

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

Section A

Local Government Information

KANSAS STORMWATER 2015 ANNUAL REPORT FORM FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)

Check box if
this is a new name,
address, phone, etc.

Permittee Information and Reporting Period

Permittee (Agency Name) Mailing Address: 1 _____

Mailing Address 2: City: _____

State Kansas

Zip Code: _____

Contact Person: _____

Contact E-Mail Address: _____

Contact Phone Number: _____

Kansas Permit Number: _____

(Example) M - MC21 - SU01

Reporting Period covers activities from January 1, 2015 through December 31, 2015.

This annual report must be submitted to the Kansas Department of Health and Environment (KDHE) by February 28, 2016. This annual report must be submitted as a word or PDF file to KDHE on a standard compact disk (CD). A paper copy of the report may, in addition to the CD, be submitted if the permittee so desires but is not required.

B. Executive Summary

Append an executive summary to this report which briefly covers the major aspects of the MS4 stormwater management program enacted during the year. In completing the executive summary, the preparer should address the following questions:

1. Were there any aspects of the program that appeared especially effective at reducing pollutants in your stormwater discharge?
2. Were there any aspects of the program that provided unsatisfactory results?
3. What was the most successful part of the program?
4. What was the most challenging aspect of the program?
5. Describe any City/County area MS4 clean-ups and the participation.
6. Describe the elected officials' participation in the stormwater pollution elimination.
7. Describe the collaboration with other organizations to eliminate stormwater pollution.

The executive summary does not need to be extensive and detailed. It is anticipated the executive summaries will range from one half of a page to two pages in length depending on the scope of the program.

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

Section B

Executive Summary

CITY OF LEAVENWORTH

**Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems
January 1, 2015 – December 31, 2015**

DRAFT Exec SUMMARY

SECTION 1: EXECUTIVE SUMMARY

To satisfy of the requirements of NPDES permit, this annual report summarizes the City of Leavenworth's plans and actions to reduce the discharge of pollutants from the municipal separate storm sewer system (MS4) to the maximum extent practicable, to protect water quality, and to meet the appropriate water quality requirements of the Clean Water Act. The information contained within this report was obtained through interviews with city staff, review of permits and projects from 2015, and examining publications made available to the citizens of Leavenworth. These discussions with office and field personnel from the Public Works and other Departments highlights the key aspects and define the current state of the stormwater management plan and provide insight into future improvements to the stormwater quality standards.

City staff communicated the awareness of water quality with increased efforts in several areas during 2015. This increased level of activity was a result of comments from the 2013 EPA inspection, adoption of stormwater guidelines in early 2015 as well as a product of staff awareness through training and education. The importance of construction site runoff control was communicated to developers and contractors through establishment of a "Land Disturbance Permit" (LDP) requirement for nearly all construction activities. The implementation of the LDP was coordinated with information distributed to local development and contracting firms and a group meeting with contractors at City Hall.

The City continued improved clean-up of Sanitary Sewer Overflow (SSO) situations on both public and private property. The aggressive commercial grease trap inspection program by the building inspectors continued with on-site inspections review of maintenance records.

The city water quality sampling program for Three and Five-Mile Creeks continued. Six storms were sampled in 2015. The most challenging part of the sampling program was determining when to send the employees into the field. The nature of the run-off patterns in Leavenworth are that the streams are quick to rise and fall in response to rainfall, and with the short duration events in 2015 it was not always possible to sample within the "rising stream" as required.

Several local governments in Leavenworth County share weather information from local weather stations. This information is often compiled into charts and graphs that provide insight to the local weather patterns and distributed via email to those who have expressed an interest.

Stormwater quality and runoff control from construction projects continues to be addressed during the planning phase of projects. This begins at the review by the "Development Review Committee", which provides general advice and guidance to applicants and other staff on most projects prior to the design process. Stormwater quantity and quality issues are discussed. The creation of the "Land Disturbance Permit" (LDP) process includes standard drawings and acknowledgements by owners and/or contractors related to their responsibilities for managing water quality from their site.

CITY OF LEAVENWORTH

**Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems
January 1, 2015 – December 31, 2015**

DRAFT Exec SUMMARY

Review of construction drawing by city staff has proven especially effective at reducing pollutants in stormwater by ensuring large and small projects attempt some measure of action. Plan reviews include evaluations of both the construction site erosion control plan and the drainage plan of the development. Addressing stormwater issues early in the design process has ensured that Best Management Practices (BMPs) are well suited for the site and adequate information is included in the plans for construction.

Leavenworth has been focused on incorporating BMPs such as native plantings and filter strips into construction plans as most developments occupy existing lots with existing drainage systems. Public Works staff has encouraged the use of filter strips, roughened textures on concrete drainage channels and similar work on multiple development projects. Several city projects in 2015 included sediment traps at inlet openings to allow particles from small rainfall events to be exposed to UV solar light and other environmental forces to accelerate degradation of pollutants. This focus has results in effective pollutant removal, low costs and low-cost maintenance efforts being required.

One of the least effective parts of the stormwater management plan lies with managing existing BMPs on private developments. Lack of maintenance to detention ponds by Home Associations continues to be a concern by both the HOA's and the City. Failure to maintain these systems can decrease the functionality of these critical stormwater infrastructure components over time and adversely impact water quality as well. In response the city will formally contact owners of these facilities to reinforce the importance of their responsibility to properly maintain these ponds.

The inspection and enforcement of the LDP and grease trap regulations has found that while initial compliance is very good, the on-going maintenance and self-inspection of these facilities is lacking. Staff is following-up by contacting the various parties involved to resolve the issues and improve compliance. City staff will be proposing ordinances related to fees and fines for these activities in 2016.

Efforts to reach out and educate the citizens of Leavenworth through media such as the city website, the local cable television station (Channel 2), Facebook, and Twitter have increased public awareness of environmental issues in general. The Adopt-A-Park program has been a very popular way to increase public awareness. Staff has been contacted by Boy Scouts and schools regarding appropriate projects with some being followed through to completion.

Stormwater guidelines adopted by the City Commission in March 2015 were augmented by the creation of the "Land Disturbance Permit" at the same time. This further increases the focus on control of erosion and pollution from all construction sites.

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

Stormwater Management Program (Section C-E)

C. Stormwater Management Program

Place a check mark in the appropriate box.

- | | Yes | No | Not Applicable |
|---|-------------------------------------|-------------------------------------|--------------------------|
| 1. Has the Stormwater Management Program (SMP) been developed? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Has the SMP been modified during this reporting period? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 3. If the answer to question 2 above was "yes", has the modified SMP been submitted to KDHE for approval? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

If the answer to item 3 is "No" a copy of the modified SMP must be submitted with this annual report. If it is anticipated a measurable goal cannot be met in the next year the SMP should be modified and submitted to KDHE for approval. The modifications may include different BMPs and/or revised goals to avoid being in a position of non-compliance.

Submit SMP

D. Total Maximum Daily Load (TMDL) Best Management Practices

The permit requires the implementation of these BMPs prior to October 1, 2006

Place a check mark in the appropriate box.

- | | Yes | No | Not Applicable |
|--|--------------------------|--------------------------|-------------------------------------|
| 1. Were any best management practices (BMPs) intended to attenuate the discharge of TMDL regulated pollutants implemented? See your permit to determine if TMDL regulated pollutants are listed for the receiving stream affected by your stormwater system. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. List all of the BMPs intended to attenuate the discharge of TMDL regulated pollutants as identified in the SMP and provide the requested information on the following table on the following pages. | | | |

D. Total Maximum Daily Load (TMDL) Best Management Practices (Table)

BMP ID Number	Brief BMP Description	Regulated TMDL Parameter	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
			$\frac{Z}{D}$	

E. Stormwater Management Program Requirements (Six Minimum Control Measures)

1. Public Education and Outreach (Table)

List all of the public education and outreach BMPs as identified in the SMP and provide the requested information in the following table.

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
1.1	Ensure the Stormwater Master Plan is available to the Public	Provide copies of the Stormwater Master Plan for viewing at the Public Library.	The Stormwater Master Plan has remained available to the public at the Leavenworth Public Library. <i>This has been shown to NOT be an effective communication tool, but will be maintained in an effort toward transparency</i>
1.2	Maintain a Library of Stormwater Educational Materials.	Distribute brochures and make them available to the public.	This year's "City Connection" newsletters have highlighted <i>Adopt-a-Park Program, Legacy Tree Program and the construction of detention basins</i> . Parks Department has <i>increased visibility and enforcement of the "dog doo" rules at parks</i> and reports it has been a successful program.
1.3	Provide Information to Citizens regarding the City of Leavenworth Solid Waste Division.	Distribute trash bags to citizens with proper disposal handout.	Trash bags are distributed twice per year with additional bags available at the City offices. Flyers available through the City advertise the brush site, the recycling center, Free First Saturdays, and trash regulations.
1.4	Issue Press Release Regarding Local Stormwater Issues	Complete and send out monthly Press Releases to local media outlets.	Information regarding solid waste collection scheduling, snow removal operations, the Spring Clean Up, leaf collection program and general updates on stormwater issues are now also being released through social media such as Twitter and Facebook in addition to Leavenworth Residents.

1.5	Show Stormwater Information on Local cable TV Station	Broadcast community forums, in which continued water quality discussions take place	<p>City Commission meetings are broadcast live, and repeat broadcast throughout the week. Meetings are also provided via a YouTube Link</p> <p>City broadcasts short episodes of "First City Focus" providing information on city services</p>
1.6	Provide Educational Stormwater Information on City Website and social media sites.	Establish a series of informational articles addressing topics on Stormwater education.	<p>The City website provides an electronic version of the City Connection Newsletter, links to First City Focus episodes on YouTube, as well information on the Public Works Department for easy access to work schedules and regulations.</p> <p>The updated Stormwater Design Manual, Land disturbance permit and other guidelines are available on-line</p>

2. Public Involvement and Participation (Table)

List all of the public involvement and participation BMPs as identified in the SMP and provide the requested information in the following table.

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
2.1	Hold Public Meetings Regarding Stormwater Issues.	Provide the public an opportunity to discuss related Water Quality topics.	On-going stormwater issues are discussed at City Planning Commission and City Commission Meetings in an Open Forum Environment, broadcast live on Cable TV, and rebroadcast several times, and covered in the Leavenworth Times (local print media). Multiple meetings regarding EPA issues and CIP drainage projects occurred in 2015.
2.2	Improve Lines of Communication with the Public.	Integrate contemporary methods of providing and receiving information to the Public.	The City Public Information Officer uses press releases, Facebook, Twitter, Youtube and other methods to distribute information regarding City services, current City projects, and educational material. City staff email addresses and phone numbers are available on the City website.
2.3	Develop a Stormwater Stenciling Program.	Advertise to the Public the importance of Stormwater Management and the need for storm drain stenciling within the City.	Local volunteers such as the Boy Scouts have helped stencil storm inlets throughout the City in the past. City did not receive contact on this type of project in 2015. City has revised specifications for inlets to now require "stenciling" be stamped into the concrete tops.
2.4	Continue to Maintain and Clean Trash and Debris from Local Streams.	Establish an Adopt a Stream program	City crews continue to clean streams on public property throughout the City. Volunteers have been especially effective on the Annual Spring Clean Up Day at removing Trash from City and Public Property. 2015 saw 1206 volunteers in clean-up activity and 378 using drop-off services. Eight parks have been adopted through the Adopt a Park program which provides organizations the opportunity to clean and keep specific parks. No new parks were adopted in 2015. Boy Scouts cleaned debris in Three Mile Creek, coordinated by the Parks Department.

2.5	Establish a Reforestation Program	Continue to promote Arbor Day to increase community involvement.	The City of Leavenworth continues to be part of the Tree City USA program sponsored by the Arbor Day Foundation. The Legacy Tree Program allows for a tree to be planted and dedicated in public spaces. Arbor Day is celebrated yearly. 12 Legacy trees were planted in 2013.
2.6	Collect rainfall and streamflow data to analyze citizen complaints	Increase data sources to include more streamflow data and weather stations	<p>Davis Pro Weather stations have been installed at 4 locations citywide. Two were installed in July 2010, and two in June 2012.</p> <p>The data is available to all on the internet and upon request. This information has been used to assist in evaluating runoff for projects and citizen concerns. Increased data allows for City staff to better analyze flooding events and address the concerns of the public.</p> <p>The City also has several portable digital depth recorders used to monitor performance of streams and detention basins. City has coordinated weather collection data with Leavenworth County, Lansing and Basehor.</p> <p>City Engineer taught a class at UMKC related to data acquisition as performed by the City.</p> <p>An occasional email is distributed to interested persons on significant weather events, often integrating the depth data in the creeks with rainfall data in spreadsheets and graphs. Other subjects have included rainfall generally, wind speed and direction, temperature anomalies, etc.</p> <p>City PIO makes occasional use of this data, and others have distributed it internally to their companies.</p>

3. Illicit Discharge Detection and Elimination

The permit requires the implementation of these BMPs prior to October 1, 2007.

Place a check mark in the appropriate box.

Explain each item below in following table.

	Yes	No	Not Applicable
1. Has a program/plan been developed and is it presently implemented to detect and address illicit/prohibited discharges into the MS4?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Has a map of the MS4 been developed, showing the location of all outfalls, either pipes or open channel drainage, showing names and location of all streams or lakes receiving discharges from the outfalls?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	DVD INCLUDED SMALL MAP ATTACH
3. The permit requires the permittee enact ordinances Resolutions or regulations. Has an ordinances, resolutions or regulations to prohibit non-stormwater discharges into the storm system been enacted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective Date:	LDP'S NOISANCE } ATTACH COPY		

Has the ordinance, resolution or regulation been modified?

Effective Date: _____

4. Has the ordinance, resolution or regulation and/or modification been submitted to KDHE for approval?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	IN 2014 REPORT
5. Have public employees, business, and the general public been informed of the hazards associated with illegal discharges and improper disposal of waste?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CONTRACTOR WORKS
6. Are stormwater inlets & detention ponds inspected for illicit discharges and debris?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CITY CREST
7. Are restaurant waste grease areas inspected?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NEW PROGRAM
8. Are septic systems inspected?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	AS NECESSARY
9. Is debris, yard waste and dead animals removed from the streets when noticed by employees or reported?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10. Is there a yard waste management program?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
11. Are snow removal activities inspected?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

12. List all of the illicit discharge detection and elimination BMPs as identified in the SMP and provide the requested information in the table on the following pages.

3. Illicit Discharge Detection and Elimination (Table)

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
3.1	Stormsewer Mapping	Continue to update existing stormsewer structures as well as add new development structures to the city mapping systems.	<p>Map of the existing storm sewer network is COMPLETE. Data collection continues using GPS receiver and invert information collected by opening all manholes. The GIS system has location information on essentially all (99%+) of the facilities, (structures, ponds, outfalls, etc.) with approx. 95% of the system having been physically verified with GPS equipment. Detailed technical information is verified by field measurement and is about 90% complete. Mapping will continue on new systems and collection of limited technical data.</p> <p>The map and GIS database are available to city users via the city Intranet and to design engineers by delivery of DVD or PDD.</p> <p>Overall system maps are available to the public at the City Clerk's Office, with approximately ten requests for complete or partial mapping being received in 2015. Indications are that the requests are primarily from owners, developers or engineers considering some type of development project.</p>
3.2	Stormsewer Maintenance and Inspection	Provide dry weather storm sewer inspection.	A 2 Person Crew is dedicated to storm sewer inspection full-time. The crew provides on-going review of storm infrastructure, assists with GPS inspection, responds to public complaints, and provides maintenance for the storm system.

3.3.1	Inspection of Sanitary Sewer Systems	<p>Inspect residential and commercial sanitary systems for improper discharge into storm drains.</p> <p>Inspect sanitary sewer system to reduce number and volume associated with SSO</p> <p>Coordinate SSO events between Wastewater Staff, Building Officials and Engineering.</p>	<p>The Sewer TV system and Pole Camera information is integrated into the GIS system. The camera crew works with Streets Division and Storm Sewer Crew to evaluate problems identified during other maintenance activities</p> <p>City completed a substantial flow monitoring study for I/I reduction efforts. An on-going I/I reduction effort continues, work in 2015 was delayed to 2016, and additional work is scheduled for 2016.</p> <p>All SSO events are shared between the noted staff members. Follow-up inspection by TV and/or, Building Inspector is typical. Recording keeping improved to reflect ultimate resolution of SSO.</p> <p>Annual meeting was held with Engineering Staff to review status of SSO locations and “High Maintenance Lines” for possible projects to reduce SSO events.</p>
3.3.2	Commercial Grease Trap Inspection Program	Review status of commercial grease traps through record review and physical inspection.	City began formal inspection efforts of commercial grease traps in 2015. A combination of notifications, physical inspections and request for records resulted in at least ??? new installations and improved performance in many others.

3.4	Procedural Training for City Staff	City staff shall attend annual continuing educational programs.	<p>City inspection staff attends continuing educational programs as required. City forces (Parks and Public Works) attend certification courses for herbicides and pesticides.</p> <p>Recent contact with EPA has identified additional training and procedures are necessary to adequately inspect construction sites. Engineering staff has attended several related training events Additional training will take place throughout 2016.</p> <p>Training will be expanded to the general workforce to improve awareness of erosion and pollution issues in 2016</p>
3.5	Establish a Program for Household Hazardous Waste Disposal.	Provide pick up for household hazardous waste on a regular Basis	Used motor oil may be dropped off at the City's Recycling Center and all other household hazardous-waste may be dropped off at the Leavenworth County Transfer Station. City collects HHW on City-wide clean-up events.

4. Construction Site Stormwater Runoff Control

The permit requires the implementation of these BMPs prior to October 1, 2007.

Explain each item below in following table.

Place a check mark in the appropriate box.

Yes No Not Applicable

- | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|---|
| 1. The permit requires the permittee to enact ordinances, resolutions or regulations. Has an ordinance, resolutions or regulation to address construction site runoff from new development and redevelopment projects been enacted?
Effective Date: _____ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <i>LOP</i> | | | |
| 2. Has a copy of the ordinance, resolution or regulation been submitted to KDHE as required by the permit? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | <i>2014 Report</i> |
| 3. Has a procedure or program been developed requiring construction site owners and/or operators to implement appropriate erosion and sediment control best management practices? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | |
| 4. Has a procedure or program been developed requiring construction site owners and/or operators to control waste such as discarded building materials, concrete truck washout, chemicals, paint, litter and sanitary waste at construction sites likely to cause adverse impacts to water quality? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | <i>Not, over last
Geo 11/15/14</i> |
| 5. Has a procedure been developed and implemented requiring site plan review of erosion control and debris container locations incorporating consideration of potential water quality impacts? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | |
| 6. After review, is a construction site permit issued? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | |
| 7. Has a procedure been developed for the receipt and consideration of information submitted by the public? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | <i>Contact via
Email &
Clerks</i> |
| 8. Has a procedure been developed and implemented for construction site inspection and enforcement of the control measures? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | |
| 9. Are construction site inspection and enforcement actions successful? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | <i>Need
more
tests</i> |
| 10. Are site owners and/or operators provided instruction On proper construction site erosion and waste control? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | |
| 11. List all the construction site stormwater runoff control BMPs as identified in the SMP and provide the requested information in the table on the following pages. | | | | |

4. Construction Site Stormwater Runoff Control (Table)

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
4.1	Construction Specifications and Standard Details.	Continue to develop and update the City specifications and design criteria.	City Commission approved the stormwater guidelines in March 2015. These are based on APWA and MARC guidelines.
4.2	BMP Fact Sheet	Develop BMP Guidelines and Distribute Materials to Developers.	Adopted BMP guidelines that are part of the adopted stormwater design guidelines are available on city website and distributed to developers, builders and engineers. The MARC BMP Manual and APWA design guidelines are also readily available online.
4.3	Construction Drawing Review	Require City review of all construction projects to ensure design addresses stormwater concerns.	<p>All new residential and commercial developments are reviewed by City staff for stormwater concerns. BMPs have been incorporated into new development by consulting firms.</p> <p>NOI permits are required on projects that disturb areas in excess of 1 acre or require that a Storm Water Pollution Prevention Plan (SWPPP) be developed.</p> <p>In June 2015 all construction projects must obtain a "Land Disturbance Permit" that requires specific measures be identified to address pollution and erosion. A total of ??? permits were issued in 2015.</p>
4.4	Pre-Construction Meetings with Owner and Contractor.	Require meetings with owner and contractor prior to commencement of grading operations.	Pre-construction meetings have been conducted by City staff with contractors and developers on all new developments to discuss the implementation of proper erosion controls and pollution prevention.

4.5	Construction Site Inspection and Enforcement	Increase the frequency of inspections and develop a site checklist	<p>City inspection staff checks construction sites a minimum of once a week. In addition, after a half inch or greater rainfall the site's BMPs functionality are checked. Stop work orders are issued if site erosion control measures are not in compliance and remedied in a timely manner. (how many inspections, how many stop work orders???)</p> <p>Temporary controls remain onsite until an acceptable grass stand is established and the permit closed.</p> <p>Random checks on contractor logs are conducted as well.</p>
4.6	Staff Training	Conduct monthly meetings with inspection staff and provide training to new staff	<p>EPA visit in 2013 identified that additional staff training related to construction practices and Inspection activities is necessary. Expectations have been reviewed with staff</p> <p>Staff training occurred in 2015 and will continue. The status of the LDP program is discussed at weekly staff meetings, and periodic training and presentations on related topics occurred throughout 2015.</p> <p>Additional training for other city forces (Code Enforcement, Parks Department, Street Division) will occur in 2016.</p>

5. Post-Construction Site Stormwater Management in New Development and Redevelopment.

The permit requires the implementation of these BMPs prior to October 1, 2007.

Place a check mark in the appropriate box.

Explain each item below in following table.

Yes No

- 1. The permit requires the permittee to enact a program to address post-construction site stormwater runoff from new development and redevelopment.

The program developed to manage stormwater in new development and redevelopment projects must include the following elements:

- a. Strategies which include a combination of structural and/or Non-structural BMPs,
- b. Measures to ensure adequate long-term operation and maintenance of BMPs,
- c. Site Owner or operator name and telephone number Responsible to ensure adequate long-term operation Maintenance of BMPs,
- d. BMPs to prevent or minimize adverse water impacts.

- 2. Has a post-construction stormwater runoff program been Implemented?

- 3. Has post-construction sites been inspected?

- 4. Have there been post-construction violations?

- 5. List all the post-construction site stormwater management in new development and redevelopment BMPs as identified in the SMP and provide the requested information in the table on the following pages.

5. Post-Construction Site Stormwater Management in New Development and Redevelopment Table

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
5.1	Construction Site Inspection and Maintenance of Long Term Controls.	Increase inspections	<p>Issuance of an Land Disturbance Permit requires inspection by owner/contractor. City also inspects on a bi-weekly schedule following construction to ensure BMP's such as gutter-buddies remain in working order. Projects that meet requirements are issued a certificate of compliance.</p> <p>City has been working on informing detention pond owners on their responsibility of maintaining permanent facilities.</p>
5.2	Protect sensitive areas, such as wetlands and riparian areas	Maintain or increase open space.	<p>The City purchased additional properties in flood prone areas in 2015. These acquired properties act to prevent development in the floodplain and in general improve water quality.</p> <p>The Stormwater Guidelines includes references to stream buffers along creeks within the City to decrease the encroachment of developments into riparian areas.</p>
5.3	Promote non-structural best management practices.	Minimize impervious surfaces and disturbance of soils and vegetation.	<p>City staff have focused on encouraging developers to minimize grading impacts, provide tree preservation, and address project BMP's early in the plan review process. The Land Disturbance Permit formalizes the type of BMP's to be built by the developer</p>

5.4	Construction Drawing Review.	Require city review of all construction projects to ensure design addresses post construction storm water concerns.	All new residential and commercial developments are reviewed by City Staff. Most projects will be reviewed by the Development Review Committee for general comments. Project site plans are reviewed by Engineering for complinace. Additional measures addressing Stormwater Quality have been incorporated into the updated City guidelines, particularly the requirement for a Land Disturbance Permit.
5.5	Analyze Existing Structural BMP Performances.	Evaluate local detention pond performances.	The City is utilizing level recorders to evaluate the performance of selected detention ponds during storm events for water quantity concerns. City began water quality testing on several basins in 2015.

6. Municipal Pollution Prevention/Housekeeping.

The permit requires the implementation of these BMPs prior to October 1, 2007.

Place a check mark in the appropriate box.

Explain each item below in following table.

	Yes	No
1. The permit requires the permittee to enact a program to address Pollution Prevention/Good Housekeeping for Municipal Operations.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Has an operation & maintenance program to reduce Pollutant runoff and an audits /inspection program been adopted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Has a municipal employee training program been established?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Are oil, hazardous wastes, chemicals and municipal debris properly disposed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are snow and ice removal material and chemicals properly managed to prevent runoff?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are municipal streets swept on a regular basis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Are municipal stormwater inlets and drains inspected and cleaned?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. Are municipal snow piles controlled drainage to prevent runoff pollution?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

List all the Municipal Pollution Prevention/Housekeeping BMPs as identified in the SMP and provide the requested information on the table on the following pages.

7. PHASE I OPERATORS ONLY - Monitoring Industrial and High Risk Run-off

Place a check mark in the appropriate box.

	Yes	No
1. Has the permittee developed and maintained a list of the municipal industrial facilities contributing to the pollutant loading to the municipal storm sewer system?	<input type="checkbox"/>	<input type="checkbox"/>
2. Has at least two municipal industrial facilities on the list had inspection and sampling conducted?	<input type="checkbox"/>	<input type="checkbox"/>

N/A

If the answer to items 1 and 2 is "No" provide a statement on the Phase I operator form Appendix B as to why monitoring and control has not occurred.

Complete Monitoring form in Appendix B.

