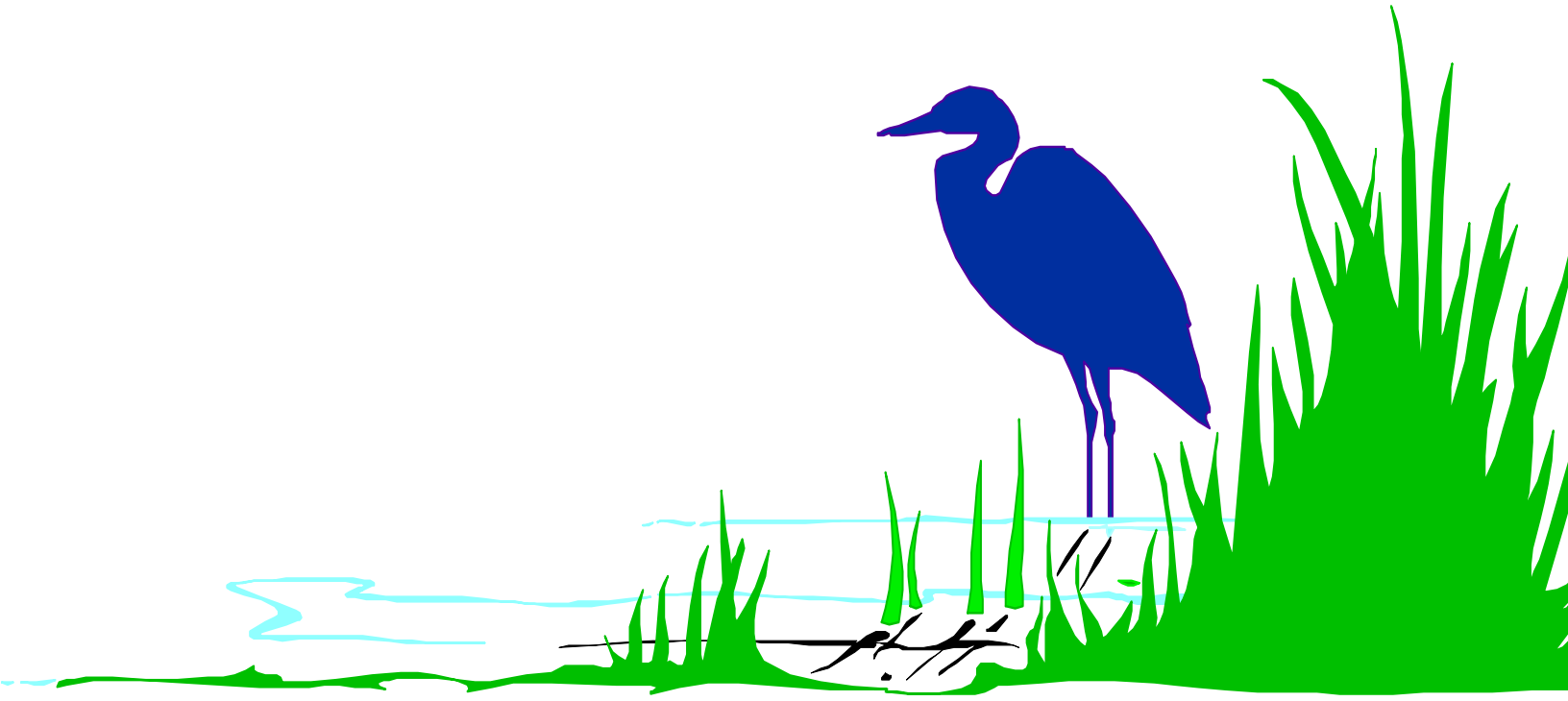
# Mason County Department of Health Services
# Sanitary Survey Procedure
# Mission Creek



**Adapted from: Mason County Sanitary Survey Procedures 2003**
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**Mason County Department of Health Services**
**Water Quality Program**

