

# KANSAS STORAGE TANK PROGRAM CORRECTIVE ACTION POLICY MANUAL

October 9, 2020



<https://www.kdhe.ks.gov/990/Storage-Tanks>

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As the state's environmental and public health agency, KDHE promotes responsible choices to protect the health and environment for all Kansans.

Through education, direct services, and the assessment of data and trends, coupled with policy development and enforcement, KDHE will improve health and the quality of life. We prevent illness, injuries and foster a safe and sustainable environment for the people of Kansas.

**KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
BUREAU OF ENVIRONMENTAL REMEDIATION  
1000 SW Jackson, Suite 410  
Topeka, KS 66612-1367**

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## KDHE UST CONTACT INFORMATION

If you should need additional information regarding UST requirements, or if you need to register UST tanks within Kansas, you should contact the appropriate individual listed below:

### CENTRAL OFFICE STAFF

<b>Program Area</b>	<b>Telephone No.</b>
General Program Information	(785) 296-1678
Fax	(785) 559-4260

#### **Underground Storage Tank Trust Fund**

Remedial Action	Scott O'Neal	(785) 296-1597
Monitoring	James Snow	(785) 296-1870
Reimbursements	Marcia Morgan	(785) 296-4574

#### **Underground Storage Tanks Prevention**

Unit Chief	Marcus Meerian	(785) 296-6372
Cathodic Protection		

New Installations, Repairs, Upgrades, & Release Detection	Bailey Ham	(785) 296-1685
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Fed. Financial, Trust Fund Compliance, Responsibility, and Tightness Testing	Gary Richardson	(785) 296-1677
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UST Permits & Registration, Fees, Ownership Changes, and Tank Permanent Out of Service	Debbie Clure	(785) 296-1599
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Contractor Licensing	Cathy Herring	(785) 296-1661
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UST compliance & Inspections	Kelsey Lamer	(785) 296-7007
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#### **Leaking USTs/Investigation**

Unit Chief	Stephanie Pfannenstiel	(785) 296-6768
Tank Closure, Leaks, Tank Removals, and Site Assessments		

### DISTRICT OFFICE STAFF

1. Southwest District Office – Dodge City	(620) 225-0596
	Fax: (620) 225-3731

Wade Kleven	DEA	(620) 682-7940
Tyrel Wehner	EC/RS	(620) 682-7948
Kevin Faurot	EC/RS	(620) 682-7941

2. South Central District Office – Wichita	(316) 337-6020
	Fax: (316) 337-6055

Allison Herring	DEA	(316) 337-6020
Kyle Parker	PG	(316) 337-6045
Meer Husain	PG	(316) 337-6046
Stan Marcotte	EC/RS	(316) 337-6043
Vince Ressel	EC/RS	(316) 337-6292

3. Southeast District Office – Chanute	(620) 431-2390
	Fax: (620) 431-1211

Doug Cole	DEA	(620) 431-2390
Renee Brown	EC/RS	(620) 860-7236
Trent Christenson	GS	(620) 860-7231

4. Northeast District Office – Lawrence	(785) 842-4600
	Fax: (785) 842-3537

Jamie Wilson	DEA	(785) 842-4600
Meredith Roth	EC/RS	(785) 330-8610
Nathan Luna	EC/RS	(785) 330-8604
Michael Law	EC/RS	(785) 330-8613

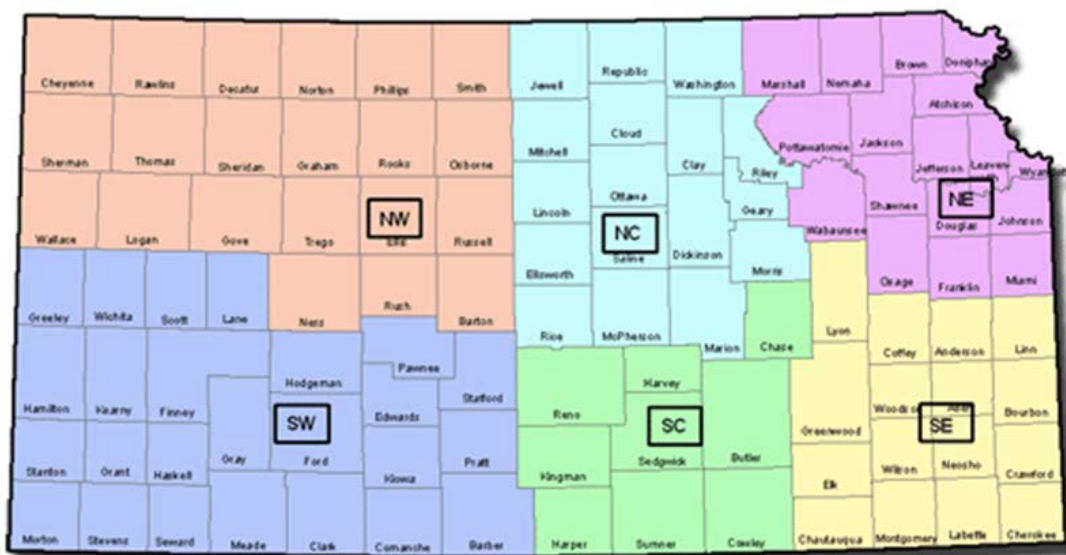
5. North Central District Office – Salina	(785) 827-9639
	Fax: (785) 559-4330

