



# CITY OF HOT SPRINGS

Utilities Department

780 Adams Street

Hot Springs, Arkansas 71901

September 7, 2022

Mr. Alan J. York, Associate Director  
Ms. Leslie Allen-Daniel, Enforcement Coordinator  
Arkansas Energy & Environment Office of Water Quality  
5301 Northshore Drive  
North Little Rock, Arkansas 72118

RE: Permit No. AR0033880, AFIN 26-00145  
Hot Springs Utilities — Request for Bacteria Sampling and a Communications Plan for  
Sanitary Sewer Overflows in Hot Springs Creek

Dear Mr. York:

Thank you for taking the time to assemble your staff for the discussion of the proposed Standard Operation Procedure for sanitary sewer overflows discharging to Hot Springs Creek.

In response to your letter of June 23, 2022, and the meeting held with staff on August 9, 2022, we have compiled a proposed Standard Operating Procedure for SSO's discharging to Hot Springs Creek attached for your review meeting the requirements of the letter, except that *E Coli* limits will align with the contact periods as depicted in Rule 2.507.

Sincerely,

Monty Ledbetter  
Utilities Director

Attachments: Exhibit A Standard Operating Procedure  
Exhibit B Sampling Sites, and Public Notification (signage and CodeRED)  
CHS Lab Performance Evaluation Report and Supplemental Proficiency Testing Program

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**cc:** **Arkansas Energy & Environment** | Stacie Wassell, Deputy Associate Director, DEQ [Wassell@adeq.state.ar.us](mailto:Wassell@adeq.state.ar.us) ; Richard Healey, OWO Enforcement Branch Manager, [healey@adeq.state.ar.us](mailto:healey@adeq.state.ar.us)  
**Arkansas Department of Health** | Terry Paul, Environmental Health Chief, ADH, [terry.paul@arkansas.gov](mailto:terry.paul@arkansas.gov)  
**City of Hot Springs** | Bill Burrough, City Manager [bburrough@cityhs.net](mailto:bburrough@cityhs.net) ; Denny McPhate, Deputy City Manager [dmcphate@cityhs.net](mailto:dmcphate@cityhs.net) ; Harold Mauldin, Wastewater Facilities Operations Manager [hmauldin@cityhs.net](mailto:hmauldin@cityhs.net) ; Todd Piller, Capital Project Manager [tpiller@cityhs.net](mailto:tpiller@cityhs.net) ; Gary Carnahan, City Engineer, City of Hot Springs, AR, [gcarnahan@cityhs.net](mailto:gcarnahan@cityhs.net)  
**Consultant** | Craig Johnson, P.E. Crist Engineers [cjohnson@crisengineers.com](mailto:cjohnson@crisengineers.com)

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# EXHIBIT A


## STANDARD OPERATING PROCEDURE

<b>SOP Title:</b>	<b>Manhole 12242, Manhole 1865 and Manhole 1866 (Hot Springs Creek Pump Station) Sanitary Sewer Overflow Standard Operating Procedure</b>		
<b>SOP CODE:</b>	6459.622.61-2022.09	<b>CATEGORY:</b>	SSO RESPONSE

