Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager: City of Olympia

Water system name: City of Olympia

County: Thurston

Water system number: 63450 Source number: 13

Well depth: 372 feet (ft.) (From WFI form)

Source name: TW-22

WA well identification tag number: ACS-968

well not tagged

Number of connections: 33,136 Population served: 59,550

Township: 18N Range: 1E

Section: 29 1/4 1/4 Section: SW/NW

Latitude/longitude (if available): 47.0187 / -122.7164

How was lat./long. determined?

___ global positioning device ___ survey ___ topographic map

other:

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 3 / 10 / 97 month/day/year

last reconstruction: 11 / 7 / 12 month/day/year

information unavailable
2) Well driller: ____________________________ Holt Well Drilling

________________________________________

__ well driller unknown

3) Type of well:

Drilled: __ rotary ___ bored ___ cable (percussion) ___ Dug

Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other:

Additional comments: ___________________________________________

________________________________________

4) Well report available? ___ YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 1,500 __________________________ (gallons/min)

Source of information: Constant rate pumping test and evaluation by Golder Associates

If not documented, how was pumping rate determined? __________________________

________________________________________

__ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

___ disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

Preventative to limit bacteriological growth in the distribution system.

Packed tower aeration for corrosion control will be installed within the next 2 years.

7) If source is chlorinated, is a chlorine residual maintained? ___ YES ___ NO

Residual level: 0.7-0.9 mg/L (At the point closest to the source.)
PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]
   ___ < 20 ft   ___ 20–50 ft   ___ 50–100 ft   ___ 100–200 ft   x ___ > 200 ft
   ___ information unavailable  ('< ' means less than; '>' means greater than)

2) Depth to ground water (static water level):
   ___ < 20 ft   ___ 20–50 ft   ___ 50–100 ft   x ___ > 100 ft
   ___ flowing well/spring (artesian)
   How was water level determined?
   x ___ well log   ___ other: ____________________________
   ___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:
   ___ psi (pounds per square inch)
   or
   ___ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated
   with this source:   ___ YES   ___ NO

5) Wellhead elevation (height above mean sea level):   131 ___ (ft)
   How was elevation determined?   ___ topographic map   ___ Drilling/Well Log   ___ altimeter
   x ___ other:   Survey
   ___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic
   report describing subsurface conditions. Please refer to assistance package for example.)
   ___ evidence of a confining layer in well log
   x ___ no evidence of a confining layer in well log

   If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the bottom of
   the lowest confining layer?   ___ YES   ___ NO
   ___ information unavailable
7) Sanitary setback:

   _ (less than) 100 ft* _ 100–120 ft _ 120–200 ft _ (greater than) 200 ft
   * if less than 100 ft describe the site conditions:

8) Wellhead construction:

   X wellhead enclosed in a wellhouse

   X controlled access (describe):

   _ other uses for wellhouse (describe):

   _ no wellhead control

9) Surface seal:

   _ 18 ft

   _ (less than) 18 ft (no Department of Ecology approval)

   _ (less than) 18 ft (Approved by Ecology, include documentation)

   X (greater than) 18 ft

   _ depth of seal unknown

   _ no surface seal

10) Annual rainfall (inches per year):

    _ (less than) 10 in/yr _ 10–25 in/yr _ (greater than) 25 in/yr
PART IV:  Mapping Your Ground Water Resource

1) Annual volume of water pumped: 525,600,000 (gallons)

   How was this determined?
   
   _ meter
   
   X estimated: X pumping rate (1000 x 1440 x 265)
   
   _ pump capacity (___________)
   
   _ other: _____________________________

2) "Calculated Fixed Radius" estimate of ground water movement:
   (see Instruction Packet)

   6 month ground water travel time: 980 (ft)
   1 year ground water travel time: 1390 (ft)
   5 year ground water travel time: 3110 (ft)
   10 year ground water travel time: 4400 (ft)

   Information available on length of screened/open interval?

   _ YES   _ NO

   Length of screened/open interval: 55 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? _ YES  X NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? _ YES  X NO (mark and identify on map).

