RURAL WATER DISTRICT NO. 13, JEFFERSON COUNTY

SOURCE WATER PROTECTION PLAN

Approved by the Governing Body and Signed by the Chair
December 16, 2021

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1. SOURCE WATER PROTECTION AREA DESCRIPTION

Rural Water District No. 13, Jefferson County: Points of Diversion Locations and Information:

Identification Name or Number	Well No. 3 (East Well)
Legal Description	(NW¼ NE¼ NE¼) 17-12S-20E
County	Douglas
Distance from SE Corner	5000' N × 1137' W
DWR File Numbers	24,331 and 42,725
Authorized Quantity (m.g.y.) and Rate (g.p.m.)	100.00 MGY & 800 GPM
Additional Quantity and Rate Limitation	Quantity and Rate limited to 165.7 MGY and 800 GPM when pumped simultaneously with DWR File Nos. 24,331 & 42,722.
Normal Quantity and Rate (Range)	79.5 MGY and 550 GPM
Status	In Use

Identification Name or Number	Well No. 2 (West Well)
Legal Description	(NE¼ NW¼ NE¼) 17-12S-20E
County	Douglas
Distance from SE Corner	5,100' N × 1837' W
DWR File Numbers	24,331 and 42,722
Authorized Quantity (m.g.y.) and Rate (g.p.m.)	100.00 MGY & 800 GPM
Additional Quantity and Rate Limitation	Rate limited to 800GPM when pumped simultaneously with DWR File No. 24,331.
Normal Quantity and Rate (Range)	66.5 MGY and 575 GPM
Status	In Use

Basis of Source Water Protection Areas:

Many factors were considered before a determination was made of the areas that should be designated as the source water protection areas for Rural Water District No. 13, Jefferson County, (the District). The Kansas Department of Health and Environment's Source Water Assessment and the District's Well Head Protection Plan adopted in 2002, were the starting points of the discussion. Additionally, the latest 2019 Annual Report of the Kansas Water Office and Kansas Geological Survey's *Kansas River Alluvial Aquifer Index Well Program* was used extensively in preparing this plan. An evaluation of the surface water flow directions, the presumed bedrock topography and the known and presumed properties of the aquifers were evaluated. Areas within KDHE's source water assessment (arbitrary 2-mile circles), which are believed to have very little influence on water recharge and water quality, were removed from consideration.

1. Source Water Assessment and Source Water Protection Area (cont.)

The District has two drilled wells covered by one certified water right and two unperfected water appropriation permits. Both wells are located in Douglas County. The source of supply for both wells appears to be the Newman Terrace and hydraulically connected Kansas River alluvium. Much of the groundwater recharge likely occurs in the immediate vicinity of the terrace and alluvial aquifers along Mud Creek and its tributaries, which in some cases appear to be in direct contact with the upper portion of the water bearing formations. Pumping likely reduces the hydraulic pressure within the aquifer, inducing recharge along the nearby Kansas River tributaries.

The wells are approximately 650 feet apart. The aquifer consists of sand and gravel from 30 to 68 ft below land surface and is overlain by thick deposits of clays and silts, likely Kansas Till. The undifferentiated terrace and alluvial aquifers are situated above the top of above the Stranger Formation, a Pennsylvanian bedrock consisting of alternating sandstones, limestones and shales.

Recognizing that the thick soils, clays and silts of Kansas Till are relatively impermeable and provide excellent protection to the aquifer from activities occurring at the ground surface, a smaller protection area has been deemed adequate. The protection area boundaries for both sites have been drawn on section and quarter-section lines. The protection area comprises approximately 5.0 square miles. It is believed that identified protection activities established in the designated source water protection areas will contribute protection benefits. Maps of the District's Source Water Assessment Areas and the Source Water Protection Areas may be found in Appendix 1.

The following narrative describes the local factors and circumstances unique to the Source Water Protection Areas:

The Kansas River alluvial aquifer index well program began monitoring groundwater levels in the vicinity of the District's well during late summer 2017 with the installation of a transducer- and telemetry-equipped well in Douglas County near the Lawrence Municipal Airport, known as Douglas County Index Well 1 (DG01). This monitoring well is located approximately 1 mile to the southwest from the District's wells. A second similarly equipped monitoring well is located less than a half-mile from the District's wells. The monitoring wells and the District's wells are situated along the edge of the Kansas River floodplain. Therefore, the local area aquifer's characteristics and behavior are well understood. According to the KGS' 2019 Annual Report, the aquifer in the vicinity of the District's wells is composed of the unconsolidated sediments that fill the Kansas River valley. These alluvial sediments are more than 80 ft in thickness in the deepest areas. The underlying bedrock consists primarily of limestone and shale, although some short sections of the valley are underlain by sandstone. The sediments in the deeper part of the alluvial aquifer are generally coarse sand and gravel and overlain by finer-grained deposits (sand, silt, and silty clay) (Davis and Carlson, 1952; Dufford, 1958; O'Connor, 1960, 1971). Where the alluvial deposits are of substantial thickness, the aquifer has a high transmissivity and can commonly yield more than 1,000 gpm to large-capacity

1. Source Water Assessment and Source Water Protection Area (cont.)

vertical wells (Fader, 1974). The quality of the water is fresh, although it is hard due to groundwater flow passing through the calcareous bedrock underlying the aquifer and in the valley walls.

High iron and manganese are naturally occurring in some portions of the Kansas River alluvium as a result of chemically reducing conditions probably generated by organic matter in sediment in buried meander cutoffs and overbank deposits (Whittemore et al., 2014).

The KGS Study notes the following aquifer characteristics in the immediate vicinity of the District's wells:

- Water-level changes appear to be primarily driven by precipitation.
- The District's water wells, which turn on and off two to three times per day, cause an apparent drawdown band in the hydrograph or hourly water-level measurement record (approximately 1 foot in width) in the nearest of of the KGS' monitoring wells.
- The impact of stream-stage changes in the Kansas River appears very small. However, the role of a nearby stream, Mud Creek, is not as well understood and has yet to be clarified.
- The form of the water-level responses to pumping indicates a confined aquifer, consistent with the direct-push electrical conductivity profile.
- Well response to barometric pressure in nearby monitoring well DG01 also appears to be consistent with a confined aquifer.

Based on the preliminary information contained in the latest KGS report, it appears that the area of influence for the wells is very small and not significantly impacted by the Kansas River.

A petroleum pipeline carrying gasoline and other refined liquid products runs through the protection area, between Well Nos. 2 and 3. The nearest terminals for this particular pipeline are located in Kansas City and Topeka. The owner of the pipeline, Magellan Midstream Partners, has incorporated sensors in the pipeline system in order to detect and prevent leaks and spills. Should there be a drop in pressure (due to a leak) pipeline use would be halted and the source of the leak would be located. While pipeline accidents resulting from material failure or corrosion is a concern, the greater threat within the protection area would appear to be unauthorized excavating or other outside force damage that could rupture the pipeline and cause a spill.

Jefferson County RWD No. 13 has one certified water right and two un-certified water appropriation permits, authorizing a maximum combined total quantity of 165.7 million gallons per year, which may be pumped at a maximum combined rate of 800 gallons per minute, as specified in the KDA/DWR Approval of Application and Permit to Proceed, File No. 42,725. Although the time to perfect water rights under File Nos. 42722 and 42725 was originally set to expire at the end of 2017, both permits are now on their first extension of time to perfect the

1. Source Water Assessment and Source Water Protection Area (cont.)

water rights. The perfection periods for the junior water appropriation permits are set to expire on December 31, 2022. While the District reported pumping 151 million gallons of water in 2008, there also appears to have been a great deal of unaccounted for water (UFW) or water loss during that year. In 2020, the district reported pumping 126.3 million gallons of water.

The District currently serves approximately 2,600 people with a recent average use of 97 gallons per capita per day (GPCD). Based on historic water use, the currently authorized quantity of 165.7 million gallons of water per year appears to be sufficient for current needs and for the immediate future. However, additional water rights will need to be sought as the population served approaches 4,000 persons or if significant stock or industrial water users be added to the system.

165,700,000 gallons ÷ 97 gallons per capita per day ÷ 365 days per year = 4,680 persons

The District also sells water to the city of McLouth and to RWD No. 10 Leavenworth County, near Linwood, Kansas.

The District's wells are located in a fairly rural area, surrounded by typical agricultural activities. However, urbanization and light industrial activity are also occurring along the fringe of the proposed protection area near the city of Lawrence. All farmland in the vicinity of the wells is cultivated in a typical rotation of dryland and irrigated agriculture, with the predominant rotation being corn, soybeans, milo or wheat. While there are horses and beef cattle on pasture in the vicinity, currently there were no active or large confined feeding operations found while completing the contaminant source inventory. According to the KDHE Identified Sites list there are also no active contamination sites within the area of consideration for the District's wells.

Several domestic livestock wells and household wells were observed in the area of the District's public water supply wells. Well drillers in Kansas were not required to file water wells completion (WWC-5) records with the state of Kansas for domestic wells until the mid-1970s and there currently are no permitting or inspection requirements. As a result, the number of domestic wells and their locations and condition of those wells is not known. Abandoned, poorly constructed or poorly maintained water wells can be a direct conduit for surface contamination of the source of supply shared by the District's wells. An apparently abandoned cistern or well was noted in close proximity to the south of the District's Well No. 3 and was brought to attention of the District staff.

The United States Geological Survey (USGS) and Kansas Department of Agriculture's Division of Water Resources designate the area in which the wells are located as the Kansas River basin. The wells are located within Hydrologic Unit Code (HUC) 102701040502 (Lake Dabanawa-Mud Creek).

The District holds permanent easements to both well locations, copies of which can be found in Appendix 9.

2. CONTAMINANT SOURCE INVENTORY

The pollutant source inventory was developed using the checklist found at Appendix 2. Analysis of the protection areas was accomplished with a drive-through survey of the protection areas. The drive-through survey and inventory was conducted by Kenneth A. Kopp, P.G., Kansas Rural Water Association, during November and December 2021.

Kansas Source Water Assessment Program Plan - Contaminant Source Inventory
Name of Public Water Supply: Rural Water District No. 13, Jefferson County
Water Supply Diversion Points: Existing Wellfield - Two (2) drilled wells located approximately 650' apart.
Inventory Prepared by: Kenneth A. Kopp, P.G.
Date Inventory Completed: December 9, 2021

Code	Description	Present	Comments
AF	Electric Power Lines	X	Zones A, B and C
BN	Native Grass Land (not CRP)	X	Zones A, B and C
115	Corn Field	X	Zones B and C
BF	Gravel Road	X	Zones B and C
BH	Grazing Livestock	X	Zones B and C
Y	Lagoons & Liquid Waste	X	Zones B and C
BM	Milo Field	X	Zones B and C
BO	Nature Center	X	Zones B and C
4600	Pipeline (Petroleum, Chemical, etc)	X	Zones B and C
BQ	Pond	X	Zones B and C
BU	Riparian Land	X	Zones B and C
116	Soybeans	X	Zones B and C
AP	Telephone Lines	X	Zones B and C
BA	Wells	X	Zones B and C
BZ	Wetland	X	Zones B and C
111	Wheat Field	X	Zones B and C
8421	Botanical Gardens	X	Zones B and C (KU Biological Survey)
4582	Airports and Flying Fields	X	Zones B and C (Lawrence Airport)
4441	River	X	Zones B and C (Mud Creek)
0	Drinking Water Treatment	X	Zones B and C (Water Treatment Plant)
7538	Auto Truck Repair Service	X	Zone C
6553	Cemetery	X	Zone C
3272	Concrete Products Manufacturing	X	Zone C
BK	Farm Equipment Sales or Service	X	Zone C
5191	Farm Supply Retail	X	Zone C
AZ	Fuel Storage Tanks	X	Zone C
AR	Highway Maintenance Facility	X	Zone C
BI	Highway Materials Storage Area	X	Zone C
AK	House (Non-farm Residence)	X	Zone C
4971	Irrigation Systems	X	Zone C
	Irrigation Well	X	Zone C
T	Lawn & Turf	X	Zone C
5999	Miscellaneous Retail Stores, nec	X	Zone C

2. Contaminant Source Inventory (cont.)

Kansas Source Water Assessment Program Plan - Contaminant Source Inventory
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Inventory Prepared by: Kenneth A. Kopp, P.G.
Date Inventory Completed: December 9, 2021

Code	Description	Present	Comments
AS	Orchard	X	Zone C
BP	Pesticide Application Equipment Storage	X	Zone C
AM	Railroad Track	X	Zone C
F	Range & Pasture	X	Zone C
5261	Retail Nursery or Garden Store	X	Zone C
BV	Road salt Storage	X	Zone C
N	Rural Homestead	X	Zone C
4952	Sanitary Sewer	X	Zone C
8211	School	X	Zone C
N	Septic Tank- Lateral Field	X	Zone C
3993	Signs and Advertising Display Manufacturing	X	Zone C
2434	Wood Kitchen Cabinets Manufacturing	X	Zone C
Other	Sod Farm	X	Zone C
4583	Airport Terminal Services--passengers service	X	Zone C (Lawrence Airport)
2875	Fertilizer Storage	X	Zone C (Midland Coop)
CE	Grain Elevator	X	Zone C (Midland Coop)
5541	Gasoline Service Station	X	Zone C (Midland)
BL	Interstate Highway	X	Zone C (U.S. Highways 40 and 59)
BG	Gravel Pit	X	Zone C: Historic

In the Kansas Source Water Assessment Program, the assessment areas were divided into three zones: Zone A, Zone B and Zone C. These zones were developed for the purpose of determining assessment scores. In theory, the presence a contaminant source in Zone A has a greater risk than a similar contaminant source in Zone B, etc. The zones for water systems using groundwater were defined in this manner:

Zone A = Land within 100 feet of the wells
Zone B = Land within 2,000 feet of the wells
Zone C = Land within 2 miles of the wells

A general description of the contaminant sources found in the protection area, with emphasis on Zones A and B, as shown in the Source Water Assessment, is as follows:

2. Contaminant Source Inventory (cont.)

-Within 100 feet of the District's wells (Zone A) are:

1. Electric Power Lines.
2. Native Grass.

-Within 2,000 feet District's wells (Zone B), not repeating the items in Zone A, are:

1. Corn Field
2. Gravel Road
3. Grazing Livestock
4. Lagoons & Liquid Waste
5. Milo Field
6. Nature Center
7. Pipeline (Petroleum, Chemical, etc)
8. Pond
9. Riparian Land
10. Soybeans
11. Telephone Lines
12. Wells
13. Wetland
14. Wheat Field
15. Botanical Gardens
16. Airports and Flying Fields
17. River
18. Drinking Water Treatment

Within the protection area, 52 categories of potential pollutant sources were identified. The inventory worksheet identifying the potential pollutant sources may be found in Appendix 2.

3. WATER QUALITY PROTECTION MEASURES

Jefferson County RWD No. 13 has identified measures to assure protection of the quality of its source of water. These Water Quality Protection Measures are described in Appendix 3 of this document.

4. SUSCEPTIBILITY ANALYSIS

The purpose of a susceptibility analysis is to identify risks. It is a systematic procedure for determining the likelihood that a public water supply's raw water will contain contaminants at concentrations of concern. Using this information, a water system can direct water quality protection efforts in the most effective manner, thereby reducing contamination risks to its drinking water source.

The Source Water Protection Planning Committee used the susceptibility analysis procedure developed by the Kansas Department of Health and Environment for use in the Kansas Source Water Assessment Program. The following is a quote from the Kansas Source Water Assessment Report that describes in part the susceptibility analysis process:

> *"This analysis was based on a decision tree framework consisting of a series of yes and no questions. These questions considered the proximity of contaminant sources to the water supply intake, the type of contaminant, and the application of pollution prevention or water quality protection practices to sources of contamination. As the evaluator moved through the analytical framework, susceptibility points were accumulated based on the presence of contaminant sources in the assessment area (AA)."*
>
> *"After all the questions were answered, the susceptibility likelihood score (SLS) was calculated for each contaminant of concern category. The SLS was determined by counting the number of contaminant risk factors found to occur in the delineated AA and applying a multiplier to this number. Because the number of contaminant category risk factors is not equal, the multiplier is used to establish a common scale for the SLS of each contaminant category."*

The process described above was used to determine the susceptibility of the District's wells. For this activity, the protection areas for each well or group of wells was separated into three zones: Zone A – 100-foot radius around the wells; Zone B – 2000-foot radius around the wells; Zone C – 2-mile radius around the wells. The decision tree procedure of questions was used to assess the circumstances pertinent to each zone and the scores were recorded using the Kansas Department of Health and Environment's Automated Source Water Assessment Tool (ASWAT).

The resulting SLS scores for the District's wells do not indicate whether the wells are at high or low risk to contamination, but rather the scores are intended to help the water system identify the types of contaminants that are most likely to impact the wells. With this information in hand, the water system can then direct water quality protection efforts towards addressing (and hopefully lowering) the highest contamination risks to a well. All risk factors should be addressed in a source water protection plan, but the use of a susceptibility analysis helps focus the protection activities.

4. Susceptibility Analysis (cont.)

The decision tree procedure and ASWAT scoring used to tally the Susceptibility Likelihood Score (SLS) for the District's wells may be found in Appendix 4 of this document. The Susceptibility Likelihood Score (SLS) for the wells used by Rural Water District No. 13, Jefferson County, are as follows:

Susceptibility Likelihood Score (SLS)						
Susceptibility Likelihood Score - SLS	**A**	**B**	**B***	**C**	**C***	**D**
Assessment Area 860 (District's Wells)	47	52	51	56	53	59
SLS Range	Low	Mid	Low	Mid	Mid	Mid

Contaminant Risk Factors

A – Microbiological
B – Inorganic Compounds (IOC's)
B* – Nitrates
C – Synthetic Organic Compounds (SOC's)
C* – Pesticides
D – Volatile Organic Compounds (VOC's)

The Susceptibility Likelihood Score (SLS) can range from 0 to 100. The greater the number, the greater the susceptibility of the water supply to contamination by the contaminant of concern. While the SLS is intended to reflect the relative susceptibility of the water supply to contamination by a particular contaminant group, there is no quantitative or value scale intended. Therefore, an SLS below a certain value is not intended to represent no problem to the water supply. There is also no intent to develop an overall or single "susceptibility score" for the water supply. The SLS is most useful for helping the public water supply direct water quality protection actions towards a contaminant category of concern. For example, if the SLS for microbiological contamination is high relative to volatile organic compounds, water supply protection planners would conclude that attention should be directed towards microbiological contaminant sources rather than VOC sources.

Based on the Susceptibility Likelihood Scores shown above, there is no one category of contamination threat that appears to be significantly greater than any of the others to the District's water supply. All efforts to reduce the risks from all contaminant sources will be beneficial, including those not addressed by the assessment tool.

In the opinion of the Source Water Protection Planning committee, the most significant potential risks to the quality and quantity of the source water to Jefferson Rural Water District No. 13, ranked highest to lowest, are:

1. Abandoned wells or wells in a state of poor maintenance.
2. Fertilizer and pesticide use on cultivated crops upgradient from the well heads.
3. Petroleum pipeline rupture.
4. Vandalism at the well heads.
5. Perfection of water rights to the fully authorized rates and quantities.

A listing of other potential pollutant sources that may pose a risk can be found in Appendix 3.

5. INFORM PUBLIC OF SOURCE WATER PROTECTION PLAN

In accordance with the 1996 Safe Drinking Water Act Amendments, the results of the Source Water Assessment portion of the Rural Water District No. 13, Jefferson County, Source Water Protection Plan have previously been made public. The Source Water Assessment requirements are:

> delineation of the protection area, an inventory of the potential contaminant sources, and a susceptibility analysis to determine the risk of contamination to the water source.

The District will provide information to the public regarding the Source Water Protection Plan in the following manner:

> Upon approval of the Source Water Protection Plan, a summary will be prepared and provided to the water systems patrons. This can be accomplished by incorporating it into the District News newsletter prepared regularly by Rural Water District No. 13, Jefferson County. Newsletters will also be sent to property owners in the source water protection area that are not customers of the water system. The District may also post this plan or a summary thereof on their website.

6. SOURCE WATER PROTECTION STRATEGY

The Source Water Protection Strategy describes the actions necessary to minimize the risk to the quality of the source water utilized by RWD No. 13, Jefferson County, Kansas.

1. The following actions will be taken to implement Water Quality Protection Measures:

    a. The County Sheriff Department, the County Conservation District, the County USDA Offices, the County Extension Offices, the County Boards of Commissioners, the County Departments of Emergency Management, the County Public Works Departments, the County Road and Bridge Departments, the County Health Departments and County Zoning will be contacted and informed of the locations of the Jefferson County RWD No. 13 Source Water Protection Areas and the development of the Source Water Protection Plan.

    b. District staff should regularly monitor the entire protection area and immediate vicinity to watch for possible illegal activities. The Douglas County Sheriff Department will be asked to regularly patrol the protection areas to prevent vandalism and any other illegal activities.

6. Source Water Protection Strategy (cont.)

c. Actions will be taken, such as constructing fences or other barriers, to enforce the District's easements and to protect the wells, pumps, water level measurement tubes and other equipment from damage.

d. A program to educate landowners of the dangers of abandoned and poorly maintained water wells and to promote the plugging of these hazards will be established with the Douglas County Health Departments, K-State Research & Extension and the Douglas County Conservation Districts. Previously drilled wells with no filed plugging reports will be specifically investigated.

e. The opportunity to install agricultural buffers, repair waterways and other projects will be explored through the Douglas County USDA offices. The USDA will be asked to "tag" the files of land eligible for Continuous Conservation Reserve Program enrollment.

f. The District will maintain water flowmeters on each well that meet the specifications of the Chief Engineer of the Division of Water Resources in order to accurately measure the quantity of water and rate of diversion diverted by the District. Each well meter will be read monthly. These well meters will be tested at least once every 5 years to confirm accuracy.

g. Water right perfection will be evaluated every year to assess the progress toward the perfection of uncertified water rights (File Nos. 42,722 and 42,725). Specifically, efforts should be taken to fully perfect the appropriations with a perfection period expiring on December 31, 2022. Perfection extension requests will be submitted to DWR or new applications for new water rights will be filed as necessary to meet increasing water demand.

h. District staff should closely monitor pipeline activities throughout the protection area. The pipeline owner's emergency number should be posted at the District's water plant and office. The pipeline owner's emergency number is also posted on the pipeline marker signs in the vicinity of the District's well field.

i. The District will investigate opportunities to purchase additional property in the immediate vicinity of the current wellfield in order to better protect their sanitary easements, create a larger buffer around the wells and to allow the District greater flexibility to construct new additional wells or to replace the existing wells when needed.

j. The District will pursue additional sources of water, such as a potential new well or wellfield beyond the currently authorized "local" source of supply, in order to create a redundant source of water supply.

6. Source Water Protection Strategy (cont.)

2. The following actions will be taken to assure continued maintenance of Water Quality Protection Measures presently in place:

    a. Each year the Source Water Assessment and Protection Plan will be re-evaluated. (This will occur at about the same time of the year that the water systems Consumer Confidence Reports are due.) At this time, progress and continued completion of the protection goals will be evaluated. If any new potential pollutant sources are identified, the potential risk they may pose to the water supply will be evaluated and the plan revised to reflect the change.

    b. Efforts will be made to maintain good communication with the landowners and partners within the protection area, providing beneficial information concerning recommended Water Quality Protection Measures.

3. The following actions will be taken to assure that persons responsible for future potential pollutant sources are aware of the expectations and requirements of the Jefferson County RWD No. 13 Source Water Protection Plan:

    a. The source water will be tested regularly and the reports reviewed and compared to insure no significant change to water quality. The results will be made available to the customers and area landowners through the Consumer Confidence reports.

    b. Efforts will be made to stay alert to any future activities that could potentially affect the water quality of Jefferson County RWD No. 13's groundwater supply.

    c. Efforts will be made to educate new landowners, operators and contractors concerning the recommended Water Quality Protection Measures by mailing information concerning the Source Water Protection Plan once a year. This will be done at the same time that the Consumer Confidence Report is made available to all water users. Information concerning educational materials and resources available through the conservation districts, extension offices and the county health and zoning departments will be provided.

7. EMERGENCY WATER SUPPLY PLAN AND WATER CONSERVATION PLAN

Jefferson County Rural Water District # 13

Emergency Water Supply Plan

Pursuant to the requirements of K.A.R. 28-15-18, RWD # 13 Jefferson County, has compiled the following information, and guidelines for the purpose of implementing an Emergency Water Supply Plan.

Section I. Purpose

The purpose of this plan is to isolate and conserve an adequate supply of potable water during emergency conditions that will be used only to sustain human life and the lives of pets and maintain standards of hygiene and sanitation.

Section II. Description

The potable water supply for RWD # 13 is obtained through 2 ground water fed wells.

How? Treated through a lime softening plant and a line fed from the City of Lawrence, KS.

Where? At the intersection of E. 1600 Rd. and 1900 Rd. Lawrence, KS.

