given at the MWCC Conference was given August 3, 2011 at the Solid Waste Advisory Board's (SWAB's) monthly meeting in Jefferson City, Missouri. The meeting attendees were from the Solid Waste Management Districts, the solid waste management industry, environmental consultants, the Solid Waste Management Program, and other governmental or interested parties. A positive response to the information presented was also received from these SWAB attendees.

Surveys Completed: Surveys were conducted to assess audience foreknowledge of solid waste management and landfills, and what was learned during the Grant project.

- One survey was given to the attendees of the presentation given at the MWCC Conference (see Appendix C).
- The same survey was also given to the attendees of the SWAB meeting.
- Another survey, more detailed and designed more for an audience not as familiar with landfills, was given to all of the landfill owners or responsible parties by telephone after they had received and reviewed their copy of their site specific Evaluation Report (see Appendix D).

Survey Results:

- Missouri Waste Control Coalition Conference (MWCC)

  As a part of the Grant project, representatives from the program prepared an exhibit booth and gave a slide presentation of the Missouri Closed Landfill Technical Assistance Project at the MWCC Conference on June 21, 2011. There were 465 registered attendees at the conference held at the Lodge of the Four Seasons at Lake Ozark, Missouri. The presentation was scheduled concurrently with two other sessions on related topics. A survey was handed out to the 41 attendees at the beginning of the presentation with the request that they fill it out at the end of the presentation. Following the presentation, 31 completed surveys were returned with responses. Ten others were returned, nine of which were left blank and one that was improperly completed so it was also excluded from the results.

  The survey asked seven questions to gauge the prior knowledge of the session attendees concerning the history of solid waste management and the current applicable requirements for those who own, or are interested in owning, property that contains a landfill. Because the conference was focused largely on waste management or topics related to waste management, it was expected that attendees would be at least nominally familiar with the information provided in the presentation. This was generally supported by the findings of the survey (see Figure 3). Of those who responded, 26 of 31 attendees (or 84%) were familiar with at least one topic discussed in the presentation. Seventy-four percent (74%) of the surveyed attendees were acquainted with at least four topics, over half of the topics discussed in the presentation. There were five attendees for whom all the topics presented and polled in the survey were wholly unknown.

