Richard Healey (adpce.ad)

From: Monty Ledbetter <MLedbetter@cityhs.net>
Sent: Friday, March 29, 2024 8:55 AM
To: Richard Healey (adpce.ad)
Cc: Leslie Allen-Daniel (adpce.ad); Bill Burrough; Denny McPhate; Harold Mauldin; Shawn Davis; Todd Piller; Craig Johnson; Bobby Harris
Subject: Update to SOP for Manholes 1748 - 1750
Attachments: CoverLetter_DEQ_SOP Revison_2.2722024.pdf; Revised SOP_Exhibit A_2.27.2024.pdf; SpencerBay_ExhibitB_2.27.2024.pdf; AlgaeWorkplan_ExhibitC_2.27.2024.pdf

Richard, attached is the revised work plan for SSO affecting Spencer Bay. The revised plan includes all of the language contained in your January 31, 2024 letter. Incorporated in the plan is the Workplan for monitoring algae and water quality in Lake Catherine.

Monitoring under this Workplan (Exhibit C) will be conducted at approximately monthly intervals starting within 30 days of DEQ approval of this Workplan and ending no later than November 2024.

Should you have any further questions or concerns, please contact me (501) 651-7730 or by email.

Thanks

CITY OF HOT SPRINGS
Utilities Department
780 Adams Street
Hot Springs, Arkansas 71901

March 28, 2024

Richard C. Healey
Enforcement Branch Manager
Office of Water Quality
Arkansas Department of Energy & Environment
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

RE: NPDES Permit Number: AR0033880, AFIN: 26-00145
Sanitary Sewer Overflows Manholes #1750 and #1748
Bacteria Sampling and a Communications Plan
Lake Catherine Filamentous Algae Study

Dear Mr. Healey

Attached, please find Hot Springs Utilities' revised work plan for responding to sanitary sewer overflows affecting Spencer Bay. The revised plan includes all of the language contained in your January 31, 2024 letter addressing the **Standard Operating Procedure – Recover/Cleanup** section **(#'s 2, 4 and 5)**, as well as the **Public Notification** revisions. Additionally we have incorporated a draft **Workplan for Monitoring Algae and Water Quality in Lake Catherine** (Exhibit C), based on the DEQ **Lake Catherine Filamentous Algae Study Design Proposa**l you included in your letter.

We have relocated the Sample and Signage Site No. 3. The new Latitude and Longitude designation is -92.985549 , 34.468338.

Should you have any further questions or concerns, please contact me at (501)651-7730 or by email at mledbetter@cityhs.net.

Sincerely,

Monty Ledbetter
Utilities Director

Attachments: Exhibit A – Standard Operating Procedure – Sanitary Sewer Overflows – Manholes 1748, 1748 and 1750: Attachment B – revised aerial map showing sampling and signage sites with geo-fence
Attachment C - draft Workplan for Monitoring Algae and Water Quality in Lake Catherine

cc: **Arkansas Energy & Environment, Division of Environmental Quality** Leslie Allen-Daniel, Enforcement Coordinator / **City of Hot Springs** - Bill Burrough, City Manager; Denny McPhate, Deputy City Manager; Harold Mauldin, Wastewater Facilities Operations Manager; Shawn Davis, Collection Manager; Todd Piller, Capital Project Manager / **Crist Engineers** - Craig Johnson

EXHIBIT A

STANDARD OPERATING PROCEDURE			
SOP Title:	Sanitary Sewer Overflows Affecting Gulpha Creek & Spencer Bay Manholes 1748, 1749, 1750, Gulpha Pump Station		
SOP CODE:	6459.662.61-2024.02	CATEGORY:	SSO RESPONSE

OBJECTIVE	To provide clear and complete instructions for responding to sanitary sewer overflows at Manhole 1750 in particular.
BACKGROUND	Manhole 1750 has a history of overflows during periods of wet weather due to the hydraulic design combined with unidentified I&I in the Gulpha Sewer Basin. Any SSO during an average to dry weather condition would likely be due to a blockage or equipment failure at the Gulpha Pump Station.
SAFETY PROCEDURES	Personnel responding to any SSO must wear appropriate personal protective equipment (PPE) to prevent contact with raw sewage. PPE may include rubber gloves, rubber boots, impermeable coveralls and protective headwear with splash shield.
POTENTIAL HAZARDS	Manhole 1750 is located (117 Catherine Heights Rd.) near Gulpha Creek, which flows into Spencer Bay and on to Lake Catherine. SSO contamination impacts the water quality of an area used for recreational activities.
RESPONSE	Upon notification from remote sensing equipment, notification by the remote float auto-dialer, SCADA, other staff, or public notification, the City of Hot Springs shall respond to investigate the potential occurrence of an SSO at Manhole 1750. Personnel responding to an SSO may encounter an emergency that requires immediate action. The first responders to the site during normal business hours will be Wastewater Lift Station crews. After hours, On-Call personnel will respond and call for back up personnel as needed. Responding personnel will: 1. Determine if a SSO is occurring. 2. Determine whether the spill has reached Spencer Bay. 3. Upon validation that the spill has reached Spencer Bay, notify testing laboratory to acquire testing samples*. 4. Post ADH signs at locations shown in Exhibit A for Sample Site 1, should the spill reach Spencer Bay. 5. Provide a CodeRED in accordance with Public Notification requirement in this SOP for effected area as outlined in the notification boundary shown in Exhibit A. 6. Determine the cause of the problem (blockage, equipment failure at Gulpha Pump Station, wet weather I&I) 7. Determine what additional resources may be needed (equipment and materials). 8. Document any necessary information needed for reporting requirements. 9. Take photos of the impacted area. 10. Estimate the release volume based on size of the sewer, weather conditions and the extent of the release. 11. Report spill in accordance with Office of Water Quality, DEQ reporting requirements. **Should the CHS lab not be available for immediate sampling, City of Hot Springs personnel will acquire a sample and hold in accordance with testing protocol and provide a chain of custody to the testing laboratory for further handling.*

