



MSD METROPOLITAN SEWERAGE DISTRICT BUNCOMBE COUNTY, NORTH CAROLINA

2028 Riverside Drive
Asheville, NC 28804
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Thomas E. Hartye, General Manager

William Clarke, General Counsel

M. Jerry VeHaun, Chairman
E. Glenn Kelly, Vice-Chairman
Jackie W. Bryson, Sec./Treasurer
Matt Ashley
Jon Creighton
Don Collins
Ellen Frost
Esther Manheimer
Chris Pelly
Robert Pressley
Al P. Root
Gwen Wisler

August 31, 2017

System Performance Annual Report
North Carolina Division of Water Quality
1617 Mail Service Center
Raleigh, NC 27699-1617

Dear Sirs;

Please find the three (3) enclosed copies of the System Performance Annual Report for the Metropolitan Sewerage District of Buncombe County, as required in the General Statute 143-215.1C. Public notification was published subsequent to the mailing of this letter on August 31, 2017, in the Asheville Citizen-Times. Reference was made in the article to the viewing of the report on our web site, www.msdbc.org, written request to the MSD, or by requesting by phone for a printed copy. An abbreviated report is also available to our customers. Please feel free to call me if you need additional information.

Respectfully,

Metropolitan Sewerage District of Buncombe County, NC

By,

Thomas E. Hartye, P.E.
General Manager MSD

CC: Ms. Linda Wiggs

System Performance Annual Report

Fiscal Year 2017 (July '16 thru June '17)

I. General Information

Metropolitan Sewerage District of Buncombe County, NC
2028 Riverside Drive, William H. Mull Building
Asheville, North Carolina 28804

General Manager	Thomas E. Hartye, P.E.	(828) 254-9646
Director of Wastewater Reclamation Facility (WRF)	Peter Weed (ORC)	(828) 225-8204
Operations Manager (WRF)	Roger Edwards (ORC-Backup)	(828) 225-8224
Director of Technical Services (Collection System)	Ken Stines (ORC)	(828) 225-8244
Director of Construction (Collection System)	Mike Stamey, P.E. (ORC-Backup)	(828) 225-8262

Permit Numbers:

- NPDES Permit # NC0024911
- General Storm water Permit # NCG110003
- Air Quality (WNCRAPCA) Permit # 11-772-14
- Collection System # WQCS00004

II. Description of Facilities

A. Collection System- System Services Division

In the fiscal year of 2017 (FY17), the Metropolitan Sewerage District provided wastewater service to over 53,000 customers with an estimated population of 130,000. This large service area spans the French Broad River and Swannanoa River Valleys covering about 180 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 1,000 miles of public sanitary sewer lines, 30 pump stations and approximately 28,000 manhole access points; significant manpower and equipment is required. Pipes vary in size from 66" diameter large interceptors down to our standard 8" serving residential communities. Most of the piping within the District is between 50 and 100 years old and requires continual upkeep and/or replacement.

B. 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 FY17 an average flow of 19.5 million gallons per day were treated with the majority coming from residences. For the year, over 7 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 has been aggressively 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. A detailed listing of our treatment system components is as follows:

Preliminary Treatment Components

- IDI Barscreens (2 units) w/screenings compactor and screw conveyer
- Influent Pumps (3 units) - 35 MGD rated capacity each
- Aerated Grit Chambers (3 units) with grease removal

Primary Treatment Components

- Primary Microscreens (7 units) - presently decommissioned

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 with Aqua Aerobics Systems AquaDisk system (16 Units)

Disinfection Components

- Sodium Hypochlorite solution - average feed 1,000 gallons/day at 7.5% solution strength with dechlorination of effluent prior to exiting the treatment facility

Residuals Handling Components

- Gravity Thickeners (2 units) - 100 foot diameter each
- 2.5 meter Belt Filter Presses (2 units)
- Anaerobic Digesters (decommissioned) - 100 foot diameter each (2)
- Fluidized Bed Incinerator (40DT/day rated)
- Alkaline Stabilization Facility (40DT/day rated - decommissioned)

Energy Management Components

- 4 Megawatts in Diesel Generators (full back-up/emergency power supply)
- 850 Kilowatt Hydro Turbines (3 units) - induction units using the French Broad River to generate power.

Automation Components

- SCADA systems employed throughout facility provide fully automated control of WRF

Sludge/Biosolids Management Plan

- MSD utilizes a fluidized bed incinerator as its primary sludge management option while maintaining an arrangement with the Buncombe County landfill (lined) for emergencies. Presently the facility is managing over 18 Dry Ton's (DT's) per day of residuals; however the designed capacity is 40DT's per day. Sludge produced thru normal biological processes in the plant is thickened to a consistency of 2% to 5% dry solids content and then pumped to belt filter presses. These presses dewater the biosolids to about a 22% dry cake suitable for incineration. Hot gases generated by the process are then piped through a scrubber to remove harmful pollutants before entering the atmosphere. The byproduct residual ash is then delivered to the on-site lagoon for long term containment.

III. Improvements to Facilities

A. 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 2017, over 1,167,200 linear feet (or 221 miles) of pipe have been replaced and over \$359 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 2017 to FY 2026, the District expects to rehabilitate or replace an additional 500,000 linear feet.

Approximately \$227 million will be spent for the District's Capital Improvement Program (CIP) over the next ten years. Of this, 23% will be spent on rehabilitating medium to large interceptors, 59% on rehabilitating or replacing small collection lines, and 17% on the treatment plant and pump station projects. The total estimated cost to rehabilitate the District's aged collection system and WRF facilities over the next twenty year period is estimated at over \$350 million.