6. Municipal Pollution Prevention/Housekeeping Table

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
6.1	Storm Sewer and Catch Basin Cleaning.	Inspect and clean all storm sewer inlets on a quarterly basis.	Two Full Time employees utilize the City's vacuum truck to remove debris from storm sewer inlets and performed several inlet repair projects . The City has contracted for repairs to several storm structures.
6.2	Street Sweeping	Increase street sweeping rotations throughout the City.	<p>Arterial streets are required to be cleaned on a monthly basis, and residential streets must be swept at least twice per year. Leavenworth's crews have met these goals and have cleaned ALL streets a minimum of 4 times in 2015. GPS tracker installed in two street sweepers for most of the sweeping season assists in managing the sweeping program.</p> <p>Two sweepers generated 525 tons of debris while sweeping for 2028 hours in 2015</p>
6.3.1	Snow Removal Operations.	Upgrade the City's Snow removal equipment.	<p>The salt trucks are ground speed controlled which allows for a more precise application rate of the salt/sand mix. Mix ratio is modified to reduce the volume of salt and materials applied to the roadways. City has moved toward more salt/sand rather than all salt for most storms. Review of application rates finds that they are within guidelines. Staff is also becoming more familiar with the controls of the spreaders to ensure proper application of sand and salt. GPS trackers are installed in four key snow removal vehicles. All salt and sand is stored in covered structures.</p>

6.3.2	Evaluate Snow Disposal Area and salt loading areas	Ensure Runoff and Melting snow is controlled from areas to avoid direct runoff to creek.	<p>City identified possible erosion-prone areas from snow disposal area and constructed berms in 2015 to reduce direct runoff of melting snow directly to creeks in the spring</p> <p>City identified potential issues related to the salt loading area at the Service Center as current containment practices appear only partially effective. A project will be developed to ensure better runoff control.</p>
6.4	Leaf Pick Up.	Establish a City wide program offering leaf pick up.	Leaf collection is scheduled in half of the City each year (alternating). Other disposal options are available to the public - free brush site use and regular refuse collection.
6.5	Review City Facilities for pollution and erosion concerns	<p>Conduct Annual Inspection of key improved City Property</p> <p>Inspect selected city properties</p>	<p>Annually evaluate key city properties for pollution and erosion concerns, make recommendations related to maintenance and/or capital improvements (City Hall, Community Center, Municipal Service Center, WWTP, Parks Shop, Library)</p> <p>Inspect at least two additional city properties to evaluate for pollution and erosion issues, typically parks, leaf/brush disposal areas, snow disposal areas and other unimproved city owned properties</p>

Record Keeping and Reporting (Section F, Items 1-5)

*SAT GRAPH
SWEEP GRAPH*

- Narrative Related to Section F, Items 1-5
- Additional Information for Section F, Item 3
 - Difficulty in Sampling in a Rising Stream
 - Difficulty in measuring Streamflow
 - Simplistic review of Water Quality data from 2014 and 2015

F. Recordkeeping and Reporting

Attach a report which addresses the following subjects:

1. A general assessment of the appropriateness of the various BMPs included for each of the major program elements as follows:
 - a. TMDL regulated pollutants (Appendix A contains TMDL Report Forms)
 - b. Public Education and Outreach
 - c. Public Involvement and Participation
 - d. Illicit Discharge Detection and Elimination
 - e. Construction Site Stormwater Runoff Control
 - f. Post-Construction Site Stormwater Management in New Development and Redevelopment
 - g. Pollution Prevention/Good Housekeeping for Municipal Operations

Issues which may be addressed include:

- a. Are the BMPs appropriate for local population?
 - b. Are the BMPs appropriate for the pollution sources?
 - c. Are there specific concerns related to the local receiving waters that may justify a change in BMPs?
2. An assessment of the effectiveness of the BMPs towards achieving the statutory goal of reducing the discharge of pollutants to the Maximum Extent Practicable (MEP).
 3. Provide a summary of results of information collected and analyzed, if any, during the reporting period, including any monitoring data used to assess the success of the SMP.
 4. Provide a summary of the planned changes in stormwater activities which are scheduled to be undertaken during the next annual reporting cycle. This should address the implementation of new BMPs and/or the deletion of BMPs and include a projected schedule for the month or quarter when the BMP will be either implemented or discontinued. Please note a revised SMP should be submitted for KDHE approval if BMPs are revised.
 5. Provide a list of other municipalities/contractors, if any, which will be responsible for implementing any of the program areas of the SMP.

(PAGE 05)

DIFFICULTIES OF RISING STREAM

DIFFICULTY IN MEASURING FLOW

DETERMINED BASED IMPACT ON WQ.

GEN NATURE OF SAMPLING PROGRAM

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems
January 1, 2015 – December 31, 2015 - DRAFT

Section F: Recordkeeping and Reporting

1. *A general assessment of the appropriateness of the various BMPs included for each of the major program elements as follows:*
 - a. **TMDL Regulated Pollutants.** Not Applicable
 - b. **Public Education and Outreach.** Stormwater information is disseminated to the public through numerous channels such as the city newsletter, press releases, posting documents on the city website, and placing reference material at the Public Library. For news and distribution of relevant material associated with storm debris collection or flood recovery efforts, Facebook, Twitter, television and YouTube are being utilized by the Public Information Officer to reach a larger population in a timely manner. Considering all of these avenues to reach the public, the city's attempt to provide its citizens with updated material is very effective. Updated videos and information would increase the effectiveness of this means of communication. A review of materials placed at the library showed that there had been little to no use of them.
 - c. **Public Involvement and Participation.** The city engages the public by calling for volunteers to work on local initiatives through the several lines of communication discussed earlier. The Annual Spring Clean Up has been effective in reducing pollution as well increasing the public awareness of stormwater BMPs and other city programs. Free drop-off of large items on Free Saturdays continues to be a popular program. Calls for civic organizations to clean and make improvements to city parks throughout the year are being made through an established Adopt-a-Park program with twenty-one parks currently adopted. Arbor Day is observed yearly and the city continues to be part of the Tree City USA program. An Adopt-a-Stream program has not been established however cleaning along streams has occurred in public spaces through the Spring Clean-up and spontaneous citizen efforts coordinated with through the Parks Department. Brochures and newsletters are published throughout the year that include code enforcement information and more information about any discarded debris and the proper place to discard it.

City receives occasional calls from groups such as Boy Scouts related to public service projects. One of these projects removed a significant amount of debris between 6th Street and 7th Street along Three-Mile Creek as a result???

Related activities in 2015 included the Annual Spring Clean-up Program held April 5, 2015?? which had an increased number of participants with ?? new groups in 2015 with a total of around 1,200 volunteers picking up trash throughout the City, the Legacy Tree

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems
January 1, 2015 – December 31, 2015 - DRAFT

Program saw an additional twelve trees planted in 2014, and the city participated in the County-wide clean-up effort on October 17, 2014

In addition - The Leavenworth Times newspaper published an article informing the public on green ways of household hazardous waste collection and informing them of the Recycling Center to keep waste from "dumping down the drains" and the importance of it not entering our water.

- d. **Illicit Discharge Detection and Elimination.** In order to control improper disposal of waste to the storm sewer system, the City of Leavenworth makes material available through flyers and online regarding household hazardous waste and its proper disposal. Wastewater Superintendent has worked with Public Information Officer and representatives of Fort Leavenworth to distribute information for disposal of outdated medicines. This has also been posted to the Webpage. Parks Department reports that the "Pick up Your Dog Doo" plan continues to be a very effective at the parks where it has been implemented.

Storm sewers are examined with the city's camera truck which allows for sewer lines to be videotaped and searched for improper connections or line failures. The purchase of a "Pole Cam" in 2014 continues to facilitate a much quicker inspection time. The city has completed the storm sewer map and it is available on the GIS system and as a paper map (upon request). Technical information on the map continues to be verified through use of physical inspection and hand held GPS, particularly to correctly note diameters and locations of storm sewer structures. The final GIS database will include size, horizontal location as well as invert and top elevations for all storm structures and outfalls.

The city has an ongoing cleaning and CCTV program for the sanitary sewer lines. This work has identified several locations that will be repaired as part of the current effort to reduce Inflow and Infiltration. There is much better coordination between the CCTV effort and the I/I effort than in previous years.

The twenty-six creek crossings by the sanitary sewer system are inspected at least three times each year. This includes regularly scheduled inspections as well as after rainfall events in excess of ??? inches

In 2013 the City began requiring all exterior clean-out caps on sanitary sewer lines be "screw caps" rather than "press-on caps". This has reduced the number of SSO events that release sewer water to environment, and has had the intended consequence that

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

property owners maintain their sewer service lines to avoid sewer back-ups into the homes.

The City began inspection of commercial facilities with grease traps (or who might/should have grease traps) inspection program in 2014. This program is a combination of inspection and education to ensure that the grease traps are properly maintained which helps to prevent blocked sewer lines, which prevents sanitary sewer water from entering the environment. This has resulted in at least one institution installing the correct grease trap, and others increasing their maintenance effort.

In 2015 the City followed up the initial contact with grease trap owners in 2014 with multiple requests for inspection records. While some businesses are able to comply when notified, others have had to be contacted multiple times for results. Several businesses have been physically inspected by city inspectors to verify grease trap operations. In general – the education and awareness portion of the plan seems to be effective, however routine maintenance of the grease traps varies considerably. On-site inspections were effective in meeting program goals of awareness and education.

It is likely that additional ordinances specific to grease trap maintenance will be necessary for greater compliance. It will be necessary to coordinate this with other city departments before it can be implemented.

City employees are reminded at staff meetings and safety meetings to report any activity that is questionable to their supervisor and/or the City Engineer Office. The maps identify all storm water facilities and outfalls and are used by employees and supervisors to evaluate concerns identified in the field.

- e. **Construction Site Stormwater Runoff Control.** City implemented a “Land Disturbance Permit” (LDP) in early 2015. This was in response to concerns raised by EPA in their report on the 2013 inspection. The City has formalized many of the processes that are involved in Construction Site Runoff Control. A copy of the LDP process is included with this report. The LDP has been very successful ensuring owners and contractors know their responsibilities, and has dramatically reduced erosion and sedimentation from construction sites .

Enforcing the LDP is time consuming during both office and field review requirements. City is evaluating several digital alternatives to better manage staff time to ensure the permits are being complied with.

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

Plan review and construction site inspection are the city's first line of defense in protecting water quality in developing areas. The initial planning process for large and small developments includes a formal focus on stormwater quantity, quality and control measures as part of the Development Review Committee meeting with project sponsors and developers. Staff comments on plans reviewed are submitted in writing.

Weekly meetings are held in the Public Works office to review stormwater issues on current city and developer projects both in the design and construction phase.

The city guidelines related to stormwater quantity and quality issued in draft form in 2014 were approved by the City Commission in early 2015. They rely upon the technical work completed in other documents – particularly the MARC BMP Manual, APWA Section 5600 and City of Leavenworth Stormwater Master Plan 1995.

City staff has attended a variety of training and educational events to become more effective in addressing the construction site runoff situation. This includes attendance at regional classes, vendor demonstrations and review of documentation in use by other municipalities.

- f. **Post-Construction Site Stormwater Management in New Development and Redevelopment.** City implemented a "Land Disturbance Permit" (LDP) in early 2015. This was in response to concerns raised by EPA in their report on the 2013 inspection. The City has formalized many of the processes that are involved in Post-Construction Stormwater Management. A copy of the LDP process is included with this report. The LDP has been very successful ensuring owners and contractors know their responsibilities, resulting in dramatically reduced erosion and sedimentation from construction sites after the construction is complete.

On City funded projects, contractors are responsible for landscaping for 2 years following construction rather than the previous period of one year. This practice ensures that an acceptable grass stand is established in the area to stabilize soils and increase infiltration by reducing runoff velocity.

On most developer funded project the city requires that the approved plans be followed. This typically requires maintaining erosion control measures until a minimum of revegetation of the site is met, and maintaining all other BMP activity. The permit is completed with issuance of a certificate once the post construction measures are fully implemented. The City has increased periodic inspection of post-construction sites to ensure compliance with the regulations by reviewing the status of active projects at weekly staff meetings.

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

Also, the city has notified several detention pond owners in order to inform them of proper maintenance procedures and requirements. This program needs to be more aggressively pursued to be effective.

- g. **Pollution Prevention/Good Housekeeping for Municipal Operations.** The leaf collection program continues in the Fall (curbside pick-up is one-half of the city each year), more efficient application of salt and sand to the roadways through better equipment, street sweeping operations, and extended sweeping season are all effective in decreasing pollutants from entering the storm sewer system. Beyond these steps the city has 2 full time employees dedicated to the cleaning of storm inlet structures with a vacuum truck. At least **xxx inlets??** were inspected and cleaned in **2015, and an additional XXX visited by the GPS locating crew.**

The addition of the ground speed control systems on the spreaders has improved consistency of application rates and they remain within the recommended rates of application. The street sweeping program has exceeded performance standards. City ensures chemicals (including salt) are stored in covered facilities, and that all personnel using herbicides/pesticides are trained appropriately. The City offers free disposal of grass and leaves, and free drop-off of recyclable goods is available.

City staff reviewed the general state of water quality management selected city facilities in late 2015. Two items were identified and action taken:

- The snow disposal area used when snow is trucked from the downtown area had a detention berm constructed around the perimeter of the site to reduce any direct runoff as the snow melts. Additional work was done to improve truck access to the site which reduced the disturbance to the gravel surface of the disposal area.
- The salt/sand operational area at the Municipal Service Center area was evaluated for functionality of containment of run-off from storage and truck loading. In general the site functions well, but substantial degradation of creek banks from erosion was noticed. City forces cleared vegetation that obstructed the view of the creek and installed silt fence. A project that will improve water quality for the salt/sand area and reduce erosion of the creek banks is expected to be completed in 2016.

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems
January 1, 2015 – December 31, 2015 - DRAFT

The results of the limited inspection of city facilities indicated that a greater effort needs to be in-place to evaluate ALL city facilities. Additional facilities will be evaluated in 2016, and it will be proposed to expand the program to all city property.

The city implanted a small water quality feature on selected stormwater inlets in 2014, and continued with an additional sixteen inlets in 2015. Many new or reconstructed inlets have a sufficiently wide throat to form "directional vanes" in the concrete to assist in efficient water movement to the inlet. The dimensions are generally about 3" wide, 3" deep and 18"-24" long. The city modified these vanes to have a closed lower end to trap sediment from low flow events. The intent is that the Solar UV radiation will degrade any pollutants, and the sediment will wash out under heavy rains to be replaced with sediment from the next low flow event. Visual inspection by city staff indicates that these modified vanes are working as intended.

Further Discussion of BMP's in general

City opinion is that the BMP approach to the current level of stormwater activity in Leavenworth is entirely appropriate. They address the main concerns of the city; water quality and construction site run-off. The implementation of the LDP has improved erosion and runoff during and after construction on many projects. The aggressive street sweeping program catches much of the salt and sand from winter operations before the spring rains. Grease trap and detention basin inspection are new important programs. Staff is aware of the significance of the stormwater issues reviewed by KDHE and seeks to ensure compliance by having an empowered staff and opportunities for the public to comment or become involved.

The paragraph above notes that the BMP's are appropriate to the City. However, it is apparent that the current Stormwater Management Plan can be updated to reflect the current city approach to BMP's and stormwater. A revised plan will be submitted with these changes as part of the 2015 Annual Report.