<b>OBJECTIVE</b>	To provide clear and complete instructions for responding to sanitary sewer overflows at Manhole 12242, Manhole 1865 and Manhole 1866 (Hot Springs Creek Pump Station)
<b>BACKGROUND</b>	Manhole 12242, Manhole 1865 and Manhole 1866 (Hot Springs Creek Pump Station) have a history of overflows during periods of wet weather due to the hydraulic design combined with unidentified I&I in the Hot Springs Creek Sewer Basin. Any SSO during an average to dry weather condition would likely be due to a blockage or equipment failure at the Hot Springs Creek Pump Station.
<b>SAFETY PROCEDURES</b>	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.
<b>POTENTIAL HAZARDS</b>	Hot Springs Creek is a tributary of Lake Hamilton. SSO contamination impacts the water quality of an area used for recreational activities.
<b>RESPONSE</b>	<p>Upon notification from remote sensing equipment from the City of Hot Springs’s SCADA network, indicating a pump station wet well depth greater than 15.50-ft (410.50 MSL) at the Hot Springs Creek Pump Station, the City of Hot Springs shall respond to investigate the potential occurrence of an SSO at Manhole 12242, Manhole 1865 and Manhole 1866. Notification can occur through other outlets such as, but not limited to: other staff or public notification.</p> <p>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 Collection crews. After hours, On-Call personnel will respond and call for back up personnel as needed.</p> <p>Responding personnel will:</p> <ol style="list-style-type: none"> <li>1. Determine if a SSO is occurring.</li> <li>2. Determine whether the spill has reached Hot Springs Creek.</li> <li>3. Upon validation that the spill has reached Hot Springs Creek, notify the CHS testing laboratory to acquire testing samples*.</li> <li>4. Post ADH signs at locations shown in Exhibit A for Sample Site 1, should the spill reach Hot Springs Creek.</li> <li>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.</li> <li>6. Determine the cause of the problem (blockage, equipment failure at Hot Springs Pump Station, wet weather I&amp;I)</li> <li>7. Determine what additional resources may be needed (equipment and materials).</li> <li>8. Document any necessary information needed for reporting requirements.</li> <li>9. Take photos of the impacted area.</li> <li>10. Estimate the release volume based on size of the sewer, weather conditions and the extent of the release.</li> <li>11. Report spill in accordance with Office of Water Quality, DEQ reporting requirements.</li> </ol> <p>The CHS testing laboratory is approved by the Arkansas Energy &amp; Environment, DEQ. All testing shall be conducted at an approved Department of Environmental Quality laboratory.</p>

	<p><i>*Should the CHS testing laboratory not be available for immediate sampling, City of Hot Springs laboratory personnel will acquire a sample and hold in accordance with testing protocol and provide a chain of custody to an outside testing laboratory for further handling.</i></p>
CONTAINMENT	<p>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:</p> <ol style="list-style-type: none"> <li>1. Identify and obtain the necessary equipment and materials needed to contain the overflow.</li> <li>2. Take immediate steps to contain the overflow (block path toward receiving water, recover with vacuum truck).</li> <li>3. Determine whether additional containment measures are needed.</li> </ol>
CORRECTION OF OVERFLOW	<p>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.</p>
SAMPLING AND TESTING	<p>Upon response to the spill and validation that the spill is entering Hot Springs Creek, the following sampling and testing will be initiated for <i>E. Coli</i>.</p> <p><b><u>May 1 to September 30:</u></b></p> <ol style="list-style-type: none"> <li>1. Sampling shall occur at the locations shown on Exhibit A.</li> <li>2. First <i>E.Coli</i> test shall be for Sample Site 1.</li> <li>3. Results shall be made available to the City of Hot Springs within three (3) calendar days of the event from the testing laboratory.</li> <li>4. Should the <i>E.Coli</i> 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, and Sample Site 4,</li> <li>5. A second series of tests will be scheduled and conducted for Sample Site 2, Sample Site 3 and Sample Site 4 until two consecutive results for <i>E.Coli</i> are equal to or less than 126 cfu/100ml are achieved, at which time the testing will cease.</li> <li>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, and Sample Site 4.</li> <li>7. City of Hot Springs shall email all test results to DEQ's Office of Water Quality, Enforcement Branch at <a href="mailto:water-enforcement-report@adeq.state.ar.us">water-enforcement-report@adeq.state.ar.us</a> upon receipt from the testing laboratory.</li> </ol> <p><b><u>October 1 to April 30:</u></b></p> <ol style="list-style-type: none"> <li>1. Sampling shall occur at the locations shown on Exhibit A.</li> <li>2. First <i>E.Coli</i> test shall be for Sample Site 1.</li> <li>3. Results shall be made available to the City of Hot Springs within three (3) calendar days of the event from the testing laboratory.</li> <li>4. Should the <i>E.Coli</i> 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, and Sample Site 4.</li> <li>5. A second series of tests will be scheduled and conducted for Sample Site 2, Sample Site 3 and Sample Site 4 until two consecutive results for <i>E.Coli</i> are equal to or less than 630 cfu/100ml are achieved, at which time the testing will cease.</li> <li>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, and Sample Site 4.</li> <li>7. City of Hot Springs shall email all test results to DEQ's Office of Water Quality, Enforcement Branch at <a href="mailto:water-enforcement-report@adeq.state.ar.us">water-enforcement-report@adeq.state.ar.us</a> upon receipt from the testing laboratory.</li> </ol>