Jennifer Nichols	DEA	(785) 515-6705
Mark Vishnefske	PG	(785) 515-6711
Javil Hansen	GS	(785) 515-6709

6. Northwest District Office – Hays	(785) 261-6100
	Fax: (785) 625-4005

Dan Wells	DEA	(785) 261-6100
Bill Heimann	PG	(785) 261-6110
Luke Truman	GA	(785) 261-6112

## KANSAS REPORTING REQUIREMENTS FOR UNDERGROUND STORAGE TANK RELEASES



The Kansas Department of Health and Environment (KDHE), Bureau of Environmental Remediation (BER) is responsible for responding to releases from underground storage tanks and the associated piping. As part of the response, field staff makes an evaluation of the release and determines what remedial action is necessary to protect public health and the environment. BER is receiving federal funding through the Leaking Underground Storage Tank (LUST) Trust Fund, which is administered by the Environmental Protection Agency. The Trust Fund is financed by a fee on motor fuels of one cent per gallon and provides BER with funding for staff as well as funding for actual clean-up of sites where no responsible party can be found.

Kansas Administrative Regulations 28-48 Parts 1 and 2 (Article 48) requires the reporting of spills to BER. The telephone numbers for reporting spills have been included with this information. Reporting requirements under Article 48 are totally independent of the "Community Right to Know" program and reportable quantities associated with those requirements. Many owners of buried tank systems are not aware of the requirements under Article 48 or do not realize that leakage from buried tanks or associated lines is reportable spillage. There are numerous service stations located throughout the state many of which operate buried tank systems. A system such as this may store large quantities of fuel, which can be accidentally released. A release of this type can cause contamination of soil and groundwater resulting in odor or product in basements, sewers, or water wells. If you observe or receive information regarding a reportable incident, this information should be referred to BER. Reportable incidents include: 1) any loss from a buried tank system or 2) discovery of product-impacted groundwater or fuel odors in sewers or the basement of a structure.

BER responds to both new releases and existing problems that result from leakage from buried tanks or associated piping. KDHE has six district offices located throughout the state as well as a central office in Topeka. The number of staff responsible for this program are limited so extensive field surveys of service stations are not possible. BER must rely on the responsible parties, local agencies and private citizens to ensure that petroleum releases are reported. Problems resulting from leaks of this type seem to compound over time so early reporting and proper clean-up of these sites is very important.

BER would appreciate any assistance that you can provide with reporting or oversight of buried tank release incidents. For additional information or to report a problem, you should call Stephanie Pfannenstiel (785) 296-6768, Sharon Morgan at (785) 296-1684 or the appropriate district office for your area.

**KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT**  
**Article 48 - Spill Reporting**

28-48-1. Definitions. The following words and phrases when used in these regulations have the meanings respectively ascribed to them in this section.

(a) "Owner" means individual, partnership, firm, trust, company, association, corporation, institution, political subdivision or agency which is financially responsible for the material or facility.

(b) "Person responsible" means person or organization which has been placed in control of the material or facility by the owner.

(c) "Waters of the state" means all streams and springs, and all bodies of surface or groundwater, whether natural or artificial, within the boundaries of the State.

28-48-2. Action required. All sewage, substances, materials, or wastes, as set forth in 65-171d, regardless of phase or physical state, which are, or threaten to contaminate or alter any of the properties of the waters of the state or pollute the soil in a detrimental, harmful, or injurious manner or create a nuisance, shall be reported in the following manner:

(a) The owner or person responsible for the discharge or escape of materials detrimental to the quality of waters of the state or pollution of the soil under conditions other than provided by a valid permit issued by the secretary of health and environment shall report the discharge or escape to the Kansas Department of Health and Environment.

(b) Emergency or accidental discharge of materials which are detrimental to the quality of waters of the state or tend to cause pollution of the soil shall be immediately reported to the Kansas Department of Health and Environment by the owner, owner's representative, or person responsible. In the event the pollution causing material is in transit or in storage within the state, the owner, carrier, or person responsible for storage shall be responsible for immediate notification to the Kansas Department of Health and Environment that the pollutant will gain admittance to the waters of the state or the soil.

(Authorized by and implementing K.S.A. 1984 Supp. 65-171D; effective 5/1/86.)

# KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT

## UST CLOSURE PROCEDURES

The Kansas Department of Health and Environment (KDHE) provides the following guidelines for acceptable closure of Underground Storage Tanks (USTs). Failure to follow these guidelines may result in UST closure refusal by KDHE and additional work may be required. Specific requirements may be provided by the KDHE Central Office or District Office staff.

### REQUIREMENTS FOR UST REMOVAL

Listed below are Kansas' requirements for a tank removal project under federal and state regulations.

1. Removal of USTs must be performed by a Kansas licensed contractor. (A contractor list is available upon request.) Prior to tank removal activities, arrangements should be made to coordinate disposal of the tank, so no delays are encountered.
2. A 30-day notification to KDHE prior to the tank removal is required. The appropriate KDHE district office, as indicated on page 3 of this document, must be notified for this requirement to be met. The exact date and time of the removal must be provided to the appropriate district office at least three working days prior to the on-site activity.

An environmental site assessment is required for all buried tank and product line removals. KDHE district staff will provide this assessment at no cost to the tank owner when KDHE staff are present on site. Adequate notice must be provided to the KDHE District Staff to ensure their availability. If the assessment is not conducted by KDHE personnel, a qualified environmental professional familiar with sampling techniques must perform the assessment. Documentation of the assessment performed, including the analytical results, must be provided to KDHE within 30 days of the tank removal. Note: The use of an environmental assessment firm does not eliminate the notification requirements outlined above.

SAMPLING: Following the removal of the tanks and associated piping, samples must be taken and submitted for laboratory analysis. The assessment must include sample analyses by a laboratory using KDHE & EPA approved methods for total petroleum hydrocarbons and benzene of representative soil samples from the excavation and line trench. Readings from field monitoring equipment may be used for screening but will not be a sufficient evaluation alone. Excavation into native soil should be done before the samples are taken. Field screening should be performed at locations where there is visible staining. If field screening results indicate TPH levels above remedial levels, a discrete sample from that location must be submitted for laboratory analysis. Discrete soil samples must be collected and submitted for laboratory analysis from each side wall and below each tank location. The soil samples must be taken from an area in the basin where the impact from a release would most likely be located. Discrete samples must also be taken from any area where field screening shows that contamination above actionable levels exists. All samples must be collected according to EPA Quality Assurance/Quality Control guidelines. Analysis must be performed by a KDHE certified laboratory and analyzed for all the chemicals of concern listed on page 10. See additional items below for directions on sampling soils along product lines and sampling groundwater.

3. Clean backfill material placed into the tank basin is required to be washed gravel or washed concrete aggregate filled from the bottom of the excavation to within 5 feet of the surface. The top 5 feet of the excavation will be a compactable clay. KDHE recommends proctor testing the clay and density testing every 6-inch lift to avoid subsidence. The surface must be restored to the original condition (i.e. concrete/asphalt) or per the property owners request. If subsidence occurs the repairs will be between the owner and the contractor.

4. Remediation is required for all contaminated fill material (i.e. media used during tank installation) and native soil around the tank basin/excavation zone with: (1) total petroleum hydrocarbon levels exceeding those levels shown on page 10, or (2) total petroleum hydrocarbon vapor levels exceeding 100 ppm as indicated by KDHE field sampling.

5. Contaminated Soil Disposal. Prior to tank removal activities, arrangements should be made to coordinate disposal of the contaminated soil, so no delays are encountered.

Land Farming: Land farming of contaminated soil is permissible. If land farming is the remedial option chosen for contaminated soils or backfill, an approval must be obtained from the KDHE Bureau of Waste Management (BWM) through the completion of an “Application to Land Farm Petroleum Contaminated Soils without a Permit”. Applications may be requested from Bureau of Waste Management at (785) 296-1600. A copy of this document is also available at: <https://www.kdhe.ks.gov/documentcenter/view/5563>

6. The location at which the contaminated soil is “placed” (i.e. land farm) will be considered active until such time sample analysis shows levels below Kansas remedial levels. A land farm location cannot be closed until the land farmed soil is analyzed. The results from the analysis will be reviewed by the KDHE District staff and the BWM will determine whether the results from the analyses warrant closure.

The removal and disposal of contaminated native soil are reimbursable upon an approved Trust Fund application. Cost for the removal and disposal of contaminated native soil must be preapproved by KDHE. KDHE personnel must be present on site during the excavation to approve the quantity of contaminated native soils to be removed. KDHE will not reimburse for stockpiling contaminated soils. It is recommended to collect and analyze soil samples prior to UST removal to eliminate the delay in the excavation process. In some instances, KDHE can collect soil samples prior to UST removal for required landfill or landfarm analysis. KDHE will reimburse for the backfill material to replace the native soil. If the excavation of native soil exceeds the extent of the tank basin, KDHE will reimburse for concrete or asphalt replacement for areas outside the tank basin. Documentation of the entire surface appearance of the property must be provided to KDHE prior to excavation of native soils. All reimbursable line items must be preapproved by KDHE and documentation must be provided for reimbursement including all load tickets from the quarry, landfill, and/or weight tickets to the land farm. Removal of contaminated soil will not result in a site closure status, however removing the contaminated soil will reduce the time spent on future remedial action.

Landfill: If materials are to be disposed of in a landfill, a special waste authorization number must be obtained. Special Waste authorization numbers may be obtained from the KDHE Bureau of Waste Management (phone: 785-296-6171).

If you have any questions regarding these requirements, contact Stephanie Pfannenstiel (785-296-6768) or the appropriate KDHE district office for your area.

6. Abandoned product lines are considered a part of the tank system. Assessment of the native soil, the backfill material, and soils associated with the piping are required to properly close product lines. At least one discrete soil sample for every 20 feet of piping trench must be submitted for laboratory analysis. Contaminated material with levels exceeding those set for tank excavations must be remediated during piping removal.

7. If contamination is encountered which cannot be physically removed, further assessment of the soil and groundwater will be required.



8. If groundwater is encountered in the tank basin during excavation activities, a water sample must be collected and submitted for laboratory analysis.

At sites where the depth to groundwater is less than 40 feet, a groundwater sample must be submitted for laboratory analysis if requested by the KDHE District Geologist. If contamination levels are at or above those levels listed in this Corrective Action Policy and the contamination cannot be physically removed, an application to the Petroleum Storage Tank Release Trust Fund will be made available to the responsible party.

If the depth to groundwater is greater than 40 feet, sampling of groundwater will be determined by the district geologist on a site by site basis. If contamination exists above levels shown on page 10, remedial action will be required. Groundwater analysis must be performed by a KDHE certified laboratory and analyzed for all the chemicals of concern listed on page 10.

9. All concrete and other debris must be property disposed. Concrete and debris will not be placed back into the excavation. Placing concrete and debris in the excavation causes issues with compaction and accumulation of water in the former basin. The concrete and debris may result in complications with future remedial action.

### **KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT REQUIREMENTS FOR IN-PLACE UST ABANDONMENT**

Listed below are KDHE's requirements for in-place tank abandonment under federal and state regulations.

1. In-place tank abandonment will be done as a last resort when utilities cannot be capped or relocated during tank removal or permanent structures cannot be removed. Documentation must be provided from the utility company(ies) if capping or relocating the lines is unavailable or cost prohibitive. Photo documentation of permanent structures in relation to the tanks must be provided. KDHE will review the documentation and provide approval or denial of in-place abandonment. Tanks filled in-place without KDHE approval may be required to be removed.
2. In-place abandonment of USTs must be performed by a KDHE licensed contractor. (The licensed contractor list is available upon request.)
3. Check to see if local ordinances prohibit the in-place abandonment of buried storage tanks.
4. For in-place abandonment, **an environmental site assessment must be completed before filling the tanks.** The environmental site assessment must be performed by an environmental professional and consist of test borings installed within the tank excavation area. One soil boring must be located at each end of every UST in the basin. The number of borings required will depend on the number and size of the USTs to be abandoned. Discrete representative samples should be collected from one, five, ten, fifteen, and twenty feet below the surface at each boring and submitted for laboratory analysis (call KDHE if saturated soils are encountered). It is advisable that the analysis be completed before the UST is filled. The submittal of a work plan by the consultant before work commences should be considered but is not required. Please refer to Attachment C on page 18 for soil boring placement.
5. The piping system must be removed unless utilities or permanent structures are an obstacle. In the event the piping system cannot be removed, an assessment for contamination must be completed by test borings. At least one soil sample for every 20 feet of piping must be submitted for laboratory analysis. Contaminated material with levels exceeding those set for tank excavations must be remediated during piping removal.



6. For closure of any site where field screening and/or laboratory analysis indicates contamination levels above remedial levels and groundwater is at a depth of 40 feet or less, a monitoring well may be required to be installed in a down-gradient position and a sample of the groundwater must be submitted for laboratory analysis. If the depth to groundwater is 40 feet or greater, sampling will be determined by the district geologist on a site by site basis. If the groundwater is contaminated with levels at or above those levels listed on page 10 and cannot be physically removed, an application to the Petroleum Storage Tank Release Fund will be made available to the responsible party and remedial action must be started.
7. A report outlining investigative procedures and the findings, including all analyses, must be submitted to KDHE. All analyses must be performed using KDHE & EPA approved methods and be performed by a KDHE Certified Laboratory. Soil and groundwater must be analyzed for the chemicals of concern listed on page 10. For TPH in soils, EPA method 418.1 will not be accepted for any contaminant other than lubrication or waste oil. If you have any questions regarding sample collection and analysis, you may contact Stephanie Pfannenstiel at (785) 296-6768.
8. For sites where contamination levels exceed the acceptable levels (page 10), a remedial action plan must be submitted for KDHE approval. Once the remedial action plan has been approved, the plan must be implemented within 30 days of approval. If contamination is within acceptable levels, the in-place closure may commence.
9. If laboratory analysis indicates contaminant levels below remedial levels, site closure will be granted pending review of the report by KDHE district personnel. If levels are above remedial levels, KDHE will request additional remedial work.
10. The top of each tank must be uncovered and disconnected from all associated piping in addition to being drained of product. Tanks are to be cleaned of any remaining fluid or sludge and properly disposed.. Sludges from USTs must be considered a hazardous waste. Appropriate testing will be required before transport to a disposal facility. Sludge can be placed in barrels while awaiting analytical results, however on-site storage cannot exceed 30 days. Once the tank has been properly cleaned the tank can be filled with an inert solid material and capped with cement or cement/grout mixture.

### **BURIED LINE REMOVAL OPTIONS**

As part of the buried storage tank removal process the department has required that associated buried piping be removed. This line removal is required to determine if petroleum contamination of soils has resulted from the operation of the product lines. The department has investigated numerous petroleum releases from buried storage tank systems over time. Of those releases, a considerable number have been documented as resulting from buried line failures. These releases are caused by any one or a number of potential causes which include corrosion leaks, line ruptures, and thread leaks. See page 7 for line closure sampling procedures.

The department has been asked to consider allowing buried lines to remain on site where removal would cause considerable disruption to the facility. The lines will be allowed to remain on site only if all of the following conditions exist and approval is granted by KDHE:

1. The lines are pressure tested at above operating pressure for at least 30 minutes. For suction lines a minimum of 30 psi should be used. For pressurized lines a minimum of 50 psi should be used, unless operating pressures exceeded 50 psi. The line test must be performed in such a manner that no more than 10% loss of pressure occurs over a 30-minute time period.

2. No visible product staining is observed around the exposed soil or pavement immediately around or above the product lines.
3. No evidence that line leakage has occurred in the past such as inventory losses, past line repairs, or evidence that buried lines have been replaced (concrete patches in the driveway could be an indication of line repairs).

The lines may need to be removed at some future date if contamination is discovered to be present. The department prefers that removal of all buried piping take place but will allow the above approach in areas which are not extremely environmentally sensitive. In sensitive areas soil sampling will be required to take place in the area of the buried piping to assess potential contamination prior to allowing in-place abandonment. If contamination is discovered to exist in unacceptable levels removal will be required.

