



During the drought situation in Magoffin County in 2008, it became necessary for SWW to utilize the two wells to supplement customer demand and lessen the stress on the Licking River. In addition, SWW engaged in stream-channel trenching to release water that was stored in pools upstream of the water supply intake and transferred water from a pool below the intake back into the water supply pool. Both of these actions were implemented by SWW as efforts to maintain a useable level of water in the water supply pool on the Licking River.

As a water system that treats surface water, SWW must conduct testing on the filtered water at the treatment plant as well as test the finished water in the distribution system. MCWD, as a purchasing system, conducts less monitoring than that required of SWW and only on the water distributed by this public water system. Therefore, there are fewer compliance criteria placed on purchasing systems than those that treat raw source water.

The quality of the drinking water distributed to MCWD customers is related to the quality of water supplied by SWW and influenced by the layout of the MCWD distribution system.

**Primary Safe Drinking Water Act (SDWA) Contaminants:**

NOTE: SWW has had eleven (11) violations of the SDWA since 2003: seven (7) for not meeting total organic carbon removal and four (4) for exceeding haloacetic acid (disinfection by-product) maximum contaminant levels. SWW is now in compliance with TOC removal.

NOTE: MCWD has had four (4) violations of the SDWA since 2003: two (2) for monitoring issues associated with the Total Coliform Rule and two (2) for Consumer Confidence Report content.

Turbidity:

As a result of the decreasing water quality in the Licking River, SWW exceeded the treatment technique (TT) requirements of the Long Term 1 Surface Water Treatment Rule for turbidity removal in October. The TT requirements are 2-fold:

- No more than 95% of the filtered water turbidity results can exceed 0.3 Turbidity Units (NTU)
- At no time will the filtered water turbidity exceed 1 NTU

As of October 27, 2008, SWW exceeded 0.3 NTU in 30% of the filtered water turbidity readings and one (1) NTU fourteen (14) times. SWW will receive two notices of violation for the month of October 2008 for violation of turbidity TT requirements and will be required to conduct public notification.

In addition, SWW failed to collect sufficient turbidity readings on 5 days through October 26, 2008 and will so receive a notice of violation for a Monitoring and Reporting violation.

As MCWD purchases water from SWW, they, too, have purchased and distributed water with elevated turbidity and will also be required to notify their customers via a public notification process.

On October 7, 2008, a county-wide Boil Water Advisory (BWA) was issued due to the elevated turbidity levels. The BWA will remain in effect until the turbidity levels decrease to and remain below the regulatory treatment technique limit of 0.3 NTU. Testing conducted by the Division of Water for Secondary Maximum Contaminants Levels (SMCLs, see below) indicate the turbidity to be due to color from oxidized manganese—treatment has been adjusted at the SWW treatment plant to improve manganese removal.

Residual Disinfectant:

The SDWA and 401 KAR 8:150 Section 1(1)(a)(4) require that chlorine residuals be checked daily at representative points throughout the system. MCWD will receive a notice of violation for a Monitoring and Reporting violation; specifically for failure to monitor the distribution system for chlorine residual on a **daily** basis. However, of the chlorine residual levels reported, none were less than the minimum of 0.2 mg/L.

### **Secondary SDWA Contaminants**

EPA has regulated Secondary Maximum Contaminant Levels (SMCL) for contaminants that are not health-based but rather mean to address aesthetic concerns such as taste, odor or color. Should such contaminants be detected in the source water and not adequately removed through treatment, the finished water can be considered unsatisfactory in appearance or taste to customers. SMCLs are not considered “enforceable” but “the cabinet may direct that supplier to modify the treatment procedure or to locate a more suitable source of water” (401 KAR 8:600 Section 1(7)).

Decreasing source-water levels and diminished flow in the Licking River can result in increased levels of secondary contaminants that cause discolored water. The Division of Water, in an effort to determine the cause of the elevated filtered water turbidity at the SWW plant, collected water samples from the Licking River, the producing water wells, the water treatment plant tap and a distribution site within the SWW distribution system. The samples were analyzed for pH, turbidity, iron, manganese, color and total organic carbon.

- The Licking River exceeded the SMCLs for iron, manganese and color.
- The water sampled at the treatment plant tap exceeded the SMCL for manganese.
- The sample of the SWW distribution exceeded the SMCL for manganese.
- The two wells continue to show good quality water.