	The CHS testing laboratory is approved by the Arkansas Energy & Environment, DEQ. All testing shall be conducted at an approved Department of Environmental Quality laboratory.
RECOVERY/CLEANUP	<p>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:</p> <ol style="list-style-type: none"> <li>1. Response crew will use appropriate PPE during cleanup and recovery</li> <li>2. Affected area will be cleaned as much as possible using rakes, shovels, hand picker tools and vacuum equipment.</li> <li>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.</li> <li>4. Maintain, as far as possible, an appropriate buffer zone between limited areas and the waters of the state and the United States.</li> <li>5. The immediate area around the overflow site will be inspected to ensure that no visual residue remains, including solids, papers, and rags, etc.</li> <li>6. If flushing is warranted and ultimately performed, then all solids and debris must be collected and disposed of properly.</li> <li>7. All wash-down water must be returned to the sewer system.</li> </ol>
ADDITIONAL RESOURCES	<p>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:</p> <ol style="list-style-type: none"> <li>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).</li> <li>2. Call (811) CALL BEFORE YOU DIG.</li> <li>3. Determine the additional resources and type of construction crew required to perform the task(s).</li> <li>4. Call for the additional resources using existing approved contact lists as deemed necessary.</li> <li>5. Enlist appropriate contract services.</li> <li>6. Manage actions taken by the additional construction crew to clean up the affected area.</li> <li>7. Ensure actions are documented following the SSO reporting procedures.</li> </ol>
FIELD REPORTING	<p>Responding personnel will collect accurate and complete field data required to be submitted to DEQ. The following information will be documented:</p> <ol style="list-style-type: none"> <li>1. Date and time of notification (SCADA, Public Notification, Staff Report)</li> <li>2. Date and time of dispatch</li> <li>3. Date and time of arrival</li> <li>4. Date and time of departure</li> <li>5. Date and time of release ended (estimated as close as possible)</li> <li>6. Location</li> <li>7. Upstream of Hot Springs Creek Pump Station manhole overflow status</li> <li>8. Probable Cause</li> <li>9. Estimated release</li> <li>10. Visual impact observed</li> <li>11. Actions to repair/mitigate</li> </ol>
REGULATORY REPORTING	<p>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 <a href="https://www.adeg.state.ar.us/water/enforcement/ss0/submit.aspx">https://www.adeg.state.ar.us/water/enforcement/ss0/submit.aspx</a></p> <p>This initial 24-hour report should include the following information:</p> <ol style="list-style-type: none"> <li>1. Permit Number</li> </ol>

