

Kansas Department of Health and Environment  
**Division of Environment**

**REGULATORY IMPACT STATEMENT**

Pursuant to K.S.A. 77-416

**Amended Regulation:**

**K.A.R. 28-29-300**

**New Regulations:**

**K.A.R. 28-29-330**

**K.A.R. 28-29-331**

**K.A.R. 28-29-332**

**K.A.R. 28-29-333**

November 15, 2012

### **Executive Summary of Amended and New Regulations**

Construction and demolition (C&D) landfills that are not designed and managed to prevent waste from becoming saturated with water can emit hazardous and explosive gases, endangering the health and safety of persons working at or living near the landfill. Performing corrective action activities at a site where major gas generation occurs could exceed \$1,000,000.

These new regulations will apply to the subset of C&D landfills in Kansas that are most likely to produce hazardous and explosive gases such as hydrogen sulfide and methane. Most of these are located either in flood plains or quarries. Some additional design, operational, and post-closure requirements will apply to new units at these landfills that exceed a certain size limit. These requirements will reduce the risk of the public being exposed to dangerous landfill gases.

**KAR 28-29-300. Definitions.** This amended regulation contains definitions of terms used in the regulations concerning C&D landfills. This regulation has been amended to expand the applicability of the definitions to include the new regulations concerning the control of hazardous and explosive gases at C&D landfills. A new definition for "lower explosive limit" has been added. Other non-substantive changes have been made to improve the clarity of the regulation and to correct obsolete references.

**KAR 28-29-330. Control of hazardous and explosive gases at C&D landfills; applicability of additional requirements.** This new regulation defines which landfills will be subject to the additional operational, design and post-closure requirements of K.A.R. 28-29-332. The only regulation that will apply to all C&D landfills in Kansas is K.A.R. 28-29-333, concerning what must be done if a gas release is detected at a landfill.

No operational, design, or post-closure requirements beyond those required for all C&D landfills will apply unless the new unit at the landfill meets all of the following criteria:

1. The landfill is located in a county that receives, on average, more than 25 inches of precipitation per year; this will include all counties in the vertical grouping from Jewell on the north to Harper on the south, and all counties east of this line. The same precipitation criterion was used for this determination as was used to determine which counties qualify for the small arid landfill exemption of KAR 28-29-103.
2. The unit is constructed:
  - After the effective date of this regulation and has a capacity of over 50,000 cubic yards; or
  - After January 1, 2014 and the capacity of the disposal unit, combined with all other units constructed after this date, is more than 50,000 cubic yards.
3. The landfill has one of the following characteristics, which increases the degree of saturation.
  - a. The landfill is located in a 100-year flood plain; or
  - b. Water cannot naturally drain out of the landfill due to the low permeability of the underlying soil or rock.

**KAR 28-29-331. Control of hazardous and explosive gases at C&D landfills; documentation of conditions used to determine applicability.** Owners and operators of C&D landfills in the eastern half of the state that will be constructing a new disposal unit must submit documentation to KDHE that shows whether or not the disposal unit meets the other applicability criteria defined in K.A.R. 28-29-330. This new regulation describes when this documentation must be submitted, and establishes a process for submission.

**KAR 28-29-332. Control of hazardous and explosive gases at C&D landfills; additional design, operating, and postclosure requirements.** This new regulation states that the owner or operator of each new unit that meets the applicability criteria must design, construct, and operated the disposal unit to prevent contact water from accumulating in the waste. If water must continue to be pumped out of the landfill after it closes, the owner or operator must obtain financial assurance.

**KAR 28-29-333. Control of hazardous and explosive gases at C&D landfills; response, assessment monitoring, and corrective action.** This new regulation describes the steps that must be taken if a release of gas is detected at the landfill. This regulation will apply to all C&D landfills in Kansas, whether or not any other of these gas control standards apply.

If landfill gas is detected, the owner or operator must assess the danger, take the steps necessary to protect human health and safety, and notify KDHE. If any gas is detected above specified action levels, the landfill owner or operator must notify the local government and develop a gas monitoring plan. If necessary based on gas monitoring data, the owner or operator must develop and implement a corrective action plan.