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 SSO & overflow 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 885,000 lineal feet of sewer lines were cleaned by high pressure water jetting equipment. In addition, over 115,000 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 2017 over 37,000 ft. were cleared.

B. Water Reclamation Facility Improvements

Recently completed or underway facility projects include the following:

- Plant Headworks Project: This is the first recommended project from the Plant Facility Plan. It will provide for new Bar Screens at the Influent Pump Station, New Fine Screens and Grit Removal,

and the re-use of existing abandoned tanks to provide a surge system for better treatment during high-flow storm events. Construction is well underway on the \$9.6 million project, and completion is expected by Winter 2018.

- High Rate Primary Treatment Project: This is the second (mid-term) project recommended by the Plant Facility Plan. This \$14.4 million project will provide high-rate primary clarification, and will help the plant's Rotating Biological Contactor system perform at a higher level and be better equipped to meet future regulations. Design for this project is underway, and construction is expected to begin in Winter 2018.

IV. Performance Measures

A. Collection System, System Services Division

- The District has an aggressive Preventative Maintenance program of high pressure cleaning and root control. This year over 1,001,000 lineal feet of pipeline was treated by MSD in this way; more than 19% of the 1,020 miles of the system.
- System Services division completed and submitted to NCDNR-DWQ two six-month High Priority Line Inspection Reports and one Increased Inspection and Maintenance Report as required. The High Priority Line report documents inspection of aerial lines, siphons and lines in proximity to vulnerable creeks and streams. The Increased Inspection Report documents oversight of problem sewer lines in the 10 year CIP, all of which must be inspected once every three years until replaced.
- The collection system recorded 30 sanitary sewer overflows (SSO's). All SSO's were remediated according to the District's standard operating procedures for sanitary sewer overflow cleanup and no severe environmental impact occurred.

Attachments (These documents are in Adobe Acrobat format. To download a free Acrobat Reader [CLICK HERE](#))

- Customer Service response times
- Pipeline Maintenance totals
- SSO Report - monthly
- Construction totals (In System Services Division)
- SSO's chart for FY17

B. Water Reclamation Facility (WRF)

During the FY17 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 94% and 97% 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 19.5 million gallons per day. The WRF remains in compliance for all permitted parameters and receives favorable reviews by NC Department of Environment and Natural Resources and the WNC Regional Air Quality Agency.

MSD maintains a service contract agreement with Pace Analytical, Inc. (NC certified lab). This agreement incorporates the exchange of full laboratory testing services for use of the existing laboratory space.

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.

Performance Measures

Task	FY15	FY16	FY17
1. Daily (average) flow, treated MGD	19.1	21.6	19.5
2. Maximum daily flow treated, MGD	39.0	67.1	53.0
3. Dry tons of bio-solids processed	5,886	6,096	6,523
4. Cost per million gallons (MG), treated	\$735	\$735	\$767
5. Energy costs per MG, treated	\$115	\$96	\$117
6. Carbonaceous biochemical oxygen demand (CBOD) removal, %	92%	94%	94%
7. Total suspended solids (TSS) removal efficiency, %	97%	97%	97%
8. Number of NPDES permit non-compliance	0	0	0
9. Preventative to corrective maintenance ratio	70:30	70:30	70:30

Attachments (These documents are in Adobe Acrobat format. To download a free Acrobat Reader [CLICK HERE](#))

- [Plant location map with contours \(This is a large file\)](#)
- [Schematic of Wastewater Reclamation Facility](#)
- [Water Reclamation Facility site](#)
- [WRF performance chart](#)
- [WRF pollutant removals](#)
- [Biosolids production](#)
- [Air emissions](#)

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. August 31, 2017

General Manager, Metropolitan Sewerage District of Buncombe County, NC

If you would like a hard copy or more information...

Write to webmaster@msdbc.org



CUSTOMER SERVICE REQUESTS

Monthly - All Crews

CREW	MONTH	JOBS	AVERAGE REPSONSE TIME	AVERAGE TIME SPENT
DAY 1ST RESPONDER				
	July, 2016	106	26	41
	August, 2016	127	27	37
	September, 2016	92	28	43
	October, 2016	111	34	39
	November, 2016	119	34	39
	December, 2016	98	33	42
	January, 2017	121	31	41
	February, 2017	109	25	30
	March, 2017	124	24	40
	April, 2017	103	24	37
	May, 2017	109	25	40
	June, 2017	87	24	33
		1,306	28	39
NIGHT 1ST RESPONDER				
	July, 2016	14	21	49
	August, 2016	32	25	28
	September, 2016	10	25	16
	October, 2016	22	30	32
	November, 2016	13	30	29
	December, 2016	11	17	16
	January, 2017	26	18	18
	February, 2017	24	26	36
	March, 2017	22	24	21
	April, 2017	29	27	30
	May, 2017	30	19	22
	June, 2017	24	23	19
		257	24	26
ON-CALL CREW *				
	July, 2016	35	48	37
	August, 2016	34	43	33

