Metropolitan Sewerage District of Buncombe County

System Performance Annual Report

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Asheville, North Carolina 28804

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Director of Wastewater Reclamation Facility (WRF)	Bart Farmer (ORC)	(828) 225-8224
Operations Manager (WRF)	Schuyler Taylor (ORC—Back-up)	(828) 225-8204
Director of Technical Services (Collection System)	Ken Stines (ORC)	(828) 225-8244
Director of Construction (Collection System)	Mike Stamey, P.E. (ORC-Back-up)	(828) 225-8262

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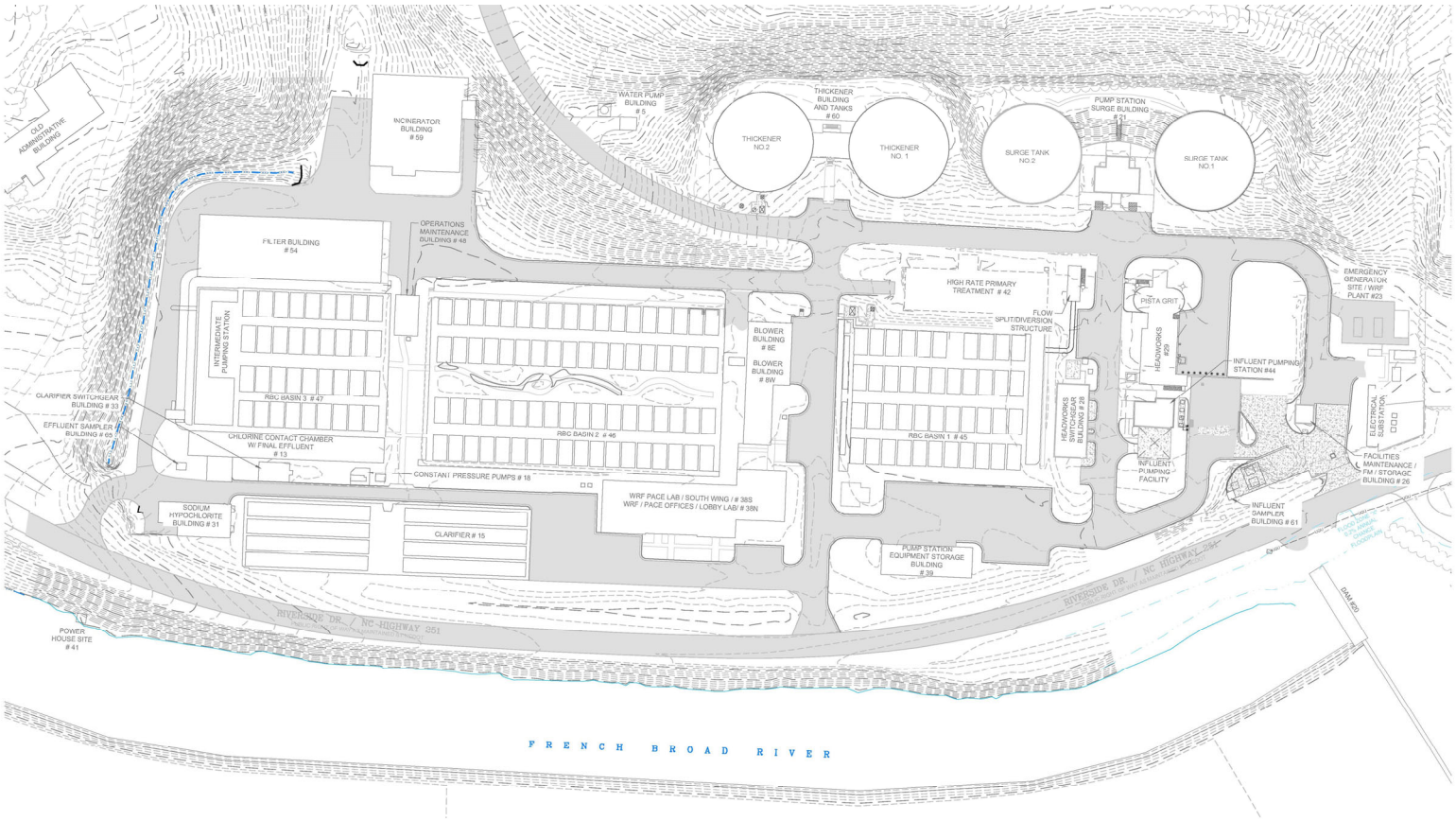
System Performance Annual Report

Fiscal Year 2023 (July 2022 - June 2023)

I. General Information



Permit Numbers:

NPDES Permit # NC0024911

General Storm Water Permit # NCG110000 COC # NCG110158

Air Quality (ABAQA) Title V Permit # 11-772-18

Collection System # WQCS00004

II. Description of Facilities

Collection System—System Services Division

In the fiscal year of 2023 (FY23), the Metropolitan Sewerage District provided wastewater service to over 58,900 customers with an estimated population of 271,534. This large service area spans the French Broad River and Swannanoa River Valleys covering about 260 square miles of land. Pipes conveying the wastewater from homes and businesses form an extensive collection system operated and maintained by our System Services Division. With over 1,140 miles of public sanitary sewer lines, 40 pump stations and approximately 33,890 manhole access points; significant manpower and equipment is required. Pipes vary in size from 66" diameter large interceptors down to 6" serving residential communities. Most of the piping within the District is between 50 and 100 years old and requires continual upkeep and/or replacement.

Water Reclamation Facility (WRF)

The Water Reclamation Facility (WRF) is rated at 40 million gallons per day (MGD) capacity serving most of Buncombe County (Asheville, Biltmore Forest, Black Mountain, Montreat, Weaverville, Woodfin and part of northern Henderson County). In FY23 an average flow of 20.88 million gallons per day were treated with the majority coming from residences. For the year, 7.6 billion gallons were treated with more than one-third coming from Infiltration & Inflow (I&I). That's the industry term for groundwater seeping in from cracks in pipes and manholes or rainwater entering through manhole lids and unauthorized Storm Water connections. The District is continually working to abate this problem.