CONTAINMENT	Containment of an overflow is the responder's first priority. The methods used will vary on a case-by-case basis. The Manager, Crew Leader and maintenance responders will: 1. Identify and obtain the necessary equipment and materials needed to contain the overflow. 2. Take immediate steps to contain the overflow (block path toward receiving water, recover with vacuum truck). 3. Determine whether additional containment measures are needed.
CORRECTION OF OVERFLOW	The time required to correct the cause of the overflow depends on the determined cause. Responding crews must begin by investigating upstream manholes and the downstream lift station for evidence of blockage or equipment failure. When necessary, contractor services may be requested as an additional resource to abate the overflow.
SAMPLING AND TESTING	Upon response to the spill and validation that the spill is entering Spencer Bay, the following sampling and testing will be initiated for *E. Coli*. (See Exhibit B for Sampling locations) <u>May 1 to September 30:</u> 1. Sampling shall occur at the locations shown on Exhibit A. 2. First *E.Coli* test shall be for Sample Site 1. 3. Results shall be made available to the City of Hot Springs within three (3) calendar days of the event from the testing laboratory. 4. Should the *E.Coli* test result exceed 126 cfu/100ml at Sample Site 1 as shown on Exhibit A, ADH signs will be posted for Sample Site 2, Sample Site 3, Sample Site 4 and Sample Site 5. 5. A second series of tests will be scheduled and conducted for Sample Site 2, Sample Site 3, Sample Site 4 and Sample Site 5, until two consecutive results for *E.Coli* are equal to or less than 126 cfu/100ml are achieved, at which time the testing will cease. 6. ADH Signs shall be removed upon satisfaction of E.Coli testing at or less than 126 cfu/100ml for Sample Sites 2, Sample Site 3, Sample Site 4 and Sample Site 5. 7. City of Hot Springs shall email all test results to DEQ's Office of Water Quality, Enforcement Branch at water-enforcement-report@adeq.state.ar.us upon receipt from the testing laboratory. <u>October 1 to April 30:</u> 1. Sampling shall occur at the locations shown on Exhibit A. 2. First *E.Coli* test shall be for Sample Site 1. 3. Results shall be made available to the City of Hot Springs within three (3) calendar days of the event from the testing laboratory. 4. Should the *E.Coli* test result exceed 630 cfu/100ml at Sample Site 1 as shown on Exhibit A, ADH signs will be posted for Sample Site 2, Sample Site 3, Sample Site 4 and Sample Site 5. 5. A second series of tests will be scheduled and conducted for Sample Site 2, Sample Site 3, Sample Site 4 and Sample Site 5 until two consecutive results for *E.Coli* are equal to or less than 630 cfu/100ml are achieved, at which time the testing will cease. 6. ADH Signs shall be removed upon satisfaction of E.Coli testing at or less than 630 cfu/100ml for Sample Sites 2, Sample Site 3, Sample Site 4 and Sample Site 5. 7. City of Hot Springs shall email all test results to DEQ's Office of Water Quality, Enforcement Branch at water-enforcement-report@adeq.state.ar.us upon receipt from the testing laboratory. E Coli testing will be performed at the Hot Springs Regional Wastewater Treatment Plant which is an approved laboratory. Should it be necessary to outsource such analysis, the testing shall be conducted at approved Department of Environmental Quality laboratory.

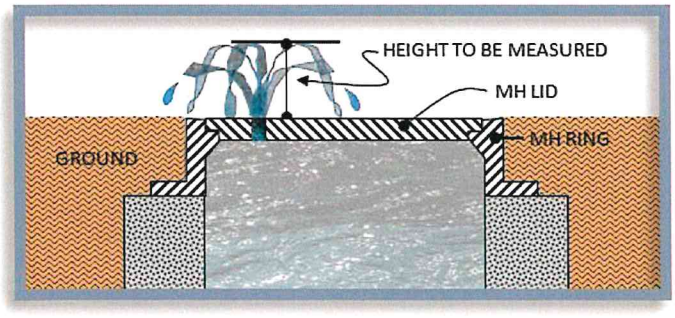
MONITORING ALGAE AND WATER QUALITY IN LAKE CATHERINE	The Workplan to document and evaluate filamentous algae in Lake Catherine as required by DEQ is included as EXHIBIT C attached hereto.
RECOVERY/CLEANUP	Cleanup will be completed for all SSOs following containment and correction of the overflow. The recovery efforts will be directed at returning the affected to a pre-release condition as quickly and efficiently as possible. Cleanup activities will vary depending on the situation. Actions selected will be performed thoroughly. The general process is as follows: 1. Response crew will use appropriate PPE during cleanup and recovery 2. Affected area will be cleaned as much as possible using rakes, shovels, hand picker tools and vacuum equipment. Hot Springs shall document methods used to remediate the SSO-affected area. The documentation shall include photographs demonstrating wastewater in the temporary rock berm has been recovered and disposed of properly. Hot Springs shall evaluate and implement additional BMPs to ensure solid waste is not leaving the site during high SSO flows. Hot Springs shall ensure the grounds surrounding the SSO-impacted area are cleaned and free from scum, sludge, and solid waste following each reported SSOs. Copies of the documentation including photographs for each reported SSO shall be included in the monthly reports to DEQ. 3. Affected overflow area will be evaluated for appropriate disinfection. This may include applying lime to absorb liquid and raise the pH to reduce pathogens, applying a non-hazardous bio-enzymatic bacteria consuming product to reduce impact of pathogens on receiving waters. Hot Springs shall document methods used to evaluate the affected overflow area for appropriate disinfection. Copies of the documentation shall be included in the monthly reports to DEQ. 4. Maintain, as far as possible, an appropriate buffer zone between limited areas and the waters of the state and the United States. 5. The immediate area around the overflow site will be inspected to ensure that no visual residue remains, including solids, papers, and rags, etc. In addition, Hot Springs shall inspect and clean up any solid waste as a result of the SSOs at the Gulpha Creek banks from manhole #1750 to the confluence at Spencer Bay. Hot Springs shall document these additional inspections with photographs and include them in the monthly reports to DEQ. 6. If flushing is warranted and ultimately performed, then all solids and debris must be collected and disposed of properly. 7. All wash-down water must be returned to the sewer system.
ADDITIONAL RESOURCES	If the maintenance crew is unable to contain and clean up the affected area with typical maintenance equipment, then the next step will be to bring in contractor or other construction support. The following steps will be taken by on-call management: 1. Assess and mark the boundaries of the suspected area for all utility service locations (marking materials such as white paint will be used to mark the boundaries, and "Locate" will be written to indicate the area). 2. Call (811) CALL BEFORE YOU DIG. 3. Determine the additional resources and type of construction crew required to perform the task(s). 4. Call for the additional resources using existing approved contact lists as deemed necessary. 5. Enlist appropriate contract services. 6. Manage actions taken by the additional construction crew to clean up the affected area. 7. Ensure actions are documented following the SSO reporting procedures.