How much? 125,828,000 gallons produced in 2020 approximately 565GPM

Storage? 1-250,000 gallon water tower, 1-200,000 gallon water tower, 1-100,000 gallon underground storage

Boosters? 1-booster for use by Jefferson RWD #13 and 1-booster to supply the City of McLouth

Line Size? 8" line from the wells to the plant

Other connection? Line from City of Lawrence, line to City of McLouth, and line to Leavenworth RWD #10

Section III. Disaster Organization

A. Chairman – In-Charge Overall

1. Coordinate and direct efforts of maintenance personnel in repair of damage.
2. Establish communications within the governing body, local news media, and general public.
3. Establish command posts, medical posts, shelters, etc. while working with the County Emergency Management.

B. District Manager

1. Assess damages and establish communication with the Chairman and other officials.
2. Notify KDHE District Engineer or Bureau of Water and request assistance as needed.
3. Oversee any repairs or alterations from the source of supply to treatment and pumping to throughout the distribution system.
4. Request emergency equipment / supplies if needed.
5. Request work assistance if needed.
6. Contact Power Company as to loss of power.

Section IV. Mutual Aid Agreement

A. Cooperative arrangement for water supply replenishing with Jefferson County Emergency Preparedness Personnel. Their office will assist the water district in supplying potable water until our system is safely online again.

B. Cooperative arrangements for water repair parts and fitting have been made with neighboring water districts and cities if needed.

C. Interconnection? City of Lawrence

Section V. Inventory of Emergency Equipment Available

A. District owned equipment:

1. Diesel Powered Electrical Generator
2. Trash pump
3. Space Heater-4
4. Battery Charger
5. Industrial Fan
6. District Truck-2
7.
8.
9.
10.

B. Locally owned equipment and supplies:

1. Hydra Vac
2. Backhoe: 430, 435, E-45 and E-50 w/ Small Hammer

3. Trackhoe 55,000 lb. w/ Big Hammer
4. D6R Dozer
5. Loader 963
6. Mini Loader 259
7. JLG Forklift
8. Tandem Truck (Barrel Bed Dump Truck)
9. Service Truck
10. Snowplow

C. Other resources for Equipment

You may call KDHE and KRWA for any other equipment and tools needed. Examples of possible equipment and tools could be chlorinators, generators, portable storage tanks, pipe and fittings and any other item that may help in an emergency. Both will do their best to help locate needed items as soon as possible.

Section VI. Vulnerability of System (Disaster Response)

A. Drought- Water Shortage-As determined by the Chairman and District Manager

1. The District's regulation will go into effect regulating the non-essential use of water during an emergency upon authorization from the Chairman.
2. Public and media notification of water conservation will be relayed.
3. Attempt to obtain water from, County Emergency Management.

B. Accidental Spills or Contamination

1. District Manager shall contact 911.
2. District Manager will assess the situation and notify KDHE, Regional EPA Office, or Office of Emergency Management of extent of damage.
3. Establish communications through the Jefferson County Sheriff's Office, fire, news media, and general public.
4. District Manager shall make sure that all sources of uncontaminated potable water storages are full.
5. Utilize 250,000 gallon and 200,000 gallon storage tank supply.
6. Upon direction of Chairman, the District shall purchase bottled water for consumption.
7. Transport water into District from another source if needed.

C. Booster Station Building

1. Power outage due to natural or man-made disaster.
    a. The District will utilize a generator and restore electricity to pump and maintain pressure.

b. District will ascertain from Evergy and Free State Electric Coop. when power will be restored.

2. Excessive damage to water treatment plant or district office
    a. Operator will assess damages and establish communication with news media and general public.
    b. The District's regulation will go into effect regulating the non-essential use of water during an emergency upon authorization from the Board of Directors or District Manager if so designated.
    c. Upon direction of Chairman, District Manager will notify KDHE and Bureau of Water of any anticipated needs.
    d. District Manager will isolate distribution system and utilize water storage.
    e. The Chairman will authorize a work force to repair damages to bring plant back online.

D. Distribution System

1. Transmission Main Damage
    a. Isolate main and repair.

2. Storage Tank Damage
    a. The District's regulation will go into effect regulating the non-essential use of water during an emergency upon authorization from the Chairman, if needed.
    b. Isolate tank by closing valve at bottom of tank.
    c. Place needed pressure gauges and relief valves on hydrants for wasting in order to maintain a constant pressure.
    d. Contact tower Maintenance Company.

E. Terrorist Threats

1. Notify District Manager and Chairman of threat and coordinate with civil defense personnel to provide protection at POE, booster station, and storage tank.

F. Radioactive Fallout

1. Contact Office of Emergency Management for information as to the possibilities of contamination to the system.
2. The District's regulation will go into effect regulating the non-essential use of water during an emergency upon authorization from the Chairman.
3. Utilize stored water until system is okay for use.

Section VII. Water Rationing

A. Refer to the Municipal Water Conservation Plan and District Bylaws/Rules and Regulations.

Section VIII. Emergency Contacts

A. District Contacts

District Manager	Joe Osborn	785-813-3589
Board Chairman	Gordon Brest, P.E.	913-416-0225
Office Manager	Linda Lips	Office: 785-842-1502
		Cell: 785-766-356

B. Emergency Services

Hazmat Hotline		866-542-9628

Jefferson County Emergency Contacts:

Emergency Management	Keith Jeffers, Director	Office: 785-403-0699 Cell: 785-309-6956
Sarcoxie Township Fire Department (21st St. & Union Rd. and 37th St. & Wellman Rd.)	Tracy Dover, Fire Chief	Cell: 785-312-1105
Rural Township Fire Department	Jeremy Rodecap, Fire Chief	785-597-5308
Jefferson County Sheriff (Dispatch)		785-863-3232 or 785-863-2247
Health Department		785-403-0025

Douglas County Emergency Contacts:

Emergency Management		785-832-5259
Lawrence Fire Department - Station No. 1		785-832-7610
Douglas County Sheriff (Dispatch)		785-843-0250
Health Department		785-843-3060

Leavenworth County Emergency Contacts:

Emergency Management	Chuck Magaha, Director	913-684-0455
Tonganoxie Township Fire Department	Tim Smith, Fire Chief	816-392-2468
Health Department		913-250-2000
Leavenworth County Sheriff (Dispatch)		913-758-4022

C. Federal and State Agencies

Kansas Department Health & Environment Bureau of Water, Topeka, Kansas	Tom Stiles, Director	785-296-6170
Kansas Department Health & Environment NE District Office, Lawrence, Kansas	Duane Dolechek	785-330-8601
Kansas Department of Emergency Management, Topeka, Kansas	Spill Hotline	785-296-1679
Environmental Protection Agency, Region 7, Kansas City, Kansas		913-281-0991
Kansas Bureau of Investigation (KBI)		785-296-8200
Homeland Security		800-237-3239

D. Services

Daniels Excavating, LLC	Brant Daniels	Cell: 913-775-0546
Kansas Rural Water Association	Elmer Ronnebaum	785-336-3760

E. Media

The Oskaloosa Independent	785-863-2520
Tonganoxie Mirror	785-843-1000
The Lawrence Journal-World	785-843-1000

Section IX. Annual Review

Annual Review Sign Off Sheet:
It shall be required that this policy be reviewed annually by the Board of Directors for Rural Water District #13 of Jefferson County and their Operator.

Date Reviewed	Signature of Chairman	Signature of Operator
6/16/2021	Gordon A. Bres	Joe Osborn

900 SW Jackson Street, Suite 404
Topeka, KS 66612

Kansas Water Office

Phone: (785)-296-3185
Fax: (785)-296-0878
www.kwo.ks.gov

Earl Lewis, Acting Director

Laura Kelly, Governor

September 10, 2019

Gordon Brest
Jefferson County RWD #13
1951 Wellman RD
Lawrence, KS 66044

Dear Mr. Brest:

Thank you for your patience and cooperation in working with us on the municipal water conservation plan and water drought/emergency resolution for the Jefferson County Rural Water District No. 13.

The Kansas Water Office has reviewed your municipal water conservation plan as adopted by the Jefferson County Rural Water District No. 13 submitted to us; and received on September 10, 2019. It appears that the plan is consistent with the current Kansas Water Office Guidelines for municipal water conservation plans. I recommend that your water conservation plan be hereby approved (copy enclosed).

The Water Drought/Emergency Resolution (Resolution No. 2019-1) as adopted by the governing body of the Jefferson County Rural Water District No. 13 on August 15, 2019, and received by us on September 6, 2019, appears to be adequate to carry out the implementation of your municipal water conservation plan (copy enclosed).

Please note that it is the city's responsibility to maintain baseline storage capacities, seasonal water levels, depth to well screen, and any other data used in defining drought response triggers levels.

Sincerely,

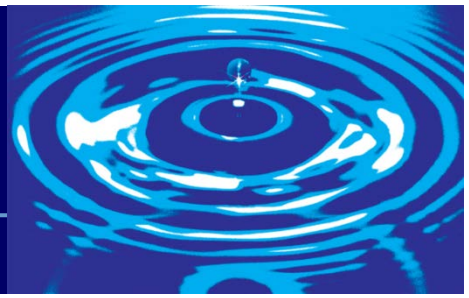
Diane Knowles
Environmental Scientist

Approved by:

Date: 09-13-19

Ginger Pugh, Professional Engineer
Kansas Department of Agriculture
Division of Water Resources

Enclosures
cc: Linda White, Kansas Department of Health and Environment
Elmer Ronnebaum, Kansas Rural Water Association
David W. Barfield, Division of Water Resources



Municipal Water Conservation Plan For Jefferson Co. RWD No. 13

Municipal Water Conservation Plan
For Jefferson County. RWD No. 13

TABLE OF CONTENTS

INTRODUCTION

The primary objectives of the Water Conservation Plan for Jefferson County Rural Water District No. 13 are to develop long-term water conservation plans (Long-Term Water Use Efficiency Section) and short-term water emergency plans (Drought Response Section) to assure the District customers of an adequate water supply to meet their needs. The efficient use of water also has the beneficial effect of limiting or postponing water distribution system expansion and thus limiting or postponing the resultant increases in costs, in addition to conserving the limited water resources of the State of Kansas.

Jefferson County Rural Water District No. 13 has undertaken a number of steps to ensure a dependable water supply for our customers during the past 40 years. The water supply for our District is obtained from two wells. These wells were drilled in 1976 and 1997 and take water from the Kansas River Alluvium. Appropriate maintenance actions have been completed on a timely basis on both wells since original construction including pump replacement, screen replacements, electrical work, and other tasks as required. Treated water storage facilities consist of one 135,000- gallon underground reservoir and one 200,000-gallon elevated tower and one 250,000-gallon elevated tower. The District also purchases water from the City of Lawrence in the event of equipment failure at the facility. The City of Lawrence is not considered a drought plan backup supply for the District. Our District water supply and distribution system have ample capacity to meet current customer demands and future projected demands for several years, except during drought periods. Jefferson County Rural Water District No. 13 believes that our Municipal Water Conservation Plan represents an additional major step in ensuring our customers of a dependable water supply in future years.

LONG-TERM WATER USE EFFICIENCY

Water Use Conservation Goals

Jefferson County Rural Water District No. 13 used 103 gallons per person per day (GPCD) in 2017. This GPCD figure included:

Water sold to residential/commercial customers;
Water distributed for free public services (parks, cemeteries, swimming pools etc.); and
Water lost by leaks in the water distribution system.

However, the GPCD figure does not include municipally supplied water for industries that use over 200,000 gallons per year. According to the publication Municipal Water Use in Kansas, 2017, our District is located in Region 8M. From this publication we determined that our District GPCD water use was 103, which was 24 percent above the regional average of 83 GPCD among public water suppliers in Region 8M during 2017. The District desires to set a water use conservation goal for usage not to exceed 97 GPCD based on the District's 5-year average and is 12% above regional average of the last five years (2013-2017). Our District anticipates not exceeding this goal by carrying out the specific actions that are outlined in our plan.

Water Conservation Practices

This subsection of the plan summarizes the current education, management and regulation efforts that relate to the long-term conservation of water in the District. Specific practices that will be undertaken to conserve water are listed and a target date to begin each practice is also shown.

Education

The District water bills show the total gallons of water used during the billing period and the amount of the bill. Water conservation tips are not normally provided with the water bills. The District has not provided information on water conservation to the local news media on a regular basis and has not encouraged the Board of Education and teachers to become involved in water conservation presentations in schools.

The District has not planned any additional conservation practices for the Education Component of the Long-Term Water Use Efficiency Section of our Water Conservation Plan.

Education Conservation Practices to be Taken	Target Date
1. Water bills will show the amount of water used in gallons and the cost of the water.	Implemented
2. Minutes of the monthly meeting are provided to customers through the District's website which includes water usage.	Implemented
3. Water Conservation Plans are available to the public through the District Office and the District website.	Implemented
4. Water conservation education is conveyed to the District patrons utilizing the automated phone call system when required.	Implemented
5. Water Conservation plan added to District's website.	Implemented

Management

Jefferson County Rural Water District No. 13 has water meters on all water supplies and water pumped to the distribution system. Any new supply will have an individual meter on each source of supply. These meters are read daily via the plant's SCADA system. Meters are sent out for tested at least once every three years. Any meter malfunctions or inaccurate meters are repaired or replaced within two weeks of identified malfunctions.

Water meters are installed on all residential/commercial customers. This practice was established during the creation of the District. However, water is provided free of charge to the local volunteer fire departments and community events on a case-by-case basis. Customer meters are scheduled for an accuracy check and possible repair or replacement upon receiving a request to do so from the customer. Water meters with over 1,000,000 gallons of service are routinely replaced.

Jefferson County Rural Water District No. 13 reads each customer's water meter monthly. In the event of inclement weather, usage may be estimated for one month. Every effort is made to ensure meters do not go two months without readings being conducted. Customer water meters are generally read approximately the last week of the month; however, the meter readers sometime deviate from the scheduled time period based primarily on weather. The

District mails a monthly water bill to customers that request a hard copy bill. Customers who have signed up for paperless billing can view their monthly water usage online.

Water leaks from the District public water distribution system are repaired when customers report significant leaks from the water mains or leaks are located by District Personnel. Water pressure is not checked unless customers complain that their water pressure is too low. Water pressure indicators are located at the plant, booster stations, and elevated towers. Pressures are monitored for deviations which can indicated malfunctions.

The water rate structure for the District was last approved by the Board of Directors on August 17, 2017. This rate is reviewed annually and adjusted as deemed appropriate. The minimum monthly water bill is established for each Benefit Unit Holder (regardless of whether there is a physical meter installed at the property). A water use charge per 1,000 gallons used is added to the monthly minimum.

The District has not planned any additional conservation practices for the Management component of the Long-Term Water Use Efficiency Section of our Water Conservation Plan.

Management Conservation Practices to be Taken	Target Date
1. All source water will have meters installed and the meters will be repaired or replaced within two weeks when malfunctions occur.	Implemented
2. Meters for source water will be tested for accuracy at least once every three years. Each meter will be repaired or replaced if the test measurements are not within industry standards (such as AWWA standards).	Implemented
3. All meters for source water will be read at least on a monthly basis and meters at individual service connections will be read at least once every two months. In the event of severe weather, the reading may be estimated for a month on a case by case basis.	Implemented
4. Meters will be installed at all locations where regular water use is expected. Exempt from this requirement is water flush/cleanout locations.	Implemented
5. A portable meter will be used to account for water usage for large scale community events where water is either provided free for the users or where water will be purchased.	Implemented
4. A water management review will be implemented whenever the amount of unsold water (amount of water provided free for public service, used for treatment purposes, water loss, etc.) exceeds 20 percent of the total source water for a four-month time period. The review will result in a specified change in water management practices or implementation of a leak detection and repair program or plan or other actions as deemed appropriate by the District.	Implemented
5. Events within the District that use water from hydrants (Mud Run, KU Cross Country Races, etc.) are metered and water usage is documented.	Implemented
6. Service meters for Benefit Unit holders are replaced after 1,000,000 gallons of usage. Service meters over 2” in diameter are replaced every 5 years.	Implemented

Regulation

Jefferson County Rural Water District No. 13 does not have any water conservation regulations in effect at the present time. Because of our ability to supply water during normal periods, regulatory controls on water use are included only in the Drought Response section of this plan and water drought/emergency resolution where they constitute the primary means for conserving water during a supply shortage.

Jefferson County Rural Water District No. 13 does not have a plumbing code and has not felt the need to incorporate mandatory use of water conservation units in a plumbing code.

Regulation Actions to be Taken	Target Date

DROUGHT RESPONSE

Jefferson County Rural Water District No. 13 addresses short-term water shortage problems through a series of stages based on conditions of supply and demand with accompanying triggers, goals and actions. Each stage is more stringent in water use than the previous stage since water supply conditions are more deteriorated. The Board of Directors of the District, or, if authorized by the Board, the District Manager shall implement the appropriate conservation measures.

Stage 1: Water Watch

Goals

The goals of this stage are to heighten awareness of the public on water conditions and to maintain the integrity of the water supply system.

Triggers

This stage is triggered by any one of the following conditions:

1. The District's storage has fallen below 85 percent capacity, and will not recover; or
2. Treatment plant operations are at 70 percent capacity or more for three consecutive days (15 hours of plant supply pump operation with a 24-hour period); or
3. Groundwater levels have fallen 5 feet below the normal seasonal level.

Education Actions

1. The District will make occasional news releases to the local media describing present conditions and indicating the water supply outlook for the upcoming season.
2. Previous months summaries of precipitation, temperature, water levels and storage will be made public at the beginning of each month.
3. Water-saving tips will be included in billings to water utility customers.

Management Actions

1. The District wells will be cleaned and flushed to maintain them at their most efficient condition.
2. Leaks will be repaired within 48 hours of detection.
3. The District will monitor internal use of water and will curtail activities such as hydrant flushing and street cleaning.

Regulation Actions

The public will be asked to curtail some outdoor water use and to make efficient use of indoor water, i.e. wash full loads, take short showers, don't let faucets run, etc.

Stage 2: Water Warning

Goals

The goals of this stage are to reduce peak demands by 20 percent and to reduce overall weekly consumption by 10 percent.

Triggers

This stage is triggered by any one of the following conditions:
1. The District's storage has fallen below 70 percent capacity, and will not recover; or
2. Treatment plant operations are at 80 percent capacity or more for three consecutive days (19 hours of plant supply pump operation with a 24-hour period); or
3. Pumping lowers water level to within 10 feet of the top of the well screens.

Education Actions

1. The District will make weekly news releases to the local media describing present conditions and indicating the water supply outlook for the upcoming week.
2. Previous week summaries of precipitation, temperature, water levels and storage will be made public each week.
3. Water conservation articles will be provided to the local newspaper.
4. Water-saving tips will be included in billings to water utility customers.
5. Implement an Auto-Call to all Benefit Unit holders that a Water Warning has been implemented.

Management Actions

1. The District water supplies will be monitored daily.
2. Leaks will be repaired within 24 hours of detection.
3. Pumpage at wells will be reduced to decrease drawdown and to maintain water levels over well screens.
4. The District will curtail internal water usage where possible.

Regulation Actions

1. Refilling of swimming pools will be discouraged.
2. A lawn watering system ban will be imposed on District customers.
3. Outdoor water use will be restricted to before 10:00 am and after 9:00 pm.
4. Outdoor watering (not including cattle watering) will be restricted to use of a hand-held hose or bucket only.

5. Excess water use charges for usage of water over the amount used in the winter will be considered.
6. Waste of water will be prohibited.

Stage 3: Water Emergency

Goals

The goals of this stage are to reduce peak demands by 50 percent and to reduce overall weekly consumption by 25 percent.

Triggers:

This stage is triggered by any one of the following conditions:

1. The District's storage has fallen below 50 percent capacity; or
2. Treatment plant operations are at 90 percent capacity or more for three consecutive days (21 hours of plant supply pump operation with a 24-hour period); or
3. Groundwater levels have fallen 15 feet below the normal seasonal level; or
4. Emergency conditions related to repairs or water quality.

Education Actions

1. The District will make daily news releases to the local media describing present conditions and indicating the water supply outlook for the next day.
2. Previous days summaries of precipitation, temperature, water levels and storage will be made public each day.
3. The District will hold public meetings to discuss the emergency, the status of the District water supply and further actions, which need to be taken.
4. Implement an Auto-Call to all Benefit Unit holders that a Water Emergency has been implemented.

Management Actions

1. The District water supplies will be monitored daily.
2. Leaks will be repaired within 24 hours of detection.
3. Pumpage at wells will be reduced to decrease drawdown and to maintain water levels over well screens.
4. The District will seek additional emergency supplies from other users, the state or the federal government.

Regulation Actions

1. Outdoor water use will be banned.

2. Waste of water will be prohibited.

PLAN REVISION, MONITORING & EVALUATION

Jefferson County Rural Water District No. 13 will establish a management practice of reviewing monthly totals for water production, residential/commercial sales, water provided free-of-charge, and “unaccounted for water”. Problems noted during the monthly review will be solved as soon as possible.

Jefferson County Rural Water District No. 13 Municipal Water Conservation Plan will be reviewed during the month of April each year and on a more frequent basis during drought or other water shortage conditions. If the water conservation GPCD goals for the previous year are not met, then the District will review the data collected from the previous year in relationship to the status and effectiveness of the conservation practices that are outlined in our plan and will provide a status report to the Kansas Department of Agriculture, Division of Water Resources, which will also include any additional water conservation practices that may need to be taken in order for the District to achieve and maintain its water use conservation GPCD goals.

WATER DROUGHT/EMERGENCY RESOLUTION

Resolution No. 2019-1

A resolution authorizing the declaration of a water watch, warning or emergency; establishing procedures and voluntary and mandatory conservation measures; authorizing the issuance of administrative regulations; and prescribing certain penalties.

Be it Resolved by Rural Water District No. 13 of Jefferson County.

Section 1. Purpose. The purpose of this resolution is to provide for the declaration of a water supply watch, warning or emergency and the implementation of voluntary and mandatory water conservation measures throughout the District in the event such a watch, warning or emergency is declared.

Section 2. Definitions.

(a) "The District," as the term is used in this resolution, shall be Rural Water District 13, Jefferson, County, Kansas.

(b) "Water," as the term is used in this resolution, shall mean water available to Rural Water District No. 13 of Jefferson County for public distribution by virtue of its water rights or any treated water introduced by the District into its water distribution system, including water offered for sale at any coin-operated site.

(c) "Customer," as the term is used in this resolution, shall mean the customer of record using water for any purpose from the District's water distribution system and for which either a regular charge is made or, in the case of coin sales, a cash charge is made at the site of delivery.

(d) "Waste of water," as the term is used in this resolution, includes, but is not limited to: (1) permitting water to escape down a gutter, ditch, or other surface drain; or (2) failure to repair a controllable leak of water due to defective plumbing.

(e) "Notice," as the term is used in this resolution, shall mean such notice as the governing body of the District determines appropriate, including direct mail to the District's customers, publication in one or more newspapers having circulation within the territory of the District, television or radio news releases broadcast by stations serving the territory of the District, or any combination thereof.

(f) "Governing body," as the term is used in this resolution, shall mean the Board of Directors of the District.

(g) "Personal notice," as the term is used in this resolution, shall mean written notice; hand delivered to the person to whom notice is directed. Personal notice is accomplished on the date that the notice is delivered.

(h) "Mailed notice," as the term is used in this resolution, shall mean written notice, placed in the United States mail, First Class postage prepaid, addressed to the person to whom notice is directed, at the last known address for such person according to the records of the District. Mailed notice is accomplished on the date that the notice is placed in the mail as described above.

(i) The following classes of uses of water are established:

Class 1:

Water used for outdoor watering; either public or private, for gardens, lawns, trees, shrubs, plants,

parks, golf courses, playing fields, swimming pools or other recreational areas; or the washing of motor vehicles, boats, trailers, or the exterior of any building or structure.

Class 2:

Water used for any commercial or industrial, including agricultural, purposes: except water actually necessary to maintain the health and personal hygiene of bona fide employees while such employees are engaged in the performance of their duties at their place of employment.

Class 3:

Domestic usage, other than that which would be included in either classes 1 or 2.

Class 4:

Water necessary only to sustain human life and the lives of domestic pets and maintain standards of hygiene and sanitation.

Section 3. Declaration of Water Watch. Whenever the governing body of the District finds that conditions indicate that the probability of a drought or some other condition causing a major water supply shortage are present, it shall be empowered to declare, by resolution, that a water watch exists and that it shall take steps to inform the public and ask for voluntary reductions in water use. Such a watch shall be deemed to continue until it is declared by resolution of the governing body to have ended. The resolutions declaring the existence and end of a water watch shall be effective upon their adoption by the governing body of the District and giving of notice thereof.

Section 4. Declaration of Water Warning. Whenever the governing body of the District finds that drought conditions or some other condition causing a major water supply shortage are present and supplies are starting to decline, it shall be empowered to declare by resolution that a water warning exists and that it will recommend restrictions on nonessential uses during the period of warning. Such a warning shall be deemed to continue until it is declared by resolution of the governing body to have ended. The resolutions declaring the beginning and ending of the water warning shall be effective upon their adoption by the governing body of the District and giving of notice thereof.

Section 5. Declaration of Water Emergency. Whenever the governing body of the District finds that an emergency exists by reason of a shortage of water supply needed for essential uses, it shall be empowered to declare by resolution that a water supply emergency exists and that it will impose mandatory restrictions on water use during the period of the emergency. Such an emergency shall be deemed to continue until it is declared by resolution of the governing body to have ended. The resolutions declaring the existence and end of a water supply emergency shall be effective upon their adoption by the governing body of the District and giving of notice thereof.

