

# **Economic Impact Analysis of Proposed Other Solid Waste Incinerator Regulation**

## **Draft Report**

Prepared for

**Tom Walton**

U.S. Environmental Protection Agency  
Office of Air Quality Planning and Standards  
Innovative Strategies and Economics Group  
MD-15  
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This report contains portions of the economic impact analysis report that are related to the industry profile.

## SECTION 3 INDUSTRY PROFILES

This section profiles the industries with the largest number of affected facilities. Included are profiles of the death care, veterinary, and medical research industries.

### **3.1 Death Care Industry**

The U.S. death care industry is comprised of three basic segments: funeral directors, crematories, and cemeteries. Many firms cross over into each market segment, maintaining one or more funeral homes, crematories, or cemeteries. Combinations are commonplace (Zrinsky, 1998). Funeral directors and crematories (SIC 7261) are the primary death care providers in the United States. Firms prepare the dead for burial, conduct and organize funerals, facilitate burial arrangements, and cremate the dead. Funeral homes are also retail establishments that sell caskets, burial clothing, and other funeral products. Cemeteries (SIC 6553) develop property that is to be subdivided and resold to consumers. Traditionally, funeral directors transfer the deceased to a cemetery following memorial services. However, cremation is becoming more popular, particularly in New England and on the West Coast. In addition to crematories, many funeral homes and cemeteries offer cremation services.

The funeral services and crematories industry generates revenue of more than \$9 billion a year (see Table 3-1). In real terms, the annual revenues for the funeral services and crematories industry have grown steadily through the 1990s at an average rate of about 3 percent a year. The growth in revenues in the death care industry is likely to continue because the U.S. Bureau of the Census projects that deaths will grow at approximately 1 percent a year through 2010. The increasing number of deaths and new marketing ideas for increasing the demand for cremation should encourage the industry's revenue growth (Zrinsky, 1998). Annual sales information for the cemetery industry is unavailable; however, the first Census of Financial, Insurance, and Real Estate Industries in 1992 estimated the cemetery industry's receipts to be approximately \$2.2 billion.

**Table 3-1. Annual Revenues: Funeral Services and Crematories (1992 \$MM)**

Year	Funeral Services and Crematories (SIC 7261)
1988	7,352.6
1989	7,240.1
1990	7,328.9
1991	7,333.6
1992	7,588.0
1993	7,958.2
1994	8,113.5
1995	8,688.7
1996	8,974.9
1997	9,295.9

Source: U.S. Department of Commerce, Bureau of the Census. 1999. *Service Annual Survey: 1997*. Washington, DC: U.S. Government Printing Office.

### **3.1.1 Supply Side**

#### *3.1.1.1 Cremation Process*

There are many different classes of crematories; however, the technology employed by each unit-type is essentially the same. The technology has changed little in the latter half of the twentieth century (Barry, 1994). Crematories vary according to size and capacity. They are typically large, front-loaded units that weigh between 20,000 and 30,000 pounds. Combustion takes place in two chambers at an average rate of 100 to 150 pounds per hour. Crematories use natural gas, electricity, and propane to power the unit and facilitate the combustion process.

The primary chamber is preheated to about 700 °C. The body is enclosed in a combustible container, such as a wooden coffin, cardboard box, or plastic bag. The operator increases the temperature to between 900 and 1,100 °C. The body stays in the primary chamber between 1 and 2 hours, depending on body size (Barry, 1994). After the remains have cooled, the bones are crushed to the consistency of coarse sand. Finally, all the remains are placed in either an urn or a plastic bag for transport.

### *3.1.1.2 Types of Output*

Cremated human remains, or “cremains,” are of about the same consistency as sand. After the cremains are removed, the ash is set aside and the bones pulverized. Both powders are then mixed and placed in an appropriate receptacle. If the cremains are not immediately placed in an urn, they are carefully packaged in a plastic bag encased in a plain cardboard box. Depending on the size of the body, cremation results in 3 to 9 pounds of cremains (NFDA, 1999a).

### *3.1.1.3 Major By-products and Co-products*

Incineration of human remains is a sensitive topic. Crematory manufacturers and operators take pains to ensure that crematory operation results in no odors or visible emissions. Most people who live or work near a crematory are unaware of its presence (Gaudet, 1999).