### **Environmental Benefit Statement**

#### **1) Need for proposed amendments and environmental benefit likely to accrue.**

**a. Need.** Construction and demolition (C&D) landfills that are not designed and managed to prevent waste from becoming saturated with water can emit hazardous and explosive gases, endangering the health and safety of persons working at or living near the landfill.

**b. Environmental benefit.** C&D disposal units that are constructed in accordance with these regulations will minimize the potential for waste saturation and the associated breakdown of organic materials that create toxic and/or explosive landfill gases that could affect the health and safety of the public.

**2) When applicable, a summary of the research or data indicating the level of risk to the public health or the environment being removed or controlled by the proposed regulations or amendments.** Landfill gases can migrate away from the landfill either through the air or through the ground. The two most dangerous gases produced by C&D landfills are hydrogen sulfide and methane.

**Hydrogen sulfide (H<sub>2</sub>S)** is a colorless, toxic, and flammable/explosive gas that produces a rotten egg odor. It often results from the breakdown of matter that contains sulfur in the absence of oxygen, for example when gypsum (drywall/sheetrock/wallboard) is submerged in water. A

water-saturated C&D landfill in Kansas has produced hydrogen sulfide gas at levels of up to 120 parts-per-million (ppm), with an average of 54 ppm. Levels up to 86,000 ppm have been measured in a Minnesota C&D landfill.\* Hydrogen sulfide is heavier than air and can remain low to the ground once it reaches the surface of the landfill. The gas can travel laterally away from the landfill and onto neighboring properties. Hydrogen sulfide gas remains in the atmosphere for an average of 18 hours.

**Methane** (CH<sub>4</sub>) is an odorless, colorless, flammable/explosive gas. Landfill methane is produced when organic materials (such as wood, cardboard, and vegetation) are decomposed by bacteria in the absence of oxygen. Methane has been detected at levels of 36% in a C&D landfill in Kansas. Levels up to 60% have been measured in a Minnesota C&D landfill.\*

\* Minnesota data from Ian Vagle, Veit USA, PowerPoint presentation.

**3) If specific contaminants are to be controlled by the proposed regulation or amendment, a description indicating the level at which the contaminants are considered harmful according to current available research.**

**Hydrogen sulfide (H<sub>2</sub>S)**

Symptoms of exposure to H<sub>2</sub>S in the air include eye and respiratory irritation, dizziness, headaches, fatigue, insomnia, gastrointestinal disturbance, and at high concentrations may result in loss of consciousness, coma, and death. Exposure to H<sub>2</sub>S may result in lasting negative effects on attention span, memory, and motor function. The following table summarizes the risks associated with different concentrations of H<sub>2</sub>S and exposure times.

**Risk Based on Level of Exposure to H<sub>2</sub>S**

Concentration (ppm)	Risk & Exposure Limits	Source
0.0005 - 0.3	Odor detection threshold	ATSDR
0.0014	Daily exposure likely to be without risk (RfC)	EPA
0.02	15-364 days of exposure with minimal risk (MRL)	ATSDR
0.07	14 days or less of exposure with minimal risk (MRL)	ATSDR
10	10-minute exposure limit	NIOSH
20	Ceiling limit	OSHA
50	Peak 10-min exposure limit	OSHA
100	Immediately dangerous to life or health (IDLH)	NIOSH
40,000 – 440,000	Explosive (lower and upper limits)	NIOSH

**ATSDR:** Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services

**EPA:** U.S. Environmental Protection Agency

**RfC:** Inhalation Reference Concentration – an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious, noncancer effects during a lifetime.

**MRL:** Minimal Risk Level – an estimate of daily human exposure to a substance that is likely to be without an appreciable risk of adverse effects (noncarcinogenic) over a specified duration of exposure.