* On-Call Crew Hours: 8:00pm-7:30am Monday-Friday, Weekends, and Holidays



CUSTOMER SERVICE REQUESTS

Monthly - All Crews

CREW	MONTH	JOB	AVERAGE RESPONSE TIME	AVERAGE TIME SPENT
ON-CALL CREW *				
	September, 2016	22	48	54
	October, 2016	43	41	34
	November, 2016	49	51	40
	December, 2016	60	50	33
	January, 2017	44	61	70
	February, 2017	43	43	40
	March, 2017	45	50	40
	April, 2017	48	44	49
	May, 2017	44	48	40
	June, 2017	36	38	33
		503	47	42
Grand Totals:		2,066	32	38

* On-Call Crew Hours: 8:00pm-7:30am Monday-Friday, Weekends, and Holidays



PIPELINE MAINTENANCE TOTALS BY DATE COMPLETED - Monthly

July 01, 2016 to June 30, 2017

	Main Line Wash Footage	Service Line Wash Footage	Rod Line Footage	Cleaned Footage	CCTV Footage	Smoke Footage	SL-RAT Footage
2016							
July	45,193	2,360	6,542	51,735	20,983	32,171	20,618
August	75,579	1,531	12,085	87,664	26,074	42,442	17,103
September	105,529	1,471	11,406	116,935	12,671	26,129	16,406
October	66,420	2,175	10,127	76,547	17,277	46,276	21,969
November	35,682	3,046	12,831	48,513	21,342	13,076	9,061
December	39,977	2,212	7,424	47,401	17,146	5,282	28,363
2017							
January	39,078	2,846	9,508	48,586	13,472	8,344	27,431
February	112,190	2,093	11,803	123,993	20,768	9,177	1,800
March	80,434	2,361	5,808	86,242	18,973	8,472	3,136
April	76,346	1,601	5,958	82,304	20,019	3,500	3,000
May	152,481	2,241	10,477	162,958	20,913	1,000	23,397
June	56,778	1,636	11,394	68,172	27,944	8,558	4,756
Grand Total:	885,687	25,573	115,363	1,001,050	237,581	204,428	177,040
Avg Per Month:	73,807	2,131	9,614	83,421	19,798	17,036	14,753



SSO Report - Monthly

From 7/1/2016 to 6/30/2017

	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.)
August, 2016	2	12	430	334	0	0	859	668
September, 2016	1	25	800	800	0	0	800	800
November, 2016	2	21	496	272	0	0	991	543
January, 2017	2	40	278	278	0	0	556	556
February, 2017	4	23	886	886	1	0	3,543	3,543
March, 2017	5	0	304	304	0	0	1,518	1,518
April, 2017	5	10	6,658	6,334	3	0	33,288	31,670
May, 2017	7	28	391	387	0	0	2,736	2,706
June, 2017	2	0	453	200	0	0	905	400
Grand Totals:	30	19	1,507	1,413	4	0	45,196	42,404



CONSTRUCTION TOTALS BY DATE COMPLETED - Monthly

From 7/1/2016 to 6/30/2017

	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 2016	24	9	114	706	35	27	0	1,620	108	0
August 2016	40	11	149	1,050	36	40	0	1,586	0	0
September 2016	32	9	219	471	23	20	1	1,833	90	0
October 2016	44	5	478	917	36	31	0	9,920	64	0
November 2016	35	11	123	703	33	20	0	1,175	198	0
December 2016	32	7	178	794	21	26	0	0	0	0
January 2017	40	9	183	692	25	17	0	710	209	0
February 2017	26	19	266	1,386	28	35	1	965	0	0
March 2017	42	17	343	1,556	27	33	0	100	385	0
April 2017	31	11	218	954	20	41	0	200	695	0
May 2017	35	11	194	824	25	37	0	220	110	0
June 2017	38	17	305	1,248	21	31	0	19,429	0	0
Grand Total	419	136	2,769	11,301	330	358	2	37,758	1,859	0