Section 6. Voluntary Conservation Measures. Upon the declaration of a water watch or water warning as provided in Sections 3 and 4, the District and/or the governing body of the District Manager is authorized to call on all water consumers to employ voluntary water conservation measures to limit or eliminate nonessential water uses including, but not limited to, limitations on the following uses:

(a) Class 1 uses of water, as provided for in Section 2(d).
(b) Waste of water.

Section 7. Mandatory Conservation Measures. Upon the declaration of a water supply emergency as provided in Section 5, the governing body of the District is also authorized to implement certain mandatory water conservation measures, including, but not limited to, the following:

(a) Suspension of new connections to the District's water distribution system, except those approved by the governing body of the District prior to the effective date of the declaration of the emergency;

(b) Restrictions on the uses of water in one or more classes of water use, wholly or in part;
(c) Restrictions on the sales of water at coin-operated facilities or sites;
(d) The imposition of water rationing based on any reasonable formula including, but not limited to, the percentage of normal use and per capita or per consumer restrictions;
(e) Complete or partial bans on the waste of water; and
(f) Any combination of the foregoing measures.

Section 8. Emergency Water Rates. Upon the declaration of a water supply emergency as provided in Section 5, the governing body of the District may adopt emergency water rates designed to conserve water supplies. Such emergency rates may provide for, but are not limited to:

(a) Higher charges for increasing usage per unit of use (increasing block rates);
(b) Uniform charges for water usage per unit of use (uniform unit rate); or
(c) Extra charges in excess of a specified level of water use (excess demand surcharge).

Section 9. Regulations. During the effective period of any water supply emergency as provided for in Section 5, the governing body of the District is empowered to promulgate such regulations as may be necessary to carry out the provisions of this resolution, any water supply emergency resolution, or emergency water rate resolution.

Section 10. Violations, Disconnections and Penalties.

(a) Upon violation of any water use restrictions imposed pursuant to Sections 7 or 9 of this resolution, a written notice of the violation shall be affixed to the property where the violation occurred and the customer of record and any other person known to the District to be responsible for the violation or its correction shall be provided with either personal or mailed notice. Such notice shall contain the following information:

(1) The customer(s) Name(s), Benefit Unit number and address where service is being provided;
(2) The nature of the violation, the corrective action required and the deadline for completion of such corrective action;
(3) A statement that the customer has the right to request a hearing and be heard at a hearing to be conducted in accordance with subsection (b), below.
(4) A statement that water service shall be terminated unless corrective action is taken by the stated deadline.

(b) Any water user receiving a notice of violation as provided above shall have the right to a hearing prior to service termination. The request for hearing must be made by the customer owner within ten(10) business days of the date of service of such notice, or hearing will be deemed irrevocably waived. The District Manager or such other person as appointed by the Board of Directors of the District shall conduct such hearing. The hearing shall be held within thirty (30) days of the request for hearing. At such hearing, the customer and the District shall each have the right to present such evidence as is pertinent to the issue, may be represented by counsel, and may examine and cross-examine witnesses. The hearing officer shall promptly make his or her findings and shall enter his or her order accordingly. The hearing officer may adopt the finding of violation, contained in the notice, or may modify or reject such finding; may make new or additional findings of violation, and order corrective action in accordance with the resolution. Unless otherwise ordered by the hearing officer, water service shall be terminated the day after the date that the order of termination is issued by the hearing officer unless the required corrective action has been made prior to termination. The hearing officer's order shall be filed in the District's records, and a copy thereof shall be provided to the water user in the same manner as set forth in subsection (2) above.

(c) Any party aggrieved by the decision of the hearing officer may appeal the same by filing a written notice of appeal with the District. Notwithstanding the order of termination, service shall not be terminated if the notice of appeal has been received prior to termination. Any such appeal shall be set for hearing before the governing body at its next regularly scheduled meeting or special meeting.

The determination of the governing body shall be final. The determination of the governing body shall be recorded in the minutes of its official proceedings, and notice thereof shall be provided to the customer in the same manner described in section (a), above. Violations of this resolution shall be an offense of the District's rules and regulations and may result in termination of service.

(d) Reconnection of service terminated as provided above shall be made only after the District has determined that the necessary corrective action has been completed and the fees provided by subsection (e), below, have been paid.

(e) A fee of $50.00 shall be paid for the reconnection of any water service terminated pursuant to subsection (a). In the event of subsequent violations, the reconnection fee shall be $200.00 for the second reconnection and $300.00 for any additional reconnections.

Section 11. Emergency Termination. Nothing in this resolution shall limit the ability of any properly authorized District official from terminating the supply of water to any or all customers upon the determination of such District official that emergency termination of water service is required to protect the health and safety of the public.

Section 12. Severability. If any provision of this resolution is declared unconstitutional, or the application thereof to any person or circumstance is held invalid, the constitutionality of the remainder of the resolution and its applicability to other persons and circumstances shall not be affected thereby.

Passed by the governing body this 15TH day of AUGUST, 2019.

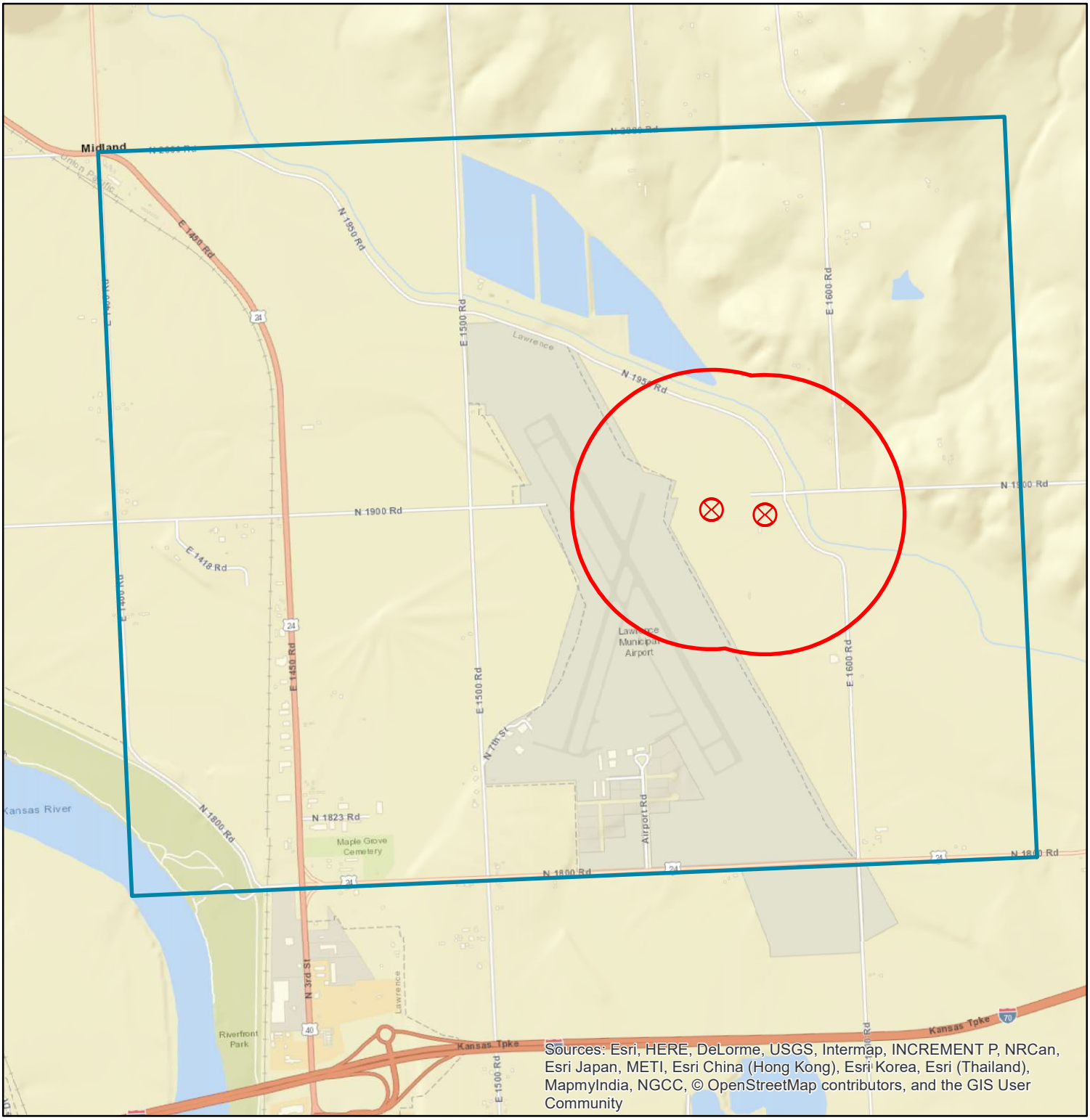
(District Board Chairman)

ATTEST:

(District Board Secretary)

Appendix - 1.

Maps of Source Water Assessment Area,
Source Water Protection Area,
and Water Well Drilling Logs



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0 0.5 1 Miles

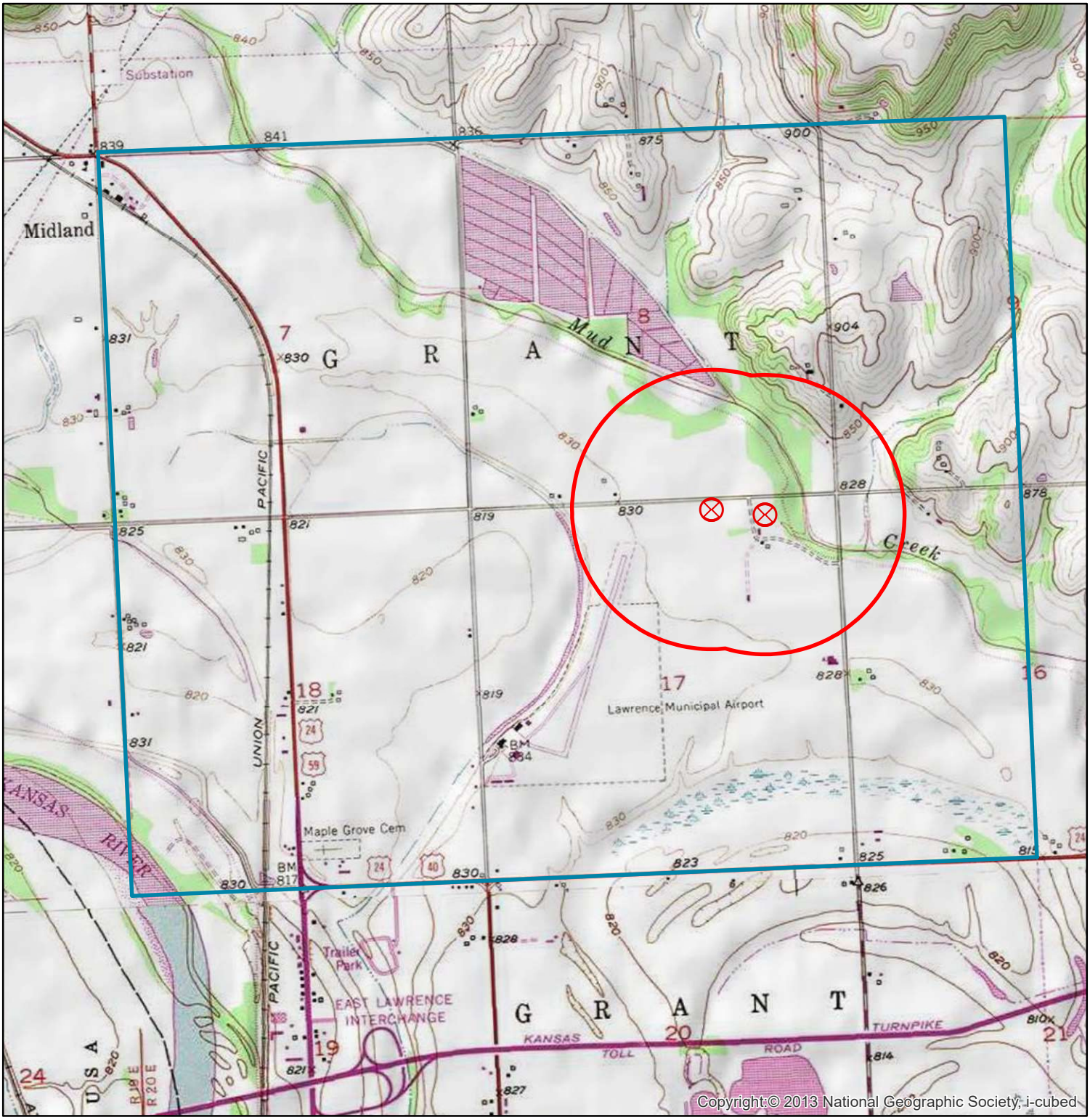
Legend

- AuthorizedWells
- Zone B
- Zone C

Rural Water District No. 13
Jefferson County Kansas

Water Well Locations and Source Water Protection Areas

Map prepared by Kenneth A. Kopp, P.G., Kansas Rural Water Association, November 3, 2021.



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0 0.5 1 Miles

Legend

- AuthorizedWells
- Zone B
- Zone C

Rural Water District No. 13
Jefferson County Kansas

Water Well Locations and Source Water Protection Areas

Map prepared by Kenneth A. Kopp, P.G., Kansas Rural Water Association, November 3, 2021.

N

0 0.5 1 Miles

Legend

- AuthorizedWells
- Zone B
- Zone C

Rural Water District No. 13
Jefferson County Kansas

Water Well Locations and Source Water Protection Areas

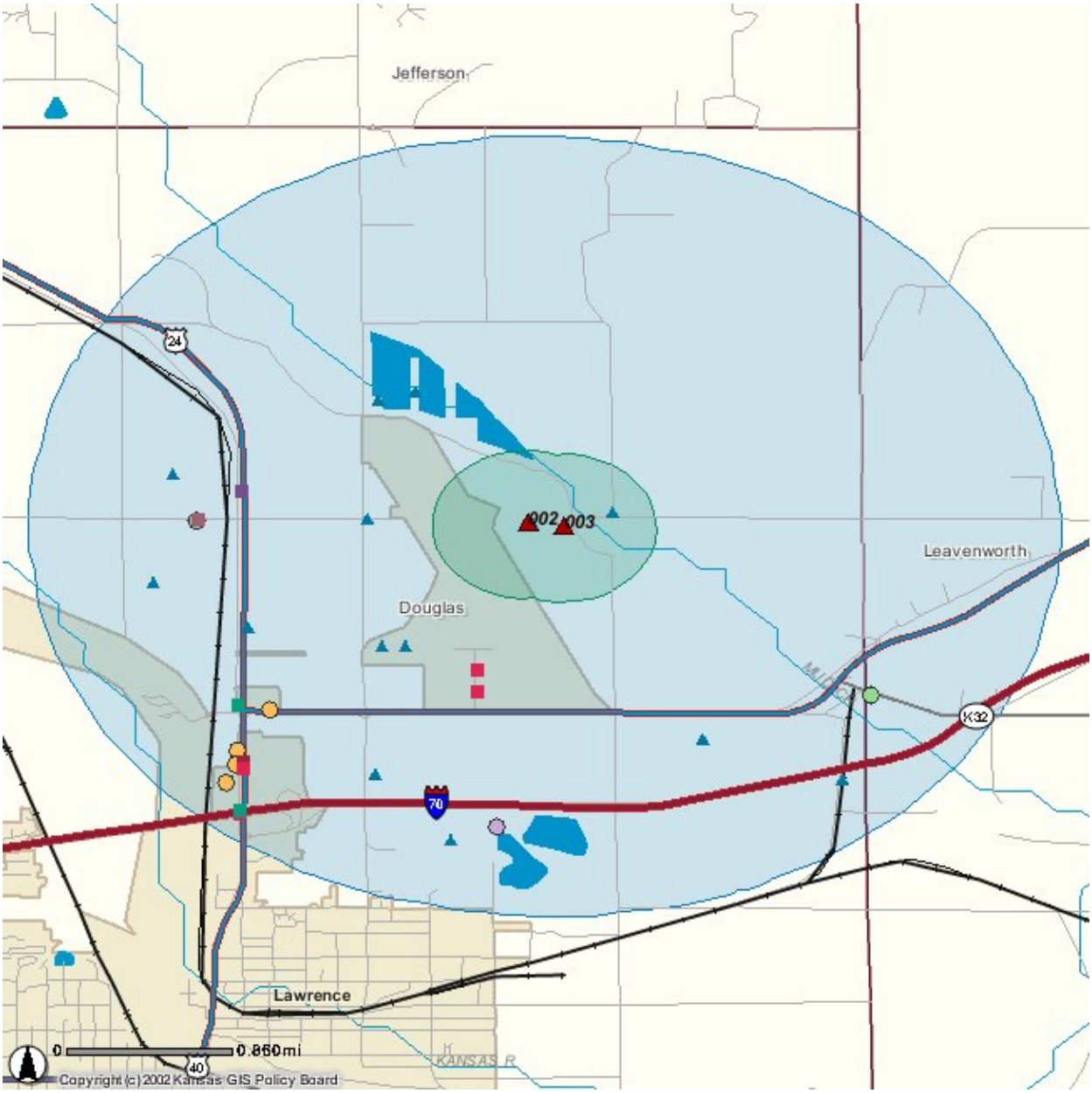
Map prepared by Kenneth A. Kopp, P.G., Kansas Rural Water Association, November 3, 2021.

Source Water Assessment Report − Map

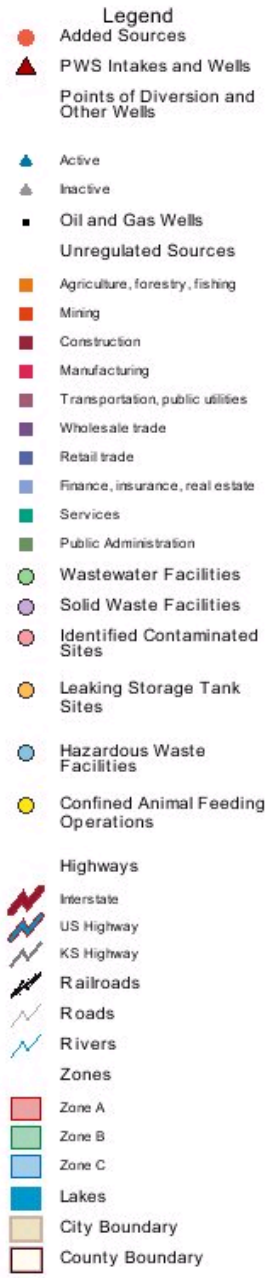
Public Water Supply (PWS):	**JEFFERSON CO RWD 13**
Assessment Area (AA):	**860**
Well/Intake ID's:	002, 003
Assessment Area Report Date:	December 10, 2002
Assessment Area Report Status:	Final

Section Description:
The Map section shows the entire assessment area, water supplies, potential sources of contamination, and other basemap data for locational reference. The map is only intended to give a broad overview for concentrations of potential contaminating sites in the assessment area. Due to the scale of the map, clusters could appear larger than they are from an actual perspective. It should not be used for anything other than what is specified in this report.

Public Water Supply: **JEFFERSON CO RWD 13**
Assessment Area: **860**
Map of the Assessment Area.



Previous Report Section Return to beginning of Step 7 Next Report Section


Legend
Added Sources
PWS Intakes and Wells
Points of Diversion and Other Wells
Active
Inactive
Oil and Gas Wells
Unregulated Sources
Agriculture, forestry, fishing
Mining
Construction
Manufacturing
Transportation, public utilities
Wholesale trade
Retail trade
Finance, insurance, real estate
Services
Public Administration
Wastewater Facilities
Solid Waste Facilities
Identified Contaminated Sites
Leaking Storage Tank Sites
Hazardous Waste Facilities
Confined Animal Feeding Operations
Highways
Interstate
US Highway
KS Highway
Railroads
Roads
Rivers
Zones
Zone A
Zone B
Zone C
Lakes
City Boundary
County Boundary

GEOLOGIC CROSS SECTIONS IN DOUGLAS COUNTY, KANSAS

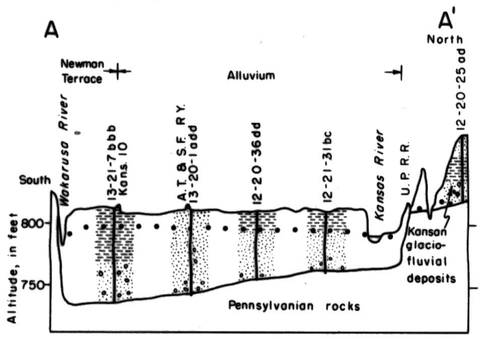
By Howard G. O'Connor

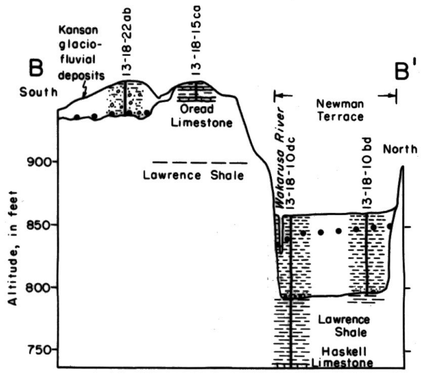
1959

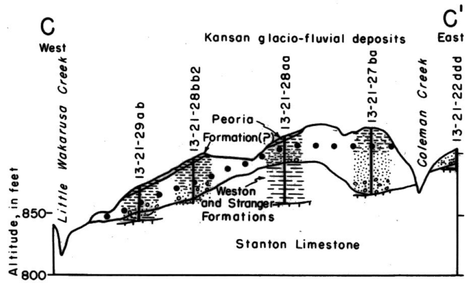
State Geological Survey
of Kansas

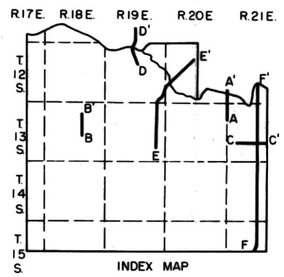
Bulletin 148

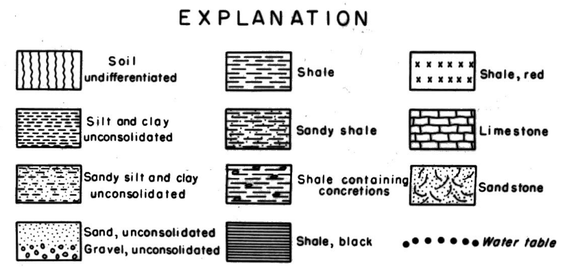
Plate 3

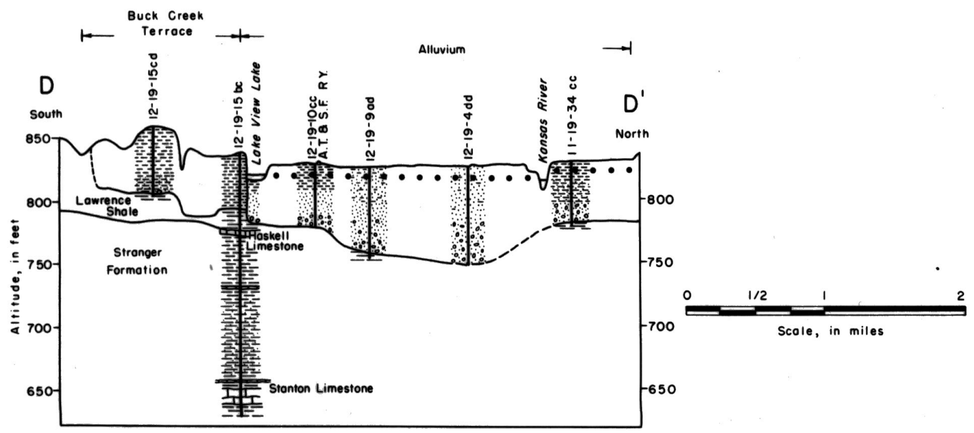


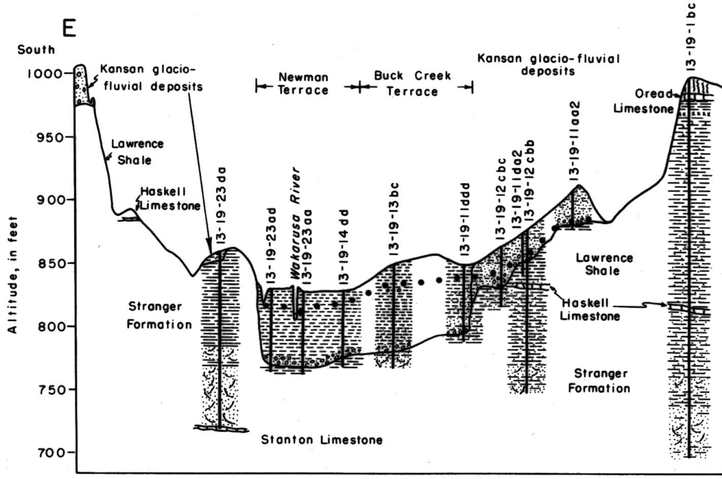


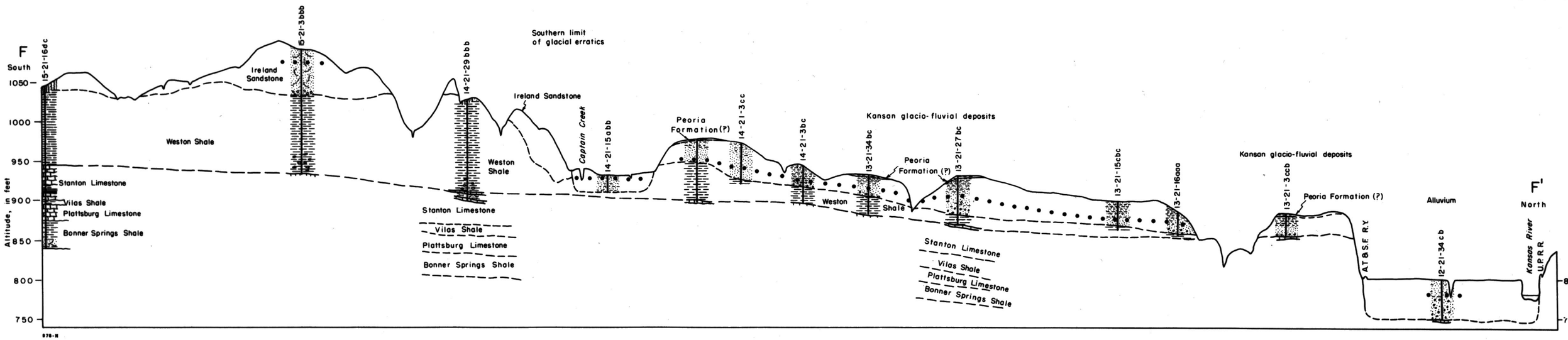












Appendix - 2.