# Mason County Department of Health Services
# MISSION CREEK SANITARY SURVEY PROCEDURE
# July 19, 2006

## I. Office Evaluation

A. Obtain Parcel File - review permits on file to determine age of the system, size, location, basis for determining size, system design, whether final inspection was conducted, soil texture/classification, and any outstanding conditions (eg. expired O & M permit). Fill in information on the survey data form and attach a copy of the As-Built.
B. Review any records of complaints received regarding the system, look in Tidemark and the parcel file.
C. Review the SCS Soil Survey to determine soil types.
D. Acquire all maps pertinent to the survey area, i.e. topographical, road, and assessor maps.
E. (Optional) Obtain additional information on systems in the area by contacting designers, installers, and pumpers.
F. (Optional) Contact water utility to obtain record of water usage.

## II. Site/System Evaluation

*The type and complexity of inspection will vary depending upon weather and system location. Site evaluations will be made year round. If a site inspection does not correlate to an elevated fecal coliform level, efforts will be made to do the inspection during the winter months, November to April.*

*A.* Homeowner Consent – consent must be received in order to complete a site inspection. This can be obtained in writing or verbally. When entering the property, the surveyors must go to the front door and identify themselves to the property owner, occupant, or authorized adult.
*B.* Homeowner Interview - interview the homeowner/occupant and complete the sanitary survey form (See Appendix A)
C. Locate On-site Sewage System - if no permit or As-built exists, ask the homeowner/occupant to indicate the location of all on-site sewage system components. If this information is unavailable, the system may be located using the following techniques:

1. Look for very green lush grass growing in obvious strips. Strips generally indicate the location of the drainfield laterals. Other indicators could be depressions or no grass growth.
2. Use the plumbing vent pipe on the roof to identify where the plumbing leaves the house. The largest of these pipes is often directly above the point at which the drain passes through the foundation. The drain location can also be determined by observing the house plumbing through a crawl space or basement. The septic tank will usually be in a straight line from the plumbing about five to ten feet away from the house. Unless the system has a pump or siphon, the drainfield will usually be in a direct line or will radiate from the septic tank.
3. Use a probe to attempt to locate tanks, pump chambers, and drain rock in a trench/bed.

D. Validate As-Built

*check validity of the site plan, As-built, or diagram of the on-site sewage system*

1. Look for changes on the property since the on-site sewage system was installed.
2. Determine the distance from the septic tank and drainfield to surface water, wells, and structures.

3. Update or draw an As-built, as necessary.

E. Site Drainage - the landscape, position, and topography of the site should be observed to determine drainage of the property and whether surface water flows towards the on-site sewage system. Draw drainage patterns on the As-built or other sketch of the system and property. The point and direction of flow for discharges from downspouts, roof/foundation drains, curtain or french drains, driveways etc. should be observed and noted. Special attention should be given to the location and discharge of curtain drains. If this location is too close to the drainfield, these drains may saturate the system or allow infiltration of partially treated effluent into these drains.

F. On-Site Sewage System Evaluation - evaluate the area over the septic tank, pump chamber, and drainfield with a walkover/visual assessment, looking for the following symptoms/features:

1. *Hydraulic Failure* - observe effluent ponding or breakout. Usually the presence of lush green grass over the drainfield is evidence of upward capillary movement of water. However, lush grass associated with surface ponding, or breakout in the drainfield area is evidence of a system failure. Wet and soggy soil over the drainfield indicates ponding of liquid in the drainfield aggregate and usually precedes surface ponding or breakout.
2. *Odors* - noticeable sewage odor emanating from the on-site sewage system area may be an indication of failure, but must be distinguished from decaying vegetation odor.
3. *Construction Damage* - observe any indications of construction damage that may have occurred before, during, or after the system installation. The construction damage could be... topsoil stripping, new or widened road cuts, landscaping, patio installation, driveway construction, excessive backfilling of topsoil over the system, or ruts caused by vehicular traffic.
4. *Unusual Surface Features* - features such as eroded soils, soil settling depressions, or added features such as sand, bark, or rock over the top of the drainfield area.
5. *Inspection Pipes* - check the depth of ponding of liquid in the aggregate where inspection ports are available. Ponding in the drainfield (trench or bed) in itself does not constitute a system failure if it can be maintained below the top of the drainrock. There are three types of ponding: dosing ponding, seasonal ponding, and continuous ponding. If the system is a dosing system or pressure distribution, ponding during dosing can occur. This type of ponding is temporary and usually disappears shortly after the dose cycle is over. Seasonal ponding occurs during the winter but usually disappears by early summer. Continuous ponding is the result of a clogging mat at the soil/aggregate interface.

