

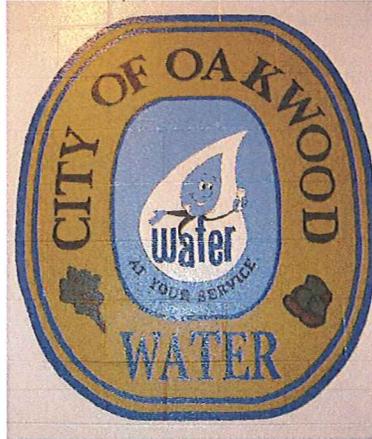
210 Shafor Water Plant



120 Springhouse Water Plant

2015

**WATER PRODUCTION
ANNUAL REPORT**



January 29, 2016

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INTRODUCTION/BRIEF HISTORY

This report provides a summary of the operations of the city of Oakwood water system for the year 2015. It includes the following items:

- Water Pumpage Statistics
- Water Monitoring and Testing (OEPA Compliance)
- Water System Maintenance
- Budget Summary

Brief History

Prior to 1954 the city of Oakwood purchased all of its water from outside sources, primarily the city of Dayton. At that time the Ohio Department of Health regulated public water systems and the rules and regulations were fairly limited, thus the price of water was relatively low. In 1954 Oakwood drilled two wells at 120 Springhouse Road. This site became known as the "Springhouse Wellfield." This was the beginning of Oakwood's quest to become water independent.

From 1954 to 1965 water was pumped from these two wells. This proved so successful that three new wells (Wells #1, 2 & 3) were drilled to a greater depth so as to sustain heavier pumping. The original two wells were abandoned. This increased water production and decreased Oakwood's reliance on Dayton water. The water was chlorinated to ensure that it was free from bacteria.

In 1978 a second well field was developed at the south end of Firwood Drive off Irving Avenue in Dayton. It was referred to as the "Firwood Wellfield." Between 1978 and 1988 three production wells (Wells #4, 5 & 6) were drilled at this location. The groundwater resources in this area proved to be abundant. In 1985 Oakwood purchased land on the north side of Irving Avenue to build a soccer field. In 1986 Well #7 was drilled adjacent to the soccer field. This site became known as the "Soccer Field Wellfield".

Prior to using water from the Firwood Wellfield, the Ohio EPA required the City to construct an Iron and Manganese Removal Plant due to elevated levels of iron and manganese in Well #5. The plant was constructed in 1980 at the 210 Shafor Boulevard Service Yard. This plant also housed the chlorination system for Wells #4, 5, 6 & 7.

In 1987 Oakwood decided to explore the possibility of softening the City water. In 1988 plans were completed for the plant at 210 Shafor. The plant was constructed in 1989. In 1991 plans were completed for the plant at 120 Springhouse and the plant was built in 1992. Both water softening plants use the "Ion Exchange" softening process. This is the same process used in most private home water softening units. The softening system removes hardness, primarily calcium and magnesium. Periodically the softening units require backwashing and regenerating of the resin bed filters.

In 2004 Well #8 was drilled in the Firwood Wellfield and placed into service. This well was needed to further enhance Oakwood's water independence.

Water Pumpage Statistics

The enclosed reports and tables (Sections II & III) provide monthly and yearly totals of the city of Oakwood's 2015 water pumpage. They include monthly and yearly totals for all wells, the Shafor plant, Springhouse plant and water purchased from outside sources (i.e., city of Dayton and Montgomery County). In 2015, no water was purchased from Dayton or from Montgomery County. Oakwood was able to provide 100% of its own water, even for fire responses.

II. Water Monitoring and Testing (OEPA Compliance)

The following samples were collected at the entry points of the water system at 120 Springhouse and 210 Shafor Water Treatment Plants as required by the Ohio EPA:

- Nitrates, collected July 15, 2015
- Inorganic Chemicals (IOC), July 15, 2015
- Volatile Organic Compounds (VOC), July 15, 2015
- Total Trihalomethanes (TTHM), collected July 15, 2015
- Total Haloacetic Acids (HAA5), collected July 15, 2015