FIELD REPORTING	Responding personnel will collect accurate and complete field data required to be submitted to DEQ. The following information will be documented: 1. Date and time of notification (SCADA, Public Notification, Staff Report) 2. Date and time of dispatch 3. Date and time of arrival 4. Date and time of departure 5. Date and time of release ended (estimated as close as possible) 6. Location 7. Upstream manhole overflow status 8. Probable Cause 9. Estimated release 10. Visual impact observed 11. Actions to repair/mitigate
REGULATORY REPORTING REGULATORY REPORTING continued...	Shawn Davis, Wastewater Collection Manager, or his designate will report the SSO to the Arkansas Energy and Environment Department, Office of Water Quality within 24 hours. The Online Sanitary Sewer Overflow (SSO) Reporting Form can be found at https://www.adeq.state.ar.us/water/enforcement/sso/submit.aspx This initial 24-hour report should include the following information: 1. Permit Number 2. Location of overflow (manhole number or street address) 3. The receiving water (if applicable) 4. Cause of overflow (if known) 5. Estimated volume of overflow 6. Total duration of the overflow If the "total duration of the overflow" is not known when the 24-hour SSO online report is submitted, then a follow-up report (5-day report) giving a detailed account of the overflow and the steps taken to resolve it must be submitted within 5 days of the overflow's discovery. This report can be submitted by email at ssoadeq@adeq.state.ar.us or by mail (include Attn: Water Quality Enforcement). A sample of the spill shall be taken prior to confluence of the receiving stream for *E.coli*. Results of the testing shall be reported to the DEQ's Office of Water Quality, Enforcement Branch within three calendar days of the event sampled. Test results will be emailed to water-enforcement-report@adeq.state.ar.us Sample locations are shown in Exhibit A.
PUBLIC NOTIFICATION	When SSO spill reaches Gulpha Creek and Spencer Bay, City of Hot Springs Utilities will take measures to inform those affected by the possible impact on water quality. Hot Springs shall document the deployed signage (locations #1–#5) for each SSO with photographs and include them in the monthly reports to DEQ. The methods of public notification include: 1. Signs will be posted at locations as detailed in this SOP as first response to the spill advising against human contact with the affected water in accordance with this SOP. Signs will be removed when testing concludes bacteriological standards are achieved in accordance the sampling and testing section in this SOP. Sign content shall be as follows: **HEALTH ADVISORY** WATER QUALITY IN THIS AREA MAY BE UNSAFE **SWIM AT YOUR OWN RISK** **Arkansas Department of Health** 4815 West Markham Street • Little Rock Arkansas 72205-3867 Environmental Health (501)661-2171 Epidemiology (501)661-2893

	2. A **CodeRED** alert will be sent to the population living near the water bodies in accordance with boundary shown on Exhibit A. *ADVISORY* *As of [date and time] a **NO SWIMMING** Advisory has been issued for the Spencer Bay area due to a wastewater overflow. Hot Springs Utilities will monitor the water quality in the area until it is safe for human contact. **If you have any questions, you may contact Hot Springs Utilities at (501) 321-6200*** 3. Upon satisfaction of *E.Coli* testing as outlined in Sampling and Testing section of the SOP the Recission of Advisory shall be provided. *RECISSION OF ADVISORY* *The **NO SWIMMING** Advisory issued on [date and time] for the Spencer Bay area has been canceled. The Bacteriological survey indicates that the water is safe for human contact. **If you have any questions, you may contact Hot Springs Utilities at (501) 321-6200***
ASSOCIATED EQUIPMENT	The following equipment may be deployed for responding to any SSO: 1. Flusher/Vac Truck 2. Backhoe 3. Dump Truck 4. Crew Trucks 5. Confined Space Entry Equipment 6. Shovels 7. Rakes 8. Trash Pickers/Grabbers 9. Trash Bags
PPE	The following personal protective equipment may be required when responding to any SSO: 1. Hard Hats 2. Safety Glasses/Goggles 3. Face Shield 4. Ear/Noise Protection 5. Rubber gloves 6. Rubber Boots 7. Protective Body Suit 8. Respirators

The following pages are tools for responding personnel to use in estimating SSO amounts. The information is largely derived from the Sewer Spill Estimation Guide developed by the Orange County Area Waste Discharge Requirements Steering Committee, Orange County, CA.

LOSS FROM PICK AND VENT-HOLE SSOs

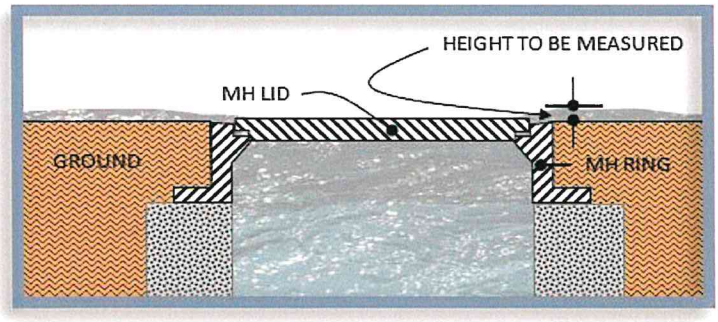


To estimate an SSO from a pick or vent-holes, measure the height of the wastewater plume exiting the hole(s). Find the height and hole diameter on the manhole pick or vent-hole chart to determine the flow rate. Multiply the flow rate time the number of holes that are discharging wastewater. Once the volume (gpm) has been determined, multiply the gpm by the duration of the SSO in minutes.