G. Greywater Discharge - check the house footing, crawl space, or basement for greywater discharge pipe from kitchen, bath, or laundry. The use of tracer dye in sink or laundry drain may confirm a suspected discharge.

H. Discharge Points - look at all potential discharge points e.g. drainage ditches, culverts, curtain drains, roof drains, foundation drains, storm water drains, bulkhead outfall pipes, wet seepage areas along downslope banks and bluffs, tidal seepage areas; ponds; streams; wells, and adjacent downslope property. Discharge points located downslope from drainfields need to be analyzed for the presence of dye by placing activated charcoal packets for up to 5 weeks.

I. Dye Tracing

*Generally dye tests are performed during the wet season (December-May). Exceptions may be made for seasonal residences or where documented levels of elevated fecal coliform exist.*

1. *Perform a Dye Test if:*

a) There are elevated levels of fecal coliform, but no known “point-source” of pollution.
b) There is an area designated to perform dye tests (e.g. Shellfish Protection Districts or under the agreements of a grant)
*c)* A complaint is received.
*d)* The system is suspect (in order to verify/eliminate)

2. *Charcoal Packet Placement*

a) **Control packets** - The presence, or level of presence, of dye should be verified prior to dye testing a particular system by placing activated charcoal packets for a one week period in the suspected discharge points. These packets may be analyzed prior to conducting the actual dye test or may be frozen and saved for later laboratory analysis.

Place a set of two (2)* control/background packets at each site in locations where water is surfacing, flowing or likely to flow, for example in the area of the drainfield, bulkhead weep holes, drain pipes that pass by the OSS, stream, rivers, ditches, beach seeps, etc. Packets can be clipped to drain pipes with binder clips, buried under rocks, or any other form of anchoring. It is sometimes helpful to mark locations with flags or whiskers (sometimes these draw unwanted attention and are removed). Packets will remain in place for 5-7 days. *Two packets are placed per site so that one packet may be sent to Ozark Underground Laboratories if we can not visually detect dye, but suspect a failure.

b) **Collect control/background packets** and replace with clean packets before introducing dye into the system. **See Packet Collection Section for proper procedure.** Each set of two packets are collected and replaced weekly for up to 5 weeks after dye has been introduced.

3. *Introduction of Dye to the system*

a) **Dye Introduction**: Put on latex gloves and have paper towels on hand. Introduce 16 ounces of fluorescein dye into the on-site sewage system via toilets, sinks, and laundry sink (under certain circumstances the amount of dye may be increased). After introducing the dye it is helpful to slip the glove off and over the top of the bottle (this helps to prevent drips or splashes.) The packets are retrieved and replaced for up to 5 weeks and analyzed for the presence/absence of dye.

b) **Alternate procedure**

1) Due to the persistence of dye in the systems and soils under certain conditions, it is necessary to use other dyes for accurate results. Under the following circumstances another type of dye may be introduced:
   a) Where a system is being re-dyed, e.g. a repair has been made, the system was suspect the previous season, there is suspected interference, it is the requirement of an appeal, etc.
   b) Small lots which are within 100 feet of a residence which has been dyed previously
   c) Systems which share a common drain(s). Use a different dye for each system.
2) **24 ounces** of **eosine** or **8 ounces** of **rhodamine** dye can be used as directed above (2.a).

