

# Human Bacteria Source Tracking With Trained Dogs Skagit County, 2018

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In late February of 2018, Skagit County worked with Environmental Canine Services (ECS) to identify sources of human sewage in the Samish and Padilla watersheds. ECS dogs are specially trained to locate sources of human sewage contamination in stormwater systems while ignoring non-human sources. The project was funded by EPA's National Estuary Program.

## Methods

In preparation for the visit, Skagit County staff combed through recent water quality results and previously identified hotspots to identify appropriate areas to have the dog assess. We focused our efforts on the Samish and Padilla watersheds, but added several extra sites in the south Mount Vernon area in response to recent concerns about declining water quality around shellfish beds in South Skagit Bay. We identified seven locations with low traffic to take the dog into the field, and 54 additional sites to sample for scent trials in the parking lot later in the day. Our focus was on sampling small areas where we had found poor water quality results over the last year without an obvious source.

While there was no rain in the two days preceding our visit with Crush, the month of February 2018 received more than twice the average rainfall – 5.78 inches compared with an average of 2.72 inches. As a result, groundwater levels were quite high for her visit. Temperatures in the week before her arrival were quite low, dropping into the low 20's overnight, and a few inches of snow remained on the ground from that time.



**Figure 1.** Crush sits or lays down to indicate that she smells sewage outside of Bay View. (It was a cold day for a California dog!)

An extensive description of daily procedures are available in the ECS report in Appendix A. All samples that Crush sniffed were taken in the morning under the assumption that, on weekdays, most septic systems are used heavily in the morning, and any scent would be strongest during those hours. While staff were out gathering samples for the afternoon session, Crush was taken out to several walkable areas where previous sampling indicated the possibility of nearby septic failures. Where Crush indicated sewage and enough water was present, a fecal coliform sample was taken and sent to a certified lab for analysis.

The afternoon session was done in a scent-neutral parking lot. Samples were collected in the morning in quart-sized plastic bottles by staff wearing disposable gloves to reduce the chance of cross-



**Figure 2. Crush indicates that she smells sewage in a sample collected earlier in the day.**

contaminating samples. Bottles were rinsed three times with stream water before the sample was taken. After capping the sample, each bottle was then rinsed with distilled water, placed inside a sealed bag to reduce the possibility of contamination, and transported to the parking lot. At the same time, a fecal coliform sample was taken at each site and sent to a certified lab for analysis. Once at the parking lot, samples were placed about 20 feet apart to isolate the scent from each other as much as possible, and uncapped. Crush was then brought to sniff each sample, and project managers recorded her response. The entire process was moved to a new section of the parking lot during each round in order to ensure that any spills did not affect the results

of subsequent rounds.

Throughout each day, Crush was exposed to quality assurance (QA) samples to ensure she was giving the proper response. In the field, QA samples consisted of distilled water. During the parking lot test, QA samples consisted of pure distilled water, horse or cow manure mixed with distilled water, and sewage from a local treatment plant. In each case, she provided no false positive or false negative responses. On two occasions in the field, Crush indicated both a positive and negative response when asked to sniff an area. In one case, the location was a dry ditch; the other was a ditch with flowing water. In both cases, a breeze may have been affecting the scent in the area, either moving the scent away from its source or carrying scent in from elsewhere. Similarly, in two cases during the parking lot trials, the dog appeared to hesitate after sniffing a sample before moving on without indicating a positive response. Upon returning to those samples, she indicated a positive response at both. Though trials were set up perpendicular to the prevailing wind direction to minimize the effect of the breeze, wind may have been a factor in these two cases.

## **Dog Response Results**

Crush's response to each site is detailed in the reports that ECS produced, attached as Appendix A. Crush detected sewage in 63 of 90 samples from the Padilla and Samish watershed, and six of ten additional locations in south Mount Vernon that flow into the shellfish beds of South Skagit Bay (see Appendix C for a map).



**Figure 3. Crush indicates that she smells sewage while PIC Coordinator Karen DuBose retrieves a sample.**

Fecal coliform sampling in areas where Crush indicated sewage was present followed the same pattern we have seen during all our previous visits with Crush: fecal coliform levels are rarely high in locations where Crush indicates a problem. Of the 71 sites where Crush indicated sewage was present and a sample was taken, only 9 had a fecal coliform count over 100 (see Appendix B for lab results).

## **Follow Up Activities**

### **Septic Referrals to Skagit County Public Health**

After the visit with Crush, we reviewed records of septic systems near where Crush indicated sewage was present. We referred six septic systems to Skagit County Public Health for further investigation and possible dye testing. Five of those were located in the Padilla watershed; three of the systems flowed into upper Joe Leary Slough, and two were along small roadside ditches that flowed directly into Padilla Bay. One referred septic system was located in the Samish watershed, in the Swede Creek area.

The three upper Joe Leary Slough sites have not been investigated by Skagit County Public Health staff, but they were included in a recent inspection enforcement mailing. Septic program staff visited one of the Padilla Bay sites in late March and did not find evidence of a surfacing failure. A dye test was not performed. The system was up to date on inspections, but was last inspected while the house was vacant. As the house is now occupied, it will be included in the next set of reminder mailings for that area. PIC staff will continue to explore the area. While in the field with Crush, a neighboring property owner offered to let us sample on her property. The timing of storms and staff schedules did not allow us to visit her property this year, but it remains a priority for the fall.

The last septic system referred to the Public Health in the Padilla watershed has not been investigated by staff by mutual agreement of the PIC Program's Project Delivery Team (PDT). During a meeting soon after the Crush visit, an Ecology staff member in contact with the property owner reported that the owner had dug a latrine in the corner of a barn and used it when he needed to (he does not live on the property). While that is significant, it is only used as needed by the one property owner, and there are serious livestock management issues on the property. The PDT agreed that the wisest course would be to focus on the larger livestock issues, and that Ecology staff would include the latrine issue in his conversations with the property owner. The staff at Ecology has since changed, and we will be updating new staff during a PDT meeting in early September.

The Samish septic system was jointly investigated by PIC and septic staff in May. There were no obvious issues, but the property owner was given several recommendations to explore the effectiveness of the system on his own. By mid-May, all nearby ditches had dried up, so a dye test could not be performed. The property owner agreed to do a flow test when groundwater levels are up and his well is able to handle it, and septic staff will perform a dye test at that time.

Five additional septic system failures were discovered that might have influenced Crush's response in several areas as part of the septic program's general enforcement activities. Three of those were in the Samish watershed, one was in the Padilla watershed, and one was in the South Skagit Bay region. Of

these, two have been fixed, two are in the process of being fixed, and one property owner is moving out of the residence.

## Lessons Learned & Remaining Questions

Our understanding of how to best use Crush continues to develop. During previous years, we learned that Crush is extremely sensitive to scent, and can smell less than one teaspoon of treated sewage effluent mixed into one gallon of water. She will still indicate sewage where septic repairs have occurred and been confirmed by a negative dye test. Though the repairs were completed as much as two years prior, the scent appears to remain in the soils. Finally, we also know that when we take a grab sample at the time and place Crush indicates sewage, we rarely find high levels of fecal coliform, even if we later find a nearby failure. This inconsistency may be due to a number of things. First is that septic systems are most used in the mornings and evenings, and sewage from a failure may have already washed through the system, leaving only a scent behind. A related possibility is that storms prior to Crush's visit washed the vast majority of the fecal contamination downstream, again leaving only the scent.

Because of her sensitivity to sewage scents, we have learned to work more effectively with her by testing areas that have already had a good amount of source identification sampling. This narrows the region down to a small area where the number of potential sources is limited. Of course, it is much easier to do this in urbanized areas where all water flows in accessible roadside ditches than it is in rural areas where private property laws limit our access to flowing water, so we don't always succeed in narrowing the area down as small as we'd like.

Even when we are able to limit the potential sources to a few, we sometimes still struggle to interpret Crush's response. For example, one short stretch of Grip Rd (in the Samish watershed) is very rural, with several houses and some livestock, but no obvious livestock influence. The area has inconsistently high bacteria levels, but is frequently high in late spring. Crush indicated she smelled sewage there, but the corresponding sample had little to no fecal coliform. All nearby septic systems are up to date on inspections, with nothing in the reports to indicate a problem. Soils in the area are poorly drained, but septic systems are all set 200 feet or more from the road, and we have never seen signs of water entering the ditch from the property during several on-foot, wet-weather explorations of the road. So how should we interpret that? Knowing how sensitive her nose is, we wonder if Crush is *too* sensitive for our purposes. ECS staff have commented that Crush is the most sensitive of all their dogs. She may be smelling properly treated effluent that has reached the shallow groundwater feeding the ditch, giving us false positives.



Figure 4. Crush and her handler, Aryn Herval show off for their segment on King 5 News during the parking lot tests.

Confounding all of this, of course, is weather. Most of the spring rain was done by mid-April, and the last significant rain – 0.34 inches at WSU’s Mount Vernon gauge – occurred on April 28. Ditches were dry or nearly dry by mid-May, halting further investigations until fall. (Dye tests can’t be done if there’s no water in the receiving ditch.)

Our Public Health Department began regularly enforcing septic system inspections in all of the MRAs in late 2016. Since they began this practice, we are finding more failed septic system than ever before. In 2017, we identified 26 failures in the Samish and Padilla Bay watersheds, and we have found eight additional failures to date in 2018. Given that the septic program is so successful at identifying failures through enforcement, we will focus on that work for the near future. We may consider bringing Crush or another a sewage-sniffing dog back to Skagit County if we have new areas of interest that we can’t figure out using more traditional PIC methods.



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**Appendix A**  
**Environmental Canine Services Report**



## REPORT: CANINE INVESTIGATION OF ILLICIT SEWAGE DISCHARGES IN SKAGIT COUNTY, WA

**Prepared For:** Karen DuBose, Skagit County Public Works

**Prepared By:** Karen Reynolds, Environmental Canine Services LLC

**Report Date:** March 6, 2018

### Introduction: Canine Source Tracking

Environmental Canine Services LLC (ECS) uses scent trained canines to identify and source track sewage pollution in stormwater systems and surface waters. It has been nationally recognized as a cost-effective rapid screening and source tracking tool for bacterial pollution from sewage discharges and utilized in over 70 illicit discharge detection projects in 14 different states since the company began in 2009.

ECS canines detect illicit sewer and septic discharges and alert to their presence by providing a trained behavior called an “alert”, such as sitting, lying down, or barking. They do not alert to the presence of animal waste. The canines can detect whether sewage is present in collected water samples and at field sites such as stormwater outfalls, manholes, catch basins, and drains and in surface waters, including freshwater and marine water. Their rapid detection of the presence of sewage can lead to immediate source tracking in the field and provide valuable information for future monitoring, investigations, and/or remediation.