All samples tested under the 2015 Ohio EPA Chemical Monitoring schedule were in compliance of the Safe Drinking Water Act. Table 1 on pages 5 - 6 compares Oakwood's water with EPA standards. All results are from the most recent samples taken. Some samples are only required to be taken every three years. The monthly routine sampling consists of the following tests:

- *10 bacteriological samples per month from Distribution System*
- *2 sodium samples per month from Distribution System*
- *1 sodium sample per month from each Plant*
- *1 iron and manganese sample per week from each Plant*
- *Hardness samples daily from each Plant and Distribution System*
- *free and total chlorine samples daily from each Plant as well as from the Distribution System.*
- *1 chloride and pH sample per month from each Plant (NPDES Stormwater Permit requirement)*
- *1 Total Dissolved Solids sample per month from each Plant (NPDES Stormwater Permit requirement)*

General test results include:

- All 120 bacteriological samples tested negative for coliform bacteria.
- Raw water sodium averaged 84 mg/L at 210 Shafor, up from 70 mg/L in 2014; and 126 mg/L at 120 Springhouse, up from 114 mg/L in 2014.
- System water sodium averaged 261 mg/L, up from 247 mg/L in 2014.
- Iron at both plant effluents averaged <0.1 mg/L.
- Manganese at both plant effluents averaged <0.01 mg/L.
- System water hardness at 210 Shafor averaged 178 mg/L (10.4 GPG)
- System water hardness at 120 Springhouse averaged 176 mg/L (10.6 GPG)

Table 1

CONTAMINANT	OAKWOOD'S WATER		OEPA MCL	DATE COLLECTED
	Shafor	Springhouse		
VOLATILE ORGANIC COMPOUNDS	Ug/L	ug/L	ug/L	
Benzene	<0.5	<0.5	5.0	7/15/15
Carbon tetrachloride	<0.5	<0.5	5.0	7/15/15
1,1-Dichloroethane	<0.5	<0.5	7.0	7/15/15
1,2-Dichloroethane	<0.5	<0.5	5.0	7/15/15
cis-1,2-Dichloroethene	<0.5	<0.5	70.0	7/15/15
Dichloromethane	<0.5	<0.5	5.0	7/15/15
1,2-Dichloropropane	<0.5	<0.5	5.0	7/15/15
Ethylbenzene	<0.5	<0.5	700.0	7/15/15
Styrene	<0.5	<0.5	100.0	7/15/15
Toluene	<0.5	<0.5	1000.0	7/15/15
1,1,1-Trichloroethane	<0.5	<0.5	200.0	7/15/15
Tetrachloroethene	<0.5	<0.5	5.0	7/15/15
1,2,4-Trichlorobenzene	<0.5	<0.5	70.0	7/15/15
Trichloroethene	<0.5	<0.5	5.0	7/15/15
1,1,2-Trichloroethane	<0.5	<0.5	5.0	7/15/15
Vinyl chloride	<0.5	<0.5	2.0	7/15/15
Xylenes, Total	<0.5	<0.5	10000.0	7/15/15
Bromodichloromethane	<0.5	<0.5	TTHM*	7/15/15
Bromoform	<0.5	<0.5	TTHM	7/15/15
Chloroform	<0.5	<0.5	TTHM	7/15/15
Dibromochloromethane	<0.5	<0.5	TTHM	7/15/15
Bromobenzene	<0.5	<0.5	NR**	7/15/15
Bromochloromethane	<0.5	<0.5	NR	7/15/15
Bromomethane	<0.5	<0.5	NR	7/15/15
n-Butylbenzene	<0.5	<0.5	NR	7/15/15
sec-Butylbenzene	<0.5	<0.5	NR	7/15/15
tert-Butylbenzene	<0.5	<0.5	NR	7/15/15
Chlorobenzene	<0.5	<0.5	NR	7/15/15
Chloroethane	<0.5	<0.5	NR	7/15/15
Chloromethane	<0.5	<0.5	NR	7/15/15
2-Chlorotoluene	<0.5	<0.5	NR	7/15/15
4-Chlorotoluene	<0.5	<0.5	NR	7/15/15
Dibromomethane	<0.5	<0.5	NR	7/15/15
1,2-Dichlorobenzene	<0.5	<0.5	NR	7/15/15
1,3-Dichlorobenzene	<0.5	<0.5	NR	7/15/15
1,4-Dichlorobenzene	<0.5	<0.5	NR	7/15/15
Dichlorodifluoromethane	<0.5	<0.5	NR	7/15/15
1,1-Dichloroethene	<0.5	<0.5	NR	7/15/15
trans-1,2-Dichloroethene	<0.5	<0.5	NR	7/15/15
1,3-Dichloropropane	<0.5	<0.5	NR	7/15/15
2,2-Dichloropropane	<0.5	<0.5	NR	7/15/15
1,1-Dichloropropene	<0.5	<0.5	NR	7/15/15
1,3-Dichloropropene	<0.5	<0.5	NR	7/15/15
Hexachlorobutadiene	<0.5	<0.5	NR	7/15/15
Isopropylbenzene	<0.5	<0.5	NR	7/15/15
Naphthalene	<0.5	<0.5	NR	7/15/15