4. *Packet Collection*

a) Use new latex gloves for each dye-test site (not packet), to ensure no cross contamination.
b) Collect charcoal packets approximately 1 week from the time of placement. New packets are placed at the time of pickup. Usually 4 sets of packets are placed after dye introduction.
c) Use one whirl-pak bag for each set of charcoal packet placement.
d) Place a 2-inch piece of white lab tape on each whirl-pak. Record the following on the tape with a black indelible ink pen (red may contain eosine, blue can contain rhodamine):

1. Area/Project name (upper left)
2. Series Number-$F_0$=control packets, $F_1$=1$^{st}$ set after dye introduction, $F_2$, $F_3$, $F_4$ (upper right)
3. Property Owner's Last Name and Site Address (middle center)
4. Packet Number(bottom left)
5. Date (bottom right)
6. Initials (bottom center)

Example:

| | | |
|---|---|---|
| LHCPIC (*1*) | | $F_0$ *(2)* |
| | Doe, 11543 SR 106 *(3)* | |
| 1 *(4)* | AG *(6)* | 7/19/06 *(5)* |

f) Group the packets together for each site and secure by lining the tops of the bags up and rolling down 1 inch then folding the tab ends in. Place in gallon zip lock bag.
g) All charcoal sampler packets will be kept in a cooler with blue ice for transport and are refrigerated upon returning to the lab.
h) Upon returning from the field, place zip lock bags with packets inside the bottom drawer of the refrigerator.

5. *Charcoal Packet Analysis*

*Background packets are collected before dye introduction and placed in the freezer. Background packets will be eluted if $F_1$- $F_4$ produce a positive result. Elutions from all sites with a positive result and the corresponding background will be saved.*

a) Set-up

1) Position whirl pak bags, in sequential order, onto lab counter near sink.
2) Place clean 4 oz. or 120ml jar on top of each bag
3) Transfer tape label from bag onto top portion of jar (not lid) and place jar back on top of bag
4) Use new latex gloves. Rinse with deionized* water between samples to prevent cross contamination (*DI water is used because the City of Shelton's drinking water is chlorinated, which could negatively affect the dye).
5) Rinse packet with fast running cold deionized water, shake off excess water
6) Open packet by cutting with scissors and empty charcoal into jar.
7) Put on gloves (KOH is **CAUSTIC** and will burn skin and eat through fabric) and dispense 20 ml of KOH solution into glass jar containing charcoal via a 25ml pipette (labeled specifically for KOH use) with a Drummond Pipette-Aid. Submerge the tip of the pipette no more than ½ inch into top layer of the solution. Solution will have 2 distinct layers, **DO NOT MIX.**
8) Cap jars and set in the dark.
9) Visually read the elutant for the presence/absence of fluorescent dye. The first reading can be done after 1hour, but if there is no visible dye, recheck after 24 hours. If there is still no presence of dye, then the jars should be rechecked after 7 days. Two staff persons shall do readings for each elutant sample. Reading is done by shining a strong beam of light through the sample in a dark room (see supply section). Record readings using the following criteria and symbols:

| | |
|---|---|
| **-** | = negative |
| **+** | = fluorescence visible via flashlight |
| **++** | = fluorescence marginally visible into charcoal layer |
| **+++** | = fluorescence visible into charcoal layer |
| **++++** | = fluorescence visible & masking view of charcoal layer |

10) For those samples in which dye is seen, decant elutant into a storage vial and transfer label. This should be done within 72 hours of finding the presence of dye.
11) For those elutions in which fluorescein is visually present, 10% of the samples shall be sent for spectroflorimetric lab analysis for QA/QC.
12) All visually positive and spectroflorimetric-confirmed dye results will be followed up by collecting a fecal coliform bacteria sample from the exact location of the positive charcoal packet, unless a fecal coliform sample has already been taken.

J. Optical Brighteners (optional) - are laundry detergent additives that can be visually observed with the use of a black light (longwave UV). These additives can be detected in suspected greywater discharges. Sterile cotton pads (verified not to contain optical Brighteners) are placed in suspected greywater discharges and analyzed with a black light (in a dark room) for the presence of optical brighteners.