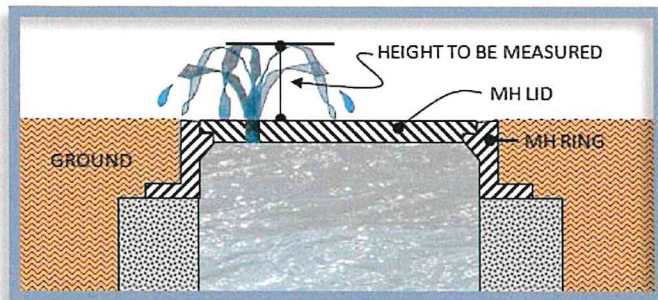
	<ol style="list-style-type: none"> <li>2. Location of overflow (manhole number or street address)</li> <li>3. The receiving water (if applicable)</li> <li>4. Cause of overflow (if known)</li> <li>5. Estimated volume of overflow</li> <li>6. Total duration of the overflow</li> </ol> <p>If the "total duration 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 <a href="mailto:ssoadeq@adeq.state.ar.us">ssoadeq@adeq.state.ar.us</a> or by <a href="#">mail</a> (include Attn: Water Quality Enforcement).</p> <p>A sample of the spill shall be taken prior to confluence of the receiving stream for <i>E.coli</i>. 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 <a href="mailto:water-enforcement-report@adeq.state.ar.us">water-enforcement-report@adeq.state.ar.us</a></p> <p>Sample locations are shown in Exhibit A.</p>
<p><b>PUBLIC NOTIFICATION</b></p>	<p>When SSO spill reaches Hot Springs Creek, City of Hot Springs Utilities will take measures to inform those affected by the possible impact on water quality. The methods of public notification include:</p> <p>May 1 to September 30:</p> <ol style="list-style-type: none"> <li>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.</li> </ol> <p>Sign content shall be as follows:</p> <div style="text-align: center;"> <p><b><u>HEALTH ADVISORY</u></b>  WATER QUALITY IN THIS AREA  MAY BE UNSAFE  <b>SWIM AT YOUR OWN RISK</b></p> <p><b>Arkansas Department of Health</b></p>  <p>815 West Markham Street • Little Rock Arkansas 72205-3867  Environmental Health (501)661-2171  Epidemiology (501)661-2893</p> </div> <ol style="list-style-type: none"> <li>2. A <b>CodeRED</b> alert will be sent to the population living near the water bodies in accordance with boundary shown on Exhibit A.</li> </ol> <p><b><u>ADVISORY</u></b>  <i>As of [date and time] a <b>NO SWIMMING</b> Advisory has been issued for the Hot Springs Creek area due to a wastewater overflow. Hot Springs Utilities will monitor the water quality in the area until it is safe for human contact. <b>If you have any questions, you may contact Hot Springs Utilities at (501) 321-6200</b></i></p> <ol style="list-style-type: none"> <li>3. Upon satisfaction of <i>E.Coli</i> testing as outlined in Sampling and Testing section of the SOP the Recission of Advisory shall be provided.</li> </ol> <p><b><u>RECISSION OF ADVISORY</u></b>  <i>The <b>NO SWIMMING</b> Advisory issued on [date and time] for the Hot Springs Creek area has been canceled. The Bacteriological survey indicates that the water is safe for human contact. <b>If you have any questions, you may contact Hot Springs Utilities at (501) 321-6200</b></i></p>
	<p>The following equipment may be deployed for responding to any SSO:</p>

<p>ASSOCIATED EQUIPMENT</p>	<table> <tr> <td>1. Flusher/Vac Truck</td> <td>6. Shovels</td> </tr> <tr> <td>2. Backhoe</td> <td>7. Rakes</td> </tr> <tr> <td>3. Dump Truck</td> <td>8. Trash Pickers/Grabbers</td> </tr> <tr> <td>4. Crew Trucks</td> <td>9. Trash Bags</td> </tr> <tr> <td>5. Confined Space Entry Equipment</td> <td></td> </tr> </table>	1. Flusher/Vac Truck	6. Shovels	2. Backhoe	7. Rakes	3. Dump Truck	8. Trash Pickers/Grabbers	4. Crew Trucks	9. Trash Bags	5. Confined Space Entry Equipment	
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4. Crew Trucks	9. Trash Bags										
5. Confined Space Entry Equipment											
<p>PPE</p>	<p>The following personal protective equipment may be required when responding to any SSO:</p> <table> <tr> <td>1. Hard Hats</td> <td>5. Rubber gloves</td> </tr> <tr> <td>2. Safety Glasses/Goggles</td> <td>6. Rubber Boots</td> </tr> <tr> <td>3. Face Shield</td> <td>7. Protective Body Suit</td> </tr> <tr> <td>4. Ear/Noise Protection</td> <td>8. Respirators</td> </tr> </table>	1. Hard Hats	5. Rubber gloves	2. Safety Glasses/Goggles	6. Rubber Boots	3. Face Shield	7. Protective Body Suit	4. Ear/Noise Protection	8. Respirators		
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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.

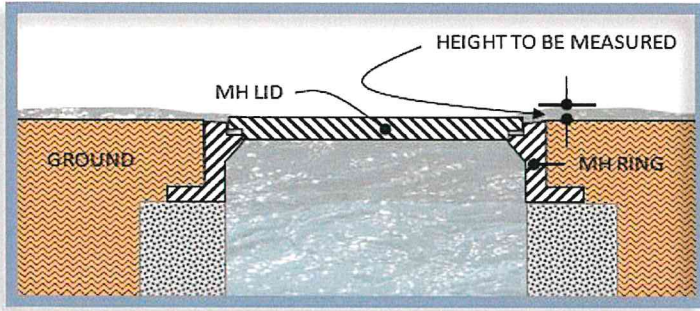


Pick and Vent Hole Estimation Chart (24" Cover)

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	0.23	14	0.75	1/16	0.063	0.005	0.51	31	
0.50	1/8	0.125	0.010	0.33	0.33	20	0.75	1/8	0.125	0.010	0.72	43	
0.50	1/4	0.250	0.021	0.47	0.47	28	0.75	1/4	0.250	0.021	1.02	61	
0.50	1/2	0.500	0.042	0.66	0.66	40	0.75	1/2	0.500	0.042	1.44	86	
0.50	3/4	0.750	0.063	0.81	0.81	49	0.75	3/4	0.750	0.053	1.77	106	
0.50	1	1.000	0.083	0.94	0.94	56	0.75	1	1.000	0.083	2.04	122	
0.50	1 1/4	1.250	0.104	1.05	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	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	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	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	1.24	74	0.75	1 3/4	1.750	0.146	2.7	162	
0.50	2	2.000	0.167	1.33	1.33	80	0.75	2	2.000	0.167	2.89	173	
0.50	2 1/4	2.25	0.188	1.41	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	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	1.56	94	0.75	2 3/4	2.750	0.229	3.38	203	
0.50	3	3.00	0.250	1.62	1.62	97	0.75	3	3.000	0.250	3.53	212	
0.50	3 1/4	3.25	0.271	1.69	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	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	1.82	109	0.75	3 3/4	3.750	0.313	3.95	237	
0.50	4	4.00	0.333	1.88	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 1/2" 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).





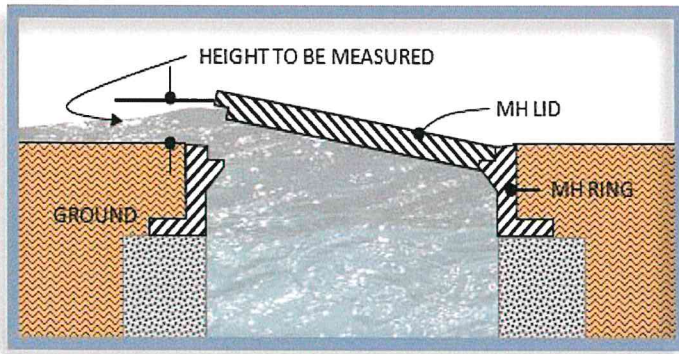
## LOSS AROUND EDGE OF NON-VENTED COVER

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.

**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.

### Estimated SSO Flow Out of Manhole with Cover in Place

Height of Spout above MH Rim (inches)	24 Inch Cover		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	6"	5	148	0.240	6"
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	
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	
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					



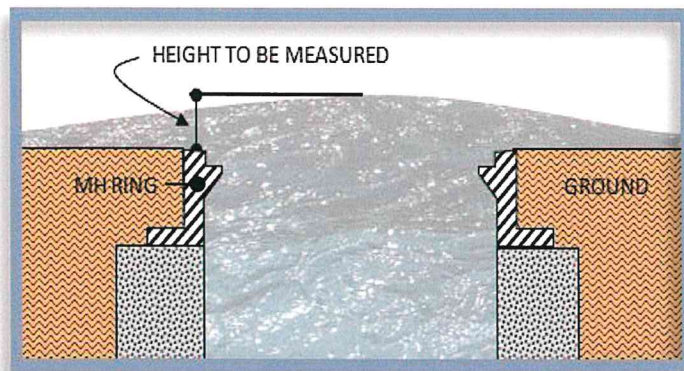
## LOSS FROM TILTED COVER

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.

$$\text{Volume} = \text{Area (sq. ft.)} \times \text{Velocity (ft/sec)} \times \text{Time (seconds)} \times 7.48 \text{ (gal/cu. ft)}$$

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



## 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.).

## 24 Inch Cover

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

# PICTORIAL REFERENCE

To use 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).