2. *An assessment of the effectiveness of the BMP's towards achieving the statutory goal of reducing the discharge of pollutants to the Maximum Extent Practicable (MEP).*

The City of Leavenworth has evaluated the functionality of various types of BMPs in Leavenworth while preparing for the adoption of an updated stormwater design manual. BMP overall effectiveness, economy, and general upkeep needs will drive BMP selection on future developments in Leavenworth. For instance, most in-situ soils in Leavenworth have low permeability which has led the Public Works staff to favor BMPs focused more on pollutant removal rather than stormwater infiltration. Recently constructed detention basins and bank stabilization projects have proven stable in normal rains. The storm of July 6th 2015 (4" or rain in an hour) did damage bank protection rip-rap on Five-Mile Creek at the treatment plant, and

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

Three-Mile Creek between Esplanade and 2nd Street. Both of these locations have projects budgeted in the CIP for repairs.

The successful operation of ground speed control on salt spreaders and performance of the street sweeping program have improved water quality of discharges to the creeks and rivers.

The increased focus on the construction site monitoring program has been generally effective. The city is seeking more effective methods to efficiently inspect these permits.

The increased number of programs and greater inspection effort have made it clear that without enforcement there is minimal effort on the part of owners and contractors on complying with record keeping. An effort in 2016 will be to create better ordinances related to compliance in these areas.

3. *Provide a summary of results of information collected and analyzed, if any, during the reporting period used to assess the success of the SMP.*

Stormwater from the MS4 has been tested during five events in 2015. Additional testing in selected detention basins and over the winter months has occurred as well.

Testing dates in 2016 are shown below:

- May 5th
- May 14th
- June 3rd
- July 20
- October 31
- November 5th

A summary of the results is included in the Appendix A along with several detailed graphs and charts in Appendix C.

The city also monitored several detention basins to evaluate performance. This information is communicated back to the designer in most cases, and adjustments made if necessary to the outfall structure.

In general the city observed the following during this process

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

1. **The stream stage is extremely sensitive to rainfall intensity and duration.** It was difficult to have all of the samples taken during a “rising Stream” stage. A report of summarizing these observations is included. Key concerns are
 - a. It will require substantial investment in equipment and staffing to operate a testing environment that can reliably take samples in rising stream stages.
 - b. City has not performed a literature search to determine if water quality varies between rising and falling stages

2. **Measuring Stream Volume is difficult.** City has used manual and “stage-discharge” charts to estimate volume while sampling. There are significant differences between the methods. A report summarizing these concerns is included.

3. **Differences in water quality are difficult to interpret.** A very simplistic analysis shows that in 2014 – water quality was improved by flowing through the City of Leavenworth. This was NOT TRUE in 2015. In 2015 some storms saw better water quality after passing through Leavenworth, and at other times not. This improvement (or not) varied between Three and Five-Mile Creek on occasion. The detailed information is in the appendices.

Three Mile Creek - 4 event 2014		
	NC/Better	Worse
Total Phosphorus	1	3
Ortho Phosphate	0	2
Nitrate+Nitrite	2	2
Total Kjeldahl Nitrogen	2	2
Total Suspended Solids	3	1
Turbidity	4	0
E.Coli		
	12	10

Five-Mile Creek - 4 event 2014		
	NC/Better	Worse
Total Phosphorus	3	1
Ortho Phosphate	2	0
Nitrate+Nitrite	0	4
Total Kjeldahl Nitrogen	4	0
Total Suspended Solids	2	2
Turbidity	2	2
E.Coli		
	13	9

Three Mile Creek - 6 event 2015		
	NC/Better	Worse
Total Phosphorus	1	5
Ortho Phosphate	3	3
Nitrate+Nitrite	2	4
Total Kjeldahl Nitrogen	3	3
Total Suspended Solids	3	3
Turbidity	2	4
E.Coli	0	6
	14	28

Five-Mile Creek - 6 event 2015		
	NC/Better	Worse
Total Phosphorus	2	4
Ortho Phosphate	5	1
Nitrate+Nitrite	0	6
Total Kjeldahl Nitrogen	4	2
Total Suspended Solids	2	4
Turbidity	3	3
E.Coli	5	1
	21	21

CITY OF LEAVENWORTH

Kansas Stormwater Annual Report Form for Municipal Separate Storm Sewer Systems

January 1, 2015 – December 31, 2015 - DRAFT

4. *Provide a summary of the planned minor changes in stormwater activities to accomplish the SMP designated goals that are scheduled to be undertaken during the next annual reporting cycle.*

The City expects to perform the following changes in 2016:

1. A revised Stormwater Management Plan has been submitted with this Annual Report
2. Consider revisions to the "Stormwater Guidelines" especially related to effective implementation, and consider implementation of a fee and fine schedule.
3. Intensify the commercial Grease Trap Program – especially for maintenance records. Consider a fine schedule for Grease Trap maintenance.
4. Begin the Detention Pond information effort. Owners will be contacted directly to promote the importance of functioning detention facilities and proper maintenance to local home associations to improve pond operation and reduce erosion. Initial contact will be by mail prior to June 1.
5. City will continue to observe performance of selected detention ponds and related facilities during the heavy rainfall season. City will evaluate hardware and software to create some level of automation related to stream stage and sampling.
6. Increase staff training related to construction site inspection and post construction inspection activities throughout the year. Increase exposure of related staff members from building inspection and code enforcement to stormwater issues.
7. Seek opportunities with community groups to improve awareness of stormwater issues
8. Evaluate at least three city facilities for stormwater quality and quantity concerns. Prepare a report with recommendations.

5. *Provide a list of other municipalities/contractors, if any, which will be responsible for implementing any of the program areas of the SMP.*

None

Section F, Item 3, Topic 1

Difficulty in obtaining samples in the rising stream

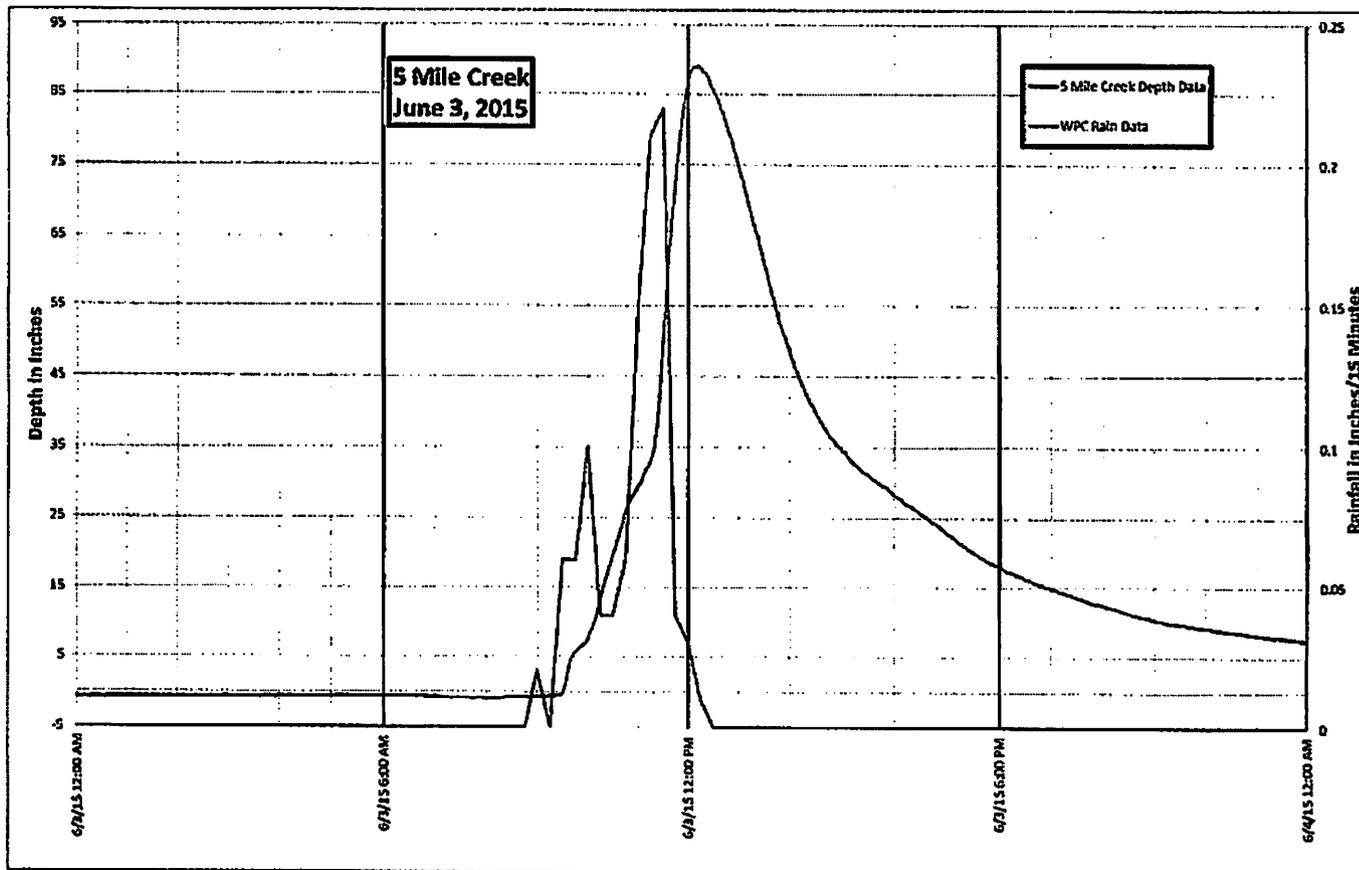
The City has conducted two years of sampling effort as part of the MS4 permit.

It has been difficult to have the sampling team obtain samples from a rising stream stage of both Three-Mile and Five-Mile Creek. The table below indicates the time-frames associated with peak of rainfall, peak stream stage and sample time. Staff can determine the amount of rain that has fallen in (usually) four locations within the city to within fifteen minutes of the current time if the rainfall is occurring during "awake" hours, typically 6:00 AM to 11:00 PM.

Three Mile Creek				
Storm	15 min. Peak Rain	Creek Peak	Sample Time	24 Rainfall inch
5-May	7:15 PM	8:00 PM	8:30 AM	1.02
14-May	2:45 AM	5:00 AM	10:00 AM	0.52
3-Jun	11:15 AM	12:00 PM	12:15 PM	1.22
20-Jul	4:00 AM	5:30 AM	8:30 AM	0.64
31-Oct	10:00 PM	12:15 AM	8:30 AM	0.85

Five-Mile Creek				
Storm	15 min. Peak Rain	Creek Peak	Sample Time	24 Rainfall inch
5-May	7:45 PM	12:15 AM	9:30 AM	1.44
14-May	3:00 AM	5:00 AM	10:00 AM	0.59
3-Jun	11:30 AM	11:45 AM	1:00 PM	1.04
20-Jul	4:15 AM	5:00 AM	9:30 AM	0.75
31-Oct	10:00 PM	2:00 AM	9:00 AM	0.27

The graphs show the relationship between rainfall and stream stage. The two main streams in Leavenworth respond quickly and dramatically in both the rising and falling stages. This sensitivity greatly impacts the ability of the samples to be taken at rising stream stages at both up and downstream locations.



Factors that influence this situation

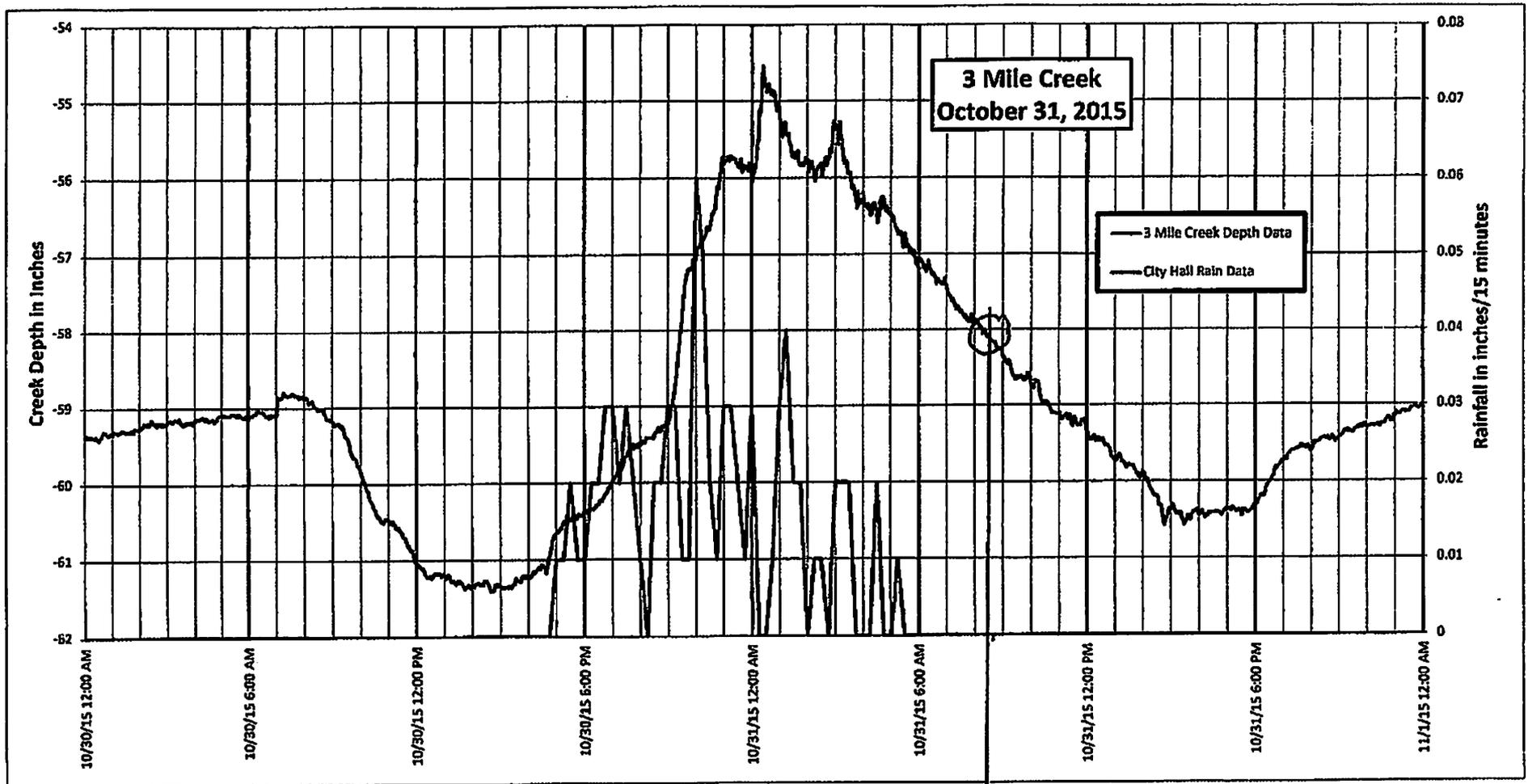
- Intensity rainfall and rainfall timing, especially when it will end
- Responsiveness of stream to rainfall
- Time of day (heavy rainfall events during the day have a better chance of meeting the goal)
- Day of week (weekdays have a better chance of meeting the goal)
- Distance between sampling points (even the hour it takes to travel to all four sites reduce stage dramatically)

It is understood that KDHE and the City are interested in determining the impact of city activity on quality of water flowing through the city. It is also expected that water quality varies by month of the year. The following methods have been identified as being likely to result in focused information. The city will continue to seek cost effective methods of meeting the KDHE goals by focusing on variations of option 2 below.

