Atlantic Richfield Company

$QWKRQ\ 5◀ %URZQ
3URMHFW 0DQDJHU 0LQLQJ
&HQWHUSRLQWH 'ULYH
/D 3DCPD &$!! ┼ ┬ ┼ ¶
2IILFH ♂ ┼ ↑ → □ ↑ ┴ ┼ ┤
)D[♂ → ¶ ┤ □ ┴ ┴ ← ┼ ├ →
(┼ PDLO $QWKRQ\◀ %URZQ#ES◀ FRP

-DQXDU\ ← ☼ ┴ !! ¶ ←

-XOLH 6XOOLYDQ
8◀ 6◀ (3$ 5HJLRQ
→ ↑ +DZWKRUQH 6WUHHW ♂ 6)'┼ → ┼ ┴ □
6DQ)UDQFLVFR ☼ &$ ┤ ¶ !! ↑

5(/HYLDWKDQ 0RQWKO\ 5HSRUW IRU 'HFHPEHU ┴ !! ¶ → DQG)RXUWK 4XDUWHU ┴ !! ¶ → 5,↕)
5HSRUW

'HDU 0V◀ 6XOOLYDQ

7KH IROORZLQJ WH[W GHVFULEHV DFWLYLWLHV FRQGXFWHG GXULQJ WKH PRQWK RI 'HFHPEHU ┴ !! ¶ →
0LQH 6LWH ♂ VLWH□ DQG DFWLYLWLHV DQWLFLSDWHG WR RFFXU GXULQJ WKH XSFRPLQJ PRQWK◀
RUJDQL]HG E\ ZRUN DUHD >$VSHQ 6HHS☼ &KDQQHO 8QGHUGUDLQ ♂ &8'□ DQG 'HQWD 6HHS ♂ '6□@
WDVNV◀ 7KLV SURJUHVV UHSRUW LV EHLQJ VXEPLWWHG LQ DFFRUGDQFH ZLWK 3DUDJUDSK ├ ┴ RI
6HWWOHPHQW $JUHHPHQW DQG 2UGHU RQ &RQVHQW IRU 5HPRYDO $FWLRQ ♂ $2&□ ♂ HIIHFWLYH -DQXDU

$WODQWLF 5LFKILHOG LV DOVR VXEPLWWLQJ WKLV CHWWHU LQ VDWLVIDFWLRQ RI WKH TXDUWHU
UHTXLUHPHQW VHW IRUWK LQ 3DUDJUDSK ├ ┬ RI WKH $GPLQLWUDWLYH 2UGHU IRU 5HPHGLDO ,QYHW
)HDVLELOLW\ 6WXG\ ♂ 8◀ 6◀ (3$ 5HJLRQ ,;☼ &(5&/$ 'RFNHW 1R◀ ┴ !! !! ← ┼ ¶ ← ☼ -XQH
TXDUWHUO\ VXPPDU\ RI 5,↕)6 DFWLYLWLHV LV SURYLGHG DW WKH HQG RI WKLV CHWWHU◀

$&7,9,7,(6)25 '(&(0%(5

$VSHQ 6HHS

x 2SHUDWHG WKH $VSHQ 6HHS %LRUHDFWRU ♂ $6%□ 7UHDWPHQW 6\WHP LQ UHFLUFXODWLRQ PRGH IR
'HFHPEHU◀ $ OLPLWHG DFFHVV VHDVRQ ♂ /$6□ ZLQWHU VLWH YLVLW WR $6% 7UHDWPHQW 6\WH
RQ 'HFHPEHU ¶ ┤ ☼ ┴ !! ¶ → ◀ 'XULQJ WKH /$6 ZLQWHU VLWH YLVLW RQ 'HFHPEHU ¶ ┤ ☼
PDLQWHQDQFH DQG FRPSOLDQFH VDPSOLQJ DFWLYLWLHV ZHUH SHUIRUPHG◀ 7KH LQIOXHQW
FRPSOLDQFH VDPSOLQJ UHVXOWV DUH SUHVHQWHG LQ 7DEOH ¶ ◀ 5HFHQW LQIOXHQW IORZ UDWH☼
GDWD DUH VXPPDUL]HG LQ 7DEOH ┴ ◀