* TTHM: Trihalomethanes regulated separately as Disinfection Byproducts

** NR: Not Regulated

Table 1 (cont.)

CONTAMINANT	OAKWOOD'S WATER		OEPA MCL	DATE COLLECTED
	Shafor	Springhouse		
SYNTHETIC ORGANIC CHEMICALS	ug/L	ug/L	ug/L	
Alachlor	<0.2	<0.2	2.0	6/11/14
Atrazine	<0.3	<0.3	3.0	6/11/14
Simazine	<0.4	<0.4	4.0	6/11/14

CONTAMINANT	OAKWOOD'S WATER		OEPA MCL	DATE COLLECTED
	Shafor	Springhouse		
INORGANIC CONTAMINENTS	ug/L	ug/L	ug/L	
Antimony, total	<4.0	<4.0	6.0	7/15/15
Barium, total	0.0996	0.0345	2.0	7/15/15
Beryllium, total	<1.0	<1.0	4.0	7/15/15
Cadmium, total	<1.0	<1.0	5.0	7/15/15
Chromium, total	<10.0	<10.0	100.0	7/15/15
Cyanide, total	<5.0	<5.0	200.0	7/15/15
Fluoride, total	0.223	0.221	4.0	7/15/15
Mercury, total	<0.5	<0.5	2.0	7/15/15
Nickel, total	<20.0	<20.0		7/15/15
Selenium, total	<5.0	<5.0	50.0	7/15/15
Thallium, total	<1.5	<1.5	2.0	7/15/15

CONTAMINANT	OAKWOOD'S WATER		OEPA MCL	DATE COLLECTED
	Wonderly	Ridgeway		
TOTAL TRIHALOMETHANES	ug/L	ug/L	ug/L	
Chloroform	0.50	1.08		7/15/15
Bromoform	1.60	5.07		7/15/15
Bromodichloromethane	1.38	4.05		7/15/15
Dibromochloromethane	2.77	8.17		7/15/15
Total TTHM's	6.250	18.37	80.0	7/15/15

CONTAMINANT	OAKWOOD'S WATER		OEPA MCL	DATE COLLECTED
	Wonderly	Ridgeway		
FIVE HALOACETIC ACIDS	ug/L	ug/L	ug/L	
Dibromoacetic Acid	1.686	2.787		7/15/15
Dichloroacetic Acid	<1.00	<1.00		7/15/15
Monobromoacetic Acid	<1.00	<1.00		7/15/15
Monochloroacetic Acid	<2.00	<2.00		7/15/15
Trichloroacetic Acid	<1.00	<1.00		7/15/15
Total HAA5's	1.686	2.787	60.00	

CONTAMINANT	OAKWOOD'S WATER		OEPA MCL	DATE COLLECTED
	Shafor	Springhouse		
MISCELLANEOUS	Mg/L	mg/L	mg/L	
Nitrate	1.70	1.46	10	7/15/15

CONTAMINANT	OAKWOOD'S WATER		OEPA MCL	DATE COLLECTED
	Shafor	Springhouse		
RADIOLOGICAL	Pci/L	pci/L	pci/L	
Alpha, total	<3	<3	15	6/20/12
Radium-228	<1.0	1.21	5	6/20/12

Oakwood's water plants reduced the hardness level by 63.5% on the average while the sodium content of the water increased by 222% on the average during 2015. Both of these percentages are within normal operating ranges.

