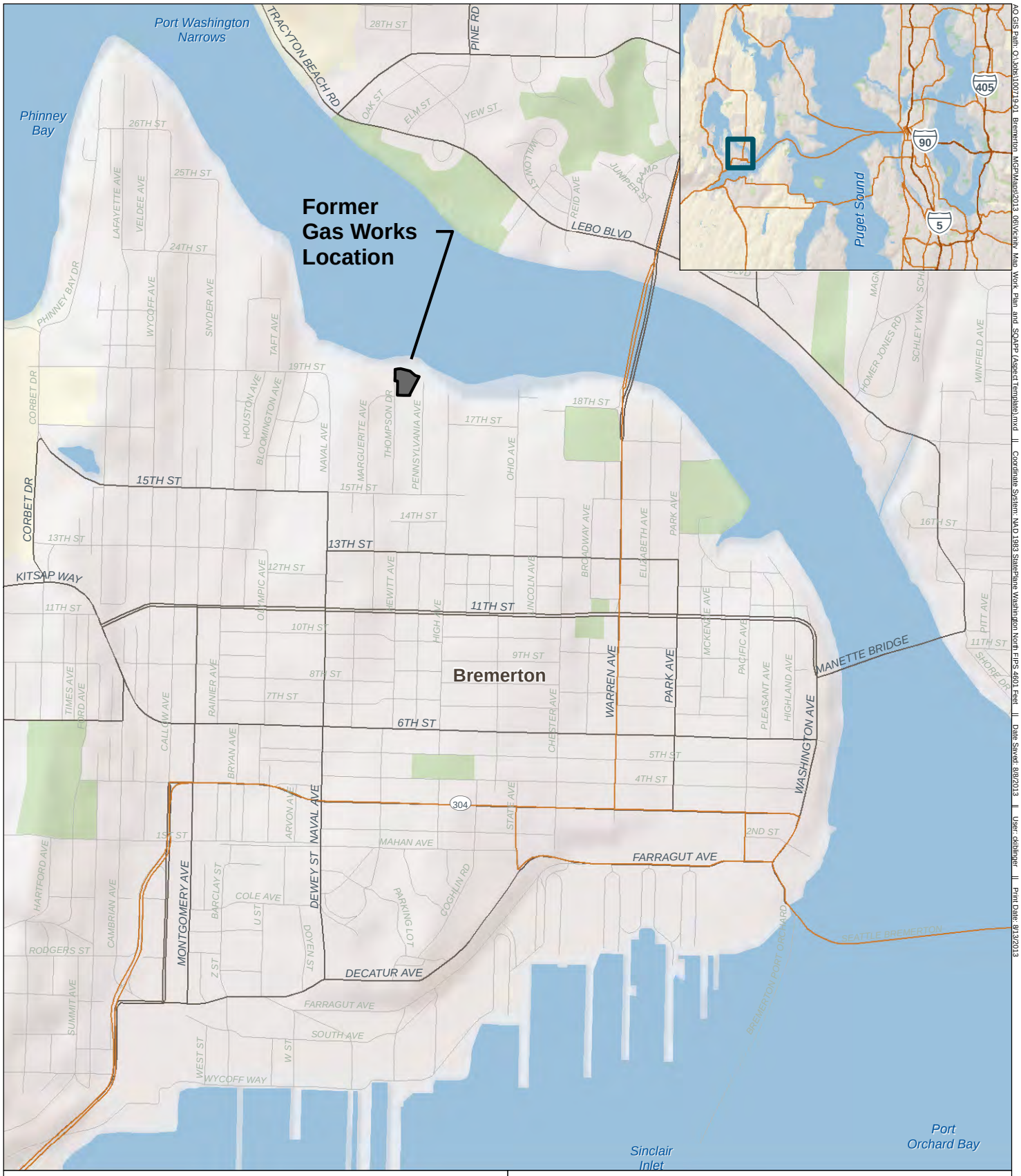
Bremerton Gas Works
Action Memorandum
Figures



0 750 1,500

Feet

1:18,000

NOTE:
If a paper copy is required, this figure is best printed in color.

Former Gas Works Location and Vicinity

Action Memorandum
Bremerton Gas Works
Bremerton, Washington

Aspect CONSULTING	ANCHOR QEA	FIRM: ANCHOR QEA DRAWN BY: ckiblinger	FIGURE NO. 1

NOTES:
1. Survey conducted by eTrac; provided on May 15, 2013.
2. See Final Completion Report, Former Bremerton MGP Site, Incident Action and Time Critical Removal Action, January, 2011. Locations are approximate.
3. Acquired from Kitsap County GIS Data Download (http://www.kitsapgov.com/gis/metadata) and Real Property Search Tools (http://kcwppub3.co.kitsap.wa.us/ParcelSearch), May 15, 2013. Locations are presumed to be approximate.
4. State Aquatic Lands - Managed by DNR
5. 0-ft contour = Mean Lower Low Water (MLLW)
6. If a paper copy is required, this figure is best printed in color.
7. Values plotted at locations BGW-RE-SG-08, BGW-RE-SG-15 and BGW-RE-SG-38 are averages of parent and duplicate results.
8. Cover area may be adjusted based on additional analytical evaluations.
9. Sanitary sewer line as located by City of Bremerton, 8/16/2013. Extent beyond that shown here is unknown.