   Comments: ____________________________________________
   ____________________________________________
   ____________________________________________

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PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

<table>
<thead>
<tr>
<th>Source</th>
<th>6 month</th>
<th>1 year</th>
<th>5 year</th>
<th>unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>likely pesticide application</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>stormwater injection wells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other injection wells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>abandoned ground water well</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>landfills, dumps, disposal areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>known hazardous materials clean-up site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>water system(s) with known quality problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>population density &gt; 1 house/acre</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>residences commonly have septic tanks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater treatment lagoons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sites used for land application of waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

Highway 510 and a number of other roadways.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. **Nitrate**: (Nitrate MCL = 10 mg/l)  
   Results greater than MCL  
   \(-\)  
   \(< 2 \text{ mg/liter nitrate}\)  
   \(\times\)  
   \(2-5 \text{ mg/liter nitrate}\)  
   \(\_\)  
   \(> 5 \text{ mg/liter nitrate}\)  
   \(\_\)  
   Nitrate sampling records unavailable  

B. **VOCs**: (VOC detection level 0.5 µg/l or 0.0005 mg/l.)  
   Results greater than MCL or SAL  
   \(\_\)  
   VOCs detected at least once  
   \(\_\)  
   VOCs never detected  
   \(\times\)  
   VOC sampling records unavailable  

C. **EDB/DBCP**:  
   (EDB MCL = 0.05 µg/l or 0.00005 mg/l, DBCP MCL = 0.2 µg/l or 0.0002 mg/l.)  
   EDB/DBCP detected below MCL at least once  
   \(\_\)  
   EDB/DBCP detected above MCL at least once  
   \(\_\)  
   EDB/DBCP never detected  
   \(\times\)  
   EDB/DBCP tests required but not yet completed  
   \(\_\)  
   EDB/DBCP tests not required  

D. **Other SOC**s (Pesticides):  
   Other SOC detected  
   \(\_\)  
   (pesticides and other synthetic organic chemicals)  
   Other SOC tests performed but none detected  
   \(\times\)  
   (list test methods in comments)  
   Other SOC tests not performed  

If any SOC in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here:  

\[\text{------------------}\]  

\[\text{------------------}\]  

E. **Bacterial contamination**:  

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).  

\[\text{------------------}\]  

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.  

\[\text{------------------}\]  

Source sampling records for bacteria unavailable  

\[\text{------------------}\]
Part VI: Geographic or Hydrologic Factors Contributing to a
Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately
represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the
CFR areas should be used as a preliminary delineation of the critical time of travel zones for that
source. As a system develops its Wellhead Protection Plan for these sources, a more detailed
delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR?
(Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or
ridge?)

x YES    ___ NO

Describe with references to map produced in Part IV:

Lake St. Clair is located within the 10 year time of travel.

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an
area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES    x NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an
area where the underground conditions are primarily identified as coarse sand and gravel?

x YES    ___ NO
3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

- YES  
- NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

<table>
<thead>
<tr>
<th>Travel Time</th>
<th>YES</th>
<th>NO</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 month</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 month – 1 year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 5 year</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>5 – 10 year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

<table>
<thead>
<tr>
<th>Travel Time</th>
<th>YES</th>
<th>NO</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>1 – 5 year</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>5 – 10 year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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Suggestions and Comments

Did you attend one of the susceptibility workshops?  
___ YES  x  NO

Did you find it useful?  
___ YES  ___ NO

Did you seek outside assistance to complete the assessment?  
___ YES  x  NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

____________________

____________________

____________________

____________________

____________________

____________________

____________________

____________________

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NOTES
1. AS-BUILT CONSTRUCTION DETAILS (REPRESENTED IN GRAY-SCALE) ARE BASED ON THE
INFORMATION PROVIDED IN "RESULTS OF WELL INSTALLATION AND TESTING, MCAULISTER SPRINGS WELLFIELD TESTING PROGRAM" BY PUREST GROUNDWATER GROUP (PGG)
SEPTEMBER 1993
2. MODIFICATIONS TO EXISTING WELL CONSTRUCTION BY GOLDEN ASSOCIATES IN 2012 ARE
REPRESENTED IN BLACK