By-products from human cremation vary according to the composition of the body being cremated. For example, if the person had a hip replacement, or if other inorganic materials were inserted in the body during his or her lifetime, there may be emissions from these materials as they combust and react with other agents in the primary chamber. According to crematory stack test results supplied by Industrial Equipment and Engineering Co., by-products emissions include particulate matter, carbon monoxide, nitrogen oxides, volatile organic compounds, and hydrochloric acid (Gaudet, 1999).

### *3.1.1.4 Cost of Service Provision*

The growth in the death care industry’s expenses has outpaced the growth in the industry’s annual revenues. From 1987 to 1992, the industry’s value of shipments grew about 3.2 percent, while the operating expenses and payroll grew nearly 20 percent (see Table 3-2). Operating expenses include costs such as utilities, supplemental labor expenses, depreciation charges, leases, taxes, and other miscellaneous expenses. The growth in operating expenses has encouraged disinvestment by individual families. Firms with multiple facilities can cut down on costs by pooling resources, such as equipment and specialized labor, for areas where funeral homes and cemeteries are in a central location (Zrinsky, 1998).

**Table 3-2. Costs: Funeral Services and Crematories (1992 \$MM)**

<b>Cost Description</b>	<b>1987</b>	<b>1992</b>
Operating Expenses	4,171	4,922
Annual Payroll	1,615	2,109
Acquisition Value of Depreciable Assets	3,887	4,622
Capital Expenditures	548	465

Source: U.S. Department of Commerce, Bureau of the Census. 1995. *1992 Census of Service Industries, Subject Series: Capital Expenditures, Depreciable Assets, and Operating Expenses*. Washington, DC: U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of the Census. 1991. *1987 Census of Service Industries, Subject Series: Capital Expenditures, Depreciable Assets, and Operating Expenses*. Washington, DC: U.S. Government Printing Office.

### **3.1.2 Demand Side**

Cremation is the second most common method of disposition in the United States and gains in popularity every year. It is the most common option in Japan, India, England, and other countries (NFDA, 1999a). For most individuals, the selection of cremation is motivated by religious practice and cultural preference. Additional reasons for choosing cremation over traditional burial are lower cost, ease, more options for memorialization, and environmental considerations.

Cremation is generally less expensive than traditional burial. The National Funeral Directors Association (1999b) estimates the average cost of a traditional funeral to be \$4,782. This price does not include cemetery charges, such as grave space, burial fees, monuments, or markers, which generally add thousands to the final cost. Cremations, on the other hand, average \$1,200 (Zrinsky, 1998). Although cremation is typically perceived to be a wholly different form of service, most firms provide elements from the traditional burial service. For example, memorial services, where the body is viewed in a rented casket, are becoming more common. Based on information from the Cremation Association of North America, the actual cremation service itself costs approximately \$110 to \$150 (Springer, 1999). Also, many people who pre-plan and pre-pay for their funeral services select cremation.

Some consumers perceive cremation to be simpler than traditional burial, and this simplicity appeals to a growing share of the market (Zrinsky, 1998). There are fewer transactions in the cremation process; a consumer may only have to interact with a funeral director rather than with cemeteries and other agencies. Funeral directors provide most legal services as part of the cremation fee, reducing the burden on families.

Cremation also provides more options for memorialization. Remains can be stored in an urn at someone's home, a cemetery, or mausoleum. The remains can also be scattered at sea, in a park, or at other locations (where permitted by law) per the deceased's request. Finally, cremated remains do not require the relatively large burial plots needed for traditional burial, reducing the cemeteries' pressure on the environment. When cremains are buried, the individual plot is significantly smaller than the plot used in traditional burial.

### ***3.1.3 Organization of the Industry***

In 1998, there were 1,305 crematories in the United States. According to the Cremation Association of North America (CANA), 80 percent are operated by funeral homes and cemeteries (Springer, 1999). It is common for firms to offer services beyond their primary business, such as a funeral home operating a cemetery or providing cremation service. According to the 1992 Census of Service Industries, over 15,600 funeral directors operated in 1992. The NFDA estimates, however, that more than 22,500 firms provide funeral services (Zrinsky, 1998). Because the Census focuses on firms' primary business, firms that provide funeral services as a secondary business are not included in the census counts.

The funeral services and crematories industry is largely family owned and operated. Nearly 85 percent of all funeral homes are individually owned. Because most funeral homes have historically been operated as family businesses, the average firm has been operating for 47 years. It is not uncommon for a firm to be more than 100 years old. However, changes in tax laws, an increase in federal regulations and monitoring, and large corporations eager to expand are eroding the traditional family-business nature of funeral services (Zrinsky, 1998). Service Corporation International, Loewen Group, and Stewart Enterprises, the largest death care firms in North America, aim to increase profits by acquiring funeral homes and crematories in one area and creating central processing points, while maintaining local flavor and management (see Table 3-3).