x 'XULQJ WKH /$6 ZLQWHU VLWH YLVLW RQ 'HFHPEHU ¶ ┤ ☼ ┴ !! ¶ → ☼ D VRGLXP K\GUR[LGH

$ %3 DIILOLDWHG FRPS

-XOLH└ 6XOOLYDQ└ ± └ 86└ (3$└ 5HJLRQ└ └
-DQXDU\└ ← ⌘ └ ⊥ ‼ ¶ ← └
3DJH└ ⊥ └ RI└ ┤ └

&8'└ DQG└ '6└

x└ 7KH└ +LJK└ 'HQVLW\└ 6XXGJH└ ♂ +'6□ └ 7UHDWPHQW└ 3DDQW└ DQG└ &8'└ DQG└ '6└ FRQVH\DQFH└ DQG
HTXLSPHQW└ UHPDLQHG└ ZLQWHUL]HG└ GXULQJ└ WKH└ PRQWK└ RI└ 'HFHPEHU◀ └
└

6LWH└ ZLGH└

x└ &RQWLQXHG└ WR└ XSGDWH└ WKH└ /HYLDWKDQ└ 0LGH└ 3URMHFW└ 'DWDEDVH└ ZLWK└ GDWD└ IURP└ PRQLWRULQJ└ S
$VDDQWLF└ 5LFKILHOG└ DQG└ YDULRXV└ DJHQFLHV◀ └

x└ 2Q└ 'HFHPEHU└ ¶ ⊥ ⌘ └ ⊥ ‼ ¶ → ⌘ └ D└ FRQIHUHQFH└ FDOO└ ZDV└ FRQGXFWHG└ ZLWK└ WKH└ 8◀ 6◀ └ (3
SURJUHVV└ XSGDWH◀ └

x└ 2Q└ 'HFHPEHU└ ¶ ┤ ⌘ └ ⊥ ‼ ¶ → ⌘ └ ILHOG└ REVHUYDWLRQV└ RI└ WKH└ /HYLDWKDQ└ &UHHN└ &XOYHUW└ DQG└
ZHUH└ FRQGXFWHG◀ └ └
└

$&7,9,7,(6└)25└ 83&20,1*└ 0217+└
└

$VSHQ└ 6HHS└

x└ &RQWLQXH└ RSHUDWLRQ└ RI└ WKH└ $6%└ 7UHDWPHQW└ 6\VWHP└ LQ└ UHFLUFXODWLRQ└ PRGH└ DQG└ FRQGXFW└ /$
PRQLWRULQJ⌘ └ DQG└ PDLQWHQDQFH└ DV└ RXWOLQHG└ LQ└ WKH└ 5HPRYDO└ $FWLRQ└ :RUN└ 3DDQ└ ♂ 5$:3□ ◀ └
/$6└ ZLQWHU└ DFFHVV└ YLVLW└ ZDV└ FRPSOHWHG└ RQ└ -DQXDU\└ ┬ ⌘ └ ⊥ ‼ ¶ → ◀ └ └

x└ &RQWLQXH└ WR└ FRPSLOH└ GDWD└ IURP└ ⊥ ‼ ¶ → └ $6%└ 7UHDWPHQW└ 3DDQW└ RSHUDWLRQV└ IRU└ LQFOX
$QQXDO└ &RPSOHWLRQ└ 5HSRUW◀ └

└

&8'└ DQG└ '6└

x└ &RQWLQXH└ WR└ FRPSLOH└ GDWD└ IURP└ ⊥ ‼ ¶ → └ +'6└ 7UHDWPHQW└ 3DDQW└ RSHUDWLRQV└ IRU└ LQFOX
$QQXDO└ &RPSOHWLRQ└ 5HSRUW◀ └

└

6LWH└ ZLGH

x└ $└ /HYLDWKDQ└ 0LGH└ 6XSHUIXQG└ 8SGDWH└ 0HHWLQJ└ LV└ VFKHGXOHG└ IRU└)HEUXDU\└ ⊥ ⌘ └ ⊥ ‼ ¶ ←
1HYDGD◀ └ └ └

x└ &RQWLQXH└ WR└ SURYLGH└ SURMHFW└ SURJUHVV└ XSGDWHV└ WR└ WKH└ 8◀ 6◀ └ (3$└ YLD└ FRQIHUHQFH└
FRQIHUHQFH└ FDOO└ LV└ FXUUHQWO\└ VFKHGXOHG└ IRU└ -DQXDU\└ ¶ ├ ⌘ └ ⊥ ