COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF NORTHERN KENTUCKY WATER DISTRICT FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY FOR PROPOSED IMPROVEMENTS TO ITS TAYLOR MILL WATER TREATMENT PLANT	)))))	CASE NO. 2011-00128

NOTICE OF FILING OF DOCUMENTS

Notice is hereby given that the attached documents, which Commission Staff obtained as a result of a written request to the Kentucky Division of Water made pursuant to KRS 61.872, have been filed in the record of the above-styled proceeding.

Jeff Derouen
Executive Director
Public Service Commission
211 Sower Boulevard
P.O. Box 615
Frankfort, Kentucky 40602

DATED: August 3, 2011

cc: Parties of Record

DIVISION OF WATER RESPONSE TO COMMISSION STAFF'S
OPEN RECORDS ACT REQUEST
INDEX

Doc Date	DOCUMENT TITLE	Begins	End
05/03/2011	Commission Staff Request for Records	000001	000001
10/20/2010	Northern Kentucky Water District Construction Application	000002	000012
10/20/2010	Kentucky Labor Cabinet – Prevailing Wage Determination	000013	000025
10/25/2010	Kentucky Federally Assisted Drinking Water State Revolving Fund Plans And Specifications Review Checklist	000026	000036
10/26/2010	SRF Plans and Specifications Review	000037	000048
10/29/2010	E-mail Msg to Jason Abbot Re: Receipt of Submittal	000049	000049
11/23/2010	Memorandum of DOW-NKWD Meeting of 11/23/2010	000050	000050
12/09/2010	NKWD's Green Project Reserve Business Case for Drinking SRF	000051	000085
01/18/2011	DOW Approval of Green Project Reserve Business Case	000086	000086
02/18/2011	DOW Approval Letter	000087	000089
Undated	Flocculator – Sedimentation Diagram	000090	000090
Undated	William Wright (DOW) – Technical Review of Project	000091	000093
Undated	TEMPO Master File Information Request Form	000094	000094
Undated	Section 00830 – Prevailing Wage Rates	000095	000096
Undated	Raw Data/MORs – Clarksville, TN	000097	000119

Wuetcher, Jerry (PSC)

From: Wuetcher, Jerry (PSC)
Sent: Tuesday, May 03, 2011 12:14
To: DOWOpenRecords (EEC)
Cc: Roney, Julie (EEC); Lyons, Debbie K (PSC)
Subject: Request for Records

Attachments: DOWApprovalLetter.pdf

To Whom It May Concern:

The Public Service Commission is reviewing the application of Northern Kentucky Water District for a certificate of public convenience and necessity to construct certain improvements to its Taylor Mill Water Treatment Plant. On 18 Feb 2011 the Division of Water issued a letter approving the plans and specifications for these improvements. A copy of the first page of this letter is attached to this message. Pursuant to the Open Records Act, the Commission requests all documents related to this improvement project, except for the project's plans and specifications, that are on file with the Division of Water.

The reference to this project as it appears on the Division of Water approval letter is:

Northern KY Water District
AI# 2485
APE20100018
Taylor Mill WTP Advanced Treatment Improvements
Kenton County, KY

The Public Service Commission would prefer to have the documents in electronic format. If Division of Water requires payment for copying costs, please contact DebbieK.Lyons@ky.gov at 564-3940 x245 to arrange an interaccount transaction.

If you have other questions, please contact me at the address/telephone number below.

Respectfully,

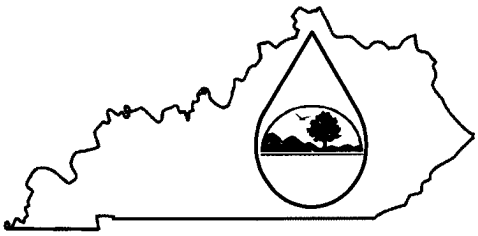
Gerald E. Wuetcher
Executive Advisor
Public Service Commission of Kentucky
(502) 564-3940, Extension 259
(502) 229-6500 (cell)
gerald.wuetcher@ky.gov

DOWApprovalLette
r.pdf (63 KB)

Tracking:

Recipient	Read
DOWOpenRecords (EEC)	
Roney, Julie (EEC)	Read: 5/3/11 17:00
Lyons, Debbie K (PSC)	Read: 5/3/11 12:42

Form DW-2



Commonwealth of Kentucky
Energy and Environment Cabinet
Division of Water

Construction Application
For Drinking Water Treatment

See the instructions for more information about selected portions of this checklist.
Questions on completing this checklist? Contact the Water Infrastructure Branch at 502/564-3410 or visit our website at http://www.water.ky.gov/dw for more information.

[redacted]

Project Name: Taylor Mill Water Treatment Plant Advanced Treatment Improvements

Project County: Kenton Estimated Project Cost: $27,500,000.00

Project Latitude/Longitude (DMS): 39° 2' 4.1712", - 84° 30' 23.817"

11 Digit Hydrologic Unit Code (HUC): -

Is this a federally funded project:

- [X] DWSRF
- [ ] SPAP
- [ ] Other:

If yes, has an Environmental Information Document (EID) been reviewed and approved? Pending

If the project has been submitted to the State Clearinghouse for review, provide the SAI number: KY201009281597

Identify all other funding sources: Bonds

Does this project modify an existing water treatment plant? Yes

Provide a DETAILED description of work to be performed for this project. Attach additional sheets as needed:

Construction of the Taylor Mill Water Treatment Plant Advanced Treatment Improvements Project consisting of Preliminary Treatment/ Granular Activated Carbon (GAC) Building with rapid mix basins, flocculation basins, sedimentation basins, plate settlers, residuals collection system and GAC contactors. Construction of a GAC feed pump station. Relocation of the existing UV system. Installation of an electrical substation and two backup generators. Demolition of existing flocculation basins, sedimentation basins and tunnel structure. General piping demolition, modifications and new piping installation.

Identify how the sanitary wastewater is handled at this site: It will be conveyed by the new pipes and structures to the existing sanitary system. (see sheet C-02-10)

[redacted]

Utility Name: Northern Kentucky Water District PWSID: KY0590220 AI# 2485

Street Address: 2835 Crescent Springs Road County: Kenton

City, State, Zip: Erlanger, KY 41018

Phone: (859) 426-2734 Fax: (859) 578-7893 Email: akramer@nkywater.org

Is the system currently under any type of waterline sanctions or Agreed Orders? No

If yes, will this project satisfy the terms of or alleviate an agreed order, water budget or any other form of sanction? N/A

If yes, describe: N/A

[redacted]

A. Plans and Specifications

Plans and specifications shall comply with **401 KAR 8:100** and **"Recommended Standards for Water Works" (Ten States' Standards)**. All plans must contain a P.E. seal, signature and date of signature with at least one set having an original seal and signature.

Plans and specifications submittals shall meet one of the following options:

☒ At least **two** printed sets of detailed plans **(no larger than 24" X 36") and** a PDF copy of the plans and specifications on CD/DVD. The PDF copy shall contain a PE seal, signature and date. The plans on the CD/DVD shall be in a folder named "Engineering Plans" and the specifications manual shall be in a folder named "Specifications". **(preferred)**

☐ At least **2** printed sets of detailed plans **(one shall be no larger than 24" X 36" and the other set shall be 11" X 17")** and **one** printed copy of the specifications manual.

B. Design Engineer

Name: Jason M. Abbott Firm: Malcolm Pirnie, Inc.

Street Address: 8600 Governors Hill Drive, Suite 210

City, State, Zip: Cincinnati, OH 45249

Phone #: (513) 677-6861 Fax #: (513) 677-8480 Email: jabbott@pirnie.com

C. Design Capacities

Communities Served: Kenton County

Identify the number of connections in the service area: 80,000

Current Treatment Plant Design Capacity: 12 MGD Proposed Treatment Plant Design Capacity: 12 MGD

Has a Preliminary Engineering Report been submitted and approved? N/A

Have Water Withdrawal and KPDES permits been updated? No expantion of plant capacity

KPDES Permit # KYG640000 Water Withdrawal Permit # 0126

What type of treatment is/will be used:

☐ Conventional

☐ Actiflo

☐ Membrane

☐ Dissolved Air Flotation

☒ Other: New preliminary treatment with plate settlers and post filtration granular activated carbon pressure vessels

Is pilot study data provided? No

D. Other Information to be Submitted with Project

1. Site

☒ *Provide a copy of the U.S.G.S. 7 ½ minute topographic map with the location(s) of the proposed project.*

What is the 100 year flood elevation for the project site? 498

What is the 500 year flood elevation or flood of record for the project site? ± 504

2. Intake and Raw Water Transmission (Intake existing; previously permitted)

Provide the Latitude and Longitude (DMS) of the intake and River Mile Index if known:

Latitude: - Longitude: - River Mile Index: -

What is the raw water source? -

☐ *If the source is new, provide 1 year of raw water data.*

Provide water level elevations for surface water sources:

Low Level: -

Normal Level: -

Flood Level: -

For surface water sources, what type of intake will be used?

☐ Floating

☒ Screened

☐ Wet Well

☐ Other: -

Does the intake have the capability to draw from multiple levels? - If yes, explain: -

Is the intake screened? -

Is a method for cleaning provided? - If yes, describe: -

Where is the raw water sample tap located? -

Are any chemicals fed at the intake? - If yes, list: -

Is the intake more than 5 miles downstream or 1,000 ft upstream of any sewage outfall? -

What is the flow rate into the intake? -

If a groundwater source is used:

Number of Wells: N/A Well Capacities: N/A

☐ *Provide water quality and quantity data for test wells.*

Raw Water Pump Data:

Pump 1	6,850	120	350
Pump 2	6,250	126	250
Pump 3	4,900	126	150

Are variable frequency drives (VFD) to be used? Yes

Raw Water Transmission Main Data:

[illegible]	[illegible]	[illegible]
CIP	24"	~5,000

Are any chemicals fed in the raw water transmission main or wet-well? No

If yes, list: _____

3. **Pretreatment**

Pre-settling Basin Volume: N/A Dimensions: N/A

Are any chemicals fed here? N/A List the chemicals fed along with the feed locations: N/A

Is aeration used? N/A If yes, purpose and type: N/A

Are provisions to feed carbon provided? N/A Rate: N/A

4. **Rapid Mix** (New rapid mix in PT/GAC Building)

Type of Rapid Mix:

- ☐ Static Mixer
- ☒ Conventional Rapid Mix
- ☐ Other: _____

Number of Mixing Basins: 2 Volume: 140 ft³ per basin Dimension: 4.5'x4.67'x6.68' per basin

Retention Time: 16 seconds at 12 MGD Velocity Gradient (G): 1,000

5. **Flocculation** (New flocculation in PT/GAC Building)

Number of trains: 1 Number of Stages: 4

Basin Volume: 8,712 ft³ per stage Dimensions: 22'x22'x18'

Detention Time: 31 minutes @ 12 MGD Flow through Rate: 2.85 fpm @ 12 MGD

Mixer Speed (sec): VFD Is the flocculation speed tapered through the process? Yes

6. **Sedimentation** (New sedimentation in PT/GAC Building)

Flow Velocity from Flocculation to Sedimentation: 0.96 ft/sec

Volume: 37,544 ft³ per basin Dimensions: 38'x38'x21' to 26'

Flow Through Velocity: 0.56 fpm Detention Time: 68 minutes

~~Overflow Rate~~ Loading Rate (gpm/ft²): 0.37 gpm/ft² Weir Loading Rate (gpd/ft): 23,438 gpd/ft

Are tube settlers to be used? No Dimensions: N/A

Are Plate Settlers Used? Yes Dimensions: Effective surface area per Basin 12,256 sf

Is overflow rate for plate settlers based on 80% of the projected horizontal plate area? Yes

Is a sludge collection system provided? Yes Describe: circular scraper with pickets to enhance thickening

Is Actiflo used? No

If yes, provide the following:

Number of trains: N/A Capacity: N/A Basin Volumes: N/A

Basin Dimensions: N/A Retention Time: N/A

Number of Hydrocyclones: N/A Hydrocyclone Capacity (GPM): N/A

Number of Recycle Pumps: N/A Recycle Pump Capacity (GPM): N/A

Overflow Rate (GPM/ft^2): N/A Number of Contact Basins: N/A

Contact Basin Volume: N/A Contact Basin Dimensions: N/A

Contact Time: N/A

7. **Filtration** (Filtration existing; previously permitted)

Type of Filtration: - Number of Filters: -

Filter Area: - Total Filter Box Depth: -

-	-	-	-
-	-	-	-
-	-	-	-

Filtration Rate at Design Capacity: -

-	-	-	-
-	-	-	-

Backwash Rate: -

What is the source of the wash water supply? -

Is air scouring or surface wash utilized? - Which? -

Number of Backwash Troughs: - Dimensions: -

Design Flow (gpm): - Distance from media surface to bottom of backwash trough: -

Are rate of flow controllers provided for backwashing? -

Is filter-to-waste capability provided? Yes

Turbidimeter Locations:

- [X] Raw Water
- [ ] Top of Filter
- [ ] Individual Filter Effluent (prior to filter-to-waste)
- [X] Combined Filter Effluent
- [ ] Other:

For membranes, what cleaning agent will be used? N/A

Type of membrane: N/A Capacity: N/A

[ ] *Provide capacity calculations used to size membrane filters.*
(Filter existing; previously permitted)

8. **Clearwell** (Clearwell existing; previously permitted)

-	-	-	-
-	-	-	-
-	-	-	-

If an offsite tank is used as a clearwell, provide location, coordinates and capacity: -

☐ *Provide Contact Time (CT) Calculations.*

9. **High Service Pumps** (HSPs existing; previously permitted)

-	-	-	-
-	-	-	-
-	-	-	-

Are variable frequency drives (VFD) to be used? -

10. **Disinfection**

Check all forms of disinfection to be used:

- ☐ Chlorine Gas
- ☒ Hypochlorite
- ☐ Chloramines
- ☒ UV
- ☐ Other: _____

List the locations of all disinfectant injection points: Hypochlorite at proposed rapid mix, Hypochlorite prior to filter (similar location to existing), Relocated UV post filter and post GAC, Hypochlorite prior to clearwell (similar location to existing).

Chlorine Room Information: (Chlorine existing; previously permitted)

Exhaust Fan Capacity (cfm): - Air Exchange Rate: -

Are air inlet louvers near the ceiling? - Do ventilation fans take suction near the floor? -

Is the chlorine room equipped with panic hardware and alarms? -

Is a bottle of Ammonium Hydroxide provided? -

Does the chlorine room have a shatterproof inspection window? -

Is SCBA equipment meeting NIOSH requirements located outside of the chlorine room? -

Are separate switches for fans and lights provided outside of the chlorine room? -

Is a gas scrubber provided? -

UV Information:

UV Wavelength: 0.18 - 0.55 time weight Dosage (MJ/cm^2): 40

Are the bulbs protected? Yes

Is the UV assembly accessible for cleaning and replacement of the bulbs, jackets, etc? Yes

Is a sensor provided to ensure UV light is being delivered at the appropriate wavelength and dosage? Yes

Ammonia Information:

Exhaust Fan Motor Capacity (cfm): N/A Air Exchange Rate: N/A

Is ammonia room equipped with panic hardware and alarms? N/A

Does the ammonia room have a shatterproof inspection window? N/A

Are separate switches for fans and lights provided outside of the room? N/A

Is a gas scrubber provided? N/A

11. Other Chemicals (Chemicals existing; previously permitted)

Provide information about chemicals to be used in the treatment process below:

-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

Will Carbon be added as a premixed slurry or dry feed? -

If dry feed, what is the hopper capacity? -

Are fireproof/explosion proof precautions provided? - Describe: -

Are floor drains and containment provided? -

-	-
-	-
-	-
-	-
-	-
-	-

12. Treatment Wastewater (Dewatering existing, previously permitted)

Disposal Method for Treatment Wastewater:

- ☐ Lagoons
- ☒ Dewatering
- ☐ Other: _____

How much treatment wastewater does the water treatment plant produce? _____

Lagoon capacity: N/A

13. General

☒ *Provide a process flow schematic.* (See sheet M-00-001)

☒ *Provide a signed letter of acceptance from the utility, which states that the utility has reviewed and approved the plans and specifications.*

☒ *If the project is funded by a State Revolving Fund Loan (SRF) provide a completed SRF Plans and Specifications Checklist along with 1 complete printed copy of the project specifications.*

[redacted]

Check or money order must be made payable to "Kentucky State Treasurer" for the total amount. Fees do not apply to projects FUNDED by a municipality, water district, or other publicly owned utility.

Project Category: Water District Total Amount: $ 0.00

Northern Kentucky
Water District

October 20, 2010

Mr. Shafiq Amawi, P.E.
Manager of Water Infrastructure Branch
Division of Water
200 Fair Oaks Lane, Fourth Floor
Frankfort, KY 40601

Mr. Amawi,

The purpose of this letter is to indicate that the Taylor Mill Treatment Plant Advanced Treatment Improvements project was initiated by the Northern Kentucky Water District and that we have reviewed and approve the plans and specifications and agree to accept maintenance of the project upon completion.

If you have any questions, please feel free to contact me at (859) 426-2734.

Sincerely,

Amy Kramer

Amy Kramer, P.E.
Design Engineering Manager

akk

cc: Jason Abbott, Malcolm Pirnie

059020-10-018

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MALCOLM PIRNIE

INDEPENDENT ENVIRONMENTAL
ENGINEERS, SCIENTISTS
AND CONSULTANTS

Malcolm Pirnie, Inc.
8600 Governors Hill Drive, Suite 210
Cincinnati, OH 45249
T: 513.677.8380 F: 513.677.8480
www.pirnie.com

October 26, 2010

Mr. Shafiq Amawi, P.E.
Manager of Water Infrastructure Branch
Division of Water
200 Fair Oakes Lane, Fourth Floor
Frankfort, KY 40601

Re: Northern Kentucky Water District
Taylor Mill Water Treatment Plant Advanced Treatment Improvements
DWSRF Loan No.: DWL1014
KDOW Construction Application for Drinking Water Treatment

Mr. Amawi,

With the letter we are submitting the KDOW Construction Application for Drinking Water Treatment, for the Northern Kentucky Water District's, Taylor Mill Water Treatment Plant Advanced Treatment Improvements project. This submittal includes the following items:

- KDOW Construction Application For Drinking Water Treatment
- A copy of the U.S.G.S 7.5 minute topographic map showing the location of the proposed project.
- A letter from the Northern Kentucky Water District that states that they have reviewed and approved the plans and specifications.
- One copy of the DWSRF Plans and Specifications Checklist
- One set of original signed, sealed and dated drawings
- One copy of the executed drawings
- One DVD with the executed drawings in PDF format
- One DVD with the specifications in PDF format

If you have any questions please do not hesitate to call me at (513) 677-6861.

Sincerely,

Jason M. Abbott, P.E.
Project Engineer

Cc: Amy Kramer, P.E., NKWD

Printed from U.S.G.S 7.5 x 7.5 Topographic Map "Covington Quadrangle Kentucky-Ohio 7.5-Minute Series (2010)". Map KY_Covington_20100729_TM_geo.pdf from the following web address:

http://store.usgs.gov/b2c_usgs/usgs/maplocator/(xcm=r3standardpitrex_prd&layout=6_1_61_48&uiarea=2&ctype=areaDetails&carea=%24ROOT)/.do

Steven L. Beshear
Governor

Daniel Mongiardo
Lieutenant Governor

KENTUCKY LABOR CABINET
DEPARTMENT OF WORKPLACE STANDARDS
1047 US Highway 127 S - Suite 4
Frankfort, Kentucky 40601
Phone: (502) 564-0977
Fax: (502) 696-1984
www.labor.ky.gov

J. R. Gray
Secretary

Mark S. Brown
Deputy Secretary

Michael L. Dixon
Commissioner

October 20, 2010

JASON ABBOTT
MALCOLM PIRNIE INC
8600 GOVERNORS HILL DR - STE 210
CINCINNATI OH 45249

Re: NORTHERN KY WATER DIST, TAYLOR MILL WATER TREATMENT ADV IMPROV

Advertising Date as Shown on Notification: November 11, 2010

Dear JASON ABBOTT:

This office is in receipt of your written notification on the above project as required by KRS 337.510 (1).

I am enclosing a copy of the current prevailing wage determination number CR 3-015, dated July 9, 2010 for KENTON County. This schedule of wages shall be attached to and made a part of the specifications for the work, printed on the bidding blanks, and made a part of the contract for the construction of the public works between the public authority and the successful bidder or bidders.

The determination number assigned to this project is based upon the advertising date contained in your notification. There may be modifications to this wage determination prior to the advertising date indicated. In addition, if the contract is not awarded within 90 days of this advertising date or if the advertising date is modified, a different set of prevailing rates of wages may be applicable. It will be the responsibility of the public authority to contact this office and verify the correct schedule of the prevailing rates of wages for use on the project. Your project number is as follows: 059-H-00476-10-3, Heavy/Highway

Sincerely,

Michael L. Dixon
Commissioner

KENTUCKY LABOR CABINET
PREVAILING WAGE DETERMINATION
CURRENT REVISION
LOCALITY NO. 15

KENTON COUNTY

PROJECT 059-H-00476-10-3 HEAVY/HIGHWAY

NORTHERN KY WATER DISTRICT
TAYLOR MILL WATER TREATMENT PLANT
ADVANCED TREATMENT IMPROVEMENTS

Determination No. CR-3-015 2010

Date of Determination: July 9, 2010

This schedule of the prevailing rate of wages for Kenton County has been determined in accordance with the provisions of KRS 337.505 to 337.550. This determination shall be referred to as Prevailing Wage Determination No. CR-3-015 2010.

Apprentices shall be permitted to work as such subject to Administrative Regulations adopted by the Commissioner of Workplace Standards. Copies of these regulations will be furnished upon request to any interested person.

Overtime is to be computed at not less than one and one-half (1 1/2) times the indicated BASE RATE for all hours worked in excess of eight (8) per day, and/or in excess of forty (40) per week. However, KRS 337.540 permits an employee and employer to agree, in writing, that the employee will be compensated at a straight time base rate for hours worked in excess of eight (8) hours in any one calendar day, but not more than ten (10) hours worked in any one calendar day, if such written agreement is prior to the over eight (8) hours in a calendar day actually being worked, or where provided for in a collective bargaining agreement. The fringe benefit rate is to be paid for each hour worked at a straight time rate for all hours worked.

Fringe benefit amounts are applicable for all hours worked except when otherwise noted. Welders will receive rate for craft in which welding is incidental.

NOTE: The type of construction shall be determined by applying the following definitions:

BUILDING CONSTRUCTION

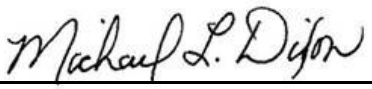
Building construction is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level, as well as incidental grading, utilities and paving.

HIGHWAY CONSTRUCTION

Highway construction includes the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction. It includes all incidental construction in conjunction with the highway construction project.

HEAVY CONSTRUCTION

Heavy projects are those projects that are not properly classified as either "building" or "highway". For example, dredging projects, water and sewer line projects, dams, flood control projects, sewage treatment plants and facilities, and water treatment plants and facilities are considered heavy.



Michael L. Dixon, Commissioner
Department of Workplace Standards
Kentucky Labor Cabinet

Determination No. CR-3-015 2010
July 9, 2010

ASBESTOS/INSULATION WORKERS:

Asbestos/Insulation Workers: (Includes application of all insulating materials, protective coverings, coatings and finishings to al types of mechanical systems):		BASE RATE	$28.03
		FRINGE BENEFITS	12.35
Hazardous Material Handlers: (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging & disposing of all insulation materials, whether they contain asbestos or nor, from mechanical systems):		BASE RATE	$23.60
		FRINGE BENEFITS	9.80

BOILERMAKERS:		BASE RATE	$35.79
		FRINGE BENEFITS	16.71

BRICKLAYERS:

Bricklayers, Caulkers, Cleaners, Pointers & Stone Masons:		BASE RATE	$26.12
		FRINGE BENEFITS	9.73
Refractory:	BUILDING	BASE RATE	$26.62
		FRINGE BENEFITS	9.73
Marble Setters, Terrazzo Workers, & Tile Setters:			
	BUILDING	BASE RATE	$26.39
		FRINGE BENEFITS	9.62
Marble, Terrazzo & Tile Finishers:			
Finishers:	BUILDING	BASE RATE	$21.95
		FRINGE BENEFITS	9.62
Marble Sanders, Polishers, Waxers, & Sawyers:			
	BUILDING	BASE RATE	$22.02
		FRINGE BENEFITS	9.62
Terrazzo Base Grinders (While operating base grinding machine):			
	BUILDING	BASE RATE	$22.37
		FRINGE BENEFITS	9.62

CLASSIFICATIONS		RATE AND FRINGE BENEFITS	
CARPENTERS:			
Carpenters, Piledrivermen, & Lathers:	BUILDING	BASE RATE	$21.47
		FRINGE BENEFITS	10.67
	HEAVY & HIGHWAY	BASE RATE	$27.05
		FRINGE BENEFITS	9.69
Divers:	HEAVY & HIGHWAY	BASE RATE	$40.58
		FRINGE BENEFITS	9.69
CEMENT MASON/CONCRETE FINISHERS:	BUILDING	BASE RATE	$22.50
		FRINGE BENEFITS	10.40
	HEAVY & HIGHWAY	BASE RATE	$25.75
		FRINGE BENEFITS	8.60
ELECTRICIANS:			
Electricians:		BASE RATE	$26.11
		FRINGE BENEFITS	13.72
ELECTRICIAN/LINE CONSTRUCTION:			
Linemen:	BUILDING	BASE RATE	$30.50
		FRINGE BENEFITS	11.15
Equipment Operator:	BUILDING	BASE RATE	$27.45
		FRINGE BENEFITS	10.51
Groundmen:	BUILDING	BASE RATE	$19.83
		FRINGE BENEFITS	8.92
SOUND & COMMUNICATION TECHNICIAN**:**		BASE RATE	$20.45
		FRINGE BENEFITS	6.95
ELEVATOR MECHANICS:		BASE RATE	$37.47
		FRINGE BENEFITS	20.035
GLAZIERS:		BASE RATE	$23.70
		FRINGE BENEFITS	11.40

IRONWORKERS:

Structural & Ornamental:		BASE RATE	$26.17
		FRINGE BENEFITS	16.72
Fence Erector:		BASE RATE	$23.55
		FRINGE BENEFITS	16.72
REINFORCING:			
Beyond 30-mile radius of Hamilton County, OH Courthouse		BASE RATE	$26.45
		FRINGE BENEFITS	16.70
Up to and including 30-mile radius of Hamilton County, OH Courthouse		BASE RATE	$26.20
		FRINGE BENEFITS	16.70

LABORERS/BUILDING:

Building & Common Laborer, Asbestos Removal, Cement Mason Tender, Hand Operated Mechanical Mule, Mechanical Sweeper, Signaler, Flagger & Wrecking Laborer:			
	BUILDING	BASE RATE	$23.15
		FRINGE BENEFITS	7.50
Bottom Man & Pipe Layer:	BUILDING	BASE RATE	23.25
		FRING BENEFITS	7.50
Skid Steer, Burning Torch Operator, Jackhammer, Air Spade, Chipping Hammer, Mechanical & Air Tamper Operator, Mechanical Concrete Buggy, Power Operated Mechanical Mule, Concrete Pump Hose Man, Vibrator Man, CERCLA Trained Hazardous Material Removal – Levels A, B, C:			
	BUILDING	BASE RATE	$23.30
		FRINGE BENEFITS	7.50
Bottom Jackhammer Man:	BUILDING	BASE RATE	$23.35
		FRINGE BENEFITS	7.50
Tunnel Laborer:	BUILDING	BASE RATE	$23.65
		FRINGE BENEFITS	7.50
Gunnite Nozzle Operator:	BUILDING	BASE RATE	$23.90
		FRINGE BENEFITS	7.50

LABORER/BUILDING: Continued

Brick Mason Tender:	BUILDING	BASE RATE	$23.10
		FRINGE BENEFITS	7.50
PLASTERER TENDER:			
Mixer Pump Operator:	BUILDING	BASE RATE	$23.30
		FRINGE BENFITS	7.50
Tender:	BUILDING	BASE RATE	$23.15
		FRINGE BENEFITS	7.50

LABORER/HEAVY HIGHWAY:

GROUP 1:
Asphalt Laborer, Carpenter Tender, Concrete Curing applicator, Dump Man (Batch Truck), Guardrail and Fence Installer, Joint Setter, Laborer (Construction), Landscape Laborer, Mesh Handlers & Placer, Right-of-way Laborer, Riprap Laborer & Grouter, Scaffold Erector, Seal Coating, Surface Treatment or Road Mix Laborer, Sign Installer, Slurry Seal, Utility Man, Bridge Man, Handyman, waterproofing Laborer, Flagperson, Hazardous Waste (Level D), Diver Tender, Zone Person & Traffic Control:

	HEAVY & HIGHWAY	BASE RATE	$25.27
		FRINGE BENEFITS	7.50

GROUP 2:
Skid Steer, Asphalt Raker, Concrete Puddler, Kettle Man (Pipeline), Machine Driven Tools (Gas, Electric, Air), Mason Tender, Brick Paver, Mortar Mixer, Power Buggy or Power Wheelbarrow, Sheeting & Shoring Man, Surface Grinder Man, Plastic Fusing Machine Operator, Pug Mill Operator, & Vacuum Devices (wet or dry), Rodding Machine Operator, Diver, Screwman or Paver, Screed Person, Water Blast, Hand Held Wand, Pumps 4" & Under (Gas, Air or Electric) & Hazardous Waste (Level C), Air Track and Wagon Drill, Bottom Person, Cofferdam (below 25 ft. deep), Concrete Saw Person, Cutting with Burning Torch, Form Setter, Hand Spiker (Railroad), Pipelayer, tunnel Laborer (without air) & Caisson, Underground Person (working in Sewer and Waterline, Cleaning, Repairing & Reconditioning), Sandblaster Nozzle Person, & Hazardous Waste (Level B):

	HEAVY & HIGHWAY	BASE RATE	$25.44
		FRINGE BENEFITS	7.50

GROUP 3:
Blaster, Mucker, Powder Person, Top Lander, Wrencher (Mechanical Joints & Utility Pipeline), Yarner, Hazardous Waste (Level A), Concrete Specialist, Concrete Crew in Tunnels (With Air-pressurized - $1.00 premium), Curb Setter & Cutter, Grade Checker, Utility Pipeline Tapper, Waterline, and Caulker:

	HEAVY & HIGHWAY	BASE RATE	$25.77
		FRINGE BENEFITS	7.50

GROUP 4:
Miner (With Air-pressurized - $1.00 premium), & Gunnite Nozzle Person:

	HEAVY & HIGHWAY	BASE RATE	$26.22
		FRINGE BENEFITS	7.50

Signal Person will receive the rate equal to the rate paid the laborer classification for which he or she is signaling

MILLWRIGHTS:

BASE RATE		$27.55
FRINGE BENEFITS		15.39

OPERATING ENGINEERS/BUILDING:

GROUP 1
Boom & Jib 250' over:

BUILDING	BASE RATE	$30.74
	FRINGE BENEFITS	11.16

GROUP 2
Boom & Jib Over 180' through 249:

BUILDING	BASE RATE	$30.49
	FRINGE BENEFITS	11.16

GROUP 3
Boom & Jib 150' through 180':

BUILDING	BASE RATE	$29.99
	FRINGE BENEFITS	11.16

GROUP 4
Master Mechanic:

BUILDING	BASE RATE	$29.74
	FRINGE BENEFITS	11.16

GROUP 5
Barrier Moving Machine; Boiler or Compressor Mounted on Crane (Piggy-Back Operation); Boom Truck (All Types); Cableway; Cherry Picker; Combination Concrete Mixer & Tower; All Concrete Pumps with Booms; Crane (All Types); Crane-Compact, Track or Rubber Over 4,000 lbs Capacity; Crane-Self Erecting, Stationary, Track or Truck (All Configurations); Derrick (All Types); Dragline; Dredge (Dipper, Clam or Suction) 3 Man Crew; Elevating Grader or Euclid Loader; Floating Equipment; Forklift(rough terrain with winch/hoist) Gradual; Helicopter Operator & Helicopter Winch Operator (Hoisting Builders Materials); Hoe (All Types); Hoist (Two or More Drums); Horizontal Directional Drill; Hydraulic Gantry (Lift System); Laser Finishing Machine; Laser Screed and Like Equipment; Lift Slab or Panel Jack; Locomotive (All Types); Maintenance Engineer (Mechanic and/or Welder); Mixer, Paving (Multiple Drum); Mobile Concrete Pump With Boom; Panelboard (All Types on Site); Pile Driver; Power Shovel; Prentice Loader; Rail Tamper (with Automatic Lifting & Aligning device); Rotary Drill (All) used on Caisson Work for Foundations & Substructure work; Side Boom; Slip Form Paver; Straddle Carrier (Building Construction on Site); Trench Machine (Over 24" Wide); & Tug Boat:

BUILDING	BASE RATE	$29.49
	FRINGE BENEFITS	11.16

GROUP 6
Asphalt Paver; Bobcat-type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Bulldozer; C.M.I. Type Equipment; Endloader; Hydro Milling Machine; Kolman Type Loader (Dirt Loading); Lead Greaseman; Mucking Machine; Pettibone-Rail Equipment; Power Grader; Power Scoop; Power Scraper; Push Cat; Rotomill (All), Grinders & Planers of All Types & Vermeer Type Concrete Saw:

BUILDING	BASE RATE	$29.37
	FRINGE BENEFITS	11.16

OPERATING ENGINEERS/ BUILDING: Continued

GROUP 7
A-Frame; Air Compressor Pressurizing Shafts or Tunnels; Asphalt Roller (All); Bobcat-type and/or Skid Steer Loader with or without Attachments; Boiler (15 lbs. pressure & over); All Concrete Pumps without Booms & with 5" System; Forklift (Except Masonry); Highway Drills-All Types (with Integral Power); Hoist (One Drum); House Elevator (except those automatic call button controlled); Man Lift; Material Hoist/Elevator; Mud Jack; Pressure Grouting; Pump (Installing or Operating Well Points or other Type of Dewatering Systems); Pump (4" and over Discharge); Railroad Tie Inserter/Remover; Rotovator (Lime soil Stabilizer); Submersible Pump (4" and over Discharge); Switch & Tie Tamper (w/o lifting & aligning device); Trench Machine (24" & under); & Utility:

	BUILDING	BASE RATE	$28.33
		FRINGE BENEFITS	11.16

GROUP 8
Ballast Relocator; Backfiller & Tamper; Batch Plant; Bar & Joint Installing Machine; Bull Floats; Burlap & Curing Machines; Clefplanes; Compressor on Building Construction; Concrete Mixer, Capacity more than one bag; Concrete Mixer, one bag capacity (side loader); All Concrete Pumps without Booms with 4" or Smaller System; Concrete Spreading Machine; Conveyor, used for handling building materials; Crusher; Deckhand; Drum Fireman in Asphalt Plant; Farm Type Tractor, Pulling Attachments; Finishing Machines; Form Trencher; Generator; Gunnite Machine; Hydro-Seeder; Pavement Breaker (Hydraulic or Cable); Post Driver; Post Hole Digger; Pressure Pump (over 1/2" discharge); Road Widening Trencher; Roller (except Asphalt); Self-propelled Power Spreader; Self-propelled Sub-Grader; Shotcrete Machine; Tire Repairman; Tractor (Pulling Sheep Foot Roller or Grader); VAC/ALL; Vibratory Compactor (with Integral Power) & Welder:

	BUILDING	BASE RATE	$27.15
		FRINGE BENEFITS	11.16

GROUP 9
Allen Screed Paver(concrete); Boiler (Less than 15 lbs. pressure); Crane-Compact, Track or Rubber under 4,000 lbs.; Directional Drill "Locator"; Inboard & Outboard Motor Boat Launch; Light Plant; Masonry Forklift; Oiler; Power Driven Heater (Oil Fired); Power Scrubber; Power Sweeper; Pump (Under 4" discharge); & Submersible Pump (Under 4" discharge):

	BUILDING	BASE RATE	$21.69
		FRINGE BENEFITS	11.16

OPERATING ENGINEERS/HEAVY HIGHWAY:

Master Mechanic & Boom from 150-180:

	HEAVY & HIGHWAY	BASE RATE	$29.74
		FRINGE BENEFITS	11.16

Boom from 180 and over:	HEAVY & HIGHWAY	BASE RATE	$29.99
		FRINGE BENEFITS	11.16

OPERATING ENGINEERS: HEAVY & HIGHWAY: Continued

GROUP 1
Air Compressor on Steel Erection; Barrier Moving Machine; Boiler Operator on Compressor or Generator when mounted on a Rig; Cableway; Combination Concrete Mixer & Tower; Concrete Plant (over 4 yd. Capacity); Concrete Pump; Crane (All Types, Including Boom Truck, Cherry Picker); Crane-Compact, Track or Rubber over 4,000 lbs. capacity; Cranes-Self Erecting, Stationary, Track or Truck (All Configurations); Derrick; Dragline; Dredge (Dipper, Clam or Suction); Elevating Grader or Euclid Loader; Floating Equipment (All Types); Gradual; Helicopter Crew (Operator-Hoist or Winch); Hoe (all types); Hoisting Engine on Shaft or Tunnel Work; Horizontal Directional Drill (over 500,000 ft. lbs. thrust); Hydraulic Gantry (Lifting System); Industrial-Type Tractor; Jet Engine Dryer (D8 or D9) Diesel Tractor; Locomotive (Standard Gauge); Maintenance Operator Class A; Mixer, Paving (Single or Double Drum); Mucking Machine; Multiple Scraper; Piledriving Machine (All Types); Power Shovel; Prentice Loader; Quad 9 (Double Pusher); Rail Tamper (with auto lifting & aligning device); Refrigerating Machine (Freezer Operation); Rotary Drill, on Caisson work; Rough Terrain Fork Lift with Winch/Hoist; Side-Boom; Slip-Form Paver; Tower Derrick; Tree Shredder; Trench Machine (Over 24" wide); Truck Mounted Concrete Pump; Tug Boat; Tunnel Machine and/or Mining Machine; & Wheel Excavator:

HEAVY & HIGHWAY	BASE RATE	$29.49
	FRINGE BENEFITS	11.16

GROUP 2
Asphalt Paver; Automatic Subgrader Machine, Self-Propelled (CMI Type); Bobcat Type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Boring Machine More than 48"; Bulldozer; Endloader; Hydro Milling Machine; Kolman-type Loader (production type-Dirt); Lead Greaseman; Lighting & Traffic Signal Installation Equipment (includes all groups or classifications); Material Transfer Equipment (Shuttle Buggy) Asphalt; Pettibone-Rail Equipment; Power Grader; Power Scraper; Push Cat; Rotomill (all), Grinders & Planers of All types; Trench Machine (24" wide & under); & Vermeer type Concrete Saw:

HEAVY & HIGHWAY	BASE RATE	$29.37
	FRINGE BENEFITS	11.16

GROUP 3
A-Frame; Air Compressor on Tunnel Work (low pressure); Asphalt Plant Engineer; Bobcat-type and/or Skid Steer Loader with or without Attachments; Highway Drills (all types); Locomotive (narrow gauge); Material Hoist/Elevator; Mixer, Concrete (more than one bag capacity); Mixer, one bag capacity (Side Loader); Power Boiler (Over 15 lbs. Pressure) Pump Operator installing & operating Well Points; Pump (4" & over discharge); Roller, Asphalt; Rotovator (lime soil stabilizer); Switch & Tie Tampers (without lifting & aligning device); Utility Operator (Small equipment); & Welding Machines:

HEAVY & HIGHWAY	BASE RATE	$28.33
	FRINGE BENEFITS	11.16

GROUP 4
Backfiller; Ballast Re-locator; Bars, Joint & Mesh Installing Machine; Batch Plant; Boring Machine Operator (48" or less); Bull Floats; Burlap & Curing Machine; Concrete Plant (capacity 4 yd. & under); Concrete Saw (Multiple); Conveyor (Highway); Crusher; Deckhand; Farm-type Tractor with attachments (highway) except Masonry); Finishing Machine; Fireperson, Floating Equipment (all types); Fork Lift (highway); Form Trencher; Hydro Hammer; Hydro Seeder; Pavement Breaker; Plant Mixer; Post Driver; Post Hole Digger (Power Auger); Power Brush Burner; Power Form Handling Equipment; Road Widening Trencher; Roller (Brick, Grade & Macadam); Self-Propelled Power Spreader; Self-Propelled Power Subgrader; Steam Fireperson; Tractor (Pulling Sheepfoot, Roller or Grader); & Vibratory Compactor with Integral Power:

HEAVY & HIGHWAY	BASE RATE	$27.15
	FRINGE BENEFITS	11.16

OPERATING ENGINEERS: HEAVY & HIGHWAY: Continued

GROUP 5
Compressor (Portable, Sewer, Heavy & Highway); Drum Fireperson (Asphalt); Generator; Inboard-Outboard Motor Boat Launch; Masonry Fork Lift; Oil Heater (asphalt plant); Oiler; Power Driven Heater; Power Sweeper & Scrubber; Pump (under 4" discharge); Signalperson; Tire Repairperson; & VAC/ALLS:

	HEAVY & HIGHWAY	BASE RATE	$21.69
		FRINGE BENEFITS	11.16

PAINTERS/ BUILDING

Brush, Roller, Paper Hanging & Drywall Taping:

	BUILDING	BASE RATE	$23.10
		FRINGE BENEFITS	6.83

Spray:	BUILDING	BASE RATE	$23.60
		FRINGE BENEFITS	6.83

Sandblasting, Waterblasting:	BUILDING	BASE RATE	$23.85
		FRINGE BENEFITS	6.83

Lead Abatement:	BUILDING	BASE RATE	$24.10
		FRINGE BENEFITS	6.83

Sign Painter & Erector:	BUILDING	BASE RATE	$20.23
		FRINGE BENEFITS	3.25

PAINTERS/ HEAVY & HIGHWAY

Bridge/Equipment Tender and/or Containment Builder:

	HEAVY & HIGHWAY	BASE RATE	$20.49
		FRINGE BENEFITS	6.83

Brush & Roller:	HEAVY & HIGHWAY	BASE RATE	$23.10
		FRINGE BENEFITS	6.83

Spray:	HEAVY & HIGHWAY	BASE RATE	$23.60
		FRINGE BENEFITS	6.83

Sandblasting & Water Blasting:	HEAVY & HIGHWAY	BASE RATE	$23.85
		FRINGE BENEFITS	6.83

PAINTERS/ HEAVY & HIGHWAY: Continued

Elevated Tanks; Steeplejack Work; Bridge & Led Abatement:

HEAVY & HIGHWAY	BASE RATE	$24.10
	FRINGE BENEFITS	6.83

PIPEFITTERS & PLUMBERS:

	BASE RATE	$28.39
	FRINGE BENEFITS	14.30

PLASTERERS:

BUILDING	BASE RATE	$22.00
	FRINGE BENEFITS	10.10

ROOFERS (excluding metal roofs):

Roofers:

	BASE RATE	$26.31
	FRINGE BENEFITS	11.07

Pitch:

	BASE RATE	$27.31
	FRINGE BENEFITS	11.07

SHEETMETAL WORKERS (including metal roofs):

	BASE RATE	$27.33
	FRINGE BENEFITS	14.66

SPRINKLER FITTERS:

	BASE RATE	$29.50
	FRINGE BENEFITS	15.85

TRUCK DRIVERS/BUILDING:

3 Tons & Under, Greaser, Tire Changer, & Mechanic Tender:

BUILDING	*BASE RATE	$19.57
	FRINGE BENEFITS	12.17

Over 3 Tons, Semi-Trailer or Pole Trailer, Dump Tandem Axles, Farm Tractor (When used to pull building material & equipment):

BUILDING	*BASE RATE	$19.68
	FRINGE BENEFITS	12.17

Concrete Mixer (Hauling on jobsites), & Truck Mechanic:

BUILDING	*BASE RATE	$19.75
	FRINGE BENEFITS	12.17

TRUCK DRIVERS/BUILDING: Continued

Euclids & Other Heavy Moving Equipment, Lowboy, Winch, A-Frame & Monorail Truck (To transport building materials):	BUILDING	*BASE RATE	$19.85
		FRINGE BENEFITS	12.17

***Work on Hazardous or Toxic Waste Site - $4.00 Premium**

TRUCK DRIVER/HEAVY HIGHWAY:

Driver:	HEAVY & HIGHWAY	BASE RATE	$15.85
		FRINGE BENEFITS	4.60

Euclid Wagon, End Dump, Lowboy, Heavy Duty Equipment, Tractor-Trailer Combination, & Drag:

	HEAVY & HIGHWAY	BASE RATE	$16.29
		FRINGE BENEFITS	4.60

End of Document
CR-3-015 2010
July 9, 2010
Page 12 of 12

KENTUCKY FEDERALLY ASSISTED DRINKING WATER STATE REVOLVING FUND
PLANS AND SPECIFICATIONS REVIEW CHECKLIST

Loan No./Loan Recipient: DWL1014 / Northern Kentucky Water District

Contract I.D./Name: Taylor Mill Water Treatment Plant, Advanced Treatment Improvements

Project No.: 184-457

Design Firm: Malcolm Pirnie, Inc.

The information provided is accurate for the above referenced contract to the best of my knowledge and belief.

Design Engineer: Jason M. Abbott
Signature: Jason M. Abbott
Date: 10/25/10

Please submit four copies of the plans and specifications with other forms at this time to the Division of Water. These plans and specifications must be sealed, signed and dated by a Professional Engineer and the title page must include the DOW loan number. When approved, the Division of Water will submit a copy of the state-stamped plans and specifications to the following:

Loan Recipient
Consultant

NOTE: When the project is advertised, a set of as-bid plans and specifications and a copy of the advertisement must be submitted to the Division of Water immediately.

Questions with (DOW) are to be completed by the Division of Water Engineer.

I have reviewed the information provided by the design engineer, verified the accuracy, and completed the **(DOW)** questions.

(DOW) Review Engineer: William Cwright
Signature: William Cwright
Date: 3/2/11

FEDERALLY ASSISTED DRINKING WATER STATE REVOLVING FUND

PLANS AND SPECIFICATIONS REVIEW

Loan Recipient/No.: Northern Kentucky Water District

Projected Sources of Funds

Source	Amount
KY DWSRF	$ 8,000,000.
Bonds	$27,000,000.

Contract Period, Number of Days 915

Estimated Construction Amount(s)	$27,500,000.
FADWSRF Eligible	$27,500,000.
FADWSRF Non-eligible	$ 7,500.000.

Description of proposed project in terms of type of treatment, flow capacity, and process unit for water treatment plants, length of waterlines, type of pipe, tanks and pump stations.

Construction of the Taylor Mill Water Treatment Plant Advanced Treatment Improvements Project consisting on Preliminary Treatment/Granular Activated Carbon (GAC) Building with rapid mix basins, flocculation basins, sedimentation basins, plate settlers, residuals collection system and GAC contractors. Construction of a GAC feed pump station. Relocation of the existing UV system. Installation of an electrical substation and two backup generators. Demolition of existing flocculation basins, sedimentation basins and tunnel structure. General piping demolition, modifications and new piping installation.

Yes	No	N/A	
Does the eligible portion include:			
☒	☐	☐	Demolition: Is it limited to that required for new construction?
☒	☐	☐	Replacement of existing utilities: Is no "betterment" proposed?
☒	☐	☐	Paving: Is it limited to the trench width and cutbacks?
☒	☐	☐	Standby generators: Has justification been provided?

The following items are considered ineligible for SRF projects. Are any of these included in the specifications:

☐	☒	☐	Bonus payments?
☐	☒	☐	Immediately available hand tools?
☐	☒	☐	Mowers, snow blowers, trimmers?

Yes	No	N/A	
☐	☒	☐	Replacement of facilities previously funded by EPA or SRF, which are still within the useful life unless EPA or SRF has approved abandonment?
☐	☒	☐	Redundant facilities (unless required by state or federal reliability requirements)?
☐	☒	☐	Routine maintenance items (oil, grease, filters, etc.)?
☐	☒	☐	Utility vehicles/golf carts?

List all FADWSRF ineligible items in the project.

None

Yes	No	N/A		
(DOW) ☑	☐	☐		Does DOW review engineer concur with the description of SRF ineligible items?
(DOW) ☑	☐	☐		Are the plans and specifications sealed, signed and dated by a professional engineer?
☒	☐	☐	1.	Are electric motors and components above the 100-year flood elevation?
☒	☐	☐	2.	Are buildings protected from the 100 year flood and usable at the 25 year flood level?

Clearinghouse Comments

Yes	No	N/A		Loan Recipient has:
☐	☐	☒	1.	Obtained Kentucky Department of Transportation encroachment permits?
☒	☐	☐	2.	Obtained determination from Kentucky Department for Labor that state labor laws are applicable, and if applicable, state wage rates and regulations are included in the specifications? Provide letter from Kentucky Labor Cabinet.
☒	☐	☐	3.	If state labor laws apply, do specifications indicate overtime pay is required for work in excess of an 8-hour day?

Yes	No	N/A		
☒	☐	☐	4.	State Wage Rate Number CR 3-015
☐	☒	☐	5.	Obtained a release from the Kentucky Heritage Council and the State Historic Preservation Officer?
☒	☐	☐	6.	If the answer to #5 is no, are all survey report conditions incorporated in the plans and specifications?
☐	☒	☐	7.	Obtained a letter from the Kentucky Nature Preserves Commission indicating there are no species of plant, animal or sensitive natural areas monitored by the Commission in the project area?
☒	☐	☐	8.	If the answer to #7 is no, are all survey report conditions incorporated in the plans and specifications?
☐	☐	☒	9.	If sludge is to be disposed of in a landfill, has the landfill operator provided a letter of intent?
☐	☐	☒	10.	If sludge is to be land-farmed, has Division of Waste Management approved the proposed site? (Note: Submit copy of approval letter.)

GENERAL INFORMATION

Yes	No	N/A		
☒	☐	☐	1.	Are permits to construct required from other Federal or State Agencies? If yes, indicate which Agencies. KDOW – Construction Application for Drinking Water Treatment (Submitted 10/27/2010).
☐	☒	☐	2.	Have the required permits been given? Provide the DOW with copies.
☐	☐	☒	3.	If the project includes work that will cumulatively disturb more than 200 linear feet of a blue line stream as shown on a USGS 7.5-min. topographic map, has an application for 401 certification been submitted to the DOW Water Quality Section?
☐	☐	☒	4.	If the project involves construction within a floodplain, including stream crossings, has an application for the appropriate permits been submitted to the DOW Floodplain Management Section?
☒	☐	☐	5.	If the loan recipient has requested to buy equipment and be exempt from sales tax, are the specifications written to accommodate this?

Yes	No	N/A		
☑	☐	☐	6.	Does this project eliminate any existing water treatment plants? **(DOW)**
☐	☒	☐	7.	If value engineering (VE) was done (whether mandated or elected) are all adopted VE proposals incorporated in the plans and specs?
☐	☐	☒	8.	Have all required easements been obtained?
☐	☒	☐	9.	Has a site certificate been received? (Certificate required before construction starts) **(DOW)**
☐	☐	☒	10.	If this proposed project includes a sludge lagoon system has the DOW Groundwater Section been contacted regarding the need for a groundwater protection plan? Is a plan required? Provide copies of correspondence.
☐	☐	☒	11.	If this project is a result of a DOW enforcement action, have all construction-related activities been addressed in the scope of work for this project? Notify the Division of Enforcement.

ENVIRONMENTAL CONSIDERATIONS

Yes	No	N/A		
☑	☐	☐	1.	**(DOW)** Has an Environmental Impact Statement (EIS) been written on this project? NOTE: Not Environmental Assessment.
☐	☐	☐	2.	**(DOW)** If answer to No. 1 is no, was a CED or FONSI issued?
☐	☐	☐	3.	**(DOW)** If answer to No. 1 is yes, have all recommendations of the EIS been followed?

OTHER

☑	☐	☐	4.	**(DOW)** Have the technical specifications been written to assure the maximum competition?

a. No unjustified experience clause.
b. Use of brand name or equal.

PROPOSAL

YES	NO	N/A		
(DOW)				
☑	☐	☐	1.	Have SRF eligible and ineligible items been separated?
☒	☐	☐	2.	Time of completion 793 days.
☒	☐	☐	3.	If the contract allows for substitution of equipment; has deductible alternates; or has bid alternates, is the method for determining the low bidder clearly indicated?
☒	☐	☐	4.	Has a base bid and any alternatives been specified?
☐	☒	☐	5.	Are there any special conditions on evaluating lump sum contract? Please Specify:_____

SPECIFICATIONS AND CONTRACT DOCUMENTS

***NOTE: (DOW) column in this Section is for the review engineer verification.**

INVITATION TO BID OR ADVERTISEMENT

*(DOW)	Section	Page		
☑	00020	1	1.	Time and place of Bid Opening.
☑	00020	2	2.	Where plans and specs may be obtained.
☑	00020	1	3.	Work to be performed.
☑	00020	2	4.	A statement bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, and the Contract Work Hours Standard Act.
☑	00020	2	5.	A statement that bidders must comply with the President's Executive Order No. 11246 as amended, which prohibits discrimination in employment regarding race, creed, color, sex or national origin.
☑	00020	2	6.	This project will be in compliance with Executive Order 11246 (Equal Employment Opportunity) as amended.
☑	00020	2	7.	A statement that the Contractor/Subcontractor will comply with 41 CFR 60-4, in regard to affirmative action, to insure equal opportunity to females and minorities and will apply the time tables and goal set forth in 41 CFR 60-4.
☑	00020	3	8.	A statement that the bidder will make positive efforts to use small, minority, women owned and disadvantaged businesses.
☑	00020	2	9.	A statement that the contract is being funded in part with a KIA FADWSRF loan.

☑	00020	3	10. A statement that the award will be made to the lowest, responsive, responsible bidder.
And	00100	7 (19.8)	

INSTRUCTIONS TO BIDDERS, GENERAL AND SPECIAL CONDITIONS

*(DOW)	Section	Page	
☑	00100	3	1. Bid Bond Requirements (≥5% for Contracts over $100,000).
☑	00100	7	2. 100% Performance Bond and 100% Payment Bond for contracts over $100,000. Single Payment and Performance Bonds may be used for contracts under $100,000. Performance Bond must be valid for one year beyond ate of acceptance of the completed project.
☑	00100	7	3. Method of Award (to the low responsive, responsible bidder unless all bids are rejected). Refer to 40 CFR 31.36(d). All bids shall not be rejected without proper justification.
☑	00100	6 & 7	4. Basis for determining responsiveness and responsibility of low bidder.
☑	00500	2	5. Contract Time _915_ days.
☑	00500	2	6. Liquidated Damages _1.500._ dollars per day.
☑	00100	4	7. Criteria that are used to evaluate proposed "equal" products.
☑	00800	8	8. Workmen's Compensation Insurance.
☑	00800	8	9. Public Liability Insurance
☑	00800	10	10. Fire and extended coverage insurance (Builders Risk).
☑	00800	3	11. Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees that receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
☑	00800	17 & 18	12. Compliance with OSHA (P.L. 91-596) and the Contract Work Hours and Safety Standards Act (P.L. 91-54).
☑	00800	24	13. A statement that change orders to the construction contract must comply with DOW Procurement Guidance for Construction and Equipment Contracts.
☑	00800	24	14. Does the contract require cost, pricing, and certification for change orders exceeding $100,000 as required by DOW Procurement Guidance for Construction and Equipment Contracts?
☑	00710	14	15. Does the contract require that the contractor provide project construction and payment schedules?

SUPPLEMENTAL GENERAL CONDITIONS

Have the Supplemental General Conditions (2010) been included in the specifications? YES.
If not, has the required wording/information from the referenced attachments been included:

*(DOW)	Section	Page	
☑	00810	3	1. Attachment No. 1 Special Provisions
☐		4	2. Attachment No. 2 Requirements for Subagreements awarded by Prime Contractor
☑		5-11 ~~367~~	3. Attachment No. 3A Federal Procurement Code
☑		12-16	4. Attachment No. 3B State Procurement Code
☑		17-24	5. Attachment No. 4 through 8 EEO Documents
☑		25,26	6. Attachment No. 9 Labor Provisions
☑		30-41	7. Attachment No. 12 Debarment, Suspension and Other Responsibilities Certification
☑		29	8. Attachment No. 11 Anti-Lobbying Certification
☑		30-41	9. Attachment No. 12 & 13 Disadvantaged Business Enterprise Requirements and Rates
☑		43	10. Attachment No. 14 Bonds and Insurance
☑		44	11. Attachment No. 15 Outlay Management
☑		47	12. Attachment No. 16 Notice of Intent for Storm Water Permit
☑		56	13. Attachment No. 17 Wage Rates

DOW Engineer, copy Pages 10, 11 and 12 and give to SRF & SPAP Section Project Administrator)

AREAS OF WORK – DISADVANTAGED BUSINESS ENTERPRISE

Loan No./Loan Recipient: F09-02 / Northern Kentucky Water District

Project Name: Taylor Mill Water Treatment Plant Advanced Treatment Improvements

Contact Person: Amy Kramer

Address: 2835 Crescent Springs, Road
Erlanger, KY 41018-0640

Phone No: (859) 426-2734

Consultant: Malcolm Pirnie, Inc.
Contact Person: Jason Abbott

Address: 8600 Governor's Hill Drive., Suite 210

Cincinnati, OH 45249-1388

Phone No.: (513) 677-6861

Contract No./Type: WX21117208

Estimated Bid Date: December 10, 2010

This contract will include the following work:

General Construction	Check if Included	Estimated Cost
Backhoe	☒	$ 200,000.
Concrete Construction	☒	$ 2,000,000.
Concrete Finishers	☒	$ 600,000.
Demolition	☒	$ 205,000.
Excavating	☒	$ 157,000.
General Construction	☒	$ 3,000,000.
Material Haulers	☒	$ 500,000.
Seeding	☒	$ 25,000.
Sodding	☐	
Surveyors	☒	$ 15,000.
Pipe Layers	☒	$ 1,000,000.

Building Construction	Check if Included	Estimated Cost
Drywall	☒	$ 20,000.
Electrical Contractors	☒	$ 5,000,000.
Flooring	☒	$ 50,000.
HVAC	☒	$ 500,000.
Insulation	☒	$ 20,000.
Landscaping	☒	$ 50,000.
Masonry	☒	$ 1,250,000.
Painting Contractors	☒	$ 200,000.
Plaster	☐	
Plumbing	☒	$ 300,000.
Roofing	☒	$ 950,000.
Sandblasting	☐	
Sprinkler System Installation	☐	
Wiring	☒	$ 200,000.
Roadway Construction		
Asphalt Removal	☐	
Guardrail Work	☐	
Roadway and Right-of-Way Work	☐	
Water Line Construction		
Pipe Fabrication	☐	
PVC or D.I. Pipe Supplier	☒	$ 2,000,000.
Water Line Work	☒	$ 1,500,000.
Water Valve Supplier	☒	$ 1,000,000.
Fire Hydrant Supplier	☐	
Specialized Construction		
Asbestos Removal	☐	
Installation of Alarm Systems	☐	
Safety Equipment Installation	☐	
Steel Erecting and Tiering	☐	
Installation of Telemetry	☐	
Supplier		
Construction Equipment Sales	☐	
Glass Suppliers and Glazing	☒	$ 20,000.
Industrial Chemical Suppliers	☐	
Industrial Equipment Suppliers	☒	$ 8,000,000.
Manufacturer - canopies, aluminum windows, and aluminum handrail	☒	$ 500,000.
Plumbing Suppliers	☒	$ 200,000
Sheet Metal Manufacturer	☐	
Steel Fabrication	☐	

Supplier (Continued)	Check if Included	Estimated Cost
Steel Supplier	☐	
Trucking	☒	$ 100,000.
Water Treatment Chemicals and Equipment	☒	$ 50,000.
Window Replacements	☐	

1. Given the nature of the scope of work of this contract, is a DBE participation of 3 and 5 percent achievable?
   ☒ Yes ☐ No

DOW will send this checklist to the following agencies:

KPAP
Community Development Office
Cabinet for Economic Development
Capital Plaza Tower
Frankfort, Kentucky 40601

Office for Civil Rights & Small Business Development
Department of Transportation
200 Mero Street
Frankfort, Kentucky. 40622

* Minority Economic Development Initiative
Hopkinsville-Christian County Economic Development Council
2800 Fort Campbell Boulevard
Hopkinsville, Kentucky 42240
Attn: Director

*For Projects West of Elizabethtown

MALCOLM PIRNIE

INDEPENDENT ENVIRONMENTAL
ENGINEERS, SCIENTISTS
AND CONSULTANTS

Malcolm Pirnie, Inc.
8600 Governors Hill Drive, Suite 210
Cincinnati, OH 45249
T: 513.677.8380 F: 513.677.8480

www.pirnie.com

October 26, 2010

Mr. Shafiq Amawi, P.E.
Manager of Water Infrastructure Branch
Division of Water
200 Fair Oakes Lane, Fourth Floor
Frankfort, KY 40601

Re: Northern Kentucky Water District
Taylor Mill Water Treatment Plant Advanced Treatment Improvements
DWSRF Loan No.: DWL1014
DWSRF Plans & Specifications Review

Mr. Amawi,

With the letter we are submitting the DWSRF Plans & Specifications Review Checklist and associated plans and specifications, for the Northern Kentucky Water District's, Taylor Mill Water Treatment Plant Advanced Treatment Improvements project. This submittal includes the following items:

- Kentucky Federal Assisted Drinking Water State Revolving Fund Plans and Specifications Review Checklist
- Four copies of the executed drawings
- Four copies of the executed specifications

If you have any questions please do not hesitate to call me at (513) 677-6861.

Sincerely,

Jason M. Abbott, P.E.
Project Engineer

Cc: Amy Kramer, P.E., NKWD

0590220-10-018

RECEIVED
OCT 27 2010
WIB

2485APE20100018

KENTUCKY FEDERALLY ASSISTED DRINKING WATER STATE REVOLVING FUND
PLANS AND SPECIFICATIONS REVIEW CHECKLIST

Loan No./Loan Recipient: DWL1014 / Northern Kentucky Water District

Contract I.D./Name: Taylor Mill Water Treatment Plant, Advanced Treatment Improvements

Project No.: 184-457

Design Firm: Malcolm Pirnie, Inc.

The information provided is accurate for the above referenced contract to the best of my knowledge and belief.

Design Engineer: Jason M. Abbott
Signature: Jason M. Abbott
Date: 10/25/10

Please submit four copies of the plans and specifications with other forms at this time to the Division of Water. These plans and specifications must be sealed, signed and dated by a Professional Engineer and the title page must include the DOW loan number. When approved, the Division of Water will submit a copy of the state-stamped plans and specifications to the following:

Loan Recipient
Consultant

NOTE: When the project is advertised, a set of as-bid plans and specifications and a copy of the advertisement must be submitted to the Division of Water immediately.

Questions with (DOW) are to be completed by the Division of Water Engineer.

I have reviewed the information provided by the design engineer, verified the accuracy, and completed the **(DOW)** questions.

(DOW) Review Engineer _____
Signature _____
Date _____

FEDERALLY ASSISTED DRINKING WATER STATE REVOLVING FUND

PLANS AND SPECIFICATIONS REVIEW

Loan Recipient/No.: Northern Kentucky Water District

Projected Sources of Funds

Source	Amount
KY DWSRF	$ 8,000,000.
Bonds	$27,000,000.

Contract Period, Number of Days 915

Estimated Construction Amount(s)	$27,500,000.
FADWSRF Eligible	$27,500,000.
FADWSRF Non-eligible	$ 7,500.000.

Description of proposed project in terms of type of treatment, flow capacity, and process unit for water treatment plants, length of waterlines, type of pipe, tanks and pump stations.

Construction of the Taylor Mill Water Treatment Plant Advanced Treatment Improvements Project consisting on Preliminary Treatment/Granular Activated Carbon (GAC) Building with rapid mix basins, flocculation basins, sedimentation basins, plate settlers, residuals collection system and GAC contractors. Construction of a GAC feed pump station. Relocation of the existing UV system. Installation of an electrical substation and two backup generators. Demolition of existing flocculation basins, sedimentation basins and tunnel structure. General piping demolition, modifications and new piping installation.

Yes	No	N/A	

Does the eligible portion include:

☒	☐	☐	Demolition: Is it limited to that required for new construction?
☒	☐	☐	Replacement of existing utilities: Is no "betterment" proposed?
☒	☐	☐	Paving: Is it limited to the trench width and cutbacks?
☒	☐	☐	Standby generators: Has justification been provided?

The following items are considered ineligible for SRF projects. Are any of these included in the specifications:

☐	☒	☐	Bonus payments?
☐	☒	☐	Immediately available hand tools?
☐	☒	☐	Mowers, snow blowers, trimmers?

Yes	No	N/A	
☐	☒	☐	Replacement of facilities previously funded by EPA or SRF, which are still within the useful life unless EPA or SRF has approved abandonment?
☐	☒	☐	Redundant facilities (unless required by state or federal reliability requirements)?
☐	☒	☐	Routine maintenance items (oil, grease, filters, etc.)?
☐	☒	☐	Utility vehicles/golf carts?

List all FADWSRF ineligible items in the project.

None

Yes	No	N/A		
(DOW)				
☐	☐	☐		Does DOW review engineer concur with the description of SRF ineligible items?
(DOW)				
☐	☐	☐		Are the plans and specifications sealed, signed and dated by a professional engineer?
☒	☐	☐	1.	Are electric motors and components above the 100-year flood elevation?
☒	☐	☐	2.	Are buildings protected from the 100 year flood and usable at the 25 year flood level?

Clearinghouse Comments

Yes	No	N/A		Loan Recipient has:
☐	☐	☒	1.	Obtained Kentucky Department of Transportation encroachment permits?
☒	☐	☐	2.	Obtained determination from Kentucky Department for Labor that state labor laws are applicable, and if applicable, state wage rates and regulations are included in the specifications? Provide letter from Kentucky Labor Cabinet.
☒	☐	☐	3.	If state labor laws apply, do specifications indicate overtime pay is required for work in excess of an 8-hour day?

Yes	No	N/A		
☒	☐	☐	4.	State Wage Rate Number CR 3-015
☐	☒	☐	5.	Obtained a release from the Kentucky Heritage Council and the State Historic Preservation Officer?
☒	☐	☐	6.	If the answer to #5 is no, are all survey report conditions incorporated in the plans and specifications?
☐	☒	☐	7.	Obtained a letter from the Kentucky Nature Preserves Commission indicating there are no species of plant, animal or sensitive natural areas monitored by the Commission in the project area?
☒	☐	☐	8.	If the answer to #7 is no, are all survey report conditions incorporated in the plans and specifications?
☐	☐	☒	9.	If sludge is to be disposed of in a landfill, has the landfill operator provided a letter of intent?
☐	☐	☒	10.	If sludge is to be land-farmed, has Division of Waste Management approved the proposed site? (Note: Submit copy of approval letter.)

GENERAL INFORMATION

Yes	No	N/A		
☒	☐	☐	1.	Are permits to construct required from other Federal or State Agencies? If yes, indicate which Agencies. KDOW – Construction Application for Drinking Water Treatment (Submitted 10/27/2010).
☐	☒	☐	2.	Have the required permits been given? Provide the DOW with copies.
☐	☐	☒	3.	If the project includes work that will cumulatively disturb more than 200 linear feet of a blue line stream as shown on a USGS 7.5-min. topographic map, has an application for 401 certification been submitted to the DOW Water Quality Section?
☐	☐	☒	4.	If the project involves construction within a floodplain, including stream crossings, has an application for the appropriate permits been submitted to the DOW Floodplain Management Section?
☒	☐	☐	5.	If the loan recipient has requested to buy equipment and be exempt from sales tax, are the specifications written to accommodate this?

Yes	No	N/A		
☐	☐	☐	6.	Does this project eliminate any existing water treatment plants? **(DOW)**
☐	☒	☐	7.	If value engineering (VE) was done (whether mandated or elected) are all adopted VE proposals incorporated in the plans and specs?
☐	☐	☒	8.	Have all required easements been obtained?
☐	☒	☐	9.	Has a site certificate been received? (Certificate required before construction starts) **(DOW)**
☐	☐	☒	10.	If this proposed project includes a sludge lagoon system has the DOW Groundwater Section been contacted regarding the need for a groundwater protection plan? Is a plan required? Provide copies of correspondence.
☐	☐	☒	11.	If this project is a result of a DOW enforcement action, have all construction-related activities been addressed in the scope of work for this project? Notify the Division of Enforcement.

ENVIRONMENTAL CONSIDERATIONS

Yes	No	N/A		
☐	☐	☐	1.	Has an Environmental Impact Statement (EIS) been written on this project? NOTE: Not Environmental Assessment. **(DOW)**
☐	☐	☐	2.	If answer to No. 1 is no, was a CED or FONSI issued? **(DOW)**
☐	☐	☐	3.	If answer to No. 1 is yes, have all recommendations of the EIS been followed? **(DOW)**

OTHER

☐	☐	☐	4.	Have the technical specifications been written to assure the maximum competition?

a. No unjustified experience clause.
b. Use of brand name or equal.

PROPOSAL

YES	NO	N/A		
(DOW)				
☐	☐	☐	1.	Have SRF eligible and ineligible items been separated?
☒	☐	☐	2.	Time of completion 793 days.
☒	☐	☐	3.	If the contract allows for substitution of equipment; has deductible alternates; or has bid alternates, is the method for determining the low bidder clearly indicated?
☒	☐	☐	4.	Has a base bid and any alternatives been specified?
☐	☒	☐	5.	Are there any special conditions on evaluating lump sum contract? Please Specify:_____

SPECIFICATIONS AND CONTRACT DOCUMENTS

***NOTE: (DOW) column in this Section is for the review engineer verification.**

INVITATION TO BID OR ADVERTISEMENT

*(DOW)	Section	Page		
☐	00020	1	1.	Time and place of Bid Opening.
☐	00020	2	2.	Where plans and specs may be obtained.
☐	00020	1	3.	Work to be performed.
☐	00020	2	4.	A statement bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, and the Contract Work Hours Standard Act.
☐	00020	2	5.	A statement that bidders must comply with the President's Executive Order No. 11246 as amended, which prohibits discrimination in employment regarding race, creed, color, sex or national origin.
☐	00020	2	6.	This project will be in compliance with Executive Order 11246 (Equal Employment Opportunity) as amended.
☐	00020	2	7.	A statement that the Contractor/Subcontractor will comply with 41 CFR 60-4, in regard to affirmative action, to insure equal opportunity to females and minorities and will apply the time tables and goal set forth in 41 CFR 60-4.
☐	00020	3	8.	A statement that the bidder will make positive efforts to use small, minority, women owned and disadvantaged businesses.
☐	00020	2	9.	A statement that the contract is being funded in part with a KIA FADWSRF loan.

☐	00020	3	10.	A statement that the award will be made to the lowest, responsive, responsible bidder.
And	00100	7 (19.8)		

INSTRUCTIONS TO BIDDERS, GENERAL AND SPECIAL CONDITIONS

*(DOW)	Section	Page		
☐	00100	3	1.	Bid Bond Requirements (≥5% for Contracts over $100,000).
☐	00100	7	2.	100% Performance Bond and 100% Payment Bond for contracts over $100,000. Single Payment and Performance Bonds may be used for contracts under $100,000. Performance Bond must be valid for one year beyond ate of acceptance of the completed project.
☐	00100	7	3.	Method of Award (to the low responsive, responsible bidder unless all bids are rejected). Refer to 40 CFR 31.36(d). All bids shall not be rejected without proper justification.
☐	00100	6 & 7	4.	Basis for determining responsiveness and responsibility of low bidder.
☐	00500	2	5.	Contract Time 915 days.
☐	00500	2	6.	Liquidated Damages 1.500. dollars per day.
☐	00100	4	7.	Criteria that are used to evaluate proposed "equal" products.
☐	00800	8	8.	Workmen's Compensation Insurance.
☐	00800	8	9.	Public Liability Insurance
☐	00800	10	10.	Fire and extended coverage insurance (Builders Risk).
☐	00800	3	11.	Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees that receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
☐	00800	17 & 18	12.	Compliance with OSHA (P.L. 91-596) and the Contract Work Hours and Safety Standards Act (P.L. 91-54).
☐	00800	24	13.	A statement that change orders to the construction contract must comply with DOW Procurement Guidance for Construction and Equipment Contracts.
☐	00800	24	14.	Does the contract require cost, pricing, and certification for change orders exceeding $100,000 as required by DOW Procurement Guidance for Construction and Equipment Contracts?
☐	00710	14	15.	Does the contract require that the contractor provide project construction and payment schedules?

SUPPLEMENTAL GENERAL CONDITIONS

Have the Supplemental General Conditions (2010) been included in the specifications? __YES___.
If not, has the required wording/information from the referenced attachments been included:

*(DOW)	Section	Page	
☐	_____	_____	1. Attachment No. 1 Special Provisions
☐	_____	_____	2. Attachment No. 2 Requirements for Subagreements awarded by Prime Contractor
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☐	_____	_____	11. Attachment No. 15 Outlay Management
☐	_____	_____	12. Attachment No. 16 Notice of Intent for Storm Water Permit
☐	_____	_____	13. Attachment No. 17 Wage Rates

DOW Engineer, copy Pages 10, 11 and 12 and give to SRF & SPAP Section Project Administrator)

AREAS OF WORK – DISADVANTAGED BUSINESS ENTERPRISE

Loan No./Loan Recipient: F09-02 / Northern Kentucky Water District

Project Name: Taylor Mill Water Treatment Plant Advanced Treatment Improvements

Contact Person: Amy Kramer

Address: 2835 Crescent Springs, Road
Erlanger, KY 41018-0640

Phone No: (859) 426-2734

Consultant: Malcolm Pirnie, Inc.
Contact Person: Jason Abbott

Address: 8600 Governor's Hill Drive., Suite 210

Cincinnati, OH 45249-1388

Phone No.: (513) 677-6861

Contract No./Type: WX21117208

Estimated Bid Date: December 10, 2010

This contract will include the following work:

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General Construction	☒	$ 3,000,000.
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Sodding	☐	
Surveyors	☒	$ 15,000.
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Plaster	☐	
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Roofing	☒	$ 950,000.
Sandblasting	☐	
Sprinkler System Installation	☐	
Wiring	☒	$ 200,000.
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Asphalt Removal	☐	
Guardrail Work	☐	
Roadway and Right-of-Way Work	☐	
Water Line Construction		
Pipe Fabrication	☐	
PVC or D.I. Pipe Supplier	☒	$ 2,000,000.
Water Line Work	☒	$ 1,500,000.
Water Valve Supplier	☒	$ 1,000,000.
Fire Hydrant Supplier	☐	
Specialized Construction		
Asbestos Removal	☐	
Installation of Alarm Systems	☐	
Safety Equipment Installation	☐	
Steel Erecting and Tiering	☐	
Installation of Telemetry	☐	
Supplier		
Construction Equipment Sales	☐	
Glass Suppliers and Glazing	☒	$ 20,000.
Industrial Chemical Suppliers	☐	
Industrial Equipment Suppliers	☒	$ 8,000,000.
Manufacturer - canopies, aluminum windows, and aluminum handrail	☒	$ 500,000.
Plumbing Suppliers	☒	$ 200,000
Sheet Metal Manufacturer	☐	
Steel Fabrication	☐	

Supplier (Continued)	Check if Included	Estimated Cost
Steel Supplier	☐	
Trucking	☒	$ 100,000.
Water Treatment Chemicals and Equipment	☒	$ 50,000.
Window Replacements	☐	

1. Given the nature of the scope of work of this contract, is a DBE participation of 3 and 5 percent achievable?
   ☒ Yes ☐ No

DOW will send this checklist to the following agencies:

KPAP
Community Development Office
Cabinet for Economic Development
Capital Plaza Tower
Frankfort, Kentucky 40601

Office for Civil Rights & Small Business Development
Department of Transportation
200 Mero Street
Frankfort, Kentucky. 40622

* Minority Economic Development Initiative
Hopkinsville-Christian County Economic Development Council
2800 Fort Campbell Boulevard
Hopkinsville, Kentucky 42240
Attn: Director

*For Projects West of Elizabethtown

Good Afternoon Jason,

We received your submittal for the Taylor Mill WTP Advanced Treatment Improvements on 10-27-2010. It has been assigned to William Wright at extension 4829. If you have any questions please call or email us anytime.

Thank you and have a nice weekend.
Lissa

Lissa Doss
KY Division of Water
Water Infrastructure Branch
Engineering Section
(502)-564-8158 ext. 4801
Fax (502)-564-0111

From: Wright, William (EEC)
Sent: Tuesday, November 23, 2010 3:11 PM
To: Dharman, Solitha (EEC); Roney, Julie (EEC)
Subject: Taylor Mill WTP Meeting (Follow Up)

During the meeting to discuss the issues related to the review of the Taylor Mill WTP the following results were obtained in reference to the items outlined below:

- Demonstrate how the Velocity Gradient was determined

  The velocity gradient is given by the manufacturer of the flocculation basin mixers.

- Demonstrate how the use of only 1 flocculation train will be effective

  A demonstration of the flow pattern was given to show that symmetry about the center point of the 4 basins will be maintained regardless to which basin is taken out of serice.

- Demonstrate how the use of Sluice Gates will not negatively effect the velocity gradient

  The consultant will provide data from existing treatment systems that used this design effectively to show that the use of the gates has not effected the velocity gradient nor caused an interruption in the

  Development of the folcs. They will also consider the use of larger gates.

- Demonstrate how having a Flocculation Velocity flow through time greater than 1.5 fpm will not affect the treatment process.

  A higher flow through velocity is something that is characteristic of the proposed design. The data provided by the consultant from existing treatment facilities should also demonstrate how this has not affected the quality of treatment.

Please feel free to contact me with any related questions. Thank you.

William

Northern Kentucky Water District

December 9, 2010

Ms. Amanda Yeary
Water Infrastructure Branch
Division of Water
200 Fair Oaks Lane
Frankfort, KY 40601

Dear Ms. Yeary:

Please find enclosed Green Project Reserve Business Case for Drinking Water SRF project WX: 21227208 for the Advanced Treatment Project. If you have any questions or require additional information, please contact me at (859) 426-2734 if you have any questions.

Sincerely,

Amy Kramer, P.E.
Design Engineering Manager

akk

Attachment

DRINKING WATER STATE REVOLVING FUND
GREEN PROJECT RESERVE
ELIGIBLE PROJECT COMPONENTS
BUSINESS CASE

Northern Kentucky Water District
Advanced Treatment Project
WX21117208

December 8, 2010

Prepared by:

Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018

Reviewed by:

CH2M HILL
10123 Alliance Road, Suite 300
Cincinnati, OH 45245

HDR Engineers, Inc.
2517 Sir Barton Way
Lexington, KY 40509

Malcolm Pirnie, Inc.
8600 Governor's Hill Drive, Suite 210
Cincinnati, OH 45249

GRW Engineers, Inc.
807 Corporate Drive
Lexington, KY 40503

BACKGROUND

The Northern Kentucky Water District (District) intends to install advanced treatment processes at its three water treatment plants. The advanced treatment processes being installed include granular activated carbon downstream of the conventional filters for removal of organic compounds as well as disinfection with ultraviolet (UV) light. Construction of the projects at Fort Thomas and Memorial Parkway is underway and the Taylor Mill project is in the final design review and approval stage. The construction costs for the projects are presented in Table 1 below:

Table 1
Construction Cost for
Northern Kentucky Water District
Advanced Treatment Project

Project Name	Construction Cost
Fort Thomas Treatment Plant (contractor bid)	$23,823,000
Memorial Parkway Treatment Plant (contractor bid)	$12,227,000
Taylor Mill Treatment Plant (engineer's estimated)	$28,000,000
Total Advanced Treatment Construction Cost	**$64,050,000**

In 2009 the District was approved for an $8 million Drinking Water State Revolving Fund Loan for the Fort Thomas Treatment Plant Advanced Treatment project and the Memorial Parkway Treatment Plant Advanced Treatment Project (WX21117208). The District is seeking to amend this loan as part of the 2011 DWSRF approval process to include the Taylor Mill Treatment Plant Advanced Treatment project. An additional $8 million is under consideration for approval by the Kentucky Infrastructure Authority Board on December 9, 2010 for the District's Advanced Treatment Project.

This document was prepared by the Northern Kentucky Water District in association with the design engineering firms CH2MHILL/HDR Engineers, who designed the improvements for Fort Thomas Treatment Plant and Memorial Parkway Treatment Plant, and Malcolm Pirnie/GRW Engineers, who designed the improvements for Taylor Mill Treatment Plant.

Questions regarding this document should be directed to the following contact person:

Ms. Amy Kramer, P.E.
Design Engineering Manager
Northern Kentucky Water District
P.O. Box 18640
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The purpose of this document is to identify components for the referenced project that may be eligible for the Green Project Reserve for the Drinking Water State Revolving Fund Loan. The components identified and described in this report include:

Category 1 – Green Infrastructure
Item 1.1 – Vegetative Roof at Fort Thomas Treatment Plant
Item 1.2 – Rain Garden at Fort Thomas Treatment Plant
Item 1.3 – Vegetative Roof at Taylor Mill Treatment Plant

Category 2 – Water Efficiency
Item 2.1 – Equalization Basin and Recycle Pumps at Fort Thomas Treatment Plant
Item 2.2 – Piping to Recycle Water to Memorial Parkway Treatment Plant Reservoir
Item 2.3 – Equalization Basin and Recycle Pumps at Taylor Mill Treatment Plant
Item 2.4 – Air Scour Blower at Fort Thomas Treatment Plant

Category 3 – Energy Efficiency
Item 3.1 – Variable Speed Drives at Fort Thomas Treatment Plant
Item 3.2 – SCADA Control System at Fort Thomas Treatment Plant
Item 3.3 – Variable Speed Drives at Memorial Parkway Treatment Plant
Item 3.4 - SCADA Control System at Memorial Parkway Treatment Plant
Item 3.5 – Variable Speed Drives at Taylor Mill Treatment Plant
Item 3.6 - SCADA Control System at Taylor Mill Treatment Plant
Item 3.7 – Site Excavation at Fort Thomas Treatment Plant
Item 3.8 – Lighting at Fort Thomas Treatment Plant
Item 3.9 – Lighting at Memorial Parkway Treatment Plant
Item 3.10 – Lighting at Taylor Mill Treatment Plant

Category 4 – Environmentally Innovative
Item 4.1 – Ultraviolet Light Disinfection at Fort Thomas Treatment Plant
Item 4.2 – Ultraviolet Light Disinfection at Memorial Parkway Treatment Plant
Item 4.3 – Granular Activated Carbon at Fort Thomas Treatment Plant
Item 4.4 – Granular Activated Carbon at Memorial Parkway Treatment Plant
Item 4.5 – Granular Activated Carbon at Taylor Mill Treatment Plant

Each of these items will be discussed individually in this document.

DESCRIPTION OF ELIGIBLE ITEMS

Category 1 – Green Infrastructure

Item 1.1 – Vegetative Roof at Fort Thomas Treatment Plant
This component of the project is eligible as a **Categorical Project** under Green Infrastructure (see 1.2-3 "Green roofs" in Part B of DWSRF GPR Specific Guidance). The pitched vegetative roof covers 14,600 of the building housing the advanced treatment processes at the Fort Thomas Treatment Plant. The roofing system consists of a waterproofing membrane and flashing, the garden roof components, and plants. The garden roof components include a root barrier to protect the membrane, a drainage course to collect any stormwater that is not retained, a water retention mat to hold 0.32 gallons per square foot, a 3" high soil retention grid to keep growing medium from moving, and 6 inches of a growing medium. The vegetation consists of established plants in trays consisting of several species of sedum. The contractor will furnish a 2-

year warranty on the entire roofing system and then the manufacturer will provide a 15-year warranty on the garden roof components (excluding plants) and a 20-year warranty on the membrane.

The United States Environmental Protection Agency report titled "Green Roofs for Stormwater Runoff Control" published February 2009 stated the a green roof can retain 50% or more of the annual precipitation. The runoff from the roof will be collected in an equalization basin that is integral with the building foundation and recycled to the raw water storage reservoirs at the treatment plant. In addition to reducing stormwater runoff, the green roof will also reduce the heat absorption during summer months and will help insulate during cold months.

Furthermore, the vegetative roof eliminated the need for a stormwater detention basin which would have been difficult and costly to construct on the site. The estimated cost for a detention pond based on the engineer's estimate for a similar structure at the Taylor Mill plant is $220,000.

The estimated cost for the vegetative roof at Fort Thomas is $278,000.

Item 1.2 – Rain Garden at Fort Thomas Treatment Plant
The proposed rain garden at the Fort Thomas Treatment Plant is considered a bioretention project and is eligible as a **Categorical Project** under Green Infrastructure (see 1.2-2 "Bioretention" in Part B of DWSRF GPR Specific Guidance). The planting area is approximately 5 feet wide by 80 feet long and is intended to reduce the amount of stormwater runoff from an estimated 50,000 square foot area behind the building. A total of 264 plants that are suitable for rain gardens will be placed in this area. The plants include 12 different perennials such as milkweed, butterfly weed, cardinal flower, blackeyed susan, iris, sedge, aster, and soft rush. The Wisconsin Department of Natural Resources document titled "Rain Gardens, A How-To Manual for Homeowners" indicates a rain garden retains 30% more water than a conventional patch of lawn. The rain garden will reduce the amount of stormwater that will enter the catch basin at the downstream end of the garden.

The estimated cost of the garden is $5 per square foot or $2,000.

Item 1.3 – Vegetative Roof at Taylor Mill Treatment Plant
This component of the project is eligible as a **Categorical Project** under Green Infrastructure (see 1.2-3 "Green roofs" in Part B of DWSRF GPR Specific Guidance). The pitched vegetative roof covers 16,000 of the building housing the advanced treatment process at the Taylor Mill Treatment Plant. The roofing system consists of a waterproofing membrane and flashing, the garden roof components, and plants. The garden roof components include a root barrier to protect the membrane, a drainage course to collect any stormwater that is not retained, a water retention mat, a soil retention grid to keep growing medium from moving, and growing medium. The vegetated roof assembly may be 4 to 8 inches deep. The established plants will include several species of sedum. The contractor will furnish a 2-year warranty on the entire roofing system and then the manufacturer will provide a 15-year warranty on the garden roof components (excluding plants) and a 20-year warranty on the membrane.

The United States Environmental Protection Agency report titled "Green Roofs for Stormwater Runoff Control" published February 2009 stated the a green roof can retain 50% or more of the annual precipitation. In addition to reducing stormwater runoff, the green roof will also reduce the heat absorption during summer months and will help insulate during cold months.

Furthermore, the vegetative roof avoided the need for a larger stormwater detention basin. The estimated additional cost to enlarge a detention pond, according to the engineer, is $5,000.

The estimated cost for the roof is $305,000.

Category 2 – Water Efficiency

Item 2.1 – Equalization Basin at Recycle Pumps at Fort Thomas Treatment Plant
This component of the project is eligible as a **Categorical Project** under Water Efficiency (see 2.2-13 "Internal plant water reuse" in Part B of DWSRF GPR Specific Guidance as well as 1.2-4 "Rainwater harvesting/cisterns). An equalization basin that is integral with the building foundation will be used to collect spent water that is used in the process plus groundwater and stormwater. If this water was not collected and recycled it would be disposed by going to sanitary sewer or storm sewer depending on the source. Recycling the water also reduces the volume of raw water that would be pumped to the reservoirs from the Ohio River Pumping Station. The process water includes water used to backwash the carbon beds (needed to remove fine carbon particles for newly installed carbon and to gently loosen the carbon bed every few weeks so it does not get too compacted) as well as the initial water sent through the carbon beds immediately following a backwash event. The equalization basin will also be used to collect slurry water used to transport new carbon from the delivery trucks to the contactors and during removal of spent carbon to the trucks. Returning the carbon fines to the raw water reservoir may be beneficial in removing compounds that form taste and odors in the water.

The equalization basin also collects groundwater from a 6" foundation drain around the perimeter of the building as well as stormwater runoff from the vegetative roof and a standing seam metal roof. A 3,200 square foot section of building is covered with a pitched metal roof. The stormwater collected from both roofs is conveyed to the equalization basin. This water may be diverted away from the equalization basin to the stormwater collection system, if maintenance activities are being performed on the roof. The basin also serves as the receiving structure for emergency overflows and pumped discharge should we need to drain the water from the wet well of the GAC pumping station.

The cost for the metal roof and small collection piping is not included in this item, but the equalization basin structure, pumping equipment, conveyance piping for recycled water, and the outfall structure at the reservoirs is included. The size of the basin is 81 feet by 70 feet with a high water level of 8 feet, so the capacity of the basin is approximately 385,000 gallons.

The estimated cost is $587,300 with a breakdown of $400,000 for the concrete structure, $50,000 for process piping and valves, $60,000 for the two 3,300 gallon per minute 70 horsepower pumps, $70,000 for 1,925 lineal feet of 24" ductile iron pipe and valves serving as the conveyance piping from the equalization tank to the outfall, and $7,300 for the concrete and rock outfall structure.

Item 2.2 – Piping to Recycle Water to Memorial Parkway Treatment Plant Reservoir
This component of the project is eligible as a **Categorical Project** under Water Efficiency (see 2.2-13 "Internal plant water reuse" in Part B of DWSRF GPR Specific Guidance). Rather than sending to sanitary sewer, the wasted process water is captured and conveyed by gravity to the raw water storage reservoirs. Recycling the water also reduces the volume of raw water that would be pumped to the reservoirs from the Ohio River Pumping Station. The wasted process water is the spent water used to backwash the carbon beds (needed to remove fine carbon particles for newly installed carbon and to gently loosen the carbon bed every few weeks so it does not get too compacted) as well as the initial water sent through the carbon beds immediately following a backwash event. Returning the carbon fines to the raw water reservoir may be beneficial in removing compounds that form taste and odors in the water.

The estimated cost for the 12" and 36" process piping, fittings, and valves needed to return the water to the reservoirs is $30,000.

Item 2.3 – Equalization Basin and Recycle Pumps at Taylor Mill Treatment Plant
This component of the project is eligible as a **Categorical Project** under Water Efficiency (see 2.2-13 "Internal plant water reuse" in Part B of DWSRF GPR Specific Guidance). Rather than sending to sanitary sewer, the wasted process water is captured and conveyed by pumping to the raw water main. Recycling the water also reduces the volume of raw water that would be pumped from the Licking River Pumping Station. The wasted process water is the spent water used to backwash the carbon vessles (needed to remove fine carbon particles for newly installed carbon and to gently loosen the carbon bed every few weeks so it does not get too compacted) as well as the initial water sent through the carbon immediately following a backwash event. Returning the carbon fines to the raw water may be beneficial in removing compounds that form taste and odors in the water.

The equalization basin at the Taylor Mill plant has an approximate capacity of 45,000 gallons. The process wastewater is collected from backwashing and truck draining activities and vessel-to-waste upon initial startup and returned into the raw water line at the head of the treatment process. Pumping is accomplished by using two submersible pumps with one being a standby pump and one being a duty pump. Each pump has a capacity of 300 gpm at 33 feet.

The estimated cost for the tank, pump, piping, and fittings is $175,000 with a breakdown of $15,000 for piping, $20,000 for pumps, and $140,000.

Item 2.4 – Air Scour Blower at Fort Thomas Treatment Plant
This component of the project is eligible as a **Categorical Project** under Water Efficiency (see 2.2-6 "Programs reasonably expected to result in a reduction in demand to alleviate the need for additional investment" in Part B of DWSRF GPR Specific Guidance). A blower system was added as part of the Fort Thomas Treatment Plant project to aid in the backwashing operations. It is believed that the blower will reduce the amount of water needed to backwash filters by approximately 50%. The water used for backwash is not yet considered potable, but it is pumped and treated by a significant part of process. The equalization basin can hold spent water from almost 30 minutes of backwashing. Site visits to utilities without backwashing capability indicated much longer times may be needed to remove carbon fines. The size of the tank was not enlarged to accommodate a higher volume, which saved consider construction cost. Additionally, the submersible pumps in the equalization tank will not need to pump as much backwash water to the reservoirs. This reduced pumping is a savings in energy cost. The blower's design capacity is sized properly at 1,760 scfm and is not to exceed the motor horsepower at a 1.15 service factor as suggested in Appendix D of the United States Environmental Protection Agency report "Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities". The 200 HP motor must meet energy efficiency levels as required by National Electrical Manufacturers Association (NEMA) Table 12-12. This equates to a nominal motor efficiency rating of 95%.