Approximately 75 percent of funeral homes are classified as small, according to guidelines published by the Small Business Administration (SBA) (Springer, 1999). The

**Table 3-3. The Largest Death Care Companies in North America**

<b>Company</b>	<b>Sales</b>	<b>Employment</b>	<b>Funeral Homes</b>	<b>Cemeteries</b>	<b>Crematories</b>
Service Corporation International	2,468.0	35,000	2,882	345	150
Loewen Group	1,114.1	16,000	984	350	NA
Stewart Enterprises	532.6	9,300	308	120	NA

NA: Not available.

Source: Zrinsky, Christine. 1998. "Funeral Service and Crematories." *Encyclopedia of American Industries, Second Edition, Volume II*. Scott Heil and Terrance Peck, editors. Detroit, MI: Gale Research, Inc.

SBA classifies funeral service and crematory firms as small if the entire corporate group's revenues are less than \$5 million annually. Table 3-4 presents the number of employees and facilities by revenue for the funeral services and crematories industry for 1987 and 1992. Relatively few facilities earned more than 1 million dollars annually, although the number has increased since 1987. Between 1987 and 1992, the number generating more than 1 million dollars a year increased by over 500 to 1,270. On average, each facility employs five to six employees; however, the number of employees is directly related to annual revenues. Most funeral homes perform about 180 services per year (Zrinsky, 1998). The typical crematory unit performs 430 cremations per year (CANA, 1998); it is common for units to be shared by several homes or for funeral homes with crematory units to contract cremation services to those without units.

Although the Bureau of the Census reports that the United States has nearly 6,500 cemeteries, the industry's trade association estimates that there are actually between 75,000 and 100,000 (Schneider, 1998). Cemeteries and memorial parks may either be stand-alone entities or located at a church or other establishment. They are managed on both a for-profit and a not-for-profit basis. In 1992, 40,102 people were employed by cemetery developers (see Table 3-5). As with funeral services and crematories, the number of employees per facility is directly related to the establishment's annual revenues. As annual revenues increase, the average number of employees also increases.

**Table 3-4. Funeral Service and Crematory Establishments**

Annual Receipts	1987		1992	
	Number of Facilities	Total Number of Employees	Number of Facilities	Total Number of Employees
\$10,000,000 or more	6	582	7	1,549
\$5,000,000 to \$9,999,999			16	1,070
\$2,500,000 to \$4,999,999	53	2,253	92	2,950
\$1,000,000 to \$2,499,999	645	12,364	1,155	17,845
\$500,000 to \$999,999	2,331	22,075	3,272	25,879
\$250,000 to \$499,999	4,589	25,098	5,102	23,808
\$100,000 to \$249,999	4,797	15,238	3,850	10,632
\$50,000 to \$99,999	1,422	2,628	787	1,476
\$25,000 to \$49,999	615	252	264	357
\$10,000 to \$24,999	216	205	90	83
Less than \$10,000	27	4	33	29
Facilities not operated entire year	843	1,432	979	2,740
<b>Total</b>	<b>15,544</b>	<b>82,631</b>	<b>15,647</b>	<b>88,328</b>

Source: U.S. Department of Commerce, Bureau of the Census. 1995. *1992 Census of Service Industries, Subject Series: Establishment and Firm Size (Including Legal Form of Organization)*. Washington, DC: U.S. Government Printing Office.

**Table 3-5. Cemeteries (1992)**

<b>Annual Receipts</b>	<b>Number of Facilities</b>	<b>Number of Employees</b>
\$10,000,000 to \$24,999,999	10	1,129
\$5,000,000 to \$9,999,999	39	2,697
\$2,500,000 to \$4,999,999	103	4,541
\$1,000,000 to \$2,499,999	407	9,586
\$500,000 to \$999,999	538	6,391
\$250,000 to \$499,999	676	5,036
\$100,000 to \$249,999	995	4,302
\$50,000 to \$99,999	771	1,960
\$25,000 to \$49,999	680	1,320
\$10,000 to \$24,999	831	1,328
Less than \$10,000	645	683
Facilities not operated entire year	795	1,129
<b>Total</b>	<b>6,490</b>	<b>40,102</b>

Source: U.S. Department of Commerce, Bureau of the Census. 1995. *1992 Census of Financial, Insurance, and Real Estate Industries, Subject Series: Establishment and Firm Size (Including Legal Form of Organization)*. Washington, DC: U.S. Government Printing Office.