Contaminant Source Inventory

Kansas Wellhead Protection Planning
Contaminant Source Inventory

Worksheet for Conducting Initial Inventory

Name of Public Water Supply: Rural Water District No. 13 Jefferson County
Water Supply Diversion Point: Existing wellfield consisting of two (2) wells.
Inventory Prepared by: Kenneth A. Kopp, P.G.
Date Inventory Completed: December 9, 2021

Code	Description	Present	Comments
2891	Adhesives and Sealants Manufacturing		
3724	Aircraft Engines and Parts Manufacturing		
3728	Aircraft Equipment Manufacturing		
3721	Aircraft--manufacturing		
4583	Airport Terminal Services--passengers service	X	Zone C (Lawrence Airport)
4582	Airports and Flying Fields	X	Zones B and C (Lawrence Airport)
E	Alfalfa Field		
3353	Aluminum Sheet, Plate, and Foil Manufacturing		
7999	Amusement and Recreation Area		
2077	Animal and Marine Fats and Oils Manufacturing		
M	Animal Feeding Operation		
6513	Apartment Building		
2952	Asphalt Felts and Coatings Manufacturing		
2951	Asphalt Pavement Production		
7531*	Auto Body Repair & Paint Service		
AA	Auto Race Track		
7538	Auto Truck Repair Service	X	Zone C
2052	Bakery Products Manufacturing		
3312	Blast Furnaces and Steel Mills Manufacturing		
3732	Boat Building and Repairing Shop Manufacturing		
8421	Botanical Gardens	X	Zones B and C (KU Biological Survey)
2086	Bottled and Canned Soft Drinks Production		
3251	Brick and Structural Clay Tile Manufacturing		
1622	Bridge Construction		
3991	Brooms and Brushes Manufacturing		
4171	Bus Terminal Facilities		
7033	Camp Ground		
7542	Car Wash		
2895	Carbon Black Manufacturing		
3592	Carburetors, Pistons, Rings, Valves Manufacturing		
3672	Cathode Ray Television Picture Tubes Manufacturing		
211	Cattle Farm		
212	Cattle Working Area		
3241	Cement, Hydraulic Manufacturing		
6553	Cemetery	X	Zone C
2812	Chemical Manufacturing--Alkalies and Chlorine		
2899	Chemical Preparations Manufacturing		
5261	Christmas Tree Farm		
8661	Church		
8221	College or University		
4939	Combination Utility Services, nec		
6611	Combined Real Estate, Insurance, etc		
3646	Commercial Lighting Fixtures Manufacturing		
2754	Commercial Printing, Gravure Manufacturing		
3272	Concrete Products Manufacturing	X	Zone C

Kansas Wellhead Protection Planning
Contaminant Source Inventory

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Code	Description	Present	Comments
2023	Condensed and Evaporated Milk Manufacturing		
5082	Construction and Mining Machinery		
1795	Construction Demolition Landfill		
A	Construction Equipment Dealer		
3531	Construction Machinery Manufacturing		
U	Construction Materials Stock Pile		
BB	Construction Project Temporary-Equipment Storage/Staging		
3535	Conveyors and Conveying Equipment Manufacturing		
3351	Copper Rolling and Drawing Manufacturing		
115	Corn Field	x	Zones B and C
2653	Corrugated and Solid Fiber Boxes Manufacturing		
723	Crop Preparation Services for Market		
BC	CRP Grassland		
3643	Current-carrying Wiring Devices Manufacturing		
3087	Custom Compound Purchased Resins Manufacturing		
AC	Dairy Farm		
2026	Dairy Products Manufacturing & Processing		
AD	Dog Kennel		
AE	Dog Race Track		
2047	Dog, Cat, and Other Pet Food Manufacturing		
2591	Drapery Hardware & Blinds & Shades Manufacturing		
1381	Drilling Oil and Gas Wells		
0	Drinking Water Treatment	x	Plant)
7216	Dry Cleaner		
6732	Education or Religious Institution		
3641	Electric Lamps Manufacturing		
AF	Electric Power Lines	x	Zones A, B and C
1692	Electric Power Plant		
4931	Electric Services		
AG	Electric Transformer Substation		
3534	Elevators and Moving Stairways Manufacturing		
3694	Engine Electrical Equipment Manufacturing		
2892	Explosives Manufacturing		
843	Extraction of Pine Gum		
3499	Fabricated Metal Products Manufacturing		
3443	Fabricated Plate Work (boiler shops) Manufacturing		
BD	Fair Ground		
BK	Farm Equipment Sales or Service	x	Zone C
3523	Farm Machinery and Equipment Manufacturing		
5191	Farm Supply Retail	x	Zone C
AH	Farmstead		
AI	Feed Mill		
2875	Fertilizer Storage	x	Zone C (Midland Coop)
2875	Fertilizers, Mixing Manufacturing		
2261	Finishing Plants, Cotton Manufacturing		

Kansas Wellhead Protection Planning
Contaminant Source Inventory

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Date Inventory Completed: December 9, 2021

Code	Description	Present	Comments
2041	Flour Mill Other Food Grain Milling		
3593	Fluid Power Cylinders & Actuators Manufacturing		
3824	Fluids Meters and Counting Devices Manufacturing		
821	Forest Nurseries and Seed Gathering		
851	Forestry Services		
2038	Frozen Specialties Manufacturing		
AZ	Fuel Storage Tanks	x	Zone C
7261	Funeral Service and Crematories		
2599	Furniture and Fixtures Manufacturing		
4932	Gas and Other Services Combined		
3053	Gaskets, Packing and Sealing Devices Manufacturing		
5541	Gasoline Service Station	x	Zone C (Midland)
849	Gathering of Forest Products, nec		
7992	Golf Course		
9100	Government Office Building		
CE	Grain Elevator	x	Zone C (Midland Coop)
BE	Gravel Dredge		
BG	Gravel Pit	x	Zone C: Historic
BF	Gravel Road	x	Zones B and C
3321	Gray Iron Foundry		
BH	Grazing Livestock	x	Zones B and C
3423	Hand and Edge Tools Manufacturing		
3429	Hardware Manufacturing		
5070	Hardware, Plumbing & Heating Equipment Wholesale Trade		
2426	Hardwood Dimension and Flooring Manufacturing		
CL	Health Services--hospitals, nursing and personal care		
G	Health Services--Office of physicians, dentists, optometrists		
1611	Highway and Street Construction		
AR	Highway Maintenance Facility	x	Zone C
BI	Highway Materials Storage Area	x	Zone C
BJ	Highway Rest Area		
Q	Historic Waste Dumps/Landfills		
V	Home & Horticultural Weed & Insect Control		
AJ	Horse Race Track		
8060	Hospital		
7010	Hotel & Motel		
AK	House (Non-farm Residence)	x	Zone C
3630	Household Appliances Manufacturing		
2519	Household Furniture Manufacturing		
Z	Household Hazardous Waste Collection Center		
2024	Ice Cream and Frozen Desserts Manufacturing		
AY	Incinerator		
2813	Industrial Gases Manufacturing		
2819	Industrial Inorganic Chemicals Manufacturing		
2869	Industrial Organic Chemicals Manufacturing		

Kansas Wellhead Protection Planning
Contaminant Source Inventory

Worksheet for Conducting Initial Inventory

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Date Inventory Completed: December 9, 2021

Code	Description	Present	Comments
3537	Industrial Trucks and Tractors Manufacturing		
CB	Injection Well		
2816	Inorganic Pigments Manufacturing		
BL	Interstate Highway	x	Zone C (U.S. Highways 40 and 59)
4971	Irrigation Systems	x	Zone C
	Irrigation Well	x	Zone C
CF	Junk Yard		
Y	Lagoons & Liquid Waste	x	Zones B and C
W	Landfills/Dumps		
C	Landscape Fungus & Weeds		
B	Landscape Insects		
7210	Laundry, Self Service		
T	Lawn & Turf	x	Zone C
3524	Lawn and Garden Equipment Manufacturing		
4110	Local and Suburban Transportation		
4212	Local Trucking, without storage		
2411	Logging Camps & Logging Contractors Manufacturing		
2992	Lubricating Oils and Greases Manufacturing		
5030	Lumber and Construction Materials		
3599	Machinery, Except Electrical Manufacturing		
3999	Manufacturing Industries, nec		
4463	Marine		
2515	Mattresses and Bedsprings Manufacturing		
2011	Meat Packing Plant Manufacturing		
3412	Metal Barrels, Drums, and Pails Manufacturing		
3479	Metal Coating and Allied Services Manufacturing		
3442	Metal Doors, Sash, and Trim Manufacturing		
3497	Metal Foil and Leaf Manufacturing		
2514	Metal Household Furniture Manufacturing		
1000	Metal Mining Industry		
2522	Metal Office Furniture Manufacturing		
2542	Metal Partitions and Fixtures Manufacturing		
3469	Metal Stampings Manufacturing		
9711	Military Base Office Building		
BM	Milo Field	x	Zones B and C
3296	Mineral Wool Manufacturing		
1400	Mining Industry--Non-Fuel, and Non-Metal		
5719	Miscellaneous Home Furnishings Stores		
3449	Miscellaneous Metal Work Manufacturing		
3079	Miscellaneous Plastics Products Manufacturing		
5999	Miscellaneous Retail Stores, nec	x	Zone C
2451	Mobile Home Manufacturing		
6515	Mobile Home Park		
3714	Motor Vehicle Parts and Accessories Manufacturing		
3711	Motor Vehicles and Car Bodies Manufacturing		

Kansas Wellhead Protection Planning
Contaminant Source Inventory

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Date Inventory Completed: December 9, 2021

Code	Description	Present	Comments
3751	Motorcycles, Bicycles, and Parts Manufacturing		
3621	Motors and Generators Manufacturing		
AU	Municipal Sewage Treatment Plant-Lagoon		
AT	Municipal Sewage Treatment Plant-Mechanical		
8411	Museums and Art Galleries		
BN	Native Grass Land (not CRP)	x	Zones A, B and C
BO	Nature Center	x	Zones B and C
2873	Nitrogen Fertilizer Manufacturing		
3644	Noncurrent-carrying Wiring devices Manufacturing		
3357	Nonferrous Wire Drawing & Insulating Manufacturing		
3299	Nonmetallic Mineral Products Manufacturing		
I	Nonmetallic Minerals--crushed limestone, fire clay		
CK	Nonmetallic Minerals--industrial sand		
1542	Nonresidential Construction		
1389	Oil and Gas Field Services		
1389	Oil or Gas Well		
AS	Orchard	x	Zone C
2860	Organic Chemical Industry		
7535*	Paint Shops		
2851	Paints and Allied Products Manufacturing		
P	Paper and Allied Products-- pulp, board, & building paper		
CI	Paper and Allied Products--envelopes & bags products		
CJ	Paper and Allied Products--paperboard, containers, and boxes		
2951	Paving Mixtures and Blocks Manufacturing		
BP	Pesticide Application Equipment Storage	x	Zone C
2879	Pesticides & Agricultural Chemicals Manufacturing		
S	Pet (Cat, Dog) Insect Control		
2999	Petroleum and Coal Products Manufacturing		
5171	Petroleum Bulk Stations & Terminals (Truck Farm)		
2911	Petroleum Refining		
2834	Pharmaceutical Preparations Manufacturing		
7384	Photofinishing Laboratory		
4600	Pipeline (Petroleum, Chemical, etc)	x	Zones B and C
4789	Pipeline Terminal		
3086	Plastics Foam Products Manufacturing		
2821	Plastics Materials and Resins Manufacturing		
3088	Plastics Plumbing Fixtures Manufacturing		
3089	Plastics Products Manufacturing		
3471	Plating and Polishing Manufacturing		
2842	Polishes and Sanitation Goods Manufacturing		
BQ	Pond	x	Zones B and C
2452	Prefabricated Wood Buildings Manufacturing		
2048	Prepared Feeds Manufacturing		
3399	Primary Metal Products Manufacturing		
H	Printing and Publishing-- newspapers, books, greeting cards		

Kansas Wellhead Protection Planning
Contaminant Source Inventory

Worksheet for Conducting Initial Inventory

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Inventory Prepared by: Kenneth A. Kopp, P.G.
Date Inventory Completed: December 9, 2021

Code	Description	Present	Comments
CM	Printing and Publishing-- photograving, & commercial printing		
2893	Printing Ink Manufacturing		
9223	Prison or Correctional Institution		
2531	Public Building & Related Furniture Manufacturing		
4220	Public Warehouse		
3561	Pumps and Pumping Equipment Manufacturing		
3743	Railroad Equipment Manufacturing		
AM	Railroad Track	x	Zone C
AN	Railroad Yard		
F	Range & Pasture	x	Zone C
3272	Ready-mix Concrete Plant		
7033	Recreational Vehicle Camp		
BS	Recreational Vehicle Sales; Repair		
3585	Refrigeration and Heating Equipment Manufacturing		
4953	Refuse Systems		
7391	Research & Development Laboratory		
8512	Restaurant		
5261	Retail Nursery or Garden Store	x	Zone C
K	Retail Operation--- food, automotive dealers, merchandise		
CH	Retail Operations--accessory, furniture stores		
CG	Retail Operations--building material & garden supply		
BT	Retirement Housing Center		
7641	Reupholstery and Furniture Repair		
BU	Riparian Land	x	Zones B and C
4441	River	x	Zones B and C (Mud Creek)
BV	Road salt Storage	x	Zone C
1429	Rock Quarry		
3052	Rubber & plastics hose & belting Manufacturing		
N	Rural Homestead	x	Zone C
AO	Salvage Yard		
4952	Sanitary Sewer	x	Zone C
2013	Sausages and Other Prepared Meats Manufacturing		
8211	School	x	Zone C
5093	Scrap and Waste Materials		
3451	Screw Machine Products Manufacturing		
3340	Secondary Nonferrous Metals Manufacturing		
N	Septic Tank- Lateral Field	x	Zone C
4952	Sewer Pump Station		
4952	Sewerage Systems		
3444	Sheet Metal Work Manufacturing		
BW	Shooting Range		
CC	Shopping Center		
3993	Signs and Advertising Display Manufacturing	x	Zone C
1521	Single-family Housing Construction		
2841	Soap and Other Detergent Manufacturing		

Kansas Wellhead Protection Planning
Contaminant Source Inventory

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Code	Description	Present	Comments
AV	Solid Waste--landfill		
AW	Solid Waste--Transfer Station		
D	Sorghum		
2075	Soybean Oil Mills Manufacturing		
116	Soybeans	x	Zones B and C
3559	Special Industries Machinery Manufacturing		
4226	Special Warehousing and Storage		
3566	Speed Changers, Drives and Gears Manufacturing		
BX	State Park		
3325	Steel Foundry		
3317	Steel Pipe and Tubes Manufacturing		
3691	Storage Batteries Manufacturing		
2439	Structural Wood Members Manufacturing		
6552	Suburban Housing Development		
X	Sunflower Field		
3841	Surgical and Medical Instruments Manufacturing		
3842	Surgical Appliances and Supplies Manufacturing		
3613	Switchgear and Switchboard Apparatus Manufacturing		
4013	Switching and Terminal Services		
3795	Tanks and Tank Components Manufacturing		
AP	Telephone Lines	x	Zones B and C
3011	Tires and Inner Tubes Manufacturing		
6541	Title Abstract Offices		
7531*	Top and Body Repair Shops		
3612	Transformers Manufacturing		
3799	Transportation Equipment Manufacturing		
3792	Travel Trailers and Campers Manufacturing		
3713	Truck and Bus Bodies Manufacturing		
3715	Truck Trailers Manufacturing		
BY	Truck Wash		
4230	Trucking Terminal Facilities		
CD	Underground Storage Tanks		
2512	Upholstered Household Furniture Manufacturing		
9532	Urban and Community Development		
AX	Urbanized Area		
7519	Utility Trailer Rental		
3494	Valves and Pipe Fittings Manufacturing		
R	Vegetable Farm		
2076	Vegetable Oil Mills Manufacturing		
741	Veterinary Services, Farm Livestock		
742	Veterinary Services, Specialties		
4221	Warehouse		
4952	Waste Water Treatment Plant		
4941	Water Supply		
2231	Weaving and Finishing Mills, Wool Manufacturing		

Kansas Wellhead Protection Planning
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Code	Description	Present	Comments
AQ	Weed Control-vegetables		
3548	Welding Apparatus Manufacturing		
BA	Wells	x	Zones B and C
2046	Wet Corn Milling Manufacturing		
BZ	Wetland	x	Zones B and C
111	Wheat Field	x	Zones B and C
L	Wholesale Distribution Activities--Durable & Nondurable goods		
2449	Wood Containers Manufacturing		
2511	Wood Household Furniture Manufacturing		
2434	Wood Kitchen Cabinets Manufacturing	x	Zone C
2521	Wood Office Furniture Manufacturing		
2448	Wood Pallets and Skids Manufacturing		
2541	Wood Partitions and Fixtures Manufacturing		
2491	Wood Preserving & Treating		
2517	Wood TV and Radio Cabinets Manufacturing		
1795	Wrecking and Demolition Work		
CA	Zoo		
Other	Sod Farm	x	Zone C

Appendix - 3.

Recommended Water Quality Protection Measures

Index of Recommended Water Quality Protection Measures

Recommended Water Quality Protection Measures (Continued)

Institutions and Businesses

72. Cemetery
73. Church
74. Hospital
75. Motel/Hotel
76. Nursing Home
77. Prison
78. Restaurant
79. School
80. Agricultural Center- Onsite Sanitary Wastewater
81. Agricultural Center- Water Well in Use
82. Agricultural Center Fuel Sales
83. Agricultural Center Equipment Repair
84. Agricultural Center Fertilizer Sales
85. Agricultural Center Fertilizer Application Service
86. Agricultural Center Pesticide Sales
87. Agricultural Center Pesticide Application Service
88. Agricultural Center Feed Mill
89. Agricultural Center Grain Elevator
90. Farm Equipment Dealer- Onsite Wastewater
91. Farm Equipment Dealer- Water Well in Use
92. Farm Equipment Dealer- Fuel Storage & Sales
93. Custom Packing Plant
94. Sale Barn
95. Seed Processor
96. Truck Wash
97. Veterinary Clinic
98. Auto Repair Shop
99. Beauty Shop
100. Car Wash
101. Dry Cleaner
102. Fuel Service Station
103. Funeral Home
104. Hardware Store
105. Photography/Print Shop
106. Small Engine Repair
107. Welding Shop

Industrial

108. Food Processor
109. Pharmaceutical Plant
110. Meat Processor
111. Metal Fabrication
112. Metal Plater
113. Petro-Chemical Refinery
114. Research Laboratory
115. Salvage/Recycler
116. Industrial Facility- Onsite Sanitary Wastewater
117. Industrial Facility- Water Well in Use

Mineral Extraction

118. Coal Mine
119. Oil or Gas Well
120. Rock Quarry
121. Geophysical Exploration Test Holes
122. Mineral Extraction- Onsite Sanitary Wastewater
123. Mineral Extraction- Water Well in Use

Recommended Water Quality Protection Measures

1. Forest Land
When possible leave in undisturbed state. Maintain good woodland conditions. Avoid or minimize woodland grazing. Control gully erosion. Use pesticides carefully.

2. Wetland
When possible leave in undisturbed state. Maintain in good wetlands condition. Avoid or minimize wetlands grazing. Use pesticides carefully.

3. Land Cover & Crop (dryland)
Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production - Nutrient Management and Pesticide Application.

4. Land Cover & Crop (irrigated)
Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production - Nutrient Management and Pesticide Application. Use only the amount of water the crop needs.

5. Pasture (Tame & Range)
Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production - Nutrient Management and Pesticide Application

6. Conservation Reserve Program (CRP)
When possible leave in undisturbed state. Maintain according to State and Federal laws regulations concerning CRP lands.

7. Irrigation Well Pump Site
Maintain site in such a way that no fuels or other contaminants may enter the soil. When possible, maintain a vegetative buffer strip between the well site and crop.

8. Chemigation System
Follow applicable State and Federal laws and regulations concerning proper operation and maintenance of Chemigation Systems. In particular, attention should be given to proper operation of anti-pollution devices.

9. Tail Water Pit
Construct and maintain according to State and Federal laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production-Nutrient Management and Pesticide Application.

10. Dairy- Drylot
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

11. Dairy- Pasture
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

12. Dog Kennel
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

13. Cattle- Feedlot
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

14. Cattle- Pasture
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

15. Hog- Feedlot
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

16. Hog- Barn
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

17. Horses- Pasture
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

18. Horses- Barn
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

19. Poultry- Barn
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

20. Sheep- Pasture
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.

21. Abandoned Water Well
Identify and properly plug all abandoned wells through a coordinated effort with landowners, cost share programs such as the County Conservation District Non-Point Source Program and the Public Water Supply.

22. Farmstead Equipment Maintenance
Use good practices for handling, recycling and disposal of equipment parts and fluids, so no contaminants may enter the soil.

23. Farmstead Feed Mill
Avoid long term spillage of grain on the ground. Use care when using pesticides to prevent them from entering the soil.

24. Farmstead Feed and Hay Storage
When possible, avoid storage of feed or hay on the ground. When storing on the ground, protect from rain and/or store at different sites each year. Use care when using pesticides to prevent them from entering the soil.

25. Farmstead Fertilizer Storage
Store fertilizer in such a manner that any spills are contained and prevented from entering the soil.

26. Farmstead Fuel Storage
Visually monitor above ground tanks for leaks. Comply with applicable State and Federal laws and regulations for large aboveground and underground fuel storage tanks.

27. Farmstead Grain Storage
Avoid long term spillage or storage of grain on the ground. Use care when using pesticides to prevent them from entering the soil.

28. Household Wastewater (septic tank, lateral field)
Install and maintain septic system according to Kansas Department of Health and Environment regulations and local codes.

29. Household Wastewater (lagoon)
Install and maintain lagoon according to Kansas Department of Health and Environment regulations and local codes.

30. Household Wastewater (city sewer)
Install and maintain lines according to Kansas Department of Health and Environment regulations and local codes.

31. Landscape Maintenance
Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production-Nutrient Management and Pesticide Application. Prevent fuels, solvents, or paints from entering the soil.

32. Farmstead and Temporary Livestock Confinement
Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application. Clean out confinement area regularly.

33. Animals (pets)
Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application. Clean out confinement area regularly.

34. Farmstead Pesticide Storage
Follow Kansas catalog of NPS Pollution Control Practices for Proper Pesticides Storage, Handling and Mixing. Handle pesticides in such a manner that it is not allowed to enter the soil at the storage site. Follow label directions.

35. Farmstead Silage
Protect from rain and runoff. In areas with shallow aquifers avoid storage in unlined ground storage bunkers.

36. Solid Waste Storage
Contain all wastes in such a manner that no waste materials have an opportunity to enter the soil.

37. Water Well in Use
Properly protect and maintain the well and wellhead area according to Kansas Department of Health and Environment standards and recommendations

38. Abandoned Farmstead
Follow guidelines and recommended protection measures for associated land use activities, properly plug any abandoned wells as listed elsewhere. Use proper practices for handling, recycling and disposal of fluids, heavy metals and other contaminants.

39. Railroad Tracks
Maintain railroad tracks in good condition. Contact the Kansas Department of Health and Environment immediately in the event of an accidental spill or derailment.

40. State/Federal Highway
Use good practices for use and handling of deicers, pesticides, and road construction materials. Use good erosion control practices.

41. City Streets (paved and gravel)
Use good practices for use and handling of deicers, pesticides, and road construction materials. Use good erosion control practices.

42. County & Township Roads (paved and gravel)
Use good practices for use and handling of deicers, pesticides, and road construction materials. Use good erosion control practices.