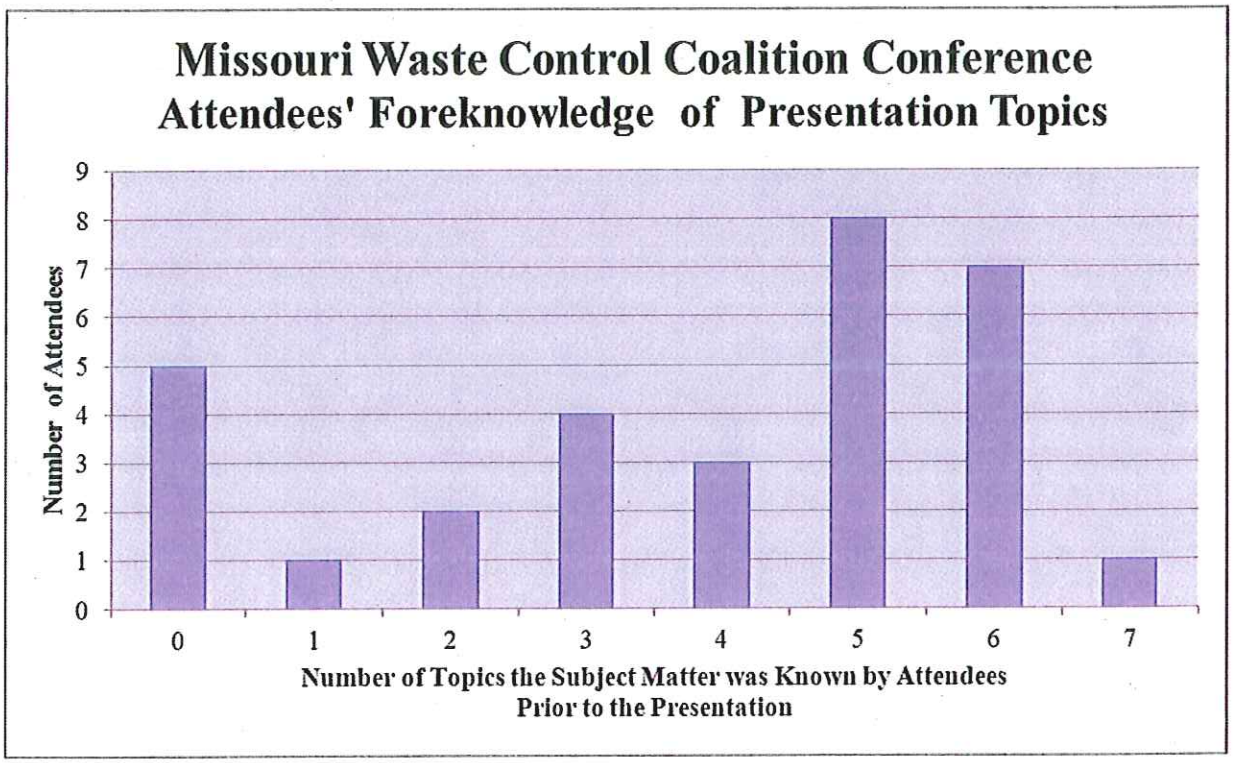

Figure 3

We also examined the survey results to determine what individual topics were either more or less familiar to the session attendees (see Figure 4). The information that was "new" to the largest number of attendees was the minimum distance required to be between a drinking water well and a landfill. Approximately three-quarters of the attendees at the presentation did not know this information. This may be due to the requirement not being the landfill owner's responsibility, but rather the responsibility of the adjacent private landowner or the well driller to check for adjacent land uses or sources of potential contamination when preparing to install a drinking water well.

Two other topics that were less familiar to session attendees were a) the requirement to prevent trees or prairie grasses from becoming established on a landfill, and b) that since 1987 the department has been authorized to require post-closure care of landfills. One-half of the attendees knew this information, while the other half did not. The reference to a specific date in the survey question about the department's jurisdiction over post-closure landfill care may have caused attendees to answer negatively on that question.

The remaining topics that most attendees were familiar with were: the requirement to notify potential buyers of a landfill being present on any property they try to sell, the fact that the release of a landfill owner from maintaining a financial assurance instrument on a landfill does not release the owner/operator from continuing maintenance, requests for changes to the use or ownership of a landfill are to be submitted and approved prior to the changes being made, and landfill inspections are supposed to be continued by the landfill

owner/operator even after site closure. Only one-quarter to one-third of the survey participants were unfamiliar with these requirements.

We will use this survey information to assist in targeting future educational presentations, fact sheets, and discussions with industry representatives, environmental consultants, well drilling companies, local county and municipal public works staff, and the general public.