The canines are only able to determine the presence or absence of sewage, not whether human fecal bacteria is present or at what level. Since detergents and fats/oils/grease, such as would occur with illicit laundry or restaurant discharges, are common components of sewage in addition to human waste, some of the canines recognize those scents as valid sewage scents and will alert to the presence of those components during field investigations, even in the absence of human waste components. Therefore, combining the canine investigation results with concurrent and historical bacterial, microbial source tracking, surfactant, or other testing results for sites investigated provides further information to help determine the type, significance, and sources of detected pollution.

### Summary

On February 27 and 28, 2018, Environmental Canine Services LLC (ECS) Project Manager, Karen Reynolds, and Handler/Canine team Aryn Havel/Crush worked with Skagit County Public Works (SCPW) to conduct illicit sewage discharge detection and source tracking in Skagit County, WA. Field investigations were conducted each morning, and canine scent testing of water samples collected from targeted sites by SCPW field personnel was conducted each afternoon.

### February 27 Field Investigations

During the morning of February 27, ECS and SCPW personnel conducted field investigations in the Sedro-Woolley area of Skagit County. A total of 21 sites were investigated. For additional quality assurance when only one canine is used in an investigation, field blanks and replicate sampling are conducted. One field blank was prepared for canine Crush to scent test during field investigations, and one site was revisited for replicate scenting. The field blank was prepared by pouring store-

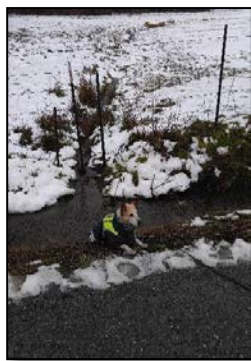
bought distilled water into a new scent testing bottle, identical to the ones used for grab samples. The bottle was placed on the ground for canine Crush to scent test in a neutral scent area.

The results for the field investigation sites, field blank, and replicate scenting site are presented in Table 1. Canine Crush alerted to the presence of sewage at 16 of the sites (indicated with red highlights), did not alert at four of the sites (indicated with green highlights), and had a mixed response (one alert and one non alert) to the one site that was replicate sampled (indicated with purple highlights). A mixed response typically means that the sewage scent is either very low volume or is masked by the presence of a high amount of animal waste in addition to human waste. Canine Crush correctly gave no alert on the field blank (indicated with blue highlights).

The quantity of sewage and its various components such as fecal bacteria, detergents, and/or fats/oils/grease is not known by ECS for the sites Crush alerted at, since ECS canines only indicate presence or absence of sewage.



Site 9 Alert



Site 12 Alert



Site 15 Alert



Site 17 Alert



Site 21 Alert

### February 27 Sample Scent Testing

In the afternoon on February 27, Crush scent tested 30 water samples collected that morning by SCPW personnel in targeted locations in the watershed. The samples were packaged for transport and placed for canine scent testing in the Skagit Public Works office building parking lot using a strict protocol to prevent possible cross-contamination. For quality assurance, four field blanks, four sewage samples, one cow manure sample, and one horse manure sample were also included for scent testing. All quality assurance samples were in new scent testing bottles, identical to the ones used for collected samples. The field blanks contained store-bought distilled water. The sewage samples contained approximately 2-3 ml human sewage (from wastewater treatment plant influent) diluted with approximately 1,000 ml store-bought distilled water. Cow and horse manure samples were mixed with store-bought distilled water. The collected water samples and quality assurance samples were set up one row at a time to be scent tested by canine Crush. At least one field blank and one sewage sample were placed in each row. The rows were placed in an alignment with the best wind direction for the least amount of possible air scent cross-contamination. ECS and SCPW personnel recorded the canine results for each row.

The results for the sample scent testing are presented in Table 2. Canine Crush alerted to the presence of sewage in 21 of the collected water samples (indicated with red highlights), including one sample that was replicate scented. She did not alert to seven of the collected samples (indicated with



green highlights), including one sample that was replicate scented. Canine Crush had a mixed response (one alert and one non alert) to two samples that were replicate scented (indicated with purple highlights). A mixed response typically means that the sewage scent is either very low volume or is masked by the presence of a high amount of animal waste in addition to human waste. The quantity of sewage and its various components such as fecal bacteria, detergents, and/or fats/oils/grease is not known to ECS for the collected water samples Crush alerted on, since ECS canines only indicate presence or absence of sewage.

Canine Crush correctly gave no alert on the four field blanks, one cow sample, and one horse sample used for quality assurance (indicated with blue highlights). She correctly alerted on three of the four quality assurance sewage samples but had a mixed response (one non alert and one alert) to one of the sewage samples. It is probable that the very high dilution rate of the sewage sample resulted in canine Crush not being able to detect the presence of sewage during her first scenting, particularly if the wind was also blowing the small amount of scent away from the container at the time she first scented it. She was able to detect the sewage scent during her second scenting on the container.



Sample Row



SCPW Sample Crew



Alert by Crush on Sample

### February 28 Field Investigations

During the morning of February 28, ECS and SCPW personnel conducted field investigations in the Bay View and South Mount Vernon areas of Skagit County. A total of 21 sites were investigated in these two combined areas. For quality assurance, one field blank was prepared for canine Crush to scent test during field investigations, and one site was revisited for replicate scenting. The field blank was prepared by pouring store-bought distilled water into a new scent testing bottle, identical to the ones used for grab samples. The bottle was placed on the ground for canine Crush to scent test in a neutral scent area.