TW-22 AND PW-24 AS-BUILT SCHEMATICS
G&O / OLYMPIA MCAULISTER WELLFIELD / WA

Golder Associates
### Geologic Log

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>Brown to olive gray, fine to medium SAND</td>
</tr>
<tr>
<td>210</td>
<td>Brown to olive gray, loose, fine to medium SAND and GRAVEL, fine to medium sandy GRAVEL; brown mud and gravel</td>
</tr>
<tr>
<td>220</td>
<td>Brown to olive gray, fine to medium SAND; brown mud and gravel, fine to medium sandy GRAVEL; very slightly silty, fine to coarse sandy GRAVEL; very slightly silty by 260 ft</td>
</tr>
<tr>
<td>230</td>
<td>Brown to olive gray, loose, well graded, slightly cobbly, fine to coarse sandy GRAVEL; very cobbly by 240 ft</td>
</tr>
<tr>
<td>240</td>
<td>Brown to olive gray, coarse of siltbound, slightly sandy GRAVEL and COBBLE</td>
</tr>
<tr>
<td>250</td>
<td>Olive gray to brown, loose, fine to coarse SAND; loose gravel</td>
</tr>
<tr>
<td>260</td>
<td>Brown to olive gray, loose, fine to coarse SAND; loose gravel</td>
</tr>
<tr>
<td>270</td>
<td>Brown to olive gray, slightly silty, gravelly SAND</td>
</tr>
<tr>
<td>280</td>
<td>Brown to olive gray, very slightly silty, fine to coarse sand and gravel</td>
</tr>
<tr>
<td>290</td>
<td>Brown to olive gray, very slightly silty, fine to coarse sand and gravel</td>
</tr>
<tr>
<td>300</td>
<td>Brown to olive gray, very slightly silty, fine to coarse sand and gravel</td>
</tr>
<tr>
<td>310</td>
<td>Brown to olive gray, generally, medium to coarse sand and gravel</td>
</tr>
<tr>
<td>320</td>
<td>Olive gray to brown, coarse, well graded, fine to coarse sandy GRAVEL</td>
</tr>
<tr>
<td>330</td>
<td>Green-gray and gray-brown, silt/sandy to sand to gravelly SAND and GRAVEL; black to brown and black in clays and silt; bottom of boring 2/4/87</td>
</tr>
</tbody>
</table>

**WELL CONSTRUCTION DETAILS**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>12-inch Steel Casing</td>
</tr>
<tr>
<td>210</td>
<td>K-logger and Xfer Pipe</td>
</tr>
<tr>
<td>220</td>
<td>10-in Pipe Size Stainless Steel Screen 60-stl (9.090-inch)</td>
</tr>
<tr>
<td>230</td>
<td>10-in Pipe Size Stainless Steel Screen 150-stl (6.150-inch)</td>
</tr>
<tr>
<td>240</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>250</td>
<td>10-in Pipe Size Stainless Steel Screen 60-stl (9.090-inch)</td>
</tr>
<tr>
<td>260</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>270</td>
<td>10-in Pipe Size Stainless Steel Screen 60-stl (9.090-inch)</td>
</tr>
<tr>
<td>280</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>290</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>300</td>
<td>10-in Pipe Size Stainless Steel Screen 150-stl (6.150-inch)</td>
</tr>
<tr>
<td>310</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>320</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>330</td>
<td>10-in Pipe Size Stainless Steel Screen 150-stl (6.150-inch)</td>
</tr>
<tr>
<td>340</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>350</td>
<td>10-in blank steel pipe</td>
</tr>
<tr>
<td>360</td>
<td>Steel Pipeline and Bell Bottom</td>
</tr>
<tr>
<td>370</td>
<td>Steel Pipeline and Bell Bottom</td>
</tr>
<tr>
<td>380</td>
<td>13-inch Olive Shoes Rendering</td>
</tr>
</tbody>
</table>