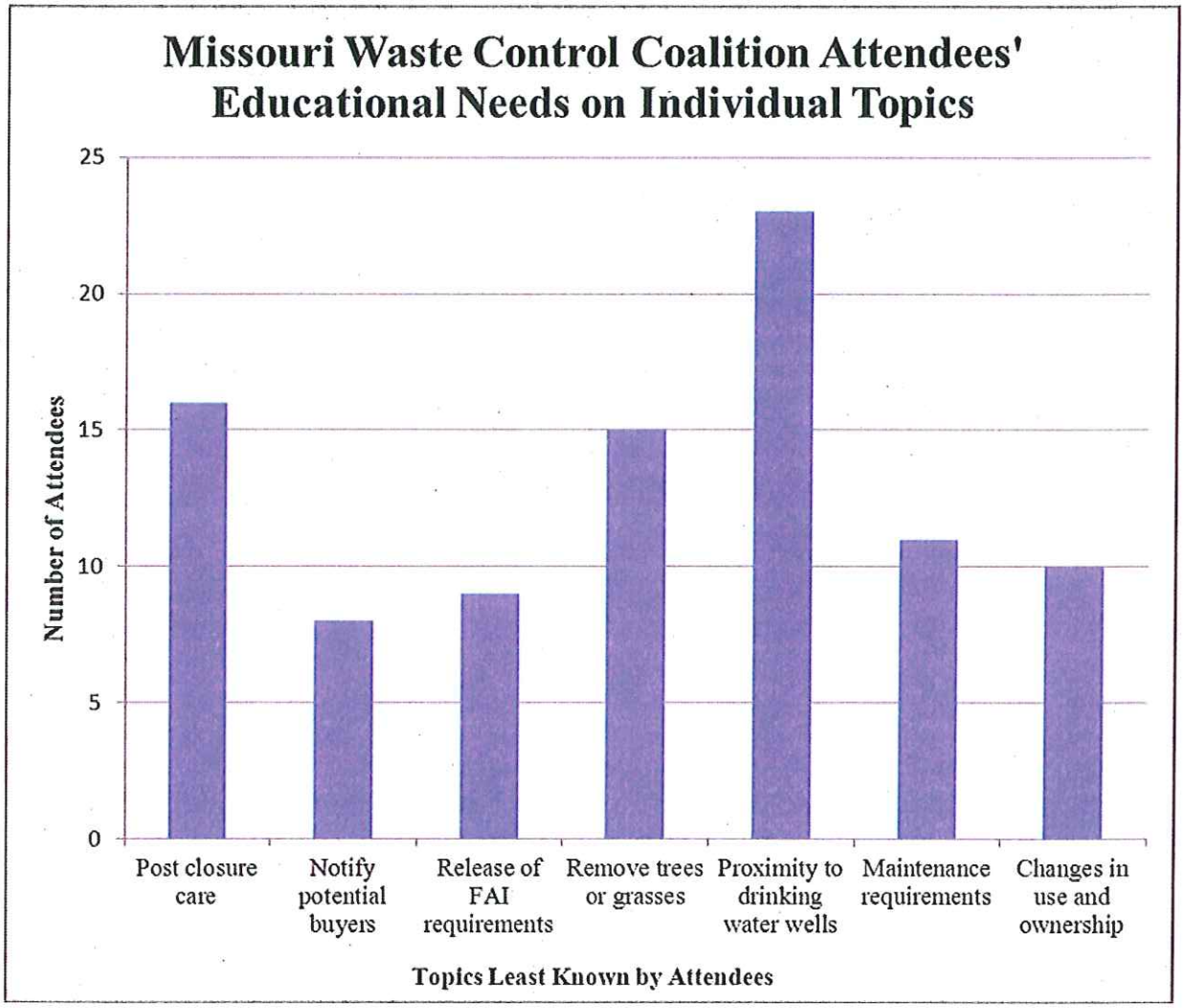

Figure 4

- Solid Waste Advisory Board (SWAB) Meeting

The same presentation given at the MWCC Conference was also presented at the Solid Waste Advisory Board meeting on August 3, 2011. The meeting was attended by solid waste district planners and board members from the state's 20 solid waste districts, solid waste management industry representatives, environmental consultants, representatives of the department's Solid Waste Management Program, and other governmental or interested parties. We distributed the same survey to 32 attendees of the board meeting, and received 23 responses back (some had also attended the MWCC Conference session in June and had completed the survey at that time).

The results of the survey were fairly similar to those received from the survey at the MWCC Conference. All of the attendees of the meeting were familiar with at least one topic in the presentation and a little over 50 percent of the attendees were familiar with at least four of the topics presented to them and polled in the survey (see Figure 5). This was a bit lower than the results from the MWCC Conference.