1. Install a semi-permanent stream gage that is connected to a semi-permanent automatic sampler. The sampler would be activated by the stream gage, and draw samples at set intervals until the stream recedes. The key samples could be sent for laboratory analysis (or all of them for that matter). Buying equipment and installation cost of a sampling station would be approximately \$20,000 to \$40,000 each, plus the cost of sampling, and there are four locations in the City of Leavenworth, or

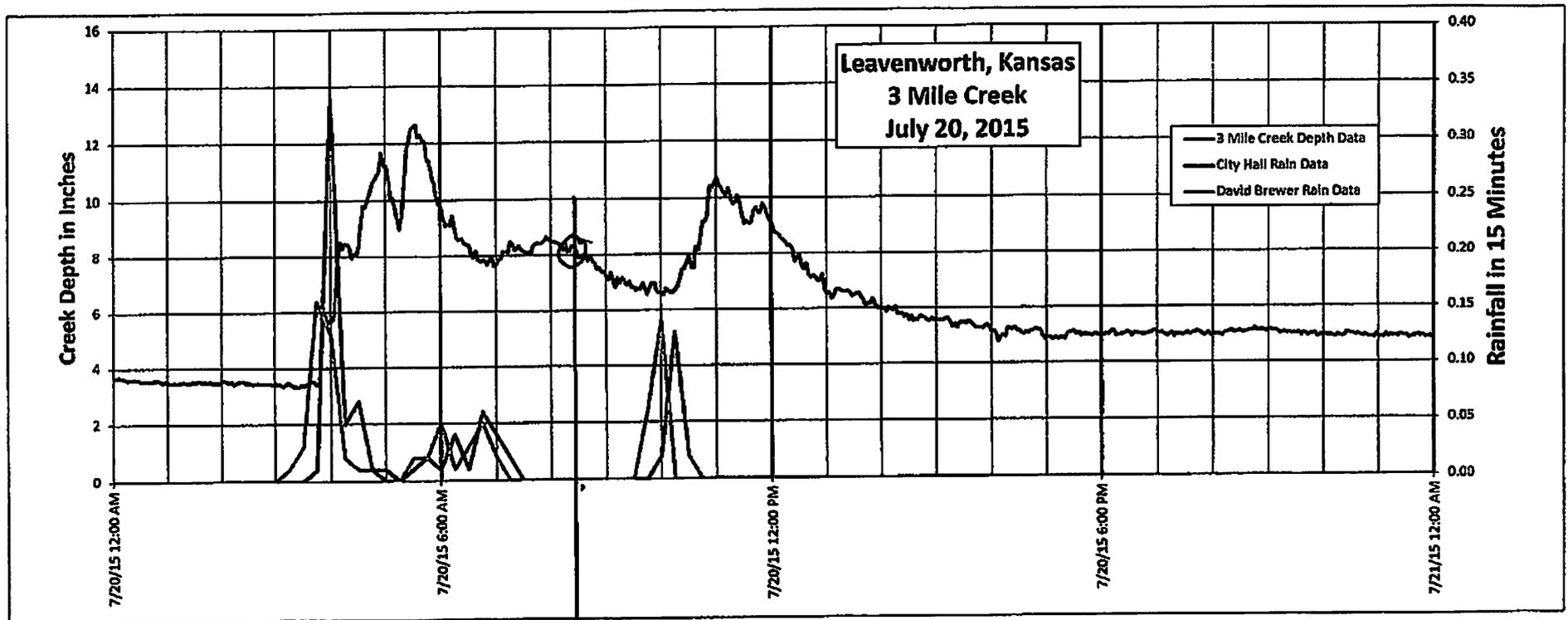
- 
- 2. Have the sampling team prepare to run the sample route at the first sign of rain when the total is forecast to be over 0.5". Once all areas have at least 0.25", run the route. If it is still raining, run it again. Stop running the route when stage levels are decreasing. Send the best set of samples in the rising stages to the laboratory (or send them all). This method creates the need for a LOT of sampling gear, increases record keeping complexity, and removes key staff from the daily workforce.**