Remove Solid Hydrocarbon-like Material on Surface

Cut Piling at Mudline

PORT WASHINGTON NARROWS[4]

Former Dock

A' BGW-RE-SG-03 18; BGW-RE-SG-32 11; BGW-RE-SG-02 17; BGW-RE-SG-31 17; BGW-RE-SG-01 18; A

B' BGW-RE-SG-06 19; BGW-RE-SG-34 33; BGW-RE-SG-35 27; BGW-RE-SG-37 28; BGW-RE-SG-05 509; BGW-RE-SG-33 60; BGW-RE-SG-04 28; B

C' BGW-RE-SG-09 12; BGW-RE-SG-08 29; BGW-RE-SG-39 15; BGW-RE-SG-38 32; BGW-RE-SG-36 56; BGW-RE-SG-07 7.5; C

D' BGW-RE-SG-11 14; BGW-RE-SG-13 9.5; BGW-RE-SG-16 14; BGW-RE-SG-10 12; BGW-RE-SG-12 5.4; BGW-RE-SG-15 26; BGW-RE-SG-14 3.5; D; BGW-RE-SG-17 5.9; BGW-RE-SG-18 0.84; BGW-RE-SG-19 4.1; BGW-RE-SG-21 0.17

E' BGW-RE-SG-23 11; BGW-RE-SG-26 4; BGW-RE-SG-20 66; BGW-RE-SG-25 2.4; BGW-RE-SG-22 2.7; BGW-RE-SG-24 0.11; E

F' BGW-RE-SG-30 2.1; BGW-RE-SG-27 2.7; BGW-RE-SG-29 0.58; BGW-RE-SG-28 0.047; F

Sesko Float; Sesko Float

Former End of Pipe

City of Bremerton 12-inch Storm Water Outfall

Farthest Up-gradient Extent of Pipe Located in Field

McConkey Property

Sesko Property

Abandon Manhole "A"

Historical Tank Farm

Thompson Dr

Pennsylvania Ave

-5; -10; -15; -20; -25; 0; 5; 10; 15; 20; 25; 30

- Test Plots with no Observed Sheen
- Test Plots with Observed Sheen
- Hydrocarbon-like Solid Observations
- Approximate Public Notice Sign Location
- Field-located Sanitary Sewer Line[9]

Surface Sediment cPAH mg/kg TEQ[7]
- 0.047 - 0.08
- 0.081 - 0.8
- 0.81 - 8
- 8.1 - 80
- 81 - 509
- Approximate Proposed Reactive Core Mat Cover[8]
- Approximate Proposed Reactive Core Mat

- 2010 TCRA/IA Pipe Plug Location[2]
- Remaining 12-inch Concrete Pipe[2]
- Field Verified Pipe Location
- Sump *(Not Field Located)*
- Area of Observed Hydrocarbon-like Sheen
- Solid Hydrocarbon-like Material
- Historic Structures
- Former Gas Works Location

- Cover of Existing Organoclay Mat (10-inch minus rock)[2]
- Extent of Existing Organoclay Mat[2]
- Pipe Removed and Backfilled to Grade[2]
- 100-Foot Transects
- Parcel Boundaries[3]
- Sanitary Sewer *(Not Field Located)*
- Storm Sewer *(Not Field Located)*
- Bathymetry/Topography Contours (MLLW ft)[1]

N

0 25 50
Feet
1:760

Proposed Removal Action
Action Memorandum
Bremerton Gas Works
Bremerton, Washington

Aspect CONSULTING | ANCHOR QEA

FIRM: ANCHOR QEA
DRAWN BY: ckiblinger

FIGURE NO. 2

Bremerton Gas Works
Action Memorandum
Attachment 1:

2013 Sediment Testing Results

Table 1
Removal Evaluation Results

Task	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval
Location ID	BGW-RE-SG-01	BGW-RE-SG-02	BGW-RE-SG-03	BGW-RE-SG-04	BGW-RE-SG-05	BGW-RE-SG-06	BGW-RE-SG-07	BGW-RE-SG-08	BGW-RE-SG-08	BGW-RE-SG-09
Sample ID	BGW-RE-SG-01-130708	BGW-RE-SG-02-130708	BGW-RE-SG-03-130708	BGW-RE-SG-04-130708	BGW-RE-SG-05-130708	BGW-RE-SG-06-130708	BGW-RE-SG-07-130708	BGW-RE-SG-08-130708	BGW-RE-SG-58-130708	BGW-RE-SG-09-130708
Sample Date	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013
Depth	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in
Sample Type	N	N	N	N	N	N	N	N	FD	N
Matrix	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
X	1193634.86	1193634.86	1193635.20	1193734.86	1193734.86	1193734.86	1193834.86	1193834.86	1193834.86	1193834.86
Y	216322.04	216356.85	216388.50	216308.24	216343.50	216379.86	216304.94	216330.55	216330.55	216357.04
Conventional Parameters (pct)										
Total organic carbon	**6.79 J**	**1.61 J**	**3.52 J**	**5.15 J**	**12.6 J**	**3.66 J**	**4.69 J**	**9.31 J**	**4.98**	**3.83 J**
Total solids	**80.14**	**80.02**	**80.46**	**77.2**	**70.92**	**79.4**	**81.32**	**78.02**	**81.48**	**74.83**
Polycyclic Aromatic Hydrocarbons (mg/kg)										
1-Methylnaphthalene	**0.58**	**0.68**	**0.33**	**18**	**14**	**0.57**	**0.35**	**0.79**	**4.2**	**0.47**
2-Methylnaphthalene	**1**	**1.1**	**0.57**	**5.4**	**12**	**0.91**	**0.83**	**2.3**	**8.7**	**1**
Acenaphthene	**0.22**	**0.33**	**0.22**	**17**	**160**	**0.34**	**0.059**	**0.15**	**0.28**	**0.1**
Acenaphthylene	**2**	**2.6**	**1.3**	**14**	**42**	**1.7**	**1.2**	**4.5**	**7**	**2**
Anthracene	**1.8**	**2.6**	**1.3**	**35**	**180**	**1.6**	**1**	**3.5**	**5.2**	**1.4**
Benzo(a)anthracene	**12**	**12**	**11**	**22**	**310**	**9.1**	**5.1**	**23**	**17**	**8.4**
Benzo(a)pyrene	**13**	**13**	**14**	**22**	**400**	**10**	**5.5**	**26**	**16**	**9.4**
Benzo(b)fluoranthene	**9.6**	**8.4**	**8.6**	**12**	**200**	**7**	**4.3**	**18**	**12**	**6.6**
Benzo(g,h,i)perylene	**13**	**10**	**11**	**14**	**260**	**9**	**5.6**	**21**	**16**	**8.1**
Benzo(j)fluoranthene	**4.9**	**4.6**	**4.4**	**6.2**	**100**	**3.4**	**2.1**	**8.7**	**6.1**	**3.5**
Benzo(k)fluoranthene	**4.6**	**4.1**	**4**	**6.5**	**93**	**3.3**	**2.2**	**7.8**	**6.1**	**3.3**
Chrysene	**13**	**11**	**11**	**24**	**270**	**9.2**	**5.5**	**25**	**22**	**8.7**
Dibenzo(a,h)anthracene	**1.5**	**1.2**	**1.2**	**1.9**	**38**	**1**	**0.66**	**3.2**	**2.8**	**0.9**
Dibenzofuran	**0.28**	**0.31**	**0.22**	**3**	**13**	**0.28**	**0.22**	**0.52**	**1.1**	**0.26**
Fluoranthene	**24**	**24**	**22**	**61**	**1100**	**18**	**9.9**	**36**	**32**	**13**
Fluorene	**1**	**1.2**	**0.58**	**33**	**42**	**0.97**	**0.54**	**1.1**	**2**	**0.78**
Indeno(1,2,3-c,d)pyrene	**8.8**	**7.3**	**8**	**9.5**	**190**	**6.3**	**3.9**	**14**	**11**	**5.5**
Naphthalene	**1.5**	**1.2**	**0.98**	**10**	**52**	**1.2**	**1.1**	**3.8**	**16**	**1.3**
Phenanthrene	**11**	**10**	**7.6**	**120**	**490**	**9.1**	**7**	**17**	**27**	**7.8**
Pyrene	**36**	**31**	**32**	**95**	**1400**	**24**	**15**	**47**	**34**	**20**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	**17**	**16**	**17**	**27**	**490**	**13**	**7.2**	**33**	**21**	**12**
Total cPAH TEQ (EPA 1993) (U = 1/2)	**18**	**17**	**18**	**28**	**510**	**13**	**7.5**	**35**	**23**	**12**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)	**17**	**16**	**17**	**27**	**490**	**13**	**7.2**	**33**	**21**	**12**
Total cPAH TEQ (EPA 1993) (U = 0)	**18**	**17**	**18**	**28**	**510**	**13**	**7.5**	**35**	**23**	**12**

Notes:
Cells in **Bold** indicate detected result
EPA = U.S. Environmental Protection Agency
CAEPA = California Environmental Protection Agency
in = inches
J = Estimated value
U = Compound not detected above detection limit
PAH = polycyclic aromatic hydrocarbons
TEQ = toxic equivalency factor
FD = field duplicate sample
N = normal sample
mg/kg = milligrams per kilogram
pct = percent

