MISSISSIPPI STATE DEPARTMENT OF HEALTH

REPORT OF INSPECTION OF DRINKING WATER SUPPLY

PWS: 0250008 **Class:** A

An inspection of the CITY OF JACKSON water supply in HINDS county was made on 11/06/2015. Present at the time of inspection was CYNTHIA H HILL, OPERATOR; WRITER. Official KISHIA L POWELL PE Address PO BOX 17 JACKSON MS 39205 W.W. Operator CYNTHIA H HILL Address P O BOX 285 TOUGALOO MS 39174 No. Connections 77050 No. Meters ___ Population Served 192547 Field Chemical Analysis: pH ___ Cl2(free) ___ Cl2(total) ___ H2S N/A Iron ___ Fluoride ___ Point of Sampling DISTRIBUTION Water Rates ___

COMMENTS

Technical: 3 Managerial: 5 Financial: 5

OVERALL CAPACITY RATING: 4.3 / 5.0

1. The Fewell & OB Curtis plants were inspected on November 2, 2015. City personnel in attendance were Terence Byrd, James Perry, Chris Ward, Roderick Diggs, Hubert Russell, Lenore Hicks, Plas McAdory, and Vincent Thomas. All elevated tanks, wells, and booster stations were inspected on November 4 and in attendance were Terence Byrd and James Perry. Records were reviewed on November 6. Present during the records review were Bill Miley and Lenore Hicks.

2. The conventional operations at both plants are meeting the requirements of the Long Term 2 Enhanced Surface Water Treatment Rule.

3. As a reminder, UV disinfection at both plants must be operated at all times that the service pumps are online. Credit can be given for 3.0 log removal for the conventional filtration plants if they maintain filter effluent turbidities of <0.3 NTU 95% of the time. However, the remaining 2.5 log inactivation of Crypto must be achieved with the UV. Likely, no disinfection credit will be given for Crypto using free chlorine or chloramines, therefore properly operating UV units will be essential.

4. It is important that anytime a UV unit is taken offline, and the corresponding high service pump remains online, the City is able to demonstrate that the appropriate free chlorine concentration is maintained between the point of chlorine injection and the point of ammonia injection in order to inactivate viruses. Calculations should be kept in the plant records showing that the appropriate CT is maintained anytime a service pump remains online with a UV unit down at either plant. Alternatively, the high service pump can be taken offline when its UV is down.

5. At the time of inspection, the Maddox Road (well) system had been back online for several months. If system officials intend for the wells to be online for an extended period of time, then the fluoride addition should be turned on.

6. The elevated tank on Forest should be the next tank to be painted.

CAPACITY ASSESSMENT COMMENTS

7. Credit for T2-1 was not given due to the fact that the membranes at O.B. Curtis were failing the membrane integrity testing. The issues surrounding this failure must be addressed immediately.

8. Credit was not given for T5-1 because the system does not have the ability to provide water during a prolonged power outage. In order to get credit next year, the City will need to obtain generators capable of keeping pressure in the system during a prolonged power outage.

*** FEWELL PLANT COMMENTS ***

9. The turbidities of all online filters were less than 0.3 NTU at the time of inspection. Turbidity readings are automatically saved every 5 minutes.

10. The following items need to be addressed: Claritrac sludge removal system was not 100% operational; one of the walking beam flocculators needs gear drive repaired; filter control valves outdated; rehabilitate the intake screens; new transformer at the intake to handle all components.

11. The following analyses were completed on the finished water from the plant and the results were as follows: Turbidity = 0.21; pH = 8.7; Total Chlorine Residual = 3.3 mg/L; Color = 15; Manganese = 0.04 mg/L; Fluoride = 1.0 mg/L; Free ammonia = 0.24 mg/l; Monochloramine = 1.39 mg/l; Alkalinity = 21 mg/L; Hardness = 62 mg/L; Iron = 0.0 mg/L. The total plant output was 10.0 MGD.

*** O.B. PLANT COMMENTS***

12. The turbidities of all online filters and online membrane trains were less than 0.3 NTU at the time of inspection.

13. As stated above, all membrane trains were failing the membrane integrity testing. Therefore, we cannot give any log removal credit for the membranes. This a serious issue and must be corrected before the membrane treatment must be taken offline. The lifespan of the membranes is greatly shortened due to them not being protected from the weather. The membranes that are designed to last 10 years are only lasting a third of that due to the lack of cover. Each of the 6 membrane trains need new fibers in the form of individual cassettes or full modules. Both the cover to protect the membrane treatment train AND new fibers PLUS repairs to operational valving are all needed in equal measure to ensure properly treated water is created through this treatment process. With the membrane treatment train offline, the plant will not make enough water to meet the demands of the City.

14. Only three high service pumps were operating correctly at the time of inspection. All other pumps were down due to worn impellers, motor vibration, a locked up motor, and non-functioning GA valves. It is imperative that all high service pumps be functional so that the plant capacity can meet the water demands of the City.

15. To improve the effectiveness of filter backwashing, it is recommended that all filters have a functioning surface wash system.

16. All cracks in interior and exterior walls of sed basins and filters should be sealed.

17. Once all repairs have been made, it is vital that both O.B. Curtis and J.H. Fewell be fully staffed with licensed Class A water operators and capable maintenance staff. The City's water treatment is not a simple undertaking and involves complex processes that require 27/7 monitoring and adjustment. To keep everything running smoothly and ensuring all Federal Safe Drinking Water Act Standards are met, will keep the City in properly treated drinking water.

18. It has already been pilot tested to show how well it maintains proper alkalinity, so we recommend that the City move forward with installing a new lime slurry system that uses liquid lime.

19. The average flow rate was 16 MGD from the conventional side and 15 MGD from the membrane side, for a total plant output of 31 MGD.

20. The following analyses were completed on the finished water from High Service 1, which is predominantly water from the conventional side: Turbidity = 0.117; pH = 8.5; Total Chlorine Residual = 3.0 mg/L; Alkalinity = 26 mg/L; Hardness = 22 mg/l; Iron = 0.02 mg/L; Manganese = 0.008 mg/L; Free ammonia = 0.32 mg/l; Monochloramine = 3.04 mg/l; Color = 2 units; Fluoride = 0.8 mg/L.

21. The following analyses were completed on the finished water from High Service 2, which is predominantly water from the membrane side: Turbidity = 0.098; pH = 8.6; Total Chlorine Residual = 2.5 mg/L; Alkalinity = 25 mg/L; Hardness = 23 mg/l; Iron = 0.01 mg/L; Manganese = 0.002 mg/L; Fluoride = 0.7 mg/L; Free ammonia = 0.41 mg/l; Monochloramine = 2.31 mg/l; Color = 2 units.

*** GENERAL REMINDER COMMENTS ***

22. When repairs are made on the distribution system, all lines affected should be properly chlorinated and flushed before they are placed back in service.

23. Whenever system pressure is lost, even for brief periods of time, contaminants may be introduced to the system through back-siphonage and/or back flow. When this occurs, system officials should notify all customers in the affected area to boil their drinking water vigorously for one minute. This boil water notice should remain in effect until clear bacteriological samples have been obtained.

Completed by Amy L. McLeod, E.I. on 12/01/2015.

Reviewed by Greg Caraway, P.E. on 12/01/2015.

If you have any questions, please call (601)576-7518.

pc:

KISHIA L POWELL PE, OFFICIAL
CYNTHIA H HILL, OPERATOR

Mississippi Department of Health
Bureau of Public Water Supply

STANDARD FORM

FY 2016 Public Water System Capacity Assessment Form

NOTE: This form must be completed whenever a routine sanitary survey of a public water system is conducted by a regional engineer of the Bureau of Public Water Supply

PWS ID#: 0250008 Class: A Survey Date: 11-06-2015 County: HINDS
Public Water System: CITY OF JACKSON Conn: 77050
Certified Waterworks Operator: CYNTHIA H HILL Pop: 192547

CAPACITY RATING DETERMINATION

Technical (T) Capacity Rating: [**3**] Managerial (M) Capacity Rating [**5**] Financial (F) Capacity Rating [**5**]

