

# **BLUEGRASS WATER**

**Utility Operating Company**

A CSWR Managed Utility

## **Wellhead Protection Plan**

for

## **Center Ridge Water System**

KY0180549, Calloway County

11 Whisper Drive West

Murray, KY 42071

Approved by the Kentucky Division of Water on December 15, 1998

Revisions and recertification to be conducted by water system personnel every five (5) years.  
Revised by Central States Water Resources EH&S personnel on August 20, 2020

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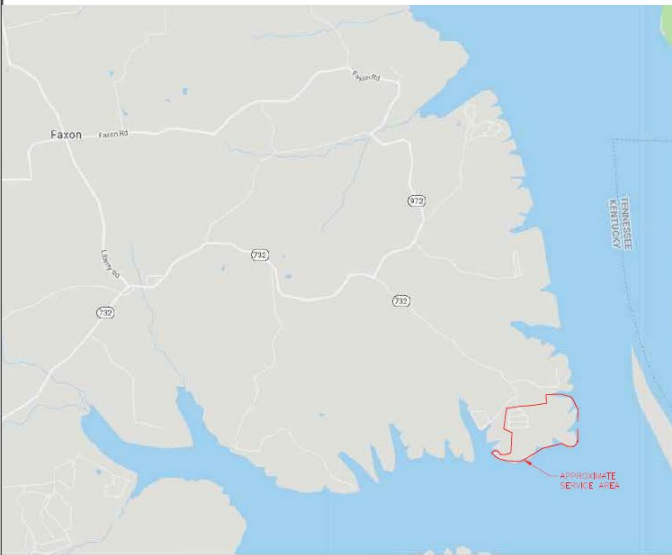
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1. Facility Service Area Map
2. June 2020 Monthly Operating Report
3. Historical Well Inspection
4. Bluegrass Water UOC Planning Team
5. Wellhead Protection Area Delineation Information
6. Wellhead Protection Area Delineation Map
7. Contaminant Source Inventory Summary and Map
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# Attachment 1 Service Area of Center Ridge Water System

**Legend**

- Well house
- Service area



Utility Note Disclaimer:

The utilities shown herein are depicted based on the original design plans provided by the system manager. 21 Design Group, Inc. performed no field verification of the layout and are unable to determine the exact location at this time. The location represents approximate location only and should not be construed as being 100% accurate. It is shown to provide general layout of the system only and should not be used to interpret encroachments.

DATE	09/24/23
PROJECT NO.	2023-11
DRAWN BY	BJJ
CHECKED BY	
SCALE	1" = 10'
DATE PLOTTED	09/24/23

**21**  
**DESIGN GROUP INC.**  
ENGINEERING SURVEYING

1301 Jefferson, Suite 301  
Washington, MO 63091  
info@21designgroup.net  
636.422.0029

# Attachment 2 June MOR

## KENTUCKY DIVISION OF WATER DRINKING WATER BRANCH

Revised 05/26/20



### MONTHLY OPERATION REPORT (MOR)--ALL WATER SYSTEMS

MONTH & YEAR (mm/yyyy) 06/2020

Indicate one with "X"

- SURFACE WATER
- GROUNDWATER
- PURCHASE/DISTRIBUTE ONLY

PWS ID :	KY0180549	PLANT ID: A	PLANT NAME: Center Ridge Water System #1
PWS NAME:	Center Ridge Water System #1	PLANT CLASS: I	DIST. CLASS: I
AGENCY INTEREST (AI):	33828	DATE MAILED:	
SOURCE NAME:	Well	COUNTY:	Calloway
OPERATOR(S) RESPONSIBLE / IN-CHARGE		CLASS	CERTIFICATION NUMBER
WTP SHIFT 1:	Freddie O 'Bryan	IV	595
WTP SHIFT 2:			
WTP SHIFT 3:			
DISTRIBUTION:	Freddie O'Bryan	III	27595

THIS REPORT MUST BE RECEIVED BY THE DIVISION OF WATER AND APPLICABLE FIELD OFFICE  
NO LATER THAN 10 DAYS AFTER THE END OF THE MONTH.

**TREATMENT PLANTS COMPLETE:**

1. DESIGN CAPACITY (gpm): 25
2. TYPE OF FILTRATION USED:
3. DESIGN FILTRATION RATE (gpm/sq. ft.):
4. PERCENT BACKWASH WATER USED: 0.0
5. DATE FLOCCULATION BASIN(S) LAST CLEANED:
6. DATE SETTLING BASIN(S) LAST CLEANED:

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein. Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. See KRS 224.99-010 and 401 KAR 8:020. (Penalties under this statute and regulation may include fines up to \$25,000 per violation or by imprisonment for not more than one year, or both).

**X**  
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

KENTUCKY DIVISION OF WATER - DRINKING WATER BRANCH  
 WATER TREATMENT PLANT - MONTHLY OPERATING REPORT

PWS ID : KY0180549  
 PLANT ID: A

REPORT MONTH/YEAR: 06/2020  
 PAGE 1 OF 11

**APPLICABLE TO ALL PLANTS**

DAY	RAW WATER TREATED GALLONS	HOURS PLANT OPERATED	COAGULANT		COAGULANT		pH ADJUSTMENT		DISINFECTANT		DISINFECTANT	
			LBS	PPM	LBS	PPM	Pre		Pre		Post	
							LBS	PPM	LBS	PPM	LBS	PPM
1	1,100	0.7									0.01	1.1
2	800	0.5									0.01	1.5
3	500	0.3									0.00	1.0
4	700	0.5									0.01	0.9
5	1,100	0.7									0.01	1.1
6	900	0.6									0.01	1.3
7	900	0.6									0.01	1.3
8	700	0.5									0.01	1.0
9	900	0.6									0.01	1.3
10	800	0.5									0.01	1.5
11	700	0.5									0.01	1.0
12	1,300	0.9									0.01	0.9
13	1,200	0.9									0.01	1.0
14	1,400	0.9									0.01	0.8
15	900	0.6									0.01	1.2
16	1,500	1.0									0.01	0.8
17	700	0.5									0.01	0.9
18	700	0.5									0.01	0.9
19	1,100	0.7									0.01	1.1
20	1,300	0.9									0.01	0.9
21	700	0.5									0.01	0.9
22	600	0.5									0.01	1.0
23	600	0.5									0.01	1.0
24	600	0.5									0.01	1.0
25	4,000	2.6									0.03	0.9
26	800	0.5									0.01	0.7
27	800	0.5									0.01	0.7
28	600	0.5									0.01	1.0
29	600	0.5									0.01	1.0
30	1,000	0.7									0.01	1.2
31												
TOTAL	29,500	20.2									0.2	
AVERAGE	983	0.7									0.0	1.0
MAX	4,000											

NUMBER DAYS IN OPERATION

30

KENTUCKY DIVISION OF WATER - DRINKING WATER BRANCH  
 WATER TREATMENT PLANT - MONTHLY OPERATING REPORT

PWS ID : KY0180549  
 PLANT ID: A

**APPLICABLE TO ALL PLANTS**

REPORT MONTH/YEAR: 06/2020

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ANALYTICAL RESULTS (mg/L OR PPM UNLESS OTHERWISE SPECIFIED)														
DAY	pH			TOTAL ALKALINITY		TOTAL HARDNESS		CHLORINE RESIDUAL				TURBIDITY (NTU)		
	RAW	TOP OF FILTER	TAP	RAW	TAP	RAW	TAP	TOP OF FILTER		PLANT TAP		RAW	SETTLED WATER	PLANT TAP
								TOTAL	FREE	TOTAL	FREE			
1										1.26				
2										1.37				
3										1.40				
4										1.45				
5										1.21				
6										1.32				
7										1.46				
8										0.96				
9										0.94				
10										0.82	0.75			
11										0.33	0.25			
12										1.11	0.99			
13										0.75	0.76			
14										0.71	0.64			
15										0.68	0.52			
16										0.83	0.74			
17										0.75	0.61			
18										0.82	0.74			
19										0.83	0.73			
20										1.02	0.96			
21										1.75	1.11			
22										0.92	0.66			
23										0.99	0.71			
24										0.87	0.56			
25										0.75	0.37			
26										1.53	0.51			
27										1.14	1.53			
28										1.00	1.15			
29										2.00	2.04			
30										2.00	2.06			
31														
AVERAGE										1.10	0.88			

KENTUCKY DIVISION OF WATER - DRINKING WATER BRANCH  
 WATER TREATMENT PLANT - MONTHLY OPERATING REPORT

PWSID: KY0180549  
 PLANT ID: A

APPLICABLE TO ALL PLANTS

REPORT MONTH/YEAR: 06/2020

\*Please answer Y/N question below this chart.