Table 1
Removal Evaluation Results

Task	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval
Location ID	BGW-RE-SG-10	BGW-RE-SG-11	BGW-RE-SG-12	BGW-RE-SG-13	BGW-RE-SG-14	BGW-RE-SG-15	BGW-RE-SG-15	BGW-RE-SG-16	BGW-RE-SG-17	BGW-RE-SG-18
Sample ID	BGW-RE-SG-10-130708	BGW-RE-SG-11-130708	BGW-RE-SG-12-130708	BGW-RE-SG-13-130708	BGW-RE-SG-14-130708	BGW-RE-SG-15-130708	BGW-RE-SG-65-130708	BGW-RE-SG-16-130708	BGW-RE-SG-17-130708	BGW-RE-SG-18-130708
Sample Date	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013
Depth	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in
Sample Type	N	N	N	N	N	N	FD	N	N	N
Matrix	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
X	1193912.72	1193918.27	1193934.86	1193945.00	1193934.86	1193957.16	1193957.16	1193965.51	1193953.99	1193967.25
Y	216293.40	216323.54	216279.67	216312.36	216244.75	216281.23	216281.23	216307.60	216227.43	216200.00
Conventional Parameters (pct)										
Total organic carbon	**2.89 J**	**3.28 J**	**2.34 J**	**5.18 J**	**1.59 J**	**5.54 J**	**3.93**	**1.75**	**3.14**	**0.514**
Total solids	**78.34**	**77.27**	**77.52**	**76.12**	**83.35**	**69.85**	**69.56**	**75.82**	**87.5**	**89.99**
Polycyclic Aromatic Hydrocarbons (mg/kg)										
1-Methylnaphthalene	**0.48**	**0.92**	**0.34**	**0.68**	**0.18 J**	**3.5**	**1.6**	**1.9**	**0.55**	**0.58**
2-Methylnaphthalene	**0.72**	**1.7**	**0.72**	**1.3**	**0.32**	**5.5**	**2.4**	**4**	**0.86**	**0.22**
Acenaphthene	**0.094**	**0.26**	**0.12**	**0.19**	**0.036**	**0.96 J**	**0.54**	**0.15**	**0.14**	**0.072**
Acenaphthylene	**1.2**	**2.7**	**0.89**	**1.6**	**0.46 J**	**6.4**	**3**	**3.2**	**2**	**0.2**
Anthracene	**1.9**	**3**	**0.89**	**1.7**	**0.44**	**7.4**	**4.3**	**2.8**	**1.3**	**0.18**
Benzo(a)anthracene	**7.5**	**9.4**	**4**	**6.8**	**2.6**	**23**	**13**	**10**	**5**	**0.48**
Benzo(a)pyrene	**9.3**	**11**	**4.3**	**7**	**2.7**	**24**	**14**	**10**	**4.2**	**0.62**
Benzo(b)fluoranthene	**5.9**	**7.4**	**2.8**	**4.6**	**1.7**	**16**	**9.5**	**6.3**	**2.9**	**0.34**
Benzo(g,h,i)perylene	**8**	**10**	**3.6**	**5.5**	**2**	**20**	**12**	**8.4**	**3.5**	**0.57**
Benzo(j)fluoranthene	**3**	**3.9**	**1.4**	**2.5**	**0.76**	**8.3**	**5**	**3.8**	**1.7**	**0.2**
Benzo(k)fluoranthene	**2.9**	**3.5**	**1.5**	**2.3**	**0.76**	**8.7**	**4.7**	**3.4**	**1.6**	**0.18**
Chrysene	**7.9**	**11**	**4.2**	**7**	**2.8**	**24**	**16**	**11**	**5.1**	**0.53**
Dibenzo(a,h)anthracene	**0.7**	**0.75**	**0.33**	**0.94**	**0.18**	**3.6**	**1.9**	**1.4**	**0.67**	**0.099**
Dibenzofuran	**0.25**	**0.36**	**0.18**	**0.39**	**0.08**	**1.2**	**0.84**	**0.36**	**0.23**	**0.11**
Fluoranthene	**14**	**20**	**8.2**	**14**	**3.9**	**45**	**29**	**16**	**13**	**0.97**
Fluorene	**0.68**	**1.4**	**0.52**	**1.2**	**0.21 J**	**3.5**	**1.4**	**1**	**1**	**0.093**
Indeno(1,2,3-c,d)pyrene	**5.3**	**7.1**	**1.2**	**3.9**	**1.4**	**14**	**7.9**	**5.9**	**2.4**	**0.39**
Naphthalene	**1.2**	**2.5**	**1.2**	**2.2**	**0.65**	**7.1**	**4.4**	**6.4**	**1.2**	**0.89**
Phenanthrene	**7.9**	**16**	**4.3**	**8.6**	**1.6**	**29**	**14**	**11**	**12**	**0.86**
Pyrene	**22**	**28**	**13**	**20**	**5.7**	**64**	**36**	**23**	**18**	**1.6**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	**12**	**14**	**5.3**	**8.9**	**3.4**	**31**	**18**	**13**	**5.5**	**0.77**
Total cPAH TEQ (EPA 1993) (U = 1/2)	**12**	**14**	**5.4**	**9.5**	**3.5**	**33**	**19**	**14**	**5.9**	**0.84**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)	**12**	**14**	**5.3**	**8.9**	**3.4**	**31**	**18**	**13**	**5.5**	**0.77**
Total cPAH TEQ (EPA 1993) (U = 0)	**12**	**14**	**5.4**	**9.5**	**3.5**	**33**	**19**	**14**	**5.9**	**0.84**

Notes:
Cells in **Bold** indicate detected result
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FD = field duplicate sample
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pct = percent

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Location ID	BGW-RE-SG-19	BGW-RE-SG-20	BGW-RE-SG-21	BGW-RE-SG-22	BGW-RE-SG-23	BGW-RE-SG-24	BGW-RE-SG-25	BGW-RE-SG-26	BGW-RE-SG-27	BGW-RE-SG-28
Sample ID	BGW-RE-SG-19-130708	BGW-RE-SG-20-130708	BGW-RE-SG-21-130708	BGW-RE-SG-22-130708	BGW-RE-SG-23-130708	BGW-RE-SG-24-130708	BGW-RE-SG-25-130708	BGW-RE-SG-26-130708	BGW-RE-SG-27-130708	BGW-RE-SG-28-130708
Sample Date	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013
Depth	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in
Sample Type	N	N	N	N	N	N	N	N	N	N
Matrix	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
X	1193979.11	1194021.95	1194007.68	1194027.96	1194041.83	1194034.86	1194050.42	1194064.71	1194080.61	1194134.94
Y	216218.60	216285.77	216198.47	216230.19	216286.01	216203.04	216235.69	216275.79	216234.33	216201.65
Conventional Parameters (pct)										
Total organic carbon	**2.29**	**2.92**	**0.444**	**2**	**2.66**	**0.207**	**16.9**	**1.15**	**0.204**	**0.25**
Total solids	**69.43**	**64.21**	**91.67**	**80.23**	**79.19**	**88.68**	**79.23**	**77.33**	**86.86**	**86.96**
Polycyclic Aromatic Hydrocarbons (mg/kg)										
1-Methylnaphthalene	**0.26**	**1.8**	**0.01**	**0.16**	**0.96**	**0.0032 J**	**0.081 J**	**0.48**	**0.096**	**0.002**
2-Methylnaphthalene	**0.42**	**1.5**	**0.0052**	**0.21**	**1.2**	**0.0067**	**0.16 J**	**0.5**	**0.18**	**0.0043**
Acenaphthene	**0.12**	**0.96**	**0.0055**	**0.044**	**0.27**	0.0047 U	**0.029**	**0.2**	**0.032**	**0.0004 J**
Acenaphthylene	**0.92**	**7.6**	**0.032**	**0.44**	**2.2**	**0.012**	**0.35 J**	**0.82**	**0.24**	**0.0053**
Anthracene	**0.89**	**8.1**	**0.024 J**	**0.44**	**2.4**	**0.0086**	**0.31 J**	**0.99**	**0.41**	**0.0034**
Benzo(a)anthracene	**2.7**	**47**	**0.1**	**1.7**	**7.3**	**0.06**	**1.5**	**2.9**	**1.5**	**0.022**
Benzo(a)pyrene	**3**	**50**	**0.13**	**2**	**7.8**	**0.08**	**1.8**	**3**	**2**	**0.034**
Benzo(b)fluoranthene	**1.8**	**29**	**0.074**	**1.2**	**5.2**	**0.048**	**1.1**	**1.8**	**1.2**	**0.021**
Benzo(g,h,i)perylene	**2.6**	**39**	**0.098**	**1.7**	**6.5**	**0.072**	**1.7**	**2.5**	**1.5**	**0.039**
Benzo(j)fluoranthene	**1.1**	**16**	**0.046 J**	**0.68**	**2.9**	**0.028**	**0.62**	**0.97**	**0.7**	**0.011**
Benzo(k)fluoranthene	**1**	**18**	**0.04 J**	**0.65**	**2.8**	**0.025**	**0.65**	**0.94**	**0.63**	**0.01**
Chrysene	**3.2**	**48**	**0.13**	**2.1**	**9.4**	**0.074**	**1.8**	**3.2**	**1.7**	**0.028**
Dibenzo(a,h)anthracene	**0.49**	**5.9**	**0.018**	**0.25**	**1.1**	**0.012**	**0.24**	**0.39**	**0.28**	**0.0058**
Dibenzofuran	**0.095**	**0.67**	**0.0038 J**	**0.065**	**0.27**	0.0047 U	**0.045**	**0.14**	**0.048**	**0.0009**
Fluoranthene	**5.7**	**87**	**0.23**	**3.7**	**16**	**0.13**	**3.3**	**6.5**	**3.2**	**0.034**
Fluorene	**0.47**	**1.9**	**0.022**	**0.2**	**1.6**	**0.0035 J**	**0.1 J**	**0.4**	**0.1**	**0.0018**
Indeno(1,2,3-c,d)pyrene	**1.7**	**27**	**0.07**	**1.1**	**4.2**	**0.05**	**1.1**	**1.6**	**1.1**	**0.025**
Naphthalene	**0.58**	**4.4**	**0.0086**	**0.41**	**1.4**	**0.011**	**0.34 J**	**0.94**	**0.32**	**0.0075**
Phenanthrene	**3.2**	**27**	**0.17**	**1.9**	**15**	**0.054**	**1.2**	**4.3**	**1.3**	**0.015**
Pyrene	**8.3**	**120**	**0.35**	**4.9**	**24**	**0.18**	**4.4**	**9.1**	**4**	**0.055**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	**3.8**	**63**	**0.16 J**	**2.5**	**10**	**0.1**	**2.3**	**3.8**	**2.5**	**0.043**
Total cPAH TEQ (EPA 1993) (U = 1/2)	**4.1**	**66**	**0.17 J**	**2.7**	**11**	**0.11**	**2.4**	**4**	**2.7**	**0.047**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)	**3.8**	**63**	**0.16 J**	**2.5**	**10**	**0.1**	**2.3**	**3.8**	**2.5**	**0.043**
Total cPAH TEQ (EPA 1993) (U = 0)	**4.1**	**66**	**0.17 J**	**2.7**	**11**	**0.11**	**2.4**	**4**	**2.7**	**0.047**