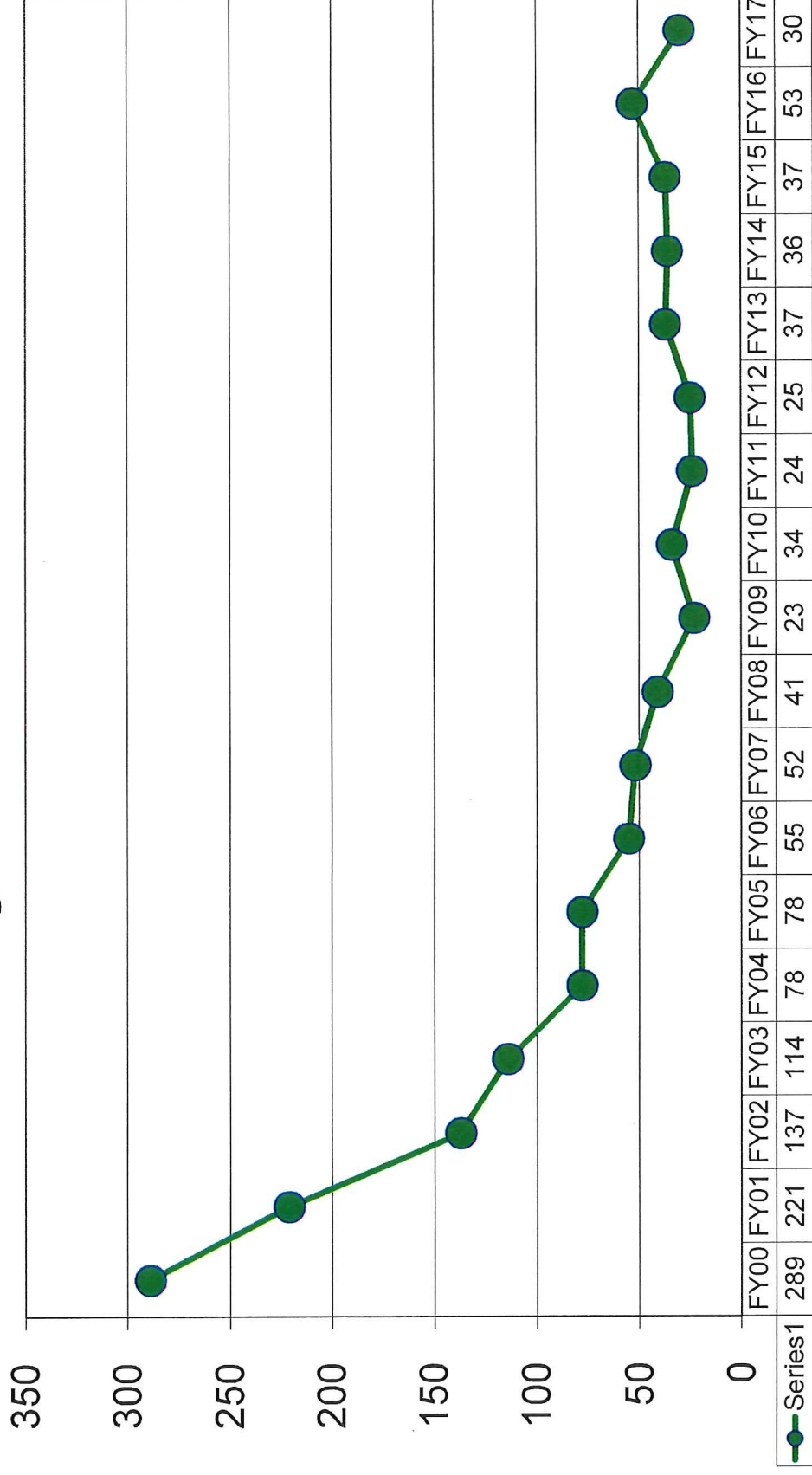


CONSTRUCTION REHAB TOTALS BY DATE COMPLETED - Monthly

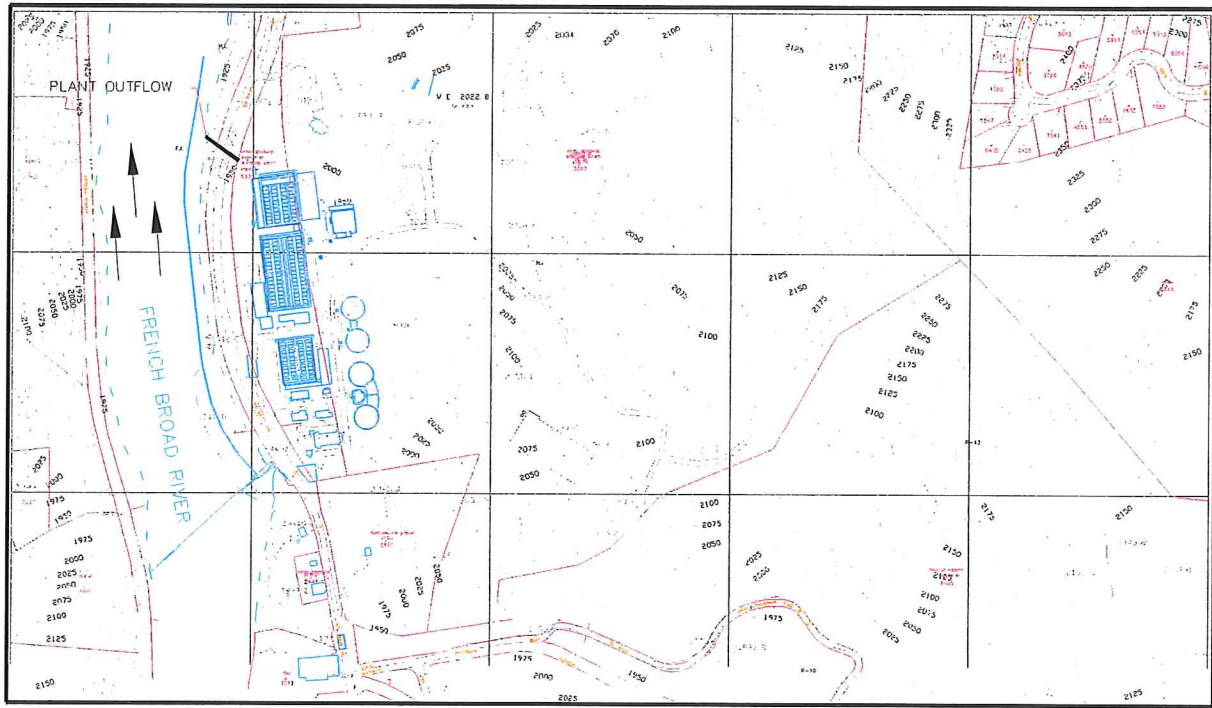
From 7/1/2016 to 6/30/2017

	# 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 2016	0	0	0	16	16	3	377	11	1463	325	2181
August 2016	0	0	0	264	264	3	300	6	0	120	684
September 2016	2	14	0	0	0	1	3923	23	0	0	3923
October 2016	1	7	0	0	0	4	1173	14	0	403	1576
November 2016	0	0	0	8	8	1	447	7	0	312	767
December 2016	1	7	0	0	0	1	582	7	0	205	787
January 2017	0	0	0	8	8	3	1161	13	0	1082	2251
February 2017	0	0	0	48	48	3	373	8	0	575	996
March 2017	0	0	0	8	8	3	841	11	0	288	1137
April 2017	0	0	0	191	377	1	425	9	0	391	1193
May 2017	1	4	144	10	374	2	774	9	0	512	1804
June 2017	0	0	0	34	29	4	442	18	2502	0	2973
Grand Totals	5	32	144	587	1132	29	10818	136	3965	4213	20272