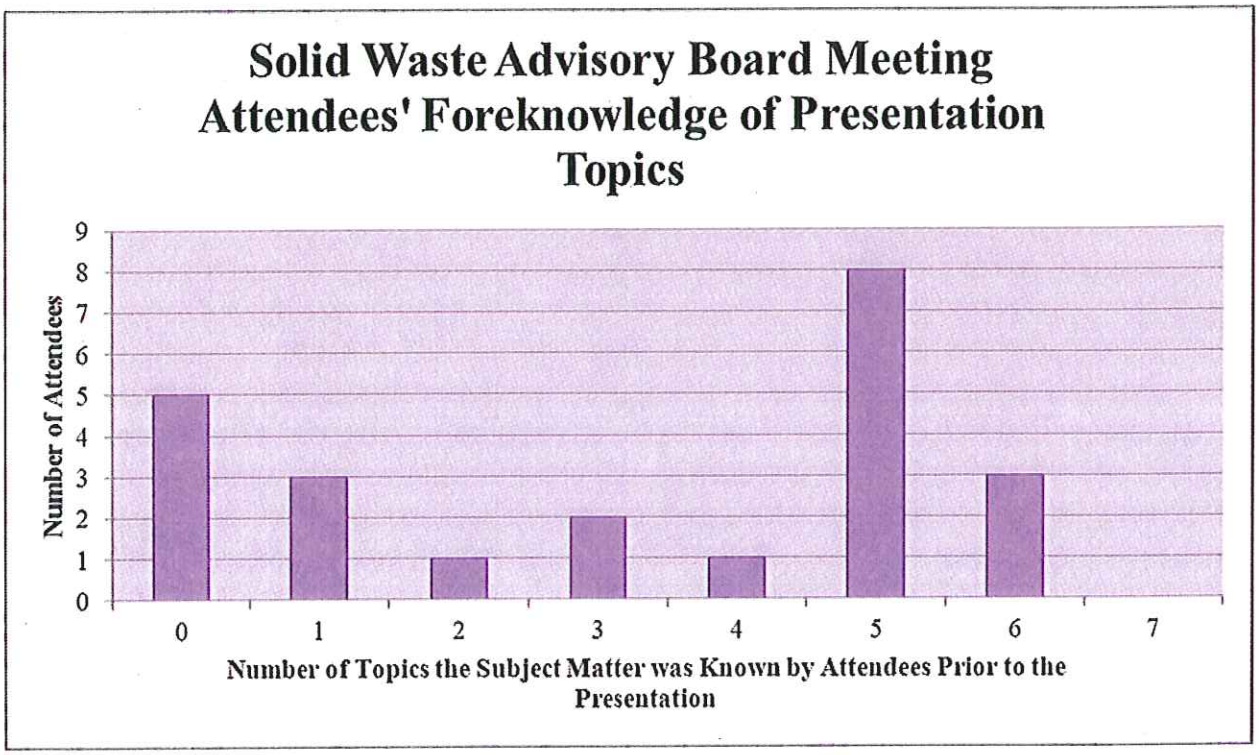

Figure 5

We then looked more closely at the topics that were either familiar or new to the board meeting attendees (see Figure 6). The least familiar topics were similar to those found in the MWCC Conference survey and included these four: post-closure care, preventing the growth of trees and prairie grasses on the landfill, set back distance requirements for

drinking water wells, and the requirement for pre-approval of changes in land use and ownership of a landfill. The requirement to remove trees or keep prairie grasses off the landfill was the least known topic. This may be due to the idea that landfills will "go back to nature" if left alone and allowed to become overgrown. Unfortunately, allowing this to occur does not eliminate the potential threat to public health and safety and the environment from the products of waste decomposition.

The remaining three topics were more familiar and the attendees had some knowledge about them. So the results from the SWAB meeting and the MWCC Conference session revealed to us the need for targeting educational efforts on at least the four topics that were less familiar to both the conference and meeting attendees, as well as a continuing need to educate people on all topics concerning landfill maintenance and care.