Pick and Vent Hole Estimation Chart (24" Cover)											
Vent/Pick Hole Diameter (Inches)	Water Height (Inches)		Water Height (Feet)	Gallons per Minute	Gallons per Hour	Vent /Pick Hole Diameter (Inches)	Water Height (Inches)		Water Height (Feet)	Gallons per Minute	Gallons per Hour
0.50	1/16	0.063	0.005	0.23	14	0.75	1/16	0.063	0.005	0.51	31
0.50	1/8	0.125	0.010	0.33	20	0.75	1/8	0.125	0.010	0.72	43
0.50	1/4	0.250	0.021	0.47	28	0.75	1/4	0.250	0.021	1.02	61
0.50	1/2	0.500	0.042	0.66	40	0.75	1/2	0.500	0.042	1.44	86
0.50	3/4	0.750	0.063	0.81	49	0.75	3/4	0.750	0.053	1.77	106
0.50	1	1.000	0.083	0.94	56	0.75	1	1.000	0.083	2.04	122
0.50	1 1/4	1.250	0.104	1.05	63	0.75	1 1/4	1.250	0.104	2.28	137
0.50	1 3/8	1.375	0.115	1.10	66	0.75	1 3/8	1.375	0.115	2.39	143
0.50	1 1/2	1.500	0.125	1.15	69	0.75	1 1/2	1.500	0.125	2.50	150
0.50	1 5/8	1.625	0.135	1.20	72	0.75	1 5/8	1.625	0.135	2.60	156
0.50	1 3/4	1.750	0.146	1.24	74	0.75	1 3/4	1.750	0.146	2.7	162
0.50	2	2.000	0.167	1.33	80	0.75	2	2.000	0.167	2.89	173
0.50	2 1/4	2.25	0.188	1.41	85	0.75	2 1/4	2.250	0.188	3.06	184
0.50	2 1/2	2.50	0.208	1.48	89	0.75	2 1/2	2.500	0.208	3.23	194
0.50	2 3/4	2.75	0.229	1.56	94	0.75	2 3/4	2.750	0.229	3.38	203
0.50	3	3.00	0.250	1.62	97	0.75	3	3.000	0.250	3.53	212
0.50	3 1/4	3.25	0.271	1.69	101	0.75	3 1/4	3.250	0.271	3.66	220
0.50	3 1/2	3.50	0.292	1.75	105	0.75	3 1/2	3.500	0.292	3.82	229
0.50	3 3/4	3.75	0.313	1.82	109	0.75	3 3/4	3.750	0.313	3.95	237
0.50	4	4.00	0.333	1.88	113	0.75	4	4.000	0.333	4.08	245

Example: The measured height of the plume exiting the vent hole is 1 inch from a ½" hole and there are four vent holes. The total volume per minute would be 0.94 gpm (from chart above) or 3.76 gpm total (0.94 gpm x 4 holes). If the SSO lasted one hour, the total wastewater lost would be 226 gallons (3.76 gpm x 60 minutes = 225.6 gallons).

LOSS AROUND EDGE OF NON-VENTED COVER



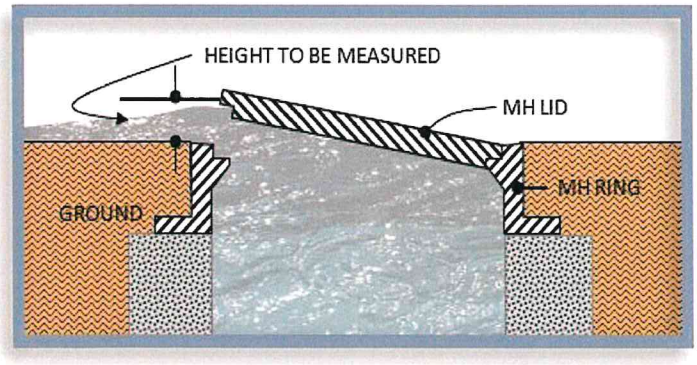
To estimate an SSO from a where wastewater is escaping from around the perimeter of the manhole cover, measure the observed height of the wastewater plume exiting the cover. Find the manhole diameter. Use the chart below to estimate volume of SSO. Wastewater escaping from vent/pick holes must be accounted for separately using Pick and Vent Hole Estimation Chart.

Estimated SSO Flow Out of Manhole with Cover in Place

24 Inch Cover							
Height of Spout above MH Rim (inches)	SSO Flow		Minimum Sewer Size in Which Flow is Possible	Height of Spout above MH Rim (inches)	SSO Flow		Minimum Sewer Size in Which Flow is Possible
	GPM	MGD			GPM	MGD	
1/4	1	0.001		5	148	0.240	
1/2	3	0.004		5 1/4	166	0.266	
3/4	6	0.008		5 1/2	185	0.294	
1	9	0.013		5 3/4	204	0.322	6"
1 1/4	12	0.018		6	244	0.352	
1 1/2	16	0.024		6 1/4	265	0.382	
1 3/4	21	0.030		6 1/2	286	0.412	
2	25	0.037		6 3/4	308	0.444	
2 1/4	31	0.045		7	331	0.476	
2 1/2	28	0.054		7 1/4	354	0.509	
2 3/4	45	0.065		7 1/2	377	0.543	
3	54	0.077		7 3/4	401	0.578	8"
3 1/4	64	0.092		8	426	0.613	
3 1/2	64	0.107		8 1/4	451	0.649	
3 3/4	75	0.125		8 1/2	476	0.686	
4	87	0.145		8 3/4	502	0.723	
4 1/4	100	0.166		9	529	0.761	
4 1/2	115	0.189					
4 3/4	131	0.214					

Example: The measured height of the plume exiting a 24" manhole is 1 inch. The total volume would be 12 gpm from around the manhole cover. Calculate the total exiting from vent/pick hole(s) and add to the total lost around the ring. if the SSO lasted 1 hour (60 minutes), multiply 12 gpm x 60 minutes = 780 gallons per hour + amount lost through pick/vent holes.

LOSS FROM TILTED COVER



To estimate the volume of a spill that occurs when the SSO pressure only lifts one side of the cover, calculate the area (in square feet) from where the wastewater is escaping and the velocity (in square feet per second). The velocity is estimated from visual observation with 2 ft/sec or less being a small velocity, 4 to 5 ft/sec being a medium velocity and 7 ft/sec or higher being a large velocity. Velocities above 7 ft/sec may be strong enough to blow the cover off. Next, multiply the duration (in seconds) that the SSO occurred. Finally, multiply by 7.48 (gallons per cubic foot) to determine the volume of the SSO in gallons.

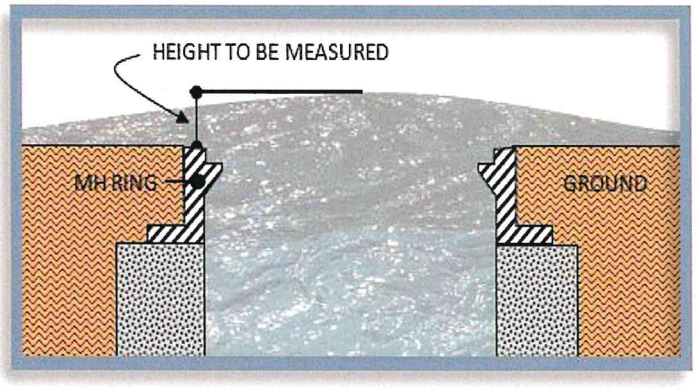
Volume = Area (sq. ft.) x Velocity (ft/sec) x Time (seconds) x 7.48 (gal/cu. ft)

Area Calculation Chart	
Height of Flow (Inches)	24 Inch Manhole (Square Feet)
0.5	0.131
1	0.262
1.5	0.393
2	0.524
2.5	0.655
A3	0.786
3.5	0.917
4	1.048

Example: The measured height of the plume exiting the side or a 24-inch manhole is 2 inches. Using the above chart, a 2-inch plume from one side provides 0.524 square feet of area. The velocity is estimated at 4-feet/second (visual observation) with a duration of 1 hour. The total estimated SSO is 56,441 gallons (0.524 sq. ft x 4 ft/sec x 60 minutes x 7.48).