The design of our wastewater treatment system is called "attached growth" relying heavily on 152 rotating biological contactors (RBC's) to do the bulk of treatment. These RBC's provide over 400 acres (about 2.5 acres per unit) of surface area for microorganisms to grow upon. As the backbone of treatment, these microorganisms do the heavy lifting providing the return of clean, safe water back to the French Broad River; our receiving stream. MSD's facility is believed to be the largest RBC plant in the world.

II. Description of Facilities — WRF Treatment Components

Preliminary Treatment Components

- Influent Multi-rake Barscreens (2 units, ½ inch Bar Spacing, 40 MGD each) with screenings washer/compactor and shaftless screw conveyer
- Influent Pumps (3 units) - 35 MGD rated capacity each
- Perforated Plate Fine Screens (3 units, ¼ inch openings, 40 MGD each) with screenings washer/compactor
- Vortex Grit Removal (2 units rated at 50 MGD) - Removal Rate 95% of Grit > 140 Mesh
- Storm Surge System - Utilizes three pumps rated at 5MGD each and two storm surge tanks rated at 2.1 million-gallons each

Primary Treatment Components

- Primary Clarification - Chemically Enhanced Kruger ACTIFLO system (Construction substantially complete in December of 2021)

Secondary Treatment Components

- 1st Stage RBC's (44 units)
- 2nd Stage RBC's (72 units)
- 3rd Stage RBC's (36 units)
- Intermediate Pumps (3 units) - pump water to clarifier from 3rd RBC stage
- Intermediate Clarifier (4 cells - total volume 2 MG)
- Microfiltration via AASI AquaDisk Units (16 units)

Disinfection Components

- Sodium Hypochlorite solution - average feed 1000 gallons/day at 6.5% solution strength

Residuals Handling Components

- Gravity Thickeners (2 units) - 100 foot-diameter each
- 2.5 Meter Belt Presses (2 units)
- Fluidized Bed Incinerator (2,651 dry pounds per hour)

Energy Management Components

- Two separate power circuits from Duke Energy for plant, with Automatic Transfer Switch if one fails
- 4-Megawatt total from three Diesel Generators (emergency backup power for WRF; will maintain full treatment processes during a power outage)
- 850 Kilowatt Hydro Turbines (3 units) - induction units (French Broad River source). These generate power using the District's dam/flume. The power is sold back to Duke Energy.

Automation Components

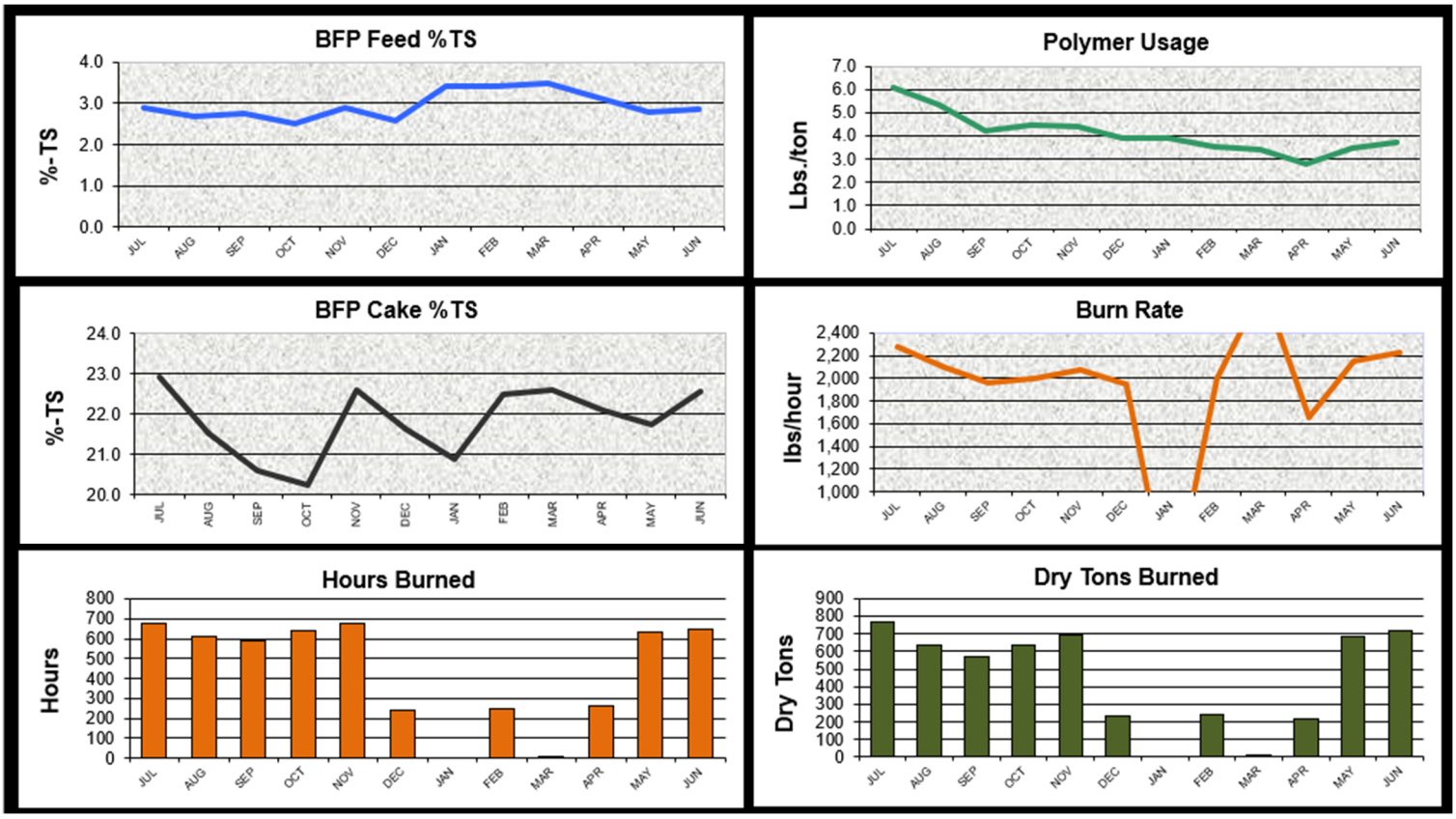
- SCADA (Supervisory Control and Data Acquisition) - full automated control of WRF

MSD utilizes its Fluidized Bed Incinerator as its primary residual management option. Presently the facility is managing 17-20 dry tons per day of residuals. The facilities are designed for 2,651 dry pounds per hour. Due to the lack of true primary clarifiers, most of the sludge generated at the facility is secondary in nature (i.e. sloughings from the RBC's).