In all cases where product lines are left in place without soil testing, closed status of the site will not be issued. A closed status can only be issued once lines have been removed or the soil testing has been performed within the line trenches.

## KANSAS PETROLEUM SITE REMEDIATION LEVELS SOIL & GROUNDWATER

For storage tank sites, the following is a list of the chemicals of concern. Maximum allowable contaminant levels may be found below. If contaminants exceed the levels described below, those levels must be reported to KDHE and remedial action should be implemented as required. Approved analytical methods may be more specific for State Trust Fund sites.

Chemical Name	RESIDENTIAL SCENARIOS			NON - RESIDENTIAL SCENARIOS		
	Soil Pathway (mg/kg)	Soil to Ground Water Protection Pathway (mg/kg)	Ground Water Pathway (ug/L)	Soil Pathway (mg/kg)	Soil to Ground Water Protection Pathway (mg/kg)	Ground Water Pathway (ug/L)
Benzene	15.9	0.168	5	28.2	0.168	5
Toluene	4320	51.2	1000	29800	51.2	1000
Ethylbenzene	82	65.6	700	145	65.6	700
Xylenes (mixed)	936	809	10000	1410	809	10000
1,2 Dichloroethane (DCA)	6.27	0.06	5	10.9	0.06	5
Methyl Tertbutyl Ether (MtBE)	585	0.848	133	1050	1.66	262
Naphthalene	30.5	0.349	1.11	64.7	0.659	2.11
Ethylene dibromide (EDB)	0.483	0.000598	0.05	0.859	0.000598	0.05
TPH (GRO)	220	79.3	500	450	79.3	500
TPH (DRO)	2000	5440	500	20000	7830	720
LRH	550	50	350	950	150	950
MRH	250	50	150	350	150	400
HRH	6000	6000	1000	27500	13000	2500

LRH, MRH, HRH are the preferred methods over TPH (GRO) and TPH (DRO). TPH (GRO) and TPH (DRO) do not have to be analyzed if LRH, MRH, HRH are analyzed and vice versa.

TPH analysis for any volatile or semi-volatile fuel must use extraction and detection methods which are appropriate for the hydrocarbon fractions present in the specific fuel. KDHE will only accept methods based on summation of peaks using gas chromatography (GC) analysis method. Infrared analysis methods will not be accepted for any compounds except waste oil or motor oil.

TPH analysis for motor or waste oil must use extraction and detection methods appropriate for heavier hydrocarbon fractions. Analysis of these compounds can be performed using either GC or infrared analysis methods. If both volatile and non-volatile fuels have been stored at a site and are potential contaminants, analysis must be performed using GC methods. Methods and detection limits must be documented on all analytical results submitted to KDHE. All laboratories performing soil analysis must be certified by KDHE for volatile organic compounds.

Water analysis for volatile organic constituents and lead must be performed by a laboratory certified by the KDHE for those specific constituents. To obtain information about KDHE laboratory certification, contact Sara Hoffman at (785) 296-3811. To obtain information about KDHE UST site remedial levels or site remediation requirements contact Stephanie Pfannenstiel at (785) 296-6768. A list of KDHE certified labs can be obtained at: [www.kdheks.gov/envlab/](http://www.kdheks.gov/envlab/).

## **SITE RANKING AND RISK BASED CORRECTIVE ACTION**

KDHE developed a site ranking system in 1992 to assign relative priority to sites that required corrective action to be implemented. The ranking system assigns scores for parameters including: hydrogeology, product released, presence of NLAPL, presence of likely conduits, property use and availability of useable groundwater. Use of groundwater is a primary component of the final score a site receives. A public or private well being used in the area will significantly raise the priority of a specific site. In 2020 the ranking system was revised due to lower petroleum releases. The 2020 ranking system prioritizes sites for extensive remedial action (soil removal, system installation, etc.) The revised ranking accounts for indoor air inhalation and the proximity of structures to the plume.

In an effort to enhance the risk-based decision-making process, KDHE has developed and implemented a Kansas Risk Based Corrective Action (KRBCA) program. The program generally follows the ASTM prototype and is intended to develop defensible decision-making criteria. The KRBCA guidance may be requested from the department by contacting Stephanie Pfannenstiel (785) 296-6768.

Staff in the KDHE central (Topeka) office will oversee and implement the KRBCA process. The district office staff will assist the KDHE central office. Their phone numbers are listed on the second page of this document.

## ATTACHMENT A STANDARD MONITORING WELL DESIGN

### WELL HEAD PROTECTOR

Steel or PVC cover with water tight cap, set in the concrete pad, and equipped with a locking device to prevent tampering. Cover should provide adequate space to allow access to the well.

### SANITARY WELL SEAL

Top of casing shall be sealed by installing a waterproof sanitary well seal when the well is completed.

### CONCRETE PAD

Should be a minimum of 2' x 2' x 6" thick to secure the protective cover, prevent pooling of water and vegetative growth around the well, and allow for placement of a surveyor pin.

### GROUT MATERIAL & MINIMUM GROUT INTERVAL

Seal the well annulus with approved impervious grout material from ground surface to at least 20 feet or to at least 5 feet into the first clay or shale layer if present, whichever is greater. The diameter of the borehole shall be at least 3-in greater than the maximum outside diameter of the casing. Water from two or more separate aquifers shall be separated by sealing the annulus between aquifers with grout. If groundwater is encountered less than the minimum grouting requirement, it may be modified to meet local conditions (K.A.R. 28-30-2(p) & 28-30-6(b) & (c)). If used, dry sodium bentonite products should be hydrated in accordance with manufacturer specifications.