The estimated cost of the blower is $152,000.

Category 3 – Energy Efficiency

Item 3.1 – Adjustable Speed Drives at Fort Thomas Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The three pumps for feeding the carbon contactors at Fort Thomas are vertical turbine pumps with a rated capacity of 15,300 gpm at 43.7 feet of head. The motors are 250 horsepower with a service factor of 1.15 and a nominal efficiency rating of 95%. The pumps are driven by low-voltage adjustable speed drives (ASDs). The ASDs will allow the pumps to continuously operate at their design point, creating an advantage in hydraulic efficiency as compared to the operation of a pump driven by a constant speed motor. The minimum hydraulic efficiency of the overall pump and motor with the ASD is specified to be 86%, whereas the variable flow conditions with a constant speed pump may lower the efficiency closer to 70%.

The estimated cost for the pumps, motors and ASDs is $256,000.

Item 3.2 – SCADA Control System at Fort Thomas Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The process control will optimize plant operations leading to more efficient use of energy.

The estimated cost for SCADA is $25,500.

Item 3.3 – Adjustable Speed Drives at Memorial Parkway Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The four pumps for feeding the carbon contactors at Memorial Parkway are vertical turbine pumps with two having a rated capacity of 7,000 gpm at 42 feet of head and two 3,500 gpm at 42 feet of head. The motors are 125 horsepower for the larger pumps and 60 horsepower for the smaller pumps, with a service factor of 1.15 and a nominal efficiency rating of 95%. The pumps are driven by low-voltage adjustable speed drives (ASDs). The ASDs will allow the pumps to continuously operate at their design point, creating an advantage in hydraulic efficiency as compared to the operation of a pump driven by a constant speed motor. The minimum hydraulic efficiency of the overall pump and motor with the ASD is specified to be 80%, whereas the variable flow conditions with a constant speed pump may lower the efficiency closer to 70%.

The estimated cost for the pumps, motors and ASDs is $110,000.

Item 3.4 - SCADA Control System at Memorial Parkway Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The process control will optimize plant operations leading to more efficient use of energy.

The estimated cost for SCADA is $31,500.

Item 3.5 – Adjustable Speed Drives at Taylor Mill Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The three pumps for feeding the carbon vessels at Taylor Mill are vertical turbine pumps with a rated capacity of 4,166 gpm at 70 feet of head. The motors are 125 horsepower with a service factor of 1.15 and a nominal efficiency rating of 84%. The pumps are driven by low-voltage adjustable speed drives (ASDs). The ASDs will allow the pumps to continuously operate at their design point, creating an advantage in hydraulic efficiency as compared to the operation of a pump driven by a constant speed motor. The minimum hydraulic efficiency of the overall pump and motor with the ASD is specified to be 80%, whereas the variable flow conditions with a constant speed pump may lower the efficiency closer to 70%.

The estimated cost for the pumps, motors and ASDs is $465,000.

Item 3.6 - SCADA Control System at Taylor Mill Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The process control will optimize plant operations leading to more efficient use of energy. In addition to greater control over pumping to the GAC pressure vessels, the preliminary treatment process will use SCADA to feed the proper amount of chemicals and to automate the removal of settled solids from the basins.

The estimated cost for SCADA is $50,000.

Item 3.7 – Site Excavation at Fort Thomas Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The building at Fort Thomas will largely be constructed in a hillside, which will help to reduce heat absorption during summer months and will provide natural insulation during cold months. Roughly 37 feet of the building depth is below ground level. The square footage of the building footprint is 20,000 square feet.

The cost to excavate the structure is $17.50 a cubic yard or roughly $500,000 for the building.

Item 3.8 – Lighting at Fort Thomas Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The lamps and ballasts are specified to be energy efficient and have motion sensors to automatically control the lighting based on occupancy.

The estimated cost of the lighting is $150,000.

Item 3.9 – Lighting at Memorial Parkway Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The lamps and ballasts are specified to be energy efficient and have motion sensors to automatically control the lighting based on occupancy.

The estimated cost of the lighting is $100,000.

Item 3.10 – Lighting at Taylor Mill Treatment Plant
This component of the project is eligible as a **Categorical Project** under Energy Efficiency (see 3.2-2 "Energy management planning and practices" in Part B of DWSRF GPR Specific Guidance). The lamps and ballasts are specified to be energy efficient and have motion sensors to automatically control the lighting based on occupancy. Existing lighting fixtures on the third floor of the filter building that were installed in the 1950s are being replaced with energy efficient fixtures as well.

The estimated cost of the lighting is $132,000.

Category 4 – Environmentally Innovative

Item 4.1 – Ultraviolet Light Disinfection at Fort Thomas Treatment Plant
This component of the project falls under the Environmentally Innovative Category (see 4.5 "Application of innovative treatment technologies or systems that improve environmental conditions and eliminate the use of chemicals in water treatment" in Part B of DWSRF GPR Specific Guidance). This process will enhance the level of disinfection of the water without the need to use more chlorine than presently used or to add a

different chemical disinfectant. The process uses UV light for disinfection, which is more effective than chlorine for *Cryptosporidium*.

The cost of the UV equipment is $712,000.

Item 4.2 – Ultraviolet Light Disinfection at Memorial Parkway Treatment Plant
This component of the project falls under the Environmentally Innovative Category (see 4.5 "Application of innovative treatment technologies or systems that improve environmental conditions and eliminate the use of chemicals in water treatment" in Part B of DWSRF GPR Specific Guidance). This process will enhance the level of disinfection of the water without the need for any additional chemicals such as chlorine. The process uses UV light for disinfection, which is more effective than chlorine for *Cryptosporidium*.

The cost of the UV equipment is $477,000.

Item 4.3 – Granular Activated Carbon at Fort Thomas Treatment Plant
This component of the project falls under the Environmentally Innovative Category (see 4.5 "Application of innovative treatment technologies or systems that improve environmental conditions and eliminate the use of chemicals in water treatment" in Part B of DWSRF GPR Specific Guidance). This process will remove organic compounds that are contained in the raw water withdrawn from the Ohio River. These compounds may be naturally occurring or may be added through surface water runoff during storms (non-point sources) or from direct discharges from wastewater or industrial facilities.

The estimated cost for the granular activated carbon media is $3,641,100. This is just the cost of the media and does not include the concrete basins, support underdrains, or piping associated with the contactors.

Item 4.4 – Granular Activated Carbon at Memorial Parkway Treatment Plant
This component of the project falls under the Environmentally Innovative Category (see 4.5 "Application of innovative treatment technologies or systems that improve environmental conditions and eliminate the use of chemicals in water treatment" in Part B of DWSRF GPR Specific Guidance). This process will remove organic compounds that are contained in the raw water withdrawn from the Ohio River. These compounds may be naturally occurring or may be added through surface water runoff during storms (non-point sources) or from direct discharges from wastewater or industrial facilities.

The estimated cost for the granular activated carbon media is $806,600. This is just the cost of the media and does not include the concrete basins, support underdrains, or piping associated with the contactors.

Item 4.5 – Granular Activated Carbon at Taylor Mill Treatment Plant
This component of the project falls under the Environmentally Innovative Category (see 4.5 "Application of innovative treatment technologies or systems that improve environmental conditions and eliminate the use of chemicals in water treatment" in Part B of DWSRF GPR Specific Guidance). This process will remove organic compounds that are contained in the raw water withdrawn from the Licking River. These compounds

may be naturally occurring or may be added through surface water runoff during storms (non-point sources) or from direct discharges from wastewater or industrial facilities.

The estimated cost for the granular activated carbon media is $784,000. This is just the cost of the media and does not include the steel pressure vessels or any ancillary equipment or piping associated with the process.

RESULTS

A number of unit costs were determined to estimate the savings from green, energy efficiency, and water efficiency measures.

- The current rate for wastewater is $6.76 per 1,000 gallons.
- The current wholesale customer rate for water is $2.97 for 1,000 gallons and will be used for determining water efficiency costs.
- The power costs for both Fort Thomas and Memorial Parkway Treatment Plants are based on a Distribution Time-of-Day rate follows:

  Energy Charge per kWh, FTTP and MPTP
  - Summer On Peak $0.054418
  - Winter On Peak $0.052118
  - Off Peak $0.046118

- The power cost at the Taylor Mill Treatment Plant is based on a Transmission Time-of-Day rate follows:

  Energy Charge per kWh, TMTP $0.052571

- For simplicity an average energy cost of $0.05 per kWh will be used for calculating the estimated savings.
- For the water recycling projects leading to enhanced water efficiency, the estimated cost savings for not having to pump raw water into reservoirs at each plant approximately $0.07 per 1,000 gallons.

1.0 Green Infrastructure Projects

Item 1.1 – Vegetative Roof at Fort Thomas Treatment Plant
The savings in green roofs is realized from both heating and cooling energy savings and the reduction of stormwater that needs to be handled and treated at the wastewater treatment plant if not controlled. The heating required for the GAC Operating Floor, Second Floor Restroom, Stairwell 1, and Stairwell 2 will benefit from the vegetative roof. It is estimated that heating requirements will be reduced by about 10% because of the roof.

EUH-15, 16, 17, 18, 19 serving GAC Operating Floor = 15 kW each

EWH-1 serving Stairwell 2 = 5 kW
EWH-2 serving Stairwell 1 = 5 kW
EWH-3 serving the Second Floor Restroom = 2 kW
Total heating requirements = 87 kW

87 kW x 12 hrs/day x 30 days/mo x 8 mos x $0.05/kWh x 0.10 = $1,253

The estimated annual power savings is $1,250.

It is assumed that the green roof reduces the stormwater runoff by 50% a year. The total estimated precipitation is about 42" a year for the Cincinnati, Ohio and the surrounding area according to the U.S. Climate Data. The size of the green roof at Fort Thomas is 14,600 square feet so a total of 382,200 gallons of precipitation would fall on the roof each year. The green roof will retain about half or 191,100 gallons of stormwater a year.

Other benefits of a green roof include an improvement in air quality by lowering greenhouse gases and airborne particulates, reduced building noise, extended roof life, and it will attract desirable wildlife such as song birds and butterflies.

The estimated annual savings by not having to treat the stormwater retained by the green roof, assuming the stormwater would eventually enter the sanitary sewer system and the District billed for this amount, is $1,290.

Item 1.2 – Rain Garden at Fort Thomas Treatment Plant
The estimated annual stormwater falling on the 50,000 square foot area behind the building is 1,308,901 gallons. For simplicity, it is assumed that 50% of the annual precipitation is retained by a conventional grass lawn (this assumption was not scientifically verified). If a rain garden retains another 30% more, then an additional 196,335 gallons a year is retained by the garden.

The estimated annual savings by not having to treat the stormwater retained by the rain garden, assuming the stormwater would eventually enter the sanitary sewer system and the District billed for this amount, is about $1,325.

Item 1.3 – Vegetative Roof at Taylor Mill Treatment Plant
The heating required for the GAC Building will benefit from the vegetative roof. It is estimated that heating requirements will be reduced by about 10% because of the roof.

ACCU-1 serving the admin. and lab area = 9.4 kW
ACCU-2 serving the admin. And lab area = 2.5 kW
DDH-1 (NG Space Only) serving the GAC portion of the building = 179 kW
DDH-1 (Electrical Only) serving the GAC portion of the building = 33 kW
PACU-1 (Heat) serving electrical room on landing = 8.3 kw
FCU-1A serving the lab = 0.10 kW
FCU-1B serving the administrative room = 0.10 kW
FCU-1C serving the corridor = 0.12 kW
FCU-1D serving the corridor = 0.12 kW

FCU-2 serving the electrical room = 0.19 kW
EWH-1 serving the Restroom = 3 kW
EWH-2 serving the Restroom = 3 kW
EUH-6 serving the residuals pump room = 3.6 kW

Total heating requirements (non-natural gas units) = 63.33 kW

63.33 kW x 12 hrs/day x 30 days/mo x 8 mos x $0.05/kWh x 0.10 = $912

Total heating requirements (DDH-1 natural gas unit, convert to equivalent natural gas units: $1.25 / 100,000 Btu x 3412 Btu/Hr / KW = $0.043 / kWH) = 179 kW

179 kW x 12 hrs/day x 30 days/mo x 8 mos x $0.043/kWh x 0.10 = $2,217

The estimated annual power savings is $3,129.

It is assumed that the green roof reduces the stormwater runoff by 50% a year. The total estimated precipitation is about 42" a year for the Cincinnati, Ohio and the surrounding area according to the U.S. Climate Data. The size of the green roof at Taylor Mill is 16,000 square feet, so a total of 418,800 gallons of precipitation would fall on the roof each year. The green roof will retain about half or 209,400 gallons of stormwater a year.

The estimated annual savings by not having to treat the stormwater retained by the green roof, assuming the stormwater would eventually enter the sanitary sewer system and the District billed for this amount, is $1,415.

Category 2 – Water Efficiency

Item 2.1 – Equalization Basin and Recycle Pumps at Fort Thomas Treatment Plant
The stormwater not retained by the green roof will be sent to the equalization basin and sent to the reservoirs and combined with the raw water entering the treatment plant. The half of the precipitation not retained by the green roof is about 191,100 gallons of stormwater a year. The volume of water collected from the metal roof runoff in a year is approximately 83,800 gallons.

The process water that is collected from the backwash of contactors and carbon changeouts during a year totals 40,950,400 gallons. This total breaks down to 7,603,000 for backwashing each of the eight 880 square foot contactors at a rate of 6 gallons a minute for 120 minutes once a year following carbon change out plus backwashing each contactor once a month for 5 minutes at 6 gallons a minute; plus 50,000 of slurry water to remove GAC from the contactor and place it in a truck and to move it from the delivery truck into the contactor, each contactor once a year for a total of 400,000 gallons of slurry water annually. Additionally, the contactor-to-waste cycle for 60 minutes at 6 gpm per square foot following each of the 104 backwash cycles a year generates 32,947,200 gallons.

The total amount of all stormwater and process water collected in the equalization basin and returned to the reservoirs is 41,034,200 gallons. The cost to pump this water from the river would be $2,870 a year. The estimated annual savings by not having to treat the process water and stormwater recycled to the reservoirs through a wastewater treatment plant is $277,390.

Item 2.2 – Piping to Recycle Water to Memorial Parkway Treatment Plant Reservoir
This plant will recycle a total of 2,021,760 for backwashing each of the three 624 square foot contactors at a rate of 6 gallons a minute per square foot for 120 minutes once a year following carbon change out and to backwash each contactor once a month for 5 minutes at 6 gallons a minute; plus 30,000 of slurry water to remove GAC from the contactor and place it in a truck and to move it from the delivery truck into the contactor, each contactor once a year for a total of 90,000 gallons of slurry water annually. Additionally a contactor-to-waste cycle recycles water to the reservoirs following each backwash event. The contactor-to-waste process assumes that each contactor treats 6 gpm for 60 minutes for a total of 39 times a year generating 8,760,960 gallons. The total volume process water that is collected from the backwash of contactors, carbon changeouts, and contactor-to-waste during a year totals 10,872,720 gallons.

The cost to pump this water from the river would be about $760 a year.

The estimated annual savings by not having to treat the process water recycled to the reservoirs through a wastewater treatment plant is $73,500.

Item 2.3 – Equalization Basin and Recycle Pumps at Taylor Mill Treatment Plant
The estimated volume for backwashing the vessels is 1,000 gpm for 30 minutes once a year for each of the 14 vessels once a month for 5 minutes is 1,260,000 gallons a year; it is estimated that 60 minutes of vessel-to-waste at about 500 gpm following each backwash generates another 5,460,000 gallons a year; the truck water to move carbon will use approximately 20,000 gallons a vessel per changeout, each vessel once a year, for a total of 280,000 gallons of slurry water. The total volume put in the equalization tank and recycled to the raw water main in a year is 7,000,000.

The cost to pump this water from the river would be about $500 a year.

The estimated annual savings by not having to treat the process water recycled to the plant through a wastewater treatment plant is $47,320.

Item 2.4 – Air Scour Blower at Fort Thomas Treatment Plant
It is estimated that at least twice the amount of water would be needed annually to backwash the carbon contactors following a change out procedure. This would total 5,068,800 for backwashing each of the eight 880 square foot contactors at a rate of 6 gallons a minute for an additional 120 minutes once a year. The cost of water for this volume is $15,050 a year using the cost to treat water that would be used for backwash is $2.97 per 1,000 gallons. The estimated energy savings by not running the backwash pump an additional 16 hours a year is $125.

Category 3 – Energy Efficiency

Item 3.1 – Adjustable Speed Drives at Fort Thomas Treatment Plant
The average flow through the plant is 13,900 gpm. It is assumed that on average one pump will run continuously 365 days a year. The pump with the ASDs will produce annual energy consumption and costs as follows:

250 HP/0.86 x 0.7457 kW per HP x 365 days x 24 hrs = 1,898,933 kWh a year

A pump without an ASD would produce the following estimated cost:

250 HP/0.70 x 0.7457 kW per HP x 365 days x 24 hrs = 2,332,976 kWh a year

The difference is 434,042 kWh a year or $21,700.

Item 3.2 – SCADA Control System at Fort Thomas Treatment Plant
It is estimated that SCADA control will improve energy use approximately 10 to 15 percent, although an industry benchmark was not located. This amount of savings is in-line with reports from optimization software companies that perform similar functions.

GAC Pump = 250 HP/0.86 x 0.7457 kW/HP x 365 days x 24 hrs x $0.05/kWh = $94,946.
GAC BW Pump = 200 HP/0.88 x 0.7457 kW/HP x 24 hrs x $0.05/kWh = $203
Filter BW Pump =200 HP/0.88 x 0.7547 kW/HP x 500 hrs x $0.05/kWh = $4,288

The total cost for power for the equipment listed above is about $99,500 a year. It is estimated that approximately $10,000 a year is saved by having SCADA control.

Item 3.3 – Adjustable Speed Drives at Memorial Parkway Treatment Plant
The average flow through the plant is 2,500 gpm. It is assumed that on average one pump will run continuously 260 days a year. The pump with the ASDs will produce annual energy consumption and costs as follows:

125 HP/0.80 x 0.7457 kW per HP x 260 days x 24 hrs = 727,057 kWh a year

A pump without an ASD would produce the following estimated cost:

125 HP/0.70 x 0.7457 kW per HP x 260 days x 24 hrs = 830,922 kWh a year

The difference is 103,865 kWh a year or $5,190.

Item 3.4 - SCADA Control System at Memorial Parkway Treatment Plant
It is estimated that SCADA control will improve energy use approximately 10 to 15 percent, although an industry benchmark was not located. This amount of savings is in-line with reports from optimization software companies that perform similar functions.

GAC Pump = 125 HP/0.80 x 0.7457 kW/HP x 260 days x 24 hrs x $0.05/kWh = $36,352

It is estimated that approximately $4,000 a year is saved by having SCADA control.

Item 3.5 – Adjustable Speed Drives at Taylor Mill Treatment Plant
The average flow through the plant is 5,200 gpm. It is assumed that one 4,100 gpm pump will run continuously 310 days a year and one pump will run 152 days a day for an equivalent of 462 days. The pump with the ASDs will produce annual energy consumption and costs as follows:

125 HP/0.80 x 0.7457 kW per HP x 462 days x 24 hrs = 1,291,925 kWh a year

A pump without an ASD would produce the following estimated cost:

125 HP/0.70 x 0.7457 kW per HP x 462 days x 24 hrs = 1,476,486 kWh a year

The difference is 184,560 kWh a year or $9,230.

Item 3.6 - SCADA Control System at Taylor Mill Treatment Plant
It is estimated that SCADA control will improve energy use approximately 10 to 15 percent, although an industry benchmark was not located. This amount of savings is in-line with reports from optimization software companies that perform similar functions.

GAC Pump = 125 HP/0.80 x 0.7457 kW/HP x 462 dys x 24 hrs x $0.05/kWh = $64,596
GAC BW Pump = 15 HP/0.88 x 0.7457 kW/HP x 21 hrs x $0.05/kWh = $13

The total cost for the equipment having the bulk of the energy consumption is $64,609 a year. It is estimated that approximately $6,500 a year is saved by having SCADA.

Item 3.7 – Site Excavation at Fort Thomas Treatment Plant
The energy savings for burying the building in the hillside are estimated to be about the same as for a green roof or 10%. The building needed to be constructed to this depth to provide the optimal hydraulic gradient for minimizing pumping head for lifting water into the GAC contactors and for allowing gravity flow to the clearwells. The energy savings realized by insulating the building using the ground is an added benefit to keeping the pumping costs lower. The heating required for the Lower Level, First Floor, Stairwell 1, and Stairwell 2 will benefit from the below-grade structure.

EUH-8 serving lower pump room = 7.5 kW
EUH-9 serving lower pump room = 10 kW
EUH-11,12,13,14 serving pipe gallery = 7.5 kW each
EUH 21, 22 serving electrical and maintenance = 5.0 kW each
EWH-1 serving Stairwell 2 = 5 kW
EWH-2 serving Stairwell 1 = 5 kW
EWH-4 serving the Basement Restroom = 2 kW
EWH-5 serving the First Floor Restroom = 2 kW
Total heating requirements = 71.5 kW

71.5 kW x 12 hrs/day x 30 days/mo x 8 mos x $0.05/kWh x 0.10 = $1,030

The estimated annual power savings is $1,030.

Item 3.8 – Lighting at Fort Thomas Treatment Plant
It is estimated that approximately 105,000 kWh a year will be needed to power the lights added by this project. This equates to $5,250. It is assumed that energy efficient fixtures saving about 20% a year over less efficient fixtures. This equates to a savings of $1,050 a year.

Item 3.9 – Lighting at Memorial Parkway Treatment Plant
It is estimated that approximately 60,000 kWh a year will be needed to power the lights added by this project. This equates to $3,000. It is assumed that energy efficient fixtures saving about 10% a year over less efficient fixtures. This equates to a savings of $600 a year.

Item 3.10 – Lighting at Taylor Mill Treatment Plant
It is estimated that approximately 175,000 kWh a year will be needed to power the lights added by this project. This equates to $8,750. There are 30 existing fixtures using 100 watts each on the third floor that are being replaced with 21 fixtures using 60 watts. In this case the new fixtures are 40% more efficient than the old ones. It is assumed that energy efficient fixtures saving about 20% a year over less efficient new fixtures. The total savings equates to about $1,750 a year. For projects leading to efficiency, the estimated annual cost savings for each project is summarized in Table 2 below.

Table 2
Categories 1 – 3 for Green Infrastructure, Energy Efficiency, and Water Efficiency

Item Description	Construction Cost	Annual Units Saved	Cost per Unit	Total Annual Cost Savings	Payback, Years
FTTP Veg Roof	$278,000	25,000 kWh	$0.05 per kWh	$1,250	23
		136,500 gallons	$6.76 for 1,000 gallons	$1,290	
		Eliminated detention pond construction $200,000			
FTTP Garden	$2,000	196,335 gallons	$6.76 for 1,000 gallons	$1,325	1
TMTP Veg Roof	$305,000	69,800 kWh	$0.05 per kWh	$3,129	66
		209,400 gallons	$6.76 for 1,000 gallons	$1415	
		Avoided larger detention pond cost $5,000			
FTTP Recycle	$587,300	41,034,200 gallons	$0.07 for 1,000 gallons	$2,870	2
			$6.76 for 1,000 gallons	$277,390	
MPTP Recycle	$30,000	10,872,720 gallons	$0.07 for 1,000 gallons	$760	0
			$6.76 for 1,000 gallons	$73,500	
TMTP Recycle	$175,000	7,000,000 gallons	$0.07 for 1,000 gallons	$500	4
			$6.76 for 1,000 gallons	$47,320	
FTTP Air Scour	$152,000	5,068,800 gallons	$2.97 for 1,000 gallons	$15,050	10
FTTP ASDs	$256,000	434,042 kWh	$0.05 per kWh	$21,700	12
FTTP SCADA	$25,500	200,000 kWh	$0.05 per kWh	$10,000	3
MPTP ASDs	$110,000	103,865 kWh	$0.05 per kWh	$5,190	21
MPTP SCADA	$31,500	80,000 kWh	$0.05 per kWh	$4,000	8
TMTP ASDs	$465,000	184,560 kWh	$0.05 per kWh	$9,230	50
TMTP SCADA	$55,000	130,000 kWh	$0.05 per kWh	$6,500	9
FTTP Excavation	$500,000	20,592 kWh	$0.05 per kWh	$1,030	485
FTTP Lighting	$150,000	105,000 kWh	$0.05 per kWh	$1,050	143
MPTP Lighting	$100,000	60,000 kWh	$0.05 per kWh	$600	167
TMTP Lighting	$132,000	178,000 kWh	$0.05 per kWh	$1,780	74
TOTAL	**$3,354,300**	**1,590,859 kWh and 64,517,955 gallons**		**$486,879 annual plus $205,000 for construction**	

Category 4 – Environmentally Innovative

Item 4.1 – Ultraviolet Light Disinfection at Fort Thomas Treatment Plant, and
Item 4.2 – Ultraviolet Light Disinfection at Memorial Parkway Treatment Plant
The process uses UV light for disinfection, which is more effective than chlorine for inactivation of Cryptosporidium. The Cryptosporidium oocyst is known to resist treatment with chlorine, so the District would need to consider another process such as membrane filtration to achieve control of this microbe to a level that is comparable with UV.

Treatment with UV does not introduce any chemicals into the water and has not been found to produce undesirable byproducts associated with other disinfectants at the low dosage level being proposed at the 3 plants. As summarized in the attached article from American Water Works Association Journal titled "Treatment Alternatives for Compliance with Stage 2 d/DBPR: An Economic Update," byproducts are formed through the use of other disinfectants such as chloramines, chlorine dioxide, and ozone. Each of these processes adds chemicals and/or disinfection byproducts to the water and membranes are associated with much higher construction and operating costs than UV.

Along with its effectiveness for inactivating bacteria and viruses commonly found in the raw water source, the UV system is designed to provide 2.5 log inactivation of Cryptosporidium and Giardia by delivering a dose of 8.5 mJ/cm^2 in accordance with the EPA UV Disinfection Guidance Manual. This will enable the District to apply for additional disinfection credit for the new treatment process. Because UV does not provide a residual, chlorine will continue to be applied to maintain microbial control in the distribution system.

Item 4.3 – Granular Activated Carbon at Fort Thomas Treatment Plant,
Item 4.4 – Granular Activated Carbon at Memorial Parkway Treatment Plant, and
Item 4.5 – Granular Activated Carbon at Taylor Mill Treatment Plant
The GAC process will remove organic compounds that are contained in the raw water withdrawn from the Ohio River and the Licking River. These compounds may be naturally occurring or may be added through surface water runoff during storms (non-point sources) or from direct discharges from wastewater or industrial facilities. Currently it is not considered economically feasible to treat wastewater and stormwater runoff to drinking water standards to remove these compounds prior to entering the source water.

When combined with chlorine, the naturally occurring organic compounds form disinfection byproducts (DBPs). The District selected granular activated carbon (GAC) over changing to an alternative disinfectant such as chloramines, chlorine dioxide, or ozone. The District's reason for selecting GAC over alternative disinfectants mirrors the rationale presented in the attached article from the American Water Works Association Journal titled "Treatment Alternatives for Compliance with Stage 2 d/DBPR: An Economic Update." The article states that switching disinfectants to comply with the regulations is unlikely to be an effective long-term solution. The article specifically says "This is because most alternative disinfectants have negative side effects, including the formation of emerging byproducts that are likely to be regulated in the future.

Technologies that target the removal of compounds that serve as precursors for the formation of DBPs can offer the best potential for overall water quality improvement." Along with enabling the District to meet the Stage 2 regulation for DPBs, carbon is effective for removing many endocrine disrupting and pharmaceutical chemicals. These products will be trapped in the carbon particle and will be destroyed when the GAC is thermally reactivated, thereby keeping these compounds from being returned to a surface water source.

The GAC process was found to have the lowest construction and operating cost as compared to other organic removal technologies employing membranes. Although membranes are highly effective at removing the organics that form DBPs, the process would require the District to have acid on-site to clean the membranes and it produces a high volume of waste stream that must be disposed. The District experienced a high rate of fouling when membranes were tested on a pilot-scale.

The construction cost for the Category 4 Environmentally Innovative projects are summarized in Table 3.

Table 3
Environmentally Innovative Projects
Category 4

Item Description	Construction Cost
FTTP UV	$712,000
MPTP UV	$477,000
FTTP GAC	$3,641,100
MPTP GAC	$806,600
TMTP GAC	$784,000
Total	**$6,420,700**

SUMMARY AND CONCLUSIONS

A summary of the construction cost for each project category is presented in Table 4. Projects leading to directly estimated energy and water efficiency have a construction cost of $6,654,300 and an annual savings of $486,879. Additionally, the two vegetative roofs saved $205,000 in construction cost by not having to build additional detention basin storage for stormwater. The environmentally innovate projects total $6,420,700 in construction.

Of the total construction cost of $64,050,000 for the Advanced Treatment Project, consisting of improvements at the Fort Thomas Treatment Plant, the Memorial Parkway Treatment Plant, and Taylor Mill Treatment Plant, documentation for $9,775,000 is provided for consideration for the Green Project Reserve.

Table 4 Summary of Green Project Reserve Components For Advanced Treatment Project			
Category	**Construction Cost**	**Eliminated Construction Cost**	**Annual Savings**
1 – Green Infrastructure	$585,000	$205,000	$8,409
2 – Water Efficiency	$944,000	NA	$417,390
3 – Energy Efficiency	$1,825,000	NA	$61,080
4 – Environmentally Innovative	$6,420,700	NA	NA
Total	**$9,775,000**	**$205,000**	**$486,879**

Regulatory Update

D/DBPR USEPA

ALAN J. ROY

Treatment alternatives for compliance with the Stage 2 D/DBPR: An economic update

TO HELP UTILITIES PREPARE FOR COMPLIANCE WITH STAGE 2 OF THE DISINFECTANTS/DISINFECTION BY-PRODUCTS RULE, THIS ARTICLE UPDATES THE DECEMBER 2005 REPORT FROM THE US ENVIRONMENTAL PROTECTION AGENCY ON DISINFECTION BY-PRODUCT CONTROL TECHNOLOGIES AND THEIR ASSOCIATED COSTS.

Chlorine disinfection is a long-used and highly effective means of preventing waterborne disease. However, chlorine reactions with natural organic matter (NOM) have created by-products, namely trihalomethanes (THMs) and haloacetic acids (HAAs), that also pose health risks. The US Environmental Protection Agency (USEPA) has implemented water quality standards to address these problems and to ensure the safety of the nation's drinking water.

Water utilities across the United States will soon face difficult choices as they formulate plans to comply with the requirements of the Stage 2 Disinfectants/Disinfection Byproducts Rule (D/DBPR) while working to continue controlling capital and operating costs. In December 2005 USEPA published a report on the technologies that can be used to control DBPs and their associated costs (USEPA, 2005). Since that time, a number of technologies have emerged as popular choices to achieve the Stage 2 treatment requirements. The costs associated with these technologies must also undergo significant adjustment in order to reflect current economic conditions and supply costs.

Although removal of DBPs from treated water may be economically feasible in some cases, in others prevention of DBP formation by changing the disinfectant or removing NOM would be more cost-effective. The use of alternative disinfectants is often considered an easily implemented and inexpensive means of reducing THMs and HAAs. There are, however, additional concerns with the use of alternative disinfectants, primarily the creation of other by-products that may pose their own health risks and ultimately prove to exhibit greater toxicity than THMs and HAAs—the "traditional" DBPs. A combina-

tion of treatment alternatives may be needed to produce the desired water quality.

Several treatment technologies are capable of achieving the desired treatment efficiency, often with ancillary benefits. The decision on which one or combination of these best suits a specific water utility often involves factors other than the cost of the technology.

This article reviews the popular treatment technologies used to limit production of DBPs in drinking water and updates their associated treatment costs, first published in 2005 by the USEPA. Consideration is also given to how the different technologies may be incorporated into larger treatment goals for future expansion and improved water quality.

CRITICAL QUESTIONS NEED TO BE ASKED

Before a technology assessment is done, it is often useful to conduct a detailed review of water quality parameters (both organic and inorganic), making sure to include changes that occur over the course of each year. Consideration must also be given to the additional treatment requirements of the Long Term 2 Enhanced Surface Water Treatment Rule and goals such as elimination of tastes and odors, inactivation of *Giardia* and *Cryptosporidium*, or removal of endocrine disrupting chemicals (EDCs).

Some questions commonly addressed before treatment technologies are assessed include:

- What is the available space for capital equipment?
- Is there any potential for integration with existing treatment?
- What is the potential for future expansion both in flow capacity and in scope of treatment?
- What are the local disposal options for process wastes?
- Is there a need for treatment redundancy?
- What amount and quality of operator attention can be provided to oversee the treatment?
- What needs are there for chemical storage?
- What safety considerations must be addressed in implementing a particular treatment technology?
- What are the monitoring requirements for the treatment technology and for compliance reporting?
- What permitting requirements must be satisfied in implementing a new treatment technology?

> Among the precursor technologies examined, the data suggest that activated carbon continues to be the most cost-effective method.

After these considerations have been assessed and prioritized, a short list of technologies can be selected for further review and/or pilot-testing. Then a list of prospective vendors can be developed.

ALTERNATIVE DISINFECTANTS ALSO HAVE DISADVANTAGES

Some of the alternative disinfectants used in place of or in combination with traditional disinfectants include monochloramine, chlorine dioxide, ozone, and ultraviolet (UV) light. The advantages and disadvantages of using these disinfectants are described in the following sections. Other less common disinfectants that may be considered in some applications include potassium permanganate, hydrogen peroxide, bromine, and iodine.

Monochloramine. Ammonia can be added to standard free chlorine disinfection processes to produce monochloramine, which has a much lower oxidation potential with NOM and exhibits a decreased potential to produce DBPs commonly found during free chlorine addition.

Advantages. Minimized production of THMs or HAAs; maintains a residual in the distribution system.

Disadvantages. Potential to form nitrosamines (*N*-nitrosodimethylamine; Choi & Valentine, 2002; Najm & Trussell, 2001); potential to form cyanogen chloride (Weinberg et al, 2002); can produce higher concentrations of iodated byproducts than chlorine disinfection (Krasner et al, 2006); not as strong a disinfectant for microbes other than bacteria; more complicated to produce than other disinfectants (must ensure dichloramine and trichloramine are not formed); less effective against viruses than other disinfectant processes; can create nitrification problems in distribution systems (Wilczak et al, 1996); toxic to fish (Seegert et al, 1979; Zillich, 1972).

Chlorine dioxide. This disinfectant is widely used in Europe. Generation usually involves the reaction of sodium chlorite with gaseous chlorine, hypochlorous acid, or hydrochloric acid.

Advantages. Minimized production of THMs and HAAs.

Disadvantages. Does not maintain a residual; requires secondary disinfection; safety concerns with sodium chlorite; can form by-products, including mutagenic compounds (such as MX and BMX), chlorates, and chlorites (Richardson, 2005); difficult to generate onsite; may produce a cat urine–type odor in the treated water; banned in some states.

UV light. Defined as electromagnetic radiation having a wavelength between 100 and 400 nm, UV light has been more commonly known as a means of disinfecting wastewater. Recently, because of its effectiveness for inactivating *Cryptosporidium* (Vrijenhoek et al, 1998), *Giardia*, bacteria, and viruses, UV has gained a much broader appeal for drinking water applications.

Advantages. Excellent disinfection for a wide variety of microbes; no DBPs produced; no chemical

TABLE 1 Capital cost comparisons—2005 and 2009

Treatment Technology	Capacity Cost—$					
	1 mgd		17 mgd		76 mgd	
	2005	2009	2005	2009	2005	2009
Alternate disinfectants						
Chloramine	53,396	62,608	98,772	113,899	397,173	451,036
Chlorine dioxide	40,035	47,531	268,223	302,344	603,425	683,678
UV disinfection	317,091	359,359	1,418,926	1,625,710	3,569,168	4,078,398
Ozone	804,614	974,973	3,946,957	4,865,079	12,628,950	15,996,225
Organic removal technologies						
Granular activated carbon (annual exchange)	783,808	863,696	6,140,593	6,902,107	18,311,317	20,481,136
Nanofiltration	912,423	1,057,344	15,546,118	17,948,220	57,558,238	67,328,295
Microfiltration/ultrafiltration	1,594,911	1,786,445	15,991,348	17,940,217	61,150,358	69,100,740

TABLE 2 Operations and maintenance cost comparisons—2005 and 2009

Treatment Technology	Capacity Cost—$					
	1 mgd		17 mgd		76 mgd	
	2005	2009	2005	2009	2005	2009
Alternate disinfectants						
Chloramine	4,443	4,861	11,333	13,528	31,538	41,078
Chlorine dioxide	18,571	21,217	35,939	41,818	87,061	102,220
UV disinfection	9,016	10,855	22,908	26,871	66,755	78,023
Ozone	76,470	91,862	455,559	652,134	1,974,401	2,906,241
Organic removal technologies						
Granular activated carbon (annual exchange)	57,078	61,531	227,710	251,037	709,287	777,712
Nanofiltration	112,309	133,392	1,780,761	2,161,229	7,914,024	9,684,873
Microfiltration/ultrafiltration	69,214	78,573	786,427	902,132	3,301,730	3,800,074

TABLE 3 Annual costs (based on a 10-year life cycle)—2005 and 2009

Treatment Technology*	Capacity Cost—$					
	1 mgd		17 mgd		76 mgd	
	2005	2009	2005	2009	2005	2009
Alternate disinfectants						
Chloramine	9,800	11,122	21,210	24,918	70,800	86,182
Chlorine dioxide	22,600	25,970	62,700	72,052	147,300	170,588
UV disinfection	40,200	46,791	164,800	189,442	423,700	485,863
Ozone	156,900	189,359	850,300	1,138,642	3,237,000	4,505,864
Organic removal technologies						
Granular activated carbon (annual exchange)†	135,500	147,900	841,100	941,248	2,539,000	2,825,826
Nanofiltration	203,000	239,126	3,326,000	3,956,051	13,660,000	16,417,703
Microfiltration/ultrafiltration	228,700	257,218	2,385,000	2,696,154	9,420,000	10,710,148

*Additional details regarding each treatment technology are available from the author upon request.
†Recent developments regarding the custom reactivation of activated carbon would result in decreases of approximately 20% in the operations and maintenance costs for that technology versus what is shown in Tables 2 and 3 for 2009.

safety concerns; efficiency is not sensitive to pH or temperature.

Disadvantages. No residual disinfection produced; requires secondary disinfection; efficiency is compromised by turbid water; some replacement parts periodically required.

Ozone. Typically generated by passing filtered, dehumidified air through a high-voltage electric field, ozone has a long history of effectively disinfecting drinking water.

Advantages. High disinfection efficiency; easily produced; produces fewer THMs or HAAs if used to offset a portion of chlorine disinfection.

Disadvantages. Produces no residual; requires secondary disinfection; forms bromate if bromides are present in the water (Weinberg et al, 2002); cannot be stored because of decay back to oxygen; potential for trihalonitromethane formation; health risk, requires monitoring when producing; breaks down organics, creating the potential for biogrowth in the distribution system; potential formaldehydes formation (Weinberg et al, 2002); expensive compared with other alternative disinfectant technologies.

ORGANIC REMOVAL TECHNOLOGIES SHOULD BE PAIRED WITH A DISINFECTANT SWITCH

Switching disinfectants in the absence of additional treatment is unlikely to be an effective long-term solution for the control of DBPs in drinking water. This is because most alternative disinfectants have negative side effects, including the formation of emerging DBPs likely to be regulated in the future. Technologies that target the removal of compounds that serve as precursors for the formation of DBPs can offer the best potential for overall water quality improvement.

Organic removal technologies can offer additional treatment benefits aside from the reduction of DBPs, but they will result in higher costs than a change of disinfectant alone. A number of treatment technologies have been shown to be effective in the reduction of DBP precursor compounds. Several of the more common are described in the following sections.

Other lesser known treatment technologies can be considered for NOM removal, but are not included because of limited information. Piloting would be advisable before committing to a technology without a proven history in a variety of applications.

Activated carbon adsorption. Used in fixed beds of granular carbon or added as powdered carbon to an agitated tank, adsorption technology is well known for its effectiveness for organic removal and is considered best available treatment (BAT) for many targeted organics as well as taste, odor, and color. There are few data regarding the effectiveness of this technology for *Cryptosporidium* removal, but it is believed that removal via activated carbon adsorption would likely be similar to that achieved with conventional granular media filtration.

Advantages. Known to effectively reduce NOM, tastes, odors, and color; BAT for THMs and HAAs; effective for removal of many endocrine disrupting and pharmaceutical chemicals; simple to operate and maintain; spent granular product can be reactivated and reused, further reducing cost; can remove DBPs formed by prechlorination treatment; generally cost-effective in relation to other processes.

Disadvantages. Does not remove inorganic bromides; depletes oxidizers used for predisinfection; pretreatment to remove solids may be required for treatment of surface water; effectiveness is a function of molecular size, polarizability, and ionic strength of the organics in the water.

Microfiltration and ultrafiltration. These low-pressure membrane filtration processes are commonly used for high-efficiency particulate removal applications. Operating at 10–30 psi, microfiltration has a nominal pore size of 0.2 µm and ultrafiltration has a nominal pore size of 0.01 µm. These treatment processes remove organics above 10,000 molecular weight.

Advantages. Simple to operate and automate; effective for particle and microbial removal.

Disadvantages. Limited effectiveness for DBP precursors when used alone; may require the addition of coagulant or powdered activated carbon to achieve desired treatment; ineffective for color, tastes, odors, and endocrin disrupting chemicals; expensive even at smaller installations; significant residual waste for disposal.

TABLE 4 USEPA 2005 cost elements

Commodity	Cost—$
Electricity	0.076/kW·h
Diesel	1.48/gal
Natural gas	0.009/scf
Building energy use	102.6 kW/sq ft/year
Alum	300/ton
Chlorine (cylinder)	600
Ferric chloride	400/ton
Lime (hydrated)	110/ton
Polymer	1.00/lb
Sodium hexametaphosphate	1,300/ton
Sodium hydroxide	350/ton
Sodium chloride	100/ton
Sulfuric acid	100/ton
Granular activated carbon	1.00–1.20/lb

Nanofiltration and reverse osmosis. These higher-pressure membrane processes are well known for the extremely high purity they are capable of producing. Operating at 90 psi, nanofiltration has a nominal pore size of 0.001 µm.

Advantages. Effective for water softening; effective for microbe removal; shown to achieve 50–90% removal of total organic carbon, depending on its molecular size, shape, chemical characteristics, and ionic character.

Disadvantages. Very expensive technology; prone to fouling in surface water treatment; no more effective for microbe removal than ultrafiltration; adsorption of organics by the membrane can be irreversible and decrease membrane life; significant wastewater volume to be treated.

Enhanced oxidation. Using UV light in combination with hydrogen peroxide or ozone, this technology serves to destroy much of the NOM by breaking chemical bonds between the

TABLE 5 2009 economic update

Product/Service	Commodity Code	February 2005 Index	February 2009 Index	Increase—%
Accommodations	721	129.1	139.7	8.2
Aluminum compounds	0613-0209	108.8	150.5	38.3
Building Cost Index (NAICS 235221)	N/A	100 (December 2004)	130.7 (January 2009)	30.7
Building Cost Index (Turner)	N/A	655	866	32.2
Capital equipment	N/A	143.9	157.4	9.4
Chemical and allied products	06	186.4	228.4	22.5
Chlorine, sodium hydroxide, and other alkali	0613-0302	100 (June 2005)	205.6	105.6
Concrete ingredients and related products	132	180.4	236.2	30.9
Electric machinery and equipment	117	113.4	113.8	0.4
Employee compensation per hour (private industry)	N/A	$24.17 (Q1, 2005)	$27.35 (Q4, 2008)	13.1
Engineering and scientific instruments	1185	177.8	193.1	8.6
Engineering services	54133	103.0	114.4	11.1
Environmental controls	1181	149.1	159.7	7.1
General purpose machinery and equipment	114	165.9	199.7	20.4
Heavy equipment leasing	532412	104.5	117.3	12.2
Industrial chemicals	061	179.2	226.2	26.2
Industrial commodities	N/A	153.6	170.9	11.3
Industrial electric power	0543	148.0	189.7	28.2
Industrial natural gas	0553	211.9	235.3	11.0
Inorganic acids	0613-0224	79.7	155.5 (November 2008)	95.1
Integrating and measuring instruments	1172	148.1	156.4	5.6
Legal services	5411	137.1	164.6	20.0
Lime	0613-0213	140.2	219.6	56.7
Medical and diagnostic laboratories	6215	104.2	108.3	3.9
Metal and metal products (iron and steel)	101	179.8	183.0	2.8
Metal valves (except fluid power)	1149-02	186.9	245.4	31.3
Miscellaneous general purpose equipment	1149	183.7	226.4	23.2
Natural sodium carbonate and sulfate	0613-0301	99.8 (March 2005)	174.7	75.0
No. 2 diesel fuel	0573-03	149.5	145.6	–2.6
Potassium and sodium compounds (except bleaches)	0613-0217	105.6	289.1	173.8
Process control instruments	1182	162.2	196.4	21.1
Pumps, compressors, and equipment	1141	175.4	212.8	21.3
Sodium hydroxide	0613-0108	145.9	N/A	N/A
Steel pipe and tube	1017-06	193.8	206.6	5.0
Sulfuric acid	0613-0232	166.7	254.8 (November 2008)	52.8
Synthetic ammonia	0652-0135	123.2	181.3	47.2
Transformers and power regulators	1174	145.2	205.9	41.8
Water treatment compounds	325998-A	152.1	182.8	20.1
Water treatment compounds	0679-0961	168.4	181.9	8.0

N/A—not applicable, Q—quarter

constituent atoms. The NOM is converted to CO_2 or a simpler organic compound that has less potential for DBP formation. This technology has also been effectively used to treat many synthetic organic compounds.