### **3.1.4 Markets and Trends**

Cremation's growth as a popular and acceptable method of disposition is expected to continue. According to a study sponsored by CANA (1998), in the 10 years between 1987 and 1997 the number of cremations per year increased from 15.2 percent of all deaths to 23.6 percent. At this rate of growth, CANA estimates that approximately one-third of the deceased in 2010 will be cremated.

Cremation is the fastest growing market in the death care industry (Zrinsky, 1998). Table 3-6 compares the estimated growth in the number of crematories and annual cremation rate. CANA anticipates a greater than 50 percent increase in the cremation rate between 1996 and 2010. To meet growing demand, the number of crematories is expected to grow by 58

**Table 3-6. Estimated Growth in Number of Cremations and Crematories**

Year	Percentage of Deceased Cremated	Number of Crematories
1996	21.37	1,205
1997	23.59	1,256
1998	23.78	1,305
2000	25.41	1,407
2010	33.22	1,907

Source: Cremation Association of North America (CANA). 1998. *1996/97 Cremation Container, Disposition, and Service Survey*. Chicago, IL: Cremation association of North America.

percent. The areas with the largest growth are Texas, California, Louisiana, the Prairie states, Florida, and the Carolinas.

CANA's 1998 study identified several trends influencing the growth in the demand for cremation services:

- People are living longer. In 1997, a man could expect to live just over 73 years, a woman about 80 years. A longer-living and large elderly population will force a change in customs and education.
- The death rate will be higher as the baby boomers move into their golden years, increasing the demand for funeral services.
- The elderly are migrating to retirement locations. As people relocate to retirement locations, such as Arizona, California, and Florida, they lose ties with their home communities. Traditional burials are often more for the benefit of the living (relatives) than as a homage to the dead because they provide a forum for survivors to grieve and to begin to recover from the loss of a loved one (NFDA, 1999a). Elderly people in retirement areas have few ties to the local community, and any relationships formed are generally with people of their own demographic group. In retirement communities, cremation is considered a dignified, economical method for disposing of human remains.
- The origins of immigrants are changing. Immigrants from cultures where cremation is considered the best and most appropriate form of disposition, such as India and East Asia, and their descendants generally choose cremation once they settle in the United States.

- The education level is rising. As society becomes more educated, the need for complicated, traditional services diminishes (Zrinsky, 1998). The educated consumer seeks more simplistic methods of disposing of the body. Also, pre-planning and pre-paying for funeral services is becoming quite common. Individuals paying for their own funeral may select cremation as the least expensive and least troublesome method. Cremation is both the simplest and generally the most cost-effective service. By 2010, cremation will be more popular than traditional burial services in the Pacific and Mountain states and in New England (CANA, 1998).
- Cremation is more acceptable as a normal form of disposition. Funeral directors hold a more favorable opinion of cremation now because the costs of providing traditional burial services and merchandise have risen. Cremation services require lower overhead, possibly increasing the profit margin (Zrinsky, 1998). Educated customers are more interested in simple services and would like to save money.
- Cremation reduces land pressure from cemeteries. About two-thirds of cremated remains are either buried or placed in a mausoleum. Burying cremated remains or placing them in a niche at a mausoleum reduces the amount of land required to inter one person; therefore, the pressure cemeteries place upon the environment decreases. This trend is especially significant where open space is scarce and only available at a premium, such as metropolitan areas and mountainous regions.

### **3.2 Veterinary Industry**

The U.S. veterinary industry (SIC 07) provides medical and other care services for more than 300 million dogs, cats, fish, livestock, birds, and other species. Table 3-7 presents the number of, and types of species cared for by veterinarians and their support technicians. The veterinary medical industry can be subdivided into livestock veterinarians (SIC 0741), companion animal veterinarians (0742), and other veterinary services (0752), such as pet cemeteries and crematories. Although animal care providers include publicly funded animal shelters, zoological parks, and animal control units, this profile concentrates on private-sector practices, categorized under SIC 074 and 075, because they comprise an overwhelming majority of the industry. Private veterinary clinics and pet cemeteries and crematories operate the majority of animal cremation units.