To estimate velocity, drop a small floating object into the flow and time how long it takes to travel a measured distance.

LOSS FROM A MANHOLE WITHOUT A LID IN PLACE



Typically, when an SSO reaches 7 cubic feet per second (approximately 3,000 gpm or about 4.32 MGD), the flow is sufficient to blow the manhole cover off. To estimate the volume, take several measurements from the surface close to the manhole ring to the top of the plume and average the findings. Find the average height of the plume on the Area Calculation Chart to determine the rate of flow exiting the manhole. Multiply the flow rate expressed in gallons per minute by the duration of the SSO in minutes to determine the total volume of the SSO.

Example: If the average height of the plume exiting a 24" manhole is 2 inches on the chart, the flow in gallons would be 3,444 gpm. If the flow lasted for 60 minutes, the amount of SSO would be estimated at 206,640 gallons (3,444 gpm x 60 min.).

MH Rim (inches)	GPM	MGD	Which Flow is Possible	MH Rim (inches)	GPM	MGD	Which Flow is Possible
1/8	58	0.04		1 5/8	2,396	3.45	18
1/4	62	0.09		1 3/4	2,799	4.03	
3/8	111	0.16		1 7/8	3,132	4.51	
1/2	160	0.23		2	3,444	4.96	21
5/8	215	0.31	6	2 1/8	3,750	5.40	
3/4	354	0.51	8	2 1/4	3,986	5.74	
7/8	569	0.82	10	2 3/8	4,215	6.07	
1	799	1.15	12	2 1/2	4,437	6.39	
1 1/8	1,035	1.49		2 5/8	4,569	6.58	24
1 1/4	1,340	1.93	15	2 3/ 4	4,687	6.75	
1 3/8	1,660	2.39		2 7/8	4,799	6.91	
1 1/2	1,986	2.86		3	4,910	7.07	

PICTORIAL REFERENCE

Currently there are two pictorial charts widely used to assist with estimating SSO Volumes displayed below. To use either of these Pictorial references, select the picture that most accurately represents the SSO being estimated. Use the gpm associated with the picture multiplied by the duration of the SSO to estimate the spill volume.

Example: If the selected picture shows 300 gpm and the duration is 55 minutes, the total estimated spill volume would be 16,500 gallons (300 gpm x 55 minutes).

Reference Sheet for Estimating Sewer Spills

From the UC San Diego Overflow Emergency Response Field Guide

5 gpm

25 gpm

50 gpm

100 gpm

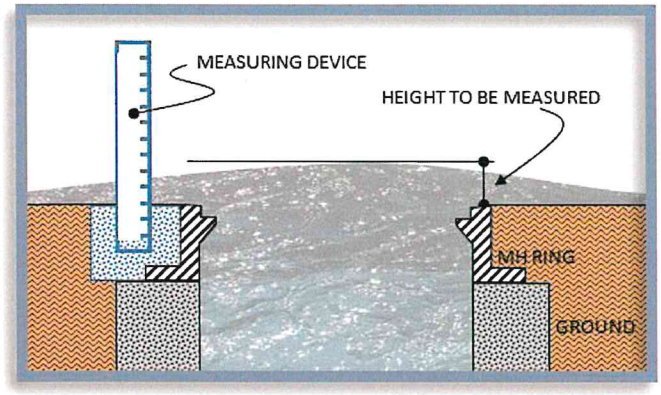
150 gpm

200 gpm

225 gpm

250 gpm

275 gpm



Hot Springs Utilities installed a measuring device at Manhole 1750 close to the rim of the manhole to assist personnel in measuring the height of the overflow plume.

Exhibit B

See Figure A

Legend
- WQAP Sample Sites
- Area of Code Red Alerts
- SLiftStation
- Identified Residences
- SManhole
- Creeks
- SGravityMain
- SPressurizedMain

Sample Site 2 & Sign
-92.9863365, 34.4714933

Sample Site 1 & Sign
-92.9862843, 34.4705257

Gulpha Lift Station

Sample Site 3 & Sign
-92.985549, 34.468338

Sample Site 4 & Sign
-92.9767442, 34.4578370

Sample Site 5 & Sign
-92.9682298, 34.4554730

Residential Areas Around Gulpha Creek and Spencer Bay

0 500 1,000 2,000 3,000 Feet

EXHIBIT C

Workplan for Monitoring Algae and Water Quality in Lake Catherine (including Spencer Bay) City of Hot Springs, Arkansas DRAFT – March 15, 2024