Advantages. Effective in reducing NOM in water; potential for destruction of endocrine disrupting chemicals in water; capability of *Cryptosporidium* and *Giardia* inactivation; no THM or HAA produced; no residual waste to dispose (Shin et al, 2000; Bolton Et al, 1998).

Disadvantages. The process is compromised by turbid water, may require pretreatment; requires chemical storage; produces no residual disinfectant; requires secondary disinfection; other DBP formation possible; some replacement parts are periodically required.

Enhanced coagulation. Many surface water treatment plants use chemical coagulation with alum, ferric chloride, or lime for the removal of suspended solids from the raw water. By increasing the coagulant dose and optimizing pH, coagulation can be adapted to the removal of DBP precursors (Bolton et al, 1998).

Advantages. Requires little additional capital equipment than that typically needed for turbidity removal; BAT for THMs and HAAs; can achieve 50% reduction in humic acids by forming insoluble humates; improved disinfection efficiency by reduced organic oxidant demand; some *Cryptosporidium* and *Giardia* removal; complements activated carbon treatment by removing high-molecular-weight, negatively charged organics.

Disadvantages. Larger sludge volumes created; increases coagulant use (up to five times that required for solid removal); optimum pH (5.5 for ferric chloride and alum) requires two pH adjustments; postprecipitation in distribution systems; corrosion potential in distribution systems; waters with high bromide

Water utilities across the United States will soon face difficult choices as they formulate plans to comply with the requirements of the Stage 2 Disinfectants/Disinfection Byproducts Rule while working to continue controlling capital and operating costs.

TABLE 6 Capital cost factors and cost escalators

Cost Factor (Capital)	Escalator (Commodity Code)
Analyzer	Engineering and scientific instruments (1185)
Chemical feed system	Capital equipment (general BLS category, no code)
Discharge pipeline	Steel pipe (1017)
Effluent ozone quench	Environmental controls (1181)
Electrical and instrumentation	Process control instrumentation (1182)
Housing	Accommodations (721)
Land	Percentage of direct capital cost (varies with technology)
Operator training	Engineering services (54133)
Ozone contactor	Capital equipment
Ozone generation system	Capital equipment
Ozone off-gas destruction system	Environmental controls (1181)
Permitting	Percentage of capital premultiplier (varies with technology)
pH adjustment	Environmental controls (1181)
Piloting	Engineering services (54133)
Pipes and valves	Steel pipe (1017) + metal valve (1149-02)*
Process monitoring equipment	Process control instrumentation (1182)
Public education	Engineering services (54133)
Pumping	Pumps, compressors, and equipment (1141)
Scrubber	Environmental controls (1181)
Stocked spare parts	Miscellaneous general purpose equipment (1149)
Treatment equipment	Capital equipment (general BLS category, no code)
Ultraviolet reactors	Capital equipment (general BLS category, no code)

BLS—Bureau of Labor Statistics

*In determining the escalation of costs for pipes and valves an assumption will need to be made about the percentage of cost that will be related to each item individually and that portion escalated.

concentrationss can produce higher brominated DBPs; adds inorganics (manganese, aluminum, sulfate, chloride, and sodium) to the water supply; may increase floc fragility.

TREATMENT SYNERGIES ARE POSSIBLE

The effectiveness of most of the treatment technologies will be limited in some regard because of the diverse nature of NOM. Combinations of treatment technologies may prove to offer significant advantages in terms of cost-effective achievement of treatment goals. For example, combining the two technologies currently designated as BAT (USEPA, 2001) may provide a significant benefit over their individual performance.

Activated carbon adsorption is most effective for the portion of NOM composed of smaller-size organic compounds without charged functional groups (DeSilva, 2000). Conversely, enhanced coagulation is generally considered to be most effective for the portion of NOM composed of large organic molecules with negatively charged functional groups (Uyak, 2007). By using a combination of technologies, the percentage reduction of DBP precursor compounds can be increased and possibly maintained for a longer duration. Combining treatment technologies with an alternative disinfectant may be a course of action worth considering for many source water applications.

CAPITAL AND OPERATING COSTS ARE CRITICAL CONSIDERATIONS

In uncertain economic times, capital and operating costs are vital considerations in the selection of best available control technologies. Although the specific capital costs for different technologies can differ greatly, general estimates have been used to account for project costs aside from the direct costs of the capital equipment. The past few years have seen significant cost increases, particularly for commodity chemicals. Rapid international growth along with production capacity limitations have resulted in significant cost increases for most water treatment chemicals. Rising fuel and energy prices have added to chemical costs as well as transportation costs. Steel and other building materials costs have also risen during this period.

In December 2005, USEPA published cost estimates (along with their component cost elements) for many of the treatment technologies that can be used to assess the cost of compliance with the Stage 2 D/DBPR (USEPA, 2001). These estimates, which include both capital and operating costs, are summarized in Tables 1 and 2, respectively; each table has been updated to also provide 2009 costs for each parameter. A simple 10-year life cycle cost analysis for 2005 (and updated here for 2009) is given in Table 3. USEPA's 2005 cost elements are listed in Table 4.

Using the cost escalations of the matching elements contained in the 2005 USEPA publication, a revised set of projected capital and operating costs for the respective technologies was generated. As the 2009 data in Tables 1–3 show, taken as a whole these price differences do not change the comparative economics of the respective technologies.

Capital costs include major equipment cost, pilot-testing, permitting, land cost, operator training, housing, pipes and valves, instrumentation and control, chemical addition systems, and on-line analyzers. As the major equipment is priced, general additions are included for initial budgeting. Typically, the following can be assumed:

- add 20% for site work and installation,
- add 10% for electrical and instrumentation and control (more if full automation is needed),
- add 20% for engineering and administration, and
- add 20% for contingencies.

Initial operations and maintenance costs (labor, power, maintenance materials, performance monitoring, media replacement, chemicals) can be estimated by using the estimates for annual chemical costs and power costs for major equipment and by adding 3% of capital cost for annual materials, labor, and maintenance.

Over the past few years, there have been several changes in costs for both products and services. Calculated from US Bureau of Labor Statistics data, values for products, services, and cost indexes for both 2005 and 2009 are shown in Table 5.

In the nearly five-year period since the initial development of USEPA's cost estimates, some capital and operating costs have changed significantly. The largest price increases

TABLE 7 Operations and maintenance cost factors and cost escalators

Cost Factor (Operations & Maintenance)	Escalator (Commodity Code)
Chemicals (activated carbon)	Vendor quote
Chemicals (antiscale)	Water treatment compounds (0679-0961)
Chemicals (chloramine)	Synthetic ammonia (0652-0135) + chlorine (0613-0302)
Chemicals (ClO_2)	Chlorine (0613-0302)
Electricity	Industrial electric power (0543)
Labor	Employee compensation per hour (private industry)
Maintenance materials	Miscellaneous general purpose equipment (1149)
Parts	Miscellaneous general purpose equipment (1149)
Performance monitoring	Medical and diagnostic laboratory (6215)
Tank lease	Heavy equipment lease (532412)

have been in commodity chemicals as a result of increasing demand from developing countries and in non-water-treatment industries, and limitations in manufacturing capacity. Costs for water treatment chemicals have increased at a somewhat slower pace than those for commodity chemicals. Energy prices have experienced significant fluctuations during this period, and they currently stand substantially below their peak levels. General prices for wages and other services have increased slowly by comparison. Tables 6 and 7 provide escalators for many of the components used to derive the projected 2009 capital and operating costs for the various treatment technologies.

SUMMARY

Ensuring safe drinking water supplies is an ongoing process. As new health risks are identified, they must be addressed. The solutions are seldom simple or inexpensive. Water utilities will soon be challenged to meet DBP regulations without creating additional health concerns, which may be the case with some of the alternative disinfectants (Krasner et al, 2006; Weinberg et al, 2002). Clearly, a number of treatment alternatives are available, and careful assessment must be made to determine which ones will provide the best performance for DBP control and other water quality objectives. Because of increasing costs, particularly those for commodity chemicals, it will be equally important to carefully evaluate the different treatments and perhaps combinations of treatments along with the respective vendors in order to ensure that an effective treatment is guaranteed while costs are kept reasonable.

Although the capital and operating costs for all of the technologies have increased from 2005 to 2009, the relative rankings of the technologies on an economic basis remain the same. On the basis of this reexamination of the technologies currently available to address compliance with the Stage 2 D/DBPR, it seems clear that precursor control—versus switching to an alternate disinfectant—is the preferred primary approach to compliance. Further, the data suggest that among the precursor technologies examined, activated carbon continues to be the most cost-effective method available.

ACKNOWLEDGMENT

Detailed information regarding the alternative disinfectants and technologies discussed in this article is available from the author. E-mail your request to alroy@comcast.net.

ABOUT THE AUTHOR

Alan J. Roy is president of MTZ Global Technologies Inc., 130 Crescent Dr., Sewickley, PA 15143; alroy813@comcast.net. A graduate of the University of Massachusetts, Amherst, with an MS in environmental engineering and a BS in civil engineering, Roy has 35 years' experience in water treatment application and practice, including evaluation of treatment technologies, design of treatment systems, and optimization of operations. He has been president and director of technical services at MTZ for the past 10 years.

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CATEGORY 1 - GREEN INFRASTRUCTURE

1.1 FTTP Green Roof

Roof Size	14,600	SF
Annual Precipitation	42	inches
Total Volume of Rain	382,199	gallons
Unit cost for wastewater treatment	$6.76	per 1,000 gallons
Amount Retained on Roof	50	percent
Amount Retained on Roof	191,099	gallons
Savings per year	$1,292	

Total heating requirements	87	kW
Hours per day operated	12	hrs
Number of months used	8	mos
Unit Cost for power	0.05	kWh
Total kWh used per year	250,560	kWh
Total cost for power	$12,528	
Estimated savings	10	percent
Amount of KW saved	25,056	kWh
Savings per year	$1,253	

1.2 FTTP Rain Garden

Area size	50,000	SF
Annual Precipitation	42	inches
Total Volume of Rain	1,308,901	gallons
Unit cost for wastewater treatment	$6.76	per 1,000 gallons
Amount Retained by grass	50	percent
Additional amount retained by garden	30	percent
Amount Retained by grass	654,450	gallons
Additional amount retained by garden	196,335	gallons
Savings per year	$1,327	

1.3 TMTP Green Roof

Roof Size	16,000	SF
Annual Precipitation	42	inches
Total Volume of Rain	418,848	gallons
Unit cost for wastewater treatment	$6.76	per 1,000 gallons
Amount Retained on Roof	50	percent
Amount Retained on Roof	209,424	gallons
Savings per year	$1,416	

Total heating requirements	87	kW
Hours per day operated	12	hrs
Number of months used	8	mos
Unit Cost for power	0.05	kWh
Total kWh used per year	250,560	kWh
Total cost for power	$12,528	
Estimated savings	10	percent
Amount of KW saved	25,056	kWh
Savings per year	$1,253	

CATEGORY 2 - WATER EFFICIENCY

2.1 FTTP EQ Basin

Amount sent to basin	191,099	gallons
Size of metal roof	3200	SF
Annual Precipitation	42	inches
Total Volume of Rain	83,770	gallons
Contactor backwash rate	6	gpm/SF
Contactor size	880	SF
Time for backwash, post change out	120	minutes
Time for backwash, monthly routine	5	minutes
Number of backwashes a year, post change out	8	events
Number of monthly routine, 12 x 8	96	events
Total volume of contactor backwash water	7,603,200	gallons
Contactor to waste rate	6	gpm/SF
Time for contactor to waste	60	minutes
Number of events	104	events
Total volume of contactor to waste water	32,947,200	gallons
Slurry water use per changout	50,000	gallons
Number of chang out events, 8	400,000	gallons
Total all flows into EQ basin	41,034,170	gallons
Unit cost for wastewater treatment	$6.76	per 1,000 gallons
Unit cost for pumping	$0.07	per 1,000 gallons
Total savings for wastewater treatment	$277,391	
Total savings for pumping	$2,872	

2.2 MPTP Reservoir Recycled Water

Contactor backwash rate	6	gpm/SF
Contactor size	624	SF
Time for backwash, post change out	120	minutes
Time for backwash, monthly routine	5	minutes
Number of backwashes a year, post change out	3	events
Number of monthly routine, 12 x 3	36	events
Total volume of contactor backwash water	2,021,760	gallons
Contactor to waste rate	6	gpm/SF
Time for contactor to waste	60	minutes
Number of events	39	events
Total volume of contactor to waste water	8,760,960	gallons
Slurry water use per changout	30,000	gallons
Number of chang out events, 3	90,000	gallons
Total all flows to Reservoir	10,872,720	gallons
Total savings for wastewater treatment	$73,500	
Total savings for pumping	$761	

2.3 TMTP EQ Basin

Contactor backwash rate	1000	gpm
Number of vessels	14	
Time for backwash, post change out	30	minutes
Time for backwash, monthly routine	5	minutes
Number of backwashes a year, post change out	14	events
Number of monthly routine, 12 x 14	168	events
Total volume of contactor backwash water	1,260,000	gallons
Contactor to waste rate	500	gpm
Time for contactor to waste	60	minutes
Number of events	182	events
Total volume of contactor to waste water	5,460,000	gallons
Slurry water use per changout	20,000	gallons
Number of chang out events, 14	280,000	gallons
Total all flows to Reservoir	7,000,000	gallons
Total savings for wastewater treatment	$47,320	
Total savings for pumping	$490	

2.4 FTTP Air Scour Blower

Contactor backwash rate	6	gpm/SF
Contactor size	880	SF
Time for backwash, post change out	120	minutes
Total volume of contactor backwash water	5,068,800	gallons
Cost to treat water that would be wasted	$2.97	per 1,000 gallons
Total savings for wastewater treatment	$15,054	

CATEGORY 3 - ENERGY EFFICIENCY

Taylor Mill Treatment Plant Advanced Treatment					
Count	Location	Watts	Hrs per week	kWh per Year	$ per Year
1	lab closet	69	2	7	$0
9	GAC PS	150	60	4,212	$211
4		73	168	2,551	$128
2	LF-AE	73	168	1,275	$64
2		36	168	629	$31
1	LF-BE	36	168	314	$16
2		60	168	1,048	$52
12		340	168	35,643	$1,782
8	LF-DE	340	168	23,762	$1,188
2		297	168	5,189	$259
3	LF-GE	297	168	7,784	$389
18		198	168	31,135	$1,557
13		123	168	13,969	$698
9	LF-JE	123	168	9,671	$484
6		93	168	4,875	$244
3	LF-KE	93	168	2,437	$122
18		60	168	9,435	$472
19	LF-ME	60	168	9,959	$498
4	LF-RE	56	168	1,957	$98
15	outside	185	70	10,101	$505
3	outside	198	70	2,162	$108
11	exit	0.92	168	88	$4
6	exit	0.92	168	48	$2
			TOTAL	**178,252**	**$8,913**

Fort Thomas Treatment Plant Advanced Treatment						
Fixture #	Count	Location	Watts	hrs per week	kWh per year	$ per Year
1	225	each floor	32	168	62,899	$3,145
2	5	pipe gallery	32	168	1,398	$70
3	35	each floor	100	168	30,576	$1,529
4	20	each floor	32	168	5,591	$280
5	7	pipe gallery	32	168	1,957	$98
6	12	mechanical	32	168	3,355	$168
8	6	exit	1	168	52	$3
9	1	exit	3	168	26	$1
11	1	exit	1	168	9	$0
12	1	roof	150	70	546	$27
13	1	roof	100	70	364	$18
				TOTAL	**106,773**	**$5,339**

Memorial Parkway Treatment Plant Advanced Treatment						
Fixture #	Count	Location	Watts	hrs per week	kWh per year	$ per Year
1	143		32	168	39,976	$1,999
2	5		32	168	1,398	$70
3	14		150	168	18,346	$917
5	10		1	168	87	$4
6	1		3	168	26	$1
8	1	outside	250	70	910	$46
				TOTAL	**60,743**	**$3,037**

u.s. climate data

Temperature - Precipitation - Sunshine

California
Florida
Georgia
Illinois
Michigan
Massachusetts
New Jersey
New York
North Carolina
Ohio
Pennsylvania
Texas
Other States

BOOKMARK

Climate - Cincinnati - Ohio

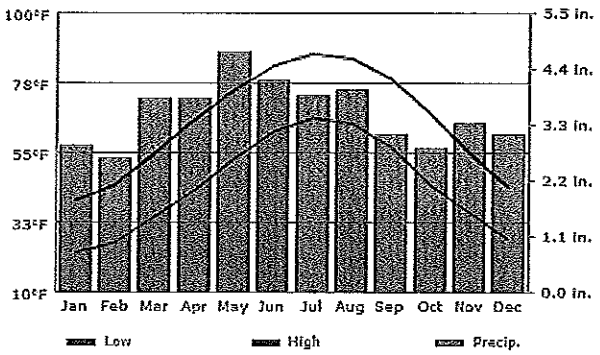
Temperature - Precipitation - Sunshine °C | °F

	Jan	Feb	March	April	May	June
Average high in °F	39	44	55	65	75	83
Average low in °F	22	26	34	43	53	62
Av. precipitation - inch	2.87	2.64	3.82	3.82	4.72	4.17
Days with precip.	13	11	13	12	12	13
Hours of sunshine	115	137	186	222	273	309

	July	Aug	Sep	Oct	Nov	Dec
Average high in °F	87	85	79	67	55	44
Average low in °F	66	64	57	44	36	27
Av. precipitation - inch	3.86	3.98	3.11	2.83	3.31	3.11
Days with precip.	10	9	9	9	10	11
Hours of sunshine	323	295	253	205	138	118

Free climate chart on your website

Cincinnati Climate Graph - Ohio Climate Chart



Totals and averages

Annual average high temperature	64.8 °F
Annual average low temperature	44.5 °F
Average temperature	54.6 °F
Average annual precipitation	42.2 in.
Days per year with precipitation	132 d.
Average annual hours of sunshine	2574 h.

Map of Cincinnati

STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE, 4TH FLOOR
FRANKFORT KENTUCKY 40601
www.kentucky.gov

January 18, 2011

Northern KY Water District
Attn: Amy Kramer, Design Engineering Manager
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018

RE: Northern Kentucky Water District
AI # 2485; PWSID # 0590220
WX: 21227208
Advanced Treatment Project
FTWTP, MPWTP & TMWTP

Dear Ms. Kramer:

Thank you for submitting a Green Project Reserve (GPR) business case for your proposed Advanced Treatment Project, funded through the Drinking Water State Revolving Fund (DWSRF). A provision of the 2011, DWSRF funding cycle requires that to the extent there are eligible project applications; states shall use 20% of its Drinking Water State Revolving Fund capitalization grant for green infrastructure projects. These projects are intended to address water and energy efficiency improvements or other environmentally innovative activities. The Kentucky Division of Water (KY DOW) has reviewed the GPR business case for the Advanced Treatment Project for the Fort Thomas Water Treatment Plant, Memorial Parkway Water Treatment Plant and the Taylor Mill Water Treatment Plant. Items 1.1-1.3, Items 2.1-2.4, and Item 3.1-3.10 were determined to be acceptable with a construction cost of $ 3,349,300. If the scope of the project is altered in any way to exclude the GPR eligible components, the Northern KY Water District shall submit the changes in writing to the KY DOW and receive prior approval in writing before proceeding with construction.

We look forward to working with you in finalizing your drinking water treatment project. If you have any questions regarding this correspondence, please contact me at (502) 564-3410, ext 4824.

Sincerely,

George P. Partridge Jr.

George P. Partridge Jr., P.E.
Kentucky Division of Water

Cc: NKWD – Amy Kramer, P.E.
DWSRF File

STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
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200 FAIR OAKS LANE, 4TH FLOOR
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

February 18, 2011

Amy Kramer, Engineering Manager
Northern KY Water District
2835 Crescent Springs Rd
PO Box 18640
Erlanger, KY 41018

RE: Northern KY Water District
AI # 2485
APE20100018
Taylor Mill WTP Advanced Treatment Improvements
Kenton County, KY

Dear Ms. Kramer:

We have reviewed the plans and specifications for the above referenced project. The plans include the following:

1. Construction of Preliminary Treatment/Granular Activated Carbon (GAC)
2. Building with rapid mix flocculation, Plate settling, residuals collection system and GAC pressure vessels.
3. Construction of a GAC Feed Pump Station.
4. Relocation of existing UV system
5. Installation of an electrical substation and two back-up generators;
6. Demolition of existing flocculation basins, sedimentation basins, and tunnel structure.

It has been determined that the plans and specification are technically APPROVED with respect to the sanitary features of design as of this date with the following stipulations:

A. The capacity of the treatment plant shall remain at 12 MGD (8,333 gpm).

B. Water pipe materials and adhesives used in the construction shall be NSF approved and compatible with various pH ranges and chemical to be used.

The following information and requirements relate to the Drinking Water State Revolving Fund.

1. You are hereby authorized to advertise for bids to construct this project. In addition to other notices, you shall advertise the bid for seven (7) to twenty-one (21) days prior to the Bid Opening date in the newspaper with the largest circulation in your area. Please provide the bid opening date to Cathy Arnett at the Division of Water who may be reached at (502) 564-3410.

2. You have received one (1) set of approved plans and specifications. An identical set should be made available at the project site at all times. If modifications are made to the plans and specifications prior to bidding, a complete set of revised plans and specifications shall be submitted to the Division of Water for approval. If applicable, our notice of approval will be issued at a later date by separate correspondence.

3. A set of AS-BID plans, executed contract specifications, and a copy of the Advertisement shall be submitted to the Division of Water. These items will be reviewed as part of the Authority to Award Process.

4. If applicable, clear site certificates of all involved properties must be submitted to the Division of Water prior to construction.

5. The attached Project Review and Cost Summary form is to be completed and signed after bids have been received and then submitted along with the supporting documents indicated on the form. Your signature on this form will certify that all the information to be retained by the recipient has been secured and is available for review by the Division at the pre-construction conference. The complete bid package should be submitted to the Division of Water within fourteen (14) days after the bid opening.

6. Upon approval of the bid documents, the Division of Water will authorize you to award the construction contract, and arrange for a pre-construction conference. Division of Water staff **must** be present at this pre-construction conference.

7. You are cautioned that the advertisement and award of this contract will be subject to the laws and regulations that govern the DWSRF process and the conditions of your KIA loan agreement.

8. Please be advised that the construction contract is subject to the Equal Employment Opportunity requirements contained in Executive Order 11246. Equal Employment opportunity affirmative action by the prime contractor and all subcontractors is mandated throughout the duration of the contract. Documentation of efforts to comply with Executive Order 11246, Equal Employment Opportunity in accordance with the EPA Special Notice to Bidders is required.

9. Documentation of compliance with the DBE Fair Share Policy in accordance with 40 CFR 31.36(e) is required and must be submitted to the Division of Water within fourteen (14) days of the bid opening.

10. If sanitary features of the approved plans are to be changed during construction, the engineer shall submit the revision to the Division of Water for approval prior to implementation of the modification. Written approval from the Division of Water must be granted prior to on-site work dedicated to the adjustment.

11. When this project is completed, the owner shall submit a written certification to the Division of Water that the above referenced water facilities have been constructed and tested in accordance with the approved plans. Such certification shall be signed by a licensed professional engineer.

12. When this project is completed, the engineer shall submit as-built drawings to the Division of Water.

13. Unless construction on this project commences within 2 years from the date of this approval, the original plans and specifications shall be re-submitted to the Division of Water for a new comprehensive review.

14. This approval has been issued under the provisions of KRS chapter 224 and regulations promulgated thereto. Issuance of this approval does not relieve the applicant from the responsibility of obtaining any other permits or licenses required by this and other state, federal, and local agencies.

If you have any questions concerning this project, please contact William Wright at (502) 564-3410 ext. 4829.

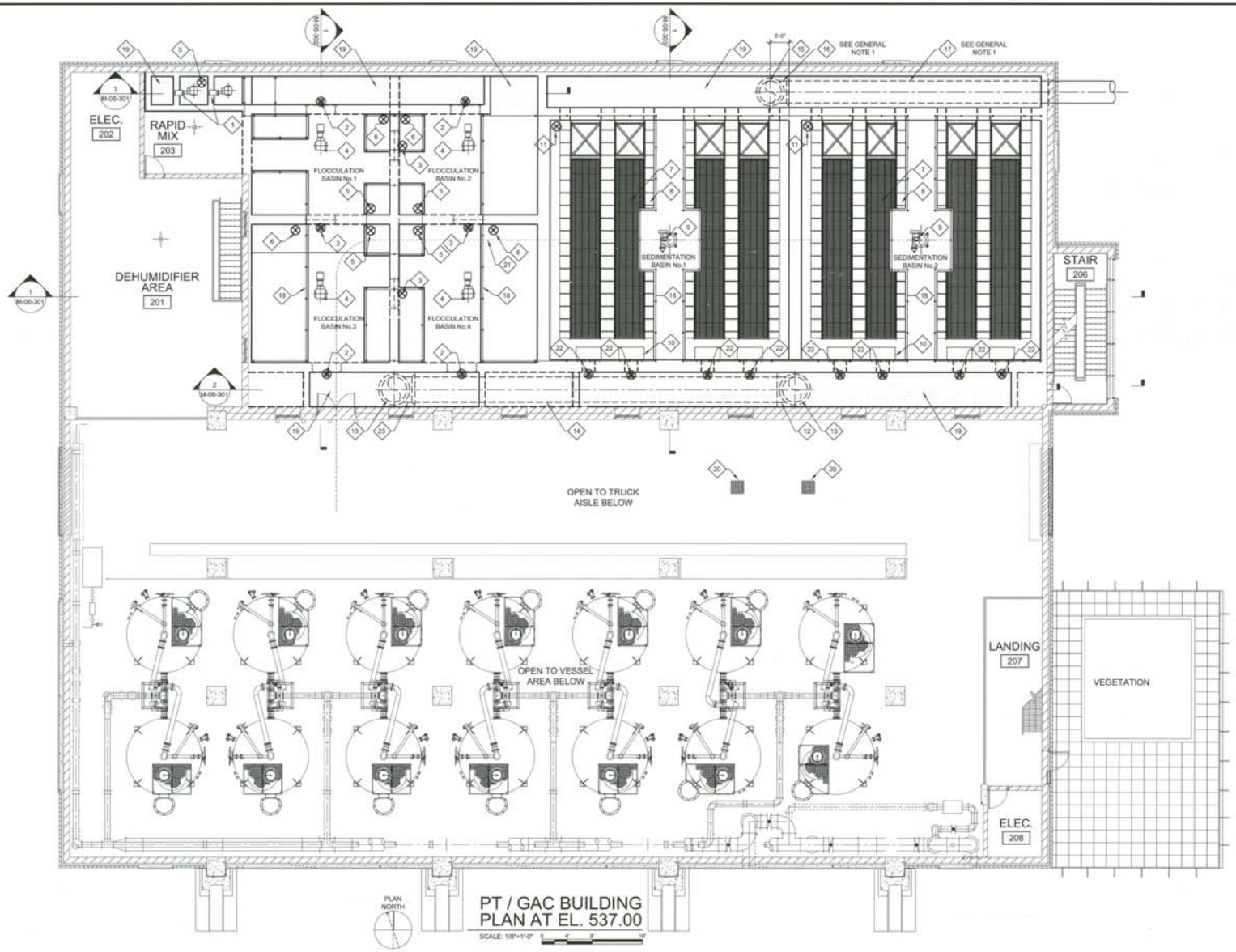
Sincerely,

E-Signed by Solitha Dharman
VERIFY authenticity with ApproveIt

Solitha Dharman, PE
Supervisor, Engineering Section
Drinking Water Branch
Division of Water

SWD:WLW

Enclosures
C: Jason Abbott, Malcolm Pirnie
Kentucky Infrastructure Authority
Cathy Arnett, Division of Water
Public Service Commission
Division of Plumbing
Florence Regional Office



◇ PRELIMINARY TREATMENT KEYNOTES:

1. RAPID MIX DRIVE
2. 4'-6" X 3'-0" SLIDE GATE W/HANDWHEEL OPERATOR
3. 4'-6" X 3'-0" SLUICE GATE W/HANDWHEEL OPERATOR
4. FLOCCULATOR DRIVE
5. 6" MUD VALVE W/HANDWHEEL OPERATOR
6. 6" PLUG VALVE W/HANDWHEEL OPERATOR
7. PLATE SETTLER CARTRIDGE (TYP.)
8. EFFLUENT TROUGH (TYP.)
9. THICKENER DRIVE
10. INLET DIFFUSER (TYP.)
11. 8" PLUG VALVE W/HANDWHEEL OPERATOR
12. 48" DI 90° BEND
13. 48" DI FLARE
14. 48" DI PIPE
15. 42" DI FLARE W/COLLAR X PE
16. 42" DI MJ 90° BEND
17. 42" DI RESTRAINED MJ PIPE
18. FRP HANDRAIL W/TOEBOARD (TYP.) SEE SHEET M-10-503
19. FRP PANELS (TYP.)
20. 2'-0" X 2'-0" ACCESS HATCH
21. MONORAIL W/2 TON ELECTRIC HOIST (SEE S-06-310 FOR DETAILS), SHOWN FOR CLARITY
22. 15" X 24" SLIDE GATE W/HANDWHEEL OPERATOR
23. 48" DI MJ 90° BEND

GENERAL NOTES:

1. REMOVE FOOTING PROJECTION AT RESTRAINED MECHANICAL JOINTS AS REQUIRED
2. INTENDED MODE OF OPERATION FOR THE FLOCCULATION BASINS SHALL BE TO OPERATE THE FOUR (4) BASINS IN SERIES WITH FLOW FROM FLOC BASIN No.2 - No. 1 - No. 3 - No. 4.

DRAWING IS NOT TO SCALE IF THIS DOCK NOT MEASURE 1 INCH.

MALCOLM PIRNIE

ENGINEERS · ARCHITECTS · PLANNERS

REVISIONS

NO.	BY	DATE	REMARKS

DES MRC
DWN JAB
CKD RCC

NORTHERN KENTUCKY WATER DISTRICT
TAYLOR MILL WATER TREATMENT PLANT
ADVANCED TREATMENT IMPROVEMENTS

MECHANICAL
PT / GAC BUILDING
PLAN AT EL. 537.00
SCALE: 1/8" = 1'-0"

ISSUED STATUS: 100% SUBMITTAL
DATE OCTOBER, 2010
SHEET M-06-103
CAD REF. NO. 3789-M-06-103

060000

Northern Kentucky Water Services
Taylor Mill Drinking Water Plant Technical Review
William Wright

Number of Service Connections = 80,000
Average Daily Flow = 12 MGD

Conversion Factors
7.48 gal/ft cube

GAC FEED PUMPS

There will be a total of three (3) Granular Activated Carbon Feed Pumps. Only two (2) will be in service with the third being used for redundancy. The capacity of each pump is 4,167 gpm each.

RAPID MIX

Coagulation - Coagulation shall mean a process using coagulant chemicals and mixing by which colloidal and suspended material are destabilized and agglomerated into settleable or filterable flocs, or both. The engineer shall submit the design basis for the velocity gradient (G value) selected, considering the chemicals to be added and water temperature, color and other related water quality parameters. For surface water plants using direct or conventional filtration, the use of a primary coagulant is required at all times

Retention Time/Velocity Gradient - Detention time should not be more than thirty seconds with mixing equipment capable of imparting a minimum velocity gradient (G) of at least 750 fps/ft. The design engineer should determine the appropriate G value and detention time through jar testing.

Number of Basins – 2
Basin Dimensions – 4.5'x4.67'x6.68'
Basin Volume – 140 ft^3 each

Retention time, **t = V/Q**

t = 140 ft^3/12 MGD = 140 ft^3/(12 MGD/7.48 gal/ft^3) = 0.0008726 Days
= 0.0008726 Days*1,440 min/Day = 0.125664 mins/basin = 7.53984 secs/basin

With 2 basins

Total Time **=** 7.53984 secs/basin * 2 basins = 15.079 secs

Required: $t \leq 30$ s
Actual: t = 15.

Required: Velocity Gradient (G) $\geq$ 750 fps/ft
Actual: G = 1000 fps/ft (provided by manufacturer)

Equipment - Basins should be equipped with devices capable of providing adequate mixing for all treatment flow rates. Static mixing may be considered where the flow is relatively constant and will be high enough to maintain the necessary turbulence for complete chemical reactions.

This plant will be equipped with a CONVENTIONAL RAPID MIXER.

Location - The coagulation and flocculation basins shall be as close together as possible.

FLOCCULATION

Basin Design - Inlet and outlet design shall minimize short-circuiting and destruction of floc. Series compartments are recommended to further minimize short-circuiting and to provide decreasing mixing energy with time. Basins shall be designed so that individual basins may be isolated without disrupting plant operation. A drain and/or pumps shall be provided to handle dewatering and sludge removal.

Detention – The detention time for floc formation should be at least 30 minutes with consideration to using tapered (i.e., diminishing velocity gradient) flocculation.

Number of Trains - 1
Number of Stages – 4
Basin Dimensions – 22'x22'x18'
Basin Volume – 8,712 ft^3 per stage

Detention time, **t = V/Q**

t = 8,712 ft^3/12 MGD = 8,712 ft^3/(12 MGD/7.48 gal/ft^3) = 0.00543048 Days
= 0.00543048 Days*1,440 min/Day = 7.819 mins/stage

With 4 stages

Total Time **=** 7.819 mins/stage * 4 stages = 31.217 minutes

Required: Great than 30 minutes
Actual: 31.217 minutes

Flow Through Rate - The flow-through velocity should be not less than 0.5 nor greater than 1.5 feet per minute.

V = L (length of basin)/t (basin detention time) = 22 feet / 7.819 mins = 2.814 ft/min

Required: 0.5 < V < 1.5 feet per minute
Actual: 2.814 fpm

Equipment – Agitators shall be driven by variable speed drives with the peripheral speed of paddles ranging from 0.5 to 3.0 feet per second. External, non-submerged motors are preferred.

Piping - Flocculation and sedimentation basins shall be as close together as possible. The velocity of flocculated water through pipes or conduits to settling basins shall be not less than 0.5 nor greater than 1.5 feet per second. Allowances must be made to minimize turbulence at bends and changes in direction.

Required: 0.5 < V < 3 feet per sec
Actual: .96 fps

SEDIMENTATION

Sedimentation shall follow flocculation unless otherwise approved by the reviewing agency. The detention time for effective clarification is dependent upon a number of factors related to basin design and the nature of the raw water. The following criteria apply to conventional gravity sedimentation units:

Detention Time - shall provide a minimum of four hours of settling time.

Number of Trains - 2
Number of Basins – 2
Basin Dimensions – 38'x38'x21'
Basin Volume – 37,544 ft^3 per basin

Detention time, **t = V/Q**

t = 37,544 ft^3/12 MGD = 37,544 ft^3/(12 MGD/7.48 gal/ft^3) = 0.023402426 Days
= 0.023402426 Days*1,440 min/Day = 7.819 mins/stage

With 4 stages

Total Time **=** 33.6994944 mins/basin * 2 basins = 67.3989888 minutes

Required: ? hours
Actual: 67.4 minutes
This was determined to be acceptable during in house meeting (as per Ten States Standards).

Weir Loading Rate - The rate of flow over the outlet weirs or through the submerged orifices shall not exceed 20,000 gallons per day per foot (250 m^3/day/m) of the outlet launder.

Requires: 20,000 gpd/ft
Actual: 23,438 gpd/ft

Flow Through Velocity - The velocity through settling basins should not exceed 0.5 feet per minute. The basins must be designed to minimize short-circuiting. Fixed or adjustable baffles must be provided as necessary to achieve the maximum potential for clarification.

Requires: 0.5 fpm
Actual: 0.56 fpm

DISINFECTION

The current disinfection set up will remain in place.

TEMPO Master File Information Request
Organization Request Form

Instructions: Complete this form as completely as possible. Any items highlighted in **RED** and preceded with ✸ are required fields and must be completed before your request can be processed. When this form is completed, **you must first save the form onto your computer**, then e-mail the completed form to EPPC DEP Tempo Svc for processing. After the request has been processed the record number will be sent via e-mail.

ORGANIZATION IDENTIFICATION INFORMATION

✸ **Proposed Master Organization Name: Malcolm Pirnie, Inc.**

✸ **Organization Type: Private**

ORGANIZATION LOCATION AND CONTACT INFORMATION

Physical Address (Primary)

✸ **Line 1: 8600 Governos Hill Drive**
Line 2: Suite 210
Line 3:
✸ **Municipality (City): Cincinnati**
✸ **State: Ohio**
✸ **Zip Code: 45249**

Mailing Address (if different from physical address)

Line 1:
Line 2:
Line 3:
Municipality (City):
State:
Zip Code:

Telecommunications:

Type	Address or Phone
Work Phone Number	513-677-6861
Work Fax Number	513-677-8480
E-Mail Address	jabbott@pirnie.com

✸ **RELATED ENTITIES (At least one related AI, Organization, or Person must be identified)**

Agency Interest	Relationship & AI #
Northern KY Water Service	Engineer submittaing Plans 2485

Organization, mailing address & phone	Relationship

Person, mailing address & phone	Relationship

SECTION 00830

PREVAILING WAGE RATES

R-1. GENERAL. The successful bidder will be required to conform to all provisions of the federal Davis-Bacon and Related Acts (The Act) which requires that all laborers and mechanics employed by contractors and subcontractors performing on federal contracts (and contractors and subcontractors performing on federally assisted contracts under the related ACTS) in excess of $2,000 pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits, as determined by the Department of Labor, for corresponding classes of laborers and mechanics employed on similar projects in the area.

This Contract shall be based upon payment by the Contractor and his Subcontractors of wage rates not less than the prevailing hourly wage rate for each craft or type of workman engaged on the Work as determined by the Department of Labor of the Commonwealth of Kentucky.

The Contractor shall comply with the prevailing wage law of Kentucky, Kentucky Revised Statutes 337.510 to 337.550, including latest amendments thereto.

The Contractor and each Subcontractor shall keep accurate records indicating the hours worked each day by each employee in each classification of work and the amount paid each employee for his work in each classification. Such records shall be open to the inspection and transcript of the Commissioner of Labor or his duly authorized representatives at any reasonable time. These payroll records shall not be destroyed or removed from the state for one year following completion of the improvement.

The Contractor and each Subcontractor shall post and keep posted in a conspicuous place or places at the construction site a copy or copies of prevailing rates of wages and working hours as prescribed in these Contract Documents.

If, during the life of this Contract, the prevailing hourly rate of wages is changed by the Department of Labor, such change shall not be the basis of any claim by the Contractor against the Owner, nor will deductions be made by the Owner against sums due the Contractor by reason of any such change.

The prevailing wage law does not prohibit payment of more than the prevailing rate of wages.

Pursuant to Kentucky Revised Statute 337.540, no laborer, workman, mechanic, helper, assistant, or apprentice shall be permitted to work more than 8 hours in one calendar day, nor more than 40 hours in one week, except in cases of emergency caused by fire, flood, or damage to life or property. Whenever work in excess of 8 hours per day or 40 hours per week is required, payment for overtime shall be at not less than one and one-half times the prevailing rate of wages.

R-2. PREVAILING WAGES. The following wage rate schedule is the prevailing wage rate determination made by the Department of Labor of the Commonwealth of Kentucky on the designated date, and shall be a part of the Contract.

Clarksville WTP Raw/Settled Turbidity

Jan-Nov 2010

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV
	R/S	R/S	R/S	R/S	R/S	R/S	R/S	R/S	R/S	R/S	R/S
1	11/.3	20/.39	14/.97	13/.40	16/.28	8/.53	14/.37	4/.34	4/.39	6/.27	4/.19
2	12/.29	19/.67	18/.67	12/.35	223/.69	8/.72	7/.41	3/.31	4/.30	6/.24	3/.14
3	10/.33	15/.46	16/.66	11/.39	223/1.30	5/.39	7/.45	4/.41	2/.31	7/.20	4/.11
4	9/.41	10/.51	15/.76	12/.49	95/1.13	6/.37	6/.34	4/.35	2/.38	4/.23	4/.30
5	12/.59	11/.37	16/.70	11/.45	73/.72	7/.35	6/.31	4/.34	3/.39	4/.37	3/.24
6	14/.66	29/.39	14/.76	7/.50	53/.98	8/.40	6/.35	3/.37	2/.34	8/.35	4/.25
7	7/.39	23/.53	15/.78	10/.50	61/.80	10/.66	6/.33	3/.36	2/.35	5/.29	3/.33
8	8/.42	21/.56	15/.89	9/.35	68/.92	8/.51	6/.35	5/.35	2/.38	4/.33	4/.34
9	8/.38	26/.57	11/.57	7/.41	62/.82	10/.38	6/.38	4/.41	2/.49	5/.25	4/.21
10	8/.92	20/.52	12/.64	8/.50	54/.65	9/.38	8/.24	3/.36	3/.31	5/.34	4/.21
11	5/.43	21/.62	12/.67	9/.42	47/.68	10/.60	13/.20	2/.39	4/.30	4/.25	4/.31
12	5/.35	21/.75	11/.64	8/.46	36/1.35	9/.36	9/.40	3/.38	3/.39	5/.17	5/.30
13	4/.49	19/.50	12/.60	16/.32	30/.64	9/.58	7/.28	3/.30	5/.25	4/.18	5/.45
14	4/.62	16/.66	14/.72	8/.52	20/.58	11/.45	4/.25	4/.27	5/.33	3/.30	3/.36
15	4/.56	14/.50	16/.84	8/.27	20/.41	7/.46	4/.23	8/.39	3/.29	4/.51	2/.38
16	4/.57	12/.46	11/.62	8/.33	19/.32	9/.55	4/.28	7/.38	2/.30	5/.30	3/.21
17	5/.39	11/.57	10/.59	9/.27	14/.38	8/.35	3/.27	6/.46	2/.30	4/.30	3/.19
18	11/.59	13/1.16	10/.70	9/.20	20/.36	8/.28	3/.39	8/.50	2/.28	6/.25	3/.18
19	35/.63	12/.49	10/.59	10/.34	12/.48	7/.29	4/.33	22/.33	3/.36	4/.16	3/.29
20	14/.40	13/.50	10/.66	7/.31	15/.37	5/.36	3/.38	33/.31	3/.44	3/.15	3/.21
21	8/.31	16/.52	11/.47	8/.16	16/.37	6/.34	4/.35	7/.34	2/.23	4/.12	5/.47
22	12/.31	13/.60	16/.68	8/.17	14/.42	6/.36	4/.52	8/.55	2/.38	3/.19	5/.35
23	16/.44	11/1.08	14/.52	16/.37	12/.46	5/.60	3/.44	7/.57	5/.31	3/.17	6/.25
24	23/.40	11/.80	12/.70	7/.21	10/.56	6/.55	4/.46	9/.57	6/.27	3/.17	4/.20
25	19/.46	12/.68	14/.53	18/.37	12/.51	7/.56	4/.35	7/.52	5/.31	2/.17	4/.25
26	23/.36	12/.90	23/.44	31/.62	11/.54	8/.41	6/.80	4/.30	5/.32	2/.16	6/.25
27	23/.33	14/.76	17/.46	16/.30	11/.87	6/.40	5/.28	7/.45	5/.30	5/.14	4/.24
28	35/.40	13/.65	17/.51	11/.45	11/.56	6/.63	7/.28	5/.36	6/.26	4/.19	4/.25
29	30/.49		13/.46	10/.28	21/.73	6/.43	5/.29	4/.37	4/.29	5/.20	4/.20
30	24/.48		12/.50	11/.27	11/.51	9/.30	4/.24	3/.48	5/.30	3/.24	6/.26
31	23/.42		12/.45		10/.30		4/.30	4/.33		3/.18	

* see note

* The highest raw turbidity reading during this May 2010 flood event was 282 NTU with a settled reading of .65 NTU.