Livestock veterinarians help maintain the quality of the American food supply by caring for food animals. Practices focus on treating injuries, providing vaccinations against the spread of disease, and caring for diseased livestock. The latter two services are the most

**Table 3-7. Companion Animal and Livestock Population, 1996 (millions)**

	1991	1996
Companion Animals		153.5
Dogs	52.5	52.9
Cats	57.0	59.1
Birds	11.0	12.6
Horses	4.9	4.0
Rabbits	4.6	5.9
Reptiles	2.0	2.6
Rodents	3.9	4.8
Livestock	3.4	6.0
Others	5.8	5.6
Livestock		677.4
Cattle and Calves		101.3
Hogs and Pigs		55.9
Sheep		7.9
Chickens		303.2

Source: American Veterinary Medical Association, Center for Information Management. 1997. *U.S. Pet Ownership and Demographics Sourcebook*. Schaumburg, IL: American Veterinary Medical Association.

important because each year the livestock industry loses \$3 billion in livestock to disease. Preventative medicine is integral to maintaining ranch and farm productivity and profitability (Lesser, 1998).

Companion animal veterinarians care for household pets and horses, focusing on animal health and protecting humans and pets from animal-borne diseases like rabies. Over 45,000 veterinarians provide services such as vaccination, dentistry, surgery, and routine health care for the U.S. pet population at about 20,000 animal hospitals and clinics.

When animals die they might be cremated at veterinary practices or at special animal cemeteries and crematories. Many veterinary practices operate animal crematories onsite to

provide memorial services for a family pet or to cremate the remains of diseased and abandoned animals. Often pet crematories operate as subcontractors, cremating large numbers of animals for fees paid it by veterinary clinics or other organizations. Pet crematories operate in similar fashion to human crematories; animal remains are cremated and then placed in an urn for a keepsake or for scatter or burial. If the animal is not a family pet, it may be cremated along with a number of other species in mass disposal operations. This practice is more typical for abandoned animals and livestock, such as chickens.

More than 26,000 veterinary clinics and hospitals operate in the United States. According to the American Veterinary Medical Association, in 1998 the average establishment generates \$422,221 in annual revenues from medical services, retail sales of pet products and pharmaceuticals, and other services, such as cremation (see Table 3-8). The market for veterinary services is valued at approximately \$11 billion a year.

**Table 3-8. U.S. Veterinary Practices, 1998**

Type of Practice	Number	Percent	Number of Vets per Practice	Mean Gross Practice Revenue
Large Animal Exclusive	1,078	4.1	2.03	448,412
Large Animal Predominant	1,871	7.2	2.53	523,214
Mixed Animal	1,553	5.9	2.43	459,239
Small Animal Predominant	3,313	12.7	2.01	430,164
Small Animal Exclusive	15,880	60.7	1.82	420,813
Equine	1,234	4.7	1.65	325,204
Unclassified	1,224	4.7	1.54	277,058
Total	26,153	100.0	1.92	422,221

Source: American Veterinary Medical Association, Center for Information Management. 1998. "Veterinary Market Statistics—U.S. Veterinarians." <<http://www.avma.org/cim/vstat1.htm>>. As obtained April 26, 1999.

Between 1985 and 1993 the median veterinary practice revenue increased 75 percent (see Table 3-9). The industry's growth is attributed to the growth in the number of companion animals and the increased variety of services. More households are keeping animals as pets, increasing the demand for routine medical procedures and animal surgery. In addition, large animal veterinarians are increasing as the number of cattle and other food animals in the U.S. grows (Lesser, 1998). A third factor is veterinary health insurance.

**Table 3-9. Median Gross Practice Revenue, 1985 to 1995 (1995 \$MM)**

Year	Median Gross Revenue
1985	264,162
1987	272,077
1989	296,168
1991	304,095
1993	352,557

Source: American Veterinary Medical Association (AVMA), Center for Information Management. 1994. *Economic Report on Veterinarians and Veterinary Practices*. Schaumburg, IL: American Veterinary Medical Association.

Insurance providers have devised animal health care plans structured in the same way as human health care plans. Health insurance allows owners to provide comprehensive, long-term care and surgery to debilitated pets rather than resorting to euthanasia.

### **3.2.1 Supply Side**

#### *3.2.1.1 Veterinary Cremation Process*

There are many different classes of veterinary crematories; however, the technology employed by each unit-type is essentially the same. Crematory technology has changed little in the latter half of the twentieth century. Crematories are typically large, front-loaded or automatic feed units that weigh between 15,000 and 20,000 pounds. Remains are combusted in two chambers at an average rate of 75 to 450 pounds per hour (Crawford Equipment, 1999). Capacity varies according to the size of the animal being cremated; livestock and horse crematories are generally larger than units used for dogs and cats. Some units employ automatic feed technology if the facility cremates large numbers of animals on a regular basis. Crematories use natural gas and propane to facilitate the combustion process.