Manganese above the secondary standard of 0.050 mg/L can result in discolored water and a metallic taste. Treatment was adjusted at the water treatment plant on October 20, 2008 to improve removing the manganese from the Licking River.

**Table 1. 4-Hour Compliance Turbidity Readings for October through 10/26/08—No more than 5% over 0.3 NTU/None over 1 NTU**

Date	Hours Operated	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
1	17	0.13	0.13	0.13	0.13	0.13	0.12
2	13	0.12	0.12	0.12	0.12	0.11	0.12
3	14.3	0.12	0.12	0.12	0.12	0.11	0.11
4	14.3	0.1	0.1	0.1	0.16	0.16	0.17
5	13.3	0.17	0.17	0.11	0.13		
6	16.3	0.22	0.22	0.24	<b>0.53</b>		
7	11.5						
8	19.2		<b>3.9</b>	<b>3.4</b>	<b>1.04</b>	<b>2.78</b>	<b>1.1</b>
9	17.3	<b>0.90</b>	<b>0.70</b>	<b>3.17</b>	<b>2.62</b>	<b>0.33</b>	<b>0.51</b>

10	19.5	<b>0.55</b>	<b>1.09</b>			<b>1.2</b>	<b>0.60</b>
11	16.3	<b>0.75</b>	<b>1.22</b>	<b>1.09</b>		<b>0.99</b>	<b>0.49</b>
12	20.0	<b>0.56</b>	<b>1.54</b>	<b>3.29</b>	0.24	0.20	<b>0.40</b>
13	16.3	0.10	0.10	0.10	0.13		
14	15.5	<b>0.89</b>	0.15	0.24	0.14	0.30	<b>0.32</b>
15	10.3	<b>0.34</b>	<b>0.34</b>	<b>0.33</b>	0.25	0.16	<b>0.52</b>
16	11.3	0.23		0.09	0.11	0.08	0.10
17	15.3	0.11		0.17	0.24	0.16	<b>0.52</b>
18	12.3	<b>0.83</b>	<b>0.92</b>	0.10	0.10	0.11	0.13
19	12.2	<b>0.37</b>	<b>0.34</b>	<b>1.93</b>	0.09	0.10	<b>0.60</b>
20	10.5	0.12		0.13	0.12	0.11	0.10
21	23.2	0.09		0.22	<b>0.33</b>	0.12	<b>0.38</b>
22	17.1	<b>0.53</b>	0.21	0.20	0.17	0.18	0.21
23	20.5	0.13	0.17	0.17	0.11	0.28	0.19
24	19.7	0.11	0.11	0.17	0.14	0.16	0.26
25	20.6	0.16	<b>0.32</b>	0.13	0.09	0.22	0.16
26	14.3	0.13	0.18	0.13	0.10	0.14	0.15
27							
28							
29							
30							
31							

42 readings over 0.3 NTU out of 138 readings taken = 30%

**Table 2. Secondary Maximum Contaminant Level (SMCL) Monitoring—Collected 10/14/08**

Parameter	Licking River @ Intake	Well #1	Well #2	WTP Tap	Salyersville Wastewater Plant	SMCL (mg/L)
Total organic carbon (mg/L)	3.97	0.556	0.732	1.86	1.46	
Color (S.U.)	23.5	4.82	ND	3.61	ND	15
pH	7.5	8.4	8.2	7.8	7.9	6.5 – 8.5
Iron (mg/L)	0.577	0.0495	0.110	0.0192	ND	0.3
Manganese (mg/L)	1.300	0.00452	0.00348	<b>1.14</b>	<b>0.0895</b>	0.05
Turbidity (NTU)	8.2	0.98	0.36	<b>1.15</b>	0.67	See table above

**Adequacy of the quantity source of water: historical hydrologic records:**

All drinking water distributed by MCWD is purchased from Salyersville Water Works (PWSID #0770566). The primary source of water supply is the Licking River, located in the uppermost reaches of the Licking River basin. At the point of withdrawal the drainage area above the intake is approximately 107 square miles.

Historical streamflow records for the Licking River near Salyersville are available for a 63-year period of record from 1939 through 1997 and 2001-2004. The record was evaluated to identify the occurrence of drought events of sufficient intensity and duration to create a water-supply deficit at the primary Licking River source. Each deficit that was identified was compared to the amount of water available from the backup wells (estimated to be 300,000 gallons per day) and from the “buffer” created from the stored water behind the dam on the Licking River at the intake site (estimated to be 2.5 million gallons).