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY Montgomery PWSID # 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Supply
COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF January YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY							CHLORINE RESIDUAL MG/L		ALKALINITY MG/L			pH		HARDNESS MG/L		IRON MG/L			MANGANESE MG/L			FLUORIDE MG/L			CHEMICALS USED
				Raw	FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	4-8	8-12	PM 12-4	4-8	8-12	ON TOP OF FILTER	LOWEST PLANT EFFLUENT	TOTAL	PHENOLPHTHALEIN FINISHED	TOTAL FINISHED	RAW	FINISHED	RAW	FINISHED	RAW	FINISHED	DIST. SYSTEM	RAW	FINISHED	DIST. SYSTEM	RAW	FINISHED	DISTRIBUTION SYSTEM	POUNDS PER 24 HOURS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31	32
1	12944	12918	10	11	0.05	0.05	0.05	0.06	0.06	0.06	0.5	1.9	85	80		7.9	7.6	104	100	0.14	0.00		0.068	0.009		0.18	1.06		1387
2	13001	12612	10	12	0.06	0.05	0.05	0.05	0.06	0.06	0.4	1.9	83	79		7.7	7.4	138	122	0.14	0.00		0.065	0.008		0.13	1.04		1314
3	13778	13838	9	10	0.06	0.05	0.05	0.05	0.06	0.06	0.5	1.8	84	82		7.9	7.5	116	110	0.06	0.00		0.063	0.009		0.03	1.23		1606
4	14676	14653	9	9	0.06	0.05	0.06	0.06	0.06	0.06	0.5	1.9	82	74		7.8	7.7	108	108	0.10	0.00	0.02	0.058	0.007	0.006	0.16	1.01	1.02	1606
5	15019	15123	9	12	0.06	0.06	0.06	0.05	0.06	0.06	0.5	2.2	79	78		7.7	7.4	100	100	0.12	0.02	0.09	0.053	0.012	0.010	0.18	1.00	1.09	1606
6	14941	14645	8	14	0.06	0.06	0.06	0.05	0.06	0.06	0.3	1.9	77	82		7.7	7.5	102	96	0.08	0.02	0.04	0.045	0.008	0.009	0.04	0.97	0.91	1314
7	14273	14442	7	7	0.06	0.06	0.06	0.05	0.10	0.06	0.5	2.0	84	84		7.9	7.6	106	104	0.06	0.03	0.02	0.056	0.006	0.008	0.06	0.98	0.94	1606
8	15114	15494	7	8	0.06	0.06	0.06	0.05	0.06	0.06	0.5	2.0	83	83		7.8	7.8	104	102	0.05	0.01	0.03	0.046	0.005	0.005	0.15	1.00	0.99	1606
9	14551	14719	7	8	0.06	0.05	0.05	0.06	0.06	0.07	0.5	1.9	79	82		8.0	7.7	94	106	0.08	0.01		0.035	0.016		0.02	0.99		1606
10	16250	15899	7	8	0.07	0.10	0.09	0.27	0.06	0.05	0.4	1.9	84	86		7.9	7.8	114	108	0.08	0.01		0.038	0.012		0.14	1.07		1752
11	16308	16823	7	5	0.06	0.06	0.05	0.18	0.06	0.06	0.4	1.9	83	80		7.9	7.6	102	104	0.06	0.03	0.18	0.052	0.016	0.020	0.02	0.91	0.87	2044
12	16453	16064	5	5	0.08	0.12	0.34	0.08	0.06	0.06	0.5	2.0	78	84		7.6	7.4	100	104	0.17	0.01	0.01	0.090	0.018	0.009	0.24	1.06	1.05	2190
13	16303	16350	5	4	0.06	0.06	0.05	0.06	0.06	0.06	0.4	1.8	80	84		7.8	7.5	102	100	0.08	0.00	0.00	0.028	0.012	0.017	0.10	1.08	1.01	1825
14	17960	18431	6	4	0.06	0.06	0.06	0.06	0.06	0.06	0.5	2.0	82	78		7.8	7.5	104	100	0.08	0.02	0.01	0.038	0.009	0.014	0.05	0.98	0.99	1898
15	15793	15838	6	5	0.06	0.06	0.07	0.05	0.20	0.06	0.4	1.9	86	82		7.9	7.7	106	102	0.07	0.02	0.01	0.048	0.011	0.016	0.14	0.98	0.91	2044
16	15180	15322	6	4	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.8	85	85		8.3	7.9	96	114	0.10	0.01		0.035	0.001		0.12	1.01		1752
17	14660	14724	6	5	0.06	0.06	0.06	0.06	0.06	0.07	0.5	1.7	84	86		8.3	8.0	108	118	0.06	0.02		0.044	0.010		0.29	1.03		2044
18	16116	16083	6	11	0.07	0.06	0.06	0.06	0.07	0.07	0.3	1.7	85	90		8.1	7.9	110	120	0.22	0.03	0.01	0.064	0.010	0.015	0.05	1.12	1.14	2263
19	16329	15901	7	35	0.06	0.06	0.06	0.06	0.06	0.06	0.3	1.8	85	88		7.5	7.4	104	108	0.18	0.02	0.02	0.052	0.011	0.009	0.09	1.06	1.01	3212
20	15659	15499	8	14	0.06	0.06	0.06	0.06	0.06	0.06	0.3	1.7	84	82		7.7	7.5	114	106	0.18	0.01	0.01	0.062	0.010	0.007	0.29	0.94	0.98	2628
21	13057	12731	8	8	0.06	0.06	0.07	0.06	0.08	0.10	0.4	1.7	91	98		7.3	7.7	108	116	0.14	0.01	0.02	0.073	0.009	0.015	0.08	1.05	1.01	2190
22	14780	14575	9	13	0.06	0.06	0.07	0.10	0.12	0.10	0.4	2.0	99	98		7.8	7.6	124	114	0.14	0.01	0.02	0.070	0.013	0.009	0.18	1.06	1.04	2482
23	13866	13915	9	16	0.10	0.10	0.08	0.07	0.07	0.08	0.4	2.0	91	96		8.0	7.8	112	124	0.15	0.01		0.071	0.007		0.14	1.08		2190
24	14272	14287	8	23	0.09	0.08	0.08	0.07	0.08	0.08	0.5	2.0	97	97		7.7	7.5	124	120	0.24	0.04		0.105	0.019		0.13	0.99		2847
25	15165	14879	8	19	0.13	0.07	0.06	0.06	0.06	0.07	0.5	2.1	102	98		7.5	7.4	122	118	0.20	0.02	0.04	0.082	0.004	0.030	0.19	1.00	0.98	2920
26	14871	14487	9	23	0.13	0.09	0.14	0.07	0.08	0.08	0.5	2.0	90	96		7.6	7.9	114	108	0.18	0.02	0.01	0.076	0.006	0.009	0.14	1.03	1.00	2847
27	13715	13409	10	23	0.10	0.09	0.09	0.07	0.08	0.09	0.3	2.1	93	95		7.8	7.7	118	116	0.37	0.01	0.03	0.040	0.000	0.001	0.11	0.92	0.90	2920
28	14272	13992	10	35	0.09	0.14	0.06	0.12	0.06	0.06	0.5	2.1	89	91		7.5	7.4	104	108	0.33	0.01	0.02	0.144	0.008	0.010	0.02	0.91	0.92	2701
29	12900	13375	10	30	0.06	0.06	0.06	0.06	0.06	0.06	0.5	2.1	91	87		7.7	7.6	106	104	0.25	0.02	0.02	0.077	0.007	0.009	0.04	0.99	1.01	2628
30	14601	14496	9	24	0.06	0.06	0.07	0.06	0.06	0.06	0.6	2.2	99	99		7.7	7.4	102	110	0.25	0.01		0.104	0.007		0.09	1.34		2336
31	13909	13681	7	23	0.06	0.06	0.06	0.06	0.06	0.06	0.4	2.0	89	79		7.6	7.3	98	102	0.21	0.01		0.096	0.006		0.22	1.11		2701
TOTAL	460715	459200	242	428	2.17	2.12	2.30	2.28	2.20	2.06	13.7	60.2	2683	2683	0	241.6	235.9	3364	3372	4.57	0.44	0.61	1.978	0.286	0.228	3.82	32.00	19.77	66065
AVE.	14862	14813	8	14	0.07	0.07	0.07	0.07	0.07	0.07	0.4	1.9	87	87	0	7.8	7.6	109	109	0.15	0.01	0.03	0.064	0.009	0.011	0.12	1.03	0.99	2131
MAX.	17960	18431	10	35	0.13	0.14	0.34	0.27	0.20	0.10	0.6	2.2	102	99	0	8.3	8.0	138	124	0.37	0.04	0.18	0.144	0.019	0.030	0.29	1.34	1.14	3212
MIN.	12900	12612	5	4	0.05	0.05	0.05	0.05	0.06	0.05	0.3	1.7	77	74	0	7.3	7.3	94	96	0.05	0.00	0.00	0.028	0.000	0.001	0.02	0.91	0.87	1314

CHEMICALS USED — POUNDS PER 24 HOURS

DATE	COAGULANT - COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALISOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	1387	104	158		464			41
2	1314	104	150		471			41
3	1606	108	162		514			32
4	1606	113	182		561			46
5	1606	145	172		555			46
6	1314	138	174		529			41
7	1606	131	160		509			41
8	1606	135	169		561			41
9	1606	132	164		528			41
10	1752	141	184		612			36
11	2044	169	231		604			46
12	2190	130	200		600			32
13	1825	122	204		589			36
14	1898	138	232		638			41
15	2044	109	199		551			41
16	1752	107	193		545			41
17	2044	103	182		523			41
18	2263	116	199		608			41
19	3212	136	221		580			36
20	2628	117	195		562			32
21	2190	108	179		466			36
22	2482	117	205		489			41
23	2190	105	185		478			36
24	2847	108	187		499			41
25	2920	109	177		557			32
26	2847	109	176		534			41
27	2920	107	169		490			32
28	2701	110	163		485			32
29	2628	103	152		409			32
30	2336	111	169		549			27
31	2701	100	151		488			41
TOTAL	66065	3685	5644	0	16548	0	0	1184
AVE.	2131	119	182	0	534	0	0	38
MAX.	3212	169	232	0	638	0	0	46
MIN.	2701	100	150	0	409	0	0	27

CHEMICALS USED — CALCULATED DOSAGE MG/L

DATE	COAGULANT - COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALISOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	12.8	2.4		0.78			0.38
2	12.1	2.3		0.79			0.38
3	14.0	2.3		0.81			0.28
4	13.1	2.4		0.83			0.38
5	12.8	2.5		0.81			0.37
6	10.5	2.5		0.77			0.33
7	13.5	2.4		0.78			0.34
8	12.7	2.4		0.81			0.33
9	13.2	2.4		0.79			0.34
10	12.9	2.4		0.82			0.27
11	15.0	2.9		0.81			0.34
12	16.0	2.4		0.80			0.23
13	13.4	2.4		0.79			0.26
14	12.7	2.5		0.78			0.27
15	15.5	2.3		0.76			0.31
16	13.8	2.4		0.78			0.32
17	16.7	2.3		0.78			0.34
18	16.8	2.3		0.82			0.31
19	23.6	2.6		0.78			0.26
20	20.1	2.4		0.78			0.25
21	20.1	2.6		0.78			0.33
22	20.1	2.6		0.72			0.33
23	18.9	2.5		0.75			0.31
24	23.9	2.5		0.76			0.34
25	23.1	2.3		0.80			0.25
26	23.0	2.3		0.78			0.33
27	25.5	2.4		0.78			0.26
28	22.7	2.3		0.74			0.27
29	24.4	2.4		0.69			0.30
30	19.2	2.3		0.82			0.22
31	23.3	2.2		0.77			0.35
TOTAL	75	75.2	0.0	24.30	0.0	0.00	9.60
AVE.	17	2.4	0.00	0.78	0.00	0.00	0.31
MAX.	26	2.9	0.00	0.83	0.00	0.00	0.38
MIN.	11	2.2	0.00	0.69	0.00	0.00	0.22

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____ SIGNATURE

CERTIFICATE NUMBER _____

000098

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L	JAR TEST DATA: pH ADJUSTMENT MG/L	JAR TEST DATA: pH		FILTER DATA	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DINSINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE END OF SEQUENCE C	CONTACT TIME IN MINUTES: T	END OF SEQUENCE pH	CALCULATED CT	REQUIRED CT	SECOND DISINFECTION SEQUENCE: FREE CHLORINE END OF SEQUENCE C	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	CALCULATED CT	REQUIRED CT	CT CALC. / CT REQ. TOTAL INACTIVATION RATIO	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distributiob system. Must vary within system.
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	12944	14		7.7			12	288	72	12	12	12	6500	140.7																			
2	13001	14		7.5		(a) Type of Filters - Gravity (x)	12	288	72	12	12	12	6500	96.7																				
3	13778	14		7.6		Pressure ( )	12	288	72	12	12	12	6500	119.6																				
4	14676	14		7.8		(b) Number of Filters - 12	12	288	72	12	12	12	6500	120.8																	1.4	0.24	0.19	109 Greenland Farms (AB 0902)
5	15019	14		7.5			12	288	72	12	12	12	6500	115.0																1.6	0.20	0.2	423 Gary Hills Dr. (1020 - AB)
6	14941	14		7.6		(c) Filter Area - Sq. Ft. (Each) 360	12	288	72	12	12	12	6500	120.5																1.2	0.26	0.19	902 Lucy Lane (AB 0905)
7	14273	14					12	288	72	12	12	12	6500	112.0																1.8	0.21	0.19	1295 Paradise Hill Rd (0955 - AT)
8	15114	14		7.8		(d) Filter Area - Sq. Ft. (Each) 360	12	288	72	12	12	12	6500	107.0																1.4	0.15	0.12	1874 Memorial Dr. (AT 0951)
9	14551	14		7.9			12	288	72	12	12	12	6500	122.9																			
10	16250	14		7.8		(e) Total Area - Sq. Ft. - 4,320	12	288	72	12	12	12	6500	123.8																				
11	16308	14		7.7			12	288	72	12	12	12	6500	147.5																1.3	0.14	0.17	1490 Charles Bell Rd. (AT 9 19)
12	16453	18		7.4		(f) Filter Rate gpm/ft2 3 gpm	12	276	48	12	12	12	6500	281.8																1.6	0.18	0.19	180 Holiday Dr. (0901 - AT)
13	16303	16					12	288	48	12	12	12	6500	215.1																1.5	0.14	0.16	925 Kenwood Dr. (0916 AT)
14	17960	16				(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	186.2																1.6	0.17	0.19	3406 Eastwood Dr. (0641 - AT)
15	15793	16		7.7			12	288	48	12	12	12	6500	197.7																1.5	0.15	0.17	114 Keith Dr. (1102 - AT)
16	15180	16		8.1		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	202.7																				
17	14660	16		8.1		GPM - 16,667	12	288	48	12	12	12	6500	177.0								1.7	206	8	207	39	5.32							
18	16116	16		7.9		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	181.1																1.2	0.14	0.08	2275 Dewitt Dr. (SK 9:30am)
19	16329	22		7.6		Wtth: Salt ( )	12	288	48	12	12	12	6500	190.5																1.7	0.12	0.1	601 Riverside Dr (1404 AB)
20	15659	20		6.8		KMnO4 ( )	12	288	48	12	12	12	6500	186.8																1.6	0.16	0.17	412 Jordan Dr. (0921 - AB)
21	13057	20		7.8		Acid ( )	12	264	48	12	12	12	6500	176.6																1.4	0.16	0.14	118 E Street (AT 0936)
22	14780	20		7.7			12	288	48	12	12	12	6500	181.5																1.2	0.16	0.22	2413 Chris Dr. (0940 AT)
23	13866	20		7.9			12	288	48	12	12	12	6500	186.5																			
24	14272	22		7.7			12	288	48	12	12	12	6500	182.2																			
25	15165	22		7.3			12	288	48	12	12	12	6500	206.5																1.4	0.23	0.2	1130 Gratton Rd. (1115 - AT)
26	14871	22		7.4			12	288	48	12	12	12	6500	186.6																1.3	0.21	0.25	2215 Madison St. (1306 AB)
27	13715	22		7.8			12	288	48	12	12	12	6500	190.1																1.5	0.12	0.16	3216 Hwy. 41-A South. (0950 - AT)
28	14272	22		6.6			12	288	48	12	12	12	6500	190.2																1.2	0.31	0.36	1990 Cane Brake Rd (AB 0950)
29	12900	24		7.5			12	288	48	12	12	12	6500	213.7																1.9	0.21	0.24	191 Cheshire Rd. (AB 1030)
30	14601	22		7.5			12	288	48	12	12	12	6500	187.6																			
31	13909	22		7.3			12	288	48	12	12	12	6500	208.4																			
						Total Backwash Water 5255.1 Remarks:																									3.66	3.69	TOTAL
																														0.18	0.18	AVERAGE
																														0.31	0.36	MAX
																														0.12	0.08	MIN

NAME OF WATER UTILITY: Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY: Montgomery PWSID #: 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Supply
COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF: February YEAR: 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY: Raw	TURBIDITY: FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L: ON TOP OF FILTER	CHLORINE RESIDUAL MG/L: LOWEST PLANT EFFLUENT	ALKALINITY MG/L: TOTAL	PHENOLPHTHALEIN: FINISHED	TOTAL: FINISHED	pH: RAW	pH: FINISHED	HARDNESS MG/L: RAW	HARDNESS MG/L: FINISHED	IRON MG/L: RAW	IRON MG/L: FINISHED	IRON MG/L: DIST. SYSTEM	MANGANESE MG/L: RAW	MANGANESE MG/L: FINISHED	MANGANESE MG/L: DIST. SYSTEM	FLUORIDE MG/L: RAW	FLUORIDE MG/L: FINISHED	FLUORIDE MG/L: DISTRIBUTION SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31
1	14689	14145	7	20	0.06	0.06	0.08	0.09	0.11	0.13	0.5	2.2	84	85		7.6	7.3	98	98	0.28	0.02	0.03	0.085	0.011	0.006	0.10	0.97	0.91
2	14942	14768	7	19	0.12	0.10	0.10	0.08	0.06	0.06	0.5	2.2	78	84		7.6	7.4	100	102	0.20	0.01	0.01	0.075	0.005	0.006	0.20	1.04	1.00
3	14359	14098	8	15	0.08	0.06	0.06	0.06	0.06	0.06	0.5	2.1	80	82		7.5	7.4	104	98	0.15	0.01	0.02	0.058	0.005	0.003	0.23	0.99	0.98
4	14819	14912	8	10	0.06	0.06	0.06	0.06	0.06	0.06	0.4	2.0	86	77		7.5	7.4	100	102	0.15	0.01	0.01	0.049	0.006	0.005	0.14	1.01	0.96
5	13803	13855	8	11	0.07	0.07	0.11	0.11	0.11	0.10	0.4	2.0	80	81		7.8	7.5	92	98	0.28	0.03	0.02	0.061	0.005	0.008	0.11	0.98	0.93
6	13478	13358	8	23	0.10	0.09	0.07	0.06	0.07	0.07	0.3	1.9	79	87		7.5	7.3	96	108	0.33	0.02		0.098	0.012		0.10	0.93	
7	14663	14155	8	23	0.07	0.07	0.06	0.07	0.08	0.09	0.5	1.9	72	78		7.6	7.5	128	130	0.26	0.01		0.105	0.004		0.32	1.05	
8	14713	14660	8	21	0.10	0.10	0.09	0.09	0.10	0.12	0.5	2.0	80	79		7.4	7.5	118	98	0.17	0.01	0.01	0.067	0.007	0.004	0.18	1.00	0.97
9	14637	14618	8	26	0.12	0.11	0.08	0.10	0.09	0.09	0.5	2.0	79	82		7.5	7.3	104	104	0.28	0.01		0.117	0.000		0.34	1.33	
10	14192	14530	7	20	0.08	0.08	0.08	0.07	0.07	0.08	0.5	1.9	81	81		7.6	7.3	112	110	0.24	0.02		0.095	0.000		0.18	1.20	
11	15147	14928	7	21	0.08	0.08	0.06	0.06	0.05	0.07	0.5	2.0	84	86		7.5	7.3	116	110	0.26	0.02	0.01	0.109	0.007	0.014	0.20	0.98	0.92
12	13324	12956	7	21	0.06	0.05	0.05	0.06	0.05	0.05	0.5	2.0	78	80		7.5	7.2	100	100	0.21	0.01	0.01	0.091	0.006	0.012	0.15	0.99	0.97
13	13921	14042	8	19	0.06	0.06	0.06	0.08	0.11	0.06	0.4	1.9	91	85		7.7	7.4	100	96	0.19	0.01		0.096	0.012		0.20	1.06	
14	14499	14546	8	16	0.09	0.07	0.06	0.06	0.06	0.06	0.5	1.9	77	75		7.5	7.3	144	136	0.24	0.01		0.074	0.006		0.25	1.01	
15	16654	16627	8	14	0.06	0.06	0.06	0.06	0.06	0.06	0.4	1.8	80	71		7.6	7.3	128	122	0.15	0.00		0.082	0.010		0.36	1.10	
16	13579	12957	8	12	0.07	0.07	0.06	0.07	0.07	0.07	0.5	2.0	82	74		7.5	7.3	96	98	0.39	0.01	0.02	0.142	0.009	0.011	0.17	0.97	0.93
17	12795	13051	7	11	0.07	0.07	0.06	0.06	0.06	0.06	0.3	1.8	82	76		7.6	7.3	94	92	0.19	0.02	0.01	0.088	0.009	0.012	0.21	0.91	0.92
18	16195	15003	7	13	0.08	0.07	0.07	0.07	0.09	0.08	0.4	2.0	79	73		7.5	7.3	96	98	0.21	0.00	0.02	0.073	0.010	0.010	0.09	1.01	1.02
19	15624	15694	7	12	0.08	0.07	0.06	0.06	0.07	0.07	0.5	1.9	77	73		7.5	7.3	94	94	0.17	0.00	0.01	0.032	0.004	0.006	0.11	1.02	0.99
20	14238	14219	7	13	0.08	0.07	0.07	0.07	0.08	0.08	0.5	1.9	75	76		7.5	7.3	94	100	0.13	0.00		0.066	0.006		0.10	0.94	
21	14587	14352	7	16	0.08	0.07	0.06	0.06	0.07	0.07	0.5	2.0	70	68		7.6	7.3	98	92	0.18	0.02		0.068	0.006		0.21	1.07	
22	14444	13353	8	13	0.07	0.08	0.08	0.07	0.08	0.08	0.5	2.0	70	71		7.5	7.2	90	104	0.45	0.02	0.01	0.099	0.013	0.007	0.06	0.92	0.96
23	14469	14132	9	11	0.07	0.07	0.08	0.08	0.08	0.08	0.4	1.8	71	67		7.7	7.3	98	98	0.09	0.02	0.01	0.111	0.007	0.008	0.16	1.02	1.07
24	14739	14270	9	11	0.07	0.07	0.07	0.07	0.07	0.06	0.4	1.9	72	73		7.6	7.4	98	96	0.14	0.02	0.01	0.126	0.011	0.016	0.15	1.00	0.96
25	14603	13825	8	12	0.06	0.06	0.07	0.08	0.07	0.07	0.5	2.0	73	70		7.5	7.3	86	84	0.16	0.02	0.01	0.108	0.009	0.014	0.13	1.02	0.98
26	14282	14322	8	12	0.07	0.07	0.07	0.07	0.07	0.07	0.4	1.9	78	82		7.7	7.5	90	94	0.15	0.01	0.02	0.144	0.014	0.016	0.04	0.97	0.96
27	14550	14211	8	14	0.06	0.07	0.07	0.07	0.06	0.07	0.5	1.9	76	74		7.4	6.7	96	92	0.16	0.00		0.152	0.010		0.25	1.10	
28	14753	14543	8	13	0.07	0.07	0.07	0.06	0.06	0.06	0.5	1.9	69	75		7.9	7.7	96	96	0.13	0.00		0.163	0.012		0.01	1.07	
29																												
30																												
31																												
TOTAL	406701	400131	216	442	2.14	2.03	1.97	2.00	2.07	2.08	12.8	54.7	2183	2165	0	212.0	205.5	2866	2850	5.94	0.34	0.24	2.634	0.216	0.158	4.75	28.66	16.43
AVE.	14525	14290	8	16	0.08	0.07	0.07	0.07	0.07	0.07	0.5	2.0	78	77	0	7.6	7.3	102	102	0.21	0.01	0.01	0.094	0.008	0.009	0.17	1.02	0.97
MAX.	16654	16627	9	26	0.12	0.11	0.11	0.11	0.11	0.13	0.5	2.2	91	87	0	7.9	7.7	144	136	0.45	0.03	0.03	0.163	0.014	0.016	0.36	1.33	1.07
MIN.	12795	12956	7	10	0.06	0.05	0.05	0.06	0.05	0.05	0.3	1.8	69	67	0	7.4	6.7	86	84	0.09	0.00	0.01	0.032	0.000	0.003	0.01	0.91	0.91

CHEMICALS USED

POUNDS PER 24 HOURS

DATE	COAGULANT -	COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALSOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	32	33	34	35	36	37	38	39
1	2555	114	175		512			36
2	2482	107	168		500			32
3	2409	108	163		494			41
4	2482	107	152		517			32
5	2190	102	144		478			27
6	1971	96	135		471			27
7	2190	106	155		503			41
8	2190	108	160		518			36
9	2482	106	155		500			36
10	2482	103	148		502			41
11	2482	108	155		534			27
12	2263	101	137		482			36
13	2409	103	142		440			36
14	2336	108	155		473			32
15	2920	122	195		550			18
16	2044	104	149		427			41
17	2190	100	148		462			32
18	2482	127	205		525			27
19	2993	126	199		553			27
20	2628	118	187		505			32
21	2482	123	189		494			32
22	2774	120	192		425			23
23	3212	114	185		490		18	36
24	2993	118	191		518		72	32
25	2044	117	192		481		57	36
26	1825	115	197		512		56	32
27	1460	117	200		498		60	23
28	1460	119	232		511		56	23
29								
30								
31								
TOTAL	56430	3117	4805	0	13875	0	319	896
AVE.	2373	111	172	0	496	0	53	32
MAX.	3212	127	232	0	553	0	72	41
MIN.	1460	96	135	0	425	0	18	18

CALCULATED DOSAGE MG/L

DATE	COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALSOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	40	41	42	43	44	45	46
1	20.9	2.4		0.76			0.30
2	19.9	2.2		0.73			0.26
3	20.1	2.3		0.75			0.34
4	20.1	2.1		0.76			0.26
5	19.0	2.1		0.76			0.23
6	17.5	2.1		0.76			0.24
7	17.9	2.1		0.75			0.34
8	17.8	2.2		0.77			0.30
9	20.3	2.1		0.75			0.30
10	21.0	2.1		0.77			0.35
11	19.6	2.1		0.77			0.21
12	20.4	2.1		0.79			0.32
13	20.7	2.1		0.69			0.31
14	19.3	2.2		0.71			0.26
15	21.0	2.3		0.72			0.13
16	18.0	2.2		0.69			0.36
17	20.5	2.3		0.79			0.30
18	18.4	2.5		0.71			0.20
19	23.0	2.5		0.77			0.21
20	22.1	2.6		0.77			0.27
21	20.4	2.6		0.74			0.26
22	23.0	2.6		0.64			0.19
23	26.6	2.5		0.74		0.15	0.30
24	24.3	2.5		0.77		0.59	0.26
25	16.8	2.5		0.72		0.47	0.30
26	15.3	2.6		0.78		0.47	0.27
27	12.0	2.6		0.75		0.49	0.19
28	11.9	2.9		0.76		0.46	0.19
29							
30							
31							
TOTAL	548	55.3	0.0	20.87	0.0	2.62	7.45
AVE.	20	2.3	0.00	0.75	0.00	0.44	0.27
MAX.	27	2.9	0.00	0.79	0.00	0.59	0.36
MIN.	12	2.1	0.00	0.64	0.00	0.15	0.13

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR

CERTIFICATE NUMBER

SIGNATURE

000100

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L	JAR TEST DATA: pH ADJUSTMENT MG/L	JAR TEST DATA: pH		FILTER DATA	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE OF FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DISINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	FIRST DISINFECTION SEQUENCE: CONTACT TIME T IN MINUTES	FIRST DISINFECTION SEQUENCE: END OF SEQUENCE pH	FIRST DISINFECTION SEQUENCE: C CALCULATED	FIRST DISINFECTION SEQUENCE: C REQUIRED	SECOND DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	SECOND DISINFECTION SEQUENCE: CONTACT TIME T IN MINUTES	SECOND DISINFECTION SEQUENCE: END OF SEQUENCE pH	SECOND DISINFECTION SEQUENCE: C CALCULATED	SECOND DISINFECTION SEQUENCE: C REQUIRED	CT CALC / CT REQ TOTAL INACTIVATION RATIO	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distributuon system **Must vary within system.**
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	14689	20					12	288	48	12	12	12	6500	197.9																1.4	0.19	0.21	1070 Riverside Dr. (AB 1056)
2	14942	20		7.4		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	182.0																1.3	0.21	0.34	869 Countrywood (0840 - AB)
3	14359	20		7.4		Pressure ( )	12	288	48	12	12	12	6500	174.7																1.6	0.22	0.31	412 E.Coy Circle (0909 AB)
4	14819	20		7.4		(b) Number of Filters - 12	12	288	48	12	12	12	6500	192.2																1.6	0.19	0.23	191 Cheshire Dr. (0915 AB)
5	13803	20		7.4			12	288	48	12	12	12	6500	175.6																1.4	0.38	0.35	2215 Madison St (AB 1000)
6	13478	20		7.4		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	211.8																			
7	14663	18		7.8			12	288	48	12	12	12	6500	198.1																			
8	14713	18		7.9		(d) Filter Area - Sq. Ft. (Each) 360	12	228	48	12	12	12	6500	155.8																1.3	0.22	0.28	3958 McGregor Rd. (AT 0906)
9	14637	18		7.4			12	288	48	12	12	12	6500	189.1																			
10	14192	20		7.5		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	185.4																			
11	15147	20		7.3			12	288	48	12	12	12	6500	208.3																1.4	0.18	0.23	3480 Arvin Dr. (0902 AT)
12	13324	20		7.6		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	203.3																1.6	0.18	0.26	498 Warfield Blvd. (0848 AB)
13	13921	20		7.6			12	288	48	12	12	12	6500	189.6																			
14	14499	20		7.5		(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	176.9																			
15	16654	20		7.4			12	288	48	12	12	12	6500	184.2																			
16	13579	20		7.7		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	242.4																1.4	0.19	0.18	194 Bobwhite (0945 - AB)
17	12795	20		7.7		16,667 GPM -	12	288	48	12	12	12	6500	160.2																1.6	0.21	0.24	225 Orleans Dr. (AB - 0908)
18	16199	20		7.5		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	192.1																1.4	0.22	0.33	18 Brandywine (1019 - AB)
19	15624	22		7.4		With: Salt ( )	12	288	48	12	12	12	6500	189.6																1.4	0.25	0.31	2022 Mason Ct. (AB 1006)
20	14236	22		7.3		KMnO4 ( )	12	288	48	12	12	12	6500	193.1																			
21	14587	22		7.3		Acid ( )	12	288	48	12	12	12	6500	192.1																			
22	14444	28		7.2			12	288	48	12	12	12	6500	189.9																1.8	0.31	0.33	1 Welch St . (AB 1028)
23	14468	28		7.6			12	288	48	12	12	12	6500	334.2																1.5	0.13	0.25	203 Bullock Dr. (1151 - AT)
24	14739	20		7.4			12	288	48	12	12	12	6500	198.2																1.8	0.19	0.15	527 Turner Reynolds Ct (1132 AB)
25	14603	18		7.5			12	288	48	12	12	12	6500	165.3																1.4	0.23	0.26	2040 Bradbury Rd. (0919 AT)
26	14282	18		6.6			12	288	48	12	12	12	6500	215.5																1.6	0.22	0.27	2537 Wilma Rudolph Blvd. (1023 AT)
27	14550	18		6.7			12	288	48	12	12	12	6500	220.1																			
28	14753	18		7.8			12	288	48	12	12	12	6500	169.0																			
29																																
30																																
31																																

COMPLETE APPLICABLE BLANKS **EACH** MONTH.

Total Backwash Water 5486.6 Remarks

3.72	4.53	TOTAL
0.22	0.27	AVERAGE
0.38	0.35	MAX
0.13	0.15	MIN

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY Montgomery PWSID # 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF March YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY Raw	TURBIDITY FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	TURBIDITY FINISHED AM 4-8	TURBIDITY FINISHED AM 8-12	TURBIDITY FINISHED PM 12-4	TURBIDITY FINISHED PM 4-8	TURBIDITY FINISHED PM 8-12	CHLORINE RESIDUAL MG/L ON TOP OF FILTER	CHLORINE RESIDUAL MG/L LOWEST PLANT EFFLUENT	ALKALINITY MG/L TOTAL	ALKALINITY MG/L RAW PHENOLPHTHALEIN	ALKALINITY MG/L FINISHED PHENOLPHTHALEIN	ALKALINITY MG/L TOTAL FINISHED	pH RAW	pH FINISHED	HARDNESS MG/L RAW	HARDNESS MG/L FINISHED	IRON MG/L RAW	IRON MG/L FINISHED	IRON MG/L DIST. SYSTEM	MANGANESE MG/L RAW	MANGANESE MG/L FINISHED	MANGANESE MG/L DIST. SYSTEM	FLUORIDE MG/L RAW	FLUORIDE MG/L FINISHED	FLUORIDE MG/L DISTRIBUTION SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31
1	14764	142 05	8	14	0.07	0.07	0.07	0.06	0.06	0.06	0.5	1.8	64	68		7.6	7.5	90	86	0.17	0.03	0.01	0.156	0.010	0.010	0.18	0.95	0.96
2	14524	14272	8	18	0.06	0.06	0.07	0.06	0.06	0.06	0.5	1.9	65	62		7.6	7.5	86	90	0.21	0.02	0.01	0.228	0.012	0.009	0.12	0.94	0.97
3	13872	13429	8	16	0.06	0.06	0.08	0.08	0.05	0.06	0.4	1.9	63	58		7.4	7.3	86	86	0.15	0.00	0.01	0.168	0.008	0.009	0.11	0.93	0.92
4	14859	13762	8	15	0.06	0.06	0.06	0.06	0.05	0.06	0.5	1.9	65	56		7.5	7.2	86	86	0.18	0.00	0.00	0.165	0.013	0.004	0.34	1.04	1.09
5	13626	13577	8	16	0.06	0.05	0.05	0.05	0.05	0.05	0.4	1.9	68	57		7.9	7.5	86	90	0.25	0.01	0.02	0.144	0.006	0.012	0.07	0.97	1.01
6	15324	15343	8	14	0.08	0.05	0.05	0.05	0.07	0.06	0.0	1.9	58	62		7.5	7.2	112	104	0.19	0.02		0.153	0.010		0.07	0.87	
7	14882	14256	8	15	0.07	0.05	0.05	0.05	0.06	0.05	0.4	1.9	64	66		7.7	7.4	108	100	0.18	0.02		0.156	0.009		0.12	1.07	
8	14994	14561	9	15	0.06	0.05	0.06	0.06	0.05	0.05	0.5	2.0	62	70		7.5	7.5	90	86	0.17	0.01	0.02	0.061	0.009	0.008	0.12	0.92	0.99
9	14701	14015	9	11	0.06	0.05	0.05	0.05	0.05	0.05	0.5	1.9	66	70		7.6	7.5	94	90	0.18	0.00	0.03	0.081	0.005	0.006	0.07	1.00	0.98
10	14199	13959	9	12	0.05	0.05	0.05	0.05	0.05	0.05	0.5	1.8	67	60		7.5	7.2	92	86	0.20	0.02	0.01	0.072	0.008	0.009	0.33	0.98	1.00
11	14379	14158	10	12	0.05	0.05	0.05	0.05	0.05	0.05	0.2	1.7	64	62		7.4	7.4	88	84	0.13	0.01	0.01	0.119	0.008	0.011	0.28	0.96	0.98
12	14038	13681	10	11	0.05	0.06	0.06	0.06	0.06	0.06	0.5	1.8	66	70		7.5	7.5	98	100	0.18	0.00	0.03	0.130	0.009	0.009	0.11	0.98	0.93
13	13561	13527	10	12	0.06	0.06	0.06	0.06	0.05	0.06	0.4	1.8	76	66		7.8	7.5	100	100	0.19	0.03		0.150	0.010		0.27	1.12	
14	14287	13822	10	14	0.06	0.06	0.06	0.06	0.06	0.06	0.3	1.7	66	66		7.4	7.2	100	106	0.15	0.02		0.170	0.011		0.10	0.97	
15	15575	14621	10	16	0.07	0.06	0.06	0.06	0.06	0.06	0.3	1.7	76	75		7.6	7.5	98	94	0.23	0.03	0.07	0.089	0.009	0.007	0.12	0.96	0.91
16	13352	12864	10	11	0.06	0.06	0.06	0.06	0.06	0.06	0.4	1.8	76	72		7.5	7.3	96	100	0.18	0.02	0.04	0.066	0.007	0.012	0.14	0.99	0.96
17	13211	12884	10	10	0.06	0.06	0.10	0.06	0.06	0.06	0.5	2.1	71	77		7.5	7.3	106	106	0.16	0.03	0.04	0.115	0.016	0.014	0.08	0.97	0.94
18	15272	14823	10	10	0.07	0.06	0.06	0.06	0.06	0.06	0.5	1.9	75	69		7.7	7.4	104	102	0.14	0.02	0.03	0.139	0.010	0.012	0.09	0.99	0.96
19	14506	14340	10	10	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.9	71	69		7.8	7.4	98	98	0.15	0.02	0.02	0.141	0.010	0.008	0.16	1.04	1.01
20	14531	14174	10	10	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.8	65	70		7.7	7.4	98	102	0.11	0.03		0.147	0.009		0.14	1.11	
21	14416	14250	10	11	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.8	67	69		7.7	7.5	98	96	0.09	0.01		0.156	0.017		0.14	1.13	
22	14099	13804	10	16	0.06	0.06	0.06	0.07	0.06	0.06	0.4	1.8	70	72		7.5	7.4	96	100	0.27	0.02		0.150	0.018		0.13	1.00	
23	12963	12121	11	14	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.9	76	73		7.6	7.4	98	102	0.13	0.02	0.02	0.150	0.010	0.009	0.19	1.06	1.08
24	14860	14865	12	12	0.06	0.06	0.06	0.06	0.06	0.06	0.3	2.0	77	72		7.6	7.5	100	98	0.28	0.00	0.00	0.152	0.012	0.008	0.20	0.29	0.33
25	14414	13924	12	14	0.08	0.06	0.06	0.07	0.07	0.06	0.5	1.9	75	77		7.7	7.5	100	100	0.14	0.00	0.01	0.195	0.011	0.013	0.23	1.08	0.92
26	13352	13516	12	23	0.07	0.06	0.07	0.09	0.07	0.06	0.5	2.0	78	82		7.3	7.4	104	100	0.18	0.02	0.02	0.188	0.009	0.014	0.19	1.12	0.96
27	14675	14321	12	17	0.06	0.05	0.06	0.06	0.06	0.06	0.5	2.1	81	85		7.7	7.5	104	110	0.30	0.02		0.201	0.018		0.04	1.09	
28	13631	13356	13	17	0.06	0.06	0.06	0.06	0.06	0.06	0.5	2.1	78	86		7.6	7.5	98	112	0.21	0.13		0.187	0.005		0.35	1.10	
29	14479	14091	13	13	0.06	0.06	0.06	0.06	0.06	0.06	0.5	2.0	84	88		7.6	7.7	98	108	0.18	0.11	0.16	0.171	0.008	0.014	0.23	1.04	1.01
30	15099	15437	14	12	0.09	0.06	0.06	0.07	0.06	0.06	0.5	1.8	80	83		7.7	7.4	106	104	0.11	0.03	0.02	0.143	0.004	0.007	0.18	1.09	0.98
31	14587	14627	14	12	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.8	91	87		7.7	7.5	110	114	0.26	0.01	0.04	0.166	0.009	0.008	0.08	0.96	0.97
TOTAL	445032	434583	316	423	1.94	1.79	1.89	1.88	1.81	1.80	13.5	58.2	2205	2199	0	235.6	230.2	3028	3040	5.65	0.71	0.62	4.509	0.310	0.213	4.98	30.72	20.86
AVE.	14356	14019	10	14	0.06	0.06	0.06	0.06	0.06	0.06	0.4	1.9	71	71	0	7.6	7.4	98	98	0.18	0.02	0.03	0.145	0.010	0.010	0.16	0.99	0.95
MAX.	15575	15437	14	23	0.09	0.07	0.10	0.09	0.07	0.06	0.5	2.1	91	88	0	7.9	7.7	112	114	0.30	0.13	0.16	0.228	0.018	0.014	0.35	1.13	1.09
MIN.	12963	12121	8	10	0.05	0.05	0.05	0.05	0.05	0.05	0.0	1.7	58	56	0	7.3	7.2	86	84	0.09	0.00	0.00	0.061	0.004	0.004	0.04	0.29	0.33

CHEMICALS USED

POUNDS PER 24 HOURS

DATE	COAGULANT - COAGULANT AID	DISINFECTION PRE DISINFECTION	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALSOFTENING OXIDATION STABILIZATION AND CORROSION CONTROL
1	32	33	34	35	36	37	38	39
1	1606	119	205		524		58	32
2	1752	117	212		503		66	32
3	2044	109	213		473		55	32
4	1752	120	207		480		58	36
5	2044	113	203		497		57	23
6	2044	126	241		487		58	23
7	1898	133	236		511			27
8	1898	217	218		518			36
9	1533	206	213		508			27
10	1460	208	199		486			27
11	1533	166	198		487		98	18
12	1460	119	218		481		56	32
13	1460	116	212		465		48	32
14	1460	126	226		463		43	37
15	1752	147	243		537		68	36
16	1314	166	254		493		38	32
17	1460	145	214		486		56	32
18	1314	135	209		551		59	36
19	1606	121	216		540		57	27
20	1460	118	220		521		31	27
21	1606	118	220		545		55	27
22	1387	122	222		546		57	36
23	1314	122	196				55	36
24	1679	124	244				56	32
25	1898	137	203		327		56	32
26	1898	121	229		440		33	32
27	1898	128	243		569		55	32
28	1387	120	181		517		50	36
29	1460	119	204		534		30	36
30	1606	105	186		561		56	23
31	1606	103	193		529		56	32
TOTAL	50589	4146	6678	0	14579	0	1465	958
AVE.	1632	134	215	0	503	0	54	31
MAX.	2044	217	254	0	569	0	98	37
MIN.	1314	103	181	0	327	0	30	18

CALCULATED DOSAGE MG/L

DATE	COAGULANT - COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALSOFTENING OXIDATION STABILIZATION AND CORROSION CONTROL
1	40	41	42	43	44	45	46
1	13.0	2.6		0.78		0.47	0.26
2	14.5	2.7		0.76		0.54	0.26
3	17.7	2.8		0.74		0.48	0.28
4	14.1	2.6		0.71		0.47	0.29
5	18.0	2.8		0.80		0.50	0.20
6	16.0	2.9		0.69		0.45	0.18
7	15.3	3.0		0.75			0.22
8	15.2	3.5		0.75			0.29
9	12.5	3.4		0.75			0.22
10	12.3	3.4		0.75			0.23
11	12.8	3.0		0.74		0.82	0.15
12	12.5	2.9		0.75		0.48	0.27
13	12.9	2.9		0.75		0.42	0.28
14	12.3	3.0		0.71		0.36	0.31
15	13.5	3.0		0.75		0.52	0.28
16	11.8	3.8		0.81		0.34	0.29
17	13.3	3.3		0.80		0.51	0.29
18	10.3	2.7		0.79		0.46	0.28
19	13.3	2.8		0.81		0.47	0.22
20	12.0	2.8		0.78		0.26	0.22
21	13.4	2.8		0.83		0.46	0.23
22	11.8	2.9		0.85		0.48	0.31
23	12.2	2.9				0.51	0.33
24	13.5	3.0				0.45	0.26
25	15.8	2.8		0.50		0.47	0.27
26	17.0	3.1		0.72		0.30	0.29
27	15.5	3.0		0.85		0.45	0.26
28	12.2	2.6		0.83		0.44	0.32
29	12.1	2.7		0.81		0.25	0.30
30	12.8	2.3		0.81		0.44	0.18
31	13.2	2.4		0.79		0.46	0.26
TOTAL	423	90.5	0.0	22.14	0.0	12.27	8.03
AVE.	14	2.9	0.00	0.76	000	0.45	0.26
MAX.	18	3.8	0.00	0.85	0.00	0.82	0.33
MIN.	10	2.3	0.00	0.50	0.00	0.25	0.15

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR

CERTIFICATE NUMBER

SIGNATURE

000102

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L	JAR TEST DATA: pH ADJUSTMENT MG/L	JAR TEST DATA: pH		FILTER DATA	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL. 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DISINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	CALCULATED C1	REQUIRED C1	SECOND DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	CALCULATED C1	REQUIRED C1	CT CALC. / CT REQ. TOTAL INACTIVATION RATIO	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distnbutiob system. Must vary within system.
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	14764						12	288	48	12	12	12	6500	197.9																1.6	0.32	0.27	391 Hawkins Rd. (1314 AT)
2	14524	18				(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	194.7																1.6	0.39	0.36	109 Greenland Farms (853 AB)
3	13672	18		6.6		Pressure ( )	12	288	48	12	12	12	6500	199.9																1.5	0.18	0.22	507 Edmonson Ferry Ct. (1.5 - AT)
4	14859	16		6.8		(b) Number of Filters - 12	12	288	48	12	12	12	6500	189.7																1.7	0.19	0.27	1404 Mutual Dr. (1043 - AT)
5	13626	16		7.6			12	276	48	12	12	12	6500	203.0																16	0.31	0.34	423 Gary Hills Dr. (AB 1406)
6	15324	18		7.2		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	183.2																				
7	14882	18		7.3			12	288	48	12	12	12	6500	190.2																			
8	14994	16		7.2		(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	183.9																1.3	0.17	0.23	2040 Bradbury Rd. (0857 - AT)
9	14701	14		7.2			12	288	48	12	12	12	6500	191.3																1.5	0.19	0.14	917 Kenwood Dr. (0927 - AT)
10	14199	14		6.8		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	190.6																1.4	0.17	0.22	312 Candlewood Dr. (0904 - AT)
11	14379	14					12	288	48	12	12	12	6500	192.0																1.2	0.13	0.22	3864 Man-O-War (0925 - AT)
12	14038	14		7.3		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	196.6																1.3	0.29	0.33	1804 Whispering Hills Rd. (0906 - AT)
13	13561	14		7.7			12	288	48	12	12	12	6500	190.9																			
14	14287	14		7.3		(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	206.2																				
15	15575	14		7.4			12	288	48	12	12	12	6500	238.2																1.4	0.31	0.33	105 Ussery Dr. (AB 9.02)
16	13352	14		7.2		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	176.5																1.3	0.28	0.32	2409 Pendleton Dr. (0933 AB)
17	13211	14		7.2		GPM - 16,667	12	288	48	12	12	12	6500	205.3																1.5	0.30	0.31	2328 41A Bypass (AB 1150)
18	15272	14		7.3		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	228.1																1.5	0.30	0.33	1204 Woodbridge Rd. (1014 - AB)
19	14506	14		7.4		With: Salt ( )	12	288	48	12	12	12	6500	199.9																1.6	0.35	0.36	112 Maxwell Dr. (1002 AT)
20	14531	14				KMnO4 ( )	12	288	48	12	12	12	6500	188.6																				
21	14416	14		7.5		Acid ( )	12	288	48	12	12	12	6500	194.7																				
22	14099	14		7.6			12	288	48	12	12	12	6500	179.4																	0.10		
23	12963	14		7.4			12	288	48	12	12	12	6500	196.1																1.5	0.17	0.18	704 Hickory Point Rd. (0950 - AT)
24	14860	14		7.4			12	288	48	12	12	12	6500	198.0																1.7	0.11	0.12	522 Turner Reynolds Ct. (1253 AT)
25	14414	14		7.4			12	288	48	12	12	12	6500	185.1																1.5	0.13	0.18	682 Beth Dr. (0920 - AT)
26	13352	18		8.0			12	288	48	12	12	12	6500	197.7																1.5	0.15	0.16	1055 Riverside Dr. (AB 11:50)
27	14675	14		7.5			12	288	48	12	12	12	6500	198.9																			
28	13631	14		7.3			12	288	48	12	12	12	6500	189.3																			
29	14479	14		7.7			12	288	48	12	12	12	6500	200.4																1.8	0.19	0.22	601 Riverside Dr. (AT 10:28)
30	15099	14		7.5			12	288	48	12	12	12	6500	197.9																1.8	0.16	0.21	1599 Ft. Campbell Blvd. (1019 - AT)
31	14587	14		7.6			12	288	48	12	12	12	6500	182.0																1.4	0.24	0.26	32 Covington St. (AB 8:48)
												Total Backwash Water		6066.1	Remarks														5.13	5.58	TOTAL
																													0.22	0.25	AVERAGE
																													0.39	0.36	MAX
																													0.10	0.12	MIN