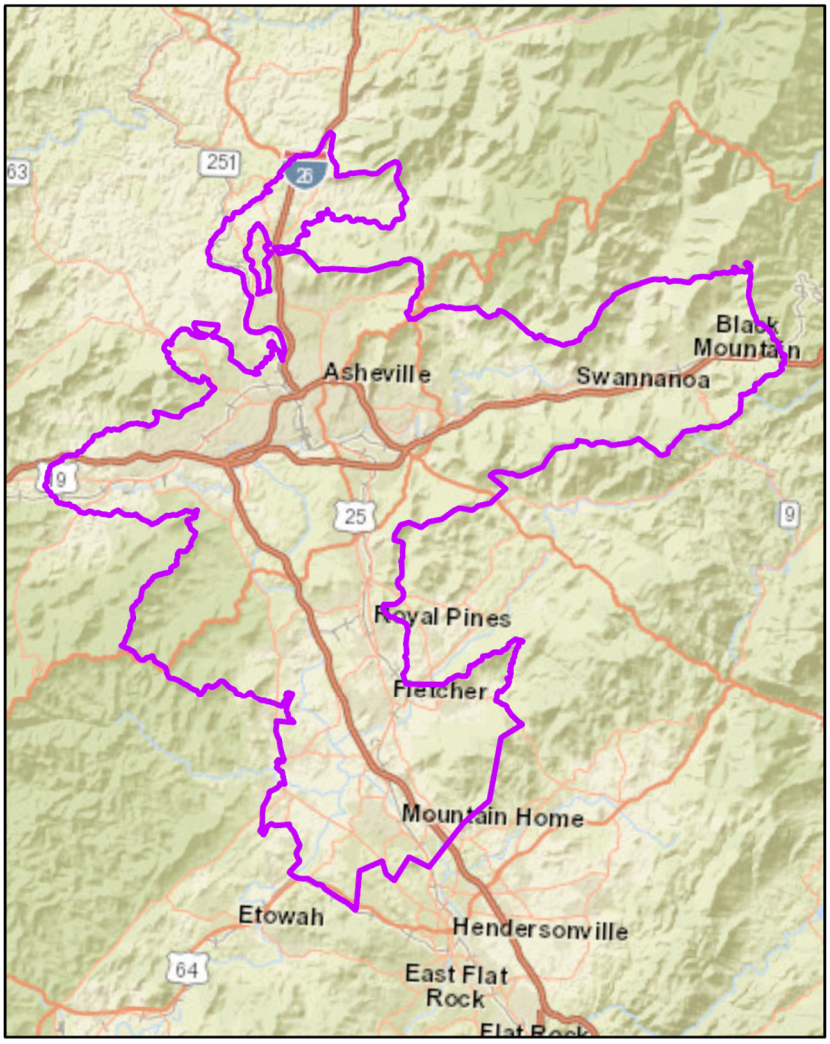
Sludge is thickened in on-site gravity thickeners to a consistency of 2-5% solids at which time it is then pumped to the 2 1/2-meter belt presses. These units dewater the sludge to over 22% solids and then it is pumped to the incinerator. Air emissions from the incinerator are of excellent quality, and air quality is further enhanced by a new filtration system added in 2016. Incinerator ash is thickened on-site via a gravity ash thickener and then pumped to an on-site lagoon. Ground-water is monitored in accordance with NCDEQ requirements (up & down gradient).

The incinerator system provides the most cost-effective method for sludge management. Supplementary fuel is sometimes required due to the 22% solids content - natural gas via Dominion Energy is utilized for this purpose.

MSD also maintains an agreement with the local county landfill (lined) to dispose of dewatered sludge during emergency and/or maintenance activities. This provides a second residuals management alternative, when or if needed.



Collection System Improvements



MSD assumed ownership and maintenance of the various local public collection systems in 1990, and since that time MSD has undertaken an aggressive program to correct existing known collection system problems. Between 1990 and 2023, over 1,378,640 linear feet (or 261 miles) of pipe have been replaced and over $504 million has been re-invested in plant and collection system rehabilitation projects. However, due to the large size of the MSD system, there is much work still to be done. From FY 2024 to FY 2033, the District expects to rehabilitate or replace an additional 415,702 linear feet.

Approximately $531.7 million will be spent for the District's Capital Improvement Program (CIP) over the next ten years. Of this, 18% will be spent on rehabilitating medium to large Interceptors, 23% on rehabilitating or replacing small collection lines, and 52% on the treatment plant and pump station projects.

MSD's Pipe Rating Program is used to objectively prioritize rehabilitation projects throughout the regional collection system. This published, award winning program utilizes the District's Geographic Information System (GIS) and database software to collect rating data for each project. The data include Sanitary Sewer Overflow (SSO) history, customer service requests, proximity to streams/waterways, structural condition, and monitoring/maintenance schedules by MSD staff. A priority rating is then generated for each project, which is used to prioritize the ten -year CIP.

MSD maintains an aggressive Preventative Maintenance Program whereby approximately 898,177 lineal feet (or about 170 miles) of sewer lines were cleaned by high pressure water jetting equipment. In addition, over 33,140 linear feet of sewer lines are mechanically treated to remove tree roots and blockages. MSD also maintains its Rights-of-Way to ensure access to the system for cleaning and maintenance activities. During FY 2023 over 118,395 ft. were cleared.