Animal cremation units operate in the same fashion as those for humans. The primary chamber is preheated to about 700 °C. The body is either enclosed in a combustible container, such as a cardboard box or plastic bag, or the body is placed directly into the unit. The operator increases the temperature to between 900 and 1,100 °C. The body stays in the primary chamber between 1 and 3 hours, depending on the number and size of the bodies. After the remains have cooled, the bones are crushed to the consistency of coarse sand if the

remains are to be given to the pet owner. Otherwise, the operator disposes of the resultant ash, according to guidelines published by health officials.

### *3.2.1.2 Types of Output*

Cremated animal remains are about the same consistency as sand. The ash generated during the cremation process is very fine, but bones do not combust. For pet owners, the ash may be set aside and the bones pulverized. Both powders are then mixed and placed in an urn. If the cremated remains are not immediately placed in an urn, they are carefully packaged in a plastic bag encased in a plain cardboard box. Cremated remains from multiple cremations are disposed of according to local and state regulations.

### *3.2.1.3 Cost of Service Provision*

It is unclear what percentage of veterinary practices' expenses can be attributed to animal cremation. For animal crematories and cemeteries, these costs are most likely the most significant. Variable costs directly associated with cremating animals are primarily limited to energy costs and the amount of maintenance required. Energy costs in animal cremation include the amount of natural gas or propane that may be used to facilitate combustion and the electricity used to operate the unit. Larger animals are more expensive to cremate because of the amount of time and energy needed.

Information on typical practice expenses is available. In 1998, the average practice's expenses, which excludes the practice owner's salary, were approximately two-thirds of practice revenue, or about \$282,000 (AVMA, 1999). Expenses include labor-related expenses, equipment, products purchased for resale, laboratory fees, and facilities expenses.

## **3.2.2 Demand Side**

Two factors generate the demand for animal cremation services: pet memorialization and economical disposal of the remains of abandoned and diseased animals. Many owners view their pets as intimate members of the family unit and choose to honor their pets' passing in a similar fashion to departed relatives (Heil & Peck, 1998). After a pet dies, the owner may arrange to have the body cremated by their veterinarian or by a pet cemetery or crematory. The cremation service provider will return the ashes to the owner in an urn. Those pet crematories located at pet cemeteries usually offer onsite scattering services for owners who do not wish to take the ashes home. Pet cemeteries will also bury the cremated remains onsite and provide grave markers for an additional fee.

The price of the cremation service varies according to the size of the animal and to whether the cremation is individual service or a group service. The price for an individual service typically ranges between \$50 and \$175, depending on the size of the animal (see Table 3-10). It is significantly more expensive to cremate large animals, such as horses. If the owner chooses to have his or her pet cremated with other pets in a group service, the price ranges between \$40 and \$100.

**Table 3-10. Animal Cremation Prices**

<b>Animal Size</b>	<b>Individual Cremation Price</b>	<b>Group Cremation Price</b>
25 lbs. and under	\$60	\$45
26 to 50 lbs.	\$70	\$55
51 to 100 lbs.	\$85	\$65
101 to 125 lbs.	\$110	\$75
126 to 150 lbs.	\$135	\$85
Over to 150 lbs.	\$145	\$95
Horses	\$0.60 per pound	

Source: Pet Rest Cemetery and Cremation Service. 1999. "The Cremation Process."  
 <<http://www.petrestcarolina.com/process.htm>>. As obtained on June 21, 1999.

Abandoned and/or diseased animals at veterinary clinics, humane societies, and animal shelters are cremated in groups for reasons of public safety. These dead animals are considered pathological waste and must be disposed of according to state, local, and federal regulations. Cremating these animals is the most cost-effective and safe method of disposing of the bodies.

### **3.2.3 Organization of the Industry**

Most veterinary clinics and hospitals and all pet cemeteries and crematories are either individually owned or a partnership. Veterinarians in private practice comprise about 75 percent of the veterinary medical industry (Heil & Peck, 1998). Two-thirds of the 26,153 veterinary clinics and hospitals serve small animals predominantly or exclusively. The remaining one-third serves either large animals or both small and large animals. These establishments typically employ one to three veterinarians and one or two technicians. The technicians usually double as receptionists and bookkeepers.