**Disclaimer:**

*This pictorial reference was developed by the California Water Environment Association, Southern Section Collection Systems Committee.*

## 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



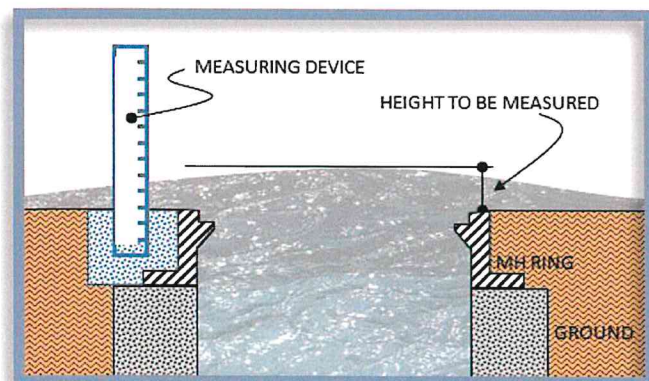
225 gpm



250 gpm



275 gpm



Hot Springs Utilities will install a measuring device at Manhole 12242, Manhole 1865 and Manhole 1866 as close to the rim of the manhole to assist personnel in measuring the height of the overflow plume.

# Exhibit B



0 250 500 1,000 1,500 2,000 Feet

**CWA - Non-Potable Water**  
**FINAL Performance Evaluation Report**  
**NSI Laboratory Proficiency Testing Program**  
**Study DMRQA-42 - Shipped: 04/15/2022 - Closed: 07/15/2022 - Reports Printed On: 07/23/2022**  
**Participant USEPA Labcode: AR00035**

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Study Designed and Coordinated by:  
NSI Lab Solutions  
7212 ACC Blvd., Raleigh, NC 27617  
ANAB Certificate#: AP-1693-1  
1-800-234-7837

**This evaluation report is being submitted to:**  
Hot Springs Wastewater Treatment Plant  
Attention: Amanda Cates  
320 Davidson Drive  
Hot Springs, AR, 71901

---

**LabCode and Accreditation Information:**

**Send Results to:** State Only  
**EPA Lab Code:** AR00035  
**State Lab Code:**  
**Primary Agency:** AR – Arkansas DEQYvette Wilkins  
5301 Northshore Drive  
North Little Rock, AR 72118  
**Reports to:** AR

---

**Participant Information**

**NSI Lab Code:** N23064  
**Permittee Code:** AR0033880

This report was submitted by Amanda Cates, Laboratory Supervisor  
Hot Springs Wastewater Treatment Plant  
320 Davidson Drive  
Hot Springs, AR, 71901  
501-262-1881

Please contact Mark Hammersla at NSI Lab Solutions if you have any questions about this report.  
(800) 234-7837 - mark.hammersla@nsilabsolutions.com

This PT report may contain data not covered under ANAB Accreditation. Such data is noted by an asterisk.

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**MIC-003 Total and Fecal Coliform** - Hot Springs Wastewater Treatment Plant - NSI Lab Solutions/DMRQA-42

TNI	Analyte	TNI	Method	Reported	Study	Assigned		EPA	Acceptance		Analysis	Analyst's
Analyte		Method Code	Description	Value	Mean	Value	Units	Code <sup>1</sup>	Limits	Evaluation	Date	Name
2530	Fecal Coliform, MF	n/a	9222A	750	789	789	cfu/100mL	AR00035	201 to 2650	ACCEPT.	6/30/22	Amanda Cates
2500	Total Coliform, MF	-- Not Reported --										
2525	E.coli, MF	-- Not Reported --										
2500	Total Coliform (MPN-Multiple Tube)	-- Not Reported --										
2500	Total Coliform (MPN-Multiple Well)	-- Not Reported --										
2530	Fecal Coliform (MPN-Multiple Tube)	-- Not Reported --										
2530	Fecal Coliform (MPN-Multiple Well)	-- Not Reported --										
2525	E.coli (MPN-Multiple Tube)	-- Not Reported --										
2525	E.coli (MPN-Multiple Well)	-- Not Reported --										

**PEI-026 Demand** - Hot Springs Wastewater Treatment Plant - NSI Lab Solutions/DMRQA-42

TNI	Analyte	TNI	Method	Reported	Study	Assigned		Standard	EPA	Acceptance		Analysis	Analyst's
Analyte		Method Code	Description	Value	Mean	Value	Units	Deviation	Code <sup>1</sup>	Limits	Evaluation	Date	Name
1555	Carbonaceous BOD (CBOD)	n/a	SM 5210B	33.5	33.5	30.6	mg/L	9.52	AR00035	12.8 to 48.4	ACCEPT.	6/30/22	Steve Rynders
1565	Chemical Oxygen Demand (COD)	-- Not Reported --											
2040	Total Organic Carbon (TOC)	-- Not Reported --											
1530	Biochemical oxygen demand	-- Not Reported --											