43. Electrical Substation and Power Lines
Use good practices for herbicide application and brush control. Follow Kansas Catalog of NPS Pollution Control Practices for proper pesticide handling and mixing.

44. Pump station- raw surface water
Maintain Pump Station site in such a manner that no contaminants may enter the soil or be washed away from the site.

45. Pump Station- petroleum
Operate and maintain according to applicable State and Federal laws and regulations. Inspect regularly to ensure proper operation. Maintain Pump Station site in such a manner that no contaminants may enter the soil or be washed away from the site.

46. Pump Station- sewer
Operate and maintain according to applicable State and Federal laws and regulations. Inspect regularly to ensure proper operation. Maintain Pump Station site in such a manner that no contaminants may enter the soil or be washed away from the site.

47. Natural Gas Pipelines
Operate and maintain according to applicable State and Federal laws and regulations. Periodically inspect pipelines for leaks. Maintain pipelines in good condition. Follow Kansas Catalog of NPS Pollution Control Practices for proper handling and mixing of weed and brush control pesticides.

48. Petroleum Pipelines (crude)
Operate and maintain according to applicable State and Federal laws and regulations. Periodically inspect pipelines for leaks. Maintain pipelines in good condition. Follow Kansas Catalog of NPS Pollution Control Practices for proper handling and mixing of weed and brush control pesticides.

49. Petroleum Pipelines (refined product)
Operate and maintain according to applicable State and Federal laws and regulations. Periodically inspect pipelines for leaks. Maintain pipelines in good condition. Follow Kansas Catalog of NPS Pollution Control Practices for proper handling and mixing of weed and brush control pesticides.

50. Sewer Lines
Operate and maintain according to applicable State and Federal laws and regulations. Smoke test sewer system to locate leaks. Maintain pipelines in good condition.

51. Airport Fuel Storage
Visually monitor above ground tanks for leaks. Comply with applicable State and Federal laws and regulations for large aboveground and underground fuel storage tanks.

52. Airport Pesticide Applicator
Operate and maintain according to applicable State and Federal laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices for Proper Pesticides Storage, Handling and Mixing. Handle pesticides in such a manner that it is not allowed to enter the soil at the storage site. Follow label directions.

53. Airport Maintenance Areas
Use approved practices for handling, recycling and disposal of equipment parts, fluids, and fuels, so no contaminants may enter the soil

54. Airport- Onsite Sanitary Wastewater
Operate and maintain according to Kansas Department of Health and Environment laws and regulations and local codes. Use system for sewage disposal only.

55. Fair Ground
Maintain grounds in such a manner that all wastes are disposed of properly. Limit use of fertilizers and pesticides when possible.

56. City Park
Maintain park in such a manner that all wastes are disposed of properly. Limit use of fertilizers and pesticides when possible.

57. Camping Area (primitive)
Provide facilities with proper containment of wastes for later disposal according to Kansas Department of Health and Environment regulations and local codes.

58. Camping Area (modern)
Construct, maintain, and operate waste disposal systems according to Kansas Department of Health and Environment regulations and local codes.

59. Golf Course
Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production - Nutrient Management and Pesticide Application.

60. Gun Club
Limit area exposed to spent lead shot. Limit use of fertilizers and pesticides when possible.

61. Sports Complex
Maintain area in such a manner that all wastes are disposed of properly. Limit use of fertilizers and pesticides when possible.

62. Municipal Wastewater: Lagoon
Operate and maintain according to applicable State and Federal laws and regulations.

63. Municipal Wastewater: Mechanical
Operate and maintain according to applicable State and Federal laws and regulations.

64. Wastewater: Land Application
Operate and maintain according to applicable State and Federal laws and regulations.

65. Wastewater: Biosolids Storage
Operate and maintain according to applicable State and Federal laws and regulations.

66. Wastewater: Biosolids Application
Operate and maintain according to applicable State and Federal laws and regulations.

67. Injection Well
Operate and maintain according to applicable State and Federal laws and regulations.

68. Sanitary Landfill
Operate and maintain according to applicable State and Federal laws and regulations.

69. Composting
Operate and maintain according to applicable State and Federal laws and regulations.

70. Abandoned Dump
Maintain and monitor according to State and Federal laws and regulations.

71. Solid Waste Transfer Station
Contain all wastes in such a manner that no waste materials have an opportunity to enter the soil. Maintain according to KDHE guidelines and regulations.

72. Cemetery
Maintain awareness of potential to contaminate groundwater supplies with heavy metals and various contaminants. Limit use of fertilizer and pesticides.

73. Church
Limit use of fertilizer and pesticides on lawn. Dispose of waste according to State laws and local codes.

74. Hospital
Properly dispose of biological and chemical waste in accordance with State and Federal laws and regulations. Limit use of fertilizer and pesticides on lawn.

75. Motel/Hotel
Limit use of fertilizer and pesticides on lawn. Dispose of waste according to State laws and local codes.

76. Nursing Home
Properly dispose of biological and chemical waste in accordance with State and Federal laws and regulations. Limit use of fertilizer and pesticides on lawn.

77. Prison
Limit use of fertilizer and pesticides on lawn. Dispose of waste according to State laws and local codes.

78. Restaurant
Limit use of fertilizer and pesticides on lawn. Dispose of waste according to State laws and local codes.

79. School
Limit use of fertilizer and pesticides on lawn. Dispose of waste according to State laws and local codes.

80. Agricultural Center-Onsite Sanitary Wastewater
Install and maintain onsite wastewater system according to Kansas Department of Health and Environment regulations and local codes. Use system for sewage disposal only.

81. Agricultural Center-Water well in use
Properly protect and maintain the well and wellhead area according to Kansas Department of Health & Environment standards and recommendations.

82. Agricultural Center Fuel Sales
Visually monitor above ground tanks for leaks. Comply with applicable State and Federal laws and regulations for large aboveground and underground fuel storage tanks.

83. Agricultural Center Equipment Repair
Use good practices for handling, recycling and disposal of equipment parts and fluids, so no contaminants may enter the soil.

84. Agricultural Center Fertilizer Sales
Store bulk fertilizer according to State and Federal laws and regulations. Handle fertilizer in such a manner that it is not allowed to enter the soil at the storage site.

85. Agricultural Center Fertilizer Application Service
Conduct soil test before application of fertilizer. Apply fertilizer according to crop nutrient requirements. Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production-Nutrient Management and Pesticide Application.

86. Agricultural Center Pesticide Sales
Store all pesticides according to State and Federal laws and regulations. Handle pesticides in such a manner that it is not allowed to enter the soil at the storage site. Follow label directions.

87. Agricultural Center Pesticide Application Service
Operate and maintain according to applicable State and Federal laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices for Proper Pesticides Storage, Handling and Mixing. Handle pesticides in such a manner that it is not allowed to enter the soil at the storage site. Follow label directions.

88. Agricultural Center Feed Mill
Avoid long term spillage of feed on the ground. Use care when using pesticides to prevent them from entering the soil.

89. Agricultural Center Grain Elevator
Avoid long term storage or spillage of grain on the ground. Use care when using pesticides to prevent them from entering the soil.

90. Farm Equipment Dealer- Onsite Wastewater
Install and maintain onsite wastewater system according to Kansas Department of Health and Environment regulations and local codes. Use system for sewage disposal only.

91. Farm Equipment Dealer- Water Well in Use
Properly protect and maintain the well and wellhead area according to Kansas Department of Health & Environment standards and recommendations.

92. Farm Equipment Dealer Fuel Storage & Sales
Visually monitor above ground tanks for leaks. Comply with applicable State and Federal laws and regulations for large aboveground and underground fuel storage tanks.

93. Custom Packing Plant
Dispose of all waste according to State and Federal laws and regulations.

94. Sale Barn
Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices- Waste Management and Pesticide Application.

95. Seed Processor
Maintain and operate in a manner that prevents any pesticides or processing chemicals from entering the soil.

96. Truck Wash
Dispose of wash water according to State and Federal laws and regulations and local codes.

97. Veterinary Clinic
Dispose of all biological and chemical waste in accordance to State and Federal laws and regulations and local codes.

98. Auto Repair Shop
Use good practices for handling, recycling and disposal of equipment parts, fuels, and solvents. Prevent contaminants from entering the soil.

99. Beauty Shop
Prevent perm solutions or dyes from entering the soil.

100. Car Wash
Dispose of wash water according to State and Federal laws and regulations and local codes.

101. Dry Cleaner
Dispose of all dry cleaning waste according to State and Federal laws and regulations. Prevent solvents and spotting chemicals from entering the soil.

102. Fuel Service Station
Visually monitor above ground tanks for leaks. Comply with applicable State and Federal laws and regulations for large aboveground and underground fuel storage tanks.

103. Funeral Home
Prevent biological and chemical materials from entering the soil.

104. Hardware Store
Prevent paints, solvents, fuels, and other contaminants from entering the soil.

105. Photography/Print Shop
Prevent solvents and processing chemicals from entering the soil.

106. Small Engine Repair
Use good practices for handling, recycling and disposal of equipment parts, fuel and solvents. Prevent contaminants from entering the soil.

107. Welding Shop
Use good practices for use, handling, recycling and disposal of solid wastes, fuels, and solvents. Prevent contaminants from entering the soil.

108. Food Processor
Dispose of all waste according to State and Federal laws and regulations.

109. Pharmaceutical Plant
Dispose of all waste according to State and Federal laws and regulations.

110. Meat Processor
Dispose of all waste according to State and Federal laws and regulations.

111. Metal Fabrication
Dispose of all waste according to State and Federal laws and regulations.

112. Metal Plater
Dispose of all waste according to State and Federal laws and regulations.

113. Petro-Chemical Refinery
Dispose of all waste according to State and Federal laws and regulations.

114. Research Laboratory
Dispose of all waste according to State and Federal laws and regulations.

115. Salvage/Recycler
Use good practices for handling, recycling and disposal of solvents, automobile and equipment parts, and fluids. Prevent contaminants from entering the soil.

116. Industrial Facility- Onsite Sanitary Wastewater
Install and maintain onsite sanitary wastewater system according to Kansas Department of Health and Environment regulations and local codes. Use system for sewage disposal only.

117. Industrial Facility- Water Well in Use
Properly protect and maintain the well and wellhead area according to Kansas Department of Health & Environment standards and recommendations.

118. Coal Mine
Dispose of all waste according to State and Federal laws and regulations.

119. Oil or Gas Well
Operate, maintain, and dispose of all waste according to State and Federal laws and regulations.

120. Rock Quarry
Dispose of all waste according to State and Federal laws and regulations.

121. Geophysical Exploration Test Holes
Properly plug all test holes when activities are completed.

122. Mineral Extraction- Onsite Sanitary Wastewater
Install and maintain onsite sanitary wastewater systems according to Kansas Department of Health and Environment laws and regulations and local codes.

123. Mineral Extraction- Water Well in Use
Properly protect and maintain the well and wellhead area according to Kansas Department of Health and Environment standards and recommendations.

K-STATE Kansas State University

WATER QUALITY SERIES

Plugging Cisterns, Cesspools, Septic Tanks, and Other Holes

Many rural homesites, farmsteads, and older homes have used underground holes to store water (cisterns) or dispose of waste (cesspools, septic tanks, and seepage pits). These holes are safety hazards for people and animals and potential routes for possible groundwater contamination. When these features are no longer used and there is no specific plan for future use or they are not suitable for future use, they should be properly plugged to eliminate the hazard.

It is the responsibility of the landowner to provide safety and protection of groundwater through plugging of cisterns, cesspools, septic tanks, and other holes. This bulletin presents the best procedures to eliminate these holes.

Origin of cisterns, cesspools and other holes

Historically, homes located where groundwater was not readily available depended heavily on roof runoff collection and cistern storage for household water. Many cisterns are unused today because homesites are now served by other water supplies. The cistern may pose environmental and safety hazards in much the same manner as an abandoned well.

This open cesspool is a serious potential safety hazard.

Although now illegal, wastewater has often been disposed of in a cesspool or dry well. Construction was similar to a shallow dug well lined with bricks or stone. It was often 6 to 10 feet in diameter and 15 to 20 feet deep. The depth was less than that of groundwater, thus the name "dry" well.

Cesspools are a serious potential source of groundwater contamination and a definite safety hazard.

In the past, Kansas law permitted seepage pits following the septic tank for wastewater disposal. These were holes in the ground filled with stone or other inert material such as broken brick. They were constructed according to state guidelines for size and depth. Construction of seepage pits has been illegal since May 1996, and existing pits must be properly disposed of whenever they are not used or not working.

Plugging highly recommended

It is strongly recommended that unused cisterns, cesspools, septic tanks, pits, or other holes in the ground be given the same consideration as abandoned wells. Although not as deep, these excavations create the same environmental concerns as dug wells. They should be properly eliminated of by plugging or filling following recommended procedures and approved materials. The Uniform Plumbing Code, Sec. 722, states that *every cesspool, septic tank, and seepage pit that has been abandoned or is not used shall have the contents and top removed, and then be filled with earth, sand, gravel, concrete or other approved material. When abandoned in conjunction with connecting to a public sewer, filling shall occur within 30 days.* Proper closure eliminates the following situations:

- safety hazard from possible collapse of the top or opening
- possible future problems with structural integrity for any construction on top of or adjacent to the structure
- a possible pathway of groundwater contamination
- liability exposure for safety or groundwater contamination from unplugged holes

By following the well-plugging procedure these concerns will be satisfied with permanent disposal of the unused or abandoned structure. Though this plugging

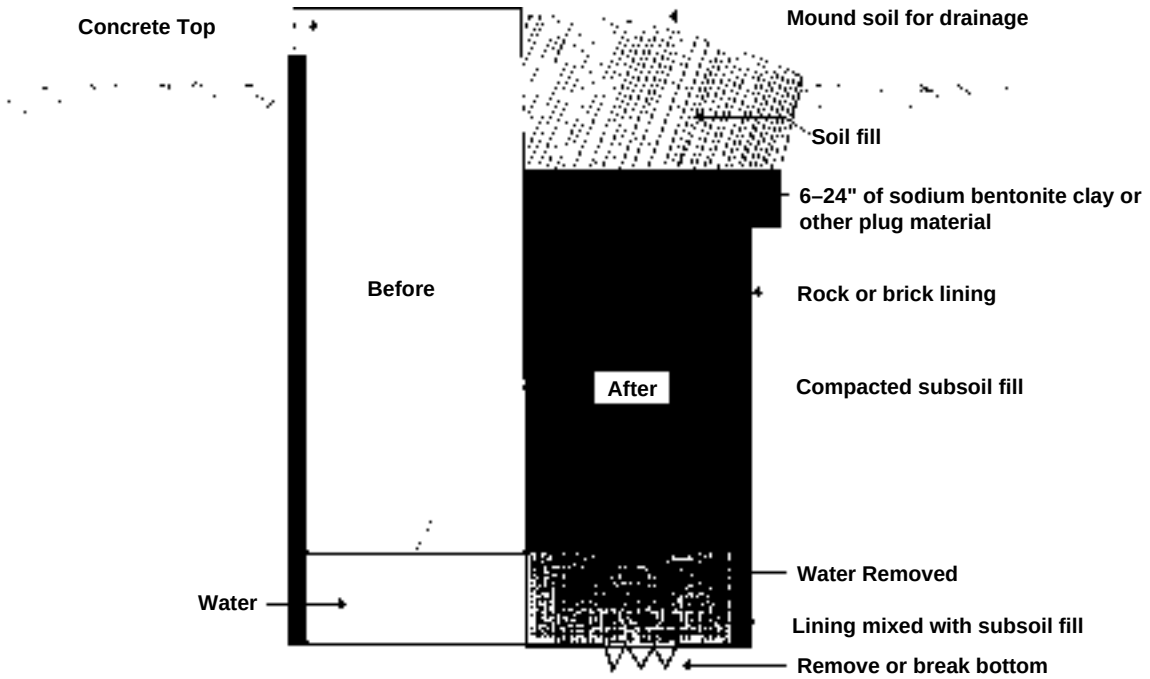

Figure 1. *Plugging diagram for cistern, cesspool or septic tank.*

procedure is a permanent solution, there may be special cases where a less permanent solution may be appropriate for a cistern as discussed later in the section on filling inactive cisterns.

The procedures discussed in this bulletin apply only to holes located at single-family residences and used only for storage or disposal of water or wastewater. Any tank or cavity used for storage of petroleum products or other chemicals requires Kansas Department of Health and Environment (KDHE) contact and procedures. Other KDHE programs such as the underground injection control (UIC) program could require other procedures. Closure of a cesspool, seepage pit, septic tank, or other hole that has received sewage, may be subject to city or county code through local health, environmental, or other agencies. Check with local agencies to determine if they have rules or assistance programs.

Procedure for plugging holes

The plugging procedure described here follows the well-plugging rules established by KDHE for dug wells and is illustrated in Figure 1. This procedure is recommended for plugging non-well holes deeper than 10 feet. Plugging a cistern, cesspool, septic tank, or other non-well hole is not addressed in Kansas law or regulations, thus no plugging report is required. The plugging procedure described in this bulletin would be most suited for deep (greater than 10 feet) and small-diameter (less than 8 feet) holes.

However, if the structure intercepts groundwater, regardless of how it was used, it is a well, and all requirements used for well plugging must be met including filing the WWC-5 or WWC-5P report with KDHE. These forms can be obtained by contacting the KDHE at (785) 296-5545.

Step 1: Remove water and organic debris. Pump any water, semisolid, or solid organic material from the cistern, cesspool, septic tank, or other hole. Organic solids, semisolids, or liquid material should be disposed of in a permitted wastewater-treatment facility or properly land applied according to current regulations. Pumping should be done by a licensed septage hauler unless the property owner has the proper equipment and does the work.

Note: Is the hole acting as a well? Sometimes cisterns, cesspools, septic tanks, or other holes might contain water either seasonally or continually. If water returns after being pumped, it is a well and should be plugged as a well following procedures outlined in Extension bulletin MF-935, *Plugging Abandoned Wells*, available at County Extension offices.

Step 2: Clear debris. Remove all hardware and foreign material or debris from the hole and remove debris from around the site. Remove any buried non-masonry or stone device, such as a car or truck body, used as the walls of the seepage pit.

Seepage pits or other filled holes constructed following old Kansas rules have their interior filled with chunks of masonry, stone, or other inert nondegrading material. It is not practical to remove this fill material, so it should remain in place. As stated earlier, car bodies or other cavity devices or structures used for seepage pits must be removed. They should have all piping entering or exiting the hole removed or plugged.

Step 3: Puncture the floor. It is important that water not accumulate inside a cistern or other structure to form a perched water table. Removing the floor is preferred, but drilling or breaking the floor is usually adequate to allow drainage and prevent any accumulation of water after plug-

ging or filling. Floors should not be present in cesspools, seepage pits, or most other holes.

Step 4: Plug/fill the structure. Plug the cistern, cesspool, or septic tank with local low-organic-matter subsoil (usually natural clay) material. Be sure this material contains no other potential contaminants and is moist enough to compact easily. The clay should be placed in layers of 6 inches to a foot (no more than 2 feet) and compacted to prevent settling. Some form of mechanical compacting should be used. Stop when the fill is within 5 feet of the surface.

The lining of the cesspool or cistern can be used as part of the fill. In some cases, however, there may not be enough volume to dispose of the lining in the hole. In this case, the excess lining should be removed. Generally, a rock or brick wall and mortar lining can be pried loose with large pry bars. However, a backhoe or front-end loader may be desirable for large structures. When using heavy equipment, the surface soil around the hole should be scraped away to expose the subsoil layer. As the rock walls are added to the fill, be certain to add sufficient fill material to eliminate any voids around the rocks.

Step 5: Place grout plug. Level the lining at the desired depth, which usually is 5 feet below the surface, and complete the subsoil fill up to this same level. The structure is now ready for the plug of approved grout material which should be 6 to 24 inches thick. Sodium bentonite clay is recommended.

Because of bentonite's expansive and pliable nature, it will conform to the uneven edges and expand to fill voids. If any settlement should occur, the bentonite plug will not crack or lose integrity as a seal. Cement also is an approved plug material. A cement plug must be much thicker and should be reinforced to have enough strength to prevent cracking and collapse.

A low water to cement ratio (max 0.5) with an ultimate design strength of at least 3,500 pounds of strength should be used. The following is an example of a cistern or cesspool grout plug procedure.

> Example: A 6-foot inside diameter lined hole is filled and ready for the plug material. How many bags of bentonite are needed?
>
> Since bentonite will expand, the minimum 6-inch thick plug will be used. Remember, the plug should extend beyond the lining of the original hole diameter. For this example, assume the brick lining is 4 inches thick and has an equal width of loose fill outside the brick lining. The plug needs to extend beyond into undisturbed soil, therefore, an 8-foot diameter plug will be placed. From Table 1, an 8-foot diameter hole requires 50 cubic feet of fill per foot of depth. Since only a 6-inch plug is required, only 25 cubic feet of material is needed. Dividing 25 cubic feet by 0.7 cubic feet/50-pound bag determines that 36 bags of bentonite are needed.

The grout seal can become very expensive for large diameters. Since this is recommended rather than required, a substitute for an approved grout would be any natural high-clay-content, low-organic-matter, and low permeability subsoil. A natural clay plug should be at least 2 feet thick. It should be thoroughly wet and compacted as placed.

Table 1
Volume per Foot of Depth for Round Holes

Diameter of Opening	ft^3/foot of fill
3 ft.	7.1
4 ft.	13
5 ft.	20
6 ft.	28
7 ft.	38
8 ft.	50
9 ft.	64
10 ft.	79
11 ft.	95
12 ft.	113
13 ft.	133
14 ft.	154
27 ft^3 = 1 yard	1 50-lb. bag of bentonite = 0.7 ft^3

Step 6: Restore surface grade. After placement of the grout seal, fill the remainder of the hole with soil. The top foot or so should be topsoil. Mound the fill at least 10 inches above the surrounding surface to allow for settling and to prevent surface water ponding.

Temporary fill for inactive cisterns

Using a filling procedure described as follows is not suitable for a cesspool, septic tank, or for other holes that received sewage. Use the plugging procedure presented previously for permanent disposal of these holes.

In cases where specific conditions occur, a cistern can be safely filled and still comply with safety and potential groundwater contamination concerns. The owner must understand that filling is a temporary fix, and construction should never occur over a filled cistern. Furthermore, construction also is discouraged adjacent to a filled cistern. The only situation where filling may be suitable is when all of the following conditions are satisfied. The filling procedure assumes the top of the cistern will remain intact rather than being completely removed.

- At least 4 feet of medium-or fine-texture soil (silts and clays) separate the bottom of the cistern from groundwater or permeable material such as sand, gravel, or fractured rock.
- The cistern sides and top are leakproof (no cracks or joints) and structurally sound. Generally, the cistern must be of high-quality reinforced concrete to meet this requirement. A good test for structural quality is to remove the cover and hit the riser hard with a heavy hammer (6 pounds or more). If no cracks or breakage occur, it passes the test.
- The cistern has not received any waste material in either solid or liquid form.
- No future construction will ever be done near or over the cistern.

If all of these conditions are satisfied, the cistern may be filled following this procedure. However, the owner must understand that this is not a permanent solution, and the proper plugging procedure may be required in the future if a structure is to be built or the cistern structure becomes leaky.

Step 1. Remove water and sediment. All water, sediment, and other debris must be removed from the cistern before beginning. Because roof runoff contains some sediment, it is not unusual for considerable sediment to have accumulated in the cistern bottom. Pump out water and semi solids and dig out solid material from the cistern.

Note. Is the cistern a well? If water seeps in after emptying the cistern, it is acting as a well and well-plugging procedures must be followed as specified previously. Follow procedures outlined in Extension Bulletin MF-935, *Plugging Abandoned Wells*.

Step 2. Clear debris. Remove all piping, hardware and nonmasonry or stone materials from inside and around the site.

Step 3. Puncturing the bottom. The cistern must not hold water, so the bottom must be removed, broken, drilled, or otherwise made to leak so any water that may seep from the surface into the cistern can get away and not accumulate inside.

Step 4. Plugging openings. Any pipes into the cistern must be removed or cut off at the inside surface. These holes and all other openings must be carefully cleaned and plugged with high quality cement to make a permanent plug. Disconnect and plug all underground inlet pipes at the source if it is not practical to remove the pipe. When finished the top and any top or side penetrations should not allow any water to enter the cistern. This may require a new cover or caulking the cover in place.

Step 5. Filling the cistern. Sand, gravel, or other clean, inert, granular material may be used. This material must be carefully placed in far corners before finally filling near the opening. The whole interior must be filled and compacted so it will not settle and leave voids. Considerable efforts will be required to fill all spaces in corners, and sand will require compacting to prevent settling.

Step 6. Replace the top cover. The inert fill material will prevent any safety hazard from possible collapse of the top. If the top should crack, deteriorate, or otherwise become leaky, repairs must be made to keep water out, or the permanent plugging previously described must be done.

Shallow Cistern Removal

Many cisterns are shallow (no more than a few feet deep), and may be partially above ground. The best course of action for disposal of these cisterns is complete removal. This is especially true if the side walls are brick or concrete block laid with mortar. Removal is a permanent solution that may not involve much more effort than the less-permanent solution of filling the structure in place. Once removed, the hole should be filled in shallow layers with local subsoil and thoroughly compacted. If the hole is less than 5 feet deep and the bottom does not contact fractured rock or coarse material, it is not necessary to place a grout plug.