III. WELL PUMPAGE REPORT AND CHARTS

The eight production wells produced 520,767,000 gallons of water in 2015, which is an average of 1,427,000 gallons per day. In 2014, the eight production wells produced 468,249,000 gallons of water. This represents an 11.2% increase in raw water produced in 2015. The 2015 maximum day well production was on June 11 at 2,602,000 gallons. It is common that our highest usage occurs during the summer months when many property owners irrigate their lawns. The 2015 minimum day well production was on December 5 at 726,000 gallons. The minimum day production normally occurs in the fall or winter.

Out of the 520,767,000 gallons pumped in 2015, 93,987,000 gallons were used to either backwash filters or regenerate the softening units at 210 Shafor and 120 Springhouse. This represents 18.1% of the total water pumped for the year, an 11.5% increase from 2014. The reason for such a large increase was the check valve on #6 well at Firwood was allowing water to flow back into the well in late 2014 and into 2015. The defective valve was replaced in 2015.

Chart 1 below and Chart 2 on the next page show the 2015 water table draw down compared to 2012, 2013, 2014 and 2015.

CHART 1

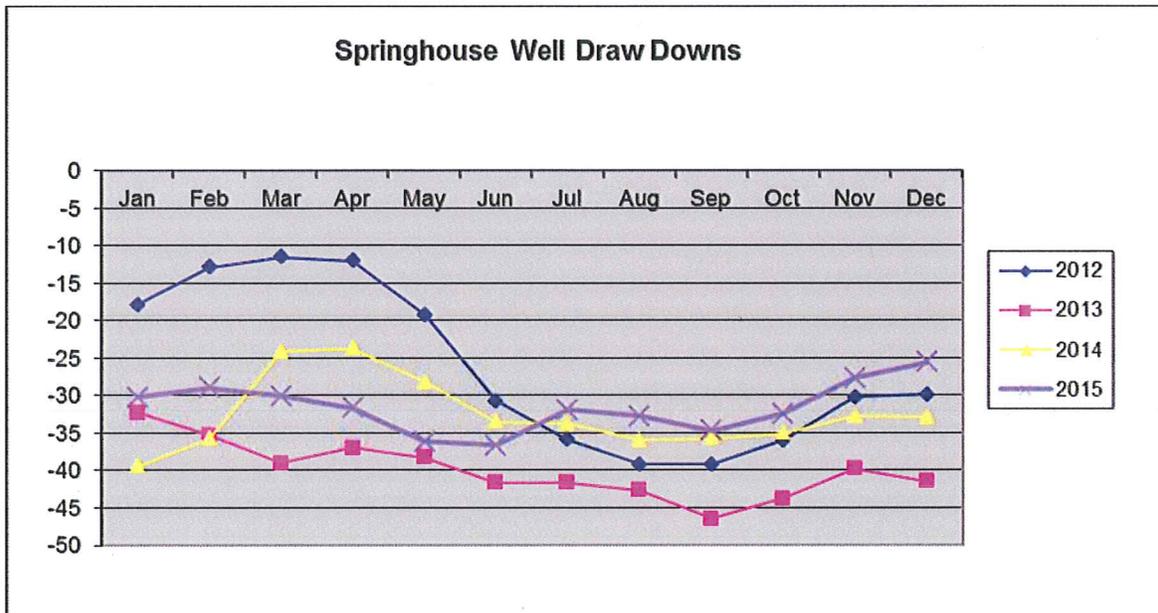
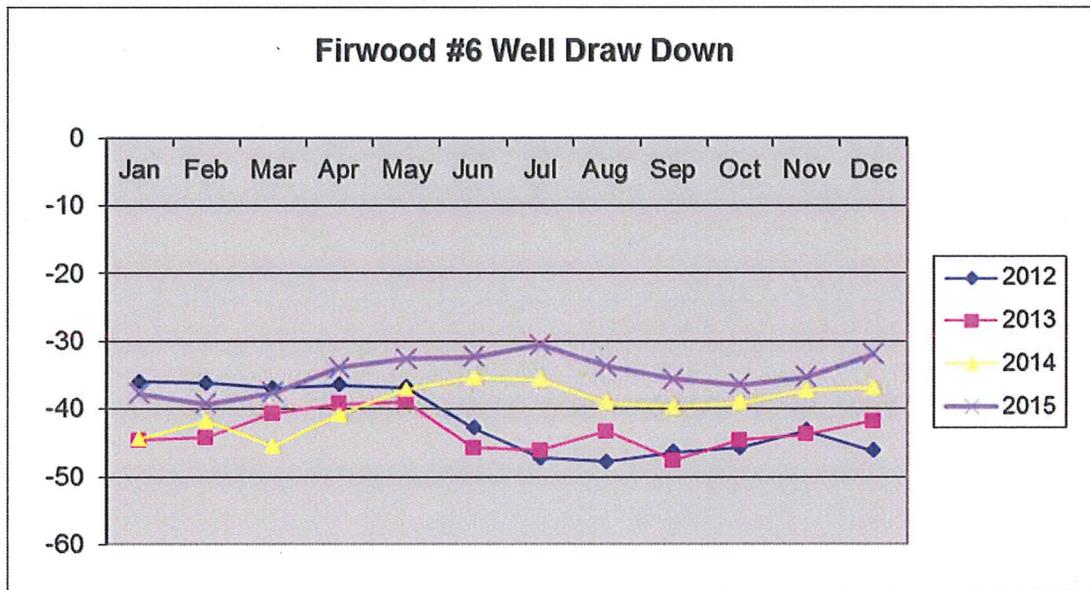