Site 1 Alert



Site 4



Site 5 Alert & Sample Collection



Site 7 Alert

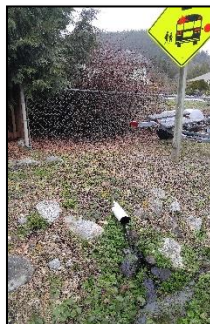
The results for the field investigation sites, field blank, and replicate scenting site are presented in Table 3. Canine Crush alerted to the presence of sewage at 16 of the sites (indicated with red highlights), did not alert at four of the sites (indicated with green highlights), and had a mixed

response (one alert and one non alert) to the one site that was replicate sampled (indicated with purple highlights). A mixed response typically means that the sewage scent is either very low volume or is masked by the presence of a high amount of animal waste in addition to human waste. Canine Crush correctly gave no alert on the field blank (indicated with blue highlights).

The quantity of sewage and its various components such as fecal bacteria, detergents, and/or fats/oils/grease is not known to ECS for the sites Crush alerted at, since ECS canines only indicate presence or absence of sewage.



Site 14 With Hose to Ditch



Site 16



Site 18

### February 28 Sample Scent Testing

In the afternoon on February 28, Crush scent tested 24 water samples collected that morning by SCPW personnel in targeted locations in the watershed. The samples were packaged for transport and placed for canine scent testing in the Skagit Public Works office building parking lot using a strict protocol to prevent possible cross-contamination. For quality assurance, three field blanks, one sewage sample, one dog waste sample, one horse manure sample, and one horse manure sample mixed with coffee were also included for scent testing. All quality assurance samples were in new scent testing bottles, identical to the ones used for collected samples. The field blanks contained store-bought distilled water. The sewage sample contained approximately 2-3 ml human sewage (from wastewater treatment plant influent) diluted with approximately 1,000 ml store-bought distilled water. Dog waste and horse manure samples were mixed with store-bought distilled water.

The collected water samples and quality assurance samples were set up one row at a time to be scent tested by canine Crush. At least one sewage sample was placed in each row. The rows were placed in an alignment with the best wind direction for the least amount of possible air scent cross-contamination. ECS and SCPW personnel recorded the canine results for each row.

The results for the sample scent testing are presented in Table 4. Canine Crush alerted to the presence of sewage in 16 of the collected water samples (indicated with red highlights). She did not alert to seven of the collected samples (indicated with green highlights), including two samples that were replicate scented. Canine Crush had a mixed response (one ambiguous response and one non alert) to one sample that was replicate scented (indicated with purple highlights). A mixed response typically means that the sewage scent is either very low volume or is masked by the presence of a high amount of animal waste in addition to human waste. In this case, since the first response was ambiguous, it may have been due to wind conditions affecting her scenting on that sample during her first response.

The quantity of sewage and its various components such as fecal bacteria, detergents, and/or fats/oils/grease is not known to ECS for the collected water samples Crush alerted on, since ECS canines only indicate presence or absence of sewage.



Alert by Crush on Sample

Canine Crush correctly gave no alert on the three field blanks, one dog sample, and one horse/coffee mix sample used for quality assurance (indicated with blue highlights). She had a mixed response (one ambiguous response and one non alert) on the one horse sample for quality assurance (indicated with purple highlights). The ambiguous first response may have been due to wind conditions affecting her scenting on that sample during her first response. She correctly alerted on the one quality assurance sewage sample.

**Table 1 – Results of Canine Field Investigations February 27, 2018**

**FIELD INVESTIGATION RESULTS - ENVIRONMENTAL CANINE SERVICES LLC**

Client: Skagit County Public Works

Date: February 27, 2018

Canine Name: Crush

Canine Response: **Y = Alert to sewage** **N = No alert** **Mixed responses** **Quality assurance sample**

Site #	Site or Sample ID, Field Blank, or Sewage Sample	Site Type*	Time	Location Description	GPS Coord	Initial Canine Response	Replicate Canine Response	Comments
Sedro-Woolley area:								
1		CR	9:45 AM	Willard Creek at Bassett Rd & Garden of Eden		Y		Alert from top of bank. Heavy flowing creek.
2		D		Ditch N of creek at site 1		Y		
3		D		N ditch at corner of Kathy Lane & Bassett Rd (aka Cully Rd)		Y		Private lane, can't source track upstream.
4		D		Kathy Lane at 10 mph sign		N		Pool of water.
5		D	9:54	Along ditch between Kathy Lane and driveway to the W		N		
6		O	9:56	Tree stump in yard near NW corner of Kathy Lane & Bassett Rd		Y		The crevices in the stump may have been collecting sewage scent from the air, or absorbing scent through its roots from sewage in the soil.
7	WI-CUL1	GS-CR		Scent test of water sample upstream on Willard Creek at Bassett Rd & Garden of Eden		Y		
8		CR	10:14	Swede Creek at Grip Rd		N		
9		D	10:20	Upstream of site 8, N ditch	48.55769 122.24745	Y		
10		D		Ditch W of site 9	48.5568 122.24796	Y		
11		D	10:24	Ditch W of site 10 at driveway	48.55772 122.24850	Y		
12		D	10:25	Swale or runoff trench on S side of Grip Rd E of site 12	48.55768 122.24956	Y		Runoff appears to originate from behind barn.
13		D	10:27	W of site 12, N side ditch across street from barn	48.55776 122.25047	Y		
14		D		S ditch at 22272 Grip Rd. Driveway from barn.	48.55775 122.25086	Y		
15		D	10:30	S ditch W of site 14	48.55778 122.25192	Y		
16		D	10::35	N ditch 22269 Grip Rd driveway		Y		This is the last upstream alert on the N ditch.
	Field Blank		10:45			N		
17	WEPRL 4	D	11:05	N ditch (small) on Park Ridge Ln at Weir Creek. Flow from uphill.		N	Y	No alert at 1st check of ditch, then alert at 2nd check. Could be low sewage scent amount causing mixed results.
18		D		S ditch, across street and downstream of site 17	48.56045 122.31328	Y		
19		CR	11:30	Butler Creek at Friday Creek Rd		Y		Pooling from where culvert emerges on S side.
20		D		Along ditch uphill on Parson Creek Rd		N		
21		D	11:35	Upstream of site 20, at top of hill, at 19366 Parson Creek Rd driveway	48.59418 122.32653	Y		