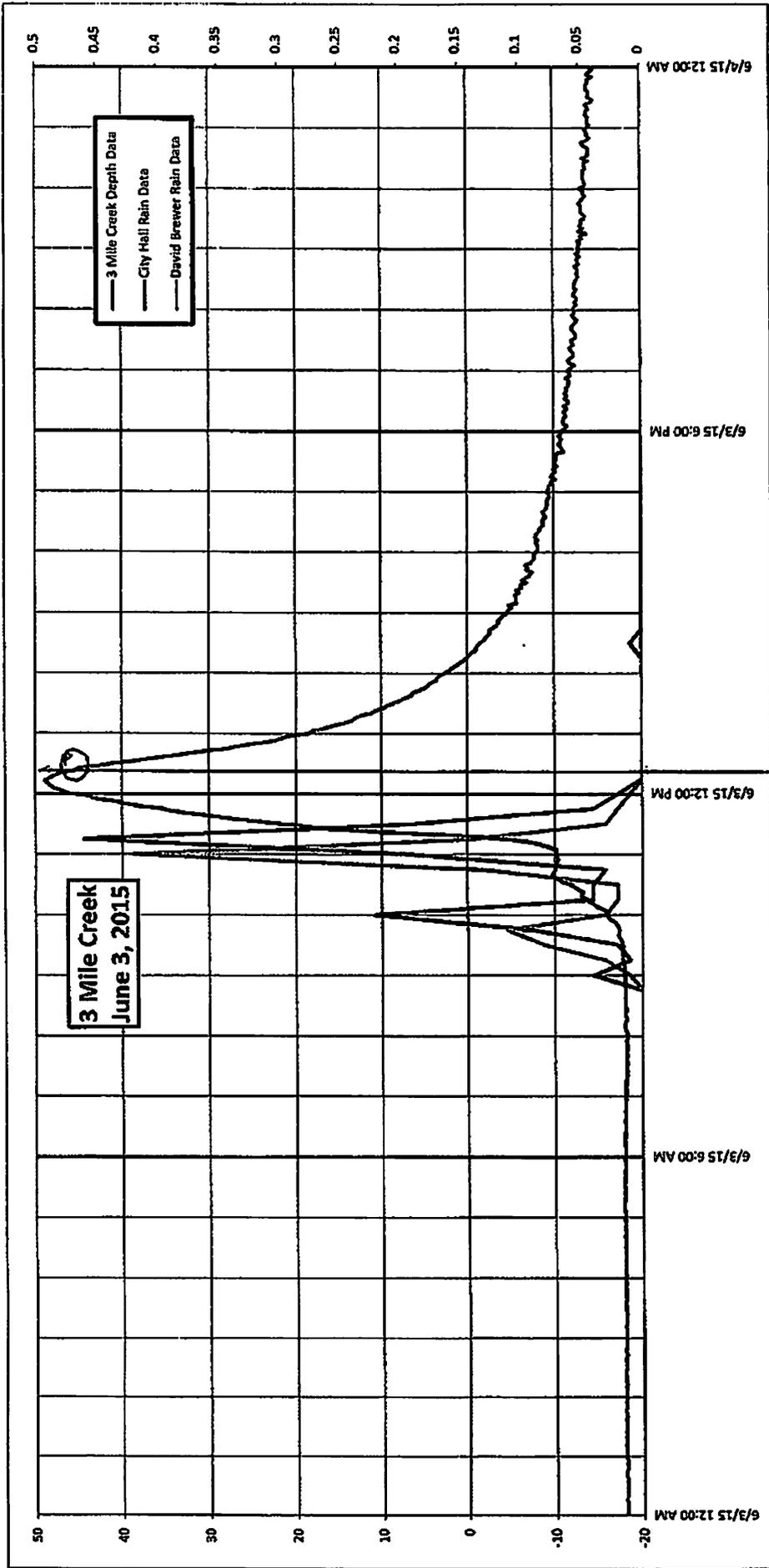
RAIN 10/30 -0.62
10/31 0.23

OCTOBER 31, 2015
SAMPLING 0830 ✓



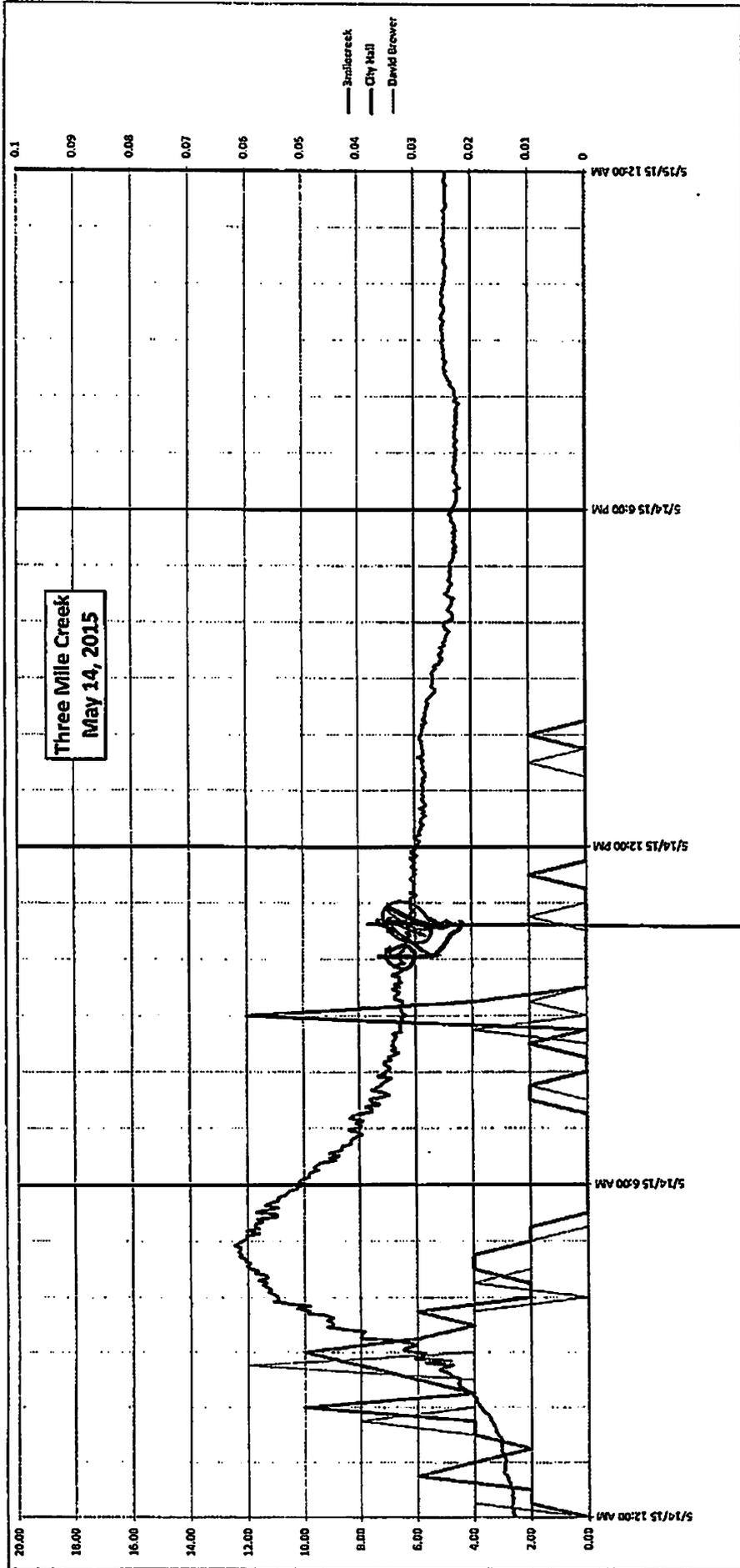
July 20, 2015
 SAMPLING 8:30 -

RAIN ~~1.00~~ 0.70
 AT SAMPLING
 CITY HALL 0.70
 DAVID BREWER 0.57



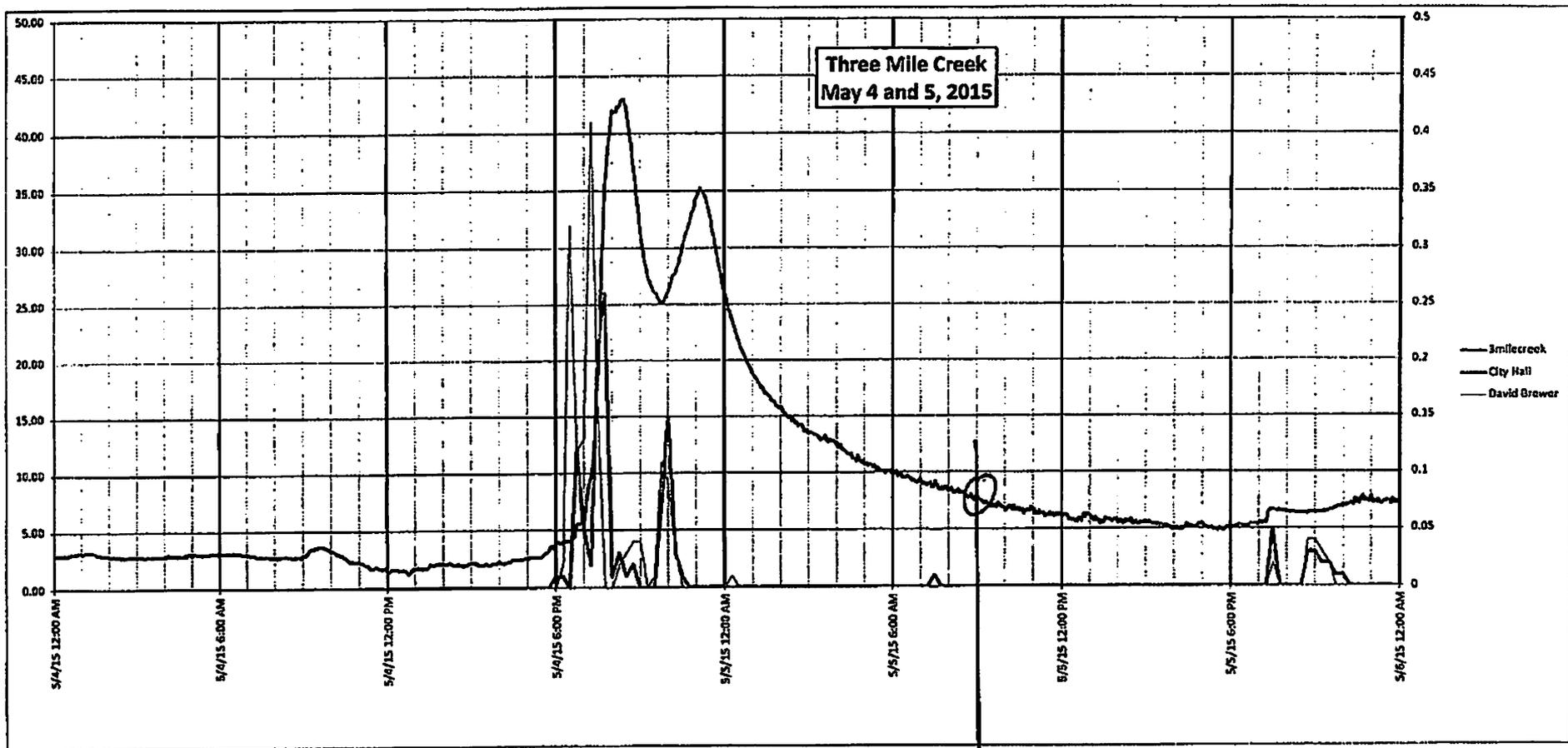
RAIN or SAMPLING
 CITY HALL 1.39"
 DAVID BREWER 1.05

JUNE 3, 1230
 SAMPLES



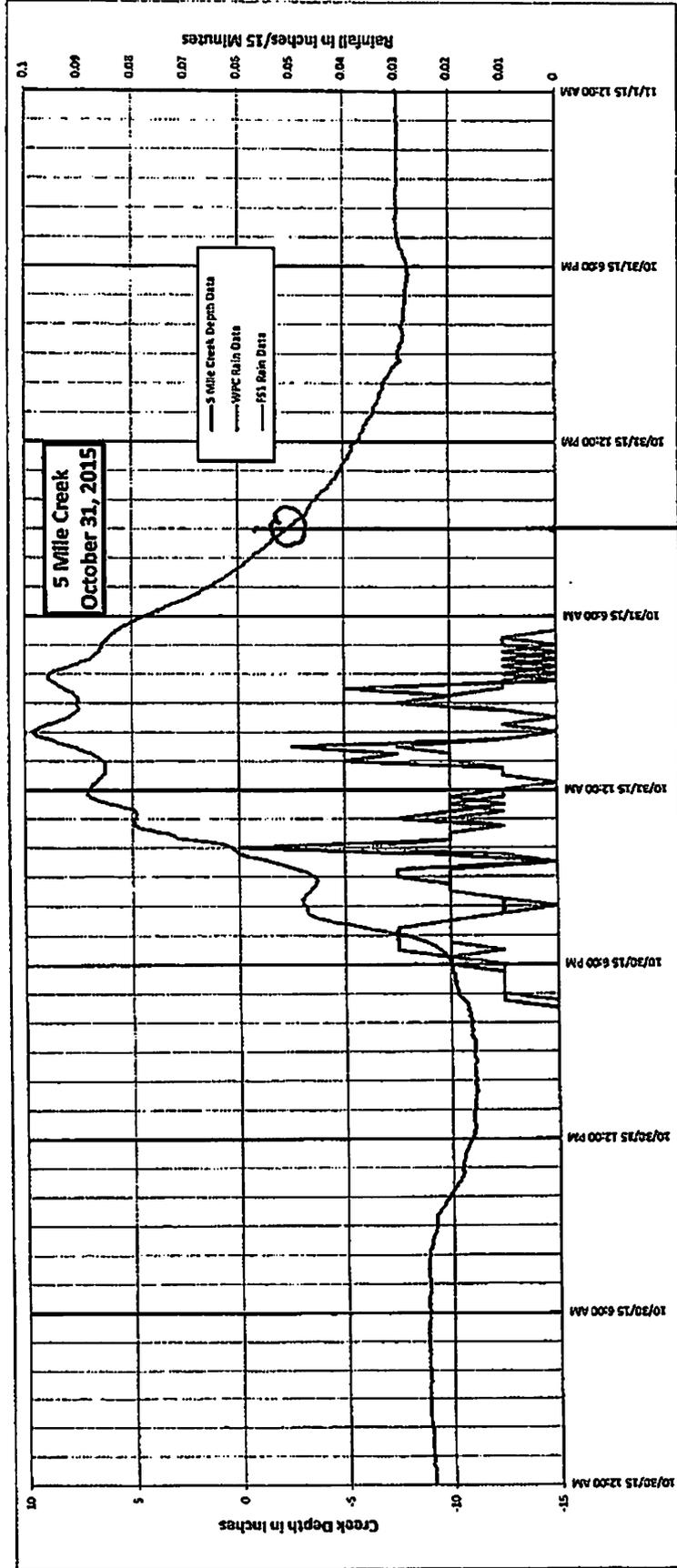
RAWFAN AT SAMPLE
 CITY HALL 0.58
 DAVID BREWER 0.46

SAMPLING ~~10:10:10~~
 MAY 14, 2015



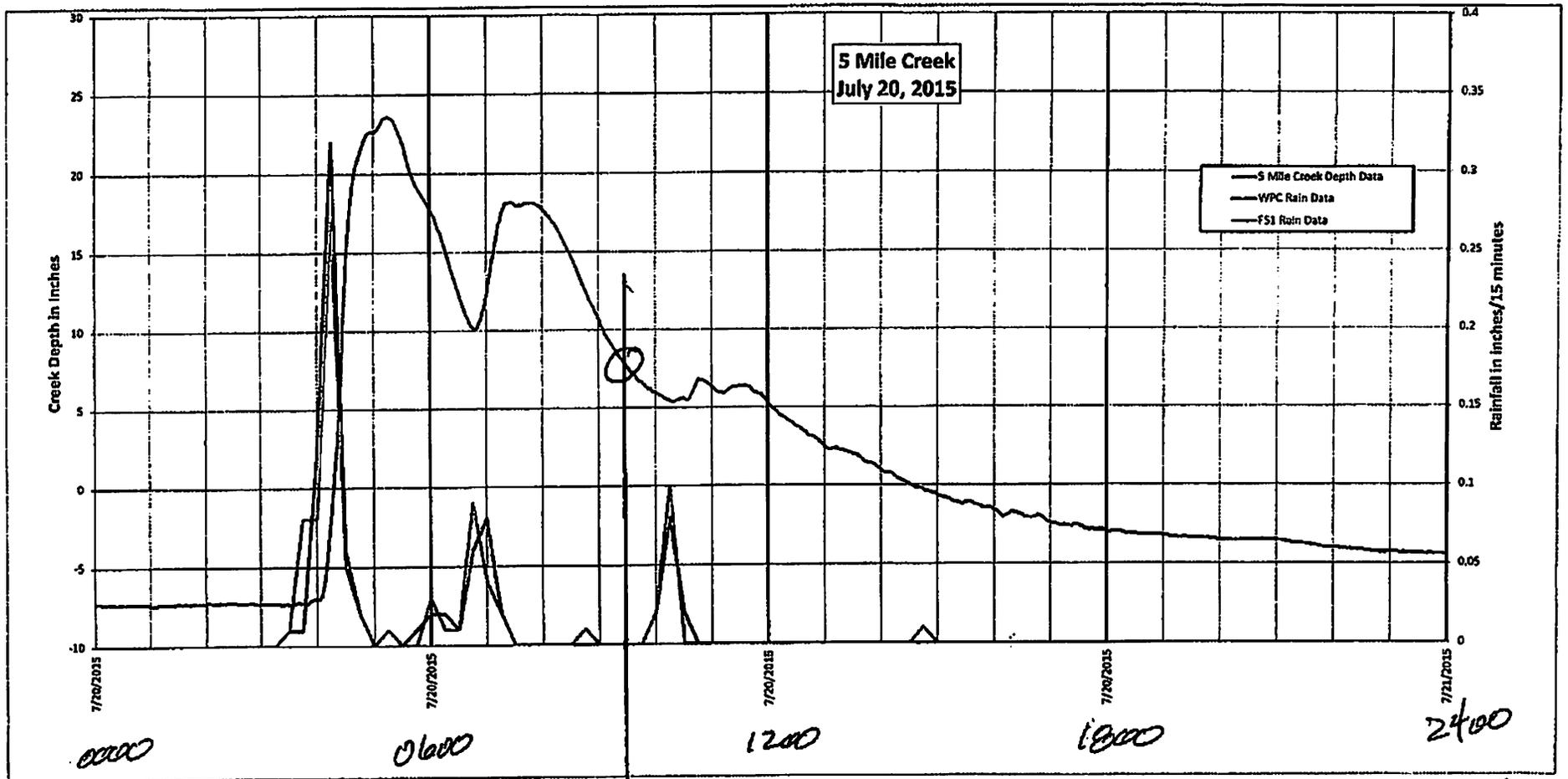
Row of Sampler
 City Hall 0.75
 David Brewer 1.28