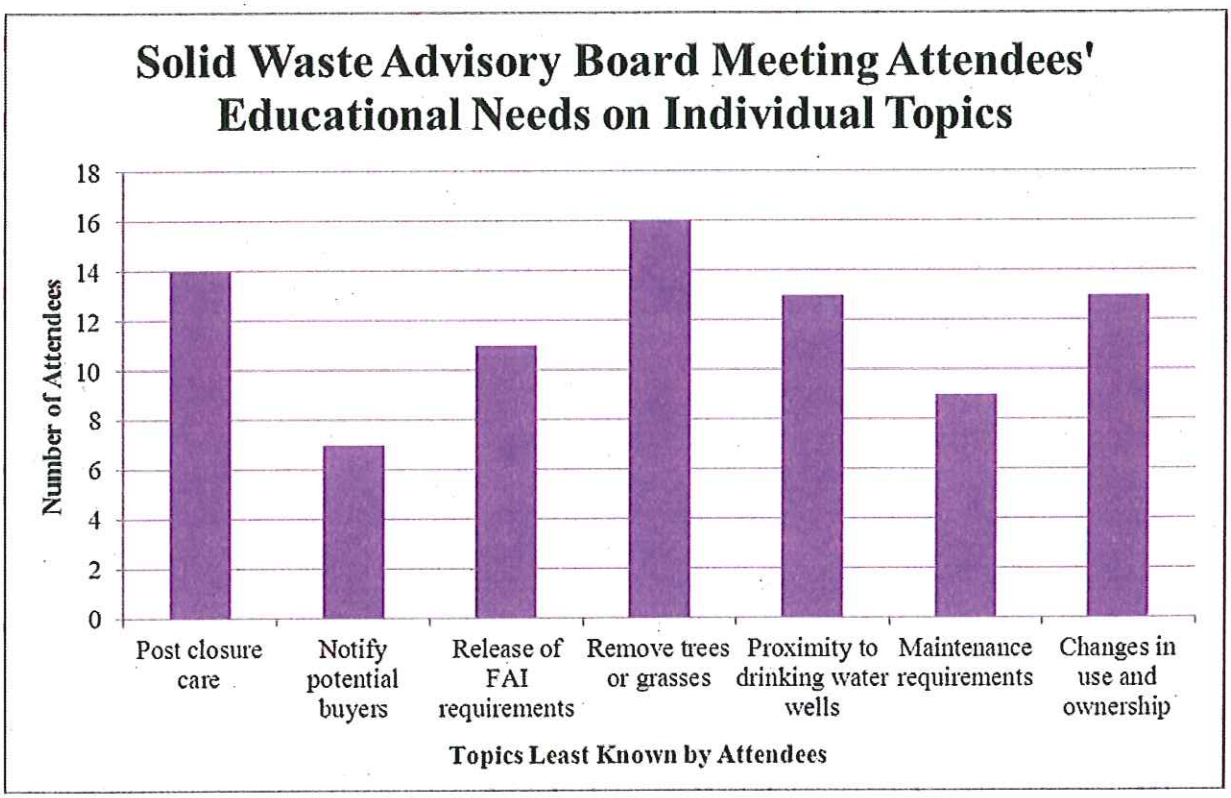

Figure 6

- Landfill Responsible Parties

In early December 2011, we sent evaluation reports to the parties responsible for the landfills chosen as a part of the Grant project. The reports were sent to parties responsible for some aspect of the maintenance and care of the permitted landfills. We followed up with a telephone conference call to these parties to discuss the findings of the report, answer any questions the reports may have prompted, discuss future corrective actions needed, and conduct a short survey. The surveys inquired whether or not the

parties had familiarity with the landfill, with waste decomposition processes, and with landfill maintenance and care requirements.

Fifty-five (55) calls were made concerning 48 landfills. Messages were left for 9 people, with a request for a return call, and three people either never answered or had no answering machine or service to leave a message. Forty-one (41) surveys were completed, and two were left incomplete due to time constraints on the part of the responsible parties. Thirteen (13) questions were asked on topics such as their historic knowledge of the landfill, whether or not they had walked around the landfill, knew about waste decomposition processes, were familiar with regulatory requirements for site care, modification of the landfill property, and the requirement to disclose the presence of the landfill during a sale. An affirmative answer to the questions asked meant that the landfill owner or caretaker had knowledge of the landfill site, regulatory requirement, or decomposition processes or products.

We reviewed the information provided in the 41 surveys and found that the majority of landfill owners or caretakers were generally familiar with their sites and with the department's requirements for maintenance, administrative actions, and disclosure requirements when planning to sell the property (see Figure 7).

The survey revealed that most of the caretakers knew at least one-half of the topics we discussed with them, with 35 out of 41 of those polled being familiar with at least 8 of the 13 topics. Even more encouraging was that 25 out of 41 (or 61%) of those surveyed responded affirmatively in 10 out of 13 questions posed to them about their knowledge of regulatory requirements, waste decomposition topics, or the landfill itself. This was encouraging news when we took into account that many of the landfill owners or caretakers are relatively new to these sites. There have been a number of turnovers in landfill ownership in the last decade or so at these sites, so it was reassuring to learn that many of these new responsible parties are attempting to familiarize themselves with what steps are needed to properly care for these sites.

The graphs (Figures 7 and 8) also tell us where more educational efforts and information are needed by the landfill owner or caretaker. Examined below in greater detail are the topics which were unfamiliar to the responsible parties.

When we looked in greater detail at the landfill caretakers' and/or responsible parties' responses to individual survey questions, we found that there were areas of greater comprehension and also areas where we need to increase our educational efforts for this group (see Figure 8). It was encouraging to hear from the respondents that 39 out of 41 (95%) of the responsible parties had been to the landfill and walked around it to familiarize themselves with the site. Familiarity with the responsibilities and requirements when owning a landfill dropped off after that point. When asked, 80 percent of the caretakers were familiar with methane gas, but an affirmative response to this question did not necessarily indicate that the caretakers were familiar with the problems associated with methane from a landfill perspective. Regardless of the source

of their information, they were more cognizant of the explosive nature of the gas and the potential for risk to human health and safety.

Three-quarters of the polled caretakers were also familiar with the statutory requirement that anyone selling a property with a landfill on it must disclose its presence to the potential buyers early in the sale negotiations. This was also an encouraging finding to counter our concern that many of the caretakers were not the original owner or operator of the landfill, but someone who either inherited or bought the landfill after it closed. Over half of the responsible parties were familiar with the remaining subjects discussed with them during the conference calls and survey. The two topics that were not as familiar to the respondents were the definition of leachate and the department's requirement that modifications to the landfill are not supposed to be made without prior approval by the program. These two subjects tend to require greater knowledge and understanding of waste decomposition and the statutes and regulations concerning solid waste management in Missouri. This information may not be generally familiar to those not involved with the solid waste management industry.

As with the results from the MWCC Conference and Solid Waste Advisory Board meeting, we will use the survey information to target educational efforts in the future to reach the landfill owners and caretakers with needed information. In doing so we can ensure these people have a better idea of their role in providing better and timely maintenance and reducing the frequency of complex or harmful problems at these rural landfill sites. This will, in turn, reduce the frequency and number of public safety issues and environmental problems caused by the sites in our rural communities.