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ANALYTICAL RESULTS (mg/L OR PPM UNLESS OTHERWISE SPECIFIED)											
DAY	FLUORIDE		IRON		MANGANESE		PHOSPHATE		Lowest Daily Chlorine Residual Plant Tap On-Line Chlorine Analyzer Total	RAINFALL INCHES	WATER TEMP. DEGREES F°/C°
	RAW	TAP	RAW	TAP	RAW	TAP	RAW	TAP			
1									1.26		
2									1.37		
3									1.40		
4									1.45		
5									1.21		
6									1.32		
7									1.46		
8									0.96		
9									0.94		
10									0.82		
11									0.33		
12									1.11		
13									0.75		
14									0.71		
15									0.68		
16									0.83		
17									0.75		
18									0.82		
19									0.83		
20									1.02		
21									1.75		
22									0.92		
23									0.99		
24									0.87		
25									0.75		
26									1.53		
27									1.14		
28									1.00		
29									2.00		
30									2.00		
31											
AVERAGE									Monthly Minimum	Total Rainfall	AVG Temp
									0.33		

Number of readings	30	
For Free Chlorine, # less than 0.2 mg/L	0	Y
For Chloramines, # less than 0.5 mg/L		N

Disinfectant Chloramines? (Y/N)

N

PWS ID : KY0180549  
 PLANT ID: A

**ALL WATER SYSTEMS**

REPORT MONTH/YEAR: 06/2020

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DAY	DISTRIBUTION SYSTEM OPERATION											
	CHEMICALS ADDED			TEST RESULTS								
	CHLORINE BOOSTER LBS	CHLORINE BOOSTER LBS		TOTAL (T) AND FREE (F) CHLORINE RESIDUAL (ppm)								
				NORTH		SOUTH		EAST		WEST		
			T	F	T	F	T	F	T	F		
1												
2												
3												
4												
5												
6												
7												
8												
9												
10					0.62							
11					0.31							
12					1.02							
13					0.45							
14					0.73							
15					0.43							
16					0.64							
17					0.63							
18					0.43							
19					0.65							
20					0.75							
21					0.53							
22					0.62							
23					0.60							
24					0.52							
25					0.53							
26					0.46							
27					1.00							
28					0.64							
29					1.21							
30					1.43							
31												
AVERAGE			Average		0.68							
TOTAL			Total Minimum									
			Free Minimum		0.31							

Total # Chlorine Samples	0	21	0	0	0	0	0	0	0	0
# Less than 0.2 mg/L/0.5 mg/L	0	0	0	0	0	0	0	0	0	0

Number of Free Residuals	21	Minimum Monthly Free Residual	<b>0.31</b>
Number of Total Residuals	0	Minimum Monthly Total Residual	<b>0.00</b>
Total # Less than 0.2 mg/L	<b>0</b>		
Total # Less than 0.5 mg/L			

Disinfectant Chloramines? (Y/N) **N** Y  
 Number of days of operation? **30** N



**KENTUCKY DIVISION OF WATER / DRINKING WATER BRANCH  
MONTHLY OPERATING REPORT (MOR) PLANT SUMMARY FORM**

PWS ID KY0180549

MONITORING PERIOD (MMYYYY) 06/2020

Y **NOTE: COMPLETE ALL APPLICABLE FIELDS!!! NOT ALL OF THE FIELDS ARE PRE-POPULATED FOR YOU!!!**  
N

**PLANT INFORMATION**

**APPLICABLE TO ALL PLANTS**

PLANT ID <u>A</u>	TOTAL WATER TREATED (gallons)	<u>29,500</u>
PLANT NAME <u>Center Ridge Water System #1</u>	AVE. DAILY PRODUCTION (gallons)	<u>983</u>
AGENCY INTEREST <u>0</u>	MAXIMUM PUMPAGE (gallons per day)	<u>4,000</u>

**INDIVIDUAL FILTER EFFLUENT TURBIDITY**

**APPLICABLE TO ALL PLANTS WITH FILTRATION**

ANALYTE CODE 0100

Was each filter monitored continuously? (Y/N) \_\_\_\_\_

Were measurements recorded every 15 minutes? (Y/N) \_\_\_\_\_

Was there a failure of the continuous monitoring equipment? (Y/N) \_\_\_\_\_

    If Yes, (1) were individual filter effluent turbidity grab samples collected every four hours of operation? (Y/N) \_\_\_\_\_

    (2) was the continuously monitoring equipment repaired within 5 working days? (Y/N) \_\_\_\_\_

Was individual filter level greater than 1.0 NTU in two consecutive measurements? (Y/N) \_\_\_\_\_

Was individual filter level greater than 0.5 NTU in two consecutive measurements after on line for more than four hours? (Y/N) \_\_\_\_\_

Was individual filter level greater than 1.0 NTU in two consecutive measurements in three consecutive months? (Y/N) \_\_\_\_\_

Was individual filter level greater than 2.0 NTU in two consecutive measurements in two consecutive months? (Y/N) \_\_\_\_\_

**If any of the last 4 boxes are YES, fill out the Individual Filter Turbidity Sheet and submit with the MOR**

<b>COMBINED FILTER EFFLUENT TURBIDITY</b>	<b>ENTRY POINT RESIDUAL DISINFECTANT CONCENTRATION</b>
---	--

<b>APPLICABLE TO ALL PLANTS WITH FILTRATION</b>	<b>APPLICABLE TO ALL PLANTS</b>
---	---------------------------------

ANALYTE CODE <u>0100</u>	ANALYTE CODE <u>0999</u>
Number of hours of plant operation <u>20.2</u>	Number of days of plant operation <u>30</u>
Were samples taken every 4 hours of plant operation? (Y/N) <input type="checkbox"/>	Were samples taken each day of operation? (Y/N) <input checked="" type="checkbox"/>
Number of samples taken <u>0</u>	Number of lowest chlorine samples recorded <u>30</u>
Highest single turbidity reading <u>0.00</u>	Lowest single chlorine reading <u>0.33</u>
For all filtration except slow sand filtration:	If less than required:
Number of samples exceeded 0.1 NTU _____	Was residual restored within 4 hours of plant operation? (Y/N) <input type="checkbox"/>
Number of samples exceeded 0.3 NTU _____	<u>Free Chlorine</u> (for all disinfectants except chloramine):
Number of samples exceeded 1 NTU _____	Number of samples under 0.2 mg/L <u>0</u>
When filtration is slow sand filtration:	<u>Total Chlorine</u> (when disinfectant is Chloramine):
Number of samples exceeded 1 NTU _____	Number of samples under 0.5 mg/L _____
Number of samples exceeded 5 NTU _____	

<b>CHLORINE DIOXIDE ENTRY POINT MONITORING</b>	<b>CHLORITE ENTRY POINT MONITORING</b>
--	--

<b>APPLICABLE TO PLANTS UTILIZING CHLORINE DIOXIDE</b>	<b>APPLICABLE TO PLANTS UTILIZING CHLORINE DIOXIDE</b>
--	--

ANALYTE CODE <u>1008</u>	ANALYTE CODE <u>1009</u>
Number of days of plant operation <u>30</u>	Number of days of plant operation <u>30</u>
Were samples taken each day of operation? (Y/N) <input type="checkbox"/>	Were samples taken each day of operation? (Y/N) <input type="checkbox"/>
Number of samples taken <u>0</u>	Number of samples taken <u>0</u>
Highest single chlorine dioxide reading <u>0.00</u>	Highest single chlorite reading <u>0.00</u>
Number of chlorine dioxide samples exceeded 0.8 mg/L <u>0</u>	Number of chlorite samples exceeded 1 mg/L <u>0</u>

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein. Based on my inquiry of those individuals immediately responsible for obtaining the information, the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Violations of 401 KAR Chapter 8 are subject to severe penalties prescribed in KRS 224.99-010, up to \$25,000 fine per day per violation and in some cases a violation may subject the violator to prison.

**X**  
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

### KENTUCKY DIVISION OF WATER / DRINKING WATER BRANCH MONTHLY OPERATING REPORT (MOR) SUMMARY FORM

PWS ID KY0180549

MONITORING PERIOD (MMYYYY) **06/2020**

AI 33828

NOTE: COMPLETE ALL APPLICABLE FIELDS!!! NOT ALL OF THE FIELDS ARE PRE-POPULATED FOR YOU!!!