CHART 2



The aquifer water levels in the wells were not as heavily stressed in 2015 like they were in 2014 due to the more even rainfall throughout the summer. The rest of the wells at Firwood (Wells #4, #7 and #8) had similar results to #6 well.

Table 2 on the next page shows a comparison of total production in gallons per well per month for 2014 and 2015.

IV. TOTAL PUMPAGE TO SYSTEM REPORT AND CHARTS

The City was able to produce 100% of its total water demand of 426,781,000 gallons (1,169,000 avg/day). The maximum day system usage was on June 11 at 2,134,000 gallons and the minimum day system usage was on November 26 at 656,000 gallons. No fire events (i.e., extra demand) occurred in 2015 that required city of Dayton or Montgomery County water.

TABLE 2

CITY OF OAKWOOD WATER DEPARTMENT
MONTHLY WELL PUMPAGE RECORD



MONTH	WELL #1		WELL #2		WELL #3		WELL #4		WELL #5		WELL #6		WELL #7		WELL #8		MONTHLY TOTAL		ANNUAL TOTAL	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
JANUARY	16.227	14.539	0.000	0.039	0.820	0.451	0.000	0.000	2.284	12.495	0.000	3.163	1.213	3.213	14.523	8.006	35.067	41.906	35.067	41.906
FEBRUARY	11.662	18.227	0.135	0.000	0.215	0.187	0.000	0.000	11.084	12.368	0.000	0.488	0.239	1.559	8.432	7.471	31.767	40.300	66.834	82.206
MARCH	6.522	20.021	0.043	0.002	0.081	0.117	0.000	0.000	7.617	13.612	6.799	0.438	3.196	2.951	11.631	7.722	35.889	44.863	102.723	127.069
APRIL	14.185	20.250	0.069	0.007	0.386	0.309	0.000	0.000	2.336	12.832	0.040	0.445	4.387	2.593	12.989	7.430	34.392	43.866	137.115	170.935
MAY	18.017	22.672	0.179	0.146	1.347	2.595	0.000	0.000	2.532	13.845	0.750	3.831	4.940	5.106	12.389	8.092	40.154	56.287	177.269	227.222
JUNE	19.842	20.468	0.417	0.500	1.241	1.826	0.000	0.000	3.446	13.149	0.587	3.992	3.788	4.892	11.431	7.232	40.752	52.059	218.021	279.281
JULY	20.827	18.779	0.043	0.376	0.462	0.029	13.621	17.349	1.645	4.050	0.008	0.580	0.285	0.516	5.330	2.078	42.221	43.757	260.242	323.038
AUGUST	21.694	21.463	0.274	1.898	1.278	0.410	17.443	16.341	0.434	2.161	0.100	0.050	0.821	1.706	6.071	3.696	48.115	47.725	308.357	370.763
SEPTEMBER	20.047	21.415	0.137	1.555	1.116	0.211	16.413	15.208	0.250	0.000	0.029	2.752	0.712	0.467	4.817	3.787	43.521	45.395	351.878	416.158
OCTOBER	19.953	20.342	0.027	0.352	0.487	0.136	1.362	14.534	11.294	0.000	0.000	0.922	0.375	0.026	4.844	2.301	38.342	38.613	390.220	454.771
NOVEMBER	18.726	17.044	0.023	0.000	0.505	0.056	0.000	13.759	12.757	0.000	0.038	0.094	0.515	0.000	4.780	1.088	37.344	32.041	427.564	486.812
DECEMBER	20.769	19.217	0.000	0.000	0.318	0.096	0.000	12.854	13.545	0.000	0.001	0.184	0.590	0.000	5.462	1.604	40.685	33.955	468.249	520.767
ANNUAL	208.471	234.437	1.347	4.875	8.256	6.423	48.839	90.045	69.224	84.512	8.352	16.939	21.061	23.029	102.699	60.507	468.249	520.767	468.249	520.767
TOTALS	44.52%	45.02%	0.29%	0.94%	1.76%	1.23%	10.43%	17.29%	14.78%	16.23%	1.78%	3.25%	4.50%	4.42%	21.93%	11.62%	100.00%	100.00%		