### SCREEN SEAL

A 2' layer of bentonite chips or pellets should be placed on the gravel pack to prevent infiltration of grout into the gravel pack.

### GRAVEL PACK

The gravel pack should be sized to prevent infiltration of fines into the well. The source of the gravel pack material should be carefully determined to eliminate the possibility of contamination of the well.

### WELL CASING

Well casing shall terminate one foot or more above ground surface (28-30-6(f)), unless located in high a traffic area according to 2830-6(s), then follow requirements. The following well casings are acceptable for monitoring well use: 2" PVC Schedule 40 or thicker, 4" PVC SDR 26 or thicker, and 5" PVC SDR 26 or thicker. Steel casing must be 10 gauge or thicker (K.A.R. 28-30-6(f)(4)).

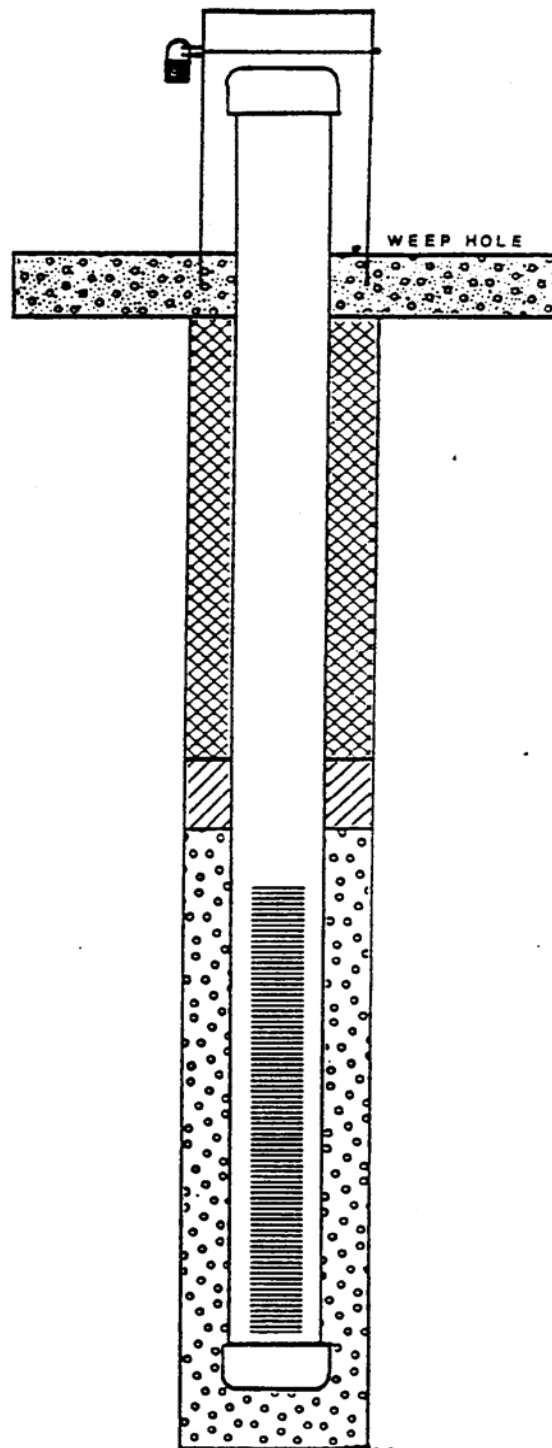
All casing materials must be connected without use of solvents, glues, or materials which would introduce contamination into the well. Some other casings are approved for well construction but are not as commonly used. All casing materials must be compatible with groundwater conditions.

### SCREEN

Wells must be equipped with manufactured well screen which provides adequate communication with the aquifer to provide a representative sample without allowing fines to enter the well.

### GROUNDWATER ZONE PROTECTION

Unless targeted by the well, each groundwater-producing zone with known or suspected natural or manmade pollution shall be cased and grouted according to 28-30-6(b) during construction to prevent movement upward or downward to other zones.



DRAWING NOT TO SCALE

## CONTRACTOR LICENSING

All monitoring wells must be constructed by a licensed water well contractor as specified in Article 12 and Article 30.

Statutes in Article 12 and regulations in Article 30 (K.A.R. 28-30-2 et seq.), can be viewed at the KDHE/BOW/Geology & Well Technology Section's Water Well Program website at: <https://www.kdhe.ks.gov/347/Water-Well-Program>.

### K.A.R. 28-30-2 (p) Grout

Grout means bentonite clay grout, cement grout, neat cement grout, or other material approved by KDHE used to create a permanent impervious, watertight bond between the casing and the undisturbed formation surrounding the casing or between two or more strings of casing.

- (1) "Bentonite clay grout" means a mixture of water and either commercial grouting or plugging sodium bentonite clay, including sodium bentonite clay manufactured under the trade name of "volclay grout," or an equivalent as approved by KDHE according to the following:
  - (A) The mixture shall be as per the manufacturer's recommendations to achieve a weight of at least 9.4 pounds per gallon of mix. Weighing agents may be added as per the manufacturer's recommendations.
  - (B) Sodium bentonite pellets, tablets or granular sodium bentonite may also be used if these additives or materials meet the specifications listed in paragraph (p)(1) above.
  - (C) Sodium bentonite products that are designed for drilling purposes or contain organic polymers shall not be used.
- (2) "Cement grout" means a mixture of one 94-pound bag of portland cement, an equal volume of sand having a diameter no larger than two millimeters, and five to six gallons of clean water.
- (3) "Neat cement grout" means a mixture consisting of one 94-pound bag of portland cement and five to six gallons of clean water.