Summary

Abandoned cisterns, cesspools, seepage pits, septic tanks or other holes are a potential safety hazard to people, animals and structures. They also are possible sources of direct contamination of valuable groundwater. To eliminate safety and environmental hazards and minimize liability exposure, they should always be properly plugged as a preventive action.

Other information sources include KDHE (785-296-5545) or local offices such as the Nonpoint Source program through the county conservation district office, local health or environmental office and county extension office.

List of References

Selected K-State Research and Extension Publications

Plugging Abandoned Wells MF-935
Safe Domestic Wells MF-970
KDHE Bulletin 4-2, *Minimum Standards for Design and Construction of Onsite Wastewater Systems*, K-State Research and Extension MF-2214
Get to Know Your Septic System MF-2179

Other Publications

Uniform Plumbing Code

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K-STATE Kansas State University

WATER QUALITY SERIES

Plugging Abandoned Wells

A source of clean, safe household water is important to all Kansans. Groundwater is often the only source, especially in areas with no public water supply. Groundwater is usually preferred for individual homes because it does not require filtering.

Groundwater use does require wells, and wells act as conduits for possible entrance of contaminants. Many test holes and unused (abandoned) wells are located in fields, farmsteads, industrial sites, and urban areas without being properly plugged. Not only are wells sources for potential contamination of groundwater, many are a physical hazard to animals and people, particularly children (see photo).

A 6-year-old child can easily slip through a section of 10-inch PVC pipe.

Landowners are liable for contamination or injury from unplugged wells or holes. The hazards of abandoned wells and test holes should concern everyone. They should be properly eliminated. This bulletin is provided to help landowners, service providers, and others understand the correct plugging procedure.

The Kansas Department of Health and Environment (KDHE) estimates more than 250,000 abandoned wells and test holes exist in Kansas. Kansas law defines an abandoned well as one that

- has not been used during the last 2 years;
- is in such disrepair that it cannot be used; or
- poses a groundwater-contamination hazard.

Kansas law requires that all abandoned wells and test holes be properly plugged. Proper plugging accomplishes five goals:

- restores protective barrier to minimize groundwater contamination;
- removes physical hazards by removing tempting openings for curious children and animals;
- restores stability to the land surface, (load carrying capacity);
- eliminates or reduces liability exposure; and
- protects and improves property values.

Kansas Regulations

The Kansas Department of Health and Environment administers laws regulating construction, reconstruction, and plugging of wells. Articles 12-K.S.A.82a-1212 and 1213 and 30-K.A.R. 28-30-4(a) and 28-30-7 specifically address plugging of abandoned wells. The regulations provide instructions for all types of wells and aquifer conditions. Well drillers and landowners alike are required by law to follow these procedures, which are available from KDHE.

This publication describes the easiest plugging procedure for the most-common well and aquifer conditions. If well or aquifer conditions are unknown or different from those described, landowners should contact KDHE for the proper plugging procedures. Landowners may plug wells on their property by following these procedures. Landowners also can hire a licensed water well contractor to plug a well.

The plugging procedure requires a plugging report (form WWC-5 or form WWC-5P) be filed with KDHE. These forms can be obtained by calling (785) 296-5524

and are frequently available locally through county health or Extension offices. Failure to file this report documenting proper closure leaves the owner liable for contamination. Documentation of the plugging procedure transfers the burden of proof to the complainant.

Aquifer Classification

Often times for older wells, little specific information is available about the well or the aquifer source. The type of aquifer or water formations penetrated by the well must be known for proper plugging. Sometimes this information can be obtained by asking questions of knowledgeable sources. Well logs for the actual well or nearby wells may be available from local drillers or KDHE. Geological and groundwater reports are available for most counties. Check the library or call the Kansas Geological Survey at (785) 864-3965.

A little must be know about the soil and geology (sand, gravel, clay, rock) of the well in order to ensure plugging will restore the integrity of the formation. Aquifers, the permeable water-bearing materials supplying a well, are classified based on the geology of the formation.

When water from the surface moves directly into an aquifer, it is called unconfined. Confined aquifers, on the other hand, have impervious layers that significantly restrict direct local recharge from the surface. Water in confined aquifers may be under pressure greater than atmospheric, and water rises above the restricting layer (artisan).

When the water-bearing layer is made up of individual grains of sand and gravel, the aquifer is called unconsolidated. All other aquifers are considered to be consolidated aquifers, often referred to as rock aquifers. Thus, there are four types of aquifers: unconfined-unconsolidated, unconfined-consolidated, confined-unconsolidated, and confined-consolidated.

Many aquifers are more complex than this simplified explanation. A consolidated formation may have several water-bearing zones separated by confining layers of varying permeability. Each zone may have a different yield and water quality. Good quality may lie above, below, or between zones of poor-quality water. Experienced well drillers recognize and note these differences as the well is drilled and connect or exclude various zones, based on the quality and quantity of water needed.

The procedure described here applies when plugging wells located in unconfined aquifers with unconsolidated formations. If it is suspected the formation is rock (consolidated formation), has confining layers, or the well penetrates multiple water-bearing formations, contact KDHE before proceeding or hire a licensed well driller to do the plugging. Do not attempt to use these procedures to plug wells in conditions other than unconfined and unconsolidated.

The procedure described generally applies to the sand and gravel aquifers shown in Figure 1. Other areas may not be sand and gravel aquifers. Generally, shallow wells (less than 50 feet near streams and 100 feet on uplands), can be plugged with this procedure. Large-diameter (12 inches or more) irrigation, industrial, or municipal wells also might be best handled by a licensed well driller.

Well Classification

Wells are classified according to construction. Understanding well construction methods is important because different types of wells require different plugging procedures. The oldest type is the dug well. These are large diameter, relatively shallow, hand-dug wells, usually lined with rock or brick. Typical dug wells are 3 to 6 feet in diameter and 15 to 50 feet deep (see Figure 2). The depth depends on depth to water, and size can vary from 2 feet in diameter to larger than 30 feet.

A driven well, used mainly for shallow, unconsolidated aquifers, is named for the process of driving the suction pipe with screened section into the sandy water-bearing formation. These wells are generally small in diameter with pipe sizes of 1 to 2 inches for home water supplies and up to 6 inches for irrigation and livestock wells. Driven wells are limited to sandy formations with high water tables,

Figure 1. *Sand and Gravel Aquifers*

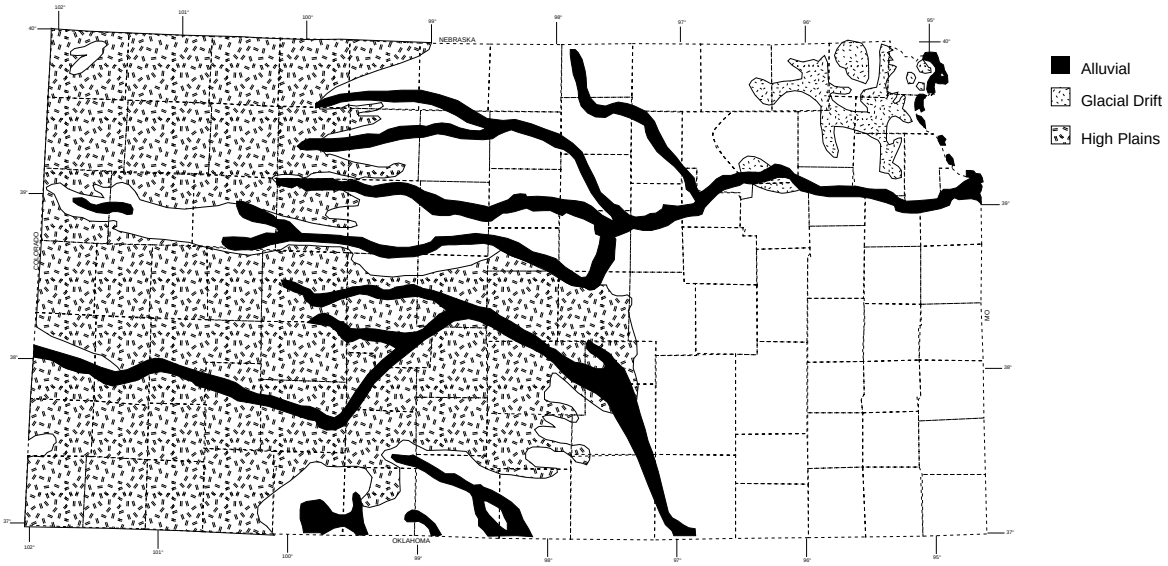


Figure 2. *Plugging Diagrams for a Hand-dug Well*

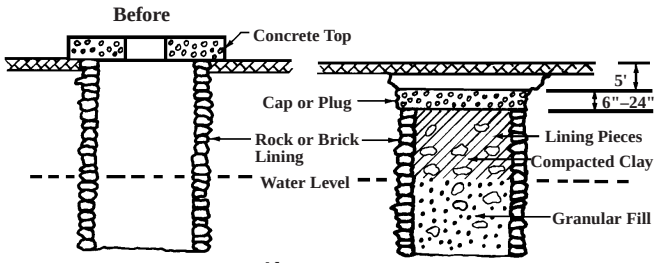


Figure 3. *Plugging Diagram for a Drilled Well in an Unconfined-unconsolidated Aquifer*

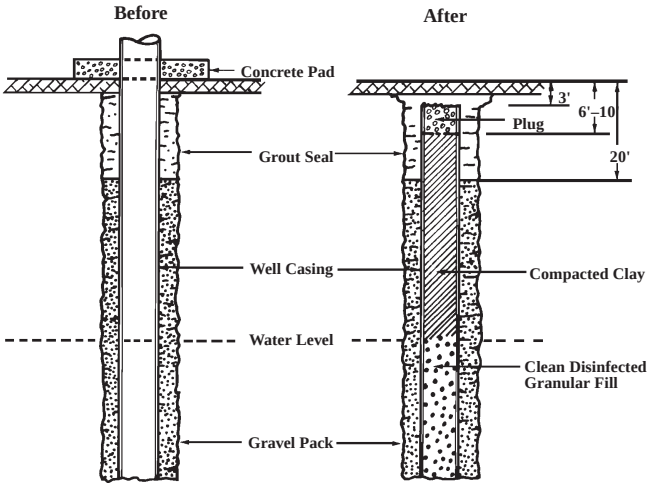
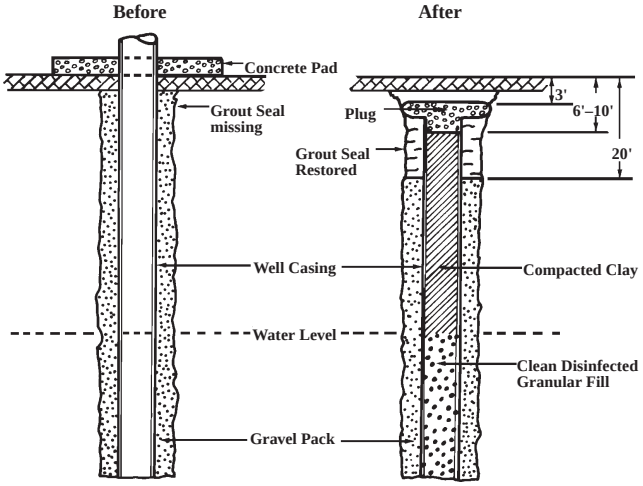


Figure 4. *Plugging Diagram for a Drilled Well Without Proper Grouting in an Unconfined-unconsolidated Aquifer*



where centrifugal or shallow well jet pumps can be used. Driven or sandpoint wells are still being installed. To be legal, however, they must be grouted to a depth of 20 feet or to the water table. Because of shallow depths and grouting difficulties, they are discouraged for domestic use.

The drilled well is the most common type of well in Kansas (see Figure 3). Typically, a hole is drilled into the aquifer, and a casing 3 to 8 inches smaller than the bore hole is installed. Domestic and livestock watering wells are generally 4 to 10 inches in diameter, while irrigation wells generally range from 10 to 18 inches.

The depth of a drilled well varies depending on the aquifer and water depth. Depths greater than 300 feet are common in some places. The small-diameter well casings, usually 6 inches or less, are generally installed in bore holes only a few inches larger than the casing. Typically, the casing is inserted after the bore hole is drilled.

For large-capacity wells for irrigation, industrial, or municipal uses, the casing is installed into oversized holes. The space between the casing and bore hole is filled with gravel. This gravel pack allows unrestricted water flow into the perforated portion of the casing and acts as a filter to retain the aquifer particles. Near the surface, this space is filled with grout to prevent water movement from the surface along the casing.

Prior to 1975, grouting was not required and the common practice was to gravel pack to very near the surface to induce the greatest yield possible. This practice made flow along the outside of the casing an easy pathway for contaminants to enter the groundwater from the surface.

Plugging Procedure

The plugging procedure described is for wells in an unconfined-unconsolidated aquifer (figures 2, 3, and 4). If the well has more than one water-bearing layer, penetrates a confining layer (aquiclude), or is into rock, contact KDHE to make certain of the proper plugging procedure or hire a licensed well driller. Plug wells using these steps:

Step 1. **Prepare site.** Remove all pumping equipment and any foreign objects from the well and remove debris from the surface around the well site.

Step 2. Remove top of casing. Excavate around the casing of a drilled or driven well to a depth that allows the casing to be cut off at least 3 feet below the surface. The more casing removed the better.

When excavating around the old casing, look for evidence that the well was properly grouted (Figure 3). Establishing a proper seal is critical to preventing contaminants from migrating along the outside of the casing. When a well does not have a proper grout seal, it should be restored. This requires 20 feet of excavation around the outside of the casing to allow placement of the grout. However, if it is possible to excavate this deep, the casing should be removed to this depth rather than be grouted.

Since deep excavation of a nongrouted well is often not practical, another option is to extend the plug beyond the edges of the original bore hole at least 1 foot outside the casing in all directions. This mushroom plug, shown in Figure 4, will help prevent water movement along the out-

side of the casing. Deeper excavation than the 3-foot minimum around the casing is especially desirable when no grouting exists outside the casing.

In dug wells, the casing of the well is the rock or brick lining of the well. This lining can be used as part of the fill material. The lining for dug wells should be removed to a depth of at least 5 feet. Be certain to mix lining material with fill material (see steps 4 and 5).

Step 3. Disinfect water. Existing bacteria or bacteria carried to the water by the fill material should be killed. This helps prevent contamination of nearby wells. Determine the amount of chlorine necessary by measuring the depth of water and diameter of the well and estimating the amount of water in the well. Then use Table 1, which lists the amount of chlorine product to add to produce a solution concentration in the well of approximately 500 milligrams per liter of chlorine.

The amount of chlorine needed depends on the product concentration. Four concentrations representing various chlorine products from household bleach (5.25 percent) to dry chlorine disinfectant (70 percent) are shown in Table 1. When dry chlorine is used, dissolve it in water before adding it to the well to make certain the material does not settle to the bottom.

If no working wells are within 100 feet of the abandoned well being plugged, the concentration of chlorine could be halved since bacteria migration beyond 100 feet is unlikely.

Example: A 6-inch diameter well, 60 feet deep, has 20 feet of water present. How much chlorine is needed for disinfection?

At the intersection of the 6-inch and 5.25-percent column in Table 1, 1.8 fluid ounces of bleach is needed for each foot of water, so 36 ounces, or 2.25 pints, (1.8 × 20) of bleach should be added.

Step 4. **Fill water zone with clean porus material.** Approved fill material is sand and gravel of less than 1-inch diameter. Generally the preferred fill is washed, course river sand. The fill material is chlorinated when it is added to the previously disinfected water in step 3.

Table 1 also shows the volume of fill needed per foot of well for various diameter holes. The water in the well may rise as the sand is added, depending on the permeability of the formation and the fill material. Estimate the volume of fill needed to avoid filling above the normal water level. Measure the normal water level using a weighted string that just touches the water surface. Mark the string with a knot at the top of the casing. Begin adding fill, but periodically check progress of the fill. Once the weight touches the top of the fill at the marked spot, stop adding fill. Even though the water level may have risen, add fill only to the original water level. Any water above the normal water level should be removed by pumping or allowed to soak away with time. The use of course sand and slow addition to the well will prevent bridging of the sand at the water surface. The sound of the sand hitting the water surface should be heard.

In dug wells, more fill than predicated from the table generally is required to fill this zone because mud in the bottom of the well compresses and voids in the rock lining. It may be necessary to bring as much as 30 percent more fill than predicted from the table.

Table 1. *Computing Volume of Fill Material and Disinfectant for Wells*

Diameter of opening	Volume of well per foot		Amount of product to disinfect 1 foot [a]			
			Liquid chlorine (fluid ounces)		Dry chlorine (dry ounces)	
	gal/ft	ft^3/ft [b]	5.25%	10%	65%	70%
2 inches	0.16	0.02	0.20	0.10	0.02	0.02
3 inches	0.37	0.05	0.45	0.22	0.05	0.02
4 inches	0.65	0.09	0.80	0.42	0.07	0.07
5 inches	1.02	0.14	1.25	0.65	0.10	0.10
6 inches	1.47	0.20	1.80	0.95	0.15	0.15
8 inches	2.61	0.35	3.20	1.67	0.27	0.25
10 inches	4.08	0.55	5.00	2.60	0.42	0.40
12 inches	5.88	0.79	7.20	3.75	0.60	0.55
14 inches	8.00	1.07	9.77	5.12	0.82	0.77
16 inches	10.44	1.40	12.77	6.67	1.07	1.00
1.5 feet	13.22	1.77	16.17	8.45	1.35	1.25
2.0 feet	23.50	3.14	28.75	15.05	2.42	2.25
2.5 feet	36.72	4.91	44.92	23.50	3.77	3.50
3.0 feet	52.88	7.07	64.70	33.85	5.42	5.05
4.0 feet	94.00	12.57	115.02	60.15	9.65	8.97
5.0 feet	146.9	19.64	179.75	94.00	15.07	14.00
6.0 feet	211.5	28.27	258.75	135.37	21.72	20.17
7.0 feet	287.9	38.48	352.25	184.25	29.55	27.45
8.0 feet	376.0	50.27	460.25	240.65	38.60	35.85
9.0 feet	475.9	63.62	582.25	304.50	48.87	45.37
10.0 feet	587.5	78.54	719.00	376.00	105.32	56.02

[a] 500 mg/L concentration of chlorine; 128 oz. = 1 gallon

[b] 27 ft^3 = 1 cubic yard

Although the lining rocks can be added in either the sand or subsoil layers, it is preferable to add with the subsoil as discussed later. This will keep the water-bearing area much cleaner, as it is difficult to remove the rock lining without a lot of debris from the surface falling into the well.

In some wells, especially those less than 20 feet deep, there may not be enough volume to dispose of the rocks in the subsoil layer only. In this case, some of the rock lining should be placed in the fill. Generally, the rock or brick lining can be pried loose with large pry bars. However, a backhoe or front-end loader may be desirable for large-diameter wells. When using heavy equipment, the surface soil around the well site should be scraped away to expose the subsoil layer. As the rock walls are added, be certain to add sufficient fill material to eliminate any voids among the rocks.

Example: For the 6-inch diameter well with 20 feet of water, how much sand is required?

From Table 1, at the intersection of 6-inch diameter and the column from the left side, 0.20 cubic foot of fill is needed for each foot of the 20-foot water zone, therefore, 4 cubic feet ($0.20\ ft^3/ft \times 20\ ft$) of fill is needed. Since there are 27 cubic feet per cubic yard, 4 cubic feet equals 0.15 cubic yard.

Step 5. Add compacted subsoil above the water zone. The casing above the water level is filled with natural subsoil clay material (subsoils low in organic matter and other potential contaminants) and compacted to form a solid column. The subsoil should be placed in a dry hole. The subsoil should be damp to allow it to compact easily. The clay fill should be placed in layers not exceeding 2 feet.

For small-diameter wells, a section of steel pipe with a cap on one end attached to a rope makes a good tamping tool. The fill should stop at least 3 feet below the top of the casing (6 feet below the surface) to leave adequate space for an approved plug.

Dug wells are filled to no more than 5 feet below the surface. At this point, the rock lining and subsoil fill should be leveled off.

Step 6. **Place approved grout plug.** Pour the approved grout material into the drilled or driven well casing making a plug at least 3 feet thick, the minimum required. In a dug well, the plug of approved grout material is 6 to 24 inches thick. KDHE-approved grout material includes commercial hole plug sodium bentonite clay, cement, and neat cement. Cement grout is a mixture of equal volumes of portland cement and sand. Use 10 to 12 gallons of water for each bag of cement. Neat cement is a mixture of portland cement and water, and 5 to 6 gallons of water should be used for each 94-pound bag of cement.

Sodium bentonite clay, normally sold in 50-pound bags that contain 0.7 cubic foot, is recommended for use because it is easy to handle, remains pliable, and expands when in contact with water. Because of bentonite's expansive and pliable nature, it will conform to the uneven rock edges and expand to fill voids in the wall. If any settlement should occur, the bentonite seal will not crack or lose its integrity.

Table 2 provides information to help determine the number of bags of sodium bentonite clay needed for placing the plug or filling the entire well with bentonite. A cement plug must be much thicker and may need reinforcing to have enough strength to prevent cracking and collapse.

Table 2. *Number of Bags of Sodium Bentonite Clay Needed for Various Well Diameters*

Diameter of opening (inches)	Feet of fill per bag [(a)]	Bags [(a)] per foot	Bags [(b)] per 3-foot plug
2	35.0	0.03	0.1
3	14.0	0.07	0.2
4	7.8	0.13	0.4
5	5.0	0.20	0.6
6	3.5	0.29	0.9
8	2.0	0.50	1.5
10	1.3	0.79	2.4
12	0.9	1.13	3.4
14	0.7	1.53	4.6
16	0.5	2.0	6.0
18	0.4	2.5	7.5

[(a)] Table values based on 50-pound bags, which have a volume of $0.7 ft^3$ per bag.

[(b)] Additional bags are required for mushroom plugs extending outside the casing (see step 6).

Example: A 6-inch diameter well is ready for the plug material. How many bags of bentonite are needed?

From Table 1, a 6-inch diameter well has a volume of 0.2 cubic feet per foot of casing. A typical bag of bentonite contains 0.7 cubic feet of material. Dividing 0.7 cubic feet per bag by 0.2 cubic feet equals 3.5 feet of casing per bag. Therefore, one bag will make a 3.5-foot plug inside the well casing. Several more bags will be needed to make the mushroom plug on top to protect the outside of the casing (see step 2).

Example: A 4-foot diameter well is ready for the plug material. How many bags of bentonite are needed?

Since bentonite is expansive, the minimum 6-inch plug will be used. Remember, the plug should extend beyond the rock lining to the original hole diameter. For this example, assume the rock lining is 1 foot thick; therefore a 6-foot diameter plug must be placed.

From Table 1, a 6-foot diameter hole requires 28.27 cubic feet of material. Since only a 6-inch plug is required, only 14.14 cubic feet of material is needed. Dividing 14.14 cubic feet by 0.7 cubic foot per bag determines that 20.2 bags (round up to 21 bags) are needed.

Step 7. Fill hole at top. Once the grout plug and mushroom cap have been completed, the remaining hole above the plug should be filled. Subsoil material can be placed in the bottom of the hole and compacted as the fill progresses in layers of 6 inches. Topsoil should be used in approximately the top foot of the hole. The fill should be mounded up at least 10 inches in the center to allow for settling and drainage away from the fill site.

Step 8. File the plugging report. Abandoned wells are an environmental and safety hazard. They are a liability. Following the plugging procedure described here and filing form WWC-5P or WWC-5 with KDHE to document the action minimizes further liability.

The well is not legally plugged until the form is filed. WWC-5 is the form used by drillers for reporting a new well.

It asks for location, property owner, physical characteristics of formation, well, casing, and the plugging procedure used. A new WWC-5P form was developed specifically for reporting well plugging. Forms are available from KDHE, but many county Extension, county health, and conservation district offices also have these forms available.

Alternative Plugging Option

For small-diameter wells, especially shallow ones, it is simpler to plug the entire casing with approved grout material or with sand fill below water and grout above water. This is a good choice for very-small-diameter wells where placement of the various layers of fill especially the subsoil fill, may be difficult. Filling the entire casing with grout may be the best option for small-diameter driven wells. A 2-inch diameter well needs only 0.02 cubic foot of fill per foot of casing. This means one bag of bentonite will fill 35 feet of well. The well water still needs to be chlorinated.

Sodium bentonite clay chips or pellets can easily be used to completely fill the casing. Bentonite clay powder or granular should never be poured into wells with water. Proper placement of powder or granular materials requires making a slurry and using a grout pump.

Placing cement grout into water. If cement or neat cement is used as grout, placement into water requires special procedures to avoid separation. A tremie pipe, which is usually about 3 inches in diameter and in sections of 5 to 10 feet long, will be needed to place the cement without passing through water. Use enough pipe to reach within a foot or two of the bottom and cut the end at a 45-degree angle. A hopper box or large funnel is attached to the top of the tremie pipe. The grout is mixed and placed in the hopper or funnel.