\*Site Type Codes: OF=Outfall MH=Manhole CB=Catch Basin D=Drain/Ditch CR=Creek Stream/Trib R=River L=Lake SH=Shoreline O=Other (Describe) FB=Field Blank SS=Sewage Sample GS=Grab Sample Scented, followed by Site Type code.

**Table 2 – Results of Canine Scenting of Collected Samples February 27, 2018**

ENVIRONMENTAL CANINE SERVICES LLC					
SAMPLE SCENT TESTING RESULTS					
Client: Skagit County Public Works					
Date: February 27, 2018			Location: Public Works Bldg Parking Lot		
Canine: Crush					
Canine Response:		Canine Response: <b>Y = Alert to sewage</b> <b>N = No alert</b> Mixed responses Quality assurance sample			
#	Sample ID, Field Blank, or Sewage Sample	Canine 1st Response		Canine Replicate Response	Comments
1	BU-BCR 6	N			
2	BU-BCR 1	N			
3	BU-BCR 4	N		Y	
	Field Blank	N			
4	BU-99	Y			
5	BU-BCR 4.75	N			
6	BU-BCR 7	N		N	
	Sewage Sample	Y			2-3 ml diluted in approx 1,000 ml distilled water
7	ESTES	Y			
	Cow	N			
	Field Blank	N			
8	SKAR	Y			
9	WILL	N			
10	WC1	Y			
	Sewage Sample	Y			2-3 ml diluted in approx 1,000 ml distilled water
11	ERSH-SH	N			
12	#39	Y			
13	DCL DITCH	Y			
14	MAD JACK	Y			
15	BU-FC-1	N			
	Sewage Sample	Y			2-3 ml diluted in approx 1,000 ml distilled water
16	BU-BCR 4.25	Y			
17	FC-99-2	Y			
	Field Blank	N			
18	SCPL 1	Y			
19	HWY 11-B	Y			
20	FC-AC-1	Y			
21	GEAR 12	Y			
22	CROP-1	Y			
23	TRACKS-1	Y			
24	SKAR PCR	Y			
25	FLINN	Y			
26	ESBCR	Y			
	Field Blank	N			
	Horse	N			
27	WC1B	Y			
	Sewage Sample	N		Y	2-3 ml diluted in approx 1,000 ml distilled water
28	MAD AND	Y		Y	
29	#4	N		Y	
30	BCCR	Y			

**Table 3 – Results of Canine Field Investigations February 28, 2018**

**FIELD INVESTIGATION RESULTS - ENVIRONMENTAL CANINE SERVICES LLC**

Client: Skagit County Public Works

Date: February 28, 2018

Canine Name: Crush

Canine Response: **Y = Alert to sewage** **N = No alert** **Mixed responses** **Quality assurance sample**

Site #	Site or Sample ID, Field Blank, or Sewage Sample	Site Type*	Time	Location Description	GPS Coord	Initial Canine Response	Replicate Canine Response	Comments
<b>Bay View Area:</b>								
1		O	9:35 AM	Flowing PVC pipe at ditch. Bayview Drive just E of driveway to cow farm, on N side.	48.47234 122.45180	Y		
2		D		E of site 1 along N ditch to Ten Acres Lane		N		
3		CB	9:44	Catch basin on E corner of Ten Acres Lane, at 13723		Y		Where sites 1 & 2 flow to.
4		O	9:49	Flowing black corrugated pipe just E of site 3	48.47236 122.44954	Y		
5		D	9:53	Road drain at N ditch, E of site 4	48.47238 122.44805	Y		
6		D	9:58	Road drain at driveway S ditch across from site 5	48.47230 122.44803	Y		Not able to upstream source track. Only a couple of houses on the driveway.
7		D	10:15	Drainage flow in E ditch	48.48653 122.47816	Y		Neighbor in car stopped to provide info on the area. She thinks source is at top of hill. Gave permission to access her property.
8		D	10:30	Ditch on NW corner of E Street & 2nd Street	48.48312 122.47625	Y		Street with old blue VW bus. Crush alerted on this street during previous investigation of Bay View.
9		D	10:32	W ditch at 11256 2nd Street driveway		Y		
10		D	10:33	W ditch at 11290 2nd Street, NE corner of driveway		Y		
	Field Blank					N		
<b>South Mount Vernon area:</b>								
11		D	11:20	E ditch at 17207 Blodgett Road. 2 corrugated black pipes.	48.39650 122.32249	Y		Alerted on N-S pipe but not E-W pipe.
12		D	11:23	Road drain at SE & NE corner of Blodgett Rd & W Ridge Lane		Y		
13		D		Along S ditch on W Ridge Lane		N		
14		D		Across the road from site 13 at 19623 W Ridge Lane		Y		Garden hose runs from RV in driveway down into ditch. Using for sewage tank cleanout?
15		D		Along N ditch W from site 14 to corner at Blodgett, where input from site 12 flowed		Y		
16		D	11:30 AM	E ditch on Blodgett, between W Ridge Lane & Skyridge Road		Y		Heavy flowing PVC pipe. Pipe direction is diagonal through back yard towards house.
17		D		S ditch at corner of Blodgett and Skyridge Road		Y		
18		D	11:50	E ditch at bottom of hill on road curve below 17342 Olympic Place		Y	N	Drain field on hill?
19		D	11:56	Along ditches S on Olympic Place past site 18 to 17306		N		
20		D	11:59	W on Olympic Place. S ditch at 17304.	48.39674 122.31657	Y		Dry ditch.
21		D		S of Olympic Place along ditches on Meadow Lane to near end of Lane at 17352		N		