Sanitary Sewer Overflows

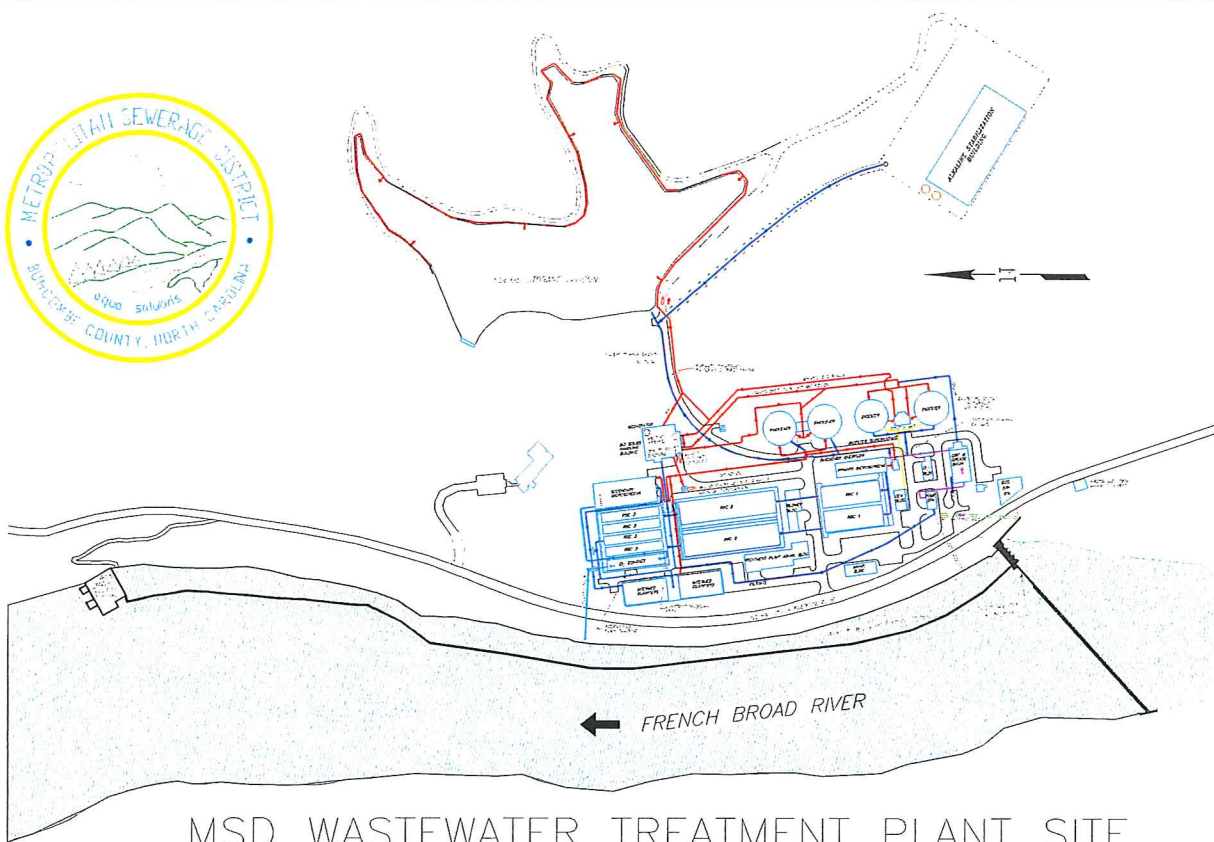
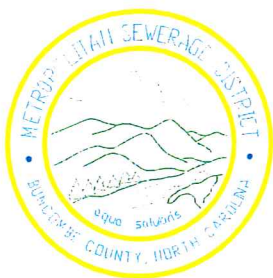