Water Reclamation Facility (WRF) Performance Measures

During the FY23 annual reporting period, high performance measures were again achieved. The WRF continues to provide effective/efficient treatment services to the community averaging wastewater CBOD & TSS removal efficiencies of 93% and 95% respectively (state permit requires a minimum of 85% removal rates for compliance). The volume of flow to the WRF continues to remain well below hydraulic capacity for the plant averaging 21.7 million gallons per day. The WRF remains in compliance for all permitted parameters and receives favorable reviews by NC Department of Environmental Quality and the Asheville-Buncombe Air Quality Agency.

MSD maintains a service contract agreement with Pace Analytical, Inc. (NC certified lab). This progressive opportunity continues to yield significant long-term savings to MSD. Also, the WRF successfully participated in surveillance audits regarding ISO14001 certification , coming through with zero (0) non-conformances. This program, also referred to as an Environmental Management System, continues to provide significant benefits to MSD both in the short & long-term.
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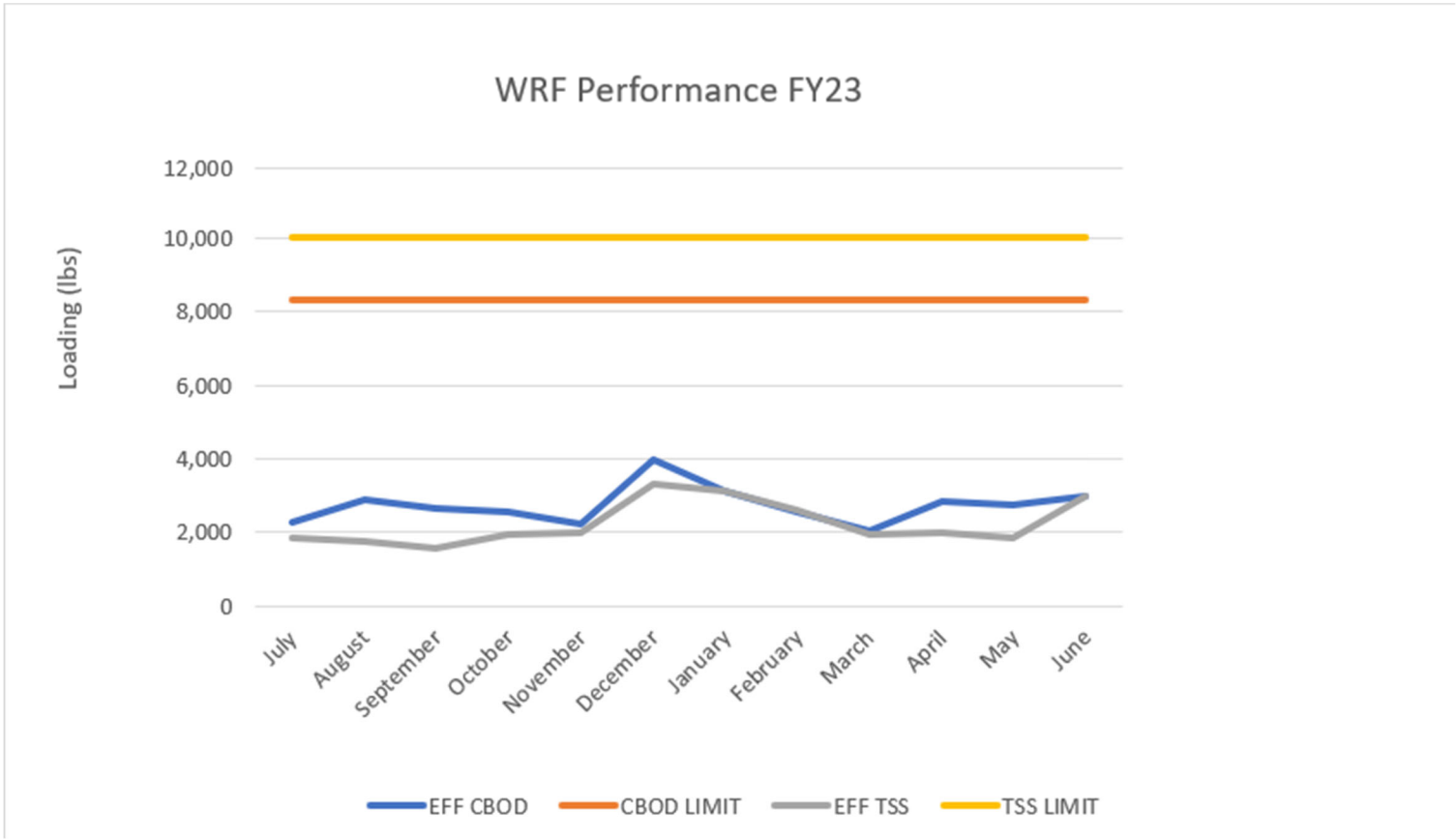


Water Reclamation Facility Improvements

The High Rate Primary Treatment Project was recommended by the Water Reclamation Facility Plan. This $17.0 million project will provide high-rate primary clarification and will work in conjunction with planned process upgrades to assist in meeting future regulations.

CONSTRUCTION TOTALS BY DATE COMPLETED - Monthly

From 7/1/2022 to 6/30/2023

	Dig Ups	Emergency Dig Ups	Dig Up ML Ftg	Dig Up SL Ftg	Manhole Repairs	Taps Installed	Creek Crossings Cleared	ROW Ftg	Service Line Bore Ftg	Service Line Burst Ftg
July 2022	28	6	63	433	17	10	0	25,839	0	35
August 2022	30	6	70	904	14	27	5	14,647	30	25
September 2022	20	7	32	494	12	17	0	6,291	0	0
October 2022	15	5	46	507	16	29	0	3,940	0	0
November 2022	10	5	27	348	17	19	1	26,106	120	0
December 2022	12	9	31	320	10	50	0	0	0	0
January 2023	39	9	49	605	17	15	1	0	4	0
February 2023	39	12	90	719	15	18	0	720	0	47
March 2023	31	10	95	881	17	39	0	60	0	0
April 2023	20	12	123	643	13	22	0	4,000	0	0
May 2023	30	12	155	457	14	9	0	5,000	0	0
June 2023	33	9	83	642	11	18	1	31,792	0	0
Grand Total	**307**	**102**	**863**	**6,953**	**173**	**273**	**8**	**118,395**	**154**	**107**