AVG. DAY (2014 YTD): 1.283 M.G.D. 2014 Springhouse wells 218.074 MGD 2015 Springhouse wells 245.735 MGD 47.19%
 1.427 M.G.D. Firwood wells 250.175 MGD Firwood wells 275.032 MGD 52.81%

Table 3 below shows a comparison of the water resources needed to meet the City's demands in 2014 and 2015.

TABLE 3

Location	2014 Gallons	2014%	2015 Gallons	2015%
Oakwood WTPs	414,272,000	100%	426,781,000	100%
Dayton/Shroyer	0	0%	0	0%
Dayton/Springhouse	0	0%	0	0%
County/Fairmont	0	0%	0	0%
TOTALS:	414,272,000	100%	426,781,000	100%

There was a increase in demand of 12,509,000 gallons of water in 2015 compared to 2014 (3.0%). Table 4 on the next page shows the comparison in total gallons pumped to the system per month for 2014 and 2015.

V. MAINTENANCE

The following is a summary of the larger maintenance projects that took place in 2015.

- January: Replace pressure reducing valve at Springhouse
Replace motor on well #4
- February: Replace 2" bypass valve at 120 Springhouse
- March: Rebuilt backwash valve at Springhouse
Replace 2" water line at Springhouse
- April: Rebuild chlorine pump at 210 Shafor
Rebuild chlorine pump at 120 Springhouse
Rebuild #2 brine valve at 210 Shafor
- May: Replace cooling line on #2 high service pump at Springhouse
Cleaned salt storage tanks at 120 Springhouse
Replace battery backup system at 210 Shafor
- June: New fan motor for dehumidifier at 210 Shafor
Cleaned well #4
Replace cooling fans on #2 VFD at Springhouse
Rebuilt #3 backwash valve at 120 Springhouse
- July: Installed new pump and motor at well #4
Replace block heater on emergency generator at Springhouse
- August: Cleaned well #6
Replace Cl2 supply line at 210 Shafor
- September: Replaced 6" influent valve on pump #2 at water tower
Rebuilt #4 brine valve at 210 Shafor
OEPA Sanitary Survey
- October: Pressure washed water tower
Replaced mechanical seal on #2 booster pump at water tower
- November: Cleaned well #5
- December: Installed new pump and motor at well #5
Cleaned salt storage tanks at 210 Shafor

All preventive maintenance was performed on schedule and all day-to-day repairs were performed as needed. All parts inventories are up-to-date in case of emergencies.