\*Site Type Codes: OF=Outfall MH=Manhole CB=Catch Basin D=Drain/Ditch CR=Creek Stream/Trib R=River L=Lake SH=Shoreline O=Other (Describe) FB=Field Blank SS=Sewage Sample GS=Grab Sample Scented, followed by Site Type code.

Table 4 – Results of Canine Scenting of Collected Samples February 28

ENVIRONMENTAL CANINE SERVICES LLC					
SAMPLE SCENT TESTING RESULTS					
Client: Skagit County Public Works					
Date: February 28, 2018			Location: Public Works Bldg Parking Lot		
Canine: Crush					
Canine Response:		Canine Response: <b>Y = Alert to sewage</b> <b>N = No alert</b> Mixed responses Quality assurance sample			
#	Sample ID, Field Blank, or Sewage Sample	Canine 1st Response		Canine Replicate Response	Comments
	Horse/Coffee mixture	N			
1	SCH B	Y			
2	SW-HB2	Y			
	Field Blank	N			
	Dog	N			
3	SW-HB5	Y			
4	FR9	Y			
5	SW-GR14	Y			
6	SW-GR12	N			
7	SW-GR13	Y			
8	SW-HB3	Y			
9	BU-BCR-10	Y			
10	NN-RR1	Y			
	Field Blank	N			
	Sewage Sample	Y			2-3 ml diluted in approx 1,000 ml distilled water
11	SW-GR15	N		N	
12	WILDE SPCR	N		N	
13	WILDE SBCR	Y			
14	8	Y			
15	BRIAUNA LANE	Y			
16	BU-BCR-9	Y			
17	WILDE S99	N			
18	NN-JW1	?		Y	1st response ambiguous
19	BU-BCR-5	N			
	Field Blank	N			
20	SW-GR11A	Y			
21	BAY VIEW PIPE	Y			
22	BCR 4.25	N			
	Horse	?		N	1st response ambiguous
23	13024 PERSONS	N			
24	APEX	Y			

**Appendix B**  
**Fecal Coliform Lab Results**





Burlington, WA Corporate Laboratory (a)  
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Corvallis, OR Microbiology/Chemistry (d)  
540 SW Third Street - Corvallis, OR 97333 - 541.753.4946

Bend, OR Microbiology (e)  
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425

# Data Report

Client Name: Skagit County Public Works  
1800 Continental Place  
Mount Vernon, WA 98273

Reference Number: **18-06552**  
Project: Pic Sampling-JQ

Report Date: 3/7/18

Date Received: 2/27/18

Approved by: jma

Authorized by:

Ceann K Knox  
Lab Manager, Bellingham

Sample Description: FC-99-2 driveway N NW Tool										Sample Date: 2/27/18 9:40 am		
Lab Number: 13625		Sample Comment:							Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	350	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: FC-AC-1 Corbell Creek										Sample Date: 2/27/18 9:55 am		
Lab Number: 13626		Sample Comment:							Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	23	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: SC-PL-1 Silver Creek										Sample Date: 2/27/18 10:05 am		
Lab Number: 13627		Sample Comment:							Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	13	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: BU-FC-1 Butler @ FCR										Sample Date: 2/27/18 10:35 am		
Lab Number: 13628		Sample Comment:							Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	49	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: BU-99 Butler @ 99										Sample Date: 2/27/18 11:40 am		
Lab Number: 13629		Sample Comment:							Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	27	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: BU-BCR-1										Sample Date: 2/27/18 11:50 am		
Lab Number: 13630		Sample Comment:							Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

Notes:

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.  
PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.  
D.F. - Dilution Factor

If you have any questions concerning this report contact us at the above phone number.

# Data Report

E-14551    **FECAL COLIFORM**    33    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BU-BCR-6										Sample Date: 2/27/18 11:52 am			
Lab Number: 13631		Sample Comment:								Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    17    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BU-BCR-5										Sample Date: 2/27/18 11:58 am			
Lab Number: 13632		Sample Comment:								Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    23    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BU-BCR-7										Sample Date: 2/27/18 12:04 pm			
Lab Number: 13633		Sample Comment:								Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    7.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BU-BCR-4.75										Sample Date: 2/27/18 12:10 pm			
Lab Number: 13634		Sample Comment:								Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    17    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BU-BCR-4.25										Sample Date: 2/27/18 12:14 pm			
Lab Number: 13635		Sample Comment:								Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    17    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BU-BCR-4										Sample Date: 2/27/18 12:40 pm			
Lab Number: 13636		Sample Comment:								Collected By:			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    <1.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

**Notes:** \_\_\_\_\_

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.  
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 D.F. - Dilution Factor