Capacity Rating $= \frac{T + M + F}{3} = \frac{13}{3} = 4.3$

Overall Capacity Rating = 4.3

Completed by Amy L. McLeod, E.I. on 11/25/2015
Reviewed by Greg Caraway, P.E. on 12/01/2015

Comments: _____

Technical Capacity Assessment	Point Scale	Point Award
[T1] Does the water system have any significant deficiencies? [Y (N)]	N - 1pt. Y - 0pt.	1
[T2] 1) Was the water treatment process functioning properly? [Y (N)] (i.e. Is pH, iron, free chlorine, fluoride, etc. within acceptable range?) **2)** Was needed water system equipment in place and functioning properly at the time of survey? [(Y) N] (**NOTE:** Equipment deficiencies must be identified in survey report.) **3)** Were records available to the regional engineer clearly showing that all water storage tanks have been inspected and cleaned or painted (if needed) within the past 5 years? [(Y) N NA] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	0
[T3] 1) Was the certified waterworks operator or his/her authorized representative present for the survey? [(Y) N] **2)** Was log book up to date and properly maintained and did it show that MSDH Minimum JOB Guidelines for W. W. Operators were being met? [(Y) N] **3)** Was the water system properly maintained at the time of survey? [(Y) N] **4)** Did operator satisfactorily demonstrate to the regional engineer that he/she could fully perform all water quality tests required to properly operate this water system? [(Y) N] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
[T4] 1) Does water system routinely track water loss and were acceptable water loss records available for review by the regional engineer? [(Y) N] **2)** Is water system overloaded? (i.e. serving customers in excess of MSDH approved design capacity)? [Y (N)] **3)** Was there any indication that the water system is/has been experiencing pressure problems in any part(s) of the distribution system? [Y (N)] (based on operator information, customer complaints, MSDH records, other information) **4)** Are well pumping tests performed routinely? [(Y) N NA] (**NOTE:** YES FOR #1 & YES OR N/A FOR #4 AND NOs FOR #2 & #3 required to receive point)	1)Y - pt. 2)N - pt. 3)N - pt. 4)Y - pt.	1
[T5] 1) Does the water system have the ability to provide water during power outages? (i.e. generator, emergency tie-ins, etc.) [Y (N)] **2)** Does the water system have a usable backup source of water? [(Y) N] (**NOTE:** Must be documented on survey report)	All Y - 1 pt. Else - 0 pt.	0
TECHNICAL CAPACITY RATING = [3] (Total Points)		

Public Water System: CITY OF JACKSON PWS ID #: 0250008

FY 2016 Public Water System Capacity Assessment Form Survey Date: 11-06-2015

Managerial Capacity Assessment	Point Scale	Point Award
[M1] Were all SDWA required records maintained in a logical and orderly manner and available for review by the regional engineer during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[M2] 1) Have acceptable written policies and procedures for operating this water system been formally adopted and were these policies available for review during the survey? [(Y) N] **2)** Have all board members (in office more than 12 months) completed Board Member Training? [(Y) N NA] **3)** Does the Board of Directors meet monthly and were minutes of Board meetings available for review during the survey? (**NOTE:** Quarterly meetings allowed if system has an officially designated full time manager) [(Y) N NA] (**NOTE:** ALL YESs or NAs required to receive point. NA - Not Applicable)	All Y - 1 pt. Else - 0 pt.	1
[M3] Has the water system had any SDWA violations since the last Capacity Assessment? [Y (N)]	N - 1pt. Y - 0pt.	1
[M4] Has the water system developed a long range improvements plan and was this plan available for review during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[M5] 1) Does the water system have an effective cross connection control program in compliance with MSDH regulations? [(Y) N] **2)** Was a copy of the MSDH approved bacti site plan and lead/copper site plan available for review during the survey and do the bacti results clearly show that this approved plan is being followed? [(Y) N] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
MANAGERIAL CAPACITY RATING = [5] (Total Points)		