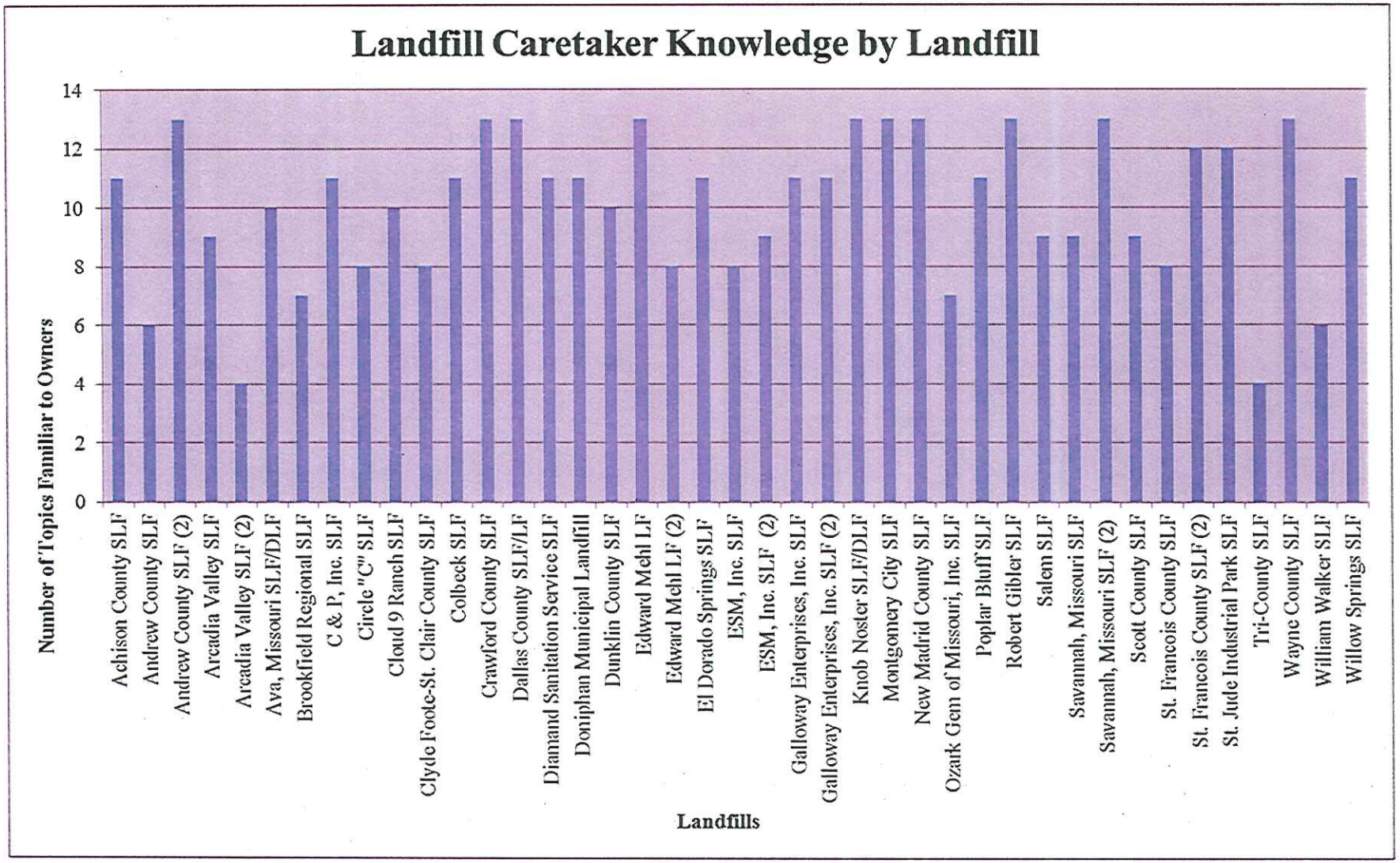
Landfill Caretaker Knowledge by Landfill
Number of Topics Familiar to Owners
0
2
4
6
8
10
12
14
Achison County SLF
Andrew County SLF
Andrew County SLF (2)
Arcadia Valley SLF
Arcadia Valley SLF (2)
Ava, Missouri SLF/DLF
Brookfield Regional SLF
C & P, Inc. SLF
Circle "C" SLF
Cloud 9 Ranch SLF
Clyde Foote-St. Clair County SLF
Colbeck SLF
Crawford County SLF
Dallas County SLF/LF
Diamand Sanitation Service SLF
Doniphan Municipal Landfill
Dunklin County SLF
Edward Mehl LF
Edward Mehl LF (2)
El Dorado Springs SLF
ESM, Inc. SLF
ESM, Inc. SLF (2)
Galloway Enterprises, Inc. SLF
Galloway Enterprises, Inc. SLF (2)
Knob Noster SLF/DLF
Montgomery City SLF
New Madrid County SLF
Ozark Gem of Missouri, Inc. SLF
Poplar Bluff SLF
Robert Gibler SLF
Salem SLF
Savannah, Missouri SLF
Savannah, Missouri SLF (2)
Scott County SLF
St. Francois County SLF
St. Francois County SLF (2)
St. Jude Industrial Park SLF
Tri-County SLF
Wayne County SLF
William Walker SLF
Willow Springs SLF
Landfills

Figure 7

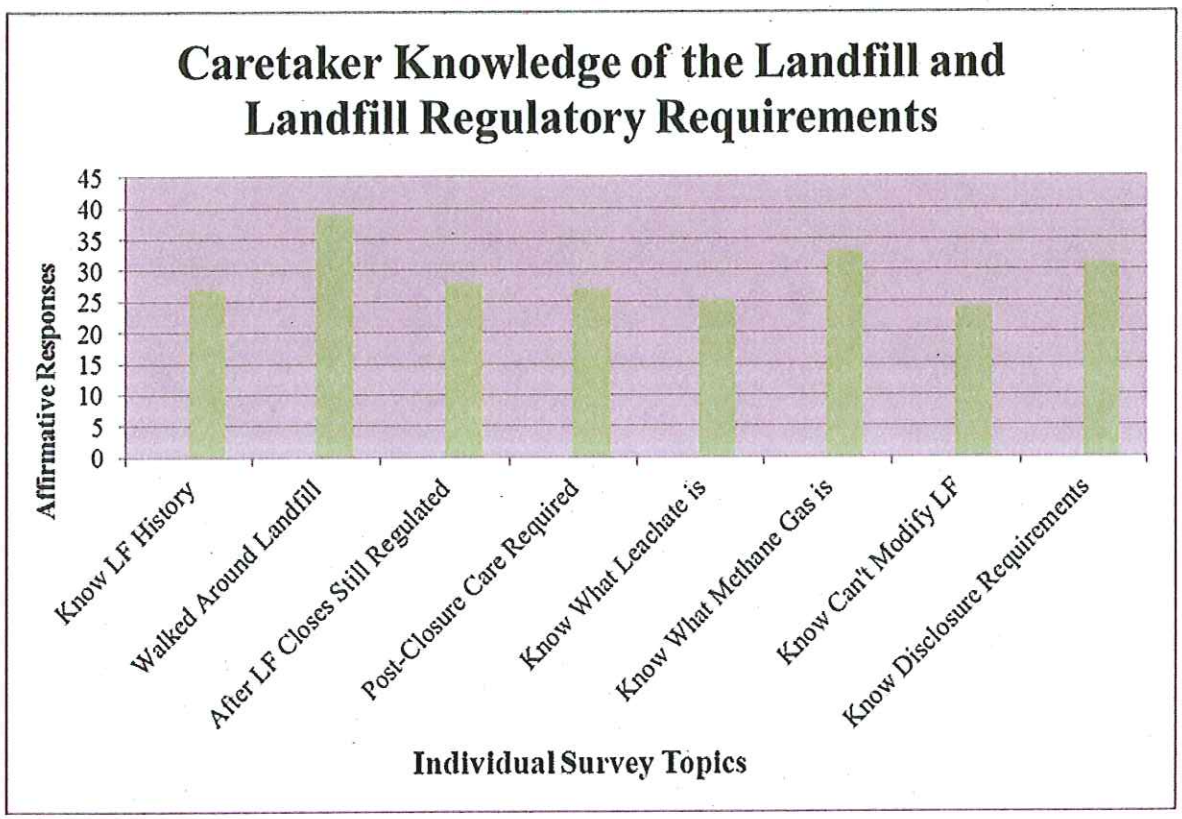

Figure 8

Project Benefits

The department is appreciative of the opportunity we have had to partner with the United States Department of Agriculture Rural Development – Utilities Program to accomplish this work. This project has benefitted rural citizens and communities, as well as the efforts of the department, in several ways. Some of these are as follows:

- Landfill owners have learned key information about the landfill they own, its history, its problems, knowledge of regulatory requirements to maintain the site or perform any other necessary corrective actions, and that the program is a resource to assist them in dealing with their landfill.
- Three fact sheets and a maintenance checklist were developed that are available to the public and will continue to be disseminated by the department.
- All legal descriptions on filed documents were checked and several were found to be incorrect. Incorrect documents will now be corrected and re-filed.
- County collectors in 37 rural counties have learned landfills are present in their counties, and that they need to disclose information to the public if one of the properties is for sale.
- The standardized informational packet that was developed for the county collectors was also mailed by the program to the remaining 49 counties that have landfills.
- Members of the solid waste management industry, county governments, municipalities, and the Solid Waste Management Districts have learned more about closed landfills and our concerns about them.
- Accurate ownership of these old landfills was determined and contact information obtained.