PURCHASED		SOLD	
APPLICABLE TO ALL WATER SYSTEMS			
FROM WHOM? (PWS ID)	HOW MUCH? (gallons)	TO WHOM? (PWS ID)	HOW MUCH? (gallons)

DISTRIBUTION RESIDUAL DISINFECTANT CONCENTRATION			
APPLICABLE TO ALL WATER SYSTEMS			
ANALYTE CODE	<u>0999</u>		
Number of days of operation	<u>30</u>	Free Chlorine (for all disinfectants except chloramine)	
Were samples taken each day of operation? (Y/N)	<b>N</b>	Number of samples under 0.2 mg/L	<u>0</u>
Number of samples taken:		Total Chlorine (when disinfectant is chloramine)	
FREE	<u>21</u>	Number of samples under 0.5 mg/L	<u> </u>
TOTAL	<u>0</u>		
Lowest single FREE chlorine reading	<u>0.31</u>		
Lowest single TOTAL chlorine reading	<u>0.00</u>		

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein. Based on my inquiry of those individuals immediately responsible for obtaining the information, the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Violations of 401 KAR Chapter 8 are subject to severe penalties prescribed in KRS 224.99-010, up to \$25,000 fine per day per violation and in some cases a violation may subject the violator to prison.

**X**  
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

RECEIVED  
OCT 21 1998

# KENTUCKY WELL INSPECT FORM

Record  
0004-9099

(1) AKGWA NUMBER  
0 0 0 4 - 9 0 3 3

(2) OWNER/FACILITY INFORMATION  
Well Owner's Name: *Tom Horderby*  
*Cenker Lodge Water System*  
Last First MI  
Mailing Address: *1715 Holiday Dr*  
City: *Murray* State: *KY* Zip: *42071*  
Well Address (if different)  
City: *Murray* State: Zip:  
Phone: *(502) 253-7124*

Note: Water well labels begin with "8".  
monitoring well labels begin with "8".  
(3) WELL RECORD LABEL LOCATION:  
 well casing  pressure tank  water pipe  
 well cap  electric box  not labeled  
 pump  other *pump line in well*

(4) WELL LOCATION  
USGS Quadrangle Name: *Rushing Creek* County: *Callaway*  
Latitude: *36° 38' 48"* Longitude: *88° 04' 59"*

(5) PHYSIOGRAPHIC OR HYDROLOGIC REGION  
 Blue Grass  Ohio River Alluvium  
 E. Coal Field  W. Coal Field  
 Miss. Plateau  Jackson Purchase *M.S. Employment*

(6) DRILLER INFORMATION  
Who Constructed Well?  unknown  
Address:  
City: State: Zip:  
Date Well Completed:  unknown  
Month Day Year

(13) WELL USE (check all that apply)  
 domestic  livestock  not used  
 public  irrigation  abandoned  
 industrial  monitoring  
 other  
PWSID# *0180549*  
Water Withdrawal Permit #

(18) ELEVATION  
*480* ft. AMSL  
From  ground surface  
 top of casing  
By  map  
 survey  
 report  
 GPS

(7) GENERAL  
Type of Construction:  
 drilled/augered  
 excavate & backfill  
 hand dug/blasted  
Depth of Well: *170* ft.  
 measured  
 reported  
 unknown  
Static Water Level, ft. below surface:  
 measured  
 reported  
 not measured  
 can't be measured  
Well Yield:  
 gpm  gph  gpd  
 measured  
 estimated  
 unknown

(9) WELLHEAD  
Is Well Located in a Pit?  
 yes  no  unknown  
Wellhead (casing top):  
 well cap  sanitary seal  
 flush mount  locking cap  
 open  unknown  
Casing Above Ground Level?  
 yes  no  unknown  
*12 1/2* inches above ground.  
Discharge Pipe Below Surface?  
 yes  no  unknown  
Pitless Adapter Used?  
 yes  no  unknown

(14) WELL SERVICE  
Number of People Served: *231*  
Number of Service Connections: *77*  
Any Quantity Problems?  yes  no  
Any Quality Problems?  yes  no  
If "yes", describe in COMMENTS section, below.

(19) TREATMENT SYSTEM  
 none  
 water softener  
 ultraviolet  
 chlorination  
 aeration  
 charcoal filter  
 sand filter  
 iron treatment  
 fluoridation  
 other  
Treatment Bypass Available?  yes  no

(8) SURFACE ANNULAR MATERIAL:  
 clay  drill cuttings  
 cement  unknown  
 open  sand  gravel  
 concrete pad

(10) PUMP DETAILS  
Date Installed: *38*  
 unknown Month Day Year  
Pump Type:  
 submersible  bailer  
 turbine  jet  hand pump  
 none  other  unknown  
Intake Level: ft. below surface  
Electric Connection:  
 2 wire  3 wire  unknown

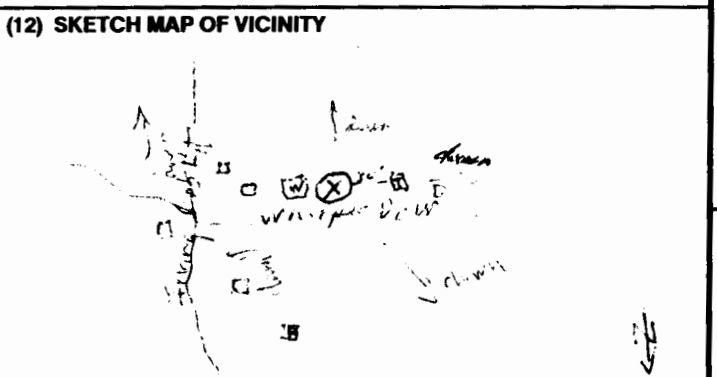
(15) COMPLIANCE TO STANDARDS  
Construction in Compliance with KY Standards?  
 yes  no  unknown  pre-law  
If "no", describe in COMMENTS section, below.

(16) RELATIVE LOCATION  
 upgradient  sidegradient  unknown  
 downgradient  varying  N/A

(11) WELL CONSTRUCTION DETAILS  
Feet Below Surface From To Casing Inside Dia. (in.) Casing Type Casing Wall Thickness (in.)  
*4" 1/2*

(17) INSPECTION INFORMATION  
Date of Inspection: *12 17 97*  
Month Day Year  
Water Quality Sample Taken:  yes  no  
Reason for Inspection:  
 general survey  
 specific complaint investigation  
 spill or incident response  
 contamination site investigation  
 enforcement  
 general water quality analysis  
 ambient groundwater monitoring  
 other *Wellhead Protection Program*  
Program Name and Facility ID#: \_\_\_\_\_  
Alternate Well ID#: \_\_\_\_\_

(20) OPTIONAL USE  
Will Owner Allow State Access?  
 yes  no  unknown  
Extent of Monitoring Allowed:  
 collect sample  
 measure SWL  
 pump well  
 complete access  
 notification required  
 other (describe below)  
Monitoring Feasibility: \_\_\_\_\_



(21) COMMENTS: *w/ line down*  
*T-trailer*

(22) INSPECTOR IDENTIFICATION  
Name: *ELLISON ERNIE A*  
Last First MI Inspector ID#  
Agency:  DOW  DWM  CHR  KGS  other  
Signature of Inspector: *[Signature]* Date: *12/17/97*

## **Attachment 4**

### **WHPP Drinking Water Planning Team**

Leader:

Jay Favor, CSWR – Director Environmental Health & Safety  
Oversees all facility operations for Bluegrass Water UOC. Directs team to carry out operation tasks.

Team:

Ali Alexander, CSWR – Environmental Compliance Officer  
Oversees facility compliance with State and Federal Regulations/Statutes.

