



## Disposal Options for Expired or Surplus Medications/Pharmaceuticals

### Technical Guidance Document SW 07-01

This technical guidance document provides information regarding the proper disposal of pharmaceuticals that are not currently regulated by the Resource Conservation and Recovery Act (RCRA), including common over-the-counter and prescription medications. Non-regulated<sup>1</sup> medications are of concern to the Kansas Department of Health and Environment (KDHE) because as many as 10% of them may be as hazardous as those that are regulated by RCRA, and the effects of many others on human and environmental health are unknown. This document does not cover controlled substances, which are subject to stringent controls by the Drug Enforcement Administration.<sup>2</sup>

#### Background

RCRA regulates hazardous waste but does not regulate many medications, including some hormones, antibiotics, antidepressants, and antihypertensives, that are very potent.<sup>3</sup> Protecting our surface waters and groundwater from contamination that may affect both the environment and human health is very important as fresh water becomes an increasingly valuable resource.

Historically, surplus and expired medications were commonly disposed of through sanitary sewer systems. However, research has found medications and their byproducts in ground and surface waters, suggesting that this disposal method is not completely effective in preventing contamination. Though wastewater treatment systems reduce the concentrations of the medications introduced through the sewer system, they are not designed to totally eliminate medications and their byproducts.

Another legal disposal option for medications has been disposal in permitted landfills. This method may have future consequences: over time, landfills generate leachate that contains the byproducts generated as medications degrade, and sometimes even the medications in their original state. Typically, the leachate is stored in tanks on-site until it is transported to a wastewater treatment plant for processing. In rare instances, leachate may migrate through the landfill liner systems and into the groundwater.

The disposal of non-regulated medications in municipal solid waste (MSW) landfills or sanitary sewer systems continues to be a legal option for

generators such as nursing homes and the public. However, new concerns have arisen due to the unexpected persistence of many chemicals in the environment and the adverse human and ecological health impacts that may result from contamination.

Studies show that some chemicals can persist for several decades in groundwater. Most of the medications and their byproducts are found at very low concentrations; however, even low-level exposure to some of these chemicals may cause serious chronic effects. Potential problems include abnormal physiological processes, reproductive impairment, increased incidences of cancer, and development of antimicrobial-resistant organisms. But the effects of many chemicals on humans and the environment are not yet understood. Furthermore, little is known about possible synergistic or antagonistic interactions between chemicals. Evidence indicates that some medications may degrade into more persistent and/or toxic compounds over time.

Because of the adverse effects (both known and potential) of pharmaceutical waste, **KDHE does not encourage the disposal of expired or surplus medications through sanitary sewers.**

#### Disposal Options

The best disposal method available to most residents in Kansas is disposal into an MSW landfill. These landfills are designed to protect the groundwater and may absorb some constituents before leachate is treated at a wastewater treatment plant.

**When disposing of surplus or expired medications in the trash, the following precautions should be taken to prevent diversion, theft, and accidents:**

1. Crush or dissolve solid medications in water, coffee, or another liquid. Make a paste by adding the dissolved medication to an undesirable substance like coffee grounds or kitty litter. The undesirable substance may be directly added to liquid medications.
2. Put the paste in a container and close the container securely. If the container is not opaque, place it in a plastic bag, a coffee jar, a laundry detergent bottle, or an equivalent container, and throw it in the trash.

Even better disposal options may become available in the future. Reverse distribution, a system allowing the consumer to return unused or expired medications to the manufacturer for credit, is by far the safest and most cost-effective method of disposal. However, reverse distribution is available primarily to hospitals and pharmacies, not to individuals. Collection events, where available, allow individuals to dispose of medications free of charge, but may not be able to accept controlled substances.

Of the physical disposal methods, thermal destruction in an incinerator or hazardous waste combustor provides the highest level of environmental and

human health protection from the potential effects of medications. Disposal in a permitted hazardous waste landfill is also an effective method, as these landfills are designed to prevent contamination of groundwater. Medications destined for disposal at a hazardous waste landfill or incinerator are usually collected at household hazardous waste (HHW) facilities or at collection events. In the future, technologies such as plasma arc units may be used for disposal.

The acceptable methods for disposal of expired or surplus medications by healthcare facilities and the general public are listed in order of preference below:

1. Reverse distribution (not available to individuals)
2. Collection events at pharmacies, HHW facilities, and other community locations (not currently available)
3. Incineration in an MSW incinerator<sup>5</sup>, a medical waste incinerator, or a hazardous waste incinerator or combustor (not available to individuals)
4. Disposal in a permitted hazardous waste landfill (not available to individuals)
5. Disposal in a permitted MSW landfill
6. Disposal into the sanitary sewer system

Failure to dispose of medications as directed in this document does **not** result in any violation, but does present risks to human health and the environment.

For additional information regarding proper management of any wastes, you may contact the Bureau of Waste Management at (785) 296-1600 or the address at the top of this document, or visit the Bureau's website at [www.kdheks.gov/waste](http://www.kdheks.gov/waste).

<sup>1</sup>Though medications are in fact regulated by a number of agencies, including the Food and Drug Administration and the Department of Justice, the term "non-regulated" in this document refers only to the authority of the Resource Conservation and Recovery Act (RCRA). This guidance tool is targeted to those medications that are not currently listed as hazardous by RCRA.

<sup>2</sup>Controlled substances are regulated by the Drug Enforcement Administration (DEA), a law enforcement agency of the U.S. Department of Justice. Only law enforcement officers are allowed to take possession of a controlled substance, regardless of whether it is considered hazardous by RCRA. These drugs are considered to have a high potential for abuse or dependency and so are subject to more stringent controls, including witnessed destruction. A list of controlled substances can be found on DEA's Office of Diversion Control website, at <http://www.deadiversion.usdoj.gov/schedules/schedules.htm>. State governments also regulate some drugs that are not controlled at the federal level.

<sup>3</sup>Some medications are classified as P-listed or U-listed hazardous wastes. A complete list of regulated hazardous wastes can be found in the *2006 Hazardous Waste Generator Handbook*, available on KDHE's Bureau of Waste Management website at <http://www.kdheks.gov/waste/apps-hw/HWGenHandbookApr2006.pdf>.

<sup>5</sup>At this time, no municipal solid waste incinerators are located in Kansas.