CONSTRUCTION REHAB TOTALS BY DATE COMPLETED - Monthly

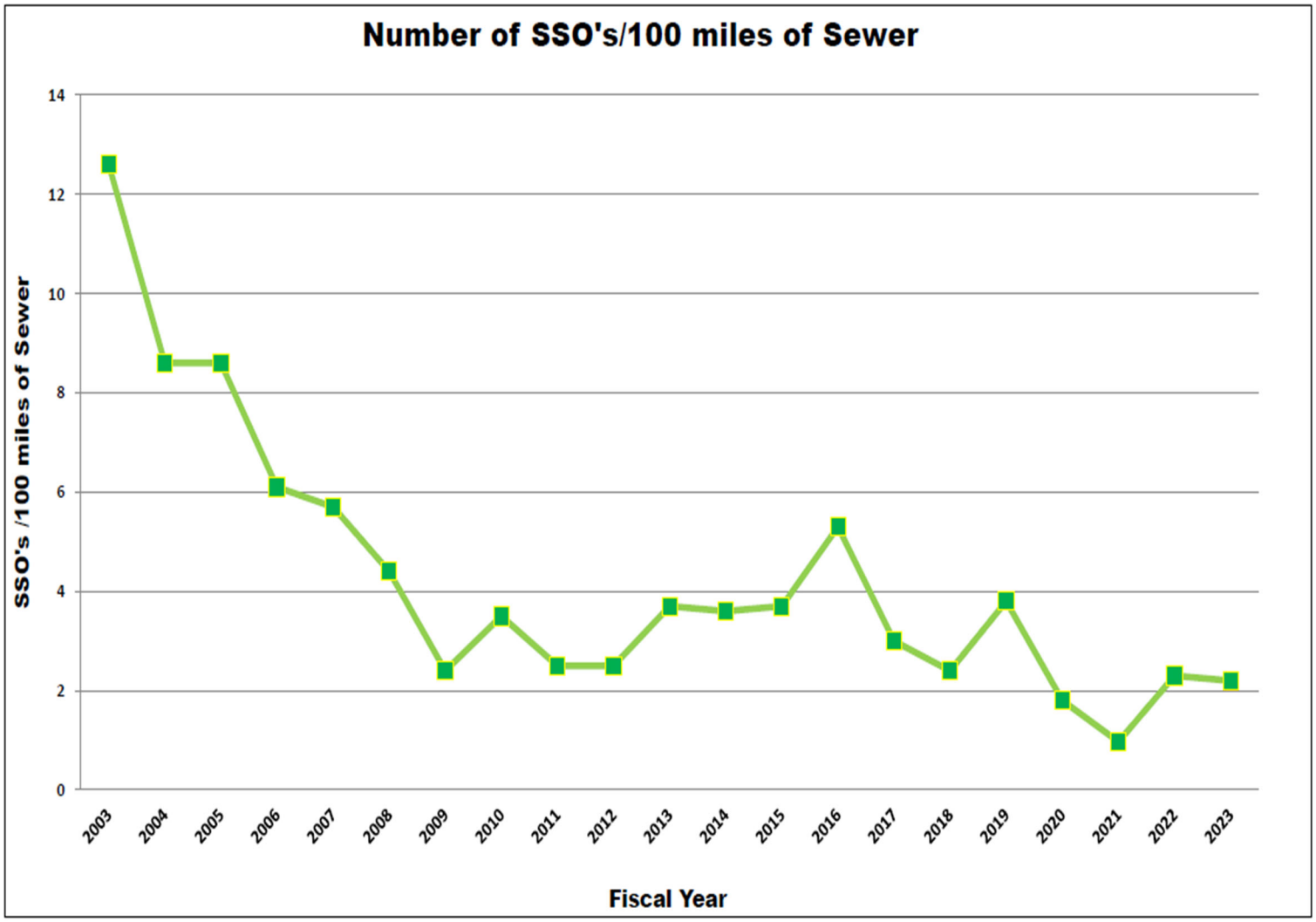
From 7/1/2022 to 6/30/2023

	# IRS Repairs	IRS Ftg	IRS Accept Ftg	Const Ftg	Const Accept Ftg	# D-R	D-R Ftg	#MH	Mainline PB Ftg	Mainline Bore Ftg	Total Rehab Ftg
July 2022	0	0	0	435	435	1	1233	7	30	0	1698
August 2022	0	0	0	0	0	2	1040	6	0	0	1040
September 2022	0	0	0	0	0	1	435	3	0	0	435
October 2022	0	0	0	350	350	1	592	7	0	0	942
November 2022	0	0	0	0	0	1	627	4	0	0	627
December 2022	0	0	0	223	223	2	383	4	0	0	606
January 2023	0	0	0	18	40	1	434	3	0	0	474
February 2023	0	0	0	0	0	1	987	11	0	0	987
March 2023	0	0	0	351	351	1	67	1	0	0	418
April 2023	0	0	0	0	0	1	630	2	0	0	630
May 2023	2	153	317	0	0	3	1142	7	0	0	1459
June 2023	1	182	182	0	0	1	201	0	0	0	383
Grand Totals	**3**	**335**	**499**	**1377**	**1399**	**16**	**7771**	**55**	**30**	**0**	**9699**