### K.A.R. 28-30-6 (b) Grouting Requirements

- (1) Constructed and reconstructed wells shall be sealed by grouting the annulus between the casing and the boring from ground level to at least 20 feet or to at least five feet into the first clay or shale layer if one is present, whichever is greater. If a pitless well adapter or unit is being installed, the grouting shall start below the point at which the pitless well adapter or unit attaches to the casing and shall continue at least 20 feet below this point or to at least five feet into the first clay or shale layer, whichever is greater.
- (2) The diameter of the drilled boring shall be at least three inches greater than the maximum outside diameter of the casing.
- (3) Water from two or more separate aquifers shall be separated from each other in the boring by sealing the annulus between the aquifers with grout.

### K.A.R. 28-30-6 (c) Grouting Requirements – Shallow Groundwater

If groundwater is encountered at a depth less than the minimum grouting requirement, the grouting requirement may be modified by KDHE to meet local conditions.

### K.A.R. 28-30-6(s) At-Grade Surface Completion

A monitoring well may be completed at-grade (or flush-mount) without requesting a waiver if it is to be located in a heavily trafficked area. Otherwise, submission of a waiver request and preapproval from KDHE/BOW is required. Requirements of 28-30-6(s)(1)-(2) must be met for all flush-mount well completions. Refer to the documents Flush-Mount Well Construction Detail and Procedure for Requesting a Waiver to Allow Installation of a Flush-Mount Monitoring Well (WWP-5).

### K.A.R. 28-30-7 Plugging Requirements

Monitoring wells must be plugged in accordance with applicable requirements in 28-30-7(a), (b), and (c), unless other regulations exist locally. Plugging and associated regulations for wells in the Equus Beds Groundwater Management District #2 are included in Article 30 as 28-30-200 through 28-30-207. Refer to the document Procedure for Plugging a Groundwater Monitoring Well (WWP-10).

## ADDITIONAL REQUIREMENTS

Additional requirements for monitoring well construction and plugging established in KDHE environmental programs must be followed, where appropriate. Check with the KDHE project manager for this information.

Regulations in Article 30 (K.A.R. 28-30-2 through 28-30-207) and documents referenced above can be found on the KDHE/BOW/Geology & Well Technology Section's Water Well Program website at: <https://www.kdhe.ks.gov/347/Water-Well-Program>.

**ATTACHMENT B**  
**APPROVED LABORATORY METHODS FOR ORGANIC COMPOUNDS**

ANALYTE	SOLID AND HAZARDOUS WASTE METHODS		WATER METHODS	
	No.	PARAMETER	No.	PARAMETER
<b>Benzene</b>	8020*	Aromatic Volatile Organics	502.2	Volatile Org. Cmp., Purgeable Org. Cmp.
	8021*	Halogenated and Aromatic Volatiles	503.1	Volatile Aromatic & Unsat. Organic Cmp.
	8240	Volatiles	524.1	Purgeable Organic Compounds
	8260	Volatiles	524.2	Purgeable Organic Compounds
		602	Purgeable Aromatics	
		624	Purgeables	
		1624	Volatile Organic Compounds	
<b>BTEX</b>	8020*	Aromatic Volatile Organics	502.2	Volatile Org. Cmp., Purgeable Org. Cmp.
	8021*	Halogenated and Aromatic Volatiles	503.1	Volatile Aromatic & Unsat. Organic Cmp.
	8240	Volatiles	524.1	Purgeable Organic Compounds
	8260	Volatiles	524	Purgeable Organic Compounds
<b>1,2-DCA</b>	8010*	Halogenated Volatile Organics	502.1	Volatile Halogenated Organic Compounds
	8021*	Halogenated and Aromatic Volatiles	502.2	Volatile Org. Cmp., Purgeable Org. Cmp.
	8240	Volatiles	504.1	Microextraction and GC
	8260	Volatiles	524.1	Purgeable Organic Compounds
	8261	Vacuum Distillation in Combination with GC/MS	524.2	Purgeable Organic Compounds
			601	Halogenated Volatile Organics
		624	Purgeables	
		1624	Volatile Organic Compounds	
<b>Ethylbenzene</b>	8020*	Aromatic Volatile Organics	502.2	Volatile Org. Cmp., Purgeable Org. Cmp.
	8021*	Halogenated and Aromatic Volatiles	503.1	Volatile Aromatic & Unsat. Organic Cmp.
	8240	Volatiles	524.1	Purgeable Organic Compounds
	8260	Volatiles	524.2	Purgeable Organic Compounds
			602	Purgeable Aromatics
		624	Purgeables	
		1624	Volatile Organic Compounds	
<b>MtBE</b>	8020*	Aromatic Volatile Organics	503.1	Volatile Aromatic & Unsat. Organic Cmp.
	8240*	Halogenated and Aromatic Volatiles		
	8260	Volatiles		
<b>Naphthalene</b>	8021*	Halogenated and Aromatic Volatiles	502.2	Volatile Org. Cmp., Purgeable Org. Cmp.
	8100	Polynuclear Aromatic Hydrocarbons	503.1	Volatile Aromatic & Unsat. Organic Cmp.
	8250	Semivolatile Organic Compounds	524.2	Purgeable Organic Compounds
	8270	Semivolatile Organic Compounds	550	Polycyclic Aromatic Hydrocarbons
	8310	Polynuclear Aromatic Hydrocarbons	550.1	Polycyclic Aromatic Hydrocarbons
	8260	Volatiles	610	Polynuclear Aromatic Hydrocarbons
			625	Base/Neutrals & Acids
		1625	Semivolatile Organic Compounds	
<b>Toluene</b>	8020*	Aromatic Volatile Organics	502.2	Volatile Org. Cmp., Purgeable Org. Cmp.
	8021*	Halogenated and Aromatic Volatiles	503.1	Volatile Aromatic & Unsat. Organic Cmp.
	8240	Volatiles	524.1	Purgeable Organic Compounds
	8260	Volatiles	524.2	Purgeable Organic Compounds
		602	Purgeable Aromatics	
		624	Purgeables	
		1624	Volatile Organic Compounds	