**PEI-035 pH** - Hot Springs Wastewater Treatment Plant - NSI Lab Solutions/DMRQA-42

TNI	Analyte	TNI	Method	Reported	Study	Assigned		Standard	EPA	Acceptance		Analysis	Analyst's
Analyte		Method Code	Description	Value	Mean	Value	Units	Deviation	Code <sup>1</sup>	Limits	Evaluation	Date	Name
1900	pH	n/a	SM 4500H+A+B	5.95	5.96	5.93	units	0.272	AR00035	5.73 to 6.13	ACCEPT.	6/30/22	Tina Mietzner

**PEI-079 Residue** - Hot Springs Wastewater Treatment Plant - NSI Lab Solutions/DMRQA-42

TNI	Analyte	TNI	Method	Reported	Study	Assigned		Standard	EPA	Acceptance		Analysis	Analyst's
Analyte		Method Code	Description	Value	Mean	Value	Units	Deviation	Code <sup>1</sup>	Limits	Evaluation	Date	Name
1960	Residue-nonfilterable (TSS)	n/a	SM 2540D	76.5	76.2	82.5	mg/L	7.83	AR00035	67.5 to 91.8	ACCEPT.	6/30/22	Amanda Cates
1950	Residue-total (TS)	-- Not Reported --											

**PEI-138 Simple Nutrients** - Hot Springs Wastewater Treatment Plant - NSI Lab Solutions/DMRQA-42

TNI	Analyte	TNI	Method	Reported	Study	Assigned		Standard	EPA	Acceptance		Analysis	Analyst's
Analyte		Method Code	Description	Value	Mean	Value	Units	Deviation	Code <sup>1</sup>	Limits	Evaluation	Date	Name
1515	Ammonia as N	n/a	SM 4500NH3D	3.60	3.69	3.58	mg/L	0.868	AR00035	2.71 to 4.51	ACCEPT.	6/30/22	Steve Rynders
1810	Nitrate as N	-- Not Reported --											
1870	Orthophosphate as P	-- Not Reported --											
1820	Nitrate plus Nitrite as N	-- Not Reported --											

**PEI-139 Complex Nutrients** - Hot Springs Wastewater Treatment Plant - NSI Lab Solutions/DMRQA-42

TNI Analyte	TNI Method Code	Method Description	Reported Value	Study Mean	Assigned Value	Units	Standard Deviation	EPA Code <sup>1</sup>	Acceptance Limits	Evaluation	Analysis Date	Analyst's Name
1910 Total Phosphorus	n/a	SM 4500PB5	1.20	1.56	1.27	mg/L	2.42	AR00035	1.00 to 1.54	ACCEPT.	6/30/22	Amanda Cates
1795 Total Kjeldahl Nitrogen	-- Not Reported --											

**Assigned Values**

All assigned values are established in a manner compliant with the current TNI FOT for Non-Potable Water. With the exception of TDS and Specific Conductance assigned values are equal to the analytically verified gravimetric true value of the PT sample. For TDS and Specific Conductance, the assigned value is set at the robust study mean.

**Accuracy/Traceability/Uncertainty**

All assigned values are analytically verified for formulation accuracy prior to shipment. A total of 10 randomly chosen samples are taken from the production run and analyzed against NIST SRMs or CRMs. Traceability to SI is established through microbalance calibration with NIST traceable test masses. The expanded uncertainty at 95% CI with K=2 of each assigned value is available upon request and is typically <0.50%.

**Batch Homogeneity**

Each individual PT sample batch is thoroughly mixed in production and guaranteed to be homogeneous. Homogeneity is verified analytically according to in-house SOP.

**Stability**

Each analyte has been verified stable through the end of the PT study by either long term monitoring or study closing stability testing.

**Acceptance Limits**

Acceptance limits are set according to current TNI limits. Where no limits are set by TNI, limits are set to  $\pm 3$  standard deviations around the study mean after outlier correction.

**Accredited Analytes**

All analytes are included under our ISO 17043/TNI scope of accreditation (Certificate #: AP-1693-1) unless otherwise noted with an asterisk (\*).