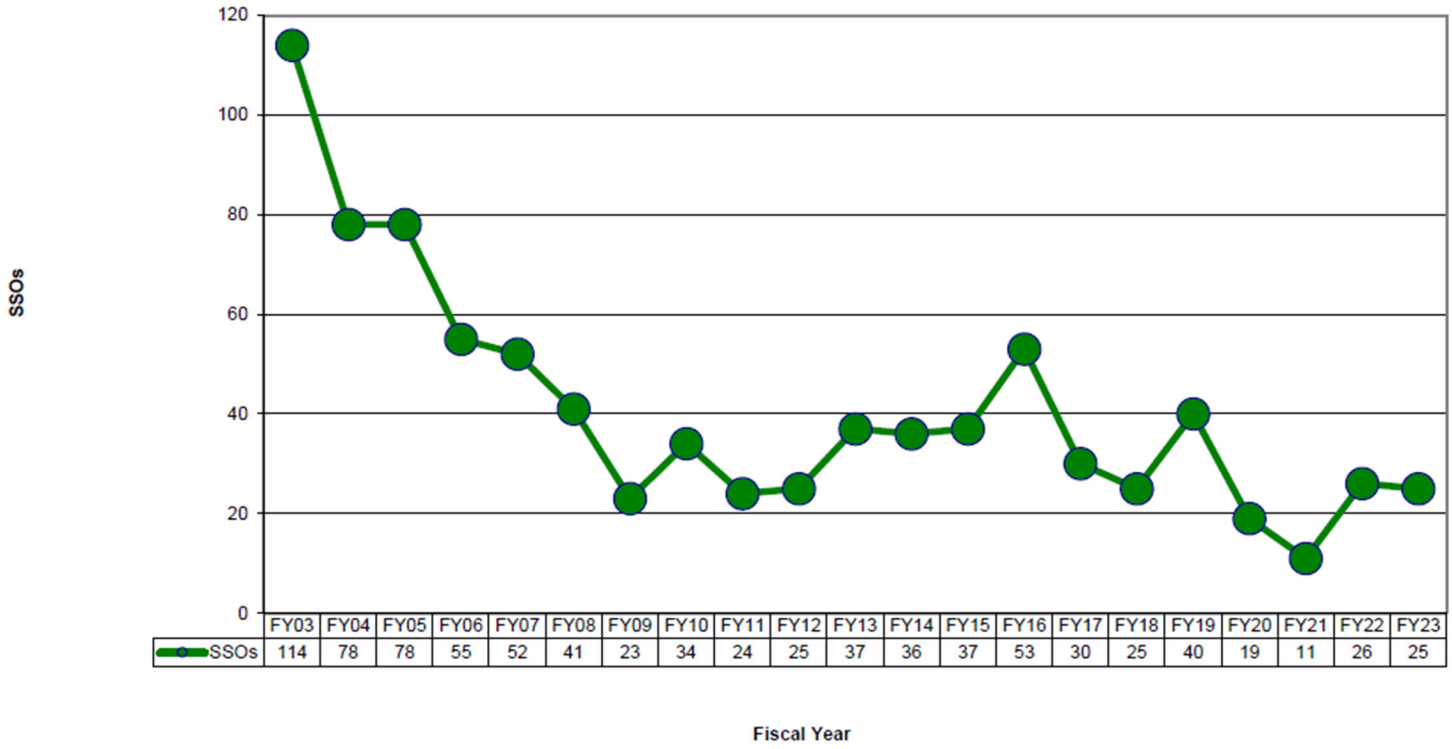
Collection System, System Services Division Performance Measures

System Services division completed and submitted to NCDEQ-DWR two six-month High Priority Line Inspection Reports. The High Priority Line report documents inspection of aerial lines, siphons and lines in proximity to vulnerable creeks and streams.

The collection system recorded 25 sanitary sewer overflows (SSO's) which equates to 2.2 SSO's per 100 miles of sewer. All SSO's were remediated according to the District's standard operating procedures for sanitary sewer overflow cleanup and no severe environmental impact occurred.



Sanitary Sewer Overflows



	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
SSOs	114	78	78	55	52	41	23	34	24	25	37	36	37	53	30	25	40	19	11	26	25

SSO Report - Monthly

From 7/1/2022 to 6/30/2023

	SSO Count	AVG Response Time (min.)	AVG SSO Volume (gal.)	AVG Surface Volume (gal.)	Spills >= 1000 Gallons	Spills >= 15,000 Gallons	Total SSO Volume (gal.)	Total Surface Volume (gal.)
July, 2022	0	0	0	0	0	0	0	0
August, 2022	3	17	280	280	0	0	840	840
September, 2022	2	29	600	600	0	0	1,200	1,200
October, 2022	2	30	655	655	0	0	1,310	1,310
November, 2022	0	0	0	0	0	0	0	0
December, 2022	1	13	700	700	0	0	700	700
January, 2023	2	126	500	500	0	0	1,000	1,000
February, 2023	4	27	793	509	2	0	3,173	2,034
March, 2023	2	30	4,196	1,696	1	0	8,392	3,392
April, 2023	4	28	448	448	0	0	1,791	1,791
May, 2023	2	0	6,781	6,781	1	0	13,561	13,561
June, 2023	3	34	395	395	0	0	1,186	1,186
Grand Totals:	25	32	1,326	1,081	4	0	33,153	27,014

CUSTOMER SERVICE REQUESTS
Monthly - All Crews

CREW	MONTH	JOBS	AVERAGE REPSONSE TIME	AVERAGE TIME SPENT
DAY 1ST RESPONDER				
	July, 2022	115	28	34
	August, 2022	83	30	37
	September, 2022	90	30	40
	October, 2022	83	29	36
	November, 2022	85	28	32
	December, 2022	71	27	50
	January, 2023	129	28	31
	February, 2023	152	28	30
	March, 2023	152	29	32
	April, 2023	108	31	35
	May, 2023	103	26	36
	June, 2023	96	25	35
		1,267	28	35
NIGHT 1ST RESPONDER				
	July, 2022	41	25	19
	August, 2022	41	26	24
	September, 2022	35	35	26
	October, 2022	28	28	34
	November, 2022	34	41	38
	December, 2022	33	33	34
	January, 2023	69	33	22
	February, 2023	43	30	23
	March, 2023	44	33	28
	April, 2023	41	30	27
	May, 2023	21	33	26
	June, 2023	30	31	26
		460	31	26
ON-CALL CREW *				
	July, 2022	29	40	39
	August, 2022	29	29	60

* On-Call Crew Hours: 8:00pm-7:30am (Jul. - Oct.) 11:30pm-7:30am (from Nov. onward) Monday-Friday, Weekends, and Holidays

8/4/2023

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CUSTOMER SERVICE REQUESTS
Monthly - All Crews

CREW	MONTH	JOBS	AVERAGE REPSONSE TIME	AVERAGE TIME SPENT
ON-CALL CREW *				
	September, 2022	27	56	67
	October, 2022	35	62	58
	November, 2022	28	49	51
	December, 2022	48	60	53
	January, 2023	60	67	33
	February, 2023	35	52	38
	March, 2023	34	55	32
	April, 2023	33	43	51
	May, 2023	31	67	50
	June, 2023	24	67	37
		413	55	46
Grand Totals:		2,140	34	35

* On-Call Crew Hours: 8:00pm-7:30am (Jul. - Oct.) 11:30pm-7:30am (from Nov. onward) Monday-Friday, Weekends, and Holidays

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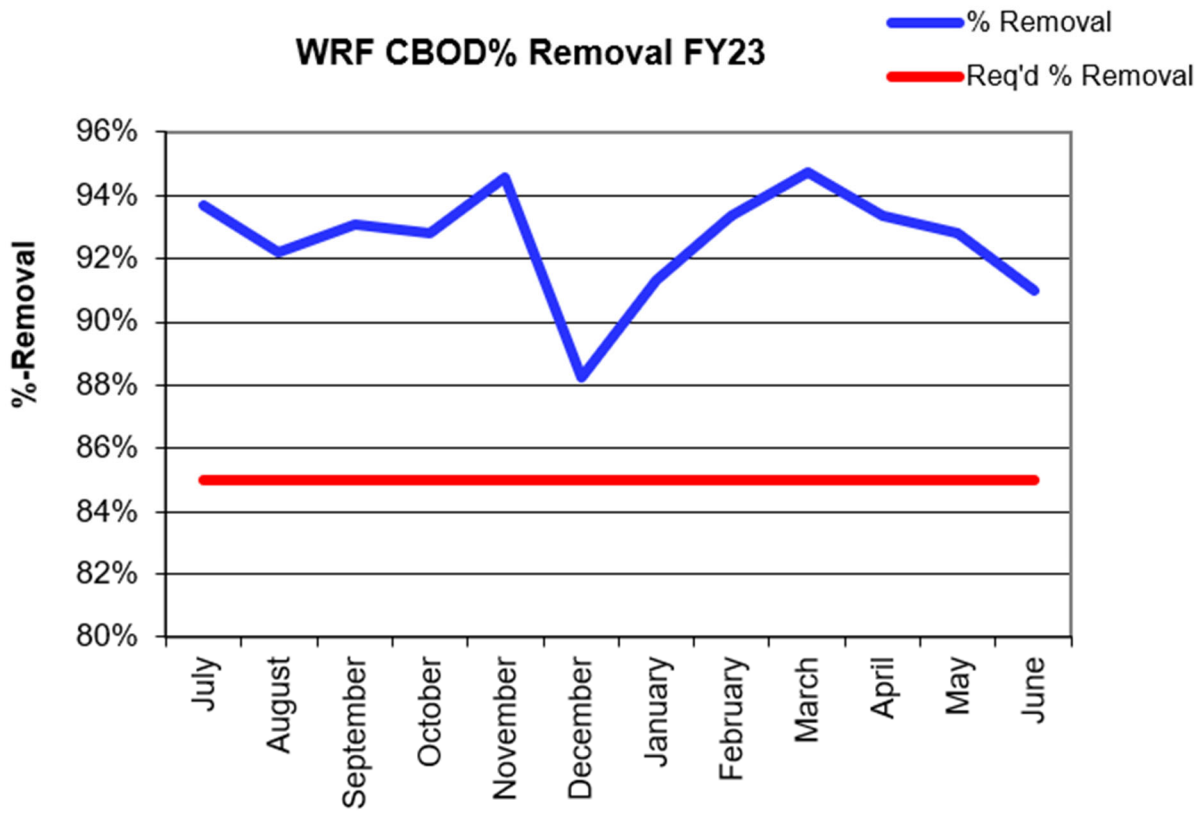
PIPELINE MAINTENANCE TOTALS BY DATE COMPLETED - Monthly

July 01, 2022 to June 30, 2023

	Main Line Wash Footage	Service Line Wash Footage	Rod Line Footage	Cleaned Footage	CCTV Footage	Smoke Footage	SL-RAT Footage
2022							
July	100,862	4,736	1,390	102,252	14,226	50	1,886
August	95,363	1,583	0	95,363	29,701	0	6,165
September	51,254	1,193	1,816	53,070	21,909	0	5,747
October	60,901	1,089	5,221	66,122	24,032	493	10,894
November	15,578	1,676	1,365	16,943	17,617	450	16,220
December	30,535	1,598	2,136	32,671	8,109	0	26,472
2023							
January	46,850	2,797	3,209	50,059	13,499	0	25,849
February	64,673	1,804	4,788	69,461	14,134	225	21,635
March	120,867	1,255	3,216	124,083	34,382	2,835	25,210
April	73,685	1,388	1,890	75,575	16,556	0	2,341
May	122,550	1,437	4,734	127,284	25,538	805	7,822
June	115,059	4,930	3,375	118,434	22,921	0	23,330
Grand Total:	**898,177**	**25,486**	**33,140**	**931,317**	**242,624**	**4,858**	**173,571**
Avg Per Month:	**74,848**	**2,124**	**2,762**	**77,610**	**20,219**	**405**	**14,464**