Financial Capacity Assessment	Point Scale	Point Award
[F1] Has the water system raised water rates in the past 5 years? [(Y) N] (**NOTE:** Point may be awarded if the water system provides acceptable financial documentation clearly showing that a rate increase is not needed, i.e. revenue has consistently exceeded expenditures by at least 10%, etc.)	Y - 1pt. N - 0pt.	1
[F2] Does the water system have an officially adopted policy requiring that water rates be routinely reviewed and adjusted as appropriate and was this policy available for review during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[F3] Does the water system have an officially adopted cut-off policy for customers who do not pay their water bills, was a copy of this policy available for review by the regional engineer, and do system records (cut-off lists, etc.) clearly show that the water system effectively implements this cut-off policy? [(Y) N]	Y - 1pt. N - 0pt.	1
[F4] Was a copy of the water system's officially adopted annual budget available for review by the regional engineer and does the water system's financial accounting system clearly and accurately track the expenditure and receipt of funds? [(Y) N]	Y - 1pt. N - 0pt.	1
[F5 - Municipal Systems] 1) Is the municipality current in submitting audit reports to the State Auditor's Office? [(Y) N] **2)** Was a copy of the latest audit report available for review at the time of the survey? [(Y) N] **3)** Does this audit report clearly show that water and sewer fund account(s) are maintained separately from all other municipal accounts? [(Y) N] (**NOTE:** Yes answer to all questions required to receive point.)	All Y - 1 pt. Else - 0 pt.	1
[F5 - Rural Systems] 1) Has the rural water system filed the required financial reports with the State Auditor's Office and were these reports available for review? [Y N] **2)** Does the latest financial report show that receipts exceeded expenditures? [Y N] (**NOTE:** Yes answer to both questions required to receive point)	All Y - 1 pt. Else - 0 pt.	
FINANCIAL CAPACITY RATING = [5] (Total Points)		

MISSISSIPPI DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
DESIGN CAPACITY SHEET

System: **CITY OF JACKSON**
ID: **0250008** Class: **A** County: **HINDS**

Date Completed: **11/25/2020**
Connections - Actual: **65640** Equivalent: **84521**
Design Capacity: **107639** Percent Design Capacity: **84521/107639 = 78.5%**

J H FEWELL WATER TREATMENT PLANT

**** CT calculations for FEWELL *****
There are four disinfection segments at Fewell, and the contact time must be determined for each segment to achieve 4-log inactivation of viruses, 3-log inactivation of Giardia, and 3.5-log inactivation of Crypto.

Fewell is required to achieve 0.3 turbidity units 95% of the time to comply with the SWTR. If this treatment is achieved, credit can be given for 2-log removal of viruses & Crypto and 2.5-log removal of Giardia. Free chlorine, chloramination, and UV disinfection must then attain the remaining 2-log inactivation of viruses, 0.5-log inactivation of Giardia, and 1.5-log of Crypto.

Book values:
CT required for 0.5-log inactivation of giardia at 10C and pH at 6.5 = 19 mg/L min
CT required for 2-log inactivation of viruses at 10C and pH at 6.5 = 3 mg/L min

The first segment is free chlorine contact between the point of chlorine injection (at the head of the outlet pipe from the sedimentation basin) and the point of ammonia injection (at the end of the outlet pipe just prior to ammonia injection).

The second is the contact time of free chlorine in the filters during normal filter operation.

The third is the contact time in the clearwell.

The fourth is the UV disinfection.

BASED ON THE TURBIDITY FILTER DATA SUBMITTED ON MONTHLY OPERATING REPORTS, MSDH IS SETTING A MAXIMUM TREATMENT CAPACITY OF 20 MGD. THE 7/13 MGD SPLIT BETWEEN BASINS IS BASED ON STANDARD OPERATION WHEN 20 MGD IS BEING TREATED.

CHLORINE RESIDUALS AND FLOW RATES UPDATED TO REFLECT WHAT THE PLANT WAS TREATING ON 11/09/20

CT SEGMENT 1 (pipes between sed basins and ammonia injection):
The free chlorine is measured by chlorine analyzers which communicate with the ammonia feed system. The concentration of free chlorine in the pipe between Sed Basin #3 and the filters was 3.53 mg/L. The concentration of free chlorine in the pipe between Sed Basin #4 and the filters was 4.58 mg/L.