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Bend, OR Microbiology (e)  
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# Data Report

Client Name: Skagit County Public Works  
1800 Continental Place  
Mount Vernon, WA 98273

Reference Number: **18-06553**  
Project: Pic Sampling KD

Report Date: 3/7/18

Date Received: 2/27/18

Approved by: jma

Authorized by:

Ceann K Knox  
Lab Manager, Bellingham

Sample Description: WI-CUL1										Sample Date: 2/27/18 9:40 am		
Lab Number: 13637		Sample Comment:								Collected By: Stephanie Fraser and I		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	33	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: WI-CUL2										Sample Date: 2/27/18 9:45 am		
Lab Number: 13638		Sample Comment:								Collected By: Stephanie Fraser and I		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	46	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: SW-GRI6										Sample Date: 2/27/18 10:30 am		
Lab Number: 13639		Sample Comment:								Collected By: Stephanie Fraser and I		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	240	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: SW-GRI7										Sample Date: 2/27/18 10:35 am		
Lab Number: 13640		Sample Comment:								Collected By: Stephanie Fraser and I		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	7.8	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: WE-PRL4										Sample Date: 2/27/18 11:11 am		
Lab Number: 13641		Sample Comment:								Collected By: Stephanie Fraser and I		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	FECAL COLIFORM	49	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: BU-PCR2										Sample Date: 2/27/18 11:35 am		
Lab Number: 13642		Sample Comment:								Collected By: Stephanie Fraser and I		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

Notes:

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.  
PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.  
D.F. - Dilution Factor

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# Data Report

E-14551    **FECAL COLIFORM**    <1.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BU-PCR3										Sample Date: 2/27/18 11:37 am			
Lab Number: 13643					Sample Comment:					Collected By: Stephanie Fraser and I			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    4.5    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: SW-GR3										Sample Date: 2/27/18 10:45 am			
Lab Number: 13644					Sample Comment:					Collected By: Stephanie Fraser and I			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    920    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

**Notes:** \_\_\_\_\_

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 D.F. - Dilution Factor



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# Data Report

Client Name: Skagit County Public Works  
1800 Continental Place  
Mount Vernon, WA 98273

Reference Number: **18-06549**  
Project: CRUSH

Report Date: 3/7/18

Date Received: 2/27/18

Approved by: jma

Authorized by:

Ceann K Knox  
Lab Manager, Bellingham

Sample Description: ESBCR Fecal										Sample Date: 2/27/18 9:15 am			
Lab Number: 13584		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	<b>FECAL COLIFORM</b>	11	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: ESTES Fecal										Sample Date: 2/27/18 9:20 am			
Lab Number: 13585		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	<b>FECAL COLIFORM</b>	170	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: FLINN Fecal										Sample Date: 2/27/18 9:30 am			
Lab Number: 13586		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	<b>FECAL COLIFORM</b>	23	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: 39 Fecal										Sample Date: 2/27/18 9:45 am			
Lab Number: 13587		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	<b>FECAL COLIFORM</b>	27	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: ERSH-SH Fecal										Sample Date: 2/27/18 9:55 am			
Lab Number: 13588		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	<b>FECAL COLIFORM</b>	33	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	
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Sample Description: SKAR Fecal										Sample Date: 2/27/18 10:15 am			
Lab Number: 13589		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

Notes:

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PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.  
D.F. - Dilution Factor

If you have any questions concerning this report contact us at the above phone number.

# Data Report

E-14551    **FECAL COLIFORM**    17    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: DCLDITCH Fecal										Sample Date: 2/27/18 10:25 am			
Lab Number: 13590		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    7.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: SKARPCR Fecal										Sample Date: 2/27/18 10:45 am			
Lab Number: 13591		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    11    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: 4 Fecal										Sample Date: 2/27/18 11:05 am			
Lab Number: 13592		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    49    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: BCCR Fecal										Sample Date: 2/27/18 11:20 am			
Lab Number: 13593		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    4.5    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: WCI Fecal										Sample Date: 2/27/18 11:40 am			
Lab Number: 13594		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    13    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: WCIB Fecal										Sample Date: 2/27/18 11:50 am			
Lab Number: 13595		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    7.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: WILL Fecal										Sample Date: 2/27/18 11:00 am			
Lab Number: 13596		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    33    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

Sample Description: MADAND Fecal										Sample Date: 2/27/18 12:20 pm			
Lab Number: 13597		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    110    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    2/28/18    JLN    MTA\_180227c

**Notes:** \_\_\_\_\_

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 D.F. - Dilution Factor

# Data Report

Sample Description: MADJACK Fecal							Sample Date: 2/27/18 12:35 pm					
Lab Number: 13598			Sample Comment:				Collected By: Rick Haley					
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
E-14551	<b>FECAL COLIFORM</b>	49	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	2/28/18	JLN	MTA_180227c	

**Notes:** \_\_\_\_\_

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.  
 PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.  
 D.F. - Dilution Factor



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Bend, OR Microbiology (e)  
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# Data Report

Client Name: Skagit County Public Works  
1800 Continental Place  
Mount Vernon, WA 98273

Reference Number: **18-06694**  
Project: Pic Sampling-JQ

Report Date: 3/7/18

Date Received: 2/28/18

Approved by: jma

Authorized by:

Ceann K Knox  
Lab Manager, Bellingham

Sample Description: NN-JW1										Sample Date: 2/28/18 9:30 am		
Lab Number: 14010		Sample Comment:							Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	79	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: NN-RR1										Sample Date: 2/28/18 9:40 am		
Lab Number: 14011		Sample Comment:							Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	2.0	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: BriannaLn										Sample Date: 2/28/18 9:50 am		
Lab Number: 14012		Sample Comment:							Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	23	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: 13024 Persons										Sample Date: 2/28/18 9:55 am		
Lab Number: 14013		Sample Comment:							Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	<1.8	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: BU-BCR9										Sample Date: 2/28/18 10:50 am		
Lab Number: 14014		Sample Comment:							Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	4.0	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: BU-BCRIO										Sample Date: 2/28/18 10:55 am		
Lab Number: 14015		Sample Comment:							Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

Notes: \_\_\_\_\_

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.  
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D.F. - Dilution Factor

If you have any questions concerning this report contact us at the above phone number.