SAMPLING @ 0800 0830
 MAY 5, 2015



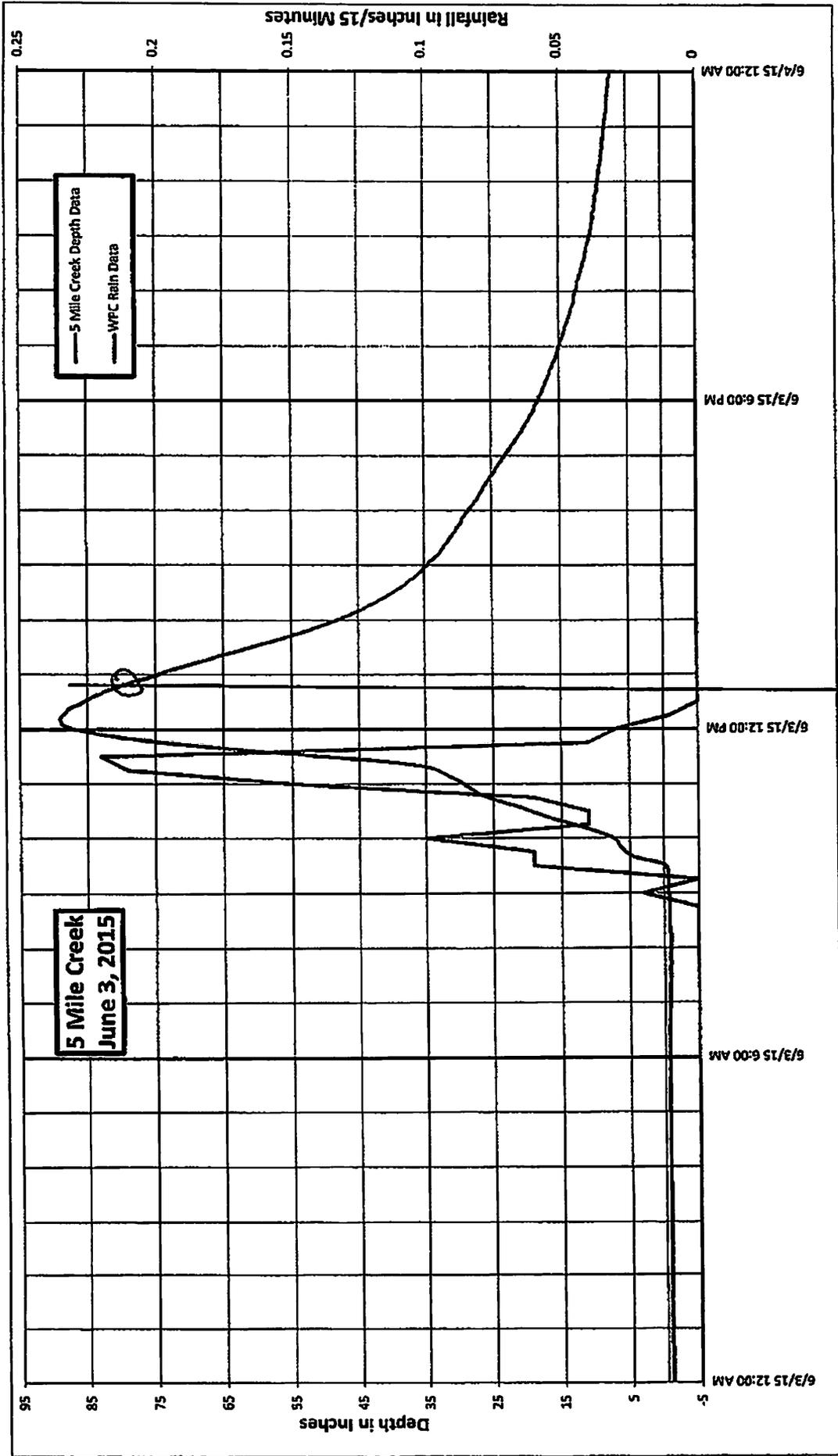
RAIN AT SAMPLE
 WPC 0.31
 F51 0.22

OCTOBER 31, 2015
 0900 SAMPLES



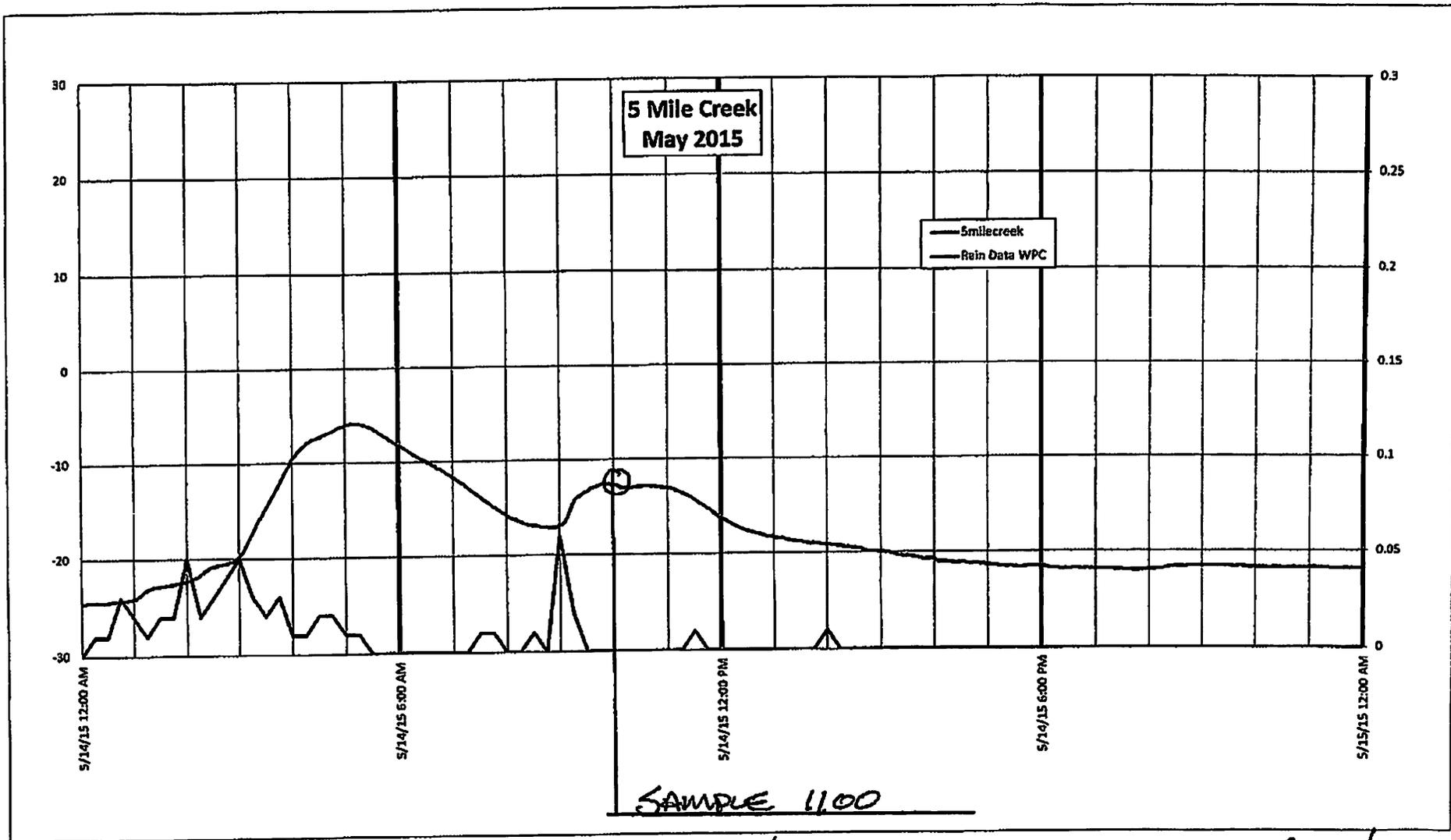
July 20, 2015
 SAMPLING 0930 ✓

RAIN AT SAMPLE
 WPC 0.17
 FSI 0.73



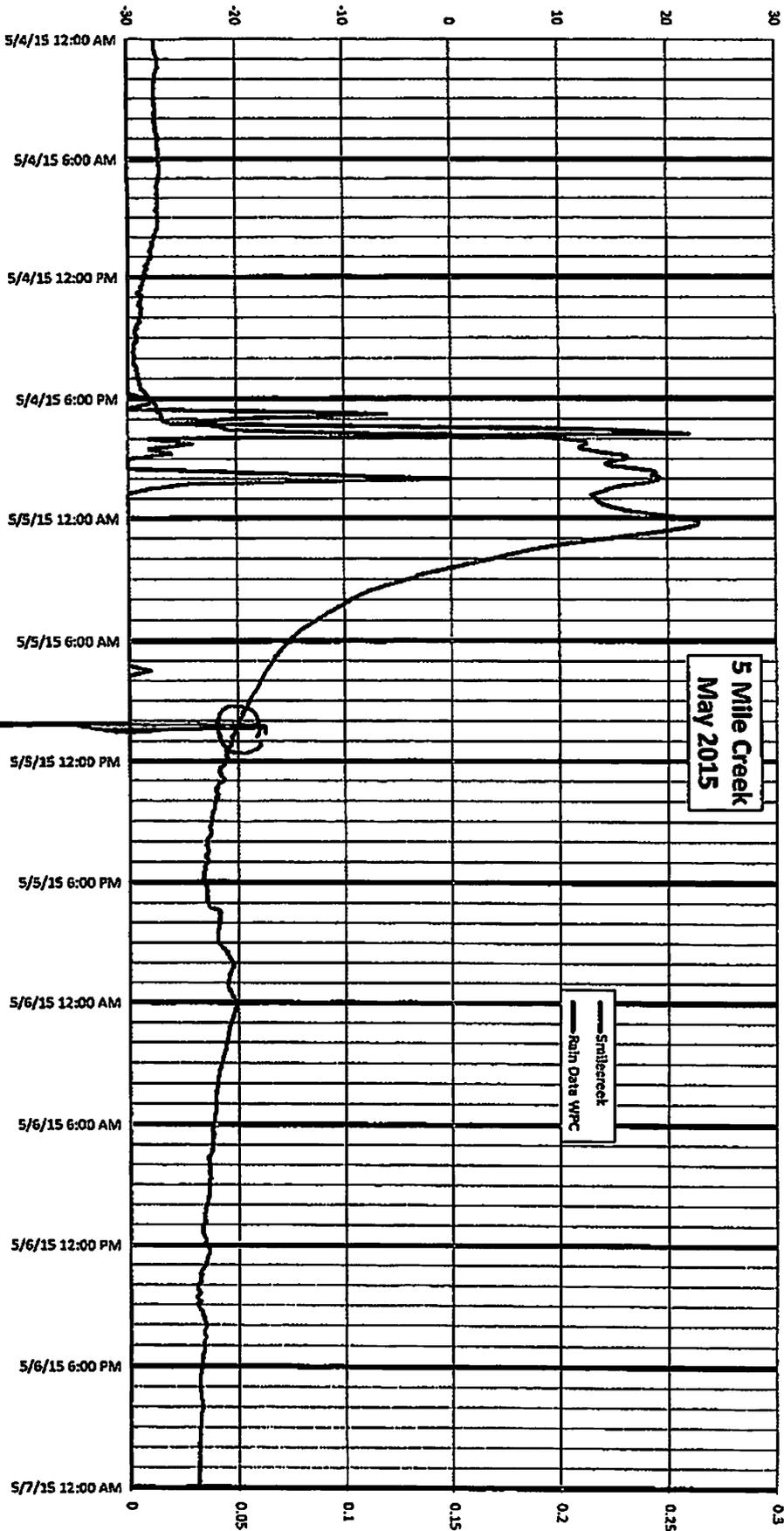
SAMPLE RAIN
WPC 1.04

JUNE 3 2015
 SAMPLE ~~TIME~~ ~~APPROX~~ 1:00 PM



MAY 14, 2015

RAIN AT SAMPLE
WPC 0.5859



5 Mile Creek
May 2015

Smilecreek
Rain Data WPC

SAMPLE ~~WPC~~ 0990
MAY 5, 2015
Rain AT Sample
WPC 1.44

Section F, Item 3, Topic 2

Difficulty in measuring streamflow (volume)

The City has conducted two years of sampling effort as part of the MS4 permit. During this time it has been necessary to determine the volume of water in the stream to calculate the total loading of "pollutants" such as suspended solids, nitrogen and such. The city prepared for the initial sampling effort by determining the elevation of the bottom of the channel at each site, and the elevation of the reference point so that the depth of the flow could be determined. Sightlines were cleared and distances measured so that a floating object could be thrown to a known point and the travel time determined to calculate velocity. In addition a short video in each direction was taken and included in the digital files.

Accuracy of the manual flow volume calculations was a concern. Water Resource Solutions Inc. was contracted to provide Stage-Discharge curves for all sampling locations. This provided a more repeatable calculation that requires only the depth of the flow. These charts were used in the 2014 and 2015 annual reports.

There are dramatic differences between the calculated flow and the flow from the stage-discharge charts. It is not clear which is more accurate. The concern of the city is that with a distributed network of data gathering across the state (all Phase I and Phase II cities) and no "approved" formal process to determine flow quantity – it is entirely possible (in-fact quite likely) that all of the flow volume data collected in the last two years is unreliable, and possibly useless. It is strongly suggested that KDHE review any flow volume data collected under this sampling program to ensure that it is sufficiently accurate to meet the goal. The City of Leavenworth does have a video record of each sampling event to allow some level of independent verification if necessary.

Flow Volume Calculations - CFS									
2015 Storm	Three Mile Creek - Downstream		Three Mile Creek - Upstream		Five-Mile Creek - Downstream		Five-Mile Creek - Upstream		
	Chart	Manual	Chart	Manual	Chart	Manual	Chart	Manual	
5-May	190	39	300	26	180	89	30		12
14-May	45	28	40	18	150	96	35		9
3-Jun	7700	3080	1300	568	1900	714	330		74
20-Jul	N/A	58	45	23	N/A	59	30		19
31-Oct	0	0	30	8	135	55	20		8
5-Nov	140	64	500	52	600	179	35		21



It is understood that KDHE and the City are interested in determining the impact of city activity on quality of water flowing through the city. It is misleading to simply use the concentration of "pollutants" as the basis to make decisions without accurate flow data. KDHE is urged to identify approved methods to determine flow volume. City will be evaluating improvements related to option #2 and #3 below.