Veterinary Centers of America, Inc. (VCA) is the only publicly traded corporation that provides comprehensive medical services to animals. VCA operates 170 centers across the country, and acquired the only other large veterinary medical companies, Pet Practice and Pet Rx, in 1996. VCA's annual revenues are approximately \$280 million. The company regularly purchases practices with annual revenues in excess of \$700,000 (VCA, 1999).

All of the approximately 450 pet crematories and cemeteries are individually owned. In some instances, firms are subsidiaries of a neighboring human cemetery. Pet cemeteries and crematories' staff generally consists of the owner or manager and one or two additional staff members. The staff share all the responsibilities of operating the cemetery and crematory with the possible exception of groundskeeping, which may be outsourced to an independent contractor.

### **3.2.4 *Markets and Trends***

The market for animal cremation will continue to grow at approximately 3.76 percent per year. The number of veterinary practices has increased from 20,200 in 1991 to 26,153 in 1998, and the percentage operating animal cremation units has remained steady. Pet cemeteries and crematories have experienced growth rates similar to veterinary practices. Demand for animal cremations services is expected to increase as the pet and livestock population increases (Heil & Peck, 1998).

### **3.3 *Medical Research and Testing Laboratories***

Many medical research and testing laboratories use animals in their research. Most laboratories that conduct animal testing are located at hospitals, pharmaceutical companies, colleges and universities, diagnostic labs, and biotechnology firms. These research organizations use animals in product development, including pharmaceuticals and cosmetics, and in medical, psychology, public health, and other experiments. Animal testing allows researchers to conduct preliminary clinical trials, to research the effects of chemical compounds on living organisms, and to study behavior under various conditions (Neubauer, 1998). Because the remains of laboratory animals may be pathological and infectious waste, many research organization cremate laboratory animal remains on site after they die.

According to the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, approximately 1.3 million animals are used in laboratories in the United States. Eighty-five to 90 percent of laboratory animals are rats, mice, or other rodents. Dogs and cats make up less than 1 percent of the laboratory animal population, and primates less than one-third of 1 percent (FBR, 1999). In recent years researchers have reduced their use

of dogs and cats in experiments more than they have for any other species. The number of laboratory animals peaked in 1970 and has since dropped over 50 percent (FBR, 1999). The decline in the number of animals being used in experiments may be attributed to public ethical concerns, as well as the growth in alternatives, such as computer models, the expansive body of existing research on animals, and strict government requirements and regulations. Laws prevent researchers from duplicating existing research; the research is only permitted to test on animals if the research adequately justifies the experiment's methods.

Testing laboratories employ the same technologies as veterinary practices when cremating animal remains. Laboratories are more likely to use automatic feeding technologies because of the large number of group cremations and the larger number of animals in each group cremation.

Since 1995, the number of facilities that use animals in their research has increased about 2 percent per year. In fiscal year 1995, 1,200 facilities used animals in their research. The number increased to 1,264 in FY 1996 before dropping to 1,243 in FY 1997 (see Table 3-11). Although the number of facilities that use laboratory animals has increased, the number of sites at those facilities has declined. A site refers to individual laboratories and areas that house laboratory animals; one facility may have numerous sites. The average number of sites per facility was 1.9 in FY 1997, down from 2.25 in FY 1995 (APHIS, 1998).

**Table 3-11. Registered Research Facilities and Sites, FY 1995 through 1997**

<b>Fiscal Year</b>	<b>Total Facilities</b>	<b>Total Sites</b>
1995	1,200	2,688
1996	1,264	2,506
1997	1,243	2,410

Source: U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS). *Animal Welfare Enforcement Report for, Fiscal Year 1997*. Washington, DC: Government Printing Office.

## REFERENCES

- American Veterinary Medical Association (AVMA), Center for Information Management. 1999. "Veterinary Market Statistics." <<http://www.avma.org/cim/vstat1.htm>>. As obtained on April 26, 1999.
- American Veterinary Medical Association (AVMA), Center for Information Management. 1997. *U.S. Pet Ownership and Demographics Sourcebook*. Schaumburg, IL: American Veterinary Medical Association.
- American Veterinary Medical Association (AVMA), Center for Information Management. 1994. Economic Report on Veterinarians and Veterinary Practices. Schaumburg, IL: American Veterinary Medical Association.
- Barry, Matthew. 1994. "Metal Residues after Cremation." *British Medical Journal* 308(6925):390.
- Carroll, Anne. June 16, 1999. American Veterinary Medical Association, Center for Information Management. Personal communication with Alan O'Connor, Research Triangle Institute.
- Crawford Equipment and Engineering Co. 1999. "Animal Cremation/Incineration Equipment." <<http://www.crawfordequipment.com/animal.html>>. As obtained on April 26, 1999.
- Cremation Association of North America (CANA). 1998. *1996/97 Cremation Container, Disposition, and Service Survey*. Chicago, IL: Cremation Association of North America.
- Cremation Association of North America (CANA). 1999.
- Foundation for Biomedical Research. 1999. "Research Facts: Figures on Animal Research." <<http://www.fbresearch.org/amres96.htm>>. As obtained on June 21, 1999.
- Gaudet, Loni M. 1999. "Regulations Affecting the Cremation Industry in Louisiana." <<http://www.epa.gov/ttnsbap1/material/cremate.txt>>. As obtained on April 27, 1999.