K. Neighbors - property owners and neighbors may indicate past and existing failure/problems in an area. Caution should be exercised in the use of neighbors as an information source without verification since they may be unreliable and can distort the quality of data gathered during the survey.

## III. Homeowner Education

On-site septic system operation and maintenance information should be given to the homeowner/occupant. This can be done verbally and/or with brochures. All written materials should have the telephone numbers of appropriate contact persons included. The more homeowners know about proper operation and maintenance of their system, the more impact we will have in increasing knowledge and eliminating myths. Homeowners need an awareness of how their maintenance will impact others as well as water quality.

## IV. Process Survey Data

A. Enter survey data from the survey forms into a database program.
B. Generate interim results as desired.
C. Draft a comprehensive report when the survey is completed.

## V. Preparation/Supplies:

A. Sampling

1. 125 mL autoclavable plastic sampling bottle
2. Cooler with ice for the samples
3. Sampling Wand
4. Boots for walking on the beach
5. Latex or non-latex gloves for your personal protection
6. GPS
7. Camera

B. Creating Charcoal/Optical Brightener Packets

1. Activated Charcoal - 8-12 mesh activated charcoal (Barnebey and Sutcliffe - supplier)
2. Cotton Pads - Swiss Beauty Pads or Swisspers (Longs Drug-supplier)
3. Screening for making charcoal packets - charcoal fiberglass 18 X 14 mesh (comes in 36" X 100' rolls). Cut into 4" X 6" pieces fold in half and staple or heat seal after filling with 1 Tablespoon of activated charcoal. Use the same screening for the optical brightener packets. After construction place packets in groups of 50 into gallon zip lock bags. Label each bag, using a black indelible marker, with name and date.

C. Dye Testing Field

1. Pre-assembled Charcoal Packets
2. Indelible Black Ink Sharpie Marker
3. Dye Testing Liquid powder tracing dye - fluorescent yellow-green (fluorescein), fluorescent orange (eosine) and fluorescent red (Rhodamine RTW) (Norlab - supplier)
2. Binder Clips, Rubber bands, marking flags, zip-ties (for connecting charcoal packets)
3. 4.5” X 9” Whirl-pak plastic bags (Nasco brand, write on, puncture proof; VWR - supplier)
4. Latex or non-latex gloves for your personal protection
5. GPS
6. Camera
7. Boots for walking on the beach

D. Eluting packets back in the lab

1. KOH Solution - 5% potassium hydroxide dissolved in 70% isopropyl alcohol. Elute each charcoal packet with 20ml of KOH solution. 1 Liter = 4.25grams KOH + 1 liter isopropyl alcohol.
2. Erlenmeyer flask for mixing
3. 25ml pipette (labeled specifically for KOH use) with a Drummond Pipette-Aid
4. 4-ounce or 120ml glass jars with screw caps. After proper cleaning with a chlorine solution, positive jars can be re-used.
5. Black Light-Longwave UV-365nm
6. Mini-Mag Light
7. Latex or non-latex gloves for your personal protection

## VI. Quality Control

A. Potassium Hydroxide (KOH) - When a new bottle of KOH solution is made, the following control procedure will be used:

1. Fill a 250-ml beaker with 150ml of cold deionized water. Submerge a clean charcoal packet in this beaker for 15 minutes.

2. Fill a 250-ml beaker with 150ml of cold deinonized water. Place 1 drop of fluorescent yellow-green dye into this beaker. Submerge a clean charcoal packet in this beaker for 15 minutes.

3. Elute these two charcoal packets.

4. Record the results. The packet placed in deionized water should produce a negative result, while the packet placed in the dye solution should produce a positive result. If any other results are observed, then the quality of the KOH solution, activated charcoal, dye or other materials should be checked.