Fiscal Year
July 1 thru June 30



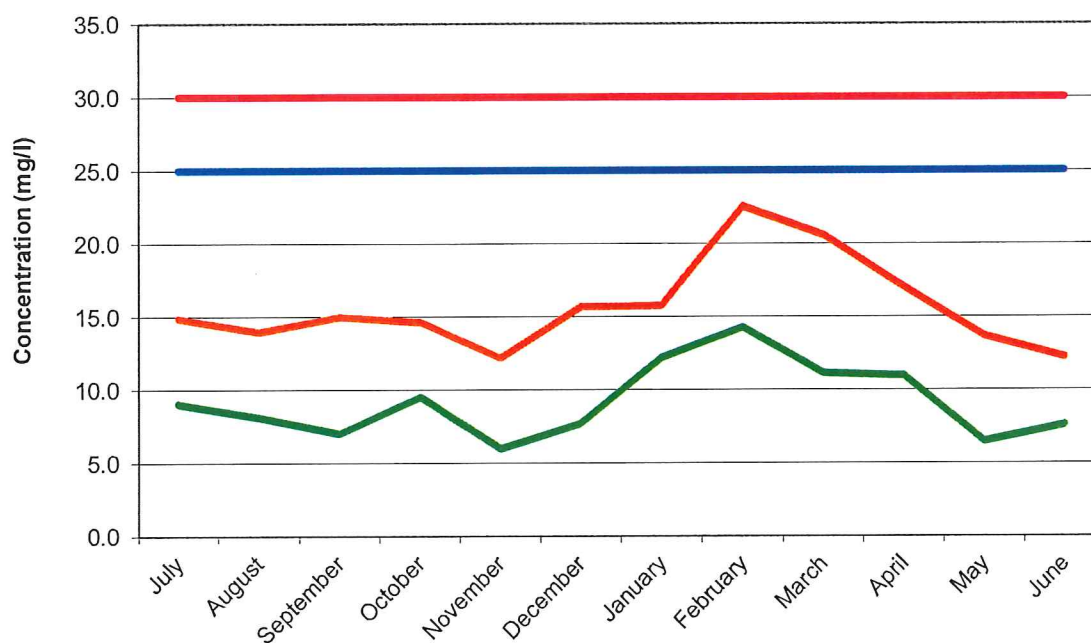
PLANT LOCATION
NOT TO SCALE



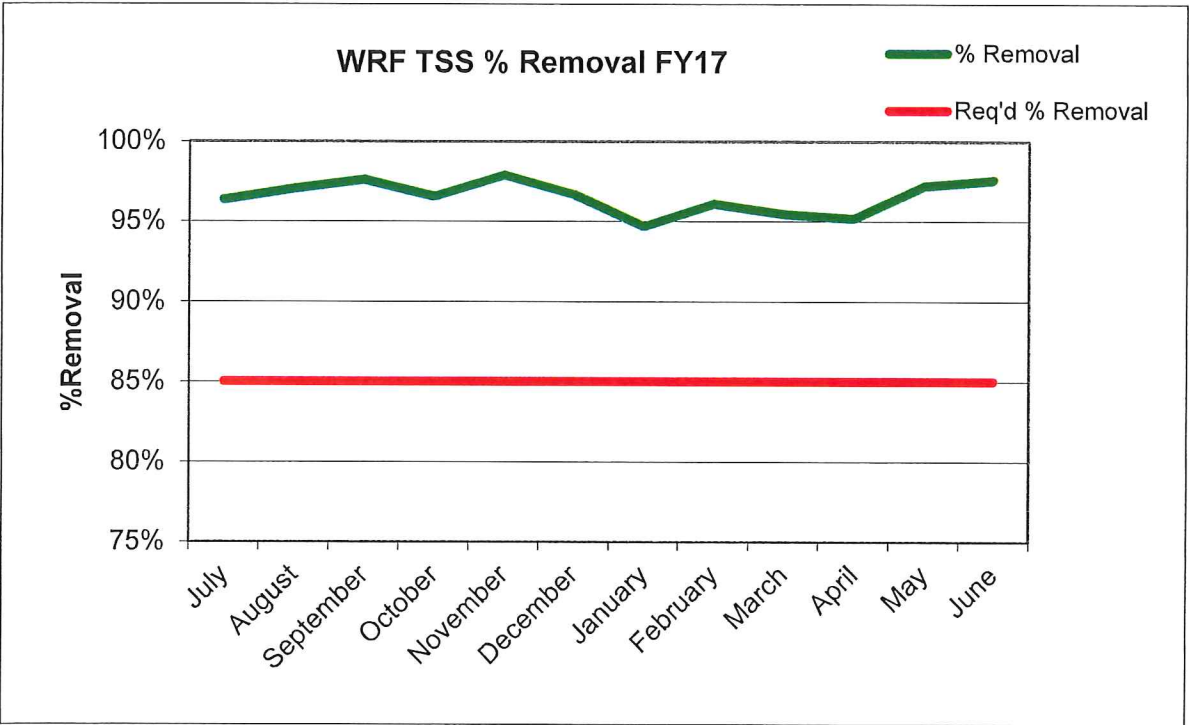
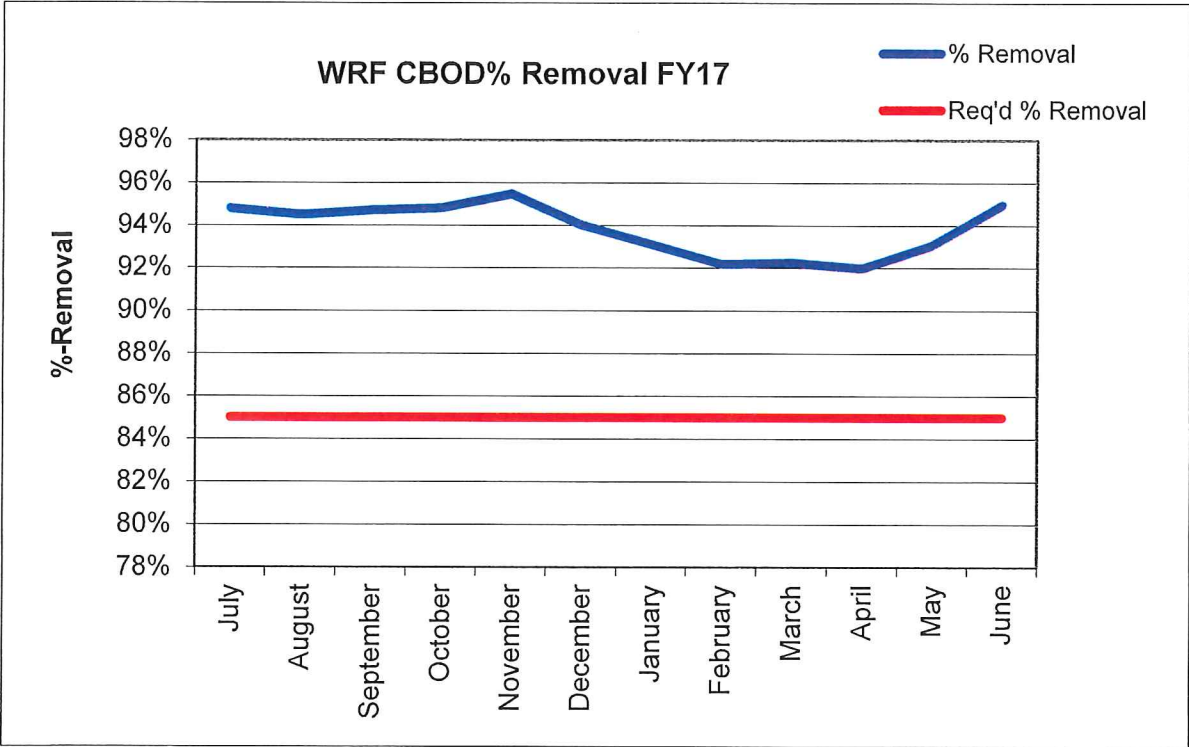