**CITY OF OAKWOOD WATER DEPARTMENT
MONTHLY PUMPAGE TO SYSTEM RECORD**

TABLE 4

YEAR: 2015
MONTH: December

MONTH	SPRINGHOUSE		FIRWOOD		DAYTON/SHROYER		FAIRMONT		DAYTON/SPRING.		MONTHLY TOTAL		ANNUAL TOTAL	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
JANUARY	16.178	14.099	16.252	19.170	0.000	0.000	0.000	0.000	0.000	0.000	32.430	33.269	32.430	33.269
FEBRUARY	11.302	17.051	17.357	13.464	0.000	0.000	0.000	0.000	0.000	0.000	28.659	30.515	61.089	63.784
MARCH	6.246	18.804	25.147	14.521	0.000	0.000	0.000	0.000	0.000	0.000	31.393	33.325	92.482	97.109
APRIL	13.705	19.415	16.999	13.001	0.000	0.000	0.000	0.000	0.000	0.000	30.704	32.416	123.186	129.525
MAY	18.580	24.316	17.962	18.168	0.000	0.000	0.000	0.000	0.000	0.000	36.542	42.484	159.728	172.009
JUNE	20.383	21.506	16.332	16.260	0.000	0.000	0.000	0.000	0.000	0.000	36.715	37.766	196.443	209.775
JULY	20.205	18.012	17.884	19.216	0.000	0.000	0.000	0.000	0.000	0.000	38.089	37.228	234.532	247.003
AUGUST	22.033	22.480	21.403	20.183	0.000	0.000	0.000	0.000	0.000	0.000	43.436	42.663	277.968	289.666
SEPTEMBER	20.203	21.980	18.916	19.295	0.000	0.000	0.000	0.000	0.000	0.000	39.119	41.275	317.087	330.941
OCTOBER	19.372	19.628	13.798	15.961	0.000	0.000	0.000	0.000	0.000	0.000	33.170	35.589	350.257	366.530
NOVEMBER	18.143	16.071	12.940	13.145	0.000	0.000	0.000	0.000	0.000	0.000	31.083	29.216	381.340	395.746
DECEMBER	19.885	18.142	13.047	12.892	0.000	0.000	0.000	0.000	0.000	0.000	32.932	31.034	414.272	426.781
ANNUAL	206.235	231.504	208.037	195.276	0.000	0.000	0.000	0.000	0.000	0.000	414.272	426.780	414.272	426.781
TOTALS	49.78%	54.24%	50.22%	45.76%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%

2014 Summary	
	M.G.
Oakwood:	414.272
Dayton:	0.000
County:	0.000
TOTAL:	414.272

2014 Avg. per day 1.132 MGD

2015 Summary	
	M.G.
Oakwood:	426.781
Dayton:	0.000
County:	0.000
TOTAL:	426.781

2015 Avg. per day: 1.169 MGD

BUDGET

In 2015, the Oakwood Water Production Unit spent \$539,446.79 toward the production of the City's drinking water. The 2015 budget allocation was \$636,456.65. This computes to an average cost of \$1,035.86 per million gallons treated in 2015, down from \$1,117.48 per million gallons in 2014. The cost per million gallons will fluctuate up or down depending on the total water demand for the year. 2015 had an average water demand higher than 2014 due to a warmer and fairly dry summer. We continually strive to bring down the cost of water by optimizing our treatment process.

The water production unit budget consists of five main categories: personnel, utilities, chemicals, maintenance and miscellaneous. The following charts show what percentage of the budget goes to each of these categories and shows a comparison from the year before.