The mix must be thin enough to flow, but thick enough to set properly once in place. The proper ratio for neat cement grout is one 94-pound bag of cement to 5 or 6 gallons of water. For cement, use 5 or 6 gallons of water for each cubic foot of cement-sand mix. The volume of material must be monitored during placement because the tremie pipe is raised as the fill progresses. The end of the tremie must be kept below the surface of the grout at all times to prevent dilution and separation of the grout mix.

Precaution: Remember how much material is in the tremie pipe at all stages and approximately how much depth it will fill. A 10-foot section of 3-inch diameter tremie contains nearly a half a cubic foot, so 100 feet would contain 5 cubic feet. If filling an 8-inch casing, which contains 0.35 cubic feet per foot of length, ignoring the volume in the tremie would be an error of 14.3 feet. Tag or measure the progress of the plugging material as the well is filled, and pump or siphon off any excess water that is displaced as the grout is added.

Plugging Confined, Multiple-zone or Rock Aquifers

If the aquifer is known to contain confining layers or more than one water-bearing zone, a plug at each confining layer between each aquifer is required. If the outside of the casing was not grouted at those locations, as is common with old wells, the casing should be ripped and grout pumped into the gravel pack to restore a good seal at the confining layer. Most licensed well drillers have equipment to rip or puncture casing so grout can be forced into the gravel pack. Landowners are advised to hire a competent licensed water well driller to plug all confined, multiple-zone or rock aquifers and other unusual formations. In addition to having needed equipment, a driller should know the local geology, so grout plugs and other materials are placed correctly.

Oil and Gas Wells

Plugging abandoned oil, gas, or brine-disposal wells is equally important. Report these wells to the Kansas Corporation Commission to assure they are properly plugged. The KCC's district offices are in Dodge City, (316) 225-8888; Wichita, (316) 337-6231; Chanute, (316) 431-6946; and Hays, (785) 628-1200.

Conclusion

Abandoned wells are potential sources of direct contamination of valuable groundwater. Wells larger than a few inches in diameter also are a safety hazard for children and animals. All abandoned wells should be properly plugged to prevent contamination and eliminate the safety hazard. Plugging is required by Kansas law. When a replacement well is drilled, the old well, according to law, must continue to be used, upgraded to current standards, or plugged. It is not uncommon to visit a farmstead and find three or four wells with only one or perhaps two currently in use. While there is a reluctance to pay to get rid of something that has outlived its usefulness, groundwater protection, safety, and Kansas law make plugging important. Abandoned water wells can no longer be ignored.

Related References:

Plugging Cisterns, Cesspools, Septic Tanks, and Other Holes, K-State Research and Extension Publication MF-2246.

Plugging Packet, Kansas Department of Health and Environment.

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MF-935 (Revised) January 1998

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Appendix - 4.

Susceptibility Analysis "Decision Tree" and "Scorecards"

Executive Summary

Public Water Supply: **JEFFERSON CO RWD 13**
Assessment Area: **860**

Susceptibility Likelihood Scores for Assessment Area

Contaminant Category	A	B	B*	C	C*	D
Susceptibility Likelihood Score − SLS	47	52	51	56	53	59
SLS Range	Low	Mid	Low	Mid	Mid	Mid

A − Microbiolgical
B* − Nitrates
C* − Pesticides
B − Inorganic Compounds
C − Synthetic Organic Compounds
D − Volatile Organic Compounds

Susceptibility Likelihood Range

SLS Range	
0−50	**Low Susceptibility**
51−80	**Moderate Susceptibility**
81−100	**High Susceptibility**

Assessment Analysis

Public Water Supply: **JEFFERSON CO RWD 13**
Assessment Area: **860**

Ground Water Multiple Wells Analysis

A − Microbiolgical **B** − Inorganic Compounds
B* − Nitrates **C** − Synthetic Organic Compounds
C* − Pesticides **D** − Volatile Organic Compounds

No.	Question	Response	A	B	B*	C	C*	D
1	Is any well under the influence of surface water?	No	0	0	0	0	0	0
2	Do all PWS wells meet KS PWS water well construction standards?	Yes	0	0	0	0	0	0
3	Is any well less than 30 feet deep?	No	0	0	0	0	0	0
4	Is gravel pack within 20 feet of any well surface?	No	0	0	0	0	0	0
5	Does a PWS own or control all the areas around the wells?	Yes	0	0	0	0	0	0
6	Does Zone B consist entirely of native grass?	No	2	2	2	2	2	2
7	Is there a contaminated well in Zone B?	No	0	0	0	0	0	0
8	Is a class V UIC well present?	No	0	0	0	0	0	0
9	Are any commercial, industrial, or urban areas present in Zone B?	No	0	0	0	0	0	0
10	Does each industrial/commercial site and urban area have a water quality protection plan in place?	Yes	0	0	0	0	0	0
11	Are any non−farm home sites present in Zone B?	Yes	1	0	1	0	1	0
12	Do all the non−farm home sites have a water quality protection plan?	No	1	0	1	0	1	0
13	Are any farmsteads present in Zone B?	Yes	1	1	1	1	1	1
14	Do all farmsteads have a water quality protection plan?	No	1	1	1	1	1	1
15	Is there grazing livestock in Zone B?	No	0	0	0	0	0	0
16	Have all livestock producers implemented water quality protection measures?	Yes	0	0	0	0	0	0
17	Is there livestock confinement in Zone B?	No	0	0	0	0	0	0

No.	Question	Response	A	B	B*	C	C*	D
18	Is each confined animal feeding operation registered with KDHE?	Yes	0	0	0	0	0	0
19	Is there corn or grain sorghum production in Zone B?	Yes	0	0	1	0	1	0
20	Are corn/grain sorghum nutrient and pesticide management plans in use for each site?	No	0	0	1	0	1	0
21	Are any orchards present in Zone B?	No	0	0	0	0	0	0
22	Are orchard nutrient and pesticide management plans in use for each site?	Yes	0	0	0	0	0	0
23	Are there unsewered developments (concentrations of lagoons or septic systems) present in Zone B?	Yes	1	1	1	0	0	0
24	Is there a railroad or major highway in Zone B or C?	Yes	0	1	1	1	1	1
25	Is there oil production in Zone B or C?	Yes	0	1	0	1	0	1
26	Do coarse textured soils predominate Zones A, B and C?	No	0	0	0	0	0	0
27	Is an irrigation well located in Zone B or C?	Yes	0	1	1	1	1	1
28	Is a wastewater treatment facility in Zone B or C?	Yes	1	1	1	1	1	1
29	Is a solid waste landfill in Zone B or C?	Yes	1	1	1	1	1	1
30	Are there unplugged, abandoned water wells present in Zone C?	Yes	2	1	1	1	1	1
31	Are any commercial, industrial, or urban area present in Zone C?	Yes	1	1	1	1	1	1
32	Does each industrial/commercial site and urban area have a water quality protection plan in place?	No	1	1	1	1	1	1
33	Is there livestock confinement in Zone C?	No	0	0	0	0	0	0
34	Is each confined livestock facility registered with KDHE?	Yes	0	0	0	0	0	0
35	Do all the livestock producers have water quality protection measures in place?	Yes	0	0	0	0	0	0
36	Are cropland nutrient management plans in place?	No	0	0	1	0	0	0
37	Are cropland pesticide management plans in place?	No	0	0	0	0	1	0
38	Does a perennial stream flow into Zone C?	Yes	1	1	1	1	1	1
39	Are watershed water quality protection plans in place?	No	1	1	1	1	1	1

Appendix - 5.

Decision on Rigorous Delineation and Control

Rural Water District No. 13, Jefferson County decided that after evaluating the results of the Susceptibility Analysis that-

___X___ The preliminary delineation was satisfactory to their needs. They do not intend to legally restrict or prohibit activities within the protection area, but rather choose to influence activities through non-regulatory activities.

_____ The preliminary delineation did not meet their needs. The risks posed by the activities and land uses within the preliminary protection area were sufficiently high, so as to dictate the need to restrict or prohibit certain activities.

Appendix - 6.

Public Participation

Rural Water District No. 13, Jefferson County solicited public participation while developing this Source Water Protection Plan in the following manner:

> Rural Water District No. 13, Jefferson County solicited public participation by asking the locally elected board members to participate on the Source Water Protection Planning Committee. This committee was instrumental in the development of the Rural Water District No. 13, Jefferson County Source Water Protection Plan.

Before the final draft of the Plan was submitted to KDHE for recording, the adoption of the source water protection plan was added to the agenda of a regular monthly board meeting. Discussion of the plan during the meeting was held before the final draft was approved by the Board of Directors of Rural Water District No. 13, Jefferson County. After discussion of the proposed plan and its adoption in the regular board meeting open to the public, a copy of the plan was submitted to the Kansas Department of Health and Environment.

Appendix - 7.

Review and Approval Document from the
Kansas Department of Health and Environment

Appendix - 8.

Contacts

Source Water Protection Plan Contact List

Douglas County USDA Service Center
4920 Bob Billings Parkway
Lawrence, Kansas 66049
Telephone: (785) 843-4260
Fax: (855) 703-6394
E-mail: david.sweany@usda.gov
Website: http://fsa.usda.gov/ks

Douglas County Conservation District
4920 Bob Billings Parkway, Suite A
Lawrence, Kansas 66049
Telephone: (785) 843-4260 Ext. 3
Website: http://www.douglasccd.com

Douglas County Extension Office
2110 Harper Street
Lawrence Kansas 66046
Telephone: (785) 843-7058
E-mail: batesm@ksu.edu

Douglas County Emergency Management
Judicial and Law Enforcement Center
111 East 11th Street (Second Floor)
Lawrence, Kansas 66044
Emergency: 911
Telephone: (785) 832-5259
Fax: (785) 832-5101
E-mail: emermgmt@douglascountyks.org

Douglas County Sheriff
Judicial and Law Enforcement Center
111 E. 11th Street (Second Floor)
Lawrence, Kansas 66044
Telephone: (785) 841-0007
Fax: (785) 841-5168
Website: https://www.dgso.org

Douglas County Public Works Department
Douglas County Road and Bridge Department
3755 East 25th Street
Lawrence, Kansas 66046
Telephone: (785) 832-5293
Fax: (785) 842-1201
E-mail: pwadmin@douglascountyks.org

Douglas County Board of Commissioners
1100 Massachusetts Street
Lawrence, Kansas 66044
Telephone: (785) 832-5268

Douglas County Public Health Department
200 Maine Street
Lawrence, Kansas 66044
Phone: (785) 843-3060
Website: https://ldchealth.org

Local Environmental Protection Program
Program Director/Sanitarian: Myles Rutledge
200 Maine, Suite B
Lawrence, Kansas 66044
Telephone: (785) 856-5370
E-mail: mrutledge@ldchealth.org

Lawrence Fire Department
LDCFM Station #1
746 Kentucky Street
Lawrence, Kansas 66044
Telephone: (785) 832-7610

Douglas County Zoning and Codes
3755 East 25th Street
Lawrence, Kansas 66046
Telephone: (785) 331-1343
E-mail: zoning@douglascountyks.org

Grant Township Board
c/o Douglas County Clerk
1100 Massachusetts Street
Lawrence, Kansas 66044
Telephone: (785) 832- 832-5167
Fax: (785) 856-0091

Evergy
746 E 27th Street
Lawrence, Kansas 66046
Telephone: (800) 383-1183
Website: http://www.evergy.com

Magellan Pipeline Company, LP
Bob Miller
One Williams Center OTC-8
Tulsa, Oklahoma 74172
Telephone: (918) 574-7393
E-mail: Bob.Miller@magellanlp.com

Source Water Protection Plan Contact List (Continued)

Kansas Department of Health and Environment
Watershed Management Section
1000 SW Jackson St., Suite 430
Topeka, Kansas 66612-1367
Telephone: (785) 296-4195
Fax: (785) 559-4258
E-mail: NPS@kdheks.gov

KDHE Northeast District Office
Jaime Wilson, Environmental Administrator
800 West 24th Street
Lawrence, Kansas 66046-4417
Telephone: (785) 842-4600
Fax: (785) 842-3537
E-mail: KDHE.NEDO.admin@ks.gov

Kansas Department of Agriculture Division of Water Resources
1320 Research Park Drive
Manhattan, Kansas 66502-5000
Telephone: (785) 564-6640
Fax: (785) 564-6778
E-mail: Lane.Letourneau@kda.ks.gov

DWR Topeka Field Office
1131 Southwest Winding Rd, Suite 400
Topeka, Kansas 66615
Telephone: (785) 296-5733
Fax: (785) 296-8298
E-mail: KDA.TOPEKAFO@ks.gov

Middle Kansas River WRAPS
Contact: Megan Rush
Kansas Alliance for Wetlands and Steams
P.O. Box 142
Holton, Kansas 67436
Telephone: (785) 410-0040
E-mail: megan.rush@kaws.org
Website: http://www.kaws.org

Kansas Rural Water Association
P.O. Box 226
Seneca, Kansas 66538
Telephone: (785) 336-2751
E-mail: krwa@krwa.net
Website: http://krwa.net

KU Endowment
P.O. Box 928
Lawrence, Kansas 66044-0928
Telephone: (785) 832-7400
Fax: (785) 832-7493
E-mail: info@kuendowment.org
Website: https://www.kuendowment.org

City of Lawrence Regional Airport
1930 Airport Road
Lawrence, Kansas 66044
Telephone: (785) 832-7800
E-mail: airportmanager@lawrenceks.org

The Drought Monitor
National Drought Mitigation Center
P.O. Box 830988
Lincoln, Nebraska 68583-0988
Telephone: (402) 472-6707
Fax: (402) 472-2946
E-mail: drought monitor@unl.edu
http://droughtmonitor.unl.edu

Appendix - 9.

Water Right and Well Site
Easement Documents

126717

PERMANENT EASEMENT - WELL SITE 10-31-97

THIS PERMANENT EASEMENT - WELL SITE, made this 6TH day of NOVEMBER, 1997, between the **THE KANSAS UNIVERSITY ENDOWMENT ASSOCIATION,** hereinafter referred to as "Endowment Association", and **RURAL WATER DISTRICT #13** of Jefferson County, Kansas, hereinafter referred to as "Water District".

RECITALS

WHEREAS, Endowment Association owns certain land in Douglas County, Kansas; and

WHEREAS, the parties desire to enter into this Easement for the purpose of the Endowment Association granting to the Water District a permanent easement for a water site on said land.

AGREEMENT

NOW, THEREFORE, for one dollar ($1.00) and other valuable consideration, the receipt of which is hereby acknowledged, the Endowment Association for itself, its successors and assigns, hereby grants and conveys unto the Water District the following.

1. One (1) permanent well site easement for one (1) water supply well, equipment, and appurtenances as may be necessary for the Water District to dig and construct the well and thereafter use, operate, repair, maintain and replace said well. The well site easement is described as follows:

> A tract of land lying in part of the NE1/4 of Section 17, Township 12 South, Range 20 East of the 6th P.M., Douglas County, Kansas and described as follows: Commencing at the NE Corner of said NE1/4; thence N 90° 00' 00" W (assumed bearing) along the north line of said NE1/4, 1052.00 feet; thence S 00° 000' 00" E, 255.00 feet to the point of beginning on the South line of an existing water line easement; thence S 00° 00' 00" E, 50.00 feet; thence N 90° 00' 00" W, 40.00 feet; thence N 00° 00'00" E, 50.00 feet; thence 90° 00' 00" E. 40.00 feet to the point of beginning, containing 0.04 acres, more or less.

2. With this Easement, the Endowment Association also grants the right of ingress and egress across its adjacent land to the Water District and also gives to the Water District the right to install water lines and power lines across existing easements to this well site.

3. It is further understood and agreed that if for any legal reason the Water District shall be abandoned and dissolved, then this Easement will terminate and be abandoned.

4. It is further understood and agreed that the Endowment Association agrees with the Water District not to install, or allow to be installed, septic tanks, fill fields, sewer lagoons, feed lots, or other sources of pollution within two hundred feet (200') of the above-described well site.

5. Water District further agrees that it will, at its own expense during the continuation of this Easement, keep the said premises and every part thereof, in good repair.

6. Water District agrees to indemnify and hold harmless Endowment Association from any and all liability, claims, law suits, or other potential losses that Endowment Association may incur by reason of Water District's occupancy, construction on, and use of the easement property.

7. In the event that the Water District abandons this easement, the Water District agrees that it will restore the premises to the condition existing at the time of the execution of this easement.

WITNESS OUR HANDS the day and year above written.

NO. 126717
INDEX
NUMERICAL INDEX
17-12-20 NE

ORIGINAL COMPARED WITH RECORD

State of Kansas, Douglas County, SS.
Filed and Entered in Vol. 594
Page 1485 at 11:19 o'clock A M
1487
DEC - 4 1997
Register of Deeds
By Deputy

THE KANSAS ENDOWMENT ASSOCIATION:

By: James B. Martin
James B. Martin, President
Date:

RURAL WATER DISTRICT #13:

By: Arnold Morgison
Arnie Morgison, Chairman
Date: 11-20-97

kg\real-est\easements\rwd13.eas

Stevens, Brand

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this 6th day of November, 1997, before me the undersigned, a Notary Public, came JAMES B. MARTIN, who is personally known to me to be the same person who executed the foregoing instrument of writing and such person duly acknowledged the execution of the same.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal the day and year last above written.

NOTARY PUBLIC - State of Kansas
DARYL G. BEENE
My Appt. Exp. August 18, 2001

Daryl G. Beene
NOTARY PUBLIC

My appointment expires:

August 18, 2001

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this 1st day of December, 1997, before me the undersigned, a Notary Public, came ARNIE MORGISON, who is personally known to me to be the same person who executed the foregoing instrument of writing and such person duly acknowledged the execution of the same.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal the day and year last above written.

NOTARY PUBLIC - State of Kansas
SARAH K. GRABER
My Appt. Exp. _____

Sarah K. Graber
NOTARY PUBLIC

My appointment expires:

7-6-01

123087

PERMANENT EASEMENT - WELL SITE

9-9-97

THIS PERMANENT EASEMENT - WELL SITE, made this 10th day of SEPTEMBER, 1997, between the **THE KANSAS UNIVERSITY ENDOWMENT ASSOCIATION,** hereinafter referred to as "Endowment Association", and **RURAL WATER DISTRICT #13** of Jefferson County, Kansas, hereinafter referred to as "Water District".

RECITALS

WHEREAS, Endowment Association owns certain land in Douglas County, Kansas; and

WHEREAS, the parties desire to enter into this Easement for the purpose of the Endowment Association granting to the Water District a permanent easement for a water site on said land.

AGREEMENT

NOW, THEREFORE, for one dollar ($1.00) and other valuable consideration, the receipt of which is hereby acknowledged, the Endowment Association for itself, its successors and assigns, hereby grants and conveys unto the Water District the following.

1. One (1) permanent well site easement for one (1) water supply well, equipment, and appurtenances as may be necessary for the Water District to dig and construct the well and thereafter use, operate, repair, maintain and replace said well. The well site easement is described as follows:

> A tract of land lying in part of the NE1/4 of Section 17, Township 12 South, Range 20 East of the 6th P.M., Douglas County, Kansas and described as follows: Commencing at the NE Corner of said NE1/4; thence N 90° 00' 00" W (assumed bearing) along the north line of said NE1/4, 1102.00 feet; thence S 00° 000' 00" E, 255.00 feet to the point of beginning on the South line of an existing water line easement; thence S 00° 00' 00" E, 50.00 feet; thence N 90° 00' 00" W, 40.00 feet; thence N 00° 00'00" E, 50.00 feet; thence 90° 00' 00" E. 40.00 feet to the point of beginning, containing 0.04 acres, more or less.

2. With this Easement, the Endowment Association also grants the right of ingress and egress across its adjacent land to the Water District and also gives to the Water District the right to install water lines and power lines across existing easements to this well site.

have env.
Stevens & Brand

3. It is further understood and agreed that if for any legal reason the Water District shall be abandoned and dissolved, then this Easement will terminate and be abandoned.

4. It is further understood and agreed that the Endowment Association agrees with the Water District not to install, or allow to be installed, septic tanks, fill fields, sewer lagoons, feed lots, or other sources of pollution within two hundred feet (200') of the above-described well site.

5. Water District further agrees that it will, at its own expense during the continuation of this Easement, keep the said premises and every part thereof, in good repair.

6. Water District agrees to indemnify and hold harmless Endowment Association from any and all liability, claims, law suits, or other potential losses that Endowment Association may incur by reason of Water District's occupancy, construction on, and use of the easement property.

7. In the event that the Water District abandons this easement, the Water District agrees that it will restore the premises to the condition existing at the time of the execution of this easement.

WITNESS OUR HANDS the day and year above written.

THE KANSAS ENDOWMENT ASSOCIATION:

By: James B. Martin
James B. Martin, President
Date:

RURAL WATER DISTRICT #13:

By: Arnold Morgison
Arnie Morgison, Chairman
Date: 9-16-97

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this 10th day of SEPTEMBER, 1997, before me the undersigned, a Notary Public, came JAMES B. MARTIN, who is personally known to me to be the same person who executed the foregoing instrument of writing and such person duly acknowledged the execution of the same.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal the day and year last above written.

Daryl G. Beene
NOTARY PUBLIC

My appointment expires:

August 18, 2001

NOTARY PUBLIC - State of Kansas
DARYL G. BEENE
My Appt. Exp. August 18, 2001

ACKNOWLEDGMENT

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this 10th day of September, 1997, before me the undersigned, a Notary Public, came ARNIE MORGISON, who is personally known to me to be the same person who executed the foregoing instrument of writing and such person duly acknowledged the execution of the same.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed my official seal the day and year last above written.

NO. 123087
INDEX
NUMERICAL INDEX
17-12-20 NE

NOTARY PUBLIC - State of Kansas
SARAH K. GRABER
My Appt. Exp. _____

Sarah K. Graber
NOTARY PUBLIC

My appointment expires:

7-6-01

State of Kansas, Douglas County, SS.
Filed and Entered in Vol. 589
Page 678 at 12:30 o'clock P M
680
SEP 25 1997
Register of Deeds
By _____ Deputy

ORIGINAL COMPARED WITH RECORD

10⁰⁰ ck

THE STATE OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE
Alice A. Devine, *Secretary of Agriculture*

DIVISION OF WATER RESOURCES
David L. Pope, *Chief Engineer*

CERTIFICATE OF APPROPRIATION
FOR BENEFICIAL USE OF WATER

WATER RIGHT, File No. 24,331

PRIORITY DATE July 30, 1975

WHEREAS, It has been determined by the undersigned that construction of the appropriation diversion works has been completed, that water has been used for beneficial purposes and that the appropriation right has been perfected, all in conformity with the conditions of approval of the application pursuant to the water right referred to above and in conformity with the laws of the State of Kansas.

NOW, THEREFORE, Be It Known that DAVID L. POPE, the duly appointed, qualified and acting Chief Engineer of the Division of Water Resources of the Kansas Department of Agriculture, by authority of the laws of the State of Kansas, and particularly K.S.A. 82a-714, does hereby certify that, subject to vested rights and prior appropriation rights, the appropriator is entitled to make use of groundwater in the drainage basin of the Kansas River to be withdrawn by means of two (2) wells:

one (1) well located in the Northwest Quarter of the Northeast Quarter of the Northeast Quarter (NW¼ NE¼ NE¼) of Section 17, more particularly described as being near a point 5,010 feet North and 1,237 feet West of the Southeast corner of said section, at a diversion rate not in excess of 320 gallons per minute (0.71 c.f.s.); one (1) well located in the Northeast Quarter of the Northwest Quarter of the Northeast Quarter (NE¼ NW¼ NE¼) of Section 17, more particularly described as being near a point 5,100 feet North and 1,837 feet West of the Southeast corner of said section, at a diversion rate not in excess of 320 gallons per minute (0.71 c.f.s.);

both in Township 12 South, Range 20 East, Douglas County, Kansas,

and a quantity not to exceed 65,700,000 gallons of water per calendar year,

for municipal use within the boundaries of Rural Water District Nos. 12 and 13, Jefferson County, Kansas and Rural Water District No. 10, Leavenworth County, Kansas.

This appropriation right is limited to diversion rate which when the wells operate simultaneously will provide a maximum diversion rate not in excess of 320 gallons per minute (0.71 c.f.s.) for municipal use at the location described herein.

DUPLICATE COPY

The appropriator shall maintain in an operating condition, satisfactory to the Chief Engineer, all check valves installed for preventing chemical or other foreign substance likely to cause pollution of the water supply.

The appropriator shall maintain records from which the quantity of water actually diverted during each calendar year may be readily determined. Such records shall be furnished to the Chief Engineer by March 1 following the end of the previous calendar year.

The appropriation right shall be deemed abandoned and shall terminate when without due and sufficient cause no lawful beneficial use is made of water under this appropriation for three (3) successive years.

The right of the appropriator shall relate to a specific quantity of water and such right must allow for a reasonable raising or lowering of the static water level and for the reasonable increase or decrease of the stream flow at the appropriator's point of diversion.

IN WITNESS WHEREOF, I have hereunto set my hand at my office at Topeka, Kansas, this 31st day of July, 1996

DIVISION OF WATER RESOURCES
DAVID L. POPE
CHIEF ENGINEER
KANSAS DEPARTMENT of AGRICULTURE

David L. Pope, P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

STATE OF KANSAS, Shawnee COUNTY, ss.