- Heil, Scott and Terrance Peck, eds. "Veterinary Services for Animal Specialties." *Encyclopedia of American Industries, 2<sup>nd</sup> Edition*, Volume 2. Detroit, MI: Gale Research, Inc.
- Industrial Combustion Coordinated Rulemaking (ICCR) Advisory Committee. 1998. Data/Information Submitted to the Coordinating Committee at the Final Meeting of the ICCR Federal Advisory Committee. EPA Docket Numbers A-94-63, II-K-4b2 through -4b5 and A-93-11. Research Triangle Park, North Carolina. September 16-17, 1999.
- Lesser, Fran. 1998. "Veterinary Services for Livestock." *Encyclopedia of American Industries, 2<sup>nd</sup> Edition*, Volume 2. Scott Heil and Terrance Peck, editors. Detroit, MI: Gale Research, Inc.
- National Funeral Directors Association (NFDA). 1999a. "Cremation: Consumer Resources." <<http://www.nfda.org/resources/marketplace/brochures/cremation.html>>. As obtained on May 3, 1999.
- National Funeral Directors Association (NFDA). 1999b. "Funeral Price Information." <<http://www.nfda.org/resources/funeralprice.html>>. As obtained on May 3, 1999.
- Neubauer, Joan R. 1998. "Testing Laboratories." *Encyclopedia of American Industries, Second Edition, Volume II*. Scott Heil and Terrance Peck, editors. Detroit, MI: Gale Research, Inc.
- Pet Rest Cemetery and Cremation Service. 1999. "The Cremation Process." <<http://www.petrestcarolina.com/process.htm>>. As obtained on June 21, 1999.
- Schneider, Bob. 1998. "Cemetery Subdividers and Developers." *Encyclopedia of American Industries, Second Edition, Volume II*. Scott Heil and Terrance Peck, editors. Detroit, MI: Gale Research, Inc.
- Springer, Jack M. Executive Director of the Cremation Association of North America. Telephone conversation with Michael P. Gallaher, Research Triangle Institute. April 23, 1999.
- Veterinary Centers of America, Inc. (VCA). 1999. Form 10-K: Annual Report, 1998. Filed with the United States Securities Exchange Commission.

- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS). *Animal Welfare Enforcement Report for Fiscal Year 1997*. Washington, DC: Government Printing Office.
- U.S. Department of Commerce, Bureau of the Census. 1999. *Service Annual Survey: 1997*. Washington, DC: U.S. Government Printing Office.
- U.S. Department of Commerce, Bureau of the Census. 1995. *1992 Census of Financial, Insurance, and Real Estate Industries, Subject Series: Establishment and Firm Size (Including Legal Form of Organization)*. Washington, DC: U.S. Government Printing Office.
- U.S. Department of Commerce, Bureau of the Census. 1995. *1992 Census of Service Industries, Subject Series: Capital Expenditures, Depreciable Assets, and Operating Expenses*. Washington, DC: U.S. Government Printing Office.
- U.S. Department of Commerce, Bureau of the Census. 1995. *1992 Census of Service Industries, Subject Series: Establishment and Firm Size (Including Legal Form of Organization)*. Washington, DC: U.S. Government Printing Office.
- U.S. Department of Commerce, Bureau of the Census. 1991. *1987 Census of Service Industries, Subject Series: Capital Expenditures, Depreciable Assets, and Operating Expenses*. Washington, DC: U.S. Government Printing Office.
- Zrinsky, Christine. 1998. "Funeral Service and Crematories." *Encyclopedia of American Industries, Second Edition, Volume II*. Scott Heil and Terrance Peck, editors. Detroit, MI: Gale Research, Inc.