**NIOSH:** National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention

**OSHA:** Occupational Safety and Health Administration, U.S. Department of Labor

### **Methane (CH<sub>4</sub>)**

Methane gas is highly explosive when it is present in the air at levels of 5% to 15% by volume. In order for an explosion to occur, there must also be oxygen in the air and an ignition source. Methane usually will not cause an explosion within the landfill itself, because the concentration is over 15% and there is no oxygen. If methane escapes the landfill into the open air, it will usually be diluted to levels below 5%. The greatest danger of explosion occurs when methane migrates away from the landfill through soil or utility trenches and collects in buildings.

### **Economic Impact Statement**

**1) Are the proposed regulations or amendments mandated by federal law as a requirement for participating in or implementing a federally subsidized or assisted program? No**

**2) Do the proposed regulations or amendments exceed the requirements of applicable federal law? No, there are no Federal regulations addressing hazardous and explosive gases at C&D landfills.**

**3) Description of costs to agencies, to the general public and to persons who are affected by, or are subject to, the regulations:**

**a. Capital and annual costs of compliance with the proposed regulations or amendments and the persons who will bear those costs.**

**KAR 28-29-300. Definitions.** There are no capital or annual costs associated with this regulation.

**KAR 28-29-330. Control of hazardous and explosive gases at C&D landfills; applicability of additional requirements.** This new regulation defines which landfills will be subject to the additional requirements of KAR 28-29-332. There are no capital or annual costs associated with this regulation.

**KAR 28-29-331. Control of hazardous and explosive gases at C&D landfills; documentation of conditions used to determine applicability.** Owners and operators of C&D landfills in the eastern half of the state that will be constructing a new disposal unit must submit documentation to KDHE that shows whether or not the disposal unit meets the other applicability criteria defined in K.A.R. 28-29-330.

Each year approximately 2 landfills in eastern Kansas can be expected to construct a new unit.

Capacity data. The disposal unit capacity data can be obtained at no expense since it is part of the design plan required under existing regulations.

Hydrogeologic data. Many landfills already have some or all of this information, so they will incur none or only some of these costs.

- Location relative to the 100-year floodplain. This determination will cost about \$200.

- Permeability of the base of the landfill and/or potential for water to drain by gravity out of the landfill. This determination will cost about \$2000.

**KAR 28-29-332. Control of hazardous and explosive gases at C&D landfills; additional design, operating, and postclosure requirements.** This new regulation states that the owner or operator of each new unit that meets the applicability criteria must design, construct, and operate the disposal unit to prevent contact water from accumulating in the waste. KDHE estimates that approximately 1 landfill each year would need to comply with these additional requirements in order to construct a new unit. These costs are too site-specific to estimate.

If water must continue to be pumped out of the landfill after it closes, the owner or operator must obtain financial assurance. The cost of financial assurance is based in part on the cost of running and maintaining the pumping system after closure, which is too site-specific to estimate. The cost is also based on the type of institution providing the financial assurance, the financial institution's requirements for assessing the environmental risks associated with the landfill operations, and the financial strength and credit risks of the owner/operator of the landfill,

**KAR 28-29-333. Control of hazardous and explosive gases at C&D landfills; response, assessment monitoring, and corrective action.** This new regulation describes the steps that must be taken if landfill gas is detected above specified action levels. The cost to analyze gas monitoring samples is approximately \$100. The cost to an individual landfill would depend on the number of samples required by the gas monitoring plan. The costs that would be incurred if corrective action is required are too site- and incident-specific to estimated, but could exceed \$1,000,000 if a major liquids and gas problem occurs. There is no way to estimate how many landfills might be subject to this regulation in the future.

**b. Initial and annual costs of implementing and enforcing the proposed regulations or amendments, including the estimated amount of paperwork, and the state agencies, other governmental agencies or other persons or entities who will bear the costs.** Documentation of applicability, plans, and sampling data will be reviewed by existing KDHE staff. No other state or federal agencies will be required to bear any additional costs due to these regulations.

**c. Costs which would likely accrue if the proposed regulations or amendments are not adopted, the persons who will bear the costs and those who will be affected by the failure to adopt the regulations.** Conducting corrective actions activities at a site where generation of gas threatens human health or safety could cost the C&D landfill owner or operator over \$1,000,000 if a major liquids and gas problem occurs.