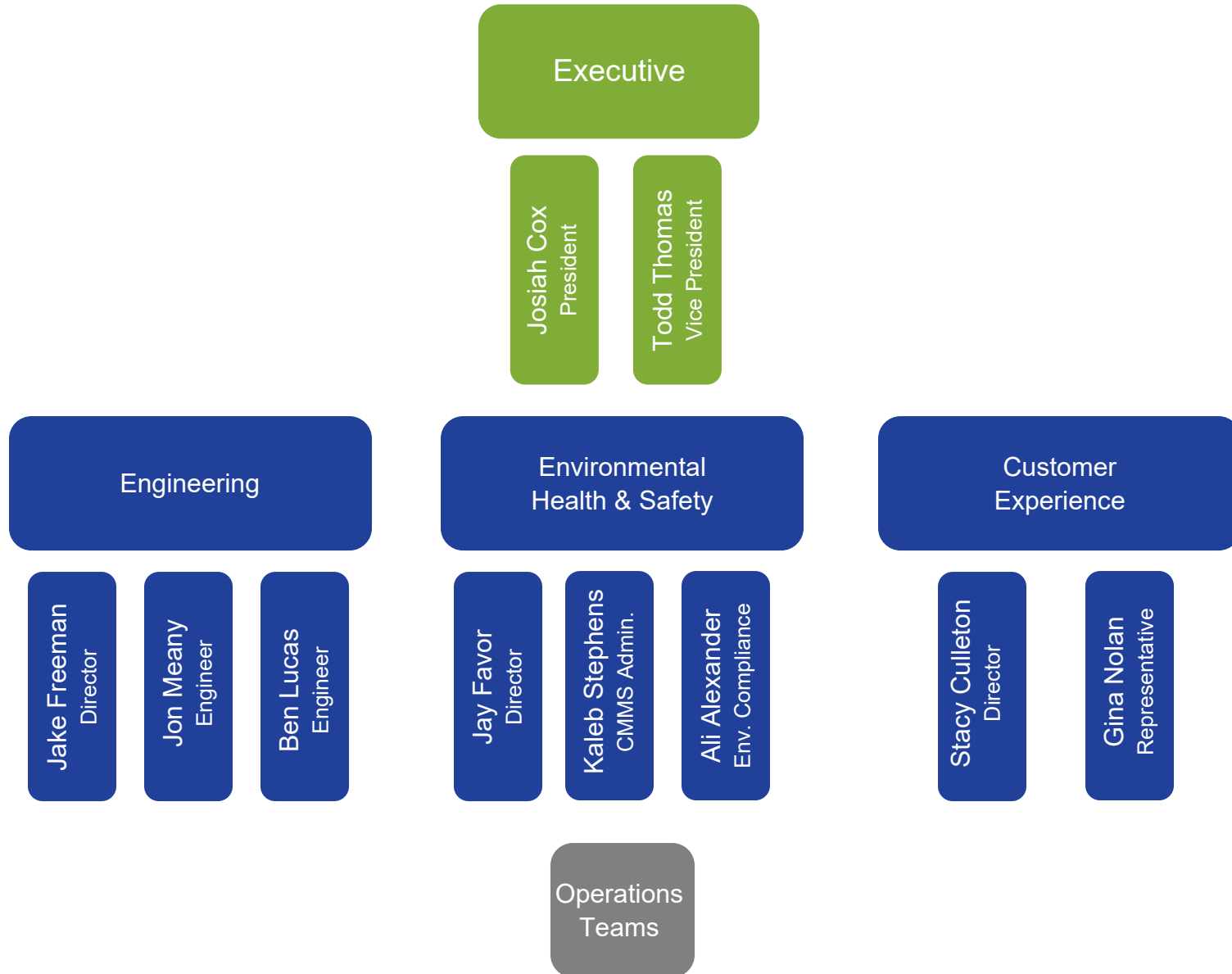
Stacy Culleton, CSWR – Director Customer Experience  
Oversees communications between operators and customers.

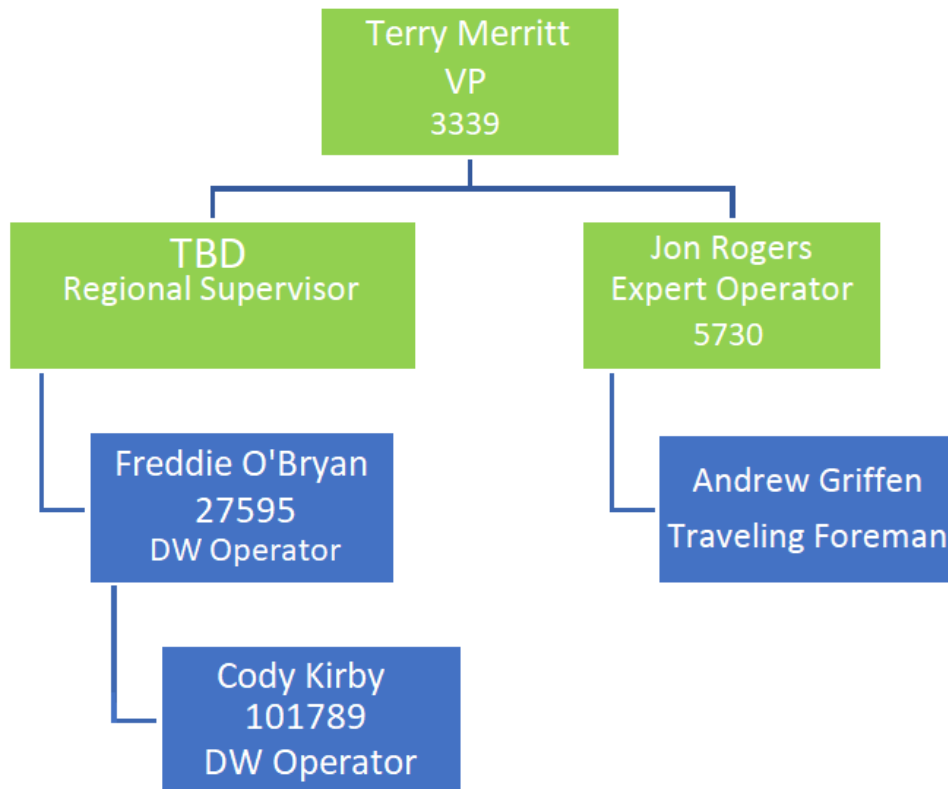
Gina Nolan, CSWR – Customer Experience Representative  
Carries out customer communication.

Terry Merritt, Midwest Water Operations – Vice President  
Oversees all facility operators and directs staff to carry out daily operation tasks.

Freddie O’Bryan, Midwest – Operator (Primary)  
Oversees facility operations.

Cody Kirby, Midwest – Operator (Back-up)  
Oversees facility operations.





## **Attachment 5**

### **WHPA Delineation Information**

The well at Center Ridge Water System is a four (4) inch diameter well with an approximate surface elevation of 440' msl.

The well has a reported depth of 170 feet for a completion elevation of 270' msl. There is approximately 25' of standing water in the well for a static water elevation of 291' msl. No pump tests have been performed on the well so there is very little documentation of aquifer characteristics or well performance.

A search of the Division of Water's data shows two (2) wells are located close to Center Ridge Water System, both of the wells are privately owned and there has been no pump tests on either of these wells.

Most of the hydro logic information therefore is derived from the hydrologic atlas. It appears from the information gathered and the well locations that all of the wells are completed in the Fort Payne Formation.

The Fort Payne yields the most water from gravel like chert rubble in the formation caused by pre-cretaceous erosion and along solution opening of joints along fault zones. The chert rubble has hydrologic characteristics resembling unconsolidated gravel. Water in the rubble drains from areas of pinnacles of limestone towards collapse structures (areas of thick deposits of chert rubble formed by solution collapse along former drainage channels and fracture zones. In areas of faulting the chert zones tend to be thicker, which will allow for more water movement.

No pump tests or aquifer tests were conducted to determine aquifer characteristics, well construction information did not include screen length so that the WHP A could not be calculated. Therefore, the 400' radius will be used as the WHPA-1, and the hydrologic boundaries will be the WHPA-2 and WHPA-3.

All public water systems using groundwater as their water source must delineate a Wellhead Protection Area (WHPA).

The WHPA is divided into three (3) categories designated as WHPA-1, WHPA-2, and WHPA-3. WHPA-1 is the area directly adjacent to the well and is based on a 180-day time-of-travel or a 400' fixed radius depending upon the availability of data.

WHPA-2 is farther away from the well and is based on the ten (10) year time-of-travel.

WHPA-3 is the boundary marking the outer limits of the recharge area (hydrogeologic boundary).