The City has identified the following as methods that can be used to more accurately measure streamflow

1. Gather more accurate data at sampling location at each event.
 - a. Verify flow width through use of plumb bob or similar
 - b. Use a velocity probe and take multiple measurements.
 2. Review and refine current techniques.
 - a. Discuss with flow measurement professionals
 - b. Modify standard procedures if necessary
 3. Review the field data and if appropriate – revise the Stage-Discharge graphs.
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City of Leavenworth
Comparison of calculated flow rates
8-Jan-16

Flow Volume Calculations - CFS								
2015 Storm	Three Mile Creek - Downstream		Three Mile Creek - Upstream		Five-Mile Creek - Downstream		Five-Mile Creek - Upstream	
	Chart	Manual	Chart	Manual	Chart	Manual	Chart	Manual
5-May	190	39	300	26	180	89	30	12
14-May	45	28	40	18	150	96	35	9
3-Jun	7700	3080	1300	569	1900	714	330	74
20-Jul	N/A	58	45	23	N/A	59	30	19
31-Oct	0	0	30	8	135	55	20	8
5-Nov	140	64	500	52	600	179	35	21

Flow Volume Calculations - CFS								
2014 Storm	Three Mile Creek - Downstream		Three Mile Creek - Upstream		Five-Mile Creek - Downstream		Five-Mile Creek - Upstream	
	Chart	Manual	Chart	Manual	Chart	Manual	Chart	Manual
2-Apr	190		200		800		1020	
12-May	190		200		660		880	
1-Oct	200		40		800		1100	
2-Oct	750		45		265		3100	

City of Leavenworth
 Comparison of calculated flow rates
 8-Jan

Flow Volume Calculations - CFS								
2015 Storm	Three Mile Creek - Downstream		Three Mile Creek - Upstream		Five-Mile Creek - Downstream		Five-Mile Creek - Upstream	
	Chart	Manual	Chart	Manual	Chart	Manual	Chart	Manual
5-May	190	39	300	26	180	89	30	12
14-May	45	28	40	18	150	96	35	9
3-Jun	7700	3080	1300	569	1900	714	330	74
20-Jul	N/A	58	45	23	N/A	59	30	19
31-Oct	0	0	30	8	135	55	20	8
5-Nov	140	64	500	52	600	179	35	21

Flow Volume Calculations - CFS								
2014 Storm	Three Mile Creek - Downstream		Three Mile Creek - Upstream		Five-Mile Creek - Downstream		Five-Mile Creek - Upstream	
	Chart	Manual	Chart	Manual	Chart	Manual	Chart	Manual
2-Apr	190		200		800		1020	
12-May	190		200		660		880	
1-Oct	200		40		800		1100	
2-Oct	750		45		265		3100	

City of Leavenworth

Time Difference between Peak Flow and Sampling Time

6-Jan-16

Storm	Three Mile Creek			
	15 min. Peak Rain	Creek Peak	Sample Time	24 Rainfall inch
5-May	7:15 PM	8:00 PM	8:30 AM	1.02
14-May	2:45 AM	5:00 AM	10:00 AM	0.52
3-Jun	11:15 AM	12:00 PM	12:15 PM	1.22
20-Jul	4:00 AM	5:30 AM	8:30 AM	0.64
31-Oct	10:00 PM	12:15 AM	8:30 AM	0.85

Storm	Five-Mile Creek			
	15 min. Peak Rain	Creek Peak	Sample Time	24 Rainfall inch
5-May	7:45 PM	12:15 AM	9:30 AM	1.44
14-May	3:00 AM	5:00 AM	10:00 AM	0.59
3-Jun	11:30 AM	11:45 AM	1:00 PM	1.04
20-Jul	4:15 AM	5:00 AM	9:30 AM	0.75
31-Oct	10:00 PM	2:00 AM	9:00 AM	0.27

City of Leavenworth

2015 Stormwater Sampling Summary

(Note - in calculating CFS - the rating curve was used rather than the observed velocities)

2015		May 5 2015		May 14 2015		June 3 2015		July 20 2015		October 31 2015		November 5 2015	
		West	East	West	East	West	East	West	East	West	East	West	East
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
Three Mile Creek	CFS	300	190	40	45	1300	7700	45	n/a (1)	30	0	500	140
Total Phosphorus	mg/l	0.14	0.24	0.15	0.23	1.1	2.4	0.34	0.18	0.19	0.47	2.4	0.76
Ortho Phosphate	mg/l	ND	ND	ND	ND	0.11	0.15	0.12	0.11	0.18	0.24	0.13	0.18
Nitrate+Nitrite	mg/l	0.33	0.94	0.27	0.37	0.27	0.33	0.39	0.61	0.4	0.38	0.47	0.31
Total Kjeldahl Nitrogen	mg/l	0.88	1.5	0.81	0.88	3	6.3	1.3	0.7	0.77	0.7	31.1	ND
Total Suspended Solids	mg/l	90	98	60	81	1380	1570	372	157	18	41	2970	402
Turbidity	NTU	87.3	117	47.4	57	804	1380	273	100	8.6	10.2	1320	69.8
E.Coli	col/100ml	2247	3873	866	9090	12997	98700	20980	13540	3448	5172	34500	42800

Three Mile Creek - 6 event 2015		
	NC/Better	Worse
Total Phosphorus	1	5
Ortho Phosphate	3	3
Nitrate+Nitrite	2	4
Total Kjeldahl Nitrogen	3	3
Total Suspended Solids	3	3
Turbidity	2	4
E.Coli	0	6
	14	28

2015		May 5 2015		May 14 2015		June 3 2015		July 20 2015		October 31 2015		November 5 2015	
		West	East	West	East	West	East	West	East	West	East	West	East
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
Five Mile Creek	CFS	30	150	35	150	330	1900	30	n/a (1)	20	135	35	600
Total Phosphorus	mg/l	0.18	0.34	0.29	0.13	2.4	1.6	0.47	0.19	0.14	0.13	0.19	0.68
Ortho Phosphate	mg/l	ND	ND	ND	ND	0.11	0.14	0.15	ND	0.14	0.14	0.12	0.15
Nitrate+Nitrite	mg/l	0.22	0.46	0.12	0.23	0.21	0.28	0.42	0.47	ND	0.19	0.13	0.24
Total Kjeldahl Nitrogen	mg/l	1.3	2.1	1.3	0.84	7.3	4.8	1.8	0.89	0.54	ND	0.5	12.2
Total Suspended Solids	mg/l	113	165	136	65	1540	2110	480	201	11	25	49	392
Turbidity	NTU	146	231	100	28.5	1660	1220	404	134	5.3	13.1	27.2	138
E.Coli	col/100ml	12997	17329	17800	7540	90500	52100	77010	61310	1421	2613	19863	2851

(1) Missouri River Backed up

Five-Mile Creek - 6 event 2015		
	NC/Better	Worse
Total Phosphorus	2	4
Ortho Phosphate	5	1
Nitrate+Nitrite	0	6
Total Kjeldahl Nitrogen	4	2
Total Suspended Solids	2	4
Turbidity	3	3
E.Coli	5	1
	21	21

2014		April 24 2014		May 12 2014		October 1 2014		October 2 2014	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
Three Mile Creek	CFS	200	190	200	190	200	190	45	750
Total Phosphorus	mg/l	0.32	0.55	0.42	0.61	1.5	0.79	0.6	0.67
Ortho Phosphate	mg/l					0.19	0.2	0.16	0.19
Nitrate+Nitrite	mg/l	0.5	0.42	0.69	0.69	0.56	0.57	0.3	0.73
Total Kjeldahl Nitrogen	mg/l	1	1.1	0.7	2.4	2.8	2.6	2.1	2.5
Total Suspended Solids	mg/l	303	242	165	440	1370	508	480	465
Turbidity	NTU	294	112	276	274	530	260	313	239
E.Coli	col/100ml	12997	3448	10500	14100	19863	72700	9208	37900
Dissolved Oxygen	mg/l	6.3	3.3	6.1	4.6				

Three Mile Creek - 4 event 2014		
	NC/Better	Worse
Total Phosphorus	1	3
Ortho Phosphate	0	2
Nitrate+Nitrite	2	2
Total Kjeldahl Nitrogen	2	2
Total Suspended Solids	3	1
Turbidity	4	0
E.Coli		
	12	10

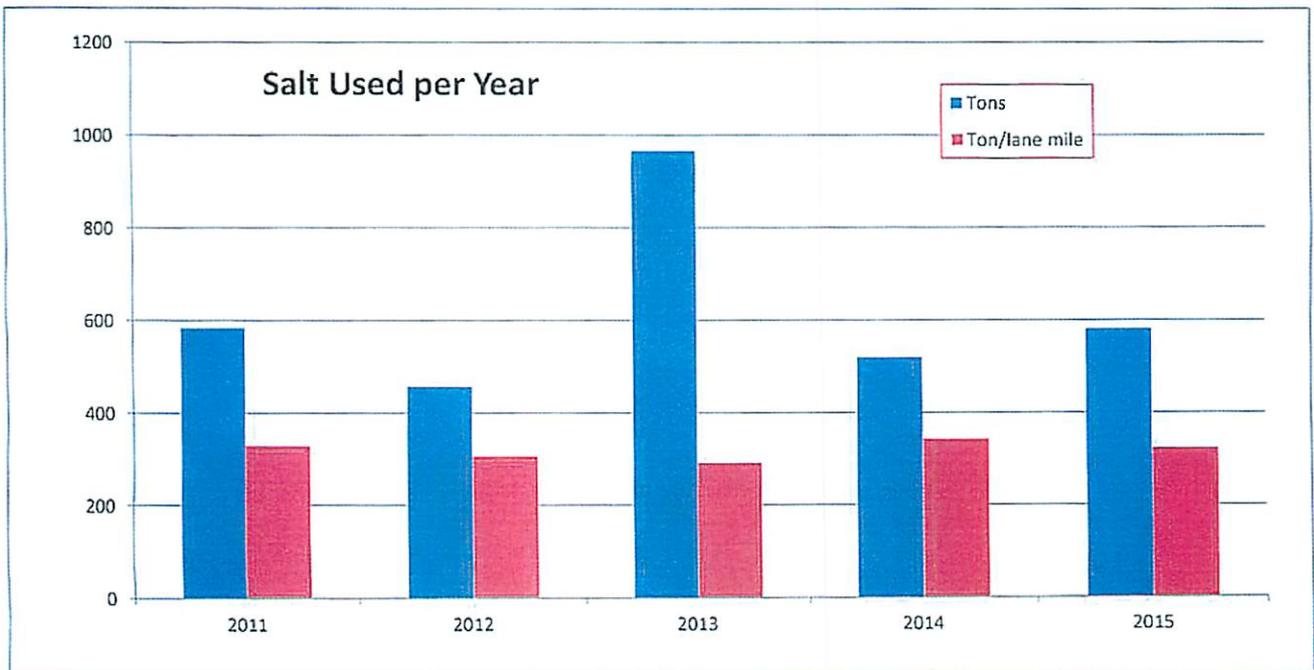
2014		April 24 2014		May 12 2014		October 1 2014		October 2 2014	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
Five Mile Creek	CFS	1020	800	880	660	1100	800	3100	265
Total Phosphorus	mg/l	0.13	0.54	0.34	0.28	0.66	0.63	1.5	1.1
Ortho Phosphate	mg/l					0.2	0.18	0.24	0.22
Nitrate+Nitrite	mg/l	0.21	0.34	0.29	0.32	0.3	0.5	0.32	0.41
Total Kjeldahl Nitrogen	mg/l	0.69	0.56	1.8	1.6	1.3	1.3	4.4	3
Total Suspended Solids	mg/l	54	485	300	226	356	472	1510	1480
Turbidity	NTU	22.5	261	199	193	241	263	488	438
E.Coli	col/100ml	1872	3255	8660	8660	88600	30900	63100	59100
Dissolved Oxygen	mg/l	6.7	4.9	5.5	5.1				

Five-Mile Creek - 4 event 2014		
	NC/Better	Worse
Total Phosphorus	3	1
Ortho Phosphate	2	0
Nitrate+Nitrite	0	4
Total Kjeldahl Nitrogen	4	0
Total Suspended Solids	2	2
Turbidity	2	2
E.Coli		
	13	9

City of Leavenworth

January 5, 2016

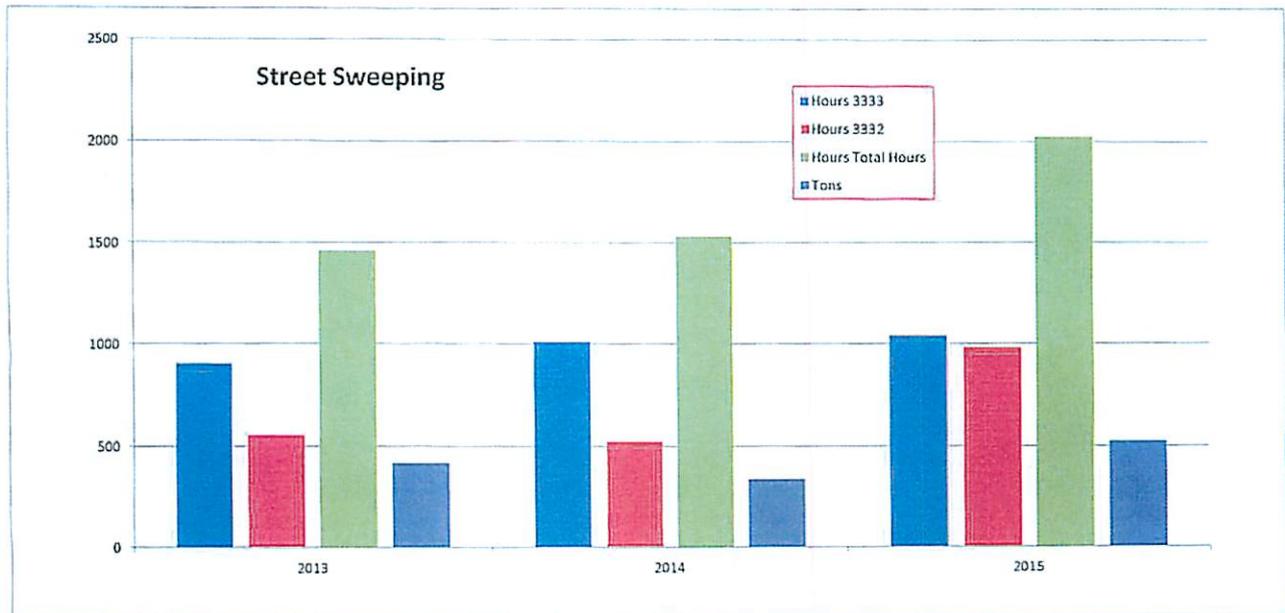
Salt Used		
Year	Tons	Ton/lane mile
2011	583	328
2012	457	305
2013	967	291
2014	520	342
2015	582	323



City of Leavenworth

January 5, 2016

Street Sweeping				
	Hours		Total Hours	Tons
	3333	3332		
2013	907	555	1462	418.91
2014	1012	522	1534	338.28
2015	1043	985	2028	525.29



G. Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Permittee: _____ Date Signed: _____
(Legally responsible person)

Name (printed): _____ Title: _____

40 CFR 122.22 Signatories to permit applications and reports.

(a) Application. All permit applications shall be signed by either a principal executive officer or ranking elected official.

All reports required by permits, and other information requested by the Director shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person.

Submit this report to:

KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT

Municipal Programs Section
000 SW Jackson Street, Suite 420
Topeka, Kansas 66612-1367