# Data Report

E-14551    **FECAL COLIFORM**    23    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: WILDESBCR										Sample Date: 2/28/18 11:10 am			
Lab Number: 14016		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    17    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: WILDESPCR										Sample Date: 2/28/18 11:15 am			
Lab Number: 14017		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    13    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: WILDES99										Sample Date: 2/28/18 11:20 am			
Lab Number: 14018		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    23    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: FR9										Sample Date: 2/28/18 11:30 am			
Lab Number: 14019		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    49    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: 8										Sample Date: 2/28/18 11:40 am			
Lab Number: 14020		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    17    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: SW-GR15										Sample Date: 2/28/18 11:50 am			
Lab Number: 14021		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    49    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: SW-GR14										Sample Date: 2/28/18 12:00 pm			
Lab Number: 14022		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    7.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: SW-GR13										Sample Date: 2/28/18 12:05 pm			
Lab Number: 14023		Sample Comment:								Collected By: JQ			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551    **FECAL COLIFORM**    <1.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

**Notes:** \_\_\_\_\_

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 D.F. - Dilution Factor

# Data Report

Sample Description: SW-GR12										Sample Date: 2/28/18 12:10 pm		
Lab Number: 14024				Sample Comment:						Collected By: JQ		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	4.5	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: SW-GR11A										Sample Date: 2/28/18 12:20 pm		
Lab Number: 14025				Sample Comment:						Collected By: JQ		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	33	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: SW-HB5										Sample Date: 2/28/18 12:30 pm		
Lab Number: 14026				Sample Comment:						Collected By: JQ		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	<1.8	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: SW-HB2										Sample Date: 2/28/18 12:35 pm		
Lab Number: 14027				Sample Comment:						Collected By: JQ		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	4.5	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: SCHB										Sample Date: 2/28/18 12:40 pm		
Lab Number: 14028				Sample Comment:						Collected By: JQ		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	49	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: SW-HB3										Sample Date: 2/28/18 12:45 pm		
Lab Number: 14029				Sample Comment:						Collected By: JQ		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551	<b>FECAL COLIFORM</b>	4.5	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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 D.F. - Dilution Factor



Burlington, WA Corporate Laboratory (a)  
1620 S Walnut St - Burlington, WA 98233 - 800.755.9295 • 360.757.1400

Bellingham, WA Microbiology (b)  
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540 SW Third Street - Corvallis, OR 97333 - 541.753.4946

Bend, OR Microbiology (e)  
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425

# Data Report

Client Name: Skagit County Public Works  
1800 Continental Place  
Mount Vernon, WA 98273

Reference Number: **18-06699**  
Project: Pic Sampling KD

Report Date: 3/7/18

Date Received: 2/28/18

Approved by: jma

Authorized by:

Ceann K Knox  
Lab Manager, Bellingham

Sample Description: PAD-BV1										Sample Date: 2/28/18 9:35 am			
Lab Number: 14036		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	FECAL COLIFORM	1600	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: NN-BV4										Sample Date: 2/28/18 9:47 am			
Lab Number: 14037		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	FECAL COLIFORM	<1.8	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: NN-BV5										Sample Date: 2/28/18 9:51 am			
Lab Number: 14038		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	FECAL COLIFORM	22	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: NN-BV6										Sample Date: 2/28/18 9:55 am			
Lab Number: 14039		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	FECAL COLIFORM	11	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: PB-SS1										Sample Date: 2/28/18 10:15 am			
Lab Number: 14040		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

E-14551	FECAL COLIFORM	130	1.8		MPN/100mL	1.0	SM9221 E/MTF	b	3/1/18	JFH	MTA_180228r	
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Sample Description: BLO-1										Sample Date: 2/28/18 11:25 am			
Lab Number: 14041		Sample Comment:								Collected By: Rick Haley			
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment	

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PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.  
D.F. - Dilution Factor

If you have any questions concerning this report contact us at the above phone number.



Reference Number: **18-06699**

Report Date: 3/7/18

# Data Report

E-14551    **FECAL COLIFORM**    <1.8    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

Sample Description: MA-SR1										Sample Date: 2/28/18 11:37 am		
Lab Number: 14042				Sample Comment:						Collected By: Rick Haley		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment

E-14551    **FECAL COLIFORM**    540    1.8    **MPN/100mL** 1.0    SM9221 E/MTF    b    3/1/18    JFH    MTA\_180228r

**Notes:** \_\_\_\_\_

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D.F. - Dilution Factor

**Appendix C**  
**Crush Response Map**

# Environmental Canine Services Sewage Detection Map

## Legend

### ECS Sewage Detection Points

### Dog Response

- Positive



Map Created by Skagit County  
Geographic Information Services  
August 21, 2018