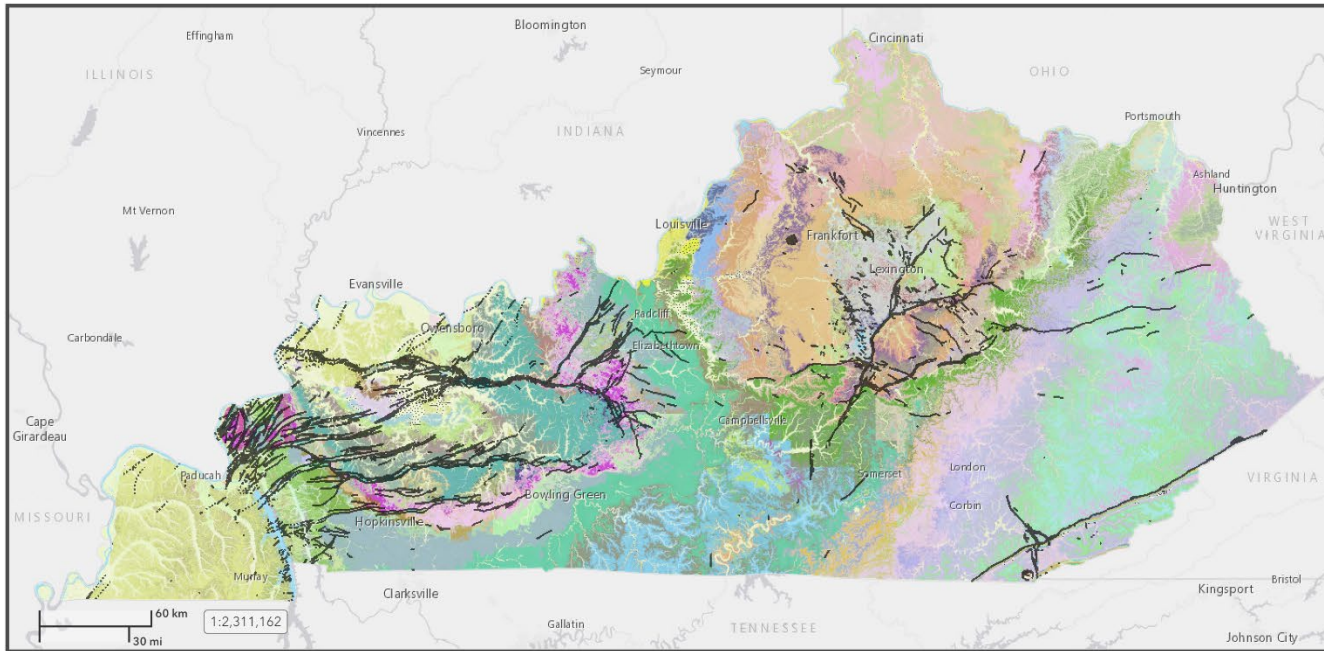
Center Ridge Water System wellhead protection area WHPA-1 is delineated as a 400' fixed radius. Due to the cost of performing well tests there is very little aquifer data and no well pump data it is impossible to determine a 180-day time-of-travel.

WHPA-2 and WHPA-3 were determined to be the same area since it was not possible to determine a ten (10) year time-of-travel. WHPA-2/WHPA-3 is the potential hydrologic boundary for the zone of contribution.

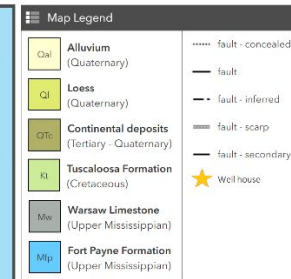
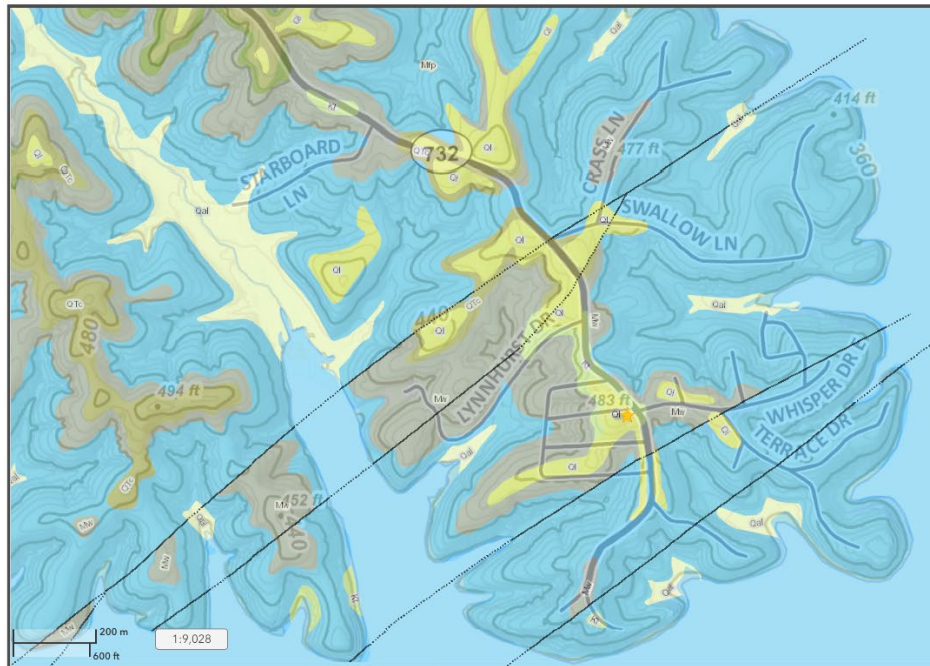
Since there are several faults in the area of the well the most conservative hydrogeologic boundary was chosen. The WHPAs are shown on the map (Attachment 6).



# Kentucky Geology



# Center Ridge Water System Geology






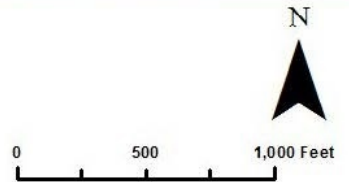
# Attachment 6 Delineation Map



Note: KY Beach resort WHPA partially lies within the Center Ridge #1 WHPA

## Center Ridge #1 WHPA

-  WHP Area 1
-  WHP Areas 2 & 3
-  Well



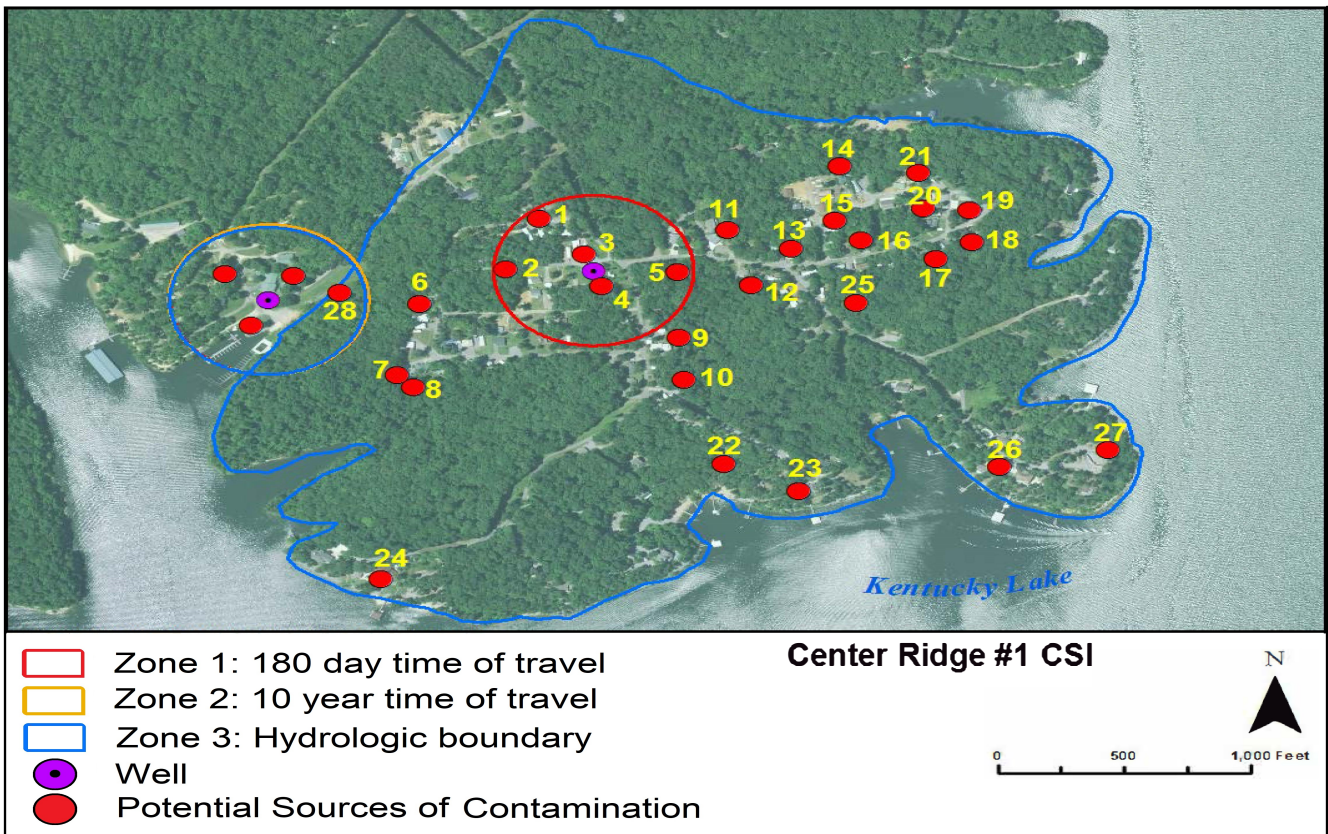


## Attachment 7 CSI Summary & Map

The Center Ridge Water System withdraws water from the Mississippi Embayment (Jackson Purchase) region of Kentucky. According to the Kentucky Division of Water's Guide for Wellhead protection, the hydro logic sensitivity value for the aquifer rates as a two on a scale of one to three (three being the highest).