Calculating the free chlorine contact time between chlorine injection and ammonia injection (at maximum design flows):

Sed basin #3: Pipe dimensions: Length = 351 ft; Diameter = 42 in = 3.5 ft.
Volume in pipe = 0.785 x 3.5 x 3.5 x 351 x 7.48 = 25,247 gallons
Estimated flow through Sed basin #3 train: 4 MGD
Contact time = 25,247 gallons/4,000,000 gal/day x 1440 min/day = 9.09 min

Sed basin #4: Pipe dimensions: Length = 357 ft; Diameter = 48 in = 4 ft.
Volume = 33,540 gallons
Estimated flow through Sed basin #4 train: 15 MGD
Contact time = 33,540/15,000,000 x 1440 = 3.22 min

CT SEGMENT 1 (using shortest contact time of 3.22 min) = 4.38 mg/L x 3.22 min
= 14.1 mg/L min

MISSISSIPPI DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
DESIGN CAPACITY SHEET

CITY OF JACKSON 11/25/2020

(Note: Virus inactivation is achieved in Segment 1; 14.1 mg/L min > 3 mg/L min)

SEGMENT 1 LOG INACTIVATION = 14.1 mg/L min/19 mg/L min * (0.5 log) = 0.37 log

CT SEGMENT 2 (Disinfection in filters):
Disinfectant contact time between filters and clearwell/storage outlet:
Calculate volume of water in filters and estimated residence time:
Volume = L X W X D (where D = depth of water above filter media)
= (20 ft x 10 ft x 1.5 ft) * 7.48 gal/cu.ft. * 8 filters +
(25 ft x 28 ft x 3 ft) * 7.48 gal/cu.ft. * 3 filters
= 17,952 gallons + 47,124 gallons
= 65,076 gallons
Residence time = (65,076 gallons/19,000,000 gallons/day)* 1440 min/day
Residence time = 4.93 minutes

CT SEGMENT 2 (assuming chlorine concentration = finished water chlorine concentration = 0.3 mg/L)
CT SEGMENT 2 = 0.2 mg/L * 4.93 minutes = 0.986 mg/L min

SEGMENT 2 LOG INACTIVATION = 0.986 mg/L min / 19 mg/L min * (0.5 log) = 0.026 log

CT SEGMENT 3 (Disinfection in the clearwell):
Using the clearwell volume of 3.8 MG and a pre-determined baffling factor of 0.233:
Contact time = 3.8 MG/20 MGD x 1440 minutes/day x 0.233 = 63.7 minutes
Free chlorine measured in finished water = 0.2 mg/L
CT SEGMENT 3 = 63.7 minutes x 0.2 mg/L = 12.7 mg/L min
SEGMENT 3 LOG INACTIVATION = 12.7 mg/L min / 19 mg/L min * (0.5 log) = 0.34 log

Total CT using free chlorine = (14.1 + 0.986 + 12.7) mg/L min = 27.8 mg/L min

Total LOG INACTIVATION using free chlorine = SEGMENT 1 + SEGMENT 2 + SEGMENT 3
Total LOG INACTIVATION using free chlorine = 0.37 + 0.026 + 0.34 = 0.736 log

CT SEGMENT 4 (UV Disinfection):
At the time of the inspection, Pump 3 was pumping 7.9 MGD and dosing 26.4 mJ/sq.cm and Pump 4 was pumping 7.9 MGD and dosing 27.4 mJ/sq.cm.

According to 40 CFR 141.720 (d)(1), a dose of 3.9 mJ/sq.cm. will achieve a 1.5 log inactivation of Crypto and 1.5-log inactivation of Giardia. Therefore, the UV disinfection more than adequately achieves the remaining inactivation of Giardia & Crypto.

NOTE: Any time that the UV disinfection is offline on any service pump, that service pump MUST be taken offline as free chlorine is not enough to achieve the log credit removal for Crypto.