MSD WASTEWATER TREATMENT PLANT SITE
NOT TO SCALE

Wastewater Reclamation Facility Performance in FY17



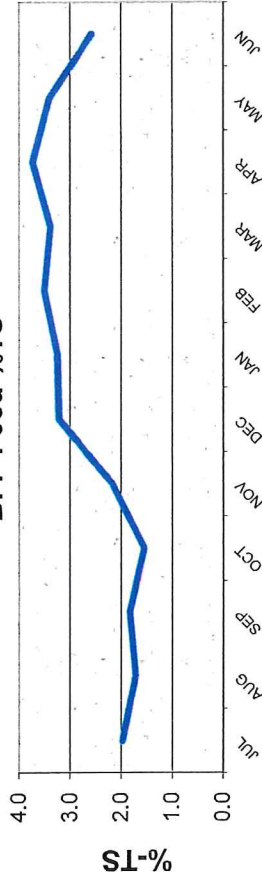
— CBOD (wastewater strength) — CBOD LIMIT
— TSS (total suspended solids) — TSS LIMIT



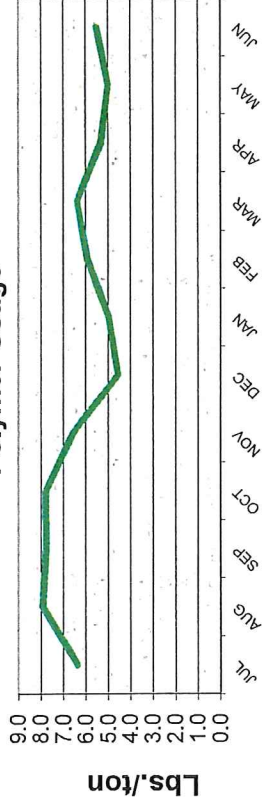
FY17 Biosolids Management

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Yearly Totals	Average per month	Units
Feed Solids	2.0	1.7	1.8	1.6	2.2	3.2	3.3	3.5	3.4	3.7	3.4	2.6			2.7 %TS
Cake Solids	21.1	20.5	20.5	20.8	21.6	21.7	21.2	21.6	22.5	22.7	22.7	20.7			21.5 %TS
Polymer - Lbs./ton	6.4	7.9	7.8	7.8	6.6	4.6	5.0	5.9	6.4	5.3	5.0	5.5			6.2 Lbs./Ton
Polymer - Total Lbs.	3,135	3,740	3,465	4,180	3,795	3,025	2,860	1,870	3,245	2,200	2,585	2,530	36,630		3,053 Lbs./Mth
Dry Tons Burned	523	524	487	491	517	548	589	420	654	570.3	628	574	6,523		544 Dry Tons
Hours Burned	675	717	639	736	643	626	646	467	715	627	661	608	7,760		647 Hours
Burn Rate - lbs/hr	1,548	1,460	1,524	1,334	1,607	1,751	1,822	1,799	1,829	1,819	1,900	1,888			1,690 lbs/hour
Natural Gas - MCF	3.03	3.40	2.92	3.10	2.94	2.46	2.77	1.95	2.20	2.15	2.26	2.80	31.98		2.67 MCF
Dry Tons - Landfill													-		Dry Tons
Wet Tons - Scales													-		Wet Tons

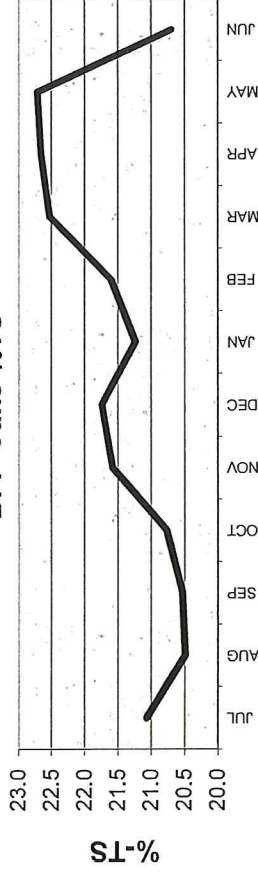
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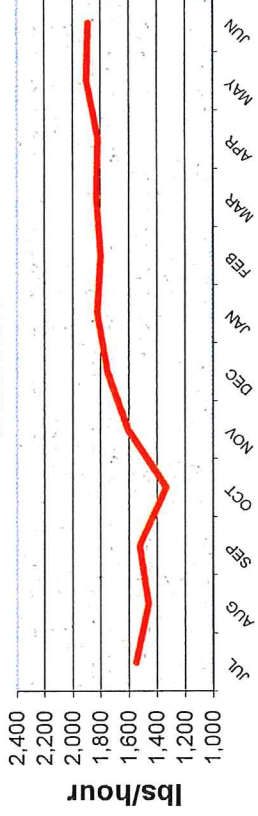
Polymer Usage