There are a total of twenty-seven potential sources of contamination within Center Ridge's wellhead protection areas. All of these potential sources are ranked as having a medium risk to contamination of the aquifer. Each source that has been identified is a septic system located in either WHPA-1 or WHPA-3.

Since there are no low risk or high risk sources, with twenty-seven medium risk sources the aquifer has been determined to have a medium risk ranking. This ranking is influenced by the nature of the aquifer that has a medium sensitivity value, the nature of the potential contaminant sources, and historical water quality results.



<b>Contaminant Source Inventory and Susceptibility Analysis for</b>									
<i>Center Ridge Water District #1</i>									
Contaminant Source ID #	Contaminant Source/Land Use	Address	Quantity	WHPA	Proximity Ranking	Contaminant Value	Hydrologic Sensitivity	Numeric Rating	Susceptibility Ranking
1-5	Septic Systems	Center Ridge #1, New Concord, KY	5	1	3	2	4	16	High
6-28	Septic Systems	Center Ridge #1, New Concord, KY	23	3	1	2	4	12	Medium
<b>Susceptibility Ranking Totals:</b>							<b>High</b>	<b>Med</b>	<b>Low</b>
28							5	23	0

## **Attachment 8**

### **Previous Management Strategy and Newly Proposed Management Strategies**

The purpose behind managing a wellhead protection area is to minimize the impact of land uses that threaten the quality and quantity of the public's drinking water supply. The underlying theme is simply to prevent pollution. Preventing pollution is the key to keeping groundwater supplies safe and to protect public health. Once a drinking water supply becomes contaminated, the community is faced with the difficult and costly task of installing additional treatment facilities or locating an alternate source.

Virtually all man-made land use activities have the potential to degrade groundwater quality. There are numerous factors that control the impact of land uses upon groundwater. The two most prominent factors are the geology of the area and the type of land use. The geology controls the direction and rate that a contaminant can travel, whereas the land use dictates the quantity and toxicity of the contaminant. This means that a particular land use in a less sensitive geologic setting may never significantly impact groundwater quality, but the same land use in a geologically sensitive setting can render groundwater unusable for human consumption. This is why a management plan must be tailored to each public water system.

The overall strategy of the management plan is to minimize the impact of the threats identified in the contaminant source inventory through regulatory and/or non-regulatory means.

#### **Management Strategies**

The Center Ridge System well field is located in a rural community. Most contaminant sources can be directly controlled through existing regulatory programs. Therefore, the management strategies for protecting the drinking water supply will be a combination of regulatory compliance and public education.

The rationale for this decision is to use as many management strategies as possible to prevent contamination of the aquifer. Regulatory compliance management strategies will be used for those potential contaminant sources already identified through the contaminant source inventory that are subject to Groundwater Protection Planning regulations (401 KAR 5:037) or Kentucky's Agriculture Water Quality Act of 1994. The purpose of a groundwater protection plan is to ensure protection for all current and future uses of groundwater and to prevent groundwater pollution. Public awareness will be used to educate the surrounding community in their part in protecting the groundwater resource.

Center Ridge Water System proposes the following management strategies for protecting their water supply.

#### **Regulatory Compliance Objectives:**

1. Center Ridge Water System will comply with groundwater protection planning regulations by completing a groundwater protection plan for their water supply well.

#### **Public Education and Awareness Objectives:**

2. A public notice will be posted to inform residents about their wellhead protection plan.

## Attachment 9 WHPP Contingency and Planning

### Emergency Response Phone List

Local Emergency Response	Phone Number
Operator: <b>Freddie O'Bryan</b>	(270) 331-8482
Ambulance District: <b>Murray-Calloway Co. EMS</b>	(270) 753-9333
Fire Department: <b>Fire-Rescue</b>	(270) 753-4112
Kentucky State Fire Marshall	(502) 573-0382
Sheriff's Department: <b>Calloway</b>	(270) 753-3151
State Highway Patrol: <b>KSP Post 1</b>	(270) 856-3721

Kentucky DOW: <b>Frankfort</b>	(502) 564-3410
Kentucky DOW RO: <b>Paducah</b>	(270) 898-8468
Kentucky Environmental Response Team	(502) 564-2380
24-hr Emergency Response Line	(800) 928-2380
County Health Department: <b>Calloway</b>	(270) 753-3381
Kentucky Public Service Commission	(502) 564-3940

Bluegrass Water UOC Customer Service	(866) 752-8982
Jay Favor	(314) 380-8525
Ali Alexander	(314) 380-8533
Stacy Culleton	(314) 380-8546
Gina Nolan	(314) 380-8544

### Procedures for Public Notification:

In the event of a water system emergency that would threaten the health or life of the public, use the following procedure. Provide Jay Favor, Ali Alexander, Stacy Culleton, and Gina Nolan a summary of the issue including time of onset, if the KyDOW was notified, and if the County Health Department was notified. Stacy & Gina will draft public notification and directions for customers which will be provided to customers on the Bluegrass Water UOC website, facebook, by email, and/or by direct handout via the operator. Stacy & Gina will coordinate with Ali to communicate with appropriate regulatory authority as needed. If additional notification is needed use the local newspaper as directed.

### Potential Future Problems:

The most common scenario that could threaten the water supply is bacteriological and/or chemical contamination from a leaking septic system.

### Alternative Water Supply (Short and Long Term):

Bacteriological contamination is mitigated by disinfecting the water system. If there were indicators of bacteriological contamination in the drinking water the facility would be placed on a boil water advisory until the problem is eliminated. If chemical contamination (such as nitrate/nitrite) is discovered in the water the facility would be placed on a do not drink advisory until the source of contamination was discovered and eliminated. If a long-term solution is needed, the facility would add centralized/localized treatment to eliminate the issue. As needed, water could be hauled in for use during these events.

### Schedule for Update and Review:

The Wellhead Protection Plan will be reviewed regularly and updated every five years as required by regulation.

**Attachment 10**  
**Public Education Material**



**Energy and Environment Cabinet**

**Generic Groundwater Protection Plan:  
Residential Septic Systems**

## **HOMEOWNER'S SEPTIC SYSTEM GUIDE AND RECORD KEEPING FOLDER**

The purpose of 401 KAR 5:037 and this groundwater protection plan is to prevent groundwater pollution. Understanding how your septic system works and following good operation and maintenance practices are the keys to preventing groundwater pollution.

This folder provides you with that information. By carefully reading it and following the guidelines, you will not only protect groundwater, but also should receive many years of trouble-free service from your system.

Keeping records will enable you to better protect and maintain your septic system. In case you sell your house, your records will show a prospective buyer that your system has been properly maintained.

### **FOR YOUR RECORDS**

1. Maintenance Log: Date, what was done and reason for the maintenance (Example: measure sludge and scum layers, pump the tank).
2. Inspection Log: Date, what you observed upon walking over the septic system (Example: any unpleasant odors, soggy soil, lush green grass over the lateral lines, surfacing wastewater).
3. Site Drawing: Show accurately the layout of the system on your lot. Include exact distances of each portion of the system from at least two (2) fixed reference points (corner of house, garage, large trees, property line markers).
4. Any permits or receipts.
5. Residential Address \_\_\_\_\_

**Sketch Septic Tank and Drainlines Location Here**


**Septic System Type:**

	Septic tank - drainfield
	Septic tank – constructed wetland - drainfield
	Septic tank – leaching chambers

	Septic tank – low pressure pipe
	Septic tank – sewage lagoon - drainfield
	Septic tank – gravelless pipe

### System Inspection Log

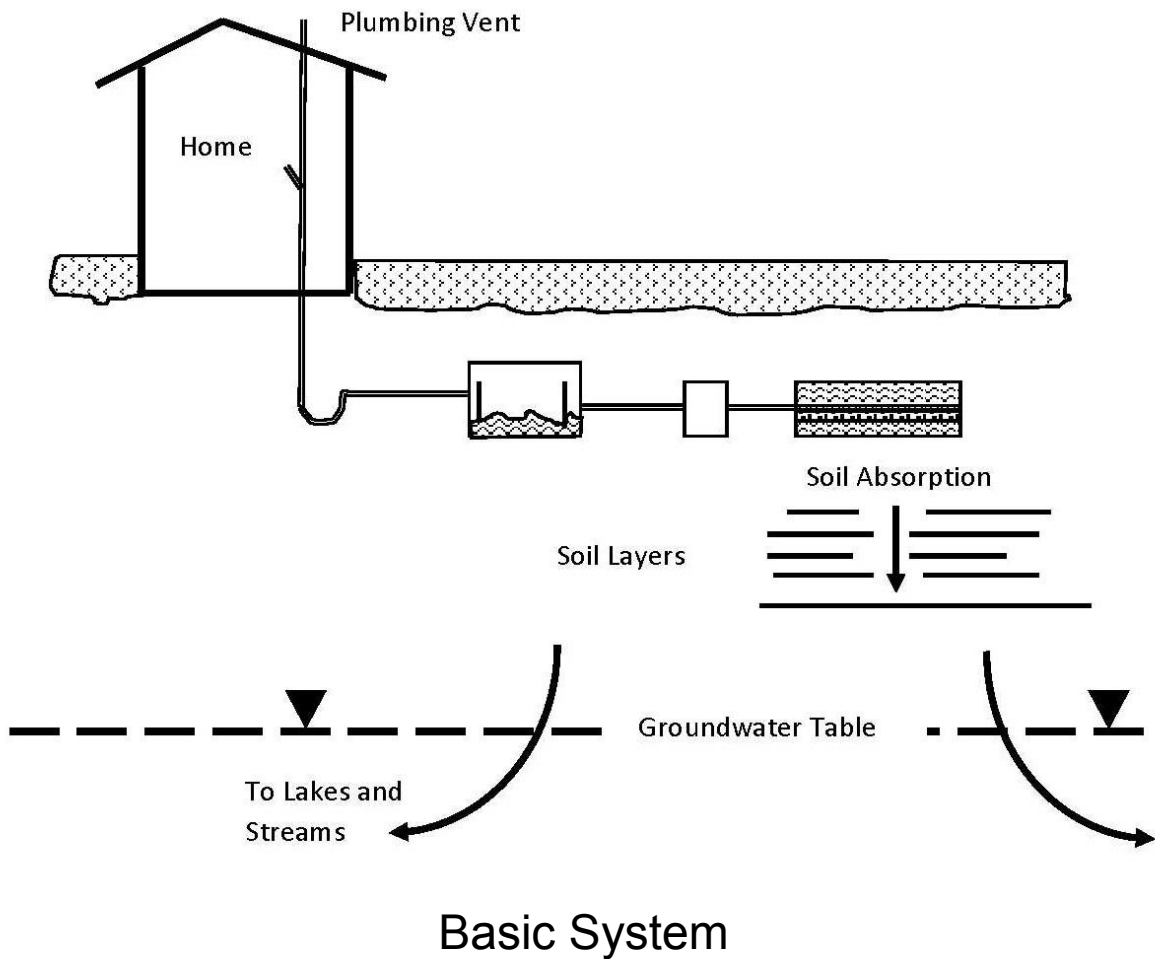
Date	Description

### System Maintenance Log

Date	Description

# SYSTEM DESCRIPTION

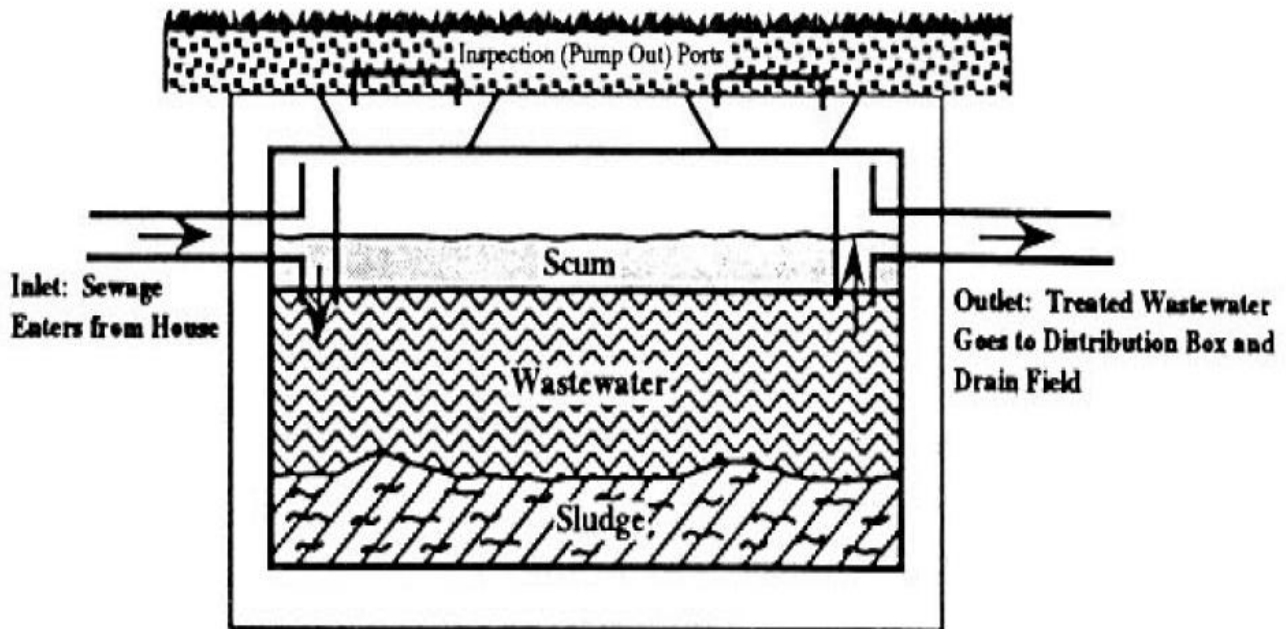
A septic system uses natural processes to treat and dispose of the wastewater in your home. It typically consists of a septic tank and a drainfield (also called a leachfield, lateral field, or subsurface soil absorption beds/trenches). The system accepts both "blackwater" (toilet wastes) and "greywater" (wastes from the kitchen sink, bath tub/showers, and laundry). Water that should not be discharged to the system includes water from foundation or footing drains, roof gutters, and other "clear" water.