---

**PROJECT NAME:** McAllister Springs Wellfield Development  
**WATER LEVEL ELEVATION:** 36.4 ft  
**WELL IDENTIFICATION NUMBER:** Well TW-22  
**WATER LEVEL DATE:** 3/10/87  
**LOCATION:** SW & NW 1/4 Sec. 29, T.18N., R.16E.  
**CONSULTING FIRM:** Pacific Groundwater Group  
**REPRESENTATIVE:** Jim Mathew, Dan Malenkov  
**DRILLING FIRM:** Pacific Groundwater  
**FIRM:** Holt Well Drilling
Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2

IMPORTANT! Please complete one form for each ground water source
(well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager: City of Olympia

Water system name: City of Olympia

County: Thurston

Water system number: 63450 Source number: 14

Well depth: 400 feet (ft.) (From WFI form)

Source name: PW-24

WA well identification tag number: ACS-969

____ well not tagged

Number of connections: 33,136 Population served: 59,550

Township: 18N Range: 1E

Section: 29 1/4 1/4 Section: SW/NW

Latitude/longitude (if available): 47.0192 / -122.7169

How was lat./long. determined?

_____ global positioning device  x survey  _____ topographic map

_____ other: ________________________________

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 6 / 16 / 97 month/day/year

last reconstruction: 12 / 13 / 12 month/day/year

_____ information unavailable

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2) Well driller: ____________ Holt Well Drilling

_____ well driller unknown

3) Type of well:
   __ Drilled:  ___ rotary  ___ bored  ___ cable (percussion)  ___ Dug
   ___ Other:   ___ spring(s) ___ lateral collector (Ranney)
     ___ driven  ___ jetted  ___ other:

   Additional comments: _____________________________________________

4) Well report available?  ___ YES (attach copy to form)  ___ NO

   If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate:  3,000 ______________________ (gallons/min)
   Source of information: Constant rate pumping test and evaluation by Golder Associates

   If not documented, how was pumping rate determined? __________________________

   ___ Pumping rate unknown

6) Is this source treated?

   If so, what type of treatment:
   ___ disinfection  ___ filtration  ___ carbon filter  ___ air stripper  ___ other

   Purpose of treatment (describe materials to be removed or controlled by treatment):
   Preventative to limit bacteriological growth in the distribution system.
   Packed tower aeration for corrosion control will be installed within the next 2 years.

7) If source is chlorinated, is a chlorine residual maintained:  ___ YES  ___ NO

   Residual level: 0.7-0.9 mg/L  (At the point closest to the source.)
PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

   __ < 20 ft  _ 20-50 ft  __ 50-100 ft  __ 100-200 ft  _ x > 200 ft

   __ information unavailable  ('< ' means less than; '> ' means greater than)

2) Depth to ground water (static water level):

   __ < 20 ft  _ 20-50 ft  __ 50-100 ft  _ x > 100 ft

   __ flowing well/spring (artesian)

   How was water level determined?

   _ x well log  __ other: _________________________________

   __ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

   __________ psi (pounds per square inch)

   or

   __________ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source:  _ _ YES   _ _ NO

5) Wellhead elevation (height above mean sea level):  129.5 (ft)

   How was elevation determined?  _ _ topographic map  _ _ Drilling/Well Log  _ _ altimeter

   _ x other: Survey _________________________________

   __ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

   __ evidence of a confining layer in well log

   _ x no evidence of a confining layer in well log

   If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the bottom of the lowest confining layer?  _ _ YES   _ _ NO

   __ information unavailable

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page 3
7) Sanitary setback:

- 100 ft
- 100-120 ft
- 120-200 ft
- > 200 ft

* if less than 100 ft describe the site conditions:


8) Wellhead construction:

- wellhead enclosed in a wellhouse
- controlled access (describe): Site is fenced and gated

- other uses for wellhouse (describe):

- no wellhead control

9) Surface seal:

- 18 ft

- < 18 ft (no Department of Ecology approval) ('< means less than)

- < 18 ft (Approved by Ecology, include documentation) ('< means less than)

- > 18 ft ('> means greater than)

- depth of seal unknown

- no surface seal

10) Annual rainfall (inches per year):

- < 10 in/yr
- 10-25 in/yr
- > 25 in/yr
PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 1,576,800,000 (gallons)

   How was this determined?

   _ meter

   x estimated: _ pumping rate (______________________)

   _ pump capacity (3,000 gpm x 60 min/day x 24 hours/day x 365 days)

   _ other: _______________________________________

2) "Calculated Fixed Radius" estimate of ground water movement:
   (see Instruction Packet)

   6 month ground water travel time: ________________(ft)

   1 year ground water travel time: ________________(ft)

   5 year ground water travel time: ________________(ft)

   10 year ground water travel time: ________________(ft)

   Information available on length of screened/open interval?

   _ YES   _ NO

   Length of screened/open interval: 74 ______ (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? _ YES   _ NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? _ YES     _ NO (mark and identify on map).

Comments: Due to the transmissivity of the aquifer, use of the calculated fixed radius method does not provide an accurate representation of wellhead protection areas. Golder Associates completed numerical modeling of the aquifer to determine wellhead protection area zone of contribution areas for the 6 month, 1 year, 5 year, and 10 year time of travel for the McAllister Wellfield. Wellhead protection areas are shown on the attached figure.
PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

<table>
<thead>
<tr>
<th>Source</th>
<th>6 month</th>
<th>1 year</th>
<th>5 year</th>
<th>unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>likely pesticide application</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stormwater injection wells</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>other injection wells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>abandoned ground water well</td>
<td></td>
<td></td>
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<tr>
<td>landfills, dumps, disposal areas</td>
<td></td>
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<tr>
<td>known hazardous materials clean-up site</td>
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</tr>
<tr>
<td>water system(s) with known quality problems</td>
<td></td>
<td></td>
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<tr>
<td>population density &gt; 1 house/acre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>residences commonly have septic tanks</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Wastewater treatment lagoons</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sites used for land application of waste</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

Highway 510 and a number of other roadways.
2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 mg/l</td>
</tr>
<tr>
<td>2-5 mg/l</td>
</tr>
<tr>
<td>&gt; 5 mg/l</td>
</tr>
<tr>
<td>Nitrate sampling records unavailable</td>
</tr>
</tbody>
</table>

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l)

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results greater than MCL or SAI</td>
</tr>
<tr>
<td>VOCs detected at least once</td>
</tr>
<tr>
<td>VOCs never detected</td>
</tr>
<tr>
<td>VOC sampling records unavailable</td>
</tr>
</tbody>
</table>

C. EDB/DBCP:

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)</td>
</tr>
<tr>
<td>EDB/DBCP detected below MCL at least once</td>
</tr>
<tr>
<td>EDB/DBCP detected above MCL at least once</td>
</tr>
<tr>
<td>EDB/DBCP never detected</td>
</tr>
<tr>
<td>EDB/DBCP tests required but not yet completed</td>
</tr>
<tr>
<td>EDB/DBCP tests not required</td>
</tr>
</tbody>
</table>

D. Other SOCs (Pesticides):

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other SOCs detected</td>
</tr>
<tr>
<td>Other SOC tests performed but none detected</td>
</tr>
<tr>
<td>(list test methods in comments)</td>
</tr>
<tr>
<td>Other SOC tests not performed</td>
</tr>
</tbody>
</table>

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here:

E. Bacterial contamination:

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).</td>
</tr>
<tr>
<td>Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.</td>
</tr>
<tr>
<td>Source sampling records for bacteria unavailable</td>
</tr>
</tbody>
</table>
Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for these sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

   x  YES  ___ NO

   Describe with references to map produced in Part IV:

   Lake St. Clair is located within the 10 year time of travel.