**d. A detailed statement of the data and methodology used in estimating the costs used in the statement.** The number of facilities that might be subject to these regulations and costs estimates were provided by KDHE staff based on their knowledge of the landfills in Kansas.

**e. Description of any less costly or less intrusive methods that were considered by the agency and why such methods were rejected in favor of the proposed regulations.** There were no less intrusive or less costly methods available for consideration by KDHE to

achieve the purposes of the new regulations.

**f. Consultation with League of Kansas Municipalities, Kansas Association of Counties, and Kansas Association of School Boards.** Cities or counties that operate construction and demolition landfills may be impacted by this regulation. The department does not anticipate that school boards will incur costs as a result of the regulatory changes. A copy of the original Regulatory Impact Statement was sent to each of these organizations on February 14, 2012.

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KDHE Article 29 Solid Waste Management New and Amended Regulations  
KAR 28-29-300, 28-29-330, 28-29-331, 28-29-332, 28-29-333

The notice of hearing and public comment period of at least 60 days regarding the above-referenced Kansas Department of Health and Environment (KDHE) Article 29 solid waste management regulations was published in the *Kansas Register* on February 9, 2012. The notice is included in the official record of the proceedings for adoption of these regulations as Attachment 1 to the Report of the Hearing Officer. During the public comment period preceding the hearing, KDHE received six comments by letter and one comment by electronic mail from the regulated community. KDHE received a comment letter dated February 15, 2012, from Raney L. Gilliland, Kansas Legislative Research Department, on behalf of the Joint Committee on Administrative Rules and Regulations (Joint Committee). The Joint Committee had considered these regulations and KDHE's presentation at its meeting on February 10, 2012.

The public hearing was conducted at 1:30 p.m., Tuesday, April 17, 2012, in the Azure Conference Room, Curtis State Office Bldg., 1000 SW Jackson, Topeka. In addition to the hearing officer, fifteen persons from the regulated community were present at the hearing. There were also four KDHE staff members in attendance. During the hearing, two persons representing a member of the regulated community presented oral comment on the proposed regulations. The agency received three additional comments by letter and one comment by electronic mail from persons representing members of the regulated community during the remainder of the public comment period, which concluded at 5:00 p.m. on April 19, 2012.

Pursuant to KSA 2011 Supp. 77-416, the agency determined that the proposed regulations may impact cities or counties that operate construction and demolition landfills and were therefore appropriate for consultation as to the environmental and economic impact with the League of Kansas Municipalities, Kansas Association of Counties and Kansas Association of School Boards. A copy of the regulatory impact statement was sent to each organization at the start of the public comment period with a request for comment that the agency should consider. A comment letter was received from the Kansas Association of Counties. The agency has addressed the issues in this comment letter in its Responsiveness Summary, which explains changes made to the regulations.

All comment received during the public comment period was fully reviewed and considered. After careful consideration, the agency determined that posthearing changes in the proposed regulations were needed to address the comment received from the Joint Committee and the regulated community. The agency determined that three regulations should be removed from the regulation package in response to the comment. The regulations with posthearing changes were submitted to the Department of Administration and the Attorney General for review and were approved and re-stamped. KDHE prepared a responsiveness summary that lists and summarizes all comment received and provides a detailed explanation of the agency's response and action to address each comment. The hearing officer entered both the public comment received and the responsiveness summary into the official record of the proceedings and these documents are attached to and made a part of the Report of the Hearing Officer as Attachment 3 and Attachment 4, respectively.

Based on the administrative record, the hearing officer found that the agency met the requirements of KSA 2011 Supp. 77-415, *et seq.*, for adopting and filing regulations with the Secretary of State. The hearing officer also determined that the Secretary of KDHE has authority pursuant to KSA. 65-3406 to promulgate the proposed solid waste management regulations. These regulations have been officially adopted by the Secretary of KDHE and filed with the Secretary of State on November 29, 2012, for final publication in the *Kansas Register*.