*** FEWELL DESIGN CAPACITY ****
Rated treatment capacity of plant = 20 MGD (limiting factor)
Clearwell volume = 3.8 MG
2 additional ground storage tanks @ 5MG each = 10 MG
Total storage located at the plant = 3.8 MG + 10 MG = 13.8 MG
Usable storage (volume filled in 6 hours) = 20 MGD/24 hrs/day x 6 hrs = 5 MG
Plant capacity = rated treatment capacity of plant + usable storage/200 minutes
Plant capacity = 20 MGD + (5 MG/200 min * 1440 min/day) = 56 MGD
Service pump capacity = (9+9+9+7) = 34 MGD

FEWELL DESIGN CAPACITY = 20,000,000 gal/day/1440 min/day = 13,889 GPM

MISSISSIPPI DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
DESIGN CAPACITY SHEET

CITY OF JACKSON 11/25/2020

O B CURTIS WATER TREATMENT PLANT

**** CT calculations for OB Curtis ****

This plant must meet 4-log inactivation of viruses, 3-log inactivation of Giardia, and 3.5-log inactivation of Crypto.

The conventional side is required to achieve 0.3 turbidity units 95% of the time to comply with the SWTR, so credit can be given by default for 2-log removal of viruses & Crypto and 2.5-log removal of Giardia. Free chlorine, chloramination, and UV disinfection must then attain the remaining 2-log inactivation of viruses, 0.5-log inactivation of Giardia, and 1.5-log of Crypto.

The membrane system is required to achieve <0.15 turbidity units 95% of the time to comply with the SWTR, so credit can be given by default for 2-log removal of viruses, 3-log inactivation of Giardia, and 2-log inactivation of Crypto. Free chlorine must achieve the remaining 2-log of viruses. Maintaining membrane integrity must achieve the remaining 1.5-log inactivation of Crypto.

MEMBRANE INTEGRITY TESTING (MIT) MUST BE COMPLETED EVERY 24 HOURS, PER THE CFR. IF THE TRAIN FAILS MIT, IT MUST BE TAKEN OFFLINE UNTIL IT PASSES. IF TRAIN TURBIDITIES EXCEED 0.15 NTU, THAT TRAIN *MUST* BE TAKEN OFFLINE UNTIL IT PASSES MIT.

**THE CONVENTIONAL SIDE OF THE PLANT HAS 4 FILTERS ONLINE AND THE MEMBRANE SIDE OF THE PLANT HAS 2 TRAINS THAT CONSISTENTLY PASS MIT. CAPACITY OF THE PLANT HAS BEEN LOWERED TO REFLECT WHAT THE PLANT CAN ACTUALLY TREAT. EACH SIDE WAS RATED AT 25 MGD.

25 MGD / 6 (FILTERS & TRAINS) = 4.2 MGD/FILTER OR TRAIN

CONVENTIONAL: 4.2 MGD * 4 FILTERS = 16.8 MGD
MEMBRANE: 4.2 MGD * 2 TRAINS = 8.4 MGD

TOTAL PLANT CAPACITY: 25.2 MGD

CT CALCULATIONS WILL REMAIN AT MAX CAPACITY OF 25 MGD

Book values:
CT required for 0.5-log inactivation of giardia at 10C and pH at 6.5 = 19 mg/L min
CT required for 2-log inactivation of viruses at 10C and pH at 6.5 = 3 mg/L min

The clearwell is divided into two separate zones based on their baffling. The conventional and membrane treatment trains feed mirror image clearwells, so the T and CT values below apply to each treatment process.

Zone 1:
Volume = 1.989 MG; BF = 0.7
T = [(1.989 MG / 25 MGD)*0.7] * 1440 min/day = 80.2 min @ 25 MGD

Zone 2:
Volume = 1.658 MG; BF = 0.3
T = [(1.658 / 25 MGD)*0.3] * 1440 min/day = 28.7 min @ 25 MGD

Total T = 80.2 + 28.7 = 108.9 min

The free chlorine residual measured from High Service 1 (conventional side) finished water = 0.1 mg/L

MISSISSIPPI DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
DESIGN CAPACITY SHEET

CITY OF JACKSON 11/25/2020

Ct25 = 0.1 mg/l * 108.9 minutes = 10.89 mg/L min

Virus inactivation achieved at 0.1 mg/L free chlorine at 25 MGD;
10.89 mg/L min > 3 mg/L min

Giardia log inactivation = 10.89 mg/L min / 19 mg/L min * (0.5) = 0.29 log
Remaining 0.5-log Giardia inactivation not achieved by free chlorine contact time in clearwell.