2) Aquifer Material:

   A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

      ___ YES  x___ NO

   B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

      x___ YES  ___ NO
3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

  x  YES  ___  NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&lt; 6 month travel time</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 month-1 year travel time</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1-5 year travel time</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>5-10 year travel time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

  b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| < 1 year travel time  |     | x       |
| 1-5 year travel time  |     | x       |
| 5-10 year travel time |     |         |

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.
Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES ___ NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? ___ YES ___ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
NOTES
1. AS BUILT CONSTRUCTION DETAILS (REPRESENTED IN GRAY-SCALE) ARE BASED ON THE INFORMATION PROVIDED IN "RESULTS OF WELL INSTALLATION AND TESTING, MCALLISTER SPRINGS WELLFIELD TESTING PROGRAM" BY FUGRO GROUNDWATER GROUP (FUG) SEPTEMBER 1997.
2. MODIFICATIONS TO EXISTING WELL CONSTRUCTION BY GOLDER ASSOCIATES IN 2012 ARE REPRESENTED IN BLACK.

GOLDER ASSOCIATES

TW-22 AND PW-24 AS-BUILT SCHEMATICS
G&O / OLYMPIA MCALLISTER WELLFIELD / WA

FIGURE 4-1
## Geologic Log for Well PW-24

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Geologic Description</th>
<th>Well Construction Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>Ground Surface Elevation: 129.5 ft</td>
<td>20-inch Steel Casing</td>
</tr>
<tr>
<td></td>
<td>Brown to olive gray, slightly sandy, medium to coarse sandy</td>
<td>X-packer and Screen Pipe</td>
</tr>
<tr>
<td>210</td>
<td>Olive gray, fine to medium very sandy GRAVEL</td>
<td>18-inch Pipe Size Stainless Steel Screen 150-slots (0.150-inch)</td>
</tr>
<tr>
<td>220</td>
<td>Olive gray, very gravelly, fine to medium SAND</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>230</td>
<td>Brown to olive gray, moderately well graded, slightly</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>sandy clay, fine to coarse sandy GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>240</td>
<td>Olive gray, fine to medium SAND and GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>250</td>
<td>Brown to olive gray, very gravelly, fine to coarse SAND</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>260</td>
<td>Brown to olive gray, very gravelly, fine to coarse SAND</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>270</td>
<td>Olive gray, fine SAND and GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>280</td>
<td>Brown to olive gray, zones of clayey, fine to coarse SAND</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>290</td>
<td>Brown to olive gray, moderately graded, fine to coarse</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>sandy GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>300</td>
<td>Brown to olive gray, well graded, slightly clayey,</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>medium to coarse sandy GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>320</td>
<td>Brown to olive gray, well graded, slightly clayey,</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>medium to coarse sandy GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>340</td>
<td>Brown to olive gray, well graded, slightly clayey,</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>medium to coarse sandy GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>360</td>
<td>Brown to olive gray, slightly sandy, clayey, GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>Brown-gray, sandy, all e. sandy, GRAVEL zone of badger</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>370</td>
<td>Light brown to gray, well graded, medium to coarse</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>sandy GRAVEL, grades more gravelly</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>380</td>
<td>Olive gray, very sandy (medium) GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>390</td>
<td>Brown to olive gray, slightly clayey, well graded,</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>medium to coarse sandy GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td>400</td>
<td>Olive gray, medium to coarse SAND and GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>Brown to olive gray, well graded, medium to coarse sand</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>GRAVEL</td>
<td>18-inch blank steel pipe</td>
</tr>
<tr>
<td></td>
<td>Bottom of Drilling</td>
<td>20-inch Drive, Sand Removal</td>
</tr>
</tbody>
</table>

### Project Information
- **Project Name:** McAllister Springs Wellfiel Development
- **Well Identification Number:** Well PW-24
- **Location:** SW 1/4 NW 1/4 Sec. 29, T.18N., R.1E.
- **Consulting Firm:** Pacific Groundwater Group
- **Representative:** Jim Mathieu, Don Mathieu

### Well Log Details
- **Water Level Elevation:** 28.5 feet
- **Water Level Date:** 6/16/87
- **Start Card No.:** W072132
- **Drilling Method:** Cable Tool
- **Driller:** Wade, Griffin
- **Firm:** Holt Well Drilling
Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2

IMPORTANT! Please complete one form for each ground water source
(well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager: City of Olympia

Water system name: City of Olympia

County: Thurston

Water system number: 63450 Source number: 15

Well depth: 415 feet (ft.) (From WFI form)

Source name: PW-25

WA well identification tag number: APF-993

____ well not tagged

Number of connections: 33,136 Population served: 59,550

Township: 18N Range: 1E

Section: 29 1/4 1/4 Section: SW/NW

Latitude/longitude (if available): 47.0182 / -122.7157

How was lat./long. determined?