CHART 3

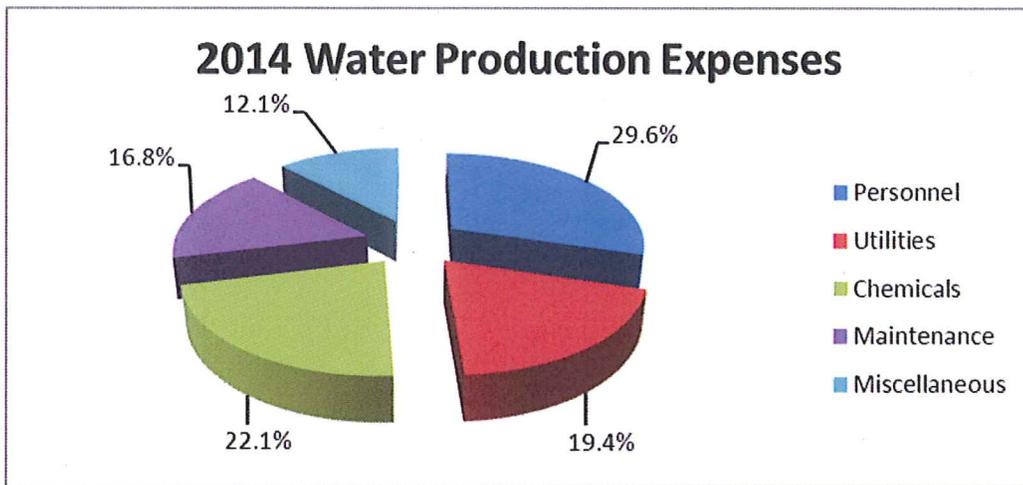
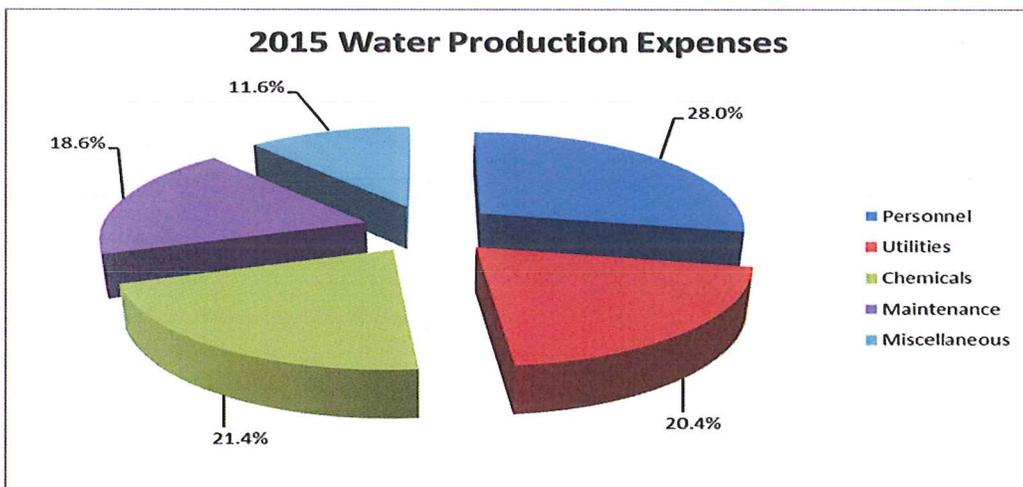


CHART 4



Personnel costs were \$151,045.62 for the year representing a 2.37% decrease from 2014. Utility costs were \$110,215.68 which includes electric and natural gas representing a 8.55 % increase over 2014. Chemical costs were \$115,326.00 representing a 0.43% decrease over 2014. 1,160 tons of salt compared to 1022 tons in 2014 and 3,450 gallons of sodium hypochlorite compared to 3,235 gallons in 2014 were used to treat the water.

Maintenance costs were \$100,561.01 representing a 14.65% increase compared to 2014. More pumps and motors needed repaired or replaced in 2015 than in 2014.

VII. CONCLUSION

In reviewing our water system, 2015 was a very successful year. All monthly and annual reports to the Ohio EPA and Ohio Department of Natural Resources were submitted on time. All lab testing was completed as required.

In 2015 Dale Waltz, Water Plant Technician, retired with over 30 years of faithful work in the water department. His experience and dedication will be missed. Dale was replaced with Derek Shell. Derek comes to us from the City of Germantown with 10 years of experience in the water field. Derek is dual certified having a license in both water and wastewater.

We continually look at ways to optimize our treatment process in order to maintain high water quality at the lowest cost. Some of the things we have accomplished to date are changing out faulty micro-switches, rebuilding process valves, adjusting treatment sequences and monitoring regeneration cycles on the softeners more closely. We have replaced the system controls at 210 Shafor and 120 Springhouse which allows us to better monitor and adjust the treatment process.

There are some new EPA regulations that will affect us in the upcoming years. In 2016 we will review these regulations and start planning on what we will need to do to fully comply with them.

In looking forward to 2016 and beyond, we will continue to seek ways to operate the water plants in the most efficient manner producing the highest quality water possible.

Respectfully submitted,
Gary L. Dursch Sr.
Water Plant Superintendent