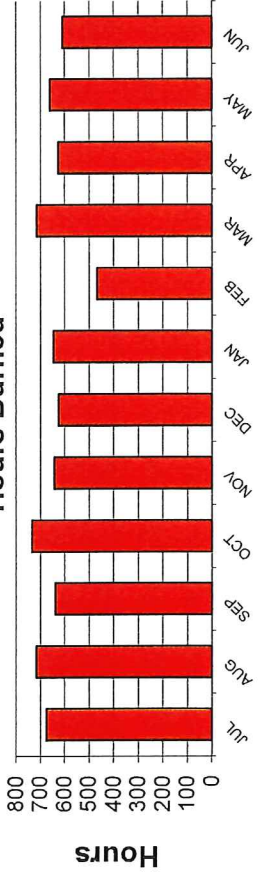
BFP Cake %TS



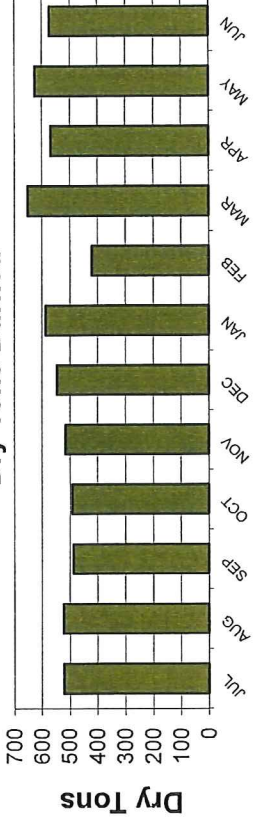
Burn Rate



Hours Burned



Dry Tons Burned



METROPOLITAN SEWERAGE DISTRICT				AIR EMISSIONS DATA FY 17												
B.F.P. SLUDGE METALS DATA	Removal Efficiency	RSC ug/M3	LIMITS Mg/Kg	dispersion factor = 245												
				JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
ARSENIC	99.83%	0.023	298	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BERYLLIUM	99.83%			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CADMIUM	99.89%	0.057	1,142	0.90	1.10	0.88	0.85	0.77	0.76	1.10	0.80	0.83	0.76	0.94	0.90	0.90
CHROME	99.85%	0.65	9,551	25.2	19.9	19.8	29.2	18.8	37.1	35.1	29.2	33.7	30.0	22.1	21.9	21.9
COPPER	99.99%			230	229	264	249	208	181	208	205	205	188	190	222	222
NICKEL	99.83%	2.0	23,201	20.6	21.6	22.3	28.8	18.0	21.6	33.3	28.2	25.9	21.7	24.7	22.8	22.8
LEAD	99.81%	0.015	3,306	28.1	26.8	28	28.7	5.4	19.1	26.2	17.9	20.9	24.9	25.0	28.8	28.8
ZINC	99.99%			1040	1230	1150	1210	935	1020	1210	939	1000	987	937	1080	1080
MERCURY	25%			0.02	0.03	0.061	0.041	0.053	0.050	0.040	0.000	0.000	0.000	0.027	0.33	0.33
PRESSURE DROP	Venturi & Tray Scrubber			23/36	23/37	23/37	23/36	23/36	24/36	23/37	23/36	23/37	25/39	25/39	26/39	26/39
OXYGEN	In Stack Gas			11.8	11.6	11.8	12.2	11.8	11.3	10.8	11.4	10.8	11.1	11.2	10.9	10.9
CARBON MONOXIDE	In Stack Gas			3.9	4.3	4.2	4.4	3.3	2.7	2.9	3.4	1.5	2.8	2.7	2.6	2.6
INCINERATOR	A-Probe Freeboard			1503	1497	1495	1489	1510	1511	1511	1503	1525	1521	1522	1525	1525
TONS BURNED				523	524	487	491	517	548	589	420	654	570	628	574	574
HOURS OPERATED				675	717	636	730	643	626	646	467	715	627	661	608	608

note - Lead limit is derived from NAAQS of 1.5ug/M3

note - dispersion factor & limits changed per 2009 emission testing & associated dispersion modeling (cooler exhaust gas temperature)

**PUBLIC NOTICE
THE MSD SYSTEM PERFORMANCE
ANNUAL REPORT IS AVAILABLE**

Metropolitan Sewerage District of Buncombe County

The Metropolitan Sewerage District of Buncombe County notifies the public that a summary of the System Performance Annual Report (SPAR) is now available on our web site; www.msdbc.org

This informative report summarizes the fiscal year, July 2016 through June 2017, with basic descriptions, achievements, effluent and emissions data, charts and maps. This document is available by request by calling 254-9646. Please ask for the SPAR 2017 Report.