_____ global positioning device _____ survey X topographic map

_____ other: ____________________________

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 12 / 11 / 12 month/day/year

last reconstruction: ___/___/___ month/day/year

_____ information unavailable
2) Well driller: ____________ Holt Services, Inc. 

______________________________

__ well driller unknown

3) Type of well:

__Drilled: __ rotary __ bored __ cable (percussion) __ Dug
__ Other: __ spring(s) __ lateral collector (Ranney)

__ driven __ jetted __ other:

Additional comments:

______________________________

4) Well report available? __ YES (attach copy to form) __ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: __ 6,000 ________________ (gallons/min)

Source of information: Constant rate pumping test and extrapolation by Golder Associates __

If not documented, how was pumping rate determined?

______________________________

__ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

__ disinfection __ filtration __ carbon filter __ air stripper __ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

Preventative to limit bacteriological growth in the distribution system.

Packed tower aeration for corrosion control will be installed within the next 2 years.

7) If source is chlorinated, is a chlorine residual maintained? __ YES __ NO

Residual level: __ 0.7-0.9 mg/L __ (At the point closest to the source.)
PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft  ___ 20–50 ft  ___ 50–100 ft  ___ 100–200 ft  x > 200 ft

___ information unavailable  ('< ' means less than; '>' means greater than)

2) Depth to ground water (static water level):

___ < 20 ft  ___ 20–50 ft  ___ 50–100 ft  x > 100 ft

___ flowing well/spring (artesian)

How was water level determined?

x well log  ___ other: ____________________________

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)

or

_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source:  ___ YES  ___ NO

5) Wellhead elevation (height above mean sea level):  158.5 (ft)

How was elevation determined?  ___ topographic map  ___ Drilling/Well Log  ___ altimeter

x other:  Survey

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

___ evidence of a confining layer in well log

x no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the bottom of the lowest confining layer?  ___ YES  ___ NO

___ information unavailable
7) Sanitary setback:

___ < 100 ft*  x  100–120 ft ___ 120–200 ft ___ > 200 ft
* if less than 100 ft describe the site conditions:

8) Wellhead construction:

x  wellhead enclosed in a wellhouse

x  controlled access (describe):  Site is fenced and gated

___ other uses for wellhouse (describe):

___ no wellhead control

9) Surface seal:

x  18 ft

___ < 18 ft (no Department of Ecology approval)   ('<' means less than)

___ < 18 ft (Approved by Ecology, include documentation)   ('<' means less than)

___ > 18 ft   ('>' means greater than)

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

___ < 10 in/yr ___ 10–25 in/yr  x ___ > 25 in/yr
PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: \( 3,153,600,000 \) (gallons)

   How was this determined?
   
   \( \_ \) meter
   
   \( \times \) estimated: \( \_ \) pumping rate (__________)
   
   \( \times \) pump capacity (6,000 gpm x 60 min/day x 24 hours/day x 365 days)
   
   \( \_ \) other: ________________________________

2) "Calculated Fixed Radius" estimate of ground water movement:
   (see Instruction Packet)

   6 month ground water travel time: ____________________ (ft)
   
   1 year ground water travel time: ____________________ (ft)
   
   5 year ground water travel time: ____________________ (ft)
   
   10 year ground water travel time: ____________________ (ft)

   Information available on length of screened/open interval?
   
   \( \times \) YES \_ NO

   Length of screened/open interval: \( 125.5 \) (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? \( \times \) YES \_ NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? \( \_ \) YES \( \times \) NO (mark and identify on map).