**PT Study Summary**

To view a summary of the PT study results, please see Study Summary Report available in our PT DataLink at [www.nsilabsolutions.com](http://www.nsilabsolutions.com).

\* The study mean and standard deviation are presented after outlier correction and are based upon pooled reported results without consideration for analytical technology.  
<sup>1</sup> If present, the EPA Code of the lab that actually performed the analysis for this analyte.

Reviewed/Approved By:   
 Mark Hammersta, President

Date: 07/23/2022

This PT report shall only be reproduced in full. This report shall not be used to claim approval, certification or endorsement by NSI Lab Solutions. This report has been released only to entities requested by the participant. This report is held in confidence by NSI Lab Solutions with additional reports available by written request of participant.

Should you disagree with any element of this PT report, please submit your complaint to [nsi@nsilabsolutions.com](mailto:nsi@nsilabsolutions.com). Include the study number, your contact information, NSI Labcode, and the nature of your disagreement. An NSI Lab Solutions representative will contact you within 48 hours.



**WP-MICRO**  
**FINAL SUPPLEMENTAL Performance Evaluation Report**  
**NSI Laboratory Supplemental Proficiency Testing Program**  
**Study PT Express - Shipped: 08/31/2021 - Closed: 10/12/2021 - Reports Printed On: 10/12/2021**  
**Participant USEPA Labcode: AR00035**

---

Study Designed and Coordinated by:  
NSI Lab Solutions  
7212 ACC Blvd., Raleigh, NC 27617  
ANAB Certificate#: AP-1693-1  
1-800-234-7837

**This evaluation report is being submitted to:**  
Hot Springs Wastewater Treatment Plant  
Attention: Amanda Cates  
320 Davidson Drive  
Hot Springs, AR, 71901

---

**LabCode and Accreditation Information:**

**Send Results to:** State Only  
**EPA Lab Code:** AR00035  
**State Lab Code:**  
**Primary Agency:** AR – Arkansas DEQPenny Semberski  
5301 Northshore Drive  
North Little Rock, AR 72118  
**Reports to:** AR

---

**Participant Information**

**NSI Lab Code:** N23064

This report was submitted by Amanda Cates, Laboratory Supervisor  
Hot Springs Wastewater Treatment Plant  
320 Davidson Drive  
Hot Springs, AR, 71901  
501-262-1881

Please contact Mark Hammersla at NSI Lab Solutions if you have any questions about this report.  
(800) 234-7837 - mark.hammersla@nsilabsolutions.com

This PT report may contain data not covered under ANAB Accreditation. Such data is noted by an asterisk.

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**MIC-QC2B Total and/or Fecal/e.Coli - Hot Springs Wastewater Treatment Plant - NSI Lab Solutions/MP-PTX1140**

TNI	Analyte	TNI	TNI	Method	Reported	Assigned	Acceptance	Analysis	Analyst's	
Analyte	Method Code	Tech. Code	Description	Value	Value	Units	Limits	Evaluation	Date	Name
2525	E.coli (MPN-Multiple Well)	n/a	n/a	Colilert	1300	1630	mpn/100mL	450 to 5140	ACCEPT.	10/5/21 Amanda Cates

About the Samples

The PT samples supplied to participant laboratories are provided as stabilized, dehydrated pure cultures of known activity. The dehydrated samples require rehydration in supplied buffer prior to analysis.

Assigned Values

Assigned values for quantitative analytes are set to the consensus robust mean of interlaboratory PT study.

Batch Homogeneity

The homogeneity of each PT sample production lot is verified by analysis of  $\geq 10$  randomly chosen samples.

Acceptance Limits

Acceptance limits are set at  $\pm 3$  standard deviations around the study mean as per current TNI requirements

Stability

The stability of each PT sample is verified at study close through re-analysis of retained samples.

Accredited Analytes

All analytes are included under our ISO 17043/TNI scope of accreditation (Certificate #: AP-1693-1) unless otherwise noted with an asterisk (\*).

PT Study Summary

To view a summary of the PT study results, please see Study Summary Report available in our PT DataLink at [www.nsilabsolutions.com](http://www.nsilabsolutions.com).

Reviewed/Approved By:   
Mark Hammersla, President

Date: 10/12/2021

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