<b>Xylene</b>	8020*	Aromatic Volatile Organics	502.2	Volatile Org. Cmp., Purgeable Org. Cmp.
	8021*	Halogenated and Aromatic Volatiles	503.1	Volatile Aromatic & Unsat. Organic Cmp.
	8240	Volatiles	524.1	Purgeable Organic Compounds
	8260	Volatiles	524.2	Purgeable Organic Compounds
<b>EDB</b>	8260	Volatiles	504.1	Microextraction and GC
	8011	Microextraction and GC with Electron Capture	555.1	Liquid-Liquid Extraction and GC with Electron Capture
	8021B	GC using Photoionization and/or Electrolytic Conductivity Detectors		
<b>Polynuclear Aromatic Hydrocarbons</b>	8310	Polynuclear Aromatic Hydrocarbons	610	Polynuclear Aromatic Hydrocarbons (High performance Liquid Chromatography)
	8270 SIM	Polynuclear Aromatic Hydrocarbons		
<b>Lead</b>	7420	AA Direct Aspiration	239.2	Atomic Absorption Spectrometry (Graphite Furnace)
	7421	Atomic Absorption, Furnace Technique	200.8	Inductively Coupled Plasma Mass Spectrometry
			200.9	Atomic Absorption Spectrometry-Stabilized Temperature (Graphite Furnace) Method

\* Water samples must be prepared using method 5030 (purge & trap extraction) if this test method is used.

**Air Sample Analysis:**

40 CFR Ch. 1 (7-1-91 Edition) Part 60, Appendix A, Method 18 (Flexible Bag Procedure)



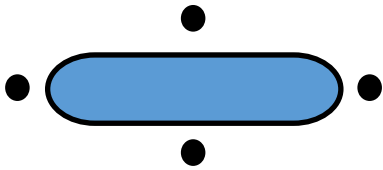
## ATTACHMENT C

### SAMPLING REQUIRMENTS FOR PERMANENT IN PLACE CLOSURES OR CHANGES-IN-SERVICE

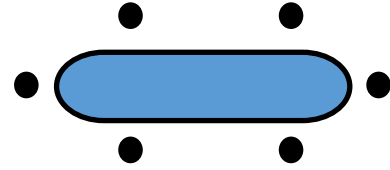
Samples should be collected within approximately three (3) feet of the tank. Borings will be advanced to native soil to a minimum depth of twenty (20) feet.

● = Recommend boring location (Distance is not to scale)

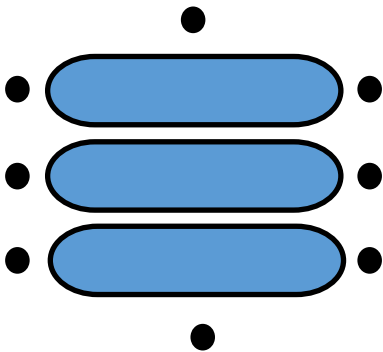
Single Tank  $\leq$  8,000 gallons



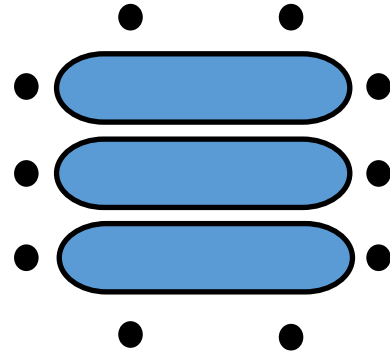
Single Tank  $>$  8,000 gallons



Multiple Tanks  $\leq$  8,000 gallons

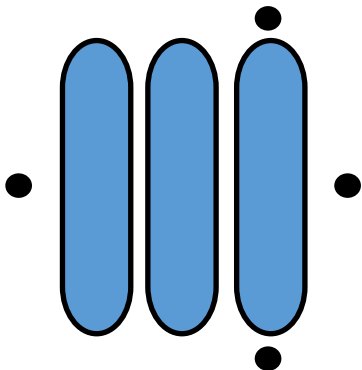


Multiple Tanks  $>$  8,000 gallons



If only one (1) tank within a multi-tank basin is to be permanently closed in place, the sampling will be required on four (4) sides of the tank basin. Sampling at the ends of the tank will only be required of the tank being permanently closed in place.

Multiple Tanks  $\leq$  8,000 gallons



Multiple Tanks  $>$  8,000 gallons