Comments: Due to the transmissivity of the aquifer, use of the calculated fixed radius method does not provide an accurate representation of wellhead protection areas. Golder Associates completed numerical modeling of the aquifer to determine wellhead protection area zone of contribution areas for the 6 month, 1 year, 5 year, and 10 year time of travel for the McAllister Wellfield. Wellhead protection areas are shown on the attached figure.
PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

<table>
<thead>
<tr>
<th>Source</th>
<th>6 month</th>
<th>1 year</th>
<th>5 year</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>likely pesticide application</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stormwater injection wells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other injection wells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>abandoned ground water well</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>landfills, dumps, disposal areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>known hazardous materials clean-up site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>water system(s) with known quality problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>population density &gt; 1 house/acre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>residences commonly have septic tanks</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Wastewater treatment lagoons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sites used for land application of waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

Highway 510 and a number of other roadways.
2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. **Nitrate**: (Nitrate MCL = 10 mg/l)

<table>
<thead>
<tr>
<th>Results greater than MCL</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 mg/liter nitrate</td>
<td>x</td>
</tr>
<tr>
<td>2–5 mg/liter nitrate</td>
<td></td>
</tr>
<tr>
<td>&gt; 5 mg/liter nitrate</td>
<td></td>
</tr>
<tr>
<td>Nitrate sampling records unavailable</td>
<td></td>
</tr>
</tbody>
</table>

B. **VOCs**: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)

<table>
<thead>
<tr>
<th>Results greater than MCL or SAL</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOCs detected at least once</td>
<td></td>
</tr>
<tr>
<td>VOCs never detected</td>
<td>x</td>
</tr>
<tr>
<td>VOC sampling records unavailable</td>
<td></td>
</tr>
</tbody>
</table>

C. **EDB/DBCP**:

<table>
<thead>
<tr>
<th>(EDB MCL = 0.05 ug/l or 0.0005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDB/DBCP detected below MCL at least once</td>
</tr>
<tr>
<td>EDB/DBCP detected above MCL at least once</td>
</tr>
<tr>
<td>EDB/DBCP never detected</td>
</tr>
<tr>
<td>EDB/DBCP tests required but not yet completed</td>
</tr>
<tr>
<td>EDB/DBCP tests not required</td>
</tr>
</tbody>
</table>

D. **Other SOCs (Pesticides)**:

<table>
<thead>
<tr>
<th>Other SOCs detected</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(pesticides and other synthetic organic chemicals)</td>
<td></td>
</tr>
<tr>
<td>Other SOC tests performed but none detected</td>
<td>x</td>
</tr>
<tr>
<td>(list test methods in comments)</td>
<td></td>
</tr>
<tr>
<td>Other SOC tests not performed</td>
<td></td>
</tr>
</tbody>
</table>

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here:

|                                               |     |
|                                               |     |

E. **Bacterial contamination**: YES

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records). ..................................................

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source. ......................

Source sampling records for bacteria unavailable

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Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

  __ YES    __ NO

Describe with references to map produced in Part IV:

Lake St. Clair is located within the 10 year time of travel.

__________________________________________________________

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

  __ YES    __ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

  __ YES    __ NO
3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

[ ] YES  [ ] NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

<table>
<thead>
<tr>
<th>Travel Time</th>
<th>YES</th>
<th>NO</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 month</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 month - 1 year</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>1 - 5 year</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5 - 10 year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

<table>
<thead>
<tr>
<th>Travel Time</th>
<th>YES</th>
<th>NO</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1 - 5 year</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 - 10 year</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.
Suggestions and Comments

Did you attend one of the susceptibility workshops?  __ YES  x  NO

Did you find it useful?  __ YES     __ NO

Did you seek outside assistance to complete the assessment?  __ YES  x  NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

________________________________________________________________________

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FIGURE 3-1
PW-25 AS-BUILT SCHEMATIC
G&O / OLYMPIA MCFALLERT WELLFIELD / WA
Golder Associates