000103

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY Montgomery PWSID # 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF April YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY Raw	TURBIDITY FINISHED WATER TURBIDITY MUSTBE MEASURED EVERY 4 HOURSAND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L N TOP OF FILTER	CHLORINE RESIDUAL MG/L LOWEST PLANT EFFLUENT	ALKALINITY MG/L TOTAL	ALKALINITY MG/L PHENOLPHTHALEIN	pH RAW	pH FINISHED	HARDNESS MG/L RAW	HARDNESS MG/L FINISHED	IRON MG/L RAW	IRON MG/L FINISHED	IRON MG/L DIST. SYSTEM	MANGANESE MG/L RAW	MANGANESE MG/L FINISHED	MANGANESE MG/L DIST. SYSTEM	FLUORIDE MG/L RAW	FLUORIDE MG/L FINISHED	FLUORIDE MG/L DISTRIBUTION SYSTEM
1	14279	14269	14	13	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.8	87	92		7.7	7.6	110	110	0.11	0.01	0.02	0.158	0.007	0.003	0.30	1.05	1.06
2	14470	14430	15	12	0.07	0.06	0.06	0.07	0.06	0.06	0.5	1.7	85	85		7.9	7.7	106	108	0.19	0.01	0.01	0.140	0.002	0.006	0.27	1.09	1.06
3	14777	14771	15	11	0.06	0.06	0.06	0.07	0.07	0.06	0.5	1.9	83	86		7.9	7.5	116	128	0.11	0.00		0.168	0.009		0.14	1.11	
4	13349	13178	15	12	0.07	0.06	0.06	0.06	0.06	0.06	0.5	2.0	85	84		8.0	7.7	102	108	0.14	0.00		0.180	0.009		0.35	1.16	
5	15182	15261	15	11	0.06	0.06	0.06	0.06	0.06	0.06	0.5	1.8	90	84		8.1	7.6	122	136	0.31	0.01	0.01	0.188	0.008	0.009	0.24	1.00	0.90
6	16446	16768	15	7	0.08	0.06	0.06	0.06	0.06	0.06	0.4	1.8	88	84		8.1	7.6	110	108	0.07	0.01	0.02	0.151	0.011	0.007	0.06	0.99	0.95
7	16034	15944	17	10	0.08	0.06	0.07	0.07	0.07	0.07	0.5	1.7	88	84		8.2	7.6	112	114	0.12	0.02	0.02	0.141	0.006	0.009	0.11	1.11	1.15
8	14046	14093	17	9	0.08	0.07	0.07	0.07	0.07	0.08	0.5	1.8	92	83		8.2	7.8	112	108	0.12	0.00	0.02	0.148	0.004	0.004	0.10	0.99	1.20
9	14712	14440	18	7	0.08	0.08	0.08	0.09	0.08	0.08	0.5	1.8	98	96		8.1	7.7	100	120	0.10	0.01	0.00	0.024	0.006	0.008	0.20	0.92	1.04
10	14283	14373	17	8	0.08	0.07	0.07	0.07	0.07	0.07	0.5	1.8	92	81		8.4	7.9	100	108	0.12	0.01		0.164	0.012		0.11	1.00	
11	15118	15304	18	9	0.07	0.08	0.07	0.07	0.08	0.07	0.5	1.8	91	90		8.3	7.7	104	108	0.11	0.03		0.166	0.007		0.30	1.11	
12	16378	16480	18	8	0.08	0.07	0.07	0.07	0.07	0.07	0.5	1.8	95	92		8.6	7.9	102	110	0.08	0.02	0.01	0.155	0.008	0.002	0.34	1.10	1.20
13	15461	15637	18	16	0.08	0.08	0.07	0.08	0.08	0.08	0.4	1.9	94	90		8.4	7.9	108	112	0.09	0.01	0.03	0.153	0.003	0.003	0.29	1.07	1.01
14	18561	18345	18	8	0.09	0.08	0.08	0.08	0.08	0.08	0.5	1.9	92	89		8.5	8.1	114	110	0.09	0.01	0.02	0.172	0.017	0.016	0.20	1.10	1.00
15	16336	16138	19	8	0.08	0.08	0.07	0.08	0.08	0.08	0.4	1.6	95	92		8.4	8.0	116	116	0.06	0.01	0.03	0.164	0.008	0.013	0.18	0.95	1.02
16	14640	14846	19	8	0.08	0.08	0.08	0.09	0.08	0.06	0.4	1.8	92	90		8.3	8.0	186	192	0.09	0.01	0.02	0.150	0.010	0.013	0.34	1.09	1.05
17	15164	15217	19	9	0.06	0.06	0.06	0.06	0.06	0.05	0.2	1.8	97	88		8.3	8.1	98	102	0.10	0.00		0.102	0.016		0.17	1.05	
18	16086	16039	19	9	0.06	0.06	0.06	0.06	0.05	0.05	0.2	2.0	89	87		8.4	8.0	102	100	0.12	0.00		0.104	0.004		0.13	1.06	
19	16643	16619	20	10	0.06	0.05	0.06	0.06	0.05	0.05	0.3	1.8	94	86		8.5	8.0	110	108	0.14	0.01	0.01	0.144	0.009	0.011	0.17	1.03	1.05
20	16793	16951	20	7	0.06	0.06	0.06	0.06	0.06	0.05	0.3	1.9	92	88		8.3	7.9	124	106	0.14	0.01	0.02	0.107	0.009	0.006	0.01	0.95	1.05
21	15618	15473	20	8	0.09	0.05	0.05	0.06	0.05	0.05	0.3	1.9	87	90		8.1	7.8	110	116	0.09	0.02	0.02	0.110	0.002	0.001	0.06	0.97	0.96
22	16512	16357	20	8	0.09	0.05	0.05	0.05	0.05	0.05	0.2	1.8	90	91		8.1	7.8	114	108	0.08	0.00	0.01	0.076	0.009	0.005	0.06	0.99	1.06
23	15740	15635	20	16	0.05	0.06	0.06	0.06	0.05	0.06	0.2	1.8	92	87		8.2	7.8	114	110	0.13	0.00	0.01	0.192	0.008	0.008	0.23	0.99	1.01
24	12753	12866	20	7	0.06	0.06	0.06	0.06	0.06	0.06	0.5	2.1	94	89		8.3	7.9	104	110	0.11	0.01		0.098	0.015		0.28	1.10	
25	14166	14337	20	18	0.08	0.07	0.06	0.07	0.07	0.11	0.1	1.7	89	89		7.9	7.6	112	108	0.18	0.00		0.122	0.006		0.02	0.98	
26	15838	14966	20	31	0.11	0.10	0.10	0.12	0.10	0.08	0.2	1.8	81	77		7.6	7.4	98	96	0.24	0.01	0.02	0.171	0.010	0.011	0.15	1.02	0.98
27	13843	13412	20	16	0.09	0.07	0.08	0.07	0.06	0.08	0.3	1.4	84	78		7.3	7.2	94	102	0.26	0.01	0.04	0.104	0.011	0.006	0.24	1.00	0.90
28	14885	14575	19	11	0.09	0.09	0.09	0.10	0.09	0.09	0.3	1.7	85	79		7.5	7.2	104	104	0.11	0.02	0.02	0.119	0.012	0.014	0.25	1.02	1.09
29	15173	14871	20	10	0.09	0.09	0.09	0.09	0.09	0.08	0.5	2.1	85	80		7.5	7.3	104	100	0.11	0.03	0.03	0.212	0.003	0.011	0.16	0.98	1.04
30	14453	14711	20	11	0.09	0.08	0.08	0.12	0.12	0.08	0.5	2.1	82	76		7.7	7.2	100	100	0.14	0.00	0.02	0.214	0.006	0.010	0.18	0.99	1.02
31																													
TOTAL	457738	456503	545	328	2.29	2.06	2.07	2.19	2.09	2.04	11.7	55.1	2688	2587	0	243.0	231.7	3296	3366	3.86	0.29	0.41	4.297	0.247	0.176	5.64	30.97	22.80
AVE.	15258	15217	18	11	0.08	0.07	0.07	0.07	0.07	0.07	0.4	1.8	90	86	0	8.1	7.7	110	112	0.13	0.01	0.02	0.143	0.008	0.008	0.19	1.03	1.04
MAX.	18561	18345	20	31	0.11	0.10	0.10	0.12	0.12	0.11	0.5	2.1	98	96	0	8.6	8.1	186	192	0.31	0.03	0.04	0.214	0.017	0.016	0.35	1.16	1.20
MIN.	12753	12866	14	7	0.05	0.05	0.05	0.05	0.05	0.05	0.1	1.4	81	76	0	7.3	7.2	94	96	0.06	0.00	0.00	0.024	0.002	0.001	0.01	0.92	0.90

CHEMICALS USED

POUNDS PER 24 HOURS

DATE	COAGULANT - COAGULANT AID	DISINFECTION PRE DISINFECTION	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALSOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	1606	98	187		540		57	41
2	1679	96	182		538		56	32
3	1533	89	196		556		56	36
4	1679	88	198		520		53	32
5	1533	92	209		534		31	36
6	1752	95	224		569		56	36
7	1606	103	202		559		60	32
8	1533	97	185		496		56	23
9	1606	101	199		486		57	41
10	1387	99	188		498		57	36
11	1825	103	191		563		56	68
12	1752	105	217		599		85	27
13	1606	102	235		570		52	23
14	2336	120	285		677		64	36
15	2190	103	249		605		89	36
16	2044	192	226		563			36
17	1533	238	240		495			32
18	2190	274	279		578			36
19	2044	275	288		631			32
20	2044	292	304		602			36
21	2044	273	266		569			36
22	2117	290	275		627			32
23	2044	296	265		572			32
24	1314	241	206		477			23
25	2190	321	260		516			32
26	3650	400	274		608			23
27	2336	238	256		506		30	27
28	2044	181	318		549		82	32
29	2409	156	289		542		55	41
30	1898	133	256		524		43	32
31								
TOTAL	57524	5291	7149	0	16669	0	1095	1018
AVE.	1917	176	238	0	556	0	58	34
MAX.	3650	400	318	0	677	0	89	68
MIN.	1314	88	182	0	477	0	30	23

CALCULATED DOSAGE MG/L

DATE	COAGULANT - COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALSOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	13.5	2.4		0.83		0.48	0.34
2	13.9	2.3		0.81		0.46	0.27
3	12.4	2.3		0.82		0.45	0.29
4	15.1	2.6		0.85		0.48	0.29
5	12.1	2.4		0.77		0.24	0.29
6	12.8	2.3		0.76		0.41	0.26
7	12.0	2.3		0.76		0.45	0.24
8	13.1	2.4		0.77		0.48	0.20
9	13.1	2.4		0.72		0.46	0.33
10	11.6	2.4		0.76		0.48	0.30
11	14.5	2.3		0.81		0.44	0.54
12	12.8	2.4		0.80		0.62	0.20
13	12.5	2.6		0.81		0.40	0.18
14	15.1	2.6		0.80		0.41	0.23
15	16.1	2.6		0.81		0.65	0.26
16	16.7	3.4		0.84			0.29
17	12.1	3.8		0.71			0.25
18	16.3	4.1		0.78			0.27
19	14.7	4.1		0.83			0.23
20	14.6	4.3		0.78			0.26
21	15.7	4.1		0.80			0.28
22	15.4	4.1		0.83			0.23
23	15.6	4.3		0.79			0.24
24	12.4	4.2		0.82			0.22
25	18.5	4.9		0.80			0.27
26	27.6	5.1		0.84			0.17
27	20.2	4.3		0.80		0.26	0.23
28	16.5	4.0		0.81		0.66	0.26
29	19.0	3.5		0.78		0.43	0.32
30	15.7	3.2		0.79		0.36	0.27
31							
TOTAL	452	97.7	00	23.87	0.0	8.64	8.02
AVE.	15	3.3	0.00	0.80	0.00	0.45	0.27
MAX.	28	5.1	0.00	0.85	0.00	0.66	0.54
MIN.	12	2.3	0.00	0.71	0.00	0.24	0.17

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents thewater quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____ SIGNATURE

CERTIFICATE NUMBER _____

000104

		JAR TEST DATA				FILTER DATA	FILTER OPERATION DATA								DISINFECTION AND CT VALUES												MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE						
															FIRST DISINFECTION SEQUENCE					SECOND DISINFECTION SEQUENCE													
DATE	RAW WATER TREATED 1,000 GALLONS	COAGULANT MG/L	pH ADJUSTMENT MG/L	pH		COMPLETE APPLICABLE BLANKS **EACH** MONTH	NUMBER OF FILTERS USED	FILTER HOURS= COL. 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	pH END OF SEQUENCE	CT CALCULATED	CT REQUIRED	FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	pH END OF SEQUENCE	CT CALCULATED	CT REQUIRED	TOTAL INACTIVATION RATIO	CT CALC. / CT REQ.	RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE: ENTRY POINT	ORTHOPHOSPHATE: DISTRIBUTION	Location of sampling point in distributiob system. **Must vary within system.**
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73		74	75	76	77	78	79	
1	14279	14		7.6			12	288	48	12	12	12	6500	196.0																	1.5	0.20	0.19	1710 Setter Ln - 1118 - AT
2	14470	14		7.4		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	210.9																	1.5	0.15	0.26	220 W.Dunbar Cave Rd. - 0950 - AT
3	14777	14		7.6		Pressure ( )	12	288	48	12	12	12	6500	202.5																				
4	13349	14		7.7		(b) Number of Filters - 12	12	288	48	12	12	12	6500	205.5																				
5	15182	14		7.5			12	288	48	12	12	12	6500	205.8																	1.7	0.13	0.22	908 Beacon Rd. - 1203 - AT
6	16448	14		7.8		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	191.0																	1.6	0.14	0.15	1053 E. Monica Dr - 0939 - AT
7	16034	14		8.0			12	276	48	12	12	12	6500	195.5																	1.4	0.04	0.11	180 Holiday Rd. AT 0933
8	14046	14		8.0		(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	200.0																	1.5	0.11	0.14	721 Cayce Dr. - 0859 - AT
9	14712	14		7.7			12	288	48	12	12	12	6500	219.0																	1.6	0.10	0.13	136 N. Meadow Dr. 1250 J.N.
10	14283	14		8.2		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	199.5																				
11	15118	14		7.7			12	288	48	12	12	12	6500	201.8																				
12	16378	14		8.2		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	182.2																	1.6	0.11	0.07	130 Greenland Farms Dr. 9:14am AT.
13	15461	14		8.1			12	276	48	12	12	12	6500	184.2																	1.2	0.21	0.1	271 Ussery Dr. - 0902 - AT
14	18561	16		8.3		(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	206.0																	1.3	0.09	0.07	2040 Bradbury Rd.- AT 0848
15	16336	16		8.2			12	288	48	12	12	12	6500	217.3							1.59	59	8	94	19	4.95					1.5	0.20	0.16	925 Kenwood Dr. - 0852 - AT
16	14640	16		7.7		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	237.1																	1.6	0.07	0.08	36 Dortch St.
17	15164	16		8.1		GPM - 16,667	12	288	48	12	12	12	6500	199.6																				
18	16086	16		7.5		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	208.3																				
19	16643	16		7.8		With: Salt ( )	12	288	48	12	12	12	6500	209.5																	1.6	0.11	0.15	1295 Paradise Hills Rd - 1340 - AT
20	16793	16		8.0		KMnO4 ( )	12	288	48	12	12	12	6500	173.0																	1.2	0.02	0.09	5013 Collinwood Dr. - BTM 1419
21	15618	16		8.0		Acid ( )	12	288	48	12	12	12	6500	158.1																	1.9	0.08	0.06	201 W. Meadow DR. - BMT 0853
22	16512	16		7.9			12	288	48	12	12	12	6500	185.4																	1.3	0.04	0.05	3722 Heather Dr. - 0921 - AT
23	15740	14		8.1			12	288	48	12	12	12	6500	219.3																	1	0.14	0.23	2084 Skyview Circle - 0951 - AT
24	12753	14		8.0			12	288	48	12	12	12	6500	185.7																				
25	14166	18		7.7			12	288	48	12	12	12	6500	174.0																				
26	15838						12	288	48	12	12	12	6500	194.4																	1.4	0.19	0.13	225 Little Hope Rd. - 1125 - AT
27	13843	18		7.2			12	288	48	12	12	12	6500	190.6							1.41	76	7.22	107	12	8.92					1.1	0.12	0.09	136 N. Meadow Dr. 1035 am J.N.
28	14885	16		7.3			12	288	48	12	12	12	6500	193.6																	1.1	0.19	0.17	947 Willow Circle - 1049 - AT
29	15173	18		7.1			12	288	48	12	12	12	6500	225.9																	1	0.16	0.13	1230 Rossview Rd. - 0910 - AT
30	14453	16		7.4			12	288	48	12	12	12	6500	189.2																	1.5	0.10	0.16	112 Madison St. - 1138 - AT
31														0.0																			
							Total Backwash Water		5961.0	Remarks:																					2.70	2.94	TOTAL
																															0.12	0.13	AVERAGE
																															0.21	0.26	MAX
																															0.02	0.05	MIN

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY Montgomery PWSID # 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF May YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY Raw	TURBIDITY FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L ON TOP OF FILTER	CHLORINE RESIDUAL MG/L LOWEST PLANT EFFLUENT	ALKALINITY MG/L TOTAL RAW	ALKALINITY MG/L PHENOLPHTHALEIN FINISHED	ALKALINITY MG/L TOTAL FINISHED	pH RAW	pH FINISHED	HARDNESS MG/L RAW	HARDNESS MG/L FINISHED	IRON MG/L RAW	IRON MG/L FINISHED	IRON MG/L DIST. SYSTEM	MANGANESE MG/L RAW	MANGANESE MG/L FINISHED	MANGANESE MG/L DIST. SYSTEM	FLUORIDE MG/L RAW	FLUORIDE MG/L FINISHED	FLUORIDE MG/L DISTRIBUTION SYSTEM
1	15089	14939	20	16	0.09	0.09	0.08	0.09	0.09	0.08	0.4	1.7	77	80		7.7	7.5	104	104	0.22	0.01		0.271	0.017		0.12	0.98	
2	13933	13978	20	223	0.08	0.08	0.09	0.10	0.09	0.09	0.3	1.7	67	60		7.0	7.2	102	98	2.35	0.01		0.960	0006		0.11	0.93	
3	14866	13213	20	223	0.08	0.07	0.07	0.07	0.09	0.07	0.5	1.9	46	45		6.9	6.9	60	60	2.55	0.00	0.01	0.722	0.006	0.013	0.10	0.90	0.94
4	17631	16966	21	95	0.06	0.06	0.08	0.06	0.06	0.05	0.5	1.9	54	60		6.7	7.5	72	70	1.25	0.02	0.03	0.405	0.003	0.002	0.22	0.93	0.90
5	15325	15014	21	73	0.07	0.06	0.06	0.06	0.07	0.05	0.4	1.8	65	55		7.0	6.8	80	78	0.88	0.01	0.02	0.503	0.002	0.007	0.14	0.94	0.98
6	15270	14795	21	53	0.08	0.05	0.07	0.08	0.05	0.06	0.5	2.7	73	68		7.2	7.1	84	88	0.98	0.00	0.02	0.400	0.002	0.005	0.25	1.05	1.00
7	15771	15766	21	61	0.06	0.05	0.06	0.07	0.05	0.05	0.4	2.8	79	71		7.0	7.0	100	94	0.61	0.01	0.02	0.370	0.004	0.005	0.22	1.03	1.13
8	14151	13868	21	68	0.07	0.05	0.07	0.06	0.05	0.05	0.4	2.8	84	76		7.2	7.1	100	100	0.63	0.00		0.446	0.005		0.24	0.95	
9	16251	15768	21	62	0.08	0.05	0.05	0.06	0.05	0.05	0.6	3.0	85	79		7.2	7.1	100	104	0.70	0.01		0.420	0.006		0.20	0.99	
10	15821	15221	21	54	0.05	0.05	0.05	0.07	0.05	0.05	0.4	2.8	85	84		7.3	7.2	80	78	0.71	0.00	0.02	0.347	0.016	0.012	0.09	0.63	0.81
11	15253	14458	20	47	0.05	0.05	0.05	0.05	0.06	0.05	0.5	2.3	79	77		7.3	7.2	92	96	0.49	0.02	0.06	0.320	0.002	0.007	0.18	0.17	0.83
12	15433	15139	20	36	0.06	0.05	0.05	0.07	0.05	0.05	0.3	2.2	82	81		7.3	7.3	100	98	0.47	0.01	0.03	0.274	0.003	0.000	0.12	0.09	0.76
13	16966	16820	20	30	0.05	0.05	0.05	0.05	0.06	0.05	0.5	2.3	80	80		7.3	7.4	102	100	0.31	0.03	0.00	0.247	0.002	0.009	0.13	0.47	0.35
14	15580	15190	20	20	0.05	0.05	0.05	0.06	0.05	0.05	0.3	2.4	81	78		7.3	7.1	102	100	0.23	0.00	0.02	0.217	0.000	0.004	0.13	1.16	0.38
15	14065	13945	20	20	0.05	0.05	0.05	0.09	0.09	0.07	0.4	2.4	83	80		7.4	7.1	107	98	0.26	0.01		0.150	0.002		0.15	1.05	
16	14969	14622	20	19	0.06	0.05	0.05	0.07	0.06	0.06	0.4	2.3	75	76		7.3	7.1	98	106	0.25	0.01		0.185	0.002		0.28	0.99	
17	15067	14575	20	15	0.07	0.06	0.05	0.06	0.06	0.06	0.4	2.4	70	70		7.3	7.2	98	92	0.13	0.01	0.02	0.189	0.000	0.000	0.15	0.95	0.85
18	14946	14387	20	20	0.06	0.06	0.06	0.07	0.06	0.06	0.5	2.4	71	69		7.3	7.2	98	96	0.20	0.01	0.00	0.232	0.003	0.007	0.06	0.94	0.94
19	14642	14308	20	12	0.06	0.06	0.06	0.05	0.07	0.06	0.5	2.3	72	72		7.4	7.2	98	94	0.25	0.00	0.03	0.190	0.006	0.008	0.15	0.91	0.95
20	14982	14689	20	15	0.06	0.05	0.06	0.07	0.06	0.06	0.4	2.5	73	72		7.4	7.3	98	96	0.15	0.02	0.02	0.159	0.001	0.004	0.06	0.93	0.95
21	15665	15427	20	16	0.06	0.06	0.06	0.07	0.06	0.06	0.5	2.4	77	70		7.5	7.0	100	94	0.14	0.03	0.01	0.160	0.010	0.005	0.09	1.00	0.97
22	13774	13594	20	14	0.06	0.06	0.06	0.06	0.06	0.06	0.4	2.4	79	73		7.4	7.1	102	96	0.17	0.02		0.157	0.009		0.09	0.99	
23	15791	15487	20	12	0.07	0.06	0.06	0.16	0.08	0.07	0.5	2.3	72	74		7.3	7.3	94	104	0.09	0.02		0.164	0.012		0.13	1.05	
24	16779	16479	21	10	0.07	0.06	0.06	0.07	0.06	0.06	0.6	2.2	75	70		7.3	7.1	100	96	0.12	0.00	0.01	0.188	0.015	0.016	0.24	0.95	0.95
25	17697	17344	21	12	0.07	0.07	0.06	0.07	0.07	0.07	0.5	2.1	71	70		7.5	7.2	94	98	0.15	0.03	0.01	0.157	0.000	0.000	0.16	0.96	0.89
26	15164	15056	21	11	0.09	0.07	0.06	0.08	0.06	0.07	0.5	2.0	69	69		7.6	7.3	98	94	0.14	0.03	0.01	0.193	0.008	0.009	0.03	1.05	1.05
27	17393	16911	21	11	0.07	0.06	0.06	0.07	0.06	0.06	0.5	2.3	67	66		7.7	7.4	96	94	0.22	0.02	0.01	0.150	0.005	0.011	0.17	1.06	1.09
28	17231	16595	21	11	0.08	0.06	0.06	0.06	0.06	0.06	0.6	2.4	69	67		7.9	7.5	94	92	0.22	0.04	0.07	0.170	0.004	0.006	0.14	1.00	1.02
29	17112	16754	22	21	0.07	0.07	0.06	0.08	0.07	0.07	0.4	2.2	65	63		7.3	7.5	94	104	0.21	0.01		0.216	0.006		0.24	1.04	
30	15257	15344	22	11	0.07	0.07	0.06	0.08	0.19	0.08	0.4	2.2	69	64		7.8	7.5	84	90	0.09	0.00		0.156	0.003		0.27	1.01	
31	15856	15489	23	10	0.09	0.07	0.06	0.11	0.07	0.07	0.5	2.0	70	73		7.7	7.5	100	102	0.10	0.01	0.02	0.162	0.010	0.008	0.10	0.96	0.92
TOTAL	483732	472140	639	1301	2.09	1.85	1.87	2.27	2.11	1.90	14.0	71.2	2264	2192	0	227.6	224.0	2931	2914	15.27	0.40	0.44	8.880	0.170	0.138	4.76	28.06	18.66
AVE.	15604	15230	21	42	0.07	0.06	0.06	0.07	0.07	0.06	0.5	2.3	73	71	0	7.3	7.2	95	94	0.49	0.01	0.02	0.286	0.005	0.007	0.15	0.91	0.89
MAX	17697	17344	23	223	0.09	0.09	0.09	0.16	0.19	0.09	0.6	3.0	85	84	0	7.9	7.5	107	106	2.55	0.04	0.07	0.960	0.017	0.016	0.28	1.16	1.13
MIN	13774	13213	20	10	0.05	0.05	0.05	0.05	0.05	0.05	0.3	1.7	46	45	0	6.7	6.8	60	60	0.09	0.00	0.00	0.150	0.000	0.000	0.03	0.09	0.35

CHEMICALS USED

DATE	POUNDS PER 24 HOURS COAGULANT - COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALS/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL	CALCULATED DOSAGE MG/L COAGULANT - COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERALS/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	2920	141	256		569		71	27	23.2	3.2		0.82		0.56	0.21
2	4088	156	270		464		57	27	35.2	3.7		0.73		0.49	0.23
3	5475	167	260		533		57	36	44.2	3.4		0.78		0.46	0.29
4	6570	182	284		628		56	41	44.7	3.2		0.78		0.38	0.28
5	4745	158	355		537		68	27	37.1	4.0		0.77		0.53	0.21
6	4672	164	406		561		58	32	36.7	4.5		0.80		0.46	0.25
7	5256	175	441		572		57	32	40.0	4.7		0.79		0.43	0.24
8	5110	175	388		516		57	27	43.3	4.8		0.80		0.48	0.23
9	5840	208	450		595		57	32	43.1	4.9		0.80		0.42	0.24
10	4672	188	403		292		57	27	35.4	4.5		0.40		0.43	0.20
11	3431	158	305				86	32	27.0	3.6				0.68	0.25
12	3796	152	322				70	32	29.5	3.7				0.54	0.25
13	4453	177	355		359		90	32	31.5	3.8		0.46		0.64	0.23
14	3212	154	314		529		50	32	24.7	3.6		0.74		0.38	0.25
15	2920	134	277		502		57	27	24.9	3.5		0.78		0.49	0.23
16	2774	149	312		532		42	27	22.2	3.7		0.78		0.34	0.22
17	2555	144	302		561		24	32	20.3	3.5		0.81		0.19	0.25
18	2044	144	317		546		55	32	16.4	3.7		0.80		0.44	0.26
19	2044	130	319		520		97	32	16.7	3.7		0.78		0.79	0.26
20	2628	133	332		544		56	27	21.0	3.7		0.79		0.45	0.22
21	2409	137	348		554		37	27	18.4	3.7		0.77		0.28	0.21
22	2190	123	293		504		61	32	19.1	3.6		0.80		0.53	0.28
23	2044	137	306		565		57	36	15.5	3.4		0.78		0.43	0.27
24	2190	138	324		610		57	32	15.6	3.3		0.79		0.41	0.23
25	2190	143	346		626		57	32	14.8	3.3		0.77		0.39	0.22
26	1971	127	310		566		57	27	15.6	3.5		0.82		0.45	0.22
27	2482	147	255		688		77	27	17.1	2.8		0.86		0.53	0.19
28	2117	143	343		638		56	23	14.7	3.4		0.81		0.39	0.16
29	1825	142	361		642		59	32	12.8	3.5		0.82		0.41	0.22
30	1533	129	328		575		56	27	12.0	3.6		0.82		0.44	0.21
31	1752	127	341		579		57	23	13.2	3.5		0.80		0.43	0.17
TOTAL	101908	4682	10223	0	15907	0	1853	931	786	114.8	0.0	22.26	0.0	14.29	7.17
AVE.	3287	151	330	0	549	0	60	30	25	3.7	0.00	0.77	0.00	0.46	0.23
MAX	6570	208	450	0	688	0	97	41	45	4.9	0.00	0.86	0.00	0.79	0.25
MIN	1533	123	255	0	292	0	24	23	12	2.8	0.00	0.40	0.00	0.19	0.19

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____ SIGNATURE

CERTIFICATE NUMBER _____

000106

		JAR TEST DATA				FILTER DATA	FILTER OPERATION DATA								DINSINFECTION AND CT VALUES											MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE					
															FIRST DISINFECTION SEQUENCE					SECOND DISINFECTION SEQUENCE										
DATE	RAW WATER TREATED 1,000 GALLONS	COAGULANT MG/L	pH ADJUSTMENT MG/L	pH		COMPLETE APPLICABLE BLANKS EACH MONTH	NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	pH END OF SEQUENCE	CT CALCULATED	CT REQUIRED	FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	pH END OF SEQUENCE	CT CALCULATED	CT REQUIRED	TOTAL INACTIVATION RATIO CT CALC / CT REQ	RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distributiob system. **Must vary within system.**
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	15089	16		7.6			12	288	48	12	12	12	6500	187.9																		
2	13933	34		7.1		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	173.1																			
3	14866	44		7.2		Pressure ( )	12	288	48	12	12	12	6500	228.1															1.3	0.15	0.11	1157 Conne Mara Way - 0938 - AT
4	17631	38		7.0		(b) Number of Filters - 12	12	288	48	12	12	12	6500	230.2															1.7	0.20	0.23	1895 Memorial Dr. - 1005 - AT
5	15325	34		6.8			12	288	48	12	12	12	6500	198.6															1.1	0.16	0.14	2040 Bradbury Rd. - 0940 - AT
6	15270	32		6.8		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	202.1															1.1	0.12	0.06	328 Excell Rd. AT 902
7	15771	34		7.1			12	288	48	12	12	12	6500	228.9															1.4	0.22	0.18	730 Huntoo Dr. - 1124 - AT
8	14151	38		7.2		(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	200.8																		
9	16251	38		7.1			12	288	48	12	12	12	6500	189.3																		
10	15821	30		7.3		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	200.1															1.9	0.30	0.31	1295 Paradise Hills Rd. - 1340 - AT
11	15253	28		7.1			12	288	48	12	12	12	6500	191.2															1.8	0.17	0.29	715 Cloud Dr. - 1005 - AT
12	15433	26		7.3		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	202.9															1.4	0.21	0.3	4021 Mcgregor Rd. - 0941 - AT
13	16966	28		7.3			12	288	48	12	12	12	6500	185.3															1.7	0.06	0.32	2215 Madison St AT 10:45
14	15580	20		7.2		(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	192.3															1.7	0.11	0.15	421 Providence Blvd. MJC 0837
15	14065	24		7.2			12	288	48	12	12	12	6500	167.0																		
16	14969	22		7.2		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	202.4																		
17	15067	18		7.4		GPM - 16,667	12	288	48	12	12	12	6500	194.5															1.7	0.20	0.26	516 Madison St. 10:00 MJC
18	14946	18		7.1		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	199.1															2	0.07	0.06	1721 Balimore Dr. 0955 MJC
19	14642	18		7.2		With: Salt ( )	12	288	48	12	12	12	6500	198.4															2.2	0.07	0.12	730 Needmore Rd. 0902 MJC
20	14982	18		7.4		KMnO4 ( )	12	288	48	12	12	12	6500	200.4															2.2	0.25	0.18	1801 Ashland City Rd. - 0947 - AT
21	15665	20		7.8		Acid ( )	12	288	48	12	12	12	6500	193.5															1.5	0.29	0.3	1470 Golf Club Ln. - 1040 - MJC
22	13774	16		6.7			12	288	48	12	12	12	6500	181.0																		
23	15791	16		7.3			12	288	48	12	12	12	6500	187.8																		
24	16779						12	288	48	12	12	12	6500	182.5															2	0.27	0.34	251 Timbercourt Dr. - 1350 - MJC
25	17597	16		7.5			12	288	48	12	12	12	6500	194.0															1.6	0.04	0.16	503 Galvin Dr. - 0933 - MJC
26	15164	16		7.5			12	288	48	12	12	12	6500	187.2															1.8	0.08	0.12	112 Stephanie Dr. - 1015 - AT
27	17393	16		7.3			12	288	48	12	12	12	6500	177.3															1.5	0.25	0.3	180 Holiday Dr. - 0847 - MJC
28	17231	16		7.5			12	288	48	12	12	12	6500	290.7															2	0.19	0.24	1874 Memorial Dr. - 1043 - AT
29	17112	14		7.4			12	288	48	12	12	12	6500	190.5																		
30	15257	14		7.5			12	288	48	12	12	12	6500	225.5																		
31	15856	14		7.4			12	288	48	12	12	12	6500	190.0															0.7	0.25	0.1	1233 Crystal Dr. 1100 am B.T.M.

Total Backwash Water 6172.4 Remarks:

3.66	4.27	TOTAL
0.17	0.20	AVERAGE
0.30	0.34	MAX
0.04	0.06	MIN

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT Clarksville Water Plant

COUNTY Montgomery PWSID # 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF June YEAR 2010

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY Raw	TURBIDITY FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L ON TOP OF FILTER	CHLORINE RESIDUAL MG/L LOWEST PLANT EFFLUENT	ALKALINITY MG/L TOTAL	ALKALINITY MG/L PHENOLPHTHALEIN FINISHED	ALKALINITY MG/L TOTAL FINISHED	pH RAW	pH FINISHED	HARDNESS MG/L RAW	HARDNESS MG/L FINISHED	IRON MG/L RAW	IRON MG/L FINISHED	IRON MG/L DIST. SYSTEM	MANGANESE MG/L RAW	MANGANESE MG/L FINISHED	MANGANESE MG/L DIST. SYSTEM	FLUORIDE MG/L RAW	FLUORIDE MG/L FINISHED	FLUORIDE MG/L DISTRIBUTION SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31
1	15007	14663	23	8	0.08	0.07	0.07	0.07	0.06	0.07	0.5	2.1	69	69		7.8	7.6	102	96	0.23	0.00	0.04	0.198	0.016	0.009	0.12	1.05	1.00
2	18656	17903	23	8	0.08	0.08	0.07	0.08	0.07	0.07	0.4	2.1	69	68		7.7	7.5	100	96	0.19	0.01	0.04	0.175	0.006	0.008	0.08	0.94	1.02
3	14944	14589	23	5	0.09	0.07	0.08	0.10	0.08	0.08	0.6	2.2	69	70		7.7	7.5	98	96	0.08	0.00	0.01	0.158	0.011	0.011	0.11	1.02	1.01
4	15715	15395	23	6	0.09	0.08	0.08	0.08	0.08	0.08	0.5	2.1	70	69		7.6	7.5	98	98	0.20	0.00	0.00	0.181	0.005	0.005	0.13	0.97	0.94
5	15202	14754	23	7	0.08	0.08	0.07	0.08	0.09	0.11	0.6	2.2	60	67		7.8	7.5	90	94	0.23	0.06		0.174	0.002		0.12	1.02	
6	15364	15350	23	8	0.10	0.09	0.10	0.09	0.09	0.09	0.5	2.2	76	80		7.7	7.5	94	92	0.15	0.00		0.169	0.007		0.08	0.95	
7	18413	18134	23	9	0.10	0.08	0.09	0.09	0.08	0.08	0.5	1.8	71	67		7.6	7.4	100	98	0.27	0.00	0.00	0.164	0.000	0.002	0.13	0.99	0.96
8	17414	16696	23	9	0.09	0.08	0.09	0.10	0.09	0.09	0.6	2.2	70	68		7.6	7.4	98	98	0.22	0.04	0.01	0.189	0.016	0.015	0.11	0.99	0.96
9	14755	14482	23	10	0.10	0.09	0.08	0.09	0.08	0.10	0.4	2.0	70	66		7.5	7.4	98	96	0.23	0.01	0.03	0.188	0.008	0.007	0.10	0.93	0.98
10	15992	15691	23	9	0.10	0.09	0.08	0.09	0.09	0.09	0.4	2.1	69	68		7.5	7.5	100	96	0.09	0.01	0.00	0.153	0.018	0.015	0.14	1.01	0.97
11	16709	16742	24	10	0.10	0.09	0.08	0.07	0.08	0.08	0.5	2.2	70	70		7.4	7.4	96	98	0.18	0.02	0.01	0.177	0.008	0.005	0.08	0.96	0.94
12	15819	15740	24	9	0.09	0.08	0.07	0.10	0.09	0.08	0.4	2.2	74	69		7.4	7.4	100	102	0.12	0.02		0.257	0.006		0.12	0.91	
13	17541	17276	25	9	0.09	0.08	0.09	0.12	0.09	0.08	0.5	2.4	68	76		7.6	7.4	90	98	0.21	0.09		0.184	0.005		0.09	0.90	
14	17739	16972	26	10	0.09	0.09	0.10	0.10	0.08	0.08	0.4	2.3	67	68		7.4	7.3	102	98	0.28	0.01	0.01	0.387	0.012	0.017	0.20	1.08	1.05
15	18363	17843	26	9	0.11	0.09	0.09	0.09	0.09	0.09	0.4	2.2	69	69		7.5	7.5	98	96	0.09	0.00	0.14	0.180	0.006	0.000	0.08	0.93	0.90
16	17947	17846	26	9	0.09	0.09	0.09	0.13	0.10	0.09	0.4	2.1	70	71		7.5	7.3	100	96	0.13	0.01	0.01	0.161	0.014	0.007	0.12	1.02	0.95
17	17699	16697	26	8	0.11	0.11	0.10	0.10	0.10	0.10	0.3	2.0	71	67		7.4	7.3	100	98	0.11	0.03	0.02	0.204	0.006	0.007	0.11	1.06	1.01
18	16237	16113	27	8	0.11	0.11	0.10	0.10	0.09	0.09	0.3	1.9	71	69		7.4	7.3	100	100	0.08	0.01	0.02	0.168	0.010	0.009	0.11	1.01	1.00
19	15687	15662	27	7	0.09	0.09	0.08	0.10	0.09	0.08	0.3	2.2	71	74		7.6	7.3	96	100	0.17	0.00		0.186	0.005		0.08	0.93	
20	17612	17620	27	5	0.08	0.08	0.08	0.10	0.08	0.08	0.3	2.2	69	67		7.4	7.4	98	96	0.09	0.01		0.150	0.012		0.03	1.05	
21	18054	17469	27	6	0.10	0.08	0.09	0.17	0.09	0.08	0.3	2.3	74	70		7.4	7.2	100	98	0.13	0.00	0.00	0.140	0.005	0.003	0.08	0.93	0.91
22	17487	17264	27	6	0.10	0.09	0.08	0.12	0.10	0.08	0.4	2.4	72	73		7.5	7.4	100	100	0.04	0.00	0.01	0.126	0.011	0.009	0.09	0.91	0.93
23	19089	18867	27	5	0.10	0.09	0.09	0.09	0.09	0.09	0.4	2.4	76	72		7.4	7.2	102	102	0.13	0.00	0.00	0.131	0.000	0.008	0.10	0.99	0.93
24	17255	17001	27	6	0.11	0.10	0.09	0.08	0.09	0.09	0.3	2.4	75	74		7.5	7.4	102	100	0.13	0.01	0.00	0.146	0.016	0.019	0.13	0.99	0.89
25	17347	16992	27	7	0.10	0.09	0.09	0.08	0.09	0.10	0.3	2.4	78	75		7.4	7.3	108	102	0.16	0.00	0.01	0.192	0.003	0.006	0.12	0.97	0.87
26	17863	17441	28	8	0.10	0.09	0.09	0.10	0.09	0.09	0.3	2.2	77	72		7.4	7.4	98	106	0.09	0.02		0.153	0.007		0.33	1.07	
27	17413	17109	28	6	0.10	0.09	0.09	0.10	0.10	0.10	0.3	2.2	75	75		7.5	7.3	104	104	0.07	0.01		0.137	0.009		0.09	0.94	
28	20946	20540	28	6	0.11	0.10	0.09	0.11	0.12	0.13	0.4	1.7	75	73		7.5	7.3	104	102	0.11	0.00	0.02	0.123	0.000	0.008	0.08	0.94	0.98
29	15949	15747	28	6	0.14	0.13	0.12	0.10	0.06	0.06	0.2	2.2	75	74		7.5	7.4	104	100	0.09	0.01	0.00	0.075	0.003	0.002	0.15	0.64	0.96
30	16763	16482	28	9	0.07	0.05	0.06	0.08	0.08	0.10	0.5	2.3	74	75		7.6	7.5	102	100	0.09	0.02	0.02	0.090	0.011	0.011	0.08	0.77	0.87
31																												
TOTAL	510981	501081	763	228	2.91	2.63	2.58	2.91	2.61	2.63	12.2	65.2	2144	2125	0	225.8	222.0	2982	2956	4.39	0.40	0.40	5.116	0.238	0.183	3.39	28.87	21.03
AVE.	17033	16703	25	8	0.10	0.09	0.09	0.10	0.09	0.09	04	2.2	71	71	0	7.5	7.4	99	99	0.15	0.01	0.02	0.171	0.008	0.008	0.11	0.96	096
MAX.	20946	20540	28	10	0.14	0.13	0.12	0.17	0.12	0.13	0.6	2.4	78	80	0	7.8	7.6	108	106	0.28	0.09	0.14	0.387	0.018	0.019	0.33	1.08	1.05
MIN.	14755	14482	23	5	0.07	0.05	0.06	0.07	0.06	0.06	0.2	1.7	60	66	0	7.4	7.2	90	92	0.04	0.00	0.00	0.075	0.000	0.000	0.03	0.64	0.87

CHEMICALS USED — POUNDS PER 24 HOURS

DATE	COAGULANT -	COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	32	33	34	35	36	37	38	39
1	1606	132	341		572		57	27
2	2190	149	418		680		57	23
3	1533	132	340		587		56	23
4	2044	133	354		578		56	23
5	2044	131	349		556		56	27
6	1825	130	353		574		55	27
7	2044	152	453		686		60	27
8	1898	153	462		629		78	50
9	1606	123	368		554		57	27
10	1898	134	405		620		57	50
11	1898	138	414		630		57	36
12	1752	135	404		581		105	41
13	1671	105	373		627		56	46
14	1898	154	451		614		52	41
15	1898	165	476		660		57	68
16	2190	157	451		663		93	91
17	2044	158	453		673	140	18	59
18	2190	145	407		597	271	57	96
19	2190	143	420		571	262	57	109
20	2336	177	482		648	294	57	96
21	2482	186	482		443	301	100	82
22	2336	181	455		551	292	57	68
23	2774	197	480		572	166	80	141
24	2336	187	443		576	287	57	96
25	2336	209	440		610	289	57	105
26	2336	269	468		643	298	57	132
27	2336	308	429		634	290	57	128
28	2993	369	536		693	349	75	160
29	2044	400	441		468	266		114
30	2628	329	407		508	280	69	146
31								
TOTAL	63356	5481	12755	0	17998	3785	1807	2160
AVE.	2112	183	425	0	600	270	62	72
MAX.	2993	400	536	0	693	349	105	160
MIN.	1533	105	340	0	443	140	18	23

CHEMICALS USED — CALCULATED DOSAGE MG/L

DATE	COAGULANT -	COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	40	41	42	43	44	45	46
1	12.8	3.8		0.83		0.46	0.22
2	14.1	3.6		0.80		0.37	0.15
3	12.3	3.8		0.86		0.45	0.18
4	15.6	3.7		0.80		0.43	0.18
5	16.1	3.8		0.80		0.44	0.21
6	14.2	3.8		0.82		0.43	0.21
7	13.3	3.9		0.81		0.39	0.18
8	13.1	4.2		0.79		0.54	0.34
9	13.1	4.0		0.82		0.46	0.22
10	14.2	4.0		0.85		0.43	0.37
11	13.6	4.0		0.82		0.41	0.26
12	13.3	4.1		0.80		0.80	0.31
13	11.4	3.3		0.78		0.38	0.31
14	12.8	4.1		0.76		0.35	0.28
15	12.4	4.2		0.79		0.37	0.45
16	14.6	4.1		0.81		0.62	0.61
17	13.8	4.1		0.83	0.95	0.12	0.40
18	16.2	4.1		0.80	2.00	0.42	0.71
19	16.7	4.3		0.80	2.00	0.44	0.83
20	15.9	4.5		0.80	2.00	0.39	0.65
21	16.5	4.4		0.54	2.00	0.66	0.55
22	16.0	4.4		0.69	2.00	0.39	0.47
23	17.4	4.3		0.65	1.04	0.50	0.89
24	16.2	4.4		0.73	1.99	0.40	0.67
25	16.1	4.5		0.77	2.00	0.39	0.72
26	15.7	4.9		0.79	2.00	0.38	0.89
27	16.1	5.1		0.80	2.00	0.39	0.88
28	17.1	5.2		0.72	2.00	0.43	0.92
29	15.4	6.3		0.64	2.00		0.86
30	18.8	5.3		0.66	2.00	0.49	1.04
31							
TOTAL	445	128.0	0.0	23.14	26.0	12.73	14.95
AVE.	15	4.3	0.00	0.77	1.86	0.44	0.50
MAX.	19	6.3	0.00	0.86	2.00	0.80	1.04
MIN.	11	3.3	0.00	0.54	0.95	0.12	0.15