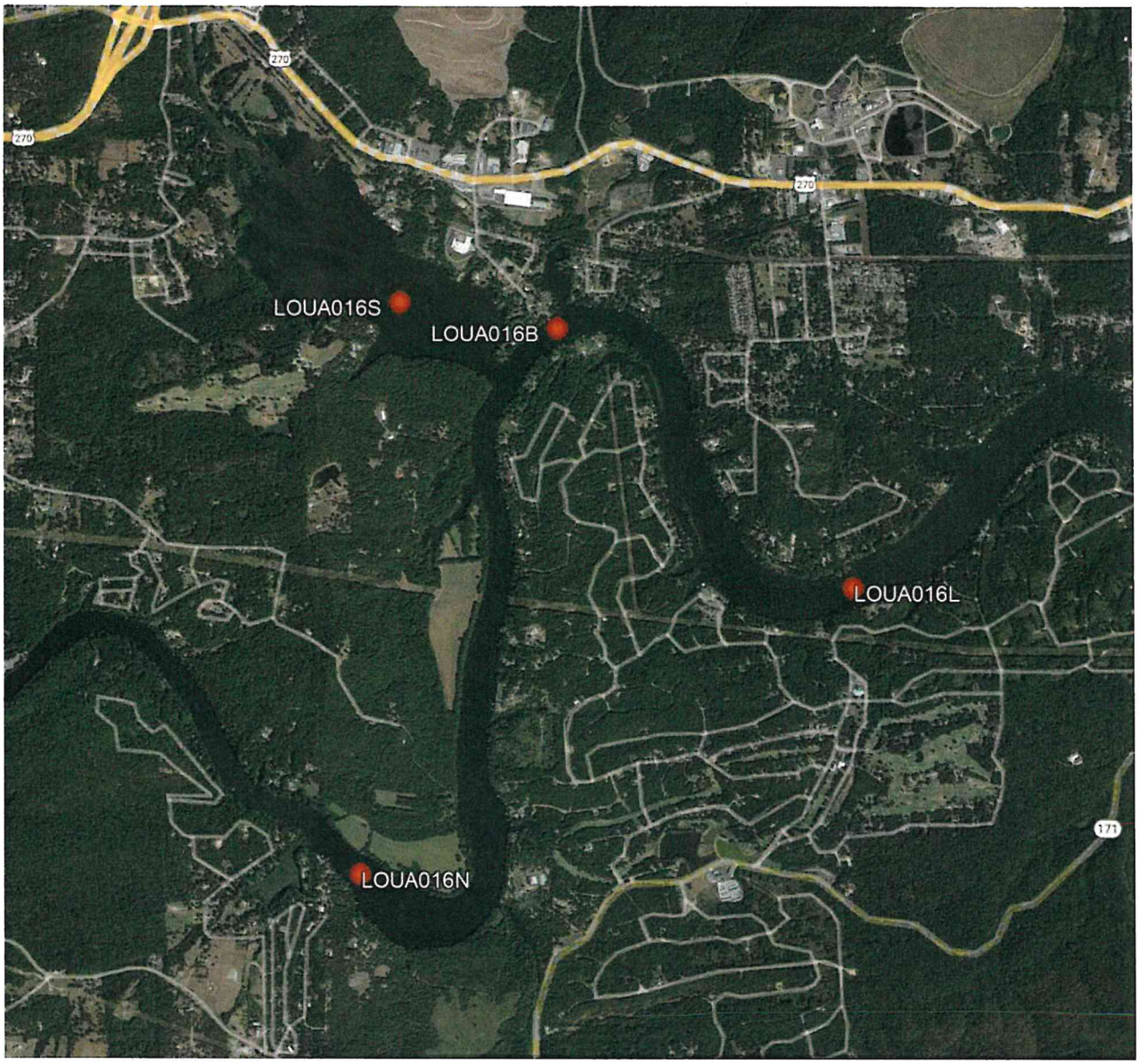
Introduction

In a letter dated January 31, 2024, the Arkansas Department of Energy & Environment Division of Environmental Quality (DEQ) required the City of Hot Springs to submit a Workplan to document and evaluate filamentous algae in Lake Catherine. DEQ's letter required the Workplan to include, at a minimum, the sampling methods detailed in a study design proposal that was attached to the letter. The Workplan described below is based on DEQ's study design proposal, with modifications to be more geographically focused in and around Spencer Bay, and with clarifications regarding details of certain procedures.

Monitoring Locations

Four monitoring locations have been selected based on DEQ's study design proposal and discussions between DEQ and the City of Hot Springs in a meeting on February 28, 2024. These monitoring locations are shown in the table and figure below.

Site Name	Location Description	Latitude	Longitude	Rationale	Established DEQ Monitoring Location
LOUA016N	Lake Catherine 0.5 miles upstream from Camp Couchdale	34.431194	-92.976433	Included in DEQ study design proposal	Y
LOUA016S	Lake Catherine in Spencer Bay	34.458206	-92.974091	Included in DEQ study design proposal	Y
LOUA016B	Lake Catherine - upper - downstream of Spencer Bay	34.457 (approx.)	-92.965 (approx.)	Discussed by City of Hot Springs and DEQ in Feb. 28 meeting	Y
LOUA016L	Lake Catherine 0.5 miles downstream of Marina Point	34.444778	-92.947914	Included in DEQ study design proposal	Y



Sampling Method

Monitoring under this Workplan will be conducted at approximately monthly intervals starting within 30 days of DEQ approval of the Workplan and ending no later than November 2024. Water quality data should be collected monthly at each site for pH, dissolved oxygen, conductivity, temperature, chlorophyll a, total nitrogen, total phosphorous, depth, and Secchi depth. Filamentous algae estimates will be collected monthly in congruence with water samples. Water collection procedures are modified from the DEQ Lake Sampling Standard Operating Procedures and Work Plan.

Secchi Depth Collection

Measure Secchi depth directly in the water. The Secchi disk should be clean, weighted, and suspended on a metric-calibrated chain, wire, or a non-stretch rope. Collect Secchi depth before any water sample collection as it will determine depth of sampling. Follow these procedures for measuring Secchi disk transparency under normal conditions:

a) Remove sunglasses and hat.
b) On the shaded side of the boat, slowly lower the Secchi disk vertically into the waterbody until it disappears. The viewer should maintain an eye level of less than 2 meters above the water's surface. Note the depth at which the Secchi disk disappears.
c) Slowly raise the Secchi disk until it becomes visible again. Take a mental note of the depth at which the disk becomes visible again.
d) Compute the average (mean) of the two depths noted and record the value. The recorded average value is the Secchi disk transparency.
e) If the disk is still visible on the lake bottom, place a "B" on the field sheet.

Depth Measurement

Measure lake depth at the site using a sounding line, depth finder, or other applicable method.

Water Sample Collection

Water samples at each site are paired with in situ water quality data. Epilimnion samples shall be taken between 0.5 and 2 meters below the surface. Hypolimnion samples shall be taken 1 meter above the bottom. In Spencer Bay (LOUA016S), no hypolimnion samples or measurements will be collected. Before sampling, triple-rinse the collection vessels and put on gloves to avoid contamination. Avoid submerging bare skin in the water at sampling locations. Collect water samples as far from the boat motor as possible. All water samples must be analyzed in a State accredited laboratory.

Grab Sample Collection Using a Van Dorn or Kemmerer Sampler

A Van Dorn sampler is a horizontal cylinder used to collect water samples at specified depths, and a Kemmerer sampler is a vertical cylinder. Use of a Van Dorn or Kemmerer sampler is an accepted method for collecting water samples. Follow these procedures to collect a water sample using a Van Dorn or Kemmerer sampler:

a) Record "Van D." or "Kem." in the "Collection Method" column of the field sheet.
b) Triple rinse the inside and outside of the Van Dorn or Kemmerer sampler. Expel the rinsate water away from the work area, ensuring that none of the rinsate water is included in the sample.
c) Close all discharge valves.
d) Lock end seals in the open position.
e) Using a marked rope, lower to the appropriate depth. Be sure to hold on to the messenger apparatus while lowering the instrument.
f) Once the desired depth is reached, release the messenger apparatus to close both ends of the instrument and collect a water sample.
g) Return instrument to boat.
h) Deposit the sample into the plastic bucket.
i) Repeat until the needed amount of water is collected.
j) Aliquot sample water to the sample containers as described.