Notes:
Cells in **Bold** indicate detected result
EPA = U.S. Environmental Protection Agency
CAEPA = California Environmental Protection Agency
in = inches
J = Estimated value
U = Compound not detected above detection limit
PAH = polycyclic aromatic hydrocarbons
TEQ = toxic equivalency factor
FD = field duplicate sample
N = normal sample
mg/kg = milligrams per kilogram
pct = percent

Table 1
Removal Evaluation Results

Task	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval	2013RemovalEval
Location ID	BGW-RE-SG-29	BGW-RE-SG-30	BGW-RE-SG-31	BGW-RE-SG-32	BGW-RE-SG-33	BGW-RE-SG-34	BGW-RE-SG-35	BGW-RE-SG-36	BGW-RE-SG-37
Sample ID	BGW-RE-SG-29-130708	BGW-RE-SG-30-130708	BGW-RE-SG-31-130807	BGW-RE-SG-32-130807	BGW-RE-SG-33-130807	BGW-RE-SG-34-130807	BGW-RE-SG-35-130807	BGW-RE-SG-36-130807	BGW-RE-SG-37-130807
Sample Date	07/08/2013	07/08/2013	08/07/2013	08/07/2013	08/07/2013	08/07/2013	08/07/2013	08/07/2013	08/07/2013
Depth	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in	0 - 4 in
Sample Type	N	N	N	N	N	N	N	N	N
Matrix	SE	SE	SE	SE	SE	SE	SE	SE	SE
X	1194134.94	1194135.08	1193582.709	1193605.077	1193688.194	1193686.771	1193736.712	1193787.442	1193786.652
Y	216225.63	216248.75	216343.4323	216368.6304	216311.8352	216351.5031	216363.0398	216308.3582	216340.7564
Conventional Parameters (pct)									
Total organic carbon	**1.1**	**1.22**	**0.594**	**0.779**	**6.64**	**2.97**	**4**	**4.84**	**4.57**
Total solids	**86.78**	**78.1**	**89.23**	**77.08**	**76.37**	**83.41**	**85.12**	**86.08**	**84.14**
Polycyclic Aromatic Hydrocarbons (mg/kg)									
1-Methylnaphthalene	**0.028**	**0.14**	**0.047 J**	**2.1**	**1.7**	**0.51**	**1.6**	**0.85**	**0.24**
2-Methylnaphthalene	**0.055**	**0.28**	**0.12 J**	**1.3**	**2.7**	**0.85**	**1.5**	**1.5**	**0.56**
Acenaphthene	**0.0072**	**0.058**	**0.024 J**	**2.1 J**	**1.4 J**	**0.73 J**	**3.6 J**	**0.23 J**	**0.38 J**
Acenaphthylene	**0.078**	**0.27**	**0.17 J**	**2.3**	**6.1**	**3.9**	**4.7**	**5.5**	**1.9**
Anthracene	**0.085**	**0.35**	**0.19 J**	**2**	**8.2**	**5.8**	**7**	**9.4**	**2**
Benzo(a)anthracene	**0.36**	**1.2**	**1.2**	**9.3**	**38**	**23**	**18**	**35**	**16**
Benzo(a)pyrene	**0.42**	**1.6**	**1.3**	**8.2**	**46**	**27**	**21**	**42**	**22**
Benzo(b)fluoranthene	**0.26**	**0.94**	**0.77 J**	**4.8**	**25**	**15**	**11**	**22**	**12**
Benzo(g,h,i)perylene	**0.4**	**1.2**	**1.2 J**	**6.4 J**	**39 J**	**25 J**	**17 J**	**34 J**	**20 J**
Benzo(j)fluoranthene	**0.16**	**0.52**	**0.32 J**	**2.8**	**14**	**8.6**	**6.5**	**13**	**6.6**
Benzo(k)fluoranthene	**0.14**	**0.47**	**0.29 J**	**2.5**	**14**	**8.1**	**5.9**	**12**	**6.2**
Chrysene	**0.38**	**1.4**	**1.1**	**8.2**	**40**	**23**	**18**	**37**	**18**
Dibenzo(a,h)anthracene	**0.072**	**0.24**	**0.15 J**	**0.96**	**4.3**	**0.12**	**1.8**	**6**	**1.9**
Dibenzofuran	**0.012**	**0.057**	**0.017**	**0.37**	**0.63**	**0.3**	**0.61**	**0.44**	**0.15**
Fluoranthene	**0.79**	**2.5**	**2.7**	**16**	**77**	**58**	**46**	**62**	**40**
Fluorene	**0.033**	**0.16**	**0.089 J**	**1.4**	**2.6**	**1.2**	**3.8**	**2.1**	**0.57**
Indeno(1,2,3-c,d)pyrene	**0.28**	**0.89**	**0.84 J**	**4.9 J**	**29 J**	**18 J**	**13 J**	**24 J**	**14 J**
Naphthalene	**0.074**	**0.34**	**0.2 J**	**2.8**	**4.8**	**3.4**	**4.2**	**2.9**	**1.7**
Phenanthrene	**0.32**	**1.6**	**0.95**	**8.6**	**30**	**18**	**37**	**21**	**8.2**
Pyrene	**1.1**	**3.3**	**2.8**	**22**	**86**	**57**	**47**	**59**	**39**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	**0.54**	**2**	**1.6 J**	**11 J**	**57 J**	**34 J**	**26 J**	**52 J**	**27 J**
Total cPAH TEQ (EPA 1993) (U = 1/2)	**0.58**	**2.1**	**1.7 J**	**11 J**	**60 J**	**33 J**	**27 J**	**56 J**	**28 J**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)	**0.54**	**2**	**1.6 J**	**11 J**	**57 J**	**34 J**	**26 J**	**52 J**	**27 J**
Total cPAH TEQ (EPA 1993) (U = 0)	**0.58**	**2.1**	**1.7 J**	**11 J**	**60 J**	**33 J**	**27 J**	**56 J**	**28 J**

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FD = field duplicate sample
N = normal sample
mg/kg = milligrams per kilogram
pct = percent

Table 1
Removal Evaluation Results

Task	2013RemovalEval	2013RemovalEval	2013RemovalEval
Location ID	BGW-RE-SG-38	BGW-RE-SG-38	BGW-RE-SG-39
Sample ID	BGW-RE-SG-38-130807	BGW-RE-SG-88-130807	BGW-RE-SG-39-130807
Sample Date	08/07/2013	08/07/2013	08/07/2013
Depth	0 - 4 in	0 - 4 in	0 - 4 in
Sample Type	N	FD	N
Matrix	SE	SE	SE
X	1193877.999	1193877.999	1193879.747
Y	216312.9415	216312.9415	216339.0871
Conventional Parameters (pct)			
Total organic carbon	**4.43**	**4.6**	**0.208**
Total solids	**77.79**	**85.41**	**76.75**
Polycyclic Aromatic Hydrocarbons (mg/kg)			
1-Methylnaphthalene	**1.2**	**2**	**0.76**
2-Methylnaphthalene	**1.6**	**1.7**	**1.7**
Acenaphthene	**1.5 J**	**3.2 J**	**0.58 J**
Acenaphthylene	**6.8**	**8**	**3.4**
Anthracene	**6.8**	**6.2**	**2.7**
Benzo(a)anthracene	**24**	**20**	**11**
Benzo(a)pyrene	**26**	**24**	**11**
Benzo(b)fluoranthene	**13**	**13**	**6.8**
Benzo(g,h,i)perylene	**19 J**	**16 J**	**10 J**
Benzo(j)fluoranthene	**7.9**	**7.6**	**4**
Benzo(k)fluoranthene	**6.6**	**6.2**	**3.3**
Chrysene	**23**	**21**	**11**
Dibenzo(a,h)anthracene	**3.4**	**1.9**	**1.1**
Dibenzofuran	**0.47**	**0.49**	**0.27**
Fluoranthene	**49**	**43**	**20**
Fluorene	**2.4**	**1.7**	**0.89**
Indeno(1,2,3-c,d)pyrene	**13 J**	**12 J**	**7.4 J**
Naphthalene	**3.3**	**3.6**	**2.8**
Phenanthrene	**16**	**15**	**9.9**
Pyrene	**55**	**44**	**24**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	**32 J**	**30 J**	**14 J**
Total cPAH TEQ (EPA 1993) (U = 1/2)	**34 J**	**30 J**	**15 J**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)	**32 J**	**30 J**	**14 J**
Total cPAH TEQ (EPA 1993) (U = 0)	**34 J**	**30 J**	**15 J**

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Bremerton Gas Works
Action Memorandum
Attachment 2:

Organo-Clay Mat Specifications

REACTIVE CORE MAT®

with ORGANOCLAY®

PRODUCT DESCRIPTION

Organoclay® Reactive Core Mat® (RCM) is designed for use in the following applications:

- In-situ subaqueous cap for contaminated sediments or post-dredge residual sediments
- Embankment seepage control
- Groundwater remediation

Organoclay® Reactive Core Mat® is a permeable composite of geotextiles and a non-swelling granular clay compound that reliably adsorbs oil and similar organics from water.