The results indicate that drought events in the 1940s and 1950s were likely severe enough to cause some level of water-supply deficit under today’s current demands. Most of these events occur late in the summer and early fall of the year. A repeat of these drought events could require some level of supplemental water supply above what could be supplied by the SWW river intake or backup wells (Table 3.).

**Table 3. Estimated water supply shortfall at Salyersville Water Works for the period 1939 through 1997 under an assumed demand of 700,000 gpd.**

		Supplemental Water Supply Requirement	
Drought Year	~Duration of Water Supply Deficit	Average	Maximum
	(days)	(million gallons per day)	
1943	34	0.275	0.400
1948	21	0.360	0.400
1953	45	0.240	0.400
1955	65	0.285	0.400
1957	8	0.250	0.400

Compared to the instrumental record that began in 1895, the 30-years between 1930 and 1960 were characterized by a higher frequency and severity of drought events than any other similar period. Prior to the events of 2007 and 2008, significant water supply deficits at SWW were essentially absent for more than 50 years.

**Adequacy of the quantity of source of water: modern-day water shortages**

Following the last extreme droughts of the 1950s extreme hydrologic drought was virtually absent for a 30-year period until the mid to late 1980s. The drought of 1988 reached extreme status in central and eastern Kentucky by mid-July but flows in the Licking River remained well above a critical level at Salyersville. A more severe drought in 1999 caused some concerns at Salyersville, but no actions beyond voluntary measures under a water shortage advisory were necessary. MCWD issued a voluntary advisory on June 24, 1999 following the announcement of a water shortage advisory by SWW. During the summer of 1999 flows in the Licking River remained at a useable level and drought conditions abated in early October.



The recent shortages and subsequent water-supply emergency in Magoffin County are the result of a two-year drought event that has had severe impacts to the hydrologic conditions in the upper Licking River watershed. Based on historical climate and hydrologic records, the 2007-2008 drought in Magoffin County ranks as one of the five (5) most severe droughts of the instrumental record. Furthermore, measured flows in the Licking River at Salyersville and Red River in Wolfe County suggest that this two-year drought is the most severe two-year hydrologic drought on record in the area comprising the upper Licking River and upper Red River basins.

As is the case with many water systems in Kentucky, MCWD is exposed to periodic occurrences of drought that have the potential to negatively impact the adequacy of the source of supply. Historical records indicate that the upper Licking River basin does not have a history of routinely reaching the level of hydrologic impact that developed by August of 2008. In most years and under the more common drought scenarios, a combination of the Licking River and backup wells can be expected to provide an adequate supply provided SWW and MCWD can effectively limit total water demand to no more than 700,000 gallons per day. Common drought scenarios will be those in which flows in the Licking River fall below a level that can fully meet the demands for raw water by SWW and MCWD, and where supplemental water from the backup wells is sufficient to meet the deficit. This level of drought can be expected to recur on a routine basis, at least one or two years each decade. It is not possible to place an upper limit on the “safe yield” of the combined sources of supply to SWW and MCWD. However, as demands on these sources increase so that 700,000 gpd is no longer an achievable

conservation goal, the adequacy of these sources will become less certain under common drought scenarios.

Hydrologic records and recent events confirm that there is potential for more extreme hydrologic drought in this area that can result in a loss of nearly all of the available flow in the Licking River. This level of drought may be statistically uncommon, but the potential consequences of having no options beyond the river and backup wells could be a significant threat to human health and safety when these droughts recur. Under these conditions the sources of supply to MCWD via SWW will not be adequate to meet demands. Increases in demand for water by MCWD either from population growth or line extensions to un-served areas will only exacerbate this condition.

I certify that the foregoing is true and correct to the best of my knowledge, information and belief formed after a reasonable inquiry.



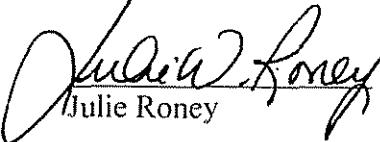
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CERTIFICATE

This is to certify that a true and correct copy of the foregoing was this the 29<sup>th</sup> day of October, 2008 delivered by hand to the following:

Public Service Commission  
211 Sower Blvd.  
Frankfort, Kentucky 40601

  
Julie Roney