Sample Aliquoting

Prior to aliquoting, label all sample containers with the Site Name. Labels must be written directly on the side of the container with permanent, waterproof ink. Do not label lids.
One duplicate sample is taken for every 10 samples collected, or at least once per calendar day. The sampler can choose which site will be the duplicate. Refer to the section entitled "Duplicate Sample Collection" below for more information regarding duplicate samples.

Aliquot water sample into containers as outlined below.

If you do not have enough volume in the sample container to aliquot all samples, repeat the water collection procedure to acquire more sample water. Keep in mind that duplicates should be aliquoted from the same container of sample water. To ensure data quality, follow all procedures described in these procedures regarding sample container preparation.

Nutrients

A 946 mL (quart) plastic container.*†

1. Gently swirl sample in collection vessel to homogenize.
2. Fill labeled 946 mL (quart) plastic container with sample water.
3. Tightly secure the lid back on the sample container so that it does not leak.
4. Refer to the Duplicate Sample Collection Section below for instructions on taking a duplicate sample.
5. Immediately place sample container(s) on ice and store at ≤ 6.0 °C until relinquished to the lab.

**If holding times cannot be met, bring an additional labeled 946 mL plastic container with H_2SO_4 preservative for each sample (and duplicate) and follow procedures above. Take care to not spill contents.*

† Sample containers may vary depending on lab used for analysis

Sestonic Chlorophyll a Sampling

A 1,000 mL brown plastic bottle.
The following methodology described is for sestonic chlorophyll a only.

1. Swirl sample in collection vessel to homogenize. Do not aerate the sample.
2. Fill labeled container with sample water, leaving a little head space.
3. Close the sample container, ensuring that the lid is properly threaded and tightened so that the sample does not leak or get contaminated.
4. Immediately place sample container(s) on ice and store at ≤ 6.0 °C.

Duplicate Sample Collection

Duplicate collection procedures may differ depending on laboratory requirements. At DEQ, duplicate samples are taken for all parameters at a rate of 10% (1 duplicate per 10 samples or at least 1 duplicate per day). Take all duplicates at a single selected site. Duplicate sites are selected at the discretion of the sampler and are usually selected based on ease of collection and distance of sample processing location from the road.
To collect a duplicate sample, fill one additional container with sample water. Label all applicable containers with their Site Name followed by "-dup". If holding times cannot be met, collect a duplicate 946 mL plastic container with H_2SO_4 preservative. Record the duplicate sample on the datasheet by indicating the Site Name-dup (i.e. LOUA016N – dup). Ensure that the time of duplicate sample collection is recorded.
Collect a sestonic chlorophyll a duplicate at the same location as the other duplicates.

In Situ Meter Calibration

Record calibration data on a calibration datasheet or lab notebook. Scan and save all calibration datasheets.

Before each calibration, clean probes using the central wiper (if available) and a lint-free cloth such as lab-tissue. Use care while cleaning sensors.

Prior to meter use, calibrate according to methods outlined in the user manual/manufacturer's guidelines. Perform proper maintenance if any sensor is not reading or calibrating correctly. Calibrate probes in the following order (as applicable). Rinse probes with Type I DI water between standards. Record both the pre-calibration and post-calibration values:

- Temperature
  - Check temperature measurements quarterly.
  - Place a NIST thermometer and the meter in the same bucket of water (can be Type 1 DI, tap, or sample water).
  - Record readings from the NIST thermometer and the meter on a calibration datasheet.
- Conductivity
  - Calibrate conductivity before each sampling event.

- Calibrate using specific conductance with one calibration standard greater than 1000 µs/cm.
- Ensure that there are no air bubbles in the sensor and that the meter is reading in the correct units.
- Record pre- and post-calibration values on a calibration datasheet.
- Check calibration standard against a second source on a monthly basis.
- Record monthly checks on a calibration datasheet.

- pH
  - Calibrate pH before each sampling event.
  - Conduct a 3-point calibration as described here using pH 7 and pH 4 and pH 10 standards or follow the calibration procedure recommended in the User Manual for the meter.
  - Record pre- and post-calibration values on a calibration datasheet. During calibration for each standard, write down the millivolts (mV) (mVs will not have a pre- and post-calibration value).
  - mVs can provide information about the effectiveness of the pH sensor.
  - While calibrating at ~25^{O}C, the mV range between standards should fall between 165 and 180. If the range falls outside of these values, the pH sensor needs replacement.
    - mVs for pH 7 should be 0 ± 50
    - mVs for pH 4 should be 177 ± 50
    - mVs for pH 10 should be -177 ± 50.
      - E.g. mV for pH 4 = 173
        - mV for pH 7 = -30
        - 173 – (-30) = 203
        - mV range = 203 pH sensor needs replacement
      - E.g. mV for pH 4 = 147
        - mV for pH 7 = -20
        - 147 – (-20) = 167
        - mV range = 167 pH sensor is OK

- Dissolved Oxygen (DO)
  - Calibrate DO before each sampling event.
  - Ensure there are no water droplets on the DO or temperature probe.
  - Record the barometric pressure using an internal barometer, a local barometer or an online resource. If not done automatically in the instrument's programming, adjust the reading for elevation. Refer to a solubility table to check appropriate calibration values.
  - Calibrate DO using percent saturation. Put a small amount (~1/8 inch) of water into the calibration cup. Loosely thread the calibration cup (do not seal) to the meter. Wait for the % DO and temperature to equilibrate.
  - Record pre- and post-calibration values on a calibration datasheet.
- Depth
  - Calibrate depth before each sampling event.
  - Record pre- and post-calibration values on a calibration datasheet.

To ensure accuracy of measurements, calibrate specific conductance, DO, and pH within 12 hours of beginning each monitoring event. If temperature is not accurate, send the instrument in for servicing.

Post Sampling Quality Assurance Check

When monitoring is complete for the day, perform a post-field QA check in the lab or other controlled environment by checking readings against calibrations standards. Place standards in the calibration cup in the same order as calibration (pH, specific conductance, DO) and record readings on a calibration datasheet. See the table below for maximum allowable deviations from calibration standards for post-field checks. If a value falls outside of the maximum allowable limit ranges, flag the data recorded from whichever probe malfunctioned as unusable.