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____

SIGNATURE

CERTIFICATE NUMBER _____

000108

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L	JAR TEST DATA: pH ADJUSTMENT MG/L	JAR TEST DATA: pH		FILTER DATA	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DISINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	END OF SEQUENCE pH	CALCULATED C	REQUIRED C	SECOND DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	END OF SEQUENCE pH	CALCULATED C	REQUIRED C	CT CALC. / CT REQ TOTAL INACTIVATION RATIO	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distributiob system. **Must vary within system.**
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	15007	14		7.6			12	288	48	12	12	12	6500	190.0																1	0.05	0.18	516 Madison St (MJC 1030)
2	18656	14		7.8		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	190.0																2.2	0.09	0.19	1721 Baltimore Dr. Apt. A - (MJC 0736)
3	14944	14		7.7		Pressure ( )	12	288	48	12	12	12	6500	126.7																1.2	0.06	0.12	328 Excell Rd. - (AT-0903)
4	15715	14		7.6		(b) Number of Filters - 12	12	288	48	12	12	12	6500	138.2																1.1	0.23	0.27	421 Providence Blvd. (MJC 0829)
5	15202	14		7.4			12	288	48	12	12	12	6500	128.9																			
6	15364	12		7.5		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	124.4																					
7	18413	14		7.3			12	288	48	12	12	12	6500	125.1																1.2	0.11	0.05	514 Eysian Dr. - (MJC 0912)
8	17414	14		7.6		(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	139.0																1.2	0.11	0.08	730 Needmore Rd. (MJC 0912)
9	14755	14		7.7			12	288	48	12	12	12	6500	141.4																1.2	0.07	0.07	3397 Quicksilver Ct. (MJC 9:57)
10	15992	14		7.4		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	134.9																1.5	0.12	0.13	2537 Wilma Rudolph Blvd. (AT 0928)
11	16709	14		7.2			12	288	48	12	12	12	6500	378.8																1.4	0.14	0.15	2040 Bradbury Rd. - (AT 0839)
12	15819	14		7.3		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	175.8																	0.10		
13	17541	14		7.5			12	288	48	12	12	12	6500	186.3																			
14	17739					(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	194.9																1.6	0.08	0.08	118 E Street - (AT 0903)
15	18363	14		8.1			12	288	48	12	12	12	6500	222.4																1	0.08	0.08	328 Excell Rd. (MJC 901)
16	17947	14		7.5		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	208.7																1	0.14	0.09	4021 McGregor Rd. - (AT 0916)
17	17699	14		7.4		GPM - 16,667	12	288	48	12	12	12	6500	216.3																1.5	0.21	0.21	954 Sugar Cane Way (AT 0958)
18	16237	16		7.4		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	227.2																1.2	0.07	0.12	251 Timber CourtDr. (MJC 8:52)
19	15687	14		7.4		With: Salt ( )	12	288	48	12	12	12	6500	192.3																	0.20		
20	17612	16		7.4		KMnO4 ( )	12	288	48	12	12	12	6500	218.8																			
21	18054	16		7.2		Acid ( )	12	288	48	12	12	12	6500	225.8																1.5	0.11	0.13	201 Cunningham Ln - (AT 1122)
22	17487	14		7.3			12	288	48	12	12	12	6500	162.0																1.5	0.16	0.15	314 Forest Hills Dr. - (AT 0933)
23	19089						12	288	48	12	12	12	6500	206.6																1.7	0.25	0.31	415 Fabian Pl. (AT 0935)
24	17255	16		6.7			12	288	48	12	12	12	6500	184.2																1	0.19	0.12	1616 Walnut Grove Blvd. (MJC 0940)
25	17347	16		7.3			12	288	48	12	12	12	6500	229.4																1.5	0.19	0.18	808 Oak Arbor Ct. (MJC 0933)
26	17863	16		7.6			12	288	48	12	12	12	6500	226.7																			
27	17413	16		7.1			12	288	48	12	12	12	6500	229.9																			
28	20946	16		7.4			12	288	48	12	12	12	6500	207.9																1.7	0.33	0.31	180 Holiday Dr. (MJC 1104)
29	15949						12	288	48	12	12	12	6500	187.1																1.7	0.19	0.24	308 Old Dunbar Cave Rd. (MJC 0700)
30	16763	16		7.5			12	288	48	12	12	12	6500	185.6																1.6	0.22	0.2	2200 Manson Ct. (MJC 0950)
31																																	
						Total Backwash Water 5705.5	Remarks:																								3.50	3.46	TOTAL
																													0.15	0.16	AVERAGE
																													0.33	0.31	MAX
																													0.05	0.05	MIN

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY Montgomery PWSID # 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF July YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY Raw	TURBIDITY FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L ON TOP OF FILTER	CHLORINE RESIDUAL MG/L LOWEST PLANT EFFLUENT	ALKALINITY MG/L TOTAL	ALKALINITY MG/L PHENOLPHTHALEIN FINISHED	ALKALINITY MG/L TOTAL FINISHED	pH RAW	pH FINISHED	HARDNESS MG/L RAW	HARDNESS MG/L FINISHED	IRON MG/L RAW	IRON MG/L FINISHED	IRON MG/L DIST SYSTEM	MANGANESE MG/L RAW	MANGANESE MG/L FINISHED	MANGANESE MG/L DIST SYSTEM	FLUORIDE MG/L RAW	FLUORIDE MG/L FINISHED	FLUORIDE MG/L DISTRIBUTION SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31
1	18114	18077	28	14	0.11	0.09	0.08	0.09	0.09	0.10	0.4	2.1	74	74		7.6	7.5	100	98	0.40	0.01	0.03	0.316	0.001	0.005	0.16	0.54	0.91
2	17412	16962	28	7	0.12	0.09	0.09	0.09	0.09	0.10	0.4	2.2	73	74		7.7	7.5	100	100	0.11	0.00	0.01	0.074	0.014	0.012	0.11	0.62	0.70
3	18825	18465	28	7	0.11	0.10	0.10	0.10	0.11	0.11	0.5	2.2	69	76		7.8	7.8	104	102	0.06	0.01		0.067	0.027		0.18	0.89	
4	16785	16498	28	6	0.11	0.10	0.09	0.10	0.10	0.11	0.4	2.1	75	78		7.6	7.6	102	108	0.03	0.01		0.050	0.013		0.19	0.96	
5	17605	17063	28	6	0.12	0.10	0.09	0.10	0.10	0.10	0.4	2.0	71	73		7.5	7.4	102	102	0.21	0.01		0.219	0.014		0.03	0.87	
5	18565	17979	28	6	0.12	0.10	0.10	0.09	0.09	0.09	0.4	2.3	76	73		7.6	7.5	102	100	0.04	0.03	0.01	0.043	0.008	0.014	0.10	0.83	0.82
7	19101	18905	28	7	0.11	0.09	0.08	0.08	0.08	0.08	0.4	2.2	74	75		7.6	7.6	106	104	0.03	0.01	0.01	0.038	0.010	0.018	0.12	0.86	0.85
8	19180	19053	28	6	0.11	0.08	0.07	0.10	0.08	0.09	0.3	2.2	74	75		7.5	7.5	104	102	0.05	0.02	0.01	0.051	0.014	0.011	0.12	0.90	0.83
9	18369	18451	28	6	0.12	0.09	0.09	0.14	0.13	0.06	0.4	2.1	74	72		7.7	7.4	104	100	0.12	0.00	0.01	0.070	0.015	0.002	0.17	1.32	1.05
10	16413	16021	28	8	0.08	0.05	0.05	0.05	0.05	0.05	0.1	1.9	71	76		7.7	7.7	104	104	0.20	0.02		0.070	0.005		0.18	0.27	
11	15530	15455	29	13	0.07	0.05	0.05	0.05	0.08	0.05	0.2	1.8	72	75		7.7	7.8	106	100	0.05	0.01		0.058	0.014		0.08	0.17	
12	17877	17473	29	9	0.07	0.06	0.06	0.06	0.07	0.08	0.2	1.9	73	74		7.7	7.7	104	100	0.18	0.00	0.01	0.133	0.006	0.008	0.19	0.43	0.34
13	16030	15841	28	7	0.10	0.07	0.07	0.12	0.07	0.08	0.3	2.0	72	73		7.7	7.7	100	100	0.12	0.01	0.03	0.086	0.009	0.005	0.07	0.66	0.65
14	15617	15387	29	4	0.10	0.09	0.06	0.06	0.07	0.07	0.2	2.2	75	75		7.5	7.8	104	100	0.07	0.00	0.01	0.038	0.007	0.009	0.07	0.15	0.78
15	16370	15978	29	4	0.09	0.07	0.06	0.06	0.06	0.06	0.3	2.2	72	73		7.4	7.5	98	98	0.07	0.00	0.03	0.052	0.015	0.003	0.18	1.04	0.58
16	17967	17988	29	4	0.09	0.06	0.06	0.06	0.06	0.06	0.2	2.2	76	77		7.6	7.4	104	102	0.02	0.02	0.02	0.047	0.010	0.016	0.15	1.04	0.53
17	16003	15738	29	3	0.08	0.06	0.06	0.06	0.06	0.06	0.2	2.2	74	76		7.4	7.4	128	114	0.04	0.01		0.036	0.006		0.19	0.98	
18	17410	17364	29	4	0.09	0.07	0.06	0.07	0.07	0.07	0.2	2.1	77	81		7.3	7.6	102	98	0.08	0.00		0.035	0.009		0.20	0.36	
19	18097	17976	29	4	0.09	0.07	0.06	0.06	0.07	0.08	0.2	2.3	78	78		7.3	7.5	100	102	0.05	0.01	0.00	0.043	0.014	0.009	0.13	0.18	0.26
20	18030	17980	29	3	0.10	0.08	0.08	0.08	0.08	0.09	0.2	2.3	80	75		7.3	7.2	108	106	0.03	0.02	0.03	0.042	0.016	0.017	0.15	0.96	0.33
21	19658	19259	29	4	0.11	0.08	0.08	0.08	0.09	0.08	0.4	2.1	84	80		7.4	7.4	106	106	0.00	0.00	0.00	0.062	0.027	0.021	0.08	1.03	0.83
22	16704	16732	29	4	0.09	0.08	0.08	0.07	0.07	0.08	0.3	2.1	76	75		7.4	7.4	100	98	0.08	0.00	0.03	0.081	0.010	0.000	0.11	0.95	0.95
23	17208	17182	29	3	0.11	0.08	0.08	0.09	0.08	0.09	0.2	1.9	73	75		7.4	7.4	102	100	0.03	0.01	0.00	0.085	0.019	0.013	0.11	0.91	0.99
24	19586	19322	29	4	0.11	0.09	0.09	0.08	0.08	0.09	0.3	2.4	76	77		7.5	7.5	112	116	0.03	0.02		0.070	0.014		0.14	1.10	
25	17250	16570	29	4	0.11	0.09	0.08	0.07	0.08	0.21	0.3	2.3	67	74		7.3	7.4	94	96	0.06	0.02		0.064	0.006		0.11	0.90	
26	17088	14667	29	6		0.39	0.27	0.08	0.06	0.06	0.3	1.7	73	73		7.2	7.3	90	94	0.05	0.02	0.01	0.053	0.005	0.006	0.09	0.90	0.91
27	21164	21511	29	5	0.07	0.05	0.05	0.05	0.05	0.05	0.3	2.0	71	70		7.3	7.3	94	92	0.08	0.01	0.02	0.060	0.002	0.000	0.11	0.97	0.93
28	20263	20233	29	7	0.09	0.05	0.05	0.05	0.05	0.05	0.3	1.8	71	69		7.2	7.2	94	92	0.08	0.03	0.02	0.061	0.009	0.012	0.09	0.96	0.94
29	21231	21230	29	5	0.07	0.05	0.05	0.05	0.07	0.08	0.2	1.7	71	66		7.2	7.1	96	94	0.06	0.01	0.00	0.043	0.005	0.008	0.13	0.98	0.92
30	18214	18166	29	4	0.12	0.08	0.08	0.08	0.07	0.08	0.3	1.7	70	67		7.2	7.1	102	98	0.02	0.00	0.01	0.057	0.007	0.018	0.09	0.94	0.93
31	17831	17593	29	4	0.12	0.08	0.07	0.07	0.08	0.08	0.3	2.3	72	75		7.3	7.2	96	104	0.06	0.00		0.042	0.008		0.01	1.02	
TOTAL	555498	547116	888	178	2.98	2.69	2.44	2.39	2.39	2.54	9.1	64.6	2284	2304	0	231.6	231.5	3168	3130	2.51	0.32	0.30	2.246	0.339	0.207	3.84	24.69	16.03
AVE.	17919	17649	29	6	0.10	0.09	0.08	0.08	0.08	0.08	0.3	2.1	74	74	0	7.5	7.5	102	101	0.08	0.01	0.01	0.072	0.011	0.010	0.12	0.80	0.76
MAX.	21231	21511	29	14	0.12	0.39	0.27	0.14	0.13	0.21	0.5	2.4	84	81	0	7.8	7.8	128	116	0.40	0.03	0.03	0.316	0.027	0.021	0.20	1.32	1.05
MIN.	15530	14667	28	3	0.07	0.05	0.05	0.05	0.05	0.05	0.1	1.7	67	66	0	7.2	7.1	90	92	0.00	0.00	0.00	0.035	0.001	0.000	0.01	0.15	0.26

CHEMICALS USED

DATE	POUNDS PER 24 HOURS: COAGULANT - COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR CONTROL	MINERAL SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL	CALCULATED DOSAGE MG/L: COAGULANT - COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR CONTROL	MINERAL SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
1	2409	188	436		385	246	103	169	15.9	4.1		0.46	1.63	0.68	1.12
2	2336	179	447		430	290	117	155	16.1	4.3		0.54	2.00	0.81	1.07
3	2336	196	480		404	314	57	169	14.9	4.3		0.47	2.00	0.36	1.08
4	2628	169	420		510	280	114	155	18.8	4.2		0.66	2.00	0.81	1.11
5	2774	177	456		502	294	111	182	18.9	4.3		0.62	2.00	0.76	1.24
5	2774	205	501		526	310	57	187	17.9	4.6		0.62	2.00	0.37	1.21
7	2774	190	526		586	319	117	192	17.4	4.5		0.67	2.00	0.73	1.21
8	2774	187	515		733	320	115	187	17.3	4.4		0.83	2.00	0.72	1.17
9	2628	372	457		994	306	58	164	17.2	5.4		1.18	2.00	0.38	1.07
10	2482	504	404		39	274	0	123	18.1	6.6		0.05	2.00	0.00	0.90
11	2190	469	361			259		96	16.9	6.4			2.00		0.74
12	1752	617	454		241	298		68	11.8	7.2		0.29	2.00		0.46
13	1460	479	371		243	267		55	10.9	6.4		0.33	2.00		0.41
14	1314	454	362		293	260		46	10.1	6.3		0.41	2.00		0.35
15	1387	478	390		609	273		59	10.2	6.4		0.81	2.00		0.43
16	1825	533	454		665	300		78	12.2	6.6		0.81	2.00		0.52
17	1241	512	397		588	267		96	9.3	6.8		0.80	2.00		0.72
18	1314	523	442			290		96	9.0	6.6			2.00		0.66
19	1314	526	444		294	0		105	8.7	6.4		0.35	0.00		0.70
20	1168	562	452		657			82	7.8	6.7		0.80			0.55
21	1314	606	491		710	764		91	8.0	6.7		0.79	4.66		0.56
22	1022	555	420		599	557		87	7.3	7.0		0.78	4.00		0.62
23	1022	564	433		651	574		87	7.1	6.9		0.83	4.00		0.51
24	1241	586	490		696	653		105	7.6	6.6		0.78	4.00		0.64
25	1095	550	417		661	577		96	7.6	6.7		0.84	4.01		0.67
26	2044	515	373		449			64	14.3	6.2		0.57			0.45
27	2774	644	546		763			109	15.7	6.7		0.79			0.62
28	2774	665	550		719	676		105	16.4	7.2		0.78	4.00		0.62
29	2920	478	591		781	708		119	16.5	6.0		0.80	4.00		0.67
30	2482	194	508		662	608	98	100	16.3	4.6		0.79	4.00	0.65	0.66
31	2409	199	502		643	595	113	87	16.2	4.7		0.79	4.00	0.76	0.59
TOTAL	61977	13076	14090	0	16033	10879	1060	3514	413	182.0	0.0	19.26	72.3	7.03	23.39
AVE.	1999	422	455	0	553	389	88	113	13	5.9	0.00	0.66	2.58	0.59	0.75
MAX.	2920	665	591	0	994	764	117	192	19	7.2	0.00	1.18	4.66	0.81	1.24
MIN.	1022	169	361	0	39	0	0	46	7	4.1	0.00	0.05	0.00	0.00	0.35

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____ SIGNATURE

CERTIFICATE NUMBER _____

000110

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L	JAR TEST DATA: pH ADJUSTMENT MG/L	JAR TEST DATA: pH		FILTER DATA	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DISINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	FIRST DISINFECTION SEQUENCE: CONTACT TIME IN MINUTES T	FIRST DISINFECTION SEQUENCE: END OF SEQUENCE pH	FIRST DISINFECTION SEQUENCE: CALCULATED C1	FIRST DISINFECTION SEQUENCE: REQUIRED C1	SECOND DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	SECOND DISINFECTION SEQUENCE: CONTACT TIME IN MINUTES T	SECOND DISINFECTION SEQUENCE: END OF SEQUENCE pH	SECOND DISINFECTION SEQUENCE: CALCULATED C1	SECOND DISINFECTION SEQUENCE: REQUIRED C1	CT CALC / CT REQ: TOTAL INACTIVATION RATIO	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distributiob system. **Must vary within system.**
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	18114	16		7.3		COMPLETE APPLICABLE BLANKS **EACH** MONTH	12	288	48	12	12	12	6500	213.2																	0.8	0.24	0.23	517 Madison St. (MJC 0907)
2	17412	16		7.4		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	233.1																	1	0.21	0.2	196 Bob White Dr. (MJC 0928)
3	18825	16		7.5		Pressure ( )	12	288	48	12	12	12	6300	211.0																				
4	16785	18		7.4		(b) Number of Filters - 12	12	288	48	12	12	12	6300	222.4																				
5	17605	18		7.3			12	288	48	12	12	12	6500	242.9																		
6	18565	18		7.6		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6300	216.6																	1	0.28	0.24	731 West Creek Dr. (MJC 0907)
7	19101	18		7.4			12	288	48	12	12	12	6300	243.6															1.7	0.27	0.28	481 Georgetown Rd. (AT 0910)
8	19180	18		7.4		(d) Filter Area - Sc. Ft. (Each) 360	12	288	48	12	12	12	6300	189.7																	08	0.27	0.23	575 Orman Dr. Apt. A (MJC 0900)
9	18369	18		7.4			12	288	48	12	12	12	6500	192.7															1.5	0.22	0.26	348A Dupuis Dr. (AT 1010)
10	16413	18		7.4		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6300	203.7																				
11	15530	16		7.4			12	264	48	12	12	12	6500	186.5																		
12	17877	12		7.6		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	197.1																	1.2	0.05	0.24	1403 Shadowlawn Ct. (MJC 0930)
13	16030	12		7.5			12	288	48	12	12	12	6500	168.8															1	0.14	0.08	3411 Sandpiper Dr. - (AT 0940)
14	15617	12		7.4		(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	144.0															1	0.07	0.23	4021 McGregor Rd. (AT 0909)
15	15370	12		7.4			12	288	48	12	12	12	6500	173.6															1	0.13	0.27	3716 Cindy Jo Dr. (AT 0906)
16	17967					(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	182.7															1	0.30	0.31	1804 Whispering Hills Dr. (AT 1026)
17	16003	10		7.4		GPM - 16.667	12	288	48	12	12	12	6500	200.9																				
18	17410	10		7.3		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	206.8																				
19	18097					With Salt ( )	12	288	48	12	12	12	6500	202.5																	1.5	0.28	0.24	425 Caney Ln. (AT 1059)
20	18030	8		7.3		KMnO4 ( )	12	288	48	12	12	12	6500	195.4															1	0.26	0.28	2215 Madison St. - (AT 0930)
21	19658	8		7.3		Acid ( )	12	288	48	12	12	12	6500	204.3															1.4	0.26	0.28	712 Rossview Rd. (AT 8:30)
22	16704	8		7.4			12	288	48	12	12	12	6500	216.1															1.7	0.14	0.28	421 Providence Blvd. (MJC 0847)
23	17208	8		7.4			12	288	48	12	12	12	6500	230.1															1.8	0.19	0.25	2207 Jan Dr. (MJC 0907)
24	19586	8		7.4			12	288	48	12	12	12	6300	217.4																		
25	17250	8		7.5			12	276	48	12	12	12	6500	187.6																		
26	17088						12	204	48	12	12	12	6500	296.4															1.6	0.27	0.31	1295 Paradise Hills Rd. (AT 0915)
27	21164	16		7.2			12	288	48	12	12	12	6500	173.7															1	0.15	0.27	1 Richmond Dr. - (MJC 840)
28	20263	16		7.2			12	288	48	12	12	12	6500	203.0															0.7	0.21	0.27	1616 Walnut Grove Rd. - (MJC 0924)
29	21231	16		7.3			12	288	48	12	12	12	6500	224.4															1.1	0.15	0.15	534 Briarwood Rd. (AT 0940)
30	18214	16		7.3			12	288	48	12	12	12	6500	205.5															1.4	0.15	0.16	180 Holiday Dr. (MJC 0933)
31	17831	16		7.2			12	288	48	12	12	12	6500	214.4																		
						Total Backwash Water 6399.9 Remarks																												
																														4.24	5.06	TOTAL
																														0.20	0.24	AVERAGE
																														0.30	0.31	MAX
																														0.05	0.08	MIN

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY Montgomery PWSID# 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF August YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY: Raw	TURBIDITY: FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L: ON TOP OF FILTER	CHLORINE RESIDUAL MG/L: LOWEST PLANT EFFLUENT	ALKALINITY MG/L: TOTAL	ALKALINITY MG/L: PHENOLPHTHALEIN FINISHED	ALKALINITY MG/L: TOTAL FINISHED	pH: RAW	pH: FINISHED	HARDNESS MG/L: RAW	HARDNESS MG/L: FINISHED	IRON MG/L: RAW	IRON MG/L: FINISHED	IRON MG/L: DIST. SYSTEM	MANGANESE MG/L: RAW	MANGANESE MG/L: FINISHED	MANGANESE MG/L: DIST SYSTEM	FLUORIDE MG/L: RAW	FLUORIDE MG/L: FINISHED	FLUORIDE MG/L: DISTRIBUTION SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31
1	16512	16567	29	4	0.11	0.08	0.07	0.08	0.08	0.08	0.4	1.9	68	67		7.3	7.3	91	90	0.04	0.01		0.040	0.003		0.08	0.90	
2	17223	17007	29		0.10	0.08	0.07	0.07	0.08	0.09	0.4	2.3	72	67		7.3	7.2	96	94	0.03	0.01	0.01	0.038	0.006	0.011	0.11	0.96	0.95
3	21200	21053	29	4	0.11	0.08	0.07	0.07	0.08	0.09	0.4	2.2	73	70		7.2	7.0	94	92	0.05	0.02	0.01	0.037	0.004	0.009	0.10	0.95	0.96
4	18280	18330	30	4	0.12	0.07	0.08	0.07	0.07	0.08	0.4	2.4	74	69		7.3	7.2	96	96	0.07	0.02	0.05	0.048	0.022	0.025	0.11	0.97	0.96
5	17744	17580	30	2	0.11	0.07	0.08	0.08	0.08	0.09	0.4	2.3	72	72		7.2	7.3	96	96	0.03	0.02	0.00	0.017	0.000	0.000	0.09	0.94	0.92
6	20007	19164	30	3	0.11	0.09	0.08	0.08	0.07	0.08	0.3	2.3	73	74		7.3	7.6	98	96	0.03	0.03	0.04	0.067	0.034	0.037	0.04	0.97	0.93
7	18136	18133	30	3	0.11	0.09	0.09	0.07	0.08	0.08	0.4	2.4	66	69		7.3	7.5	102	98	0.04	0.00		0.071	0.007		0.09	0.38	
8	18732	18225	30	5	0.11	0.08	0.07	0.07	0.08	0.08	0.4	2.6	68	78		7.3	7.5	88	94	0.10	0.00		0.051	0.011		0.08	0.26	
9	19766	19430	30	4	0.09	0.08	0.08	0.07	0.08	0.09	0.5	2.4	67	70		7.4	7.5	94	100	0.19	0.00	0.03	0.057	0.010	0.013	0.13	0.22	0.27
10	18484	18328	30	3	0.11	0.09	0.09	0.08	0.08	0.12	0.5	2.4	74	77		7.6	7.6	100	98	0.04	0.02	0.00	0.044	0.007	0.007	0.13	0.18	0.18
11	19451	18973	30	2	0.11	0.09	0.08	0.08	0.09	0.10	0.5	2.3	72	73		7.2	7.5	100	96	0.03	0.02	0.02	0.038	0.013	0.014	0.11	0.10	0.24
12	18609	18581	30	3	0.09	0.09	0.09	0.08	0.09	0.10	0.5	2.4	78	77		7.5	7.6	102	102	0.03	0.00	0.01	0.043	0.005	0.004	0.08	0.16	0.15
13	18457	17774	30	3	0.10	0.09	0.09	0.08	0.09	0.09	0.4	2.4	74	74		7.5	7.4	104	102	0.07	0.03	0.00	0.029	0.002	0.004	0.11	1.00	0.29
14	18751	18261	30	4	0.09	0.09	0.08	0.09	0.09	0.09	0.2	2.2	80	70		7.4	7.4	100	110	0.05	0.02		0.043	0.001		0.13	0.97	
15	18977	18778	30	8	0.10	0.09	0.09	0.08	0.08	0.09	0.3	2.3	76	74		7.3	7.4	112	104	0.11	0.02		0.096	0.022		0.07	0.87	
16	19276	18553	30	7	0.09	0.09	0.09	0.08	0.09	0.10	0.3	2.1	76	73		7.3	7.2	102	100	0.12	0.00	0.04	0.086	0.016	0.007	0.11	1.04	0.93
17	19359	18570	30		0.09	0.10	0.10	0.08	0.09	0.09	0.5	2.1	77	74		7.4	7.3	100	100	0.09	0.02	0.02	0.074	0.014	0.018	0.08	1.00	0.95
18	15072	14592	30	7	0.09	0.08	0.10	0.08	0.08	0.08	0.3	1.8	74	74		7.4	7.3	98	100	0.59	0.01	0.01	0.176	0.011	0.005	0.11	1.05	0.97
19	17689	16589	28	22	0.08	0.07	0.07	0.07	0.06	0.06	0.3	1.9	69	73		7.0	7.1	98	94	1.03	0.02	0.00	0.330	0.003	0.004	0.10	1.02	1.03
20	19342	18600	28	48	0.06	0.06	0.06	0.06	0.06	0.06	0.4	2.3	65	61		7.1	7.0	94	90	1.11	0.00	0.01	0.412	0.006	0.012	0.07	1.00	1.00
21	17634	17279	28	7	0.06	0.06	0.06	0.06	0.06	0.06	0.3	2.4	68	60		7.1	7.0	92	92	0.13	0.00		0.090	0.013		0.02	0.95	
22	17737	17883	28	8	0.06	0.06	0.07	0.07	0.07	0.07	0.4	2.1	66	68		7.1	7.1	102	96	0.14	0.00		0.071	0.011		0.10	0.99	
23	18349	17526	28	7	0.07	0.06	0.07	0.07	0.07	0.07	0.5	2.2	71	68		7.1	7.1	98	94	0.14	0.00	0.01	0.072	0.008	0.021	0.07	0.95	0.93
24	16815	16856	28	9	0.07	0.07	0.08	0.07	0.07	0.07	0.6	2.2	71	70		7.1	7.0	102	98	0.14	0.00	0.00	0.091	0.015	0.010	0.15	0.96	0.99
25	18997	18447	28	6	0.07	0.07	0.07	0.06	0.07	0.07	0.6	2.3	73	72		7.0	7.0	98	98	0.09	0.01	0.03	0.056	0.007	0.007	0.07	1.06	1.03
26	17828	17522	27	7	0.08	0.08	0.07	0.08	0.08	0.08	0.6	1.8	72	74		7.2	7.2	96	102	0.12	0.01	0.04	0.081	0.022	0.014	0.12	1.04	1.00
27	18466	18361	27		0.08	0.07	0.09	0.08	0.08	0.08	0.5	2.1	76	74		7.3	7.2	100	102	0.11	0.00	0.00	0.087	0.019	0.017	0.12	0.97	0.95
28	17982	17722	26	5	0.09	0.08	0.10	0.09	0.08	0.08	0.5	2.3	73	75		7.3	7.2	100	98	0.03	0.00		0.060	0.016		0.03	1.00	
29	17322	16742	27	4	0.08	0.08	0.10	0.09	0.09	0.09	0.4	2.2	74	76		7.3	7.2	100	102	0.08	0.00		0.057	0.024		0.20	0.92	
30	17374	16874	27	3	0.09	0.09	0.10	0.09	0.10	0.10	0.4	2.2	75	75		7.3	7.2	98	98	0.05	0.02	0.01	0.034	0.008	0.010	0.08	1.02	1.01
31	18091	18059	27	4	0.10	0.09	0.10	0.09	0.08	0.09	0.5	2.2	75	71		7.3	7.1	98	98	0.05	0.01	0.01	0.046	0.010	0.016	0.06	1.02	0.98
TOTAL	567663	556358	894	196	2.84	2.47	2.54	2.37	2.45	2.60	13.1	69.0	2242	2219	0	225.6	225.3	3049	3030	4.93	0.32	0.35	2.542	0.350	0.265	2.95	25.82	17.62
AVE.	18312	17947	29	7	0.09	0.08	0.08	0.08	0.08	0.08	0.4	2.2	72	72	0	7.3	7.3	98	98	0.16	0.01	0.02	0.082	0.011	0.012	0.10	0.83	0.80
MAX	21200	21053	30	48	0.12	0.10	0.10	0.09	0.10	0.12	0.6	2.6	80	78	0	7.6	7.6	112	110	1.11	0.03	0.05	0.412	0.034	0.037	0.20	1.06	1.03
MIN	15072	14592	26	2	0.06	0.06	0.06	0.06	0.06	0.06	02	1.8	65	60	0	7.0	7.0	88	90	0.03	0.00	0.00	0.017	0.000	0.000	0.02	0.10	0.15

CHEMICALS USED

POUNDS PER 24 HOURS

DATE	COAGULANT - COAGULANT AID	DISINFECTION PRE DISINFECTION	POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	32	33	34	35	36	37	38	39
1	2336	186	470		593	551	113	78
2	2044	207	495		619	575	114	73
3	2920	258	609		763	707	147	119
4	2482	229	558		653	610	82	96
5	2482	224	510		460	592	114	73
6	2774	269	571			667	114	100
7	2482	246	518			605	115	91
8	2482	261	544			625	114	91
9	2628	269	542		0	659	114	82
10	2452	243	496			617	114	87
11	2774	261	528			649	57	91
12	2774	252	513			621	114	87
13	2774	253	499		675	616	113	96
14	2482	271	513		635	625	114	82
15	2628	295	513		685	633	114	91
16	2628	303	494		689	643	114	78
17	2701	287	490		672	646	57	73
18	2044	193	353		565	503	57	46
19	2920	268	439		608	590	114	59
20	4526	250	462		639	645	114	68
21	3358	245	501		638	588	57	78
22	2920	245	429		645	591	114	82
23	2117	256	437		683	612	57	68
24	2482	236	403		632		114	78
25	3285	252	446		689	634	57	68
26	2847	221	412		590	595	113	73
27	3139	231	422		662	616	114	68
28	3066	225	409		648	599	57	68
29	2774	214	390		615	578	114	64
30	2628	214	391		639	580	57	73
31	2701	232	433		650	604	113	64
TOTAL	84650	7596	14790	0	15347	18376	3076	2445
AVE.	2731	245	477	0	614	613	99	79
MAX	4526	303	609	0	763	707	147	119
MIN	2044	186	353	0	0	503	57	46

CALCULATED DOSAGE MG/L

DATE	COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	40	41	42	43	44	45	46
1	17.0	4.8		0.78	4.00	0.82	0.57
2	14.2	4.9		0.78	4.00	0.79	0.51
3	16.5	4.9		0.79	4.00	0.83	0.67
4	16.3	5.2		0.78	4.00	0.54	0.63
5	16.8	5.0		0.57	4.00	0.77	0.49
6	16.6	5.0			4.00	0.68	0.60
7	16.4	5.1			4.00	0.76	0.60
8	15.9	5.2			4.00	0.73	0.58
9	15.9	4.9		0.00	4.00	0.69	0.50
10	15.9	4.8			4.00	0.74	0.56
11	17.1	4.9			4.00	0.35	0.56
12	17.9	4.9			4.00	0.73	0.56
13	18.0	4.9		0.80	4.00	0.73	0.62
14	15.9	5.0		0.74	4.00	0.73	0.52
15	16.6	5.1		0.79	4.00	0.72	0.58
16	16.3	5.0		0.78	4.00	0.71	0.49
17	16.7	4.8		0.76	4.00	0.35	0.45
18	16.3	4.3		0.82	4.00	0.45	0.37
19	19.8	4.8		0.75	4.00	0.77	0.40
20	28.1	4.4		0.72	4.00	0.71	0.42
21	22.8	5.1		0.79	4.00	0.39	0.53
22	19.7	4.5		0.79	4.00	0.77	0.55
23	13.8	4.5		0.81	4.00	0.37	0.44
24	17.7	4.6		0.82		0.81	0.56
25	20.7	4.4		0.79	4.00	0.36	0.43
26	19.1	4.3		0.72	4.00	0.76	0.49
27	20.4	4.2		0.78	4.00	0.74	0.44
28	20.4	4.2		0.79	3.99	0.38	0.45
29	19.2	4.2		0.78	4.00	0.79	0.44
30	18.1	4.2		0.80	4.00	0.39	0.50
31	17.9	4.4		0.78	4.00	0.75	0.42
TOTAL	554	146.3	0.0	18.53	120.0	20.14	15.95
AVE.	18	4.7	0.00	0.74	4.00	0.65	0.51
MAX	28	5.2	0.00	0.82	4.00	0.83	0.67
MIN	14	4.2	0.00	0.00	3.99	0.35	0.37

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____ SIGNATURE

CERTIFICATE NUMBER _____

000112

		JAR TEST DATA				FILTER DATA	FILTER OPERATION DATA								DINSINFECTION AND CT VALUES										MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE						
															FIRST DISINFECTION SEQUENCE					SECOND DISINFECTION SEQUENCE											
DATE	RAW WATER TREATED 1,000 GALLONS	COAGULANT MG/L	pH ADJUSTMENT MG/L	pH		COMPLETE APPLICABLE BLANKS EACH MONTH	NUMBER OF FILTERS USED	FILTER HOURS= COL. 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		FREE CHLORINE END OF SEQUENCE C	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	CALCULATED C	REQUIRED C	FREE CHLORINE END OF SEQUENCE C	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	CALCULATED C	REQUIRED C	TOTAL INACTIVATION RATIO	CT CALC / CT REQ	RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distribution system. Must vary within system.
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73		74	75	76	77	78	79	
1	16512	16		7.2			12	288	48	12	12	12	6500	203.5																			
2	17223	16		7.2		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	216.3																	1.5	0.29	0.30	220 W. Dunbar Cave Rd. - (AT 0922)
3	21200	16		7.3		Pressure ( )	12	288	48	12	12	12	6500	193.4																	1.2	0.28	0.27	532 Donna Dr. - (AT 0950)
4	18280	16		7.2		(b) Number of Filters - 12	12	288	48	12	12	12	6500	195.0																	1.7	0.16	0.18	730 Rossview Rd. (MJC 1027)
5	17744	16		7.3			12	288	48	12	12	12	6500	202.1																	2.0	0.12	0.15	1104 Plymouth Rd. Apt. A (MJC 0912)
6	20007	16		7.3		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	209.4																	0.8	0.25	0.37	517 Madison St (MJC 0805)
7	18136	16		7.2			12	288	48	12	12	12	6500	208.9																			
8	18732	16		7.5		(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	219.0																					
9	19766	16		7.4			12	288	48	12	12	12	6500	227.2																	1.2	0.25	0.20	704 Meadowgate Ln. (AT 1115)
10	18484	16		7.3		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	182.0																	1.6	0.16	0.22	113 A- Strawberry Alley (MJC 0856)
11	19451	16		7.2			12	288	48	12	12	12	6500	194.0																	1.1	0.16	0.19	3893 Roscommon Wy; (AT 0850)
12	18609	16		7.3		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	207.8																	2.5	0.11	0.19	1721 Baltimore Dr Apt A. (MJC 1015)
13	18457	16		7.3			12	288	48	12	12	12	6500	224.9																	0.7	0.13	0.23	328 Excell Rd. (MJC 1000)
14	18751	16		7.3		(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	229.0																					
15	18977	16		7.3			12	288	48	12	12	12	6500	164.5																			
16	19276	16		7.3		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	204.0																	1.1	0.15	0.21	3919 Rhonda Ct. (AT 0954)
17	19359	16		7.4		GPM - 16,667	12	288	48	12	12	12	6500	183.5																	1.5	0.15	0.16	2940 Nicole Rd. - 1018 - AT
18	15072	16				(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	222.0																	1.5	0.14	0.17	136 N Meadow Dr - 0940 - MJC
19	17689	24		7.0		With: Salt ( )	12	288	48	12	12	12	6500	218.8																	1.4	0.13	0.14	811 Benton Ct. (MJC 0900)
20	19342	24		7.1		KMnO4 ( )	12	288	48	12	12	12	6500	171.9																	2.0	0.13	0.15	421 Providence Blvd. (MJC 0747)
21	17634	20		7.1		Acid ( )	12	288	48	12	12	12	6500	190.5																			
22	17737	16		7.1			12	288	48	12	12	12	6500	216.0																			
23	18349	20		7.1			12	288	48	12	12	12	6500	198.6																	0.9	0.10	0.16	134 Hampton Station Rd. (MJC 0926)
24	16815	20		7.1			12	288	48	12	12	12	6500	211.2																	1.1	0.18	0.16	2040 Bradbury Rd. (AT 0857)
25	18997	20		7.1			12	288	48	12	12	12	6500	195.8																	1.7	0.17	0.14	308 Old Dunbar Cave Rd. (MJC 0917)
26	17828						12	288	48	12	12	12	6500	217.2																	1.1	0.11	0.16	1804 Whispering hills Dr - 0908 - AT
27	18466	20		7.3			12	288	48	12	12	12	6500	207.1																	1.0	0.11	0.19	900 Tiny Town Rd - 0949 - MJC
28	17982	20		7.3			12	288	48	12	12	12	6500	201.0																			
29	17322	20		7.2			12	288	48	12	12	12	6500	211.4																			
30	17374	18		7.3			12	288	48	12	12	12	6500	208.0																	1.0	0.20	0.23	202 Rachel Ct. - 1209 - AT
31	18091	18		7.1			12	288	48	12	12	12	6500	213.3																	2.0	0.15	0.16	1496 Golf Club Ln. - 1129 - AT
						Total Backwash Water								6347.2	Remarks:																	3.63	4.33	TOTAL
																															0.16	0.20	AVERAGE
																															0.29	0.37	MAX
																															0.10	0.14	MIN

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY Montgomery PWSID # 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF October YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY Raw	FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L ON TOP OF FILTER	LOWEST PLANT EFFLUENT	ALKALINITY MG/L TOTAL RAW	PHENOLPHTHALEIN FINISHED	TOTAL FINISHED	pH RAW	pH FINISHED	HARDNESS MG/L RAW	HARDNESS FINISHED	IRON MG/L RAW	IRON FINISHED	IRON DIST. SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25
1	17791	17185	24	6	0.08	0.07	0.07	0.07	0.07	0.08	0.5	1.8	76	77		7.4	7.3	102	102	0.14	0.00	0.04
2	16790	16612	24	6	0.08	0.07	0.08	0.07	0.07	0.08	0.5	2.3	79	72		7.5	7.4	110	104	0.11	0.00	
3	17496	17145	23	7	0.08	0.07	0.07	0.07	0.07	0.07	0.5	2.3	77	75		7.3	7.3	106	102	0.10	0.00	
4	16280	16556	22	10	0.07	0.07	0.08	0.07	0.07	0.08	0.5	2.4	75	74		7.4	7.4	98	98	0.08	0.02	0.02
5	18675	17285	22	4	0.08	0.07	0.07	0.07	0.08	0.07	0.5	2.2	76	73		7.5	7.4	106	102	0.04	0.00	0.00
6	17699	17110	22	8	0.07	0.07	0.07	0.07	0.07	0.07	0.5	2.4	75	75		7.5	7.4	104	98	0.07	0.00	0.01
7	17815	17865	22	5	0.08	0.07	0.08	0.07	0.07	0.07	0.5	2.4	72	74		7.5	7.4	102	100	0.09	0.01	0.02
8	16969	16866	21	4	0.07	0.07	0.08	0.08	0.08	0.08	0.5	2.2	73	74		7.5	7.4	100	104	0.05	0.00	0.01
9	17862	17130	21	5	0.08	0.08	0.08	0.09	0.09	0.09	0.4	2.1	74	77		7.6	7.4	100	98	0.06	0.00	
10	18755	18428	21	4	0.09	0.09	0.09	0.09	0.09	0.09	0.6	2.1	76	80		7.7	7.3	98	97	0.03	0.00	
11	16479	16693	21	4	0.09	0.08	0.12	0.12	0.06	0.06	0.1	1.5	76	77		7.7	7.5	108	100	0.08	0.00	0.02
12	16333	15893	21	5	0.06	0.06	0.06	0.06	0.06	0.06	0.2	2.0	78	76		7.5	7.4	102	98	0.04	0.00	0.01
13	17033	16032	22	4	0.06	0.06	0.06	0.04	0.04	0.05	0.2	2.4	78	75		7.4	7.4	100	100	0.03	0.02	0.00
14	17489	17293	21	3	0.06	0.06	0.06	0.06	0.06	0.06	0.3	2.4	77	73		7.5	7.4	108	100	0.07	0.00	0.00
15	16978	15770	21	4	0.06	0.06	0.06	0.06	0.06	0.06	0.2	2.3	75	76		7.4	7.4	100	98	0.04	0.00	0.00
16	16700	16822	21	5	0.06	0.05	0.06	0.05	0.06	0.06	0.3	2.3	77	76		7.6	7.5	100	96	0.03	0.00	
17	16764	16490	21	4	0.06	0.06	0.06	0.06	0.06	0.06	0.3	2.3	75	74		7.5	7.4	106	96	0.27	0.01	
18	16731	14812	21	6	0.06	0.06	0.07	0.06	0.06	0.06	0.3	2.4	77	78		7.6	7.6	104	100	0.07	0.01	0.03
19	17633	16393	20	4	0.06	0.06	0.06	0.06	0.06	0.06	0.5	2.5	78	76		7.6	7.5	102	100	0.07	0.01	0.06
20	16966	16392	20	3	0.06	0.06	0.06	0.06	0.06	0.06	0.4	2.4	83	75		7.6	7.5	102	100	0.04	0.00	0.00
21	16876	16200	20	4	0.06	0.06	0.06	0.06	0.06	0.06	0.3	2.3	80	70		7.6	7.5	106	102	0.07	0.01	0.00
22	17311	17244	20	3	0.06	0.06	0.06	0.05	0.06	0.06	0.4	2.2	79	77		7.6	7.6	102	100	0.03	0.00	0.00
23	16279	15889	20	3	0.06	0.06	0.06	0.05	0.06	0.06	0.4	2.5	75	77		7.6	7.5	106	104	0.04	0.00	
24	17308	16659	20	3	0.06	0.06	0.06	0.05	0.06	0.06	0.4	2.6	75	76		7.6	7.6	108	96	0.04	0.00	
25	15318	15010	20	2	0.06	0.05	0.05	0.05	0.05	0.06	0.5	2.5	78	72		7.6	7.6	106	104	0.02	0.00	0.00
26	15090	14975	20	2	0.05	0.05	0.05	0.05	0.05	0.05	0.5	2.5	76	78		7.5	7.5	102	100	0.04	0.02	0.02
27	15671	15354	20	5	0.05	0.05	0.05	0.05	0.05	0.05	0.4	2.3	82	81		7.5	7.5	106	102	0.07	0.00	0.01
28	16057	15370	20	4	0.05	0.05	0.05	0.05	0.06	0.06	0.3	2.4	83	82		7.8	7.6	104	104	0.06	0.00	0.00
29	13843	13631	19	5	0.07	0.05	0.05	0.05	0.06	0.06	0.3	2.4	85	83		7.8	7.6	106	104	0.04	0.00	0.01
30	17604	16597	18	3	0.06	0.06	0.06	0.06	0.06	0.06	0.5	2.5	80	85		7.8	7.8	104	110	0.06	0.01	
31	15069	14781	18	3	0.07	0.06	0.06	0.05	0.06	0.06	0.5	2.4	82	87		7.8	7.8	102	106	0.04	0.00	
TOTAL	521662	506481	646	138	2.06	1.95	2.05	1.95	1.97	2.01	12.3	71.2	2402	2375	0	234.6	231.9	3210	3125	2.02	0.12	0.26
AVE.	16828	16338	21	4	0.07	0.06	0.07	0.06	0.06	0.06	0.4	2.3	77	77	0	7.6	7.5	104	101	0.07	0.00	0.01
MAX.	18755	18428	24	10	0.09	0.09	0.12	0.12	0.09	0.09	0.6	2.6	85	87	0	7.8	7.8	110	110	0.27	0.02	0.06
MIN.	13843	13631	18	2	0.05	0.05	0.05	0.04	0.04	0.05	0.1	1.5	72	70	0	7.3	7.3	98	96	0.02	0.00	0.00