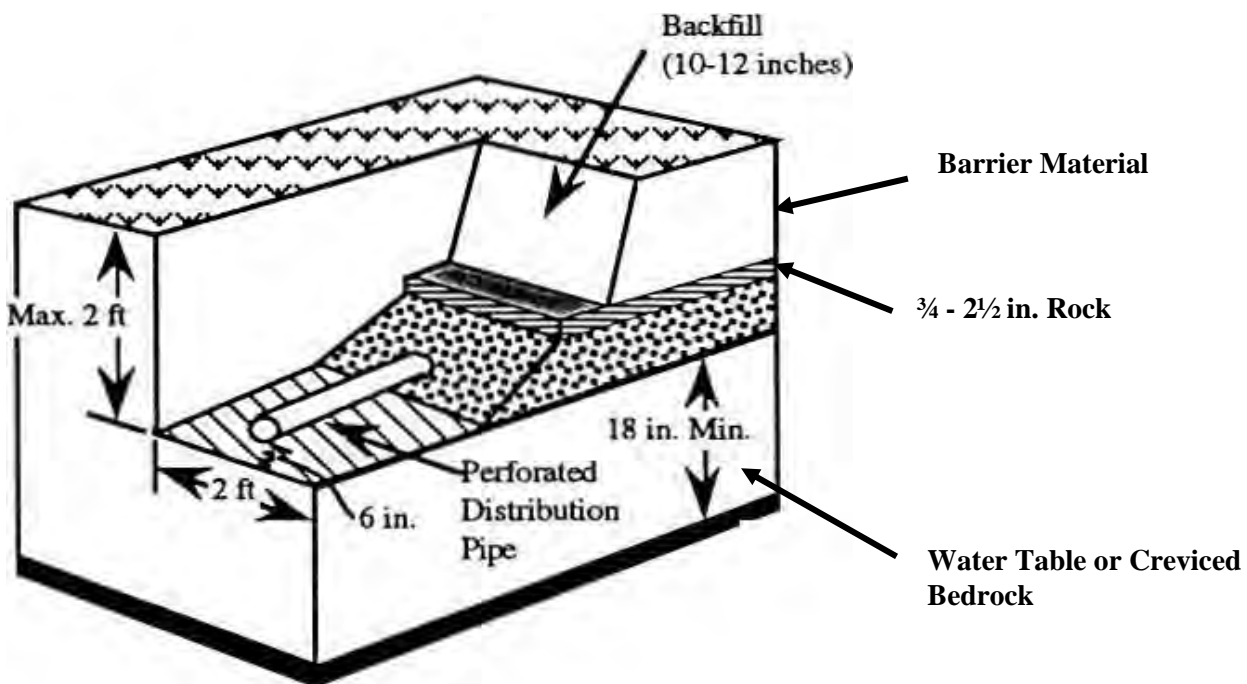
# SEPTIC TANK

The septic tank provides the first step in treatment by separating the solids from the liquids. The wastewater is retained in the tank for 24 hours or more. During this time the heavier solids settle the bottom to form a sludge layer while the lighter solids float to the top to form a scum layer. Bacteria break down the solids, producing carbon dioxide, hydrogen sulfide, and other gases in the process. These gases are vented through the plumbing vent on your house roof. Since the bacteria reduce only about 40 percent of the sludge and scum volume, the tank must be pumped regularly (approximately every three to five years) to remove the accumulated solids. If the tank fills with sludge and scum, the solids will overflow into the drainfield and quickly clog the soil, resulting in system failure.



# THE DRAINFIELD

The drainfield provides the final treatment of the wastewater and disposes of it through groundwater recharge. The typical drainfield is composed of trenches or beds which are shallow, level excavations installed one to one and a half feet above the groundwater table. Each trench contains a perforated distribution pipe through which wastewater drains into the gravel. The water is stored in the gravel until it can seep into unsaturated soil underlying and adjacent to the trench. As the wastewater moves slowly through the gravel and soil, many of the disease-causing bacteria and viruses are filtered out, or adsorbed and held by the soil particles until they die. Where soils do not permit a drainfield to adequately treat septic tank effluent, an additional or alternative treatment system must be used in conjunction with the drainfield. Alternative systems primarily used in Kentucky are constructed wetlands and sewage lagoons. These alternative systems have their own operation and maintenance guidelines. If you would like information about these guidelines, contact the Groundwater Section.

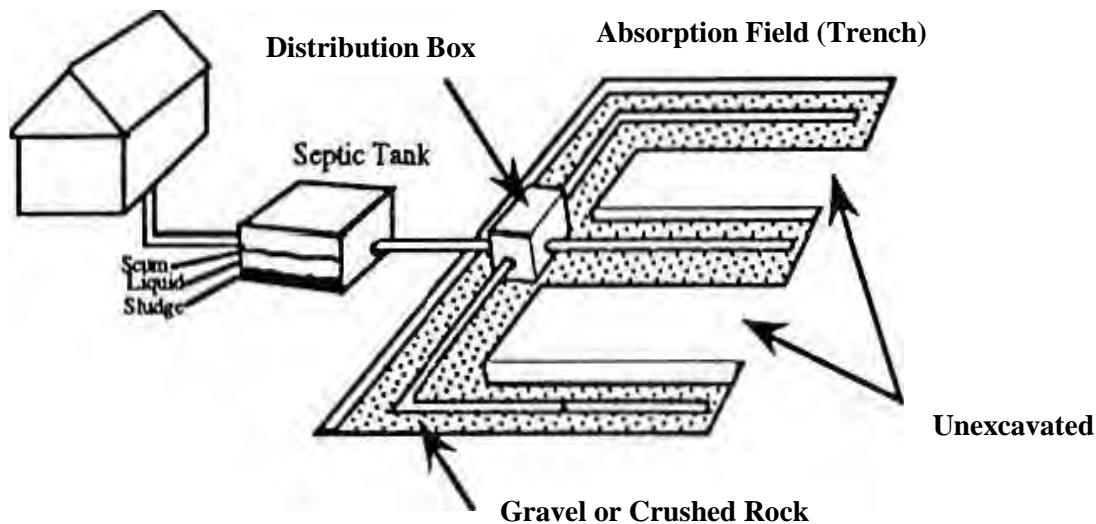


Conventional Rock Drainfield  
Trench Cross-Section

# TAKING CARE OF YOUR SYSTEM

Your septic system represents a significant investment worth protecting. The old "An ounce of prevention is worth a pound of cure" is so true when it comes to the care of your septic system. If you follow the operation and maintenance guidelines below, your system will function better and last longer, and you will avoid the nightmare and se of a failed system. Most important, your a will not be polluting groundwater.

## Conventional Septic System



### DO

- Conserve water to reduce the amount of wastewater that must be treated and disposed.
- Repair any leaking faucets and toilets.
- Discharge only biodegradable wastes into system.
- Divert down spouts and other surface water away from your drainfield.
- Keep your septic tank cover accessible for tank inspections and pumping
- Have your septic tank pumped regularly and checked for leaks and cracks.
- Call a professional when you have problems
- Compost your garbage or put in trash.

### DON'T

- Use a garbage grinder.
- Flush sanitary napkins, tampons, disposable diapers, condoms and other non-biodegradable products into your system.
- Dump solvents, oils, paints, thinners, disinfectants, pesticides or poisons down the drain. These materials can disrupt the treatment process and contaminate the groundwater.
- Dig in your drainfield or build anything over it.
- Plant anything over the drainfield except grass
- Drive over you drainfield or compact the soil in any way.

If you have any questions or need additional information, contact:

The **Groundwater Protection Program Coordinator**

**Kentucky Energy and Environment Cabinet  
Kentucky Division of Water  
Watershed Management Branch  
Groundwater Section  
300 Sower Boulevard, 3<sup>rd</sup> floor  
Frankfort, KY 40601  
(502) 564-3410**

**Groundwater Protection Plan Regulation 401 KAR 5:037**  
<http://water.ky.gov/groundwater/Pages/GroundwaterProtection.aspx>

**Kentucky Cabinet for Health and Family Services  
Department of Public Health  
Environmental Management Branch  
275 E. Main St.  
Frankfort, Ky. 40621  
(502) 564-4856**

**Onsite Regulations 902 KAR 10:085  
Septic Tank Servicing Regulation 902 KAR 10:170**  
<http://chfs.ky.gov/dph/info/phps/enviromgmt.htm>

***Homeowner's Manual Onsite Sewage Disposal Systems***  
<http://chfs.ky.gov/NR/rdonlyres/CA014E47-2256-444D-8FE4-84C9FF456C8E/0/onsitesewagemanual.pdf>

**Check List  
for  
Evaluating Your Septic System**

- 1.** Find and mark the location of the septic system, you should map this information in the space provided in your Groundwater Protection Plan: "Homeowner's Septic System Guide and Record Keeping Folder."
- 2.** When was the septic tank last pumped?  
\_\_\_\_\_
- 3.** If the tank was last pumped over three years ago, or if you have recently moved into the house and don't know when the tank was last pumped, contact a septic tank pumper. Have him service the tank and check the baffles.
- 4.** Do toilets flush slowly and does water drain slowly from sinks and tubs, or does either "gurgle"?  
Yes  No
- 5.** Is there any standing water, soggy ground, or smelly liquid in or near the drainfield?  
Yes  No
- 6.** Does the ground slope toward the septic system?  
Yes  No
- 7.** Are your septic tank and drainfield less than 100 feet from a lake, stream, or pond?  
Yes  No
- 8.** Are water-loving trees such as willows, sycamores, birches, or water maples growing within 10 feet of the septic tank?  
Yes  No
- 9.** Are there any areas over the septic tank or drainfield where people have frequently driven their cars or trucks?  
Yes  No
- 10.** Have any additions been made to the house since the present septic system was installed?  
Yes  No
- 11.** Do you have dripping faucets or a toilet that runs continuously or gradually loses water from its tank?  
Yes  No
- 12.** Do you put cigarette butts, coffee grounds, cooking fats, disposable diapers, facial tissue, wet-strength towels, or other non-biodegradable materials into your septic tank?  
Yes  No

If you have answered YES to one or more of questions 4 - 12, the septic system may not be functioning correctly. Call your local health department, or seek other professional help. Should repair of the system be necessary, be sure to engage the services of a professional who has a groundwater protection plan on file.