Acceptable value ranges for post-field QA check (TCEQ, 2012)

Measured Field Parameter	Maximum allowable limits for water-quality sensor values
Temperature	±0.2 °C (pursue factory maintenance) **±0.5 °C (flag data)**
Specific conductance	±5%
Dissolved Oxygen	±6% saturation, ±0.5 mg/L
pH	±0.5 pH units

In situ Data Collection

In situ data at sampling depth

During each monitoring event, paired in situ data should be collected using a calibrated multisensor meter or instrument(s). Collect and record discrete in situ data at approximately the same depth as the water sample collection (not to exceed 2 m for epilimnetic samples). Collect dissolved oxygen (DO), temperature, conductivity, and pH readings in a manner that won't disturb or be disturbed by water sample collection.
Take a duplicate in situ reading where duplicate water chemistry samples are collected by lifting the meter out of the water for several moments and lowering back into the water at the depth of the previous reading. Record results and ensure that DO readings are within 0.5 mg/L of one another. If not, flag the data.

Vertical Profile

Collect a vertical profile of in situ measurements at each monitoring location.
Meters that can internally store profile information should be programmed to collect the profile under a unique file name with the following naming convention:

Site_mmddyyyy.ext (Example: LOUA016N_01062023.ext)

Ensure that the meter is logging information. Slowly lower the meter into the lake at a consistent rate. Recall the depth of the lake and do not lower more than 1 m above the lake bed. Stop logging information on the meter and pull the meter back into the boat. Bring the meter back to the surface where the discrete measurement was taken and note the DO. If DO is within 0.5 mg/L of initial reading, indicate that the profile has passed QC on the datasheet. Verify that the file was accurately recorded. Refer to the instrument's user manual for logging and verification procedures.
Meters that do not have the ability to internally store profile data should follow EPA's National Lakes

Assessment method:

- Determine Measurement Intervals:
  a) The number of readings and the depth intervals taken depends on the site depth. Below is a list of rules for determining the intervals:
     i. The profile will always begin with a measurement just below the surface (e.g., approximately 10 cm or the minimum depth required to keep all probes submerged).
     ii. The last (deepest) measurements will always be at 0.5 m above the bottom.
     iii. If the site is < 2.0 m deep, record measurements beginning just below the surface and at 0.5 m intervals, until 0.5 m above the bottom.
     iv. If the depth is between 2.0-20 m (inclusive), record measurements beginning just below the surface and then at 1.0 m intervals until reaching 0.5 m above the bottom.
     v. If the depth exceeds 20 m, record measurements beginning just below the surface, then at 1.0 m intervals until you reach 20 m, then at 2.0 m intervals until 0.5 m above the bottom.
     vi. If the metalimnion is encountered (observed as a change of ≥1 °C per meter of depth), take

measurements at least every meter within the metalimnion.

vii. Record the intervals on the Profile Data Sheet.

- Measure Temperature, DO, specific conductance, and pH:
  a) Lower the meter in the water and measure the vertical profile of temperature, DO, specific conductance and pH at the predetermined depth intervals. Be careful not to let the probe touch the bottom.
  b) Record the measurements on the Profile Data Sheet.
  c) Use the provided comment box to provide extra information about any measurements that the crew feels needs further comment or when a measurement cannot be made.

Filamentous Algae

Filamentous algae sampling procedures for Lake Catherine have been modified from the subsampling method for longitudinal surveys detailed in Griggs, et al., 2015. These procedures will accompany each monthly water sample.

Upon arrival to each site, samplers will navigate to each bank and follow a transect perpendicular to the bank. Samplers will measure the horizontal distance from shore to the point where the water is 3 meters deep (average photic zone) or 50 meters from shore, whichever is less. This horizontal distance will be split into 10 m plots for visual estimation of filamentous algae. Plot 1 will always be closest to shore, with plot numbers increasing towards mid-lake. Each plot should also be identified as to whether it is associated with the right bank or left bank (looking downstream). All samplers must be able to recognize the difference between filamentous algae, macrophytes, and cyanobacteria.

Estimates will be made in a 1 m wide strip under the transect line (i.e. 10 x 1 m^2 plot). During normal pool, maximum distances from each bank should be 50 meters resulting in a maximum of 5 samples per bank or 10 samples per transect. For any transects that do not include 5 plots, the unused plots should be marked on the datasheet as "NA" in the appropriate "% Cover" field. Filamentous algae estimates will be conducted visually to the maximum extent possible and shall be recorded as a percent coverage of the plot. Samplers will navigate along each plot and determine a visual estimate at the end. While navigating along the plot, at least 3 depth measurements will be made in meters to determine the average plot depth. At least two samplers will visually estimate independently and the result will be the average of the two estimates. Samplers will indicate if the observed algae was benthic, floating, or a combination of both. In plots where visual estimates are not possible due to lack of water clarity, the sampler will note on the "% Cover" field of the datasheet with "VDI" (for visual determination inhibited) along with a Secchi depth at mid-plot, which will be recorded in the adjacent "Position" field.

During times of draw-down, samplers will measure the distance between the wetted width and the normal pool height to determine the length of exposed bank. Samplers will estimate the percent coverage of filamentous algae on the shoreline; the exposed bank will count as an additional plot (drawdown plot = exposed bank length x 1m^2).

Incidental sampling

As samplers navigate between sites, any noticeable blooms of filamentous algae will be investigated if the blooming area is approximately 5 m^2 (about the size of a sedan) or more. At these incidental sites, samplers will indicate the relative size of the blooming area, collect in situ data, and a Secchi depth. Samplers will indicate if the algae is benthic, floating, or a combination of both.

References

- Griggs, A.N., Selckmann, G.M., Cummins, J. and Buchanan, C., 2015. Methods for estimating filamentous algae cover in streams and rivers of the Shenandoah River Basin. Final Report. US EPA Region, 3, p.33.
- WVDEP (West Virginia Department of Environmental Protection). 2018. Watershed Assessment Branch 2018 Field Sampling Standard Operating Procedures. Division of Water and Waste Management, Watershed Assessment Branch, Charleston, WV.
- ADEE-DEQ (Arkansas Department of Energy and Environment – Division of Environmental Quality). 2023. Lake Sampling Standard Operating Procedures (SOPs) and Work Plan. Office of Water Quality, Planning Branch, North Little Rock, AR.