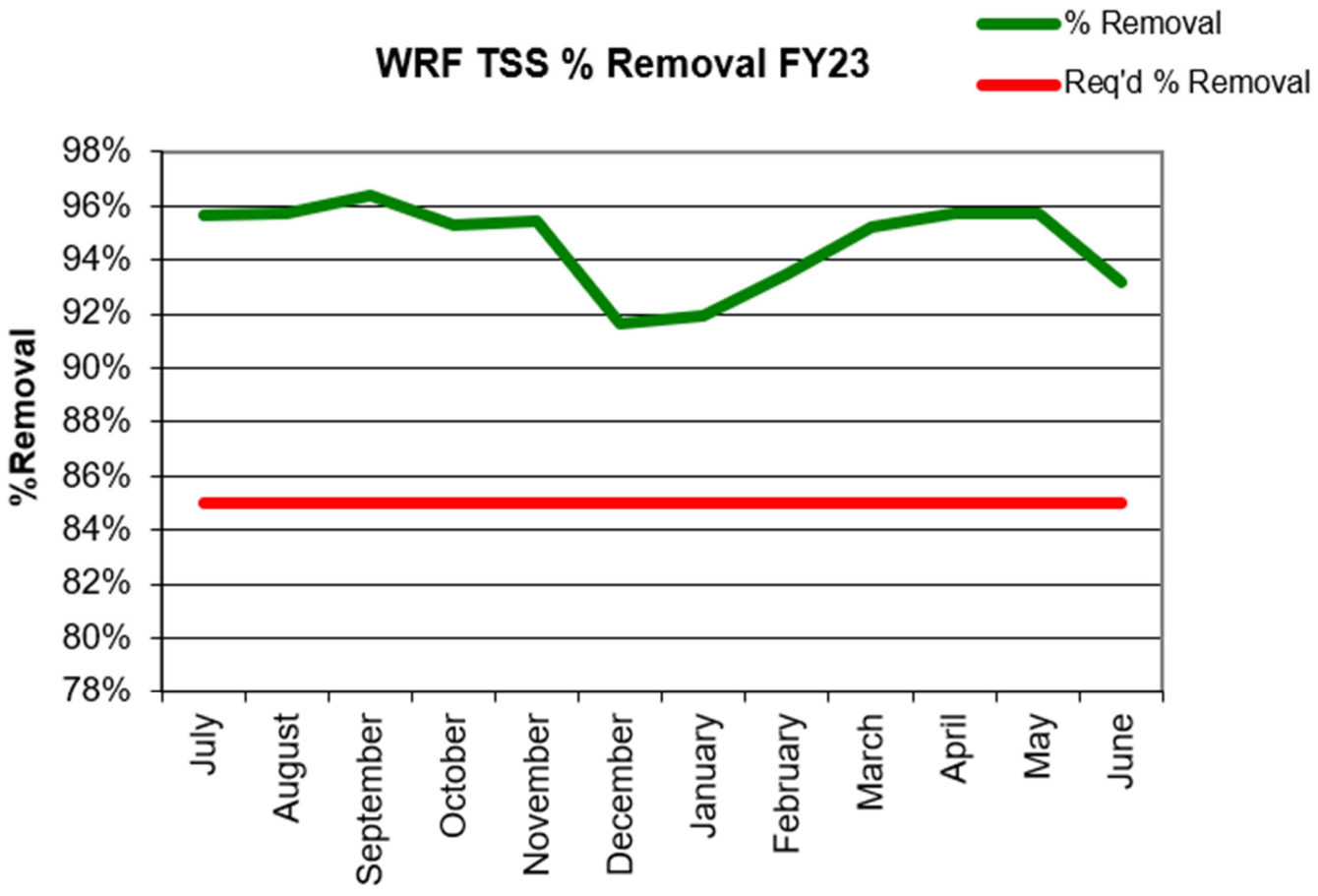
Water Reclamation Facility (WRF) Performance Measures

Month	INF CBOD	EFF CBOD	% Removal	Req'd % Removal
July	207.4	13.1	94%	85%
August	222.6	17.3	92%	85%
September	225.0	15.6	93%	85%
October	226.4	16.3	93%	85%
November	242.0	13.2	95%	85%
December	189.9	22.3	88%	85%
January	193.4	16.8	91%	85%
February	204.5	13.6	93%	85%
March	223.1	11.8	95%	85%
April	228.9	15.2	93%	85%
May	216.5	15.6	93%	85%
June	198.6	17.9	91%	85%
Average	214.8	15.7		
% Removal		93%		



Water Reclamation Facility (WRF) Performance Measures

Month	INF TSS	EFF TSS	% Removal	Req'd % Removal
July	241.5	10.5	96%	85%
August	247.9	10.6	96%	85%
September	259.8	9.4	96%	85%
October	262.7	12.4	95%	85%
November	256.7	11.8	95%	85%
December	223.8	18.6	92%	85%
January	208.2	16.8	92%	85%
February	211.6	13.8	93%	85%
March	231.7	11.2	95%	85%
April	249.2	10.7	96%	85%
May	245.4	10.5	96%	85%
June	261.4	17.9	93%	85%
Average	241.7	12.8		
% Removal		95%		



Hydroelectric Performance Measures

MSD operates a hydroelectric facility with three (3) horizontal turbines that produce electrical power. This energy is then sold back to the electrical grid to Duke Energy. These turbines benefit MSD because it offsets the cost of energy used to operate the WRF. The treatment of wastewater is an energy hungry process, but the hydroelectric facility allows MSD to save $300,000 to $600,000 in energy costs per year. The variation in savings is dependent on rainfall and maintenance requirements that occur during the year.

Task	FY21	FY22	FY23
Daily (average) Flow, treated MGD	23.9	22.2	20.88
Maximum daily flow treated, MGD	67.3	53.7	60.00
Dry tons of bio-solids processed	6,841	7,834	5,419
Cost per million gallons (MG), treated	$708	$575	$730
Energy cost per MG. treated	$91	$136	$139
Carbonaceous biochemical oxygen demand (CBOD) removal, %	92%	93%	93%
Total suspended solids (TSS) removal efficiency, %	93%	94%	95%
Number of NPDES permit non-compliance	1	1	0
Preventative to corrective maintenance ratio	70:30	70:30	70:30

V. Certification

I certify under penalty of law that this report is complete and accurate to the best of my knowledge. I further certify that this report has been made available to the users and customers of the MSD system and that those users have been notified of its availability.

Thomas E. Hartye, P.E.
General Manager
Metropolitan Sewerage District of Buncombe County, NC

August 29, 2023

If you would like more information please email webmaster@msdbc.org