The foregoing instrument was acknowledged before me this 31st day of July, 1996, by David L. Pope, P.E., Chief Engineer, Division of Water Resources, Kansas Department of Agriculture.

DENISE J. ROLFS
NOTARY PUBLIC
My Appt. Exp. 3-1-98
STATE OF KANSAS

Signature: Denise J. Rolfs
Notary Public

My appointment expires:

(Record in the Office of Register of Deeds in the county or counties wherein the point of diversion is located)

CERTIFICATE OF APPROPRIATION
FOR BENEFICIAL USE OF WATER

STATE OF KANSAS

Water Right, File No. 24,331

STATE OF KANSAS,
_____ COUNTY, ss.

Filed for record this ____ day of _____, 19____

at ____ o'clock ____ m. and

recorded in Book ____ Page ____

Fee $ ____

_____
Register of Deeds.

Submit To:
Division of Water Resources
Field Office for your area
Call for address
Topeka - (913) 267-6200
Stafford - (316) 234-5311
Stockton - (913) 425-6787
Garden City - (316) 276-2901

APPLICATION AND APPROVAL TO CHANGE THE PLACE OF USE UNDER AN EXISTING IRRIGATION RIGHT, PROVIDED THE BASE ACRES ARE NOT INCREASED, AND/OR THE POINT OF DIVERSION IF WITHIN 1320 FEET OF THE AUTHORIZED POINT OF DIVERSION.

STATE OF KANSAS

CTO Recd $50.00 $100. CK#3277

Any other application for approval to change an existing water right must be filed on DWR Form 120 in Topeka.

Filing Fee Must Accompany the Application
(Please refer to Fee Schedule on the third page of this application form.)

RECEIVED
Recd 10:15am.
SEP 08 1997
FIELD OFFICE
DIVISION OF WATER RESOURCE
TOPEKA

Complete only that portion applicable.
If change in point of diversion is greater than 100 feet, or place of use will be changed, include topographic map or detailed plat showing the authorized and proposed place of use and/or point of diversion.

1. Application is hereby made for approval of the Chief Engineer to change the

(Check one or more) ☐ Place of Use ☑ Point of Diversion (Check one only) ☐ Groundwater ☐ Surface Water

under the water right which is the subject of this application in accordance with the particulars hereinafter described

(Check one only) ☐ Vested Right under File No. _____

☑ Appropriation Right under Application No. 24,331

2. Name and address of applicant/land owner: RURAL WATER DISTRICT No. 13 JEFFERSON CO. KS.
RR3 Box 38 F LAWRENCE KANSAS 66044 Phone Number: (913)842-1502

Name and address of water use correspondent: SAME

Phone Number: ( ) -

3. The presently authorized place of use is:

Owner of Land ------- NAME: NO CHANGE

ADDRESS: _____

Sec. Twp. Rng.	NE¼				NW¼				SW¼				SE¼				Total
	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

DIVISION OF WATER RESOURCES RECEIVED SEP 09 1997 KANSAS DEPARTMENT OF AGRICULTURE

(If there is more than one landowner, attach additional sheets as necessary.)

Base Acres N/A Minimum Reasonable Quantity N/A

RECEIVED
SEP 12 1997
FIELD OFFICE
DIVISION OF WATER RESOURCE

4. It is proposed that the place of use be changed to:

Owner of Land ------- NAME: NO CHANGE

ADDRESS: _____

Sec. Twp. Rng.	NE¼				NW¼				SW¼				SE¼				Total
	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

(If there is more than one landowner, attach additional sheets as necessary.)

MICROFILMED
9-11-97
BLC

DWR 1-121.0 (Revised 01/09/96)

5. The presently authorized point(s) of diversion (~~is~~) (are) TWO WELLS located as follows:

(a) One in the NW quarter of the NE quarter of the NE quarter of Section 17, Township 12, Range 20 (E/~~W~~), in DOUGLAS County, Kansas, 5010 feet North 1237 feet West of Southeast corner of section.

* Rate 320 GALLONS PER MINUTE Quantity 65,700,000 GALLONS (TOTAL BOTH WELLS)

Depth of well (feet) 77 Computer ID No. 01 **(Division of Water Resources use only)**

(b) One in the NE quarter of the NW quarter of the NE quarter of Section 17, Township 12, Range 20 (E/~~W~~), in DOUGLAS County, Kansas, 5100 feet North 1837 feet West of Southeast corner of section,

* Rate 320 GALLONS PER MINUTE Quantity 65,700,000 GALLONS (TOTAL BOTH WELLS)

Depth of well (feet) 77 Computer ID No. 02 **(Division of Water Resources use only)**

DIVERSION RATE LIMITED TO 320 GALLONS PER MINUTE AT TIMES WHEN THE WELLS OPERATE SIMULTANEOUSLY

6. The proposed location of the point(s) of diversion (~~is~~) (are) TWO WELLS located as follows:

(a) One in the NW quarter of the NE quarter of the NW quarter of Section 17, Township 12, Range 20 (E/~~W~~), in DOUGLAS County, Kansas, 5000 feet North 1137 feet West of Southeast corner of section, Proposed well depth (feet) 80'± (PROPOSED WELL)

(b) One in the NE quarter of the NW quarter of the NE quarter of Section 17, Township 12, Range 20 (E/~~W~~), in DOUGLAS County, Kansas, 5100 feet North 1837 feet West of Southeast corner of section, Proposed well depth (feet) NO CHANGE

7. If a well, is the test hole log attached?

☐ Yes ☑ ~~No~~

If no, applicant must submit a completed well log prior to the notice and proof date.

8. Why do you need a new point of diversion? CAPACITY OF EXISTING WELL HAS DECLINED AND WON'T ADEQUATELY RESPOND TO TREATMENT

9. When do you propose to complete the new point of diversion? BY OCTOBER 15, 1997

10. a. If the point of diversion is a well, what are you going to do with the old well? WILL BE PLUGGED PER KDHE STANDARDS

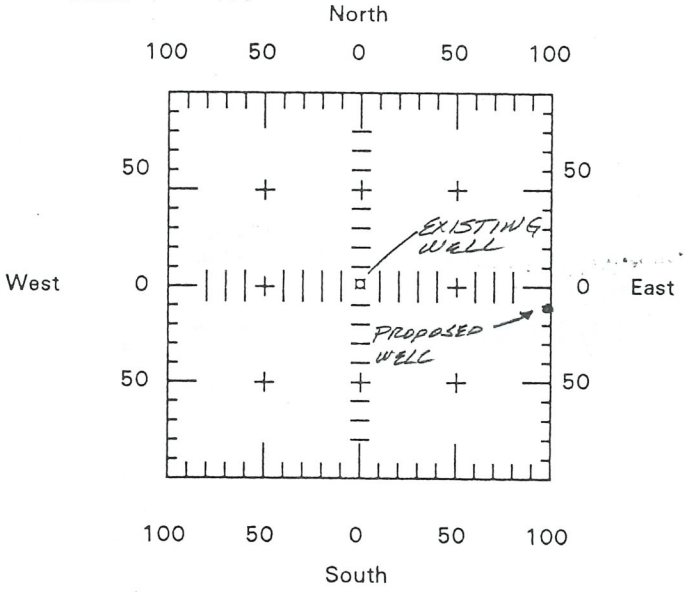
b. When will this be done? UPON COMPLETION OF NEW WELL

11. Groundwater Management District recommendation attached? ☐ Yes ☑ ~~No~~

12. Assisted by MAHAN (TEO)

13. For relocation of the point of diversion up to 100 feet, the location of the proposed point of diversion shall be indicated on the diagram below in relation to the existing point of diversion, ¤, which is plotted in the center of the diagram below; for moves more than 100 feet up to 1320 feet, attach a topographic map or aerial photograph showing all points of diversion within one-half mile and the names and mailing addresses of the owners.

Scale: 1" = 100'



Section 82a-728 of the Kansas Water Appropriation Act, provides

(a) Except for the appropriation of water for the purpose of domestic use, . . . it shall be unlawful for any person to appropriate or threaten to appropriate water from any source without first applying for and obtaining a permit to appropriate water in accordance with the provisions of chapter 7 of Article 82a of the Kansas Statutes Annotated [the Water Appropriation Act] and acts amendatory thereof or supplemental thereto or, for any person to violate any condition of a vested right, appropriation right or an approved application for a permit to appropriate water for beneficial use. . . (Emphasis added)

(b) (1) The violation of any provision of this section by any person is a class C misdemeanor. . .

A class C misdemeanor is punishable by a fine, not to exceed $500 and/or a term of confinement not to exceed one month in the county jail. Each day that the violation occurs constitutes a separate offense.

I declare that I am a landowner as identified herein, or that I represent a landowner as identified herein and am authorized to make this application in his or her behalf, and declare further that the statements contained herein are true, correct, and complete.

Dated at TOPEKA, Kansas, this 8 day of SEPTEMBER, 19 97.

John P. Kramer
(Land Owner)
John P. Kramer, Project Engineer

RWD NO. 13 JEFFERSON COUNTY KS
(Applicant)

[redacted]
(Land Owner(s) Social Security Identification Number)

(and/or Land Owner(s) Taxpayer I.D. No.)

(Land Owner)

(Applicant)

(Land Owner)

(Applicant)

(Land Owner)

(Applicant)

State of Kansas)
) SS
County of Shawnee)

PATRICIA L. OSBORN
Notary Public - State of Kansas
My Appt. Expires 1-17-1999

I hereby certify that the foregoing application was signed in my presence and sworn to before me this 8th day of Sept., 19 97.

Patricia L. Osborn
Notary Public

My Commission Expires Jan. 17, 1999.

NOTE: Final Form: All the applicable portions of the application form have been completed with accurate information; maps, if necessary, have been included; all the appropriate landowner's signatures have been affixed to the application. If the proposed change in point of diversion is less than 300 feet, the applicant must indicate that he/she represents the landowner. If the proposed change is in point of diversion or place of use, the application must carry signatures of all owners of the currently authorized place of use or the applicant must sign as representing the landowner (if not the landowner) and have a notarized statement from each landowner authorizing his/her representation.

FEE SCHEDULE

Each application to change the place of use or the point of diversion under this section shall be accompanied by the application fee set forth in the schedule below:

(1) Application to change a point of diversion 300 feet or less	$50
(2) Application to change a point of diversion more than 300 feet	100
(3) Application to change the place of use	100

Any application submitted which requests two of the types of changes set forth above shall be accompanied by a fee of $150.

RECEIVED
SEP 12 1997
FIELD OFFICE
DIVISION OF WATER RESOURCE

MICROFILMED

CONDITIONS

1. The change in point of diversion shall not impair existing rights; the source of supply shall be limited to the same source or sources from which the replaced point of diversion withdrew water; the maximum rate and the total annual quantity of water diverted and used for beneficial use shall not exceed that which has been established under the water right; and the point of diversion shall be located within a 10 **foot** radius of the approved point of diversion.

2. All diversion works into which any type of chemical or other foreign substance will be injected into the water pumped from the diversion works shall be equipped with an in-line, automatic, quick-closing check valve capable of preventing pollution of the source of the water supply. The type of valve installed shall meet specifications adopted by the Chief Engineer and shall be maintained in an operating condition satisfactory to the Chief Engineer.

3. A well with a diversion rate of 100 gallons per minute or more, drilled under the authority of this order, shall have a tube or other device installed in a manner acceptable to, and in accordance with specifications adopted by the Chief Engineer. This tube or device shall be suitable for making water level measurements and shall be maintained in a condition satisfactory to the Chief Engineer.

4. **The landowner shall properly install an acceptable water meter on or before December 31, 1997** , or before the first use of water, whichever occurs first, in strict accordance with the specifications adopted by the Chief Engineer on February 27, 1985, and shall maintain it in an operating condition satisfactory to the Chief Engineer at all times during diversion of water and shall maintain records from which the total quantity of water diverted may be determined. The landowner shall also report the reading of said water meter and the total quantity of water diverted annually to the Chief Engineer. Such records shall be furnished to the Chief Engineer by March 1 following the end of each calendar year.

5. **INSTALLATION OF THE WORKS FOR DIVERSION OF WATER SHALL BE COMPLETED ON OR BEFORE DECEMBER 31, 1997** , or within any authorized extension of time. The applicant shall notify the Chief Engineer when construction of the works for diversion has been completed.

6. The effective date of the change shall be the date this order is executed, after which the authorized location of the place of use shall be as located substantially as shown on the topographic map accompanying the application to change the place of use.

The test hole log is waived until the required notice and proof is submitted ☑

The point of diversion authorized herein shall not exceed 101 **feet from the previously authorized point of diversion.**

FOR OFFICE USE ONLY

APPLICATION APPROVED

By: _____
Division of Water Resources
Kansas Department of Agriculture

Date: September 8, 1997

Meter Required (check one) ✓ Yes ___ No

PATRICIA L. OSBORN
Notary Public - State of Kansas
My Appt. Expires 1-17-1999

Acknowledged before me on Sept. 8 , 1997 ,

by DALE P MAHAN

Signature: Patricia L. Osborn

Title: Notary Public

(My commission expires: Jan. 17, 1999)

(Record in the Office of Register of Deeds in the county or counties wherein the point of diversion is located)

File No. 24,331

STATE OF KANSAS

STATE OF KANSAS, ___ COUNTY, ss.

Filed for record this ___ day of ___, 19___

at ___ o'clock ___ m. and

recorded in Book ___ Page ___

Fee $ ___

Register of Deeds.

THE STATE OF KANSAS

DUPLICATE COPY

KANSAS DEPARTMENT OF AGRICULTURE
Alice A. Devine, Secretary of Agriculture

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer

APPROVAL OF APPLICATION
and
PERMIT TO PROCEED

(This Is Not a Certificate of Appropriation)

This is to certify that I have examined Application, File No. 42,722 of the applicant

Rural Water District No. 13, Jefferson County
Rural Route 3, Box 38F
Lawrence, Kansas 66044

for a permit to appropriate water for beneficial use, together with the maps, plans and other submitted data, and that the application is hereby approved and the applicant is hereby authorized, subject to vested rights and prior appropriations, to proceed with the construction of the proposed diversion works (except those dams and stream obstructions regulated by K.S.A. 82a-301 through 305a, as amended), and to proceed with all steps necessary for the application of the water to the approved and proposed beneficial use and otherwise perfect the proposed appropriation subject to the following terms, conditions and limitations:

1. That the priority date assigned to such application is March 26, 1997.

2. That the water sought to be appropriated shall be used for municipal purposes within the boundaries of Rural Water District Nos. 12 and 13, Jefferson County, Kansas, Rural Water District No. 10, Leavenworth County, Kansas, and the City of McLouth, Kansas, and immediate vicinity.

3. That the authorized source from which the appropriation shall be made is groundwater from the alluvial aquifer, in the drainage basin of the Kansas River to be withdrawn by means of one (1) well located in the Northeast Quarter of the Northwest Quarter of the Northeast Quarter (NE¼ NW¼ NE¼) of Section 17, more particularly described as being near a point 5,100 feet North and 1,837 feet West of the Southeast corner of said section, in Township 12 South, Range 20 East, Douglas County, Kansas, located substantially as shown on the topographic map accompanying the application.

4. That the appropriation sought shall be limited to a maximum diversion rate not in excess of 800 gallons per minute (1.78 c.f.s.) and to a quantity not to exceed 100 million gallons (307 acre-feet) for any calendar year.

5. That installation of works for diversion of water shall be completed on or before December 31, 1998, or within any authorized extension thereof. The applicant shall notify the Chief Engineer and pay the statutorily required field inspection fee, which is currently $200.00 when construction of the works has been completed. Failure to timely submit the notice and the fee will result in revocation of the permit. Any request for an extension of time shall be accompanied by the required statutory fee, which is currently $50.00.

6. That the proposed appropriation shall be perfected by the actual application of water to the proposed beneficial use on or before December 31, 2017, or any authorized extension thereof. Any request for an extension of time shall be submitted prior to the expiration of the deadline and shall be accompanied by the required statutory fee which is currently $50.00.

7. That the applicant shall not be deemed to have acquired a water appropriation for a quantity in excess of the amount approved herein nor in excess of the amount found by the Chief Engineer to have been actually used for the approved purpose during one calendar year subsequent to approval of the application and within the time specified for perfection or any authorized extension thereof.

8. That the use of water herein authorized shall not be made so as to impair any use under existing water rights nor prejudicially and unreasonably affect the public interest.

9. That the right of the appropriator shall relate to a specific quantity of water and such right must allow for a reasonable raising or lowering of the static water level and for the reasonable increase or decrease of the streamflow at the appropriator's point of diversion.

10. That this permit does not constitute authority under K.S.A. 82a-30l to 305a to construct any dam or other obstruction; nor does it grant any right-of-way, or authorize entry upon or injury to, public or private property.

11. That all diversion works constructed under the authority of this permit into which any type of chemical or other foreign substance will be injected into the water pumped from the diversion works shall be equipped with an in-line, automatic quick-closing, check valve capable of preventing pollution of the source of the water supply. The type of valve installed shall meet specifications adopted by the Chief Engineer and shall be maintained in an operating condition satisfactory to the Chief Engineer.

12. That an acceptable water flow meter shall be installed on the diversion works authorized by this permit in accordance with specifications adopted by the Chief Engineer on February 27, 1985, shall be maintained in an operating condition satisfactory to the Chief Engineer, and shall be used to provide information required on the annual water use report.

13. That the applicant shall maintain accurate and complete records from which the quantity of water diverted during each calendar year may be readily determined and the applicant shall file an annual water use report with the Chief Engineer by March 1 following the end of each calendar year. Failure to file the annual water use report by the due date shall cause the applicant to be subject to a civil penalty.

14. That no water user shall engage in nor allow the waste of any water diverted under the authority of this permit.

15. That failure without cause to comply with provisions of the permit and its terms, conditions and limitations will result in the forfeiture of the priority date, revocation of the permit and dismissal of the application.

16. That the right to appropriate water under authority of this permit is subject to any minimum desirable streamflow requirements identified and established pursuant to K.S.A. 82a-703c for the source of supply to which this water right applies.

17. That the permit holder must submit a progress report to the office of the Chief Engineer by March 1, after the tenth year from the date of the approval of this application and permit to proceed. The progress report is to contain sufficient details to explain the extent of development (perfection) of the water right during the previous ten (10) years, the extent of population being served by the water right and how the water right, in association with any other water right(s) meets the demonstrated municipal use need.

18. That the rate of diversion approved under this permit is further limited to the rate which combined with Water Right, File No. 24,331, will provide a maximum diversion rate not in excess of 800 gallons per minute (1.78 c.f.s.) for municipal purposes.

19. That the intent of the application and the permit is to allow a total of 508.5 acre-feet to be pumped at 800 gallons per minute for municipal use in one (1) calendar year.

20. That the Chief Engineer specifically retains jurisdiction in this matter with authority to make such reasonable reductions in the approved rate of diversion and quantity authorized to be perfected, and such changes in other terms, conditions, and limitations set forth in this approval and permit to proceed as may be deemed to be in the public interest.

Dated at Topeka, Kansas, this 21st day of May, 1997.

David L. Pope, P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

DUPLICATE COPY

THE STATE OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE
Alice A. Devine, Secretary of Agriculture

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer

APPROVAL OF APPLICATION
and
PERMIT TO PROCEED

(This Is Not a Certificate of Appropriation)

RECEIVED
JUN 17 1997
FIELD OFFICE
DIVISION OF WATER RESOURCE

This is to certify that I have examined Application, File No. 42,725 of the applicant

Rural Water District No. 13, Jefferson County
Rural Route 3, Box 38F
Lawrence, Kansas 66044

for a permit to appropriate water for beneficial use, together with the maps, plans and other submitted data, and that the application is hereby approved and the applicant is hereby authorized, subject to vested rights and prior appropriations, to proceed with the construction of the proposed diversion works (except those dams and stream obstructions regulated by K.S.A. 82a-301 through 305a, as amended), and to proceed with all steps necessary for the application of the water to the approved and proposed beneficial use and otherwise perfect the proposed appropriation subject to the following terms, conditions and limitations:

1. That the priority date assigned to such application is March 28, 1997.

2. That the water sought to be appropriated shall be used for municipal purposes within the boundaries of Rural Water District Nos. 12 and 13, Jefferson County, Kansas, Rural Water District No. 10, Leavenworth County, Kansas, and the City of McLouth, Kansas, and immediate vicinity.

3. That the authorized source from which the appropriation shall be made is groundwater from the alluvial aquifer, in the drainage basin of the Kansas River to be withdrawn by means of one (1) well located in the Northwest Quarter of the Northeast Quarter of the Northeast Quarter (NW¼ NE¼ NE¼) of Section 17, more particularly described as being near a point 5,010 feet North and 1,237 feet West of the Southeast corner of said section, in Township 12 South, Range 20 East, Douglas County, Kansas, located substantially as shown on the topographic map accompanying the application.

4. That the appropriation sought shall be limited to a maximum diversion rate not in excess of 800 gallons per minute (1.78 c.f.s.) and to a quantity not to exceed 100 million gallons (307 acre-feet) for any calendar year.

5. That installation of works for diversion of water shall be completed on or before December 31, 1998, or within any authorized extension thereof. The applicant shall notify the Chief Engineer and pay the statutorily required field inspection fee, which is currently $200.00 when construction of the works has been completed. Failure to timely submit the notice and the fee will result in revocation of the permit. Any request for an extension of time shall be accompanied by the required statutory fee, which is currently $50.00.

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6. That the proposed appropriation shall be perfected by the actual application of water to the proposed beneficial use on or before December 31, 2017, or any authorized extension thereof. Any request for an extension of time shall be submitted prior to the expiration of the deadline and shall be accompanied by the required statutory fee which is currently $50.00.

7. That the applicant shall not be deemed to have acquired a water appropriation for a quantity in excess of the amount approved herein nor in excess of the amount found by the Chief Engineer to have been actually used for the approved purpose during one calendar year subsequent to approval of the application and within the time specified for perfection or any authorized extension thereof.

8. That the use of water herein authorized shall not be made so as to impair any use under existing water rights nor prejudicially and unreasonably affect the public interest.

9. That the right of the appropriator shall relate to a specific quantity of water and such right must allow for a reasonable raising or lowering of the static water level and for the reasonable increase or decrease of the streamflow at the appropriator's point of diversion.

10. That this permit does not constitute authority under K.S.A. 82a-30l to 305a to construct any dam or other obstruction; nor does it grant any right-of-way, or authorize entry upon or injury to, public or private property.

11. That all diversion works constructed under the authority of this permit into which any type of chemical or other foreign substance will be injected into the water pumped from the diversion works shall be equipped with an in-line, automatic quick-closing, check valve capable of preventing pollution of the source of the water supply. The type of valve installed shall meet specifications adopted by the Chief Engineer and shall be maintained in an operating condition satisfactory to the Chief Engineer.

12. That an acceptable water flow meter shall be installed on the diversion works authorized by this permit in accordance with specifications adopted by the Chief Engineer on February 27, 1985, shall be maintained in an operating condition satisfactory to the Chief Engineer, and shall be used to provide information required on the annual water use report.

13. That the applicant shall maintain accurate and complete records from which the quantity of water diverted during each calendar year may be readily determined and the applicant shall file an annual water use report with the Chief Engineer by March 1 following the end of each calendar year. Failure to file the annual water use report by the due date shall cause the applicant to be subject to a civil penalty.

14. That no water user shall engage in nor allow the waste of any water diverted under the authority of this permit.

15. That failure without cause to comply with provisions of the permit and its terms, conditions and limitations will result in the forfeiture of the priority date, revocation of the permit and dismissal of the application.

16. That the right to appropriate water under authority of this permit is subject to any minimum desirable streamflow requirements identified and established pursuant to K.S.A. 82a-703c for the source of supply to which this water right applies.

17. That the permit holder must submit a progress report to the office of the Chief Engineer by March 1, after the tenth year from the date of the approval of this application and permit to proceed. The progress report is to contain sufficient details to explain the extent of development (perfection) of the water right during the previous ten (10) years, the extent of population being served by the water right and how the water right, in association with any other water right(s) meets the demonstrated municipal use need.

18. That the quantity of water and rate of diversion approved under this permit are further limited to the quantity and rate which combined with Water Right, File No. 24,331 and Appropriation of Water, File No. 42,722, will provide a total not to exceed 165.7 million gallons (508.5 acre-feet) of water per calendar year to be diverted at a maximum diversion rate not in excess of 800 gallons per minute (1.78 c.f.s.) for municipal purposes.

19. That the intent of the application and the permit is to allow a total of 508.5 acre-feet to be pumped at 800 gallons per minute for municipal use in one calendar year.

20. That the Chief Engineer specifically retains jurisdiction in this matter with authority to make such reasonable reductions in the approved rate of diversion and quantity authorized to be perfected, and such changes in other terms, conditions, and limitations set forth in this approval and permit to proceed as may be deemed to be in the public interest.

Dated at Topeka, Kansas, this 21st day of May, 1997.

David L. Pope, P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

Appendix - 10.

Annual Review Check-off

Annual Review Check-Off

As stated in the Source Water Protection Strategy, the Source Water Protection Plan should be reviewed annually to ensure that the adopted source water protection measures are effective and relevant to protect Jefferson County RWD No. 13's water supply, and that the items identified for implementation have been completed.

Date of Review	Signature of Committee Chair	Signature of Operator