- Site histories were compiled from several sources and documented for future reference.
- Many missing historical documents were located.
- Some sites that never received official closure will now be able to receive closure.
- A standardized form was developed to assist in any future reviews of older closed landfills.
- The program and regional offices have learned more about these older sites and the condition of these landfills after being closed for 25 to 35 years.

And, most importantly, through the education of the responsible parties, landfills will be better managed, thus ensuring the safety of Missouri's rural citizens, better protecting rural Missouri's water resources and achieving the goals of the Grant.

Considerations for Similar Projects

- If a similar project were to be completed in the future, we would plan more time on the front end researching the sites and compiling the information from state records and outside sources prior to starting the on-site assessments. To be most effective, we scheduled the site assessments to start prior to poor weather (cold and snow) setting in and to end prior to a lot of vegetative growth on the sites. However, scheduling the site assessments like this reduced the time available for necessary pre-site assessment research.

- We had originally planned to meet personally with each landfill owner or responsible party to discuss the results of the evaluation. As the site evaluations proceeded, several of these people met with us on-site. The evaluations also revealed more issues and problems to resolve than originally anticipated and will require additional follow-up after the Grant ends. We have already conducted follow-up on sites where we were especially concerned due to the potential for public safety problems, for example, where we documented methane gas migration. We were also contacted by some landfill owners who needed our assistance prior to the end of the Grant. We then decided that the prudent use of time and money would be to send the reports out, give the parties a chance to review the contents of the report, and follow-up by phone to discuss the report and the expectations and need for any corrective actions. After the close of the Grant, we plan to continue working with these owners in order to assist them with their sites to ensure they return to compliance and public safety concerns are addressed. We believe this change to our original plan would result in the most efficient way to do a similar project in the future.

- The owner surveys were not completed as originally envisioned. We had planned to use two separate surveys to address two different audiences. During calls to obtain access to the site, the person we had planned to survey was not always the person who was available so another authorized person granted us access to the site. It also became evident that contact with the appropriate person to complete a survey might prove to be a real challenge; some owners are only available evenings or weekends, while county commissioners are usually only available two mornings a week. We felt that it was a better use of time to conduct the assessments, send the reports out, call to discuss the results, and at the end of the call conduct a survey with the person ultimately responsible for the landfill property. This single survey was then designed to assess what they had learned as a result of the grant project and basically combined the pre- and post-survey instruments. For a similar project, we would revise our plan to incorporate only the combined survey instrument.

Follow-up Work Planned

- A press release describing the completed Grant will be written and released to the public (Task 22).
- The Final Report with all Appendices will be placed on the program's webpage (Task 22).
- Evaluation reports will be sent to the 7 landfills where assessments were completed but where the responsible party has yet to receive, review and discuss with us the Final Report.
- Follow-up calls and site visits will be conducted as necessary to assist the landfill owners to improve their properties and return to compliance.
- Residents who live adjacent to landfills will receive informational letters about methane gas.
- Residents who own wells next to landfills will receive an assessment of their well from the Department's Division of Geology and Land Survey to determine if there is any safety concern associated with the well.
- An article will be submitted for possible publication in the Missouri Association of Counties quarterly magazine.
- An article will be submitted for publication in the Missouri Department of Natural Resources' quarterly magazine, called Missouri Resources.
- A presentation about the Grant will be given in June 2012 at the Midwest Environmental Enforcement Association's 2012 Summer Conference in Jefferson City, Missouri.

Appendices

A. Inventory of Educational & Technical Assistance Materials
(Task 1)

B. Standardized Form for File Reviews and Site Assessments
(Tasks 2 and 3)

C. Survey for Use at Conference Presentations
(Task 3)

D. Survey for Use with Landfill Owners
(Task 3)

E. Landfill Owner's Maintenance Guide and Checklist
(Task 6)

F. Final List of Landfills Assessed
(Task 8)

G. Schedule of Site Assessments
(Task 9)

H. Press Release Announcing the Project
(Task 10)

I. Landfill Evaluation Reports
(Tasks 15 and 17)

J. Informational Packets for County Collectors
(Tasks 17 and 19)

K. Presentation Given at Missouri Waste Control Coalition Conference and Solid Waste Advisory Board
(Task 14)

L. Program Webpage Describing the Grant Project with Links to Final Report
(Task 24)