BENEFITS

- RCM provides a reactive material that treats contaminants which are carried by advective or diffusive flow
- Reactive cap allows for thinner cap thickness than a traditional sand cap
- Geotextiles provide stability and physical isolation

PHYSICAL PROPERTIES

PROPERTIES	TEST METHOD	VALUE
ORGANOCLAY[1]		
Bulk Density Range	CETCO Test Method	44 – 56 lbs/ft^3
Oil Adsorption Capacity	CETCO Test Method	0.5 lb of oil per lb of organoclay, min
Quaternary Amine Content	CETCO Test Method	25 – 33% quaternary amine loading
FINISHED RCM PRODUCT		
Organoclay Mass per Area	CETCO Test Method	0.8 lb/ft^2
Mat Grab Strength[2]	CETCO Test Method	90 lbs. MARV
Hydraulic Conductivity[3]	CETCO Test Method	1 x 10^{-3} cm/sec minimum

Notes

[1] Apatite properties performed periodically on material prior to incorporation into the RCM.

[2] All tensile testing is performed in the machine direction.

[3] Permittivity at constant head of 2 inches and converted to hydraulic conductivity using Darcy's Law and RCM thickness per ASTM D5199 for geotextiles.

PACKAGING

- 15' x 100' rolls, packaged on 4" PVC core tubes wrapped with polyethylene plastic packaging

AVAILABILITY

Shipping is available from the following location:

- CETCO, 218 NE Industrial Park Rd, Cartersville, GA

Contact your local technical sales manager at:
714-384-0111 or 800-527-9948

Bremerton Gas Works
Action Memorandum
Attachment 3:

Best Management Practices

This attachment describes Best Management Practices to be utilized during implementation of the Removal Action.

Construction Methods

- To the extent practicable, construction of the Removal Action (including hydrocarbon material removal, piling removal, organo-clay mat placement, and cover placement) will be conducted at low tide when the work area is not inundated with tidal waters.
- Prior to and during construction, the work area will be surrounded by an absorbent oil boom.
- The location of the existing, buried sanitary sewer force main within the work area shall be marked and shall be protected from damage during performance of the work.
- Construction equipment shall be placed and retrieved from the beach using a crane or other low-impact methods, and construction materials shall be placed using methods that minimize the disturbance of the beach and shoreline areas beyond the immediate vicinity of the capping area.
- Construction equipment operating on the beach will be low ground pressure (LGP) type (to the extent practicable) to minimize the disturbance of the beach and shoreline areas beyond the immediate vicinity of the capping area.
- Construction equipment shall be removed from the beach area during periods of high tide.
- Construction materials will not be stockpiled below the ordinary high higher water (OHHW) mark.
- Construction personnel will use designated access routes and shall minimize disturbance of shoreline and bluff vegetation to the extent practicable.
- Removal or destruction of overhanging bankline vegetation shall be limited to that necessary for the construction of the project.
- Trimming of vegetation material from the bluff (required to facilitate equipment access) shall be minimized. Removed vegetation shall be left in as whole pieces

as possible and removed from the site upon completion of the Removal Action.

- The organo-clay mat shall meet the specifications listed in Attachment 3.
- The mat cover material shall consist of clean 10-inch Streambed Cobbles per Section 9-03.11(2) of the Washington State Department of Transportation handbook. This material is a well-graded streambed cobble that passes all material smaller than 10 inches.
- The removal of creosote-treated piles within the work area will be consistent with the conditions issued as part of the Derelict Creosote Pile Removal Project Hydraulic Project Approval (HPA), issued to Washington State Department of Natural Resources (Control Number 125073-1; issued December 15, 2011).

Upland Staging Areas

- Equipment will only be serviced in the upland staging area.
- Equipment will be decontaminated following each work cycle and wash water from decontaminating activities will be contained (for example, via the use of containment basins) and will not be discharged to the adjacent water body or to the storm drains.
- All construction materials, debris, and wastes generated during the Removal Action shall be removed from upland staging areas at the conclusion of the work.
- No wastes generated during the removal action shall be disposed of on site. Wastes removed from the site shall be disposed of using appropriately-permitted treatment, storage, disposal or recycling facilities.

Spill Prevention and Control

- Cascade Natural Gas will require its contractor to prepare and deploy a Spill Control and Response Plan.
- Construction personnel will be trained in hazardous material handling and will be equipped with appropriate response tools, including absorbent oil booms.
- Cascade Natural Gas will require its contractor to inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks in order to prevent spills into the surface water.
- Oil-absorbent pads will be available to be deployed in the event that hydrocarbon sheens are noted within the work area.
- Inspections shall be conducted daily during performance of the Removal Action. On-site inspections shall also be conducted weekly for a period of 30 days after construction of the Removal Action is complete.