CHEMICALS USED

DATE	MANGANESE MG/L RAW	MANGANESE FINISHED	MANGANESE DIST. SYSTEM	FLUORIDE MG/L RAW	FLUORIDE FINISHED	FLUORIDE DISTRIBUTION SYSTEM	POUNDS PER 24 HOURS COAGULANT - COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL\SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL	CALCULATED DOSAGE MG/L COAGULANT - COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL\SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
1	0.080	0.008	0.019	0.08	0.95	0.97	2336	190	354		642	683	57	68	15.7	3.7		0.79	4.60	0.38	0.46
2	0.090	0.005		0.10	1.03		2336	178	367		600	644	57	68	16.7	3.9		0.78	4.60	0.41	0.49
3	0.060	0.008		0.07	0.99		2263	189	411		628	671	114	55	15.5	4.1		0.78	4.60	0.78	0.38
4	0.062	0.012	0.019	0.08	0.97	0.99	1898	177	385		565	625	57	59	14.0	4.1		0.76	4.60	0.42	0.43
5	0.060	0.005	0.009	0.09	1.01	1.06	2336	209	436		654	434	57	59	15.0	4.1		0.76	4.61	0.37	0.38
6	0.066	0.007	0.004	0.08	0.96	0.98	2190	193	397		614	679	94	64	14.8	4.0		0.76	4.61	0.64	0.43
7	0.072	0.002	0.003	0.05	1.02	0.99	2336	193	405		642	683	57	68	15.7	4.0		0.79	4.60	0.38	0.46
8	0.042	0.012	0.010	0.13	1.03	1.02	2336	185	395		629		81	73	16.5	4.1		0.81		0.57	0.52
9	0.064	0.004		0.11	0.99		2336	198	384		602		57	64	15.7	3.9		0.74		0.38	0.43
10	0.070	0.006		0.08	1.01		2336	195	370		664		114	78	14.9	3.6		0.77		0.73	0.50
11	0.048	0.008	0.007	0.10	0.99	1.00	2336	301	331		603	0	72	64	17.0	4.6		0.80	0.00	0.52	0.47
12	0.058	0.010	0.004	0.11	1.02	1.07	2190	348	360		621	0	0	55	16.1	5.2		0.83	0.00	0.00	0.40
13	0.043	0.009	0.008	0.10	1.05	1.04	1898	377	387		554	0	0	55	13.4	5.4		0.71	0.00	0.00	0.39
14	0.075	0.009	0.012	0.07	1.02	1.03	2044	391	397		599	0	0	55	14.0	5.4		0.75	0.00	0.00	0.38
15	0.036	0.000	0.000	0.12	0.90	0.94	2190	387	375		559			55	15.5	5.4		0.72			0.39
16	0.047	0.019		0.10	1.04		2190	404	377		581			50	15.7	5.6		0.76			0.36
17	0.049	0.007		0.09	0.93		2044	408	377		602		0	68	14.6	5.6		0.78		0.00	0.49
18	0.068	0.011	0.009	0.09	0.94	0.98	2263	423	379		591	0	0	41	16.2	5.7		0.77	0.00	0.00	0.29
19	0.051	0.011	0.014	0.09	0.92	0.98	2117	438	404		599	0	0	41	14.4	5.7		0.74	0.00	0.00	0.28
20	0.039	0.000	0.000	0.11	0.96	0.94	1971	433	387		572			50	13.9	5.8		0.74			0.35
21	0.084	0.012	0.005	0.11	0.97	0.97	2044	429	368		553			36	14.5	5.7		0.72			0.26
22	0.042	0.006	0.001	0.15	0.97	0.96	2190	464	418		601			59	15.2	6.1		0.76			0.41
23	0.039	0.009		0.19	1.06		2190	443	413		567			41	16.1	6.3		0.76			0.30
24	0.029	0.008		0.10	0.90		2190	454	423		602			55	15.2	6.1		0.76			0.38
25	0.043	0.009	0.012	0.11	0.94	0.98	2044	420	358		553	0	0	41	16.0	6.1		0.79	0.00	0.00	0.32
26	0.042	0.028	0.026	0.10	0.96	0.96	1898	384	344		527	579	0	36	15.1	5.8		0.76	4.60	0.00	0.29
27	0.033	0.005	0.007	0.12	0.96	0.92	1971	401	351		537	601	0	41	15.1	5.8		0.75	4.60	0.00	0.31
28	0.067	0.016	0.009	0.08	0.99	0.90	2044	420	378		540	616	0	41	15.3	6.0		0.73	4.60	0.00	0.31
29	0.043	0.007	0.012	0.08	0.96	0.94	1898	361	313		518	531		50	16.4	5.8		0.82	4.60		0.43
30	0.047	0.018		0.04	0.90		2044	484	411		551	675		32	13.9	6.1		0.68	4.60		0.22
31	0.052	0.012		0.06	0.94		1898	395	335		511	579		46	15.1	5.8		0.74	4.61		0.37
TOTAL	1.701	0.283	0.190	2.99	30.28	20.62	66357	10472	11790	0	18181	8000	817	1668	473	159.5	0.0	23.61	59.8	5.59	11.86
AVE.	0.055	0.009	0.009	0.10	0.98	0.98	2141	338	380	0	586	400	39	54	15	5.1	0.00	0.76	2.99	0.27	0.38
MAX.	0.090	0.028	0.026	0.19	1.06	1.07	2336	484	436	0	664	683	114	78	17	6.3	0.00	0.83	4.61	0.78	0.52
MIN.	0.029	0.000	0.000	0.04	0.90	0.90	1898	177	313	0	511	0	0	32	13	3.6	0.00	0.68	0.00	0.00	0.22

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB.	COST PER MONTH

I certify that the data provided accurately represents the water quality, quaantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR ____________________ SIGNATURE

CERTIFICATE NUMBER ____________________

000114

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L	JAR TEST DATA: pH ADJUSTMENT MG/L	JAR TEST DATA: pH		FILTER DATA: COMPLETE APPLICABLE BLANKS EACH MONTH	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DISINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE END OF SEQUENCE C	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	C - CALCULATED	C - REQUIRED	SECOND DISINFECTION SEQUENCE: FREE CHLORINE END OF SEQUENCE C	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	C - CALCULATED	C - REQUIRED	CT CALC. TOTAL INACTIVATION RATIO	CT REQ	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distributiob system. Must vary within system.
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	17791	16		7.4			12	288	48	12	12	12	6500	204.4																1.8	0.12	0.11	2575 Memorial Dr EXT 1128 AT
2	16790	16		7.4		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	201.2																				
3	17498	16				Pressure ( )	12	288	48	12	12	12	6500	213.1																				
4	16280	16		7.0		(b) Number of Filters - 12	12	288	48	12	12	12	6500	211.1																1.1	0.12	0.13	2040 Bradbury Rd. - 0945 - AT
5	18675	16		7.4			12	288	48	12	12	12	6500	183.3																1.7	0.17	0.2	308 Old Dunbar Cave Rd. (MJC 0700)
6	17699	16		7.8		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	212.2																1.8	0.15	0.1	2115 Riichview Pl (MJC 8.56)
7	17815	16		7.5			12	288	48	12	12	12	6500	199.9																2.2	0.09	0.11	421 Providence Blvd (MJC 0850)
8	18969	16		7.5		(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	215.6																1.7	0.21	0.22	1121 Plymouth Rd. - 0721 - MJC
9	17862	16					12	288	48	12	12	12	6500	223.7																				
10	18755	16		7.6		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	186.8																				
11	16479						12	287	48	12	12	12	6500	185.7						1.5	79	7.5	118	12					1.0	0.13	0.15	114 Lealand Terr. (MJC 1106)
12	16333	16				(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	204.7																1.8	0.13	0.2	440 Georgetown Rd - 0939 - AT
13	17033	16		7.4			12	288	48	12	12	12	6500	198.3																1.2	0.15	0.11	326 Lancaster Dr. - 0831 - MJC
14	17489	16				(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	175.0																1.3	0.23	0.27	380 Treeland Dr. - 0932 - AT
15	16978	16		7.5			12	288	48	12	12	12	6500	184.1																1.4	0.10	0.13	254 Holiday Rd. - 1101 - MJC
16	16700	16		7.5		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	179.6																	0.09			
17	16764	16		7.3		GPM - 16,667	12	286	48	12	12	12	6500	187.1																				
18	16731	16		7.5		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	433.3																1.2	0.12	0.11	2713 Knob Ct. (MJC 0822)
19	17633					With Salt ( )	12	288	48	12	12	12	6500	187.3																1.2	0.09	0.12	1201-D Ash Ridge Dr. (MJC 0915)
20	16966	16		7.5		KMnO4 ( )	12	288	48	12	12	12	6500	171.4																1.7	0.10	0.16	251 Timber Court Dr. (MJC 0705)
21	16876	16		7.5		Acid ( )	12	288	48	12	12	12	6500	161.6																1.7	0.08	0.14	3030 Westchester Dr. (MJC 1022)
22	17311	16		7.5			12	288	48	12	12	12	6500	194.0																1.7	0.13	0.11	1496 Golf Club Ln. - 1142 - AT
23	16279	16		7.4			12	288	48	12	12	12	6500	170.7																				
24	17308	16		7.5			12	288	48	12	12	12	6500	181.1																				
25	15318	16		7.6			12	288	48	12	12	12	6500	212.3																2.0	0.16	0.19	1513 Vista Ln. - 1136 - AT
26	15090	16		7.3			12	288	48	12	12	12	6500	147.9																2.0	0.13	0.18	1470 Golf Club Ln. (MJC 0910)
27	15671	16		7.4			12	288	48	12	12	12	6500	158.9																1.7	0.12	0.13	2690 Trenton Rd. - 0924 - AT
28	16057	16		7.6			12	288	48	12	12	12	6500	173.7																1.8	0.07	0.11	254 Holiday Dr. (MJC 1119)
29	13843	16		7.6			12	288	48	12	12	12	6500	157.1																1.0	0.06	0.12	134 Hampton Station Rd. (MJC 0826)
30	17604	16		7.6			12	288	48	12	12	12	6500	156.3																				
31	15069	16		7.6			12	288	48	12	12	12	6500	171.3																				
						Total Backwash Water								6042.7	Remarks:																2.75	3.10	TOTAL
																														0.12	0.15	AVERAGE
																														0.23	0.27	MAX
																														0.06	0.10	MIN

NAME OF WATER UTILITY: Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT: Clarksville Water Plant

COUNTY: Montgomery PWSID #: 0000116

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF: September YEAR: 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY						CHLORINE RESIDUAL MG/L		ALKALINITY MG/L			pH		HARDNESS MG/L		IRON MG/L			MANGANESE MG/L			FLUORIDE MG/L		
				Raw	FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	4-8	8-12	PM 12-4	4-8	8-12	ON TOP OF FILTER	OVEST PLANT EFFLUENT	RAW TOTAL	PHENOLPHTHALEIN FINISHED	TOTAL FINISHED	RAW	FINISHED	RAW	FINISHED	RAW	FINISHED	DIST. SYSTEM	RAW	FINISHED	DIST. SYSTEM	RAW	FINISHED	DISTRIBUTION SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31
1	19453	18580	27	4	0.09	0.09	0.09	0.08	0.08	0.09	0.5	2.3	78	74		7.4	7.2	96	96	0.02	0.00	0.01	0.035	0.009	0.008	0.17	1.05	1.02
2	17840	18070	27	4	0.09	0.09	0.09	0.09	0.08	0.08	0.5	2.4	77	72		7.3	7.1	98	98	0.02	0.02	0.00	0.043	0.016	0.015	0.12	0.98	0.97
3	16814	16651	27	2	0.08	0.07	0.10	0.09	0.07	0.08	0.2	2.3	80	77		7.3	7.1	102	100	0.03	0.00	0.00	0.042	0.012	0.015	0.09	1.05	0.95
4	18671	18377	27	2	0.08	0.07	0.08	0.08	0.07	0.08	0.3	2.1	82	78		7.2	7.3	106	102	0.06	0.00		0.043	0.020		0.12	1.12	
5	16110	15747	27	3	0.08	0.08	0.07	0.07	0.07	0.07	0.3	2.3	81	84		7.3	7.4	100	102	0.05	0.01		0.042	0.024		0.02	0.12	
6	19268	18672	27	2	0.09	0.08	0.07	0.07	0.07	0.07	0.4	2.3	94	83		8.2	7.3	104	104	0.02	0.00		0.027	0.006		0.03	0.14	
7	18695	18286	26	2	0.07	0.07	0.07	0.07	0.08	0.08	0.5	2.2	78	80		7.2	7.3	104	104	0.02	0.01	0.01	0.034	0.014	0.012	0.07	0.35	0.38
8	18803	18433	26	2	0.09	0.07	0.10	0.07	0.08	0.07	0.5	2.4	77	75		7.2	7.1	94	94	0.02	0.02	0.01	0.023	0.000	0.005	0.10	0.99	0.92
9	16599	16444	26	2	0.07	0.07	0.08	0.07	0.07	0.07	0.4	2.0	77	76		7.3	7.2	100	100	0.02	0.00	0.00	0.037	0.015	0.010	0.12	1.05	0.95
10	16559	15962	26	2	0.08	0.08	0.08	0.08	0.08	0.08	0.3	2.1	77	76		7.2	7.1	92	96	0.01	0.00	0.02	0.027	0.009	0.004	0.04	0.95	0.94
11	15915	15802	26	4	0.08	0.07	0.07	0.07	0.07	0.06	0.3	2.2	79	77		7.3	7.2	108	98	0.03	0.01		0.036	0.002		0.07	0.98	
12	15272	15096	26	3	0.06	0.07	0.07	0.06	0.06	0.07	0.4	1.8	75	73		7.3	7.2	98	90	0.04	0.00		0.031	0.003		0.15	1.02	
13	19137	18847	26	4	0.08	0.06	0.07	0.07	0.07	0.07	0.4	2.0	81	75		7.2	7.1	98	98	0.06	0.01	0.00	0.062	0.006	0.007	0.08	1.00	0.98
14	17324	17222	26	5	0.08	0.08	0.09	0.09	0.09	0.09	0.6	2.1	82	78		7.4	7.2	100	100	0.07	0.00	0.02	0.070	0.011	0.006	0.10	1.03	0.96
15	16146	16021	26	3	0.09	0.09	0.11	0.09	0.09	0.09	0.6	2.1	83	78		7.3	7.3	102	100	0.01	0.00	0.00	0.039	0.010	0.008	0.06	1.03	0.93
16	16861	16428	26	2	0.09	0.09	0.08	0.08	0.08	0.08	0.6	2.1	80	80		7.4	7.2	102	104	0.03	0.00	0.00	0.027	0.008	0.010	0.08	0.98	0.95
17	17908	17907	26	2	0.09	0.09	0.08	0.08	0.08	0.07	0.5	2.0	80	79		7.3	7.3	104	102	0.03	0.01	0.00	0.029	0.008	0.008	0.09	0.99	0.97
18	17676	17134	26	2	0.07	0.07	0.08	0.07	0.07	0.07	0.5	1.9	82	87		7.4	7.3	104	94	0.02	0.00		0.026	0.003		0.10	0.96	
19	16481	16417	26	3	0.08	0.07	0.08	0.08	0.08	0.08	0.6	2.1	84	81		7.3	7.2	102	100	0.05	0.00		0.021	0.004		0.09	0.99	
20	18671	18510	26	3	0.08	0.07	0.08	0.07	0.07	0.07	0.6	2.1	81	75		7.3	7.2	104	102	0.04	0.01	0.02	0.029	0.009	0.006	0.08	1.01	0.99
21	17167	16643	26	2	0.07	0.06	0.07	0.07	0.07	0.07	0.5	2.2	81	79		7.3	7.2	102	102	0.06	0.00	0.01	0.031	0.012	0.009	0.07	1.00	0.97
22	18512	18477	26	2	0.07	0.07	0.07	0.07	0.07	0.08	0.4	2.0	82	74		7.4	7.3	104	104	0.04	0.01	0.01	0.031	0.011	0.012	0.01	0.99	1.01
23	18435	18113	26	5	0.08	0.08	0.09	0.08	0.08	0.08	0.5	2.5	80	75		7.4	7.3	96	94	0.06	0.01	0.00	0.045	0.012	0.013	0.10	0.99	0.97
24	17460	17645	26	6	0.08	0.08	0.08	0.08	0.08	0.08	0.3	2.5	76	77		7.5	7.4	104	104	0.07	0.03	0.01	0.066	0.015	0.014	0.05	1.01	1.04
25	17922	17292	26	5	0.09	0.08	0.08	0.08	0.08	0.08	0.5	2.5	75	77		7.4	7.4	90	94	0.06	0.02		0.060	0.002		0.14	1.00	
26	15782	15684	26	5	0.07	0.07	0.07	0.07	0.07	0.07	0.4	2.5	75	72		7.3	7.3	80	96	0.08	0.00		0.050	0.005		0.12	0.99	
27	19767	18828	25	5	0.07	0.07	0.07	0.07	0.07	0.07	0.4	2.5	76	75		7.4	7.3	104	104	0.08	0.02	0.02	0.086	0.010	0.006	0.06	0.99	0.98
28	16523	16053	25	6	0.07	0.06	0.07	0.07	0.07	0.07	0.3	1.8	77	74		7.3	7.2	106	102	0.10	0.00	0.04	0.096	0.014	0.017	0.10	1.02	1.04
29	17409	17249	25	4	0.07	0.07	0.07	0.07	0.07	0.07	0.4	1.8	75	75		7.4	7.2	104	102	0.08	0.00	0.03	0.059	0.014	0.007	0.08	1.02	1.03
30	18286	18233	24	5	0.07	0.07	0.07	0.07	0.07	0.08	0.5	2.1	73	76		7.4	7.4	104	100	0.05	0.01	0.01	0.063	0.011	0.012	0.09	1.03	0.98
31																												
TOTAL	527466	518822	781	101	2.36	2.24	2.38	2.26	2.24	2.27	13.2	65.1	2378	2312	0	220.5	217.2	3012	2986	1.33	0.20	0.22	1.310	0.295	0.204	2.60	27.83	19.93
AVE.	17582	17294	26	3	0.08	0.07	0.08	0.08	0.07	0.08	0.4	2.2	79	77	0	7.3	7.2	100	100	0.04	0.01	0.01	0.044	0.010	0.010	0.09	0.93	0.95
MAX.	19767	18847	27	6	0.09	0.09	0.11	0.09	0.09	0.09	0.6	2.5	94	87	0	8.2	7.4	108	104	0.10	0.03	0.04	0.096	0.024	0.017	0.17	1.12	1.04
MIN.	15272	15096	24	2	0.06	0.06	0.07	0.06	0.06	0.06	0.2	1.8	73	72	0	7.2	7.1	80	90	0.01	0.00	0.00	0.021	0.000	0.004	0.01	0.12	0.38

CHEMICALS USED

DATE	POUNDS PER 24 HOURS: COAGULANT -	COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL	CALCULATED DOSAGE MG/L: COAGULANT -	COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	32	33	34	35		36	37	38	39	40	41	42	43	44	45	46	
1	3212	245	443			696	649	89	87	19.8	4.2		0.78	4.00	0.55	0.54	
2	3066	223	428			619		77	64	20.6	4.4		0.76		0.52	0.43	
3	2774	212	429			652		114	46	19.8	4.6		0.85		0.81	0.33	
4	3212	259	486			724		113	59	20.6	4.8		0.85		0.73	0.38	
5	2774	229	435					57		20.6	4.9				0.42		
6	2847	277	528					114	23	17.7	5.0				0.71	0.14	
7	2993	258	520			623		114	41	19.2	5.0		0.73		0.73	0.29	
8	3066	253	545			675		77	50	19.6	5.1		0.78		0.49	0.32	
9	2774	221	462			615		57	50	20.0	4.9		0.81		0.41	0.36	
10	2482	234	452			546		114	55	18.0	5.0		0.72		0.83	0.40	
11	2993	238	387			601		57	68	22.5	4.7		0.82		0.43	0.51	
12	2628	209	314			548		57	55	20.6	4.1		0.78		0.45	0.43	
13	3066	277	401			663	734	114	55	19.2	4.2		0.76	4.60	0.71	0.34	
14	2774	229	359			607		114	46	19.2	4.1		0.77		0.79	0.32	
15	2920	187	317			609	619	57	64	21.7	3.7		0.82	4.60	0.42	0.48	
16	2774	197	329			602	647	95	64	19.7	3.7		0.78	4.60	0.68	0.45	
17	2555	211	351			631	687	76	73	17.1	3.8		0.77	4.60	0.51	0.49	
18	2993	218	352			686	678	82	73	20.3	3.9		0.85	4.60	0.56	0.50	
19	2847	195	323			598	632	86	59	20.7	3.8		0.79	4.60	0.63	0.43	
20	3212	209	356			644	716	80	64	20.6	3.6		0.75	4.60	0.51	0.41	
21	3066	190	334			615	659	91	59	21.4	3.7		0.78	4.60	0.64	0.41	
22	3066	198	401			664	710	57	64	19.9	3.9		0.78	4.60	0.37	0.41	
23	2774	200	452			674	707	114	73	18.0	4.2		0.80	4.60	0.74	0.47	
24	2482	197	415			632	670	57	82	17.0	4.2		0.79	4.60	0.39	0.56	
25	2482	208	429			644	725	114	68	16.6	4.3		0.78	4.85	0.76	0.45	
26	2190	176	387			618	605	57	64	16.6	4.3		0.86	4.60	0.43	0.49	
27	2482	234	487			649	758	112	73	15.1	4.4		0.72	4.60	0.68	0.44	
28	2190	200	380			591	634	57	55	15.9	4.2		0.78	4.60	0.41	0.40	
29	2336	205	382			613	668	57	27	16.1	4.0		0.77	4.60	0.39	0.19	
30	2482	190	343			656	702	114	68	16.3	3.5		0.78	4.60	0.75	0.45	
31																	
TOTAL	83512	6579	12227	0		17695	12200	2574	1729	571	128.2	0.0	22.02	82.4	17.45	11.80	
AVE.	2784	219	408	0		632	678	86	60	19	4.3	0.00	0.79	4.58	0.58	0.41	
MAX.	3212	277	545	0		724	758	114	87	23	5.1	0.00	0.86	4.85	0.83	0.56	
MIN.	2190	176	314	0		546	605	57	23	15	3.5	0.00	0.72	4.00	0.37	0.14	

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____

CERTIFICATE NUMBER _____

SIGNATURE _____

000116

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L		pH ADJUSTMENT MG/L	pH		FILTER DATA	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURBIDIMETERS WORKING	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DISINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	C CALCULATED	C REQUIRED	SECOND DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME IN MINUTES T	END OF SEQUENCE pH	C CALCULATED	C REQUIRED	TOTAL INACTIVATION RATIO	CT CALC / CT REQ	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distribution system. Must vary within system.
47	48	49	50	51	52		53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73		74	75	76	77	78	79	
1	19453	20		7.1				12	288	48	12	12	12	6500	222.6																	1	0.20	0.14	3768 Oakland Rd. (AT 0957)
2	17840	20		7.2			(a) Type of Filters - Gravity (x)	12	276	48	12	12	12	6500	227.4																	1.4	0.14	0.18	180 Holiday Dr. (AT 0956)
3	16814	20		7.3			Pressure ( )	12	288	48	12	12	12	6500	171.1																	0.9	0.16	0.22	2040 Bradbury Rd (AT 0905)
4	18671	20		7.2			(b) Number of Filters - 12	12	288	48	12	12	12	6500	172.7																					
5	16110	20		7.2				12	252	48	12	12	12	6500	217.4																			
6	19268	20		7.2			(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	205.2																		0.02			
7	18695	20						12	288	48	12	12	12	6500	248.9															1.5	0.06	0.12	2413 Chris Dr. - (AT 1110)
8	18803	20					(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	217.7																	2.2	0.09	0.12	421 Providence Blvd. (MJC 0853)
9	16599	20						12	288	48	12	12	12	6500	228.8															2	0.14	0.12	810 Kingsbury Rd. (MJC 1054)
10	16559	20		7.2			(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	197.4															1.5	0.05	0.03	308 Old Dunbar Cave Rd. (MJC 0705)
11	15915	20		7.2				12	288	48	12	12	12	6500	187.0																			
12	15272	20		7.3			(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	196.9																					
13	19137	20		7.1				12	288	48	12	12	12	6500	481.7															1.6	0.10	0.16	1295 Paradise Hills Rd. (AT1101)
14	17324	20		7.3			(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	393.9															1	0.10	0.18	781 Windermere Dr. (AT 0919)
15	16146	20		7.5				12	288	48	12	12	12	6500	186.6															1.8	0.08	0.11	1661 Baltimore Dr. (AT 1433)
16	16861	20		7.2			(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	183.4															1.9	0.12	0.18	1520 Vista Ln. (AT 0758)
17	17908						GPM - 16,667	12	288	48	12	12	12	6500	203.6															0.9	0.14	0.12	1346 Chucker Dr. (MJC 0952)
18	17676	20		7.2			(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	192.0																					
19	16481	20		7.3			With: Salt ( )	12	288	48	12	12	12	6500	215.5																					
20	18671	20		7.1			KMnO4 ( )	12	288	48	12	12	12	6500	207.2															1.4	0.18	0.19	473 Caney Ln. (AT 1129)
21	17167						Acid ( )	12	288	48	12	12	12	6500	182.0															0.6	0.13	0.17	351 Ussery Dr. (AT 1109)
22	18512	20		7.4				12	288	48	12	12	12	6500	187.7															1.7	0.14	0.18	2229 Kim Dr. (AT 1136)
23	18435	16		7.3				12	288	48	12	12	12	6300	204.9															1.5	0.15	0.15	311 Landrum Place (AT 1308)
24	17460	16		7.3				12	288	48	12	12	12	6300	202.0															1.9	0.23	0.19	1496 Golf Club Ln. (AT 1102)
25	17922	16		7.3				12	288	48	12	12	12	6500	214.7																			
26	15782	16		7.3				12	288	48	12	12	12	6500	204.2																			
27	19767	16		7.2				12	288	48	12	12	12	6500	210.5															1.5	0.15	0.10	25 Timber Court Dr. (MJC 0900)
28	16523							12	288	48	12	12	12	6500	193.0															1.5	0.12	0.14	714 Welsey Dr. (MJC 0906)
29	17409	16		7.2				12	288	48	12	12	12	6500	174.9															0.7	0.13	0.13	328 Excell Rd. (MJC 0907)
30	18286	16		7.4				12	288	48	12	12	12	6500	186.4															1.2	0.09	0.15	741 Acorn Dr. (AT 0858)
31																																			
							Total Backwash Water 6517.3	Remarks:																								2.72	3.08	TOTAL
																														0.12	0.15	AVERAGE
																														0.23	0.22	MAX
																														0.02	0.03	MIN

000117

NAME OF WATER UTILITY Clarksville Gas & Water

NAME OF WATER TREATMENT PLANT Clarksville Water Plant

COUNTY Montgomery PWSID # 0000118

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Supply

COMPREHENSIVE MONTHLY OPERATION REPORT

MONTH OF November YEAR 2010

PHYSICAL AND CHEMICAL CHARACTERISTICS

DATE	RAW WATER TREATED - 1,000 GALLONS	FINISHED WATER PUMPED TO SYSTEM - 1,000 GALLONS	RAW WATER TEMPERATURE C	TURBIDITY RAW	TURBIDITY FINISHED WATER TURBIDITY MUST BE MEASURED EVERY 4 HOURS AND RECORDED AM 12-4	AM 4-8	AM 8-12	PM 12-4	PM 4-8	PM 8-12	CHLORINE RESIDUAL MG/L ON TOP OF FILTER	CHLORINE RESIDUAL MG/L LOWEST PLANT EFFLUENT	ALKALINITY MG/L TOTAL RAW	ALKALINITY MG/L PHENOLPHTHALEIN FINISHED	ALKALINITY MG/L TOTAL FINISHED	pH RAW	pH FINISHED	HARDNESS MG/L RAW	HARDNESS MG/L FINISHED	IRON MG/L RAW	IRON MG/L FINISHED	IRON MG/L DIST. SYSTEM	MANGANESE MG/L RAW	MANGANESE MG/L FINISHED	MANGANESE MG/L DIST. SYSTEM	FLUORIDE MG/L RAW	FLUORIDE MG/L FINISHED	FLUORIDE MG/L DISTRIBUTION SYSTEM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	25	26	27	28	29	30	31
1	14138	13993	18	4	0.08	0.05	0.06	0.06	0.05	0.06	0.4	2.2	85	73		7.7	7.5	108	104	0.06	0.00	0.03	0.072	0.012	0.018	0.07	0.90	0.92
2	16625	15980	18	3	0.06	0.05	0.05	0.06	0.06	0.06	0.4	2.1	85	80		7.8	7.7	110	106	0.02	0.00	0.00	0.034	0.012	0.020	0.12	0.91	0.95
3	13903	13817	18	4	0.06	0.05	0.06	0.08	0.09	0.09	0.2	1.4	85	82		7.8	7.6	114	110	0.04	0.02	0.02	0.048	0.001	0.007	0.10	0.94	1.01
4	15918	15414	18	4	0.11	0.11	0.10	0.10	0.10	0.09	0.4	1.6	81	84		7.6	7.8	118	98	0.04	0.01	0.01	0.046	0.007	0.006	0.04	0.95	0.90
5	14641	14628	17	3	0.08	0.08	0.08	0.10	0.09	0.09	0.4	1.9	87	84		7.7	7.6	110	110	0.03	0.01	0.02	0.049	0.011	0.009	0.09	0.99	0.91
6	14372	13960	17	4	0.09	0.08	0.08	0.09	0.09	0.08	0.3	1.9	88	85		7.4	7.4	112	110	0.03	0.00		0.046	0.013		0.04	0.84	
7	15799	15503	16	3	0.08	0.07	0.09	0.08	0.08	0.08	0.4	1.9	89	82		7.8	7.6	116	112	0.02	0.00		0.036	0.007		0.11	0.99	
8	16500	16368	16	3	0.08	0.07	0.08	0.08	0.08	0.08	0.4	2.0	86	82		7.8	7.6	108	108	0.02	0.00	0.00	0.042	0.012	0.006	0.11	0.93	0.96
9	15983	15501	16	4	0.08	0.07	0.09	0.08	0.08	0.07	0.4	1.9	83	78		7.8	7.7	112	110	0.05	0.02	0.03	0.053	0.009	0.006	0.15	0.96	0.98
10	14070	14031	15	4	0.08	0.07	0.09	0.08	0.07	0.07	0.5	2.0	86	77		7.8	7.7	112	110	0.04	0.01	0.00	0.054	0.014	0.008	0.14	0.97	0.97
11	15136	15042	15	4	0.07	0.08	0.07	0.07	0.07	0.07	0.6	2.0	78	87		8.1	7.7	108	115	0.03	0.00		0.061	0.010		0.10	0.90	
12	16227	15642	15	5	0.08	0.07	0.07	0.07	0.07	0.07	0.5	1.9	82	85		7.9	7.8	104	108	0.02	0.01	0.01	0.021	0.004	0.006	0.15	1.03	0.99
13	14535	14302	15	5	0.07	0.07	0.09	0.07	0.07	0.07	0.6	1.9	92	95		7.9	7.7	116	124	0.05	0.00		0.042	0.003		0.09	0.94	
14	14660	14639	15	3	0.07	0.07	0.08	0.07	0.07	0.07	0.5	1.9	82	90		7.7	7.8	102	110	0.02	0.01		0.028	0.002		0.15	0.95	
15	13794	13532	15	2	0.08	0.08	0.08	0.07	0.07	0.07	0.4	1.9	86	83		7.8	7.7	110	110	0.06	0.01	0.02	0.040	0.014	0.015	0.16	0.94	0.92
16	15376	15117	15	3	0.07	0.07	0.07	0.07	0.07	0.07	0.4	1.9	86	82		7.7	7.6	114	110	0.04	0.00	0.01	0.041	0.009	0.012	0.17	0.94	0.92
17	14903	14497	15	3	0.07	0.06	0.07	0.07	0.06	0.06	0.3	1.8	85	77		7.6	7.4	110	108	0.03	0.02	0.00	0.078	0.009	0.009	0.08	0.95	0.96
18	14156	13794	14	3	0.06	0.06	0.06	0.07	0.06	0.06	0.4	1.9	87	74		7.7	7.6	114	110	0.04	0.02	0.02	0.041	0.014	0.016	0.11	0.96	0.95
19	14494	14093	14	3	0.06	0.06	0.07	0.06	0.07	0.07	0.4	2.1	87	82		7.7	7.6	112	112	0.04	0.00	0.01	0.041	0.018	0.019	0.18	0.96	0.93
20	13042	12507	14	3	0.07	0.06	0.06	0.08	0.07	0.07	0.2	1.8	82	95		7.9	7.6	96	100	0.01	0.00		0.026	0.008		0.21	1.01	
21	15281	15172	14	5	0.07	0.07	0.06	0.07	0.07	0.07	0.4	1.8	82	90		7.6	7.5	100	120	0.01	0.00		0.052	0.009		0.10	0.90	
22	15660	15789	14	5	0.08	0.07	0.06	0.07	0.07	0.07	0.3	2.2	83	80		7.7	7.6	108	120	0.03	0.01	0.00	0.059	0.006	0.004	0.11	0.92	0.92
23	14856	14457	14	6	0.07	0.07	0.06	0.08	0.07	0.07	0.1	1.7	81	80		7.7	7.7	108	108	0.06	0.00	0.00	0.066	0.013	0.015	0.10	0.95	0.93
24	13375	12950	14	4	0.07	0.06	0.06	0.07	0.07	0.07	0.2	1.5	85	79		7.7	7.7	104	106	0.04	0.00	0.00	0.044	0.010	0.007	0.11	0.94	0.90
25	14905	14812	14	4	0.07	0.06	0.06	0.07	0.07	0.07	0.6	1.8	77	78		7.6	7.5	108	106	0.05	0.02		0.051	0.053		0.09	0.93	
26	12402	12016	14	6	0.07	0.06	0.06	0.08	0.07	0.07	0.7	1.9	87	79		7.5	7.6	110	106	0.06	0.03		0.055	0.016		0.59	1.50	
27	13394	13151	14	4	0.07	0.06	0.06	0.08	0.07	0.07	0.4	1.7	76	79		7.6	7.3	100	116	0.07	0.01		0.054	0.015		0.11	0.90	
28	13629	13744	13	4	0.09	0.07	0.06	0.08	0.07	0.07	0.5	2.0	78	82		7.6	7.5	102	108	0.05	0.00		0.040	0.009		0.12	0.99	
29	14224	13508	13	4	0.07	0.07	0.07	0.08	0.08	0.08	0.4	1.8	79	72		7.6	7.4	100	104	0.04	0.01	0.03	0.038	0.005	0.008	0.04	0.90	0.87
30	15074	14573	13	6	0.08	0.07	0.07	0.08	0.08	0.08	0.4	1.8	81	78		7.8	7.8	108	106	0.23	0.01		0.149	0.018		0.05	1.05	
31																												
TOTAL	446074	432624	453	118	2.33	2.04	2.12	2.37	2.02	2.17	12.1	56.1	2511	2454	0	231.6	228.8	3254	3285	1.33	0.23	0.21	1.507	0.343	0.191	3.79	28.94	16.89
AVE	14702	14421	15	4	0.07	0.07	0.07	0.08	0.07	0.07	0.4	1.9	84	82	0	7.7	7.6	108	110	0.04	0.01	0.01	0.050	0.011	0.011	0.13	0.96	0.94
MAX	16625	16368	18	6	0.11	0.11	0.10	0.10	0.10	0.09	0.7	2.2	92	95	0	8.1	7.9	118	124	0.23	0.03	0.03	0.149	0.053	0.020	0.59	1.50	1.01
MIN	12402	12016	13	2	0.06	0.05	0.06	0.06	0.05	0.06	0.1	1.4	76	72	0	7.4	7.3	96	98	0.01	0.00	0.00	0.021	0.001	0.004	0.04	0.84	0.87

CHEMICALS USED

DATE	POUNDS PER 24 HOURS COAGULANT - COAGULANT AID	DISINFECTION PRE	DISINFECTION POST	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL	CALCULATED DOSAGE MG/L COAGULANT	COAGULANT AID	DISINFECTION	pH ADJUSTMENT	FLUORIDE	TASTE AND ODOR	MINERAL/SOFTENING OXIDATION	STABILIZATION AND CORROSION CONTROL
1	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
1	1971	359	307		536	352		46	16.7	5.6		0.83	2.99		0.39
2	1679	399	328		557			55	12.1	5.2		0.73			0.40
3	1971	174	207		510			41	17.0	3.3		0.80			0.35
4	1898	180	307		500		55	46	14.3	3.7		0.69		0.41	0.34
5	1752	174	289		502		55	41	14.3	3.8		0.75		0.45	0.34
6	1898	177	284		499		55	46	15.8	3.8		0.76		0.46	0.38
7	1898	195	308		549		42	50	14.4	3.8		0.76		0.32	0.38
8	1898	202	396		578		55	41	13.8	4.3		0.77		0.40	0.30
9	1971	203	285		542		72	41	14.8	3.7		0.74		0.54	0.31
10	1898	176	244		520		57	41	16.2	3.6		0.81		0.49	0.35
11	2044	176	259		515		57	41	16.2	3.4		0.74		0.45	0.32
12	2044	178	285		565		57	59	15.1	3.4		0.76		0.42	0.44
13	1606	155	256		505		57	50	13.2	3.4		0.76		0.47	0.41
14	1825	152	260		511		57	55	14.9	3.4		0.76		0.47	0.45
15	1606	146	250		459		33	32	14.0	3.4		0.73		0.29	0.28
16	1898	179	280		529		57	55	14.8	3.6		0.75		0.44	0.43
17	1971	168	276		512		31	46	15.9	3.6		0.75		0.25	0.37
18	1752	159	282		462			46	14.8	3.7		0.71			0.39
19	2044	159	283		504			36	16.9	3.7		0.76			0.30
20	1752	160	267		440			36	16.1	3.9		0.74			0.33
21	2044	296	337		530			50	16.0	5.0		0.76			0.39
22	2263	247	298		562			50	17.3	4.2		0.78			0.38
23	2044	234	275		515			27	16.5	4.1		0.76			0.22
24	1898	265	268		464			23	17.0	4.8		0.76			0.20
25	2190	186	327		493			46	17.6	4.1		0.72			0.37
26	1898	104	229		427			36	18.3	3.2		0.75			0.35
27	1825	137	301		451			41	15.3	3.9		0.74			0.37
28	1825	116	276		461			36	16.1	3.4		0.74			0.32
29	1825	93	281		506			32	15.4	3.2		0.78			0.27
30	2190	98	294		512			32	17.4	3.1		0.74			0.25
31															
TOTAL	57378	5647	8539	0	15216	352	740	1277	469.2	115.4	0.0	22.61	5.0	5.86	10.39
AVE	1913	188	285	0	507	352	53	43	16	3.8	0.00	0.75	2.99	0.42	0.35
MAX	2263	399	396	0	578	352	72	59	18	5.6	0.00	0.83	2.99	0.54	0.45
MIN	1606	93	207	0	427	352	31	23	12	3.1	0.00	0.69	2.99	0.25	0.20

CHEMICAL USED	BRAND	ANALYSIS	COST PER LB	COST PER MONTH

I certify that the data provided accurately represents the water quality, quantity, treatment, operational practices, and other activities for the reporting period specified herein.

CERTIFIED OPERATOR _____ SIGNATURE _____

CERTIFICATE NUMBER _____

000118

DATE	RAW WATER TREATED 1,000 GALLONS	JAR TEST DATA: COAGULANT MG/L	JAR TEST DATA: pH ADJUSTMENT MG/L	JAR TEST DATA: pH		FILTER DATA	FILTER OPERATION DATA: NUMBER OF FILTERS USED	FILTER HOURS= COL 54 x HOURS RUN	AVERAGE LENGTH FILTER RUN - HOURS	RATE-OF-FLOW GAUGES WORKING	LOSS-OF-HEAD GAUGES WORKING	TURNIDIMETERS	BACKWASH RATE gpm/ft2	BACKWASH WATER USED - 1,000 gallons		DISINFECTION AND CT VALUES: FIRST DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	END OF pH SEQUENCE	C CALCULATED	C REQUIRED	SECOND DISINFECTION SEQUENCE: FREE CHLORINE C END OF SEQUENCE	CONTACT TIME T IN MINUTES	END OF pH SEQUENCE	C CALCULATED	C REQUIRED	CT CALC. / CT REQ. TOTAL INACTIVATION RATIO	MICROBIOLOGICAL EXAMINATION AND SYSTEM PRESSURE: RAW	PLANT EFFLUENT	DISTRIBUTION SYSTEM	FREE CHLORINE MG/L AT POINT OF SAMPLING & DISTRIBUTION SYSTEM	ORTHOPHOSPHATE ENTRY POINT	ORTHOPHOSPHATE DISTRIBUTION	Location of sampling point in distributiob system. **Must vary within system.**
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
1	14138	16		7.5			12	288	48	12	12	12	6500	213.9																1.8	0.08	0.12	205 Eva Dr (MJC 1215)
2	16625	16		7.4		(a) Type of Filters - Gravity (x)	12	288	48	12	12	12	6500	170.3																1.1	0.22	0.25	3706 Oakland Rd. (MJC 0915)
3	13903	16		7.4		Pressure ( )	12	288	48	12	12	12	6500	182.8							1.4	185	7.6	260	19	13.6				1.7	0.12	0.12	308 Old Dunbar Cave Rd. (MJC 0703)
4	15918	16		7.6		(b) Number of Filters - 12	12	288	48	12	12	12	6500	197.2																1.6	0.09	0.08	135 N. Meadow dr @ 1040am J.N
5	14641	16					12	288	48	12	12	12	6500	173.7																1.8	0.12	0.14	421 Providence Blvd. - 0930 - MJC
6	14372	16		7.3		(c) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	181.1																			
7	15799	16		7.5			12	288	48	12	12	12	6500	178.9																			
8	16500	16		7.3		(d) Filter Area - Sq. Ft. (Each) 360	12	288	48	12	12	12	6500	209.8																1.0	0.06	0.08	2425 Kirkwood Rd. (At 0926)
9	15983	16		7.5			12	288	48	12	12	12	6500	213.3																1.1	0.15	0.17	2040 Bradbury Rd. - 0857 - AT
10	14070	16		7.7		(e) Total Area - Sq. Ft. - 4,320	12	288	48	12	12	12	6500	213.4																0.9	0.04	0.16	759 Ellie Nat Dr. (AT 0951)
11	15136	16		7.7			12	288	48	12	12	12	6500	262.1																			
12	16227	16		7.7		(f) Filter Rate gpm/ft2 3 gpm	12	288	48	12	12	12	6500	164.8																1.5	0.11	0.1	2537 Wilma Rudolph Blvd (AT 1023)
13	14535	16		7.3			12	288	48	12	12	12	6500	177.3																			
14	14660	16		7.6		(g) Filter Rate gpm/ft2 4 gpm	12	288	48	12	12	12	6500	181.4																			
15	13794	16		7.4			12	288	48	12	12	12	6500	182.6																2.0	0.15	0.16	1801 Ashland City Rd. (AT 1207)
16	15376	16		7.5		(h) Total Rated Filter Capacity 24 MGD	12	288	48	12	12	12	6500	225.5																1.2	0.14	0.19	180 Holiday Dr. (MJC 0940)
17	14903	16		7.3		GPM - 16,667	12	288	48	12	12	12	6500	218.7																1.2	0.08	0.09	251 Timber Court dr (0703 MJC)
18	14156	16		7.5		(i) Ion Exchange Unit Regenerate	12	288	48	12	12	12	6500	193.4																1.6	0.07	0.09	1496 Golf Club Ln. (AT 1048)
19	14494	16		7.5		With: Salt ( )	12	288	48	12	12	12	6500	191.3																1.7	0.10	0.14	401 Locust St. (MJC 0850)
20	13042	16		7.4		KMnO4 ( )	12	288	48	12	12	12	6500	169.3																			
21	15281	16		7.5		Acid ( )	12	288	48	12	12	12	6500	159.3																			
22	15660	16		7.5			12	288	48	12	12	12	6500	156.0																1.8	0.11	0.13	519 Turner Reynolds Ct @ 0833 M.J.C.
23	14856	16		7.5			12	288	48	12	12	12	6500	196.3																2.0	0.07	0.12	1295 Paradise Hills Rd. - 0917 - AT
24	13375	16		7.5			12	288	48	12	12	12	6500	193.0							1.5	72.9	7.7	109	28	3.9				1.0	0.08	0.09	1784 Dunlop Ln. - 0851 - AT
25	14905	16		7.4			12	288	48	12	12	12	6500	177.3																	0.09		
26	12402	16		7.5			12	288	48	12	12	12	6500	158.4																	0.04		
27	13394	16		7.5			10	240	48	10	10	10	6500	145.2																			
28	13629	16		7.3			10	240	48	10	10	10	6500	140.6																			
29	14224	16		7.4			10	240	48	10	10	10	6500	156.2																1.9	0.09	0.09	136 N. Meadow Dr. @ 1032 J.N
30	15074	16		7.6			10	240	48	10	10	10	6500	148.8																			
31																																	

Total Backwash Water 5531.8 Remarks:

2.01	2.32	TOTAL
0.10	0.13	AVERAGE
0.22	0.25	MAX
0.04	0.08	MIN

000119