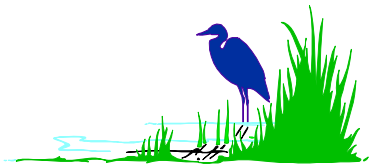
B. Field Samples – because all sites will have a set of packets, each site will have a duplicate. Five percent (5%) of the duplicate packets will be eluted in our lab unless they are sent to Ozark Underground Laboratories. All charcoal sampler packets will be kept in a dark cooler with blue ice until are refrigerated upon returning to the lab.
C. Charcoal packets (including all materials used in manufacture) - shall be constructed and stored with EXTREME CARE so that nothing contaminates them. One packet per batch of charcoal packets shall be eluted and results recorded.
D. Eluted Charcoal - Two staff shall read all elutant samples

Reference:

Aley, Tom. 1999.*The Ozark Underground Laboratory's Groundwater Tracing Handbook. A Handbook prepared for the use of clients and colleagues of the Ozark Underground Laboratory*

# Appendix A:
# Sanitary Survey Form

Adapted from Kitsap County Health District



# MASON COUNTY HEALTH DEPARTMENT — Survey Form

**WATER QUALITY PROGRAM** — **Initial Inspection Date: ___/___/_____**

**PROPERTY INFORMATION:**

Address: _____
_____
_____
Phone: _____
Parcel Number: _____
Number of Occupants:_____
Previous Owner: _____

Occupant: _____
Owner (if different): _____
Address: _____
_____
Phone: _____
Water supply Public: _____ Private: _____
Number of Bedrooms: _____ Water Meter? _____
County/ City: _____

**SEPTIC SYSTEM INFORMATION:**

System type : _____
System altered: Yes__ No__ Repair__ Date:_____
Sytems size (bedroom #): _____
Date of last septic tank pumping: _____
Effluent filter?_____ Washer filter?_____
Install Date: _____
Records: BSA ☐ Permit ☐ As-built ☐ Complaint ☐

**OSS Check List :**

Additives ☐ Water softener ☐
Plumbing leaks or back-ups ☐
Clotheswasher use ☐ Max # loads/day) ____
Medications (Antibiotics ☐ Garbage grinder used ☐
chemo, kidney dialysis ) Fabric softener used ☐

_____

**FIELD INSPECTION INFORMATION:**

Inspector: _____
Dates of site visits: _____
_____
OSS condition: _____
Reserve condition: _____
Roof drains: _____
_____
Curtain drains: _____
_____
Bulkhead drains: _____

Surface Waters Nearby: Yes__ No__ Type:_____
Distance From Drainfield: _____
Animals: Domestic or Livestock? (Type and Number) _____
_____
_____
Site concerns: ( Ponds, Topography, etc) _____
_____
_____
Approx. distance to sewer service_____
_____

**FINAL RATING OSS:**

❑ **NAP** ❑ **NO RECORDS** ❑ **NON-CONFORMING** ❑ **SUSPECT** ❑ **FAILURE**

**Reasons for final rating:**_____
_____
_____

Public education information: ❑ OSS Facts ❑ OSS Manual ❑ OSS Repair ❑ PIC
❑ Additives ❑ Lake Living Guide ❑ Pet Waste ❑ Conservation Kit ❑ Leak Guide
Other:_____ _____

Notes:_____
_____
_____
_____

**If Flows Emanating from this Property are Potentially Impacting Water Quality, Complete the Following:**

In the box below, indicate sources/areas of animal waste, surface water flows, locations of OSS, and where samples/dye tests were collected/placed on the property. For consistency, indicate distances and directions on the drawing (Not To Scale).

Notes:_____

_____

_____

**Dye Test Date:** **Dye Used:**

| Location Number | Control (BAC) | | | Pack Week #1 (F1) | | | Pack Week #2 (F2) | | | Pack Week #3 (F3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Placed | Retrieved | Result | Placed | Retrieved | Result | Placed | Retrieved | Result | Placed | Retrieved | Result |
| 1 | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | |

**WATER SAMPLE DATA:** (**FC per 100mL**)

Water Sample Taken: Date:_____ Inspector:____ Result:_____ Location:_____
Water Sample Taken: Date:_____ Inspector:____ Result:_____ Location:_____
Water Sample Taken: Date:_____ Inspector:____ Result:_____ Location:_____
Water Sample Taken: Date:_____ Inspector:____ Result:_____ Location:_____
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