UV disinfection - UV unit attached to each filter
Each UV unit must be dosing a minumum of 4 mJ/sq.cm. to achieve the final 1.5-log removal of Crypto and the remaining 0.21-log removal of Giardia.

IF AT ANY TIME A UV UNIT IS OUT OF SERVICE, THE CORRESPONDING FILTER MUST BE TAKEN OUT OF SERVICE. CRYPTO AND GIARDIA REMOVAL IS NOT ACHIEVED WITHOUT UV DISINFECTION

Full CT credit for the conventional side at maximum treatment capacity of 25 MGD can be given, so full CT credit at decreased capacity of 16.8 MGD can be given.

The free chlorine residual measured from High Service 2 (membrane side) finished water = 0.2 mg/L.

Using this minimum concentration throughout the clearwell and flow rate of 25 MGD, the contact time is:
T = 108.9 min
CT = 0.2 mg/L * 108.9 minutes = 21.78 mg/L min

Virus inactivation achieved at 0.3 mg/L free chlorine at 25 MGD;
21.78 mg/L min > 3 mg/L min

Giardia & Crypto log inactivation achieved by maintaining turbidities <0.15 NTU 95% of the time. Any time turbidities exceed 0.15 NTU, that train must be taken offline.

Full CT credit for the membrane side at maximum treatment capacity of 25 MGD can be given, so full CT credit at decreased capacity of 8.4 MGD can be given.

Treatment capacity is not limited on either side by CT.

TOTAL TREATMENT CAPACITY AT OB CURTIS = Conventional (16.8 MGD) + Membrane (8.4 MGD)
= 25.2 MGD

*** OB CURTIS DESIGN CAPACITY ***
Raw water pump capacity = (9+8+9+8+8+17+8+17) MGD = 84 MGD
Rated treatment capacity of plant = 25.2 MGD (limiting factor)
Service pump capacity = (8+8+12+12+12+16+16+22+22) = 128 MGD
Total storage located at the plant (clearwell capacity) = 10 MG
Usable storage (volume filled in 6 hours) = 25.2 MGD/24 hrs/day x 6 hrs = 6.3 MG
Total plant capacity = rated treatment capacity of plant + usable storage/200 minutes
Total plant capacity = 25.2 MGD + (6.3 MG/200min * 1440 min/day) = 70.56 MGD
This does not exceed the service pump capacity of 128 MGD, so:
OB CURTIS DESIGN CAPACITY = 70.56 MGD

MISSISSIPPI DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
DESIGN CAPACITY SHEET

CITY OF JACKSON 11/25/2020

TOTAL SYSTEM DESIGN CAPACITY

TOTAL CAPACITY OF FEWELL AND OB CURTIS PLANTS = 20 MGD + 70.56 MGD = 90.56 MGD
90,560,000 gpd / 1440 min/day = 62,889 CONNECTIONS

TOTAL ELEVATED STORAGE ON SYSTEM:
0.5 MG + 0.2 + 1.0 + 0.5 + 1.5 + 1.0 + 0.5 + 1.0 + 1.0 + 0.25 + 1.5 = 8.95 MG
*1.0 MG Byram tank taken out of calculations due to being offline

FINAL DESIGN CAPACITY FOR ENTIRE SYSTEM:
Final design capacity = 62,889 + (8,950,000 gal/200 min) = 107,639 CONNECTIONS

EQUIVALENT CONNECTIONS CALCULATIONS:

COMMERCIAL/INDUSTRIAL USAGE FACTOR CALCULATIONS:
Ciu = Average total CI use(gal)/avg total use (gal)
The Ciu factor calculated from 2019 data = 0.5
Number of Actual Connections = 54,679
Apartment Adjusted = # Units X 2/3 = 19,407 x 2/3 = 12,938
Total Adjusted Connections = Actual + Apartment Adjusted
= 54,679 + 12,938 = 67,617

Eq. connections = # of adjusted conn + (# of adjusted conn x Ciu factor x 0.5)
= 67,617 + (67,617 x 0.5 x 0.5)
= 84,521

Total final equivalent connections = 84,521

THEREFORE THIS SYSTEM IS CURRENTLY AT 84,521/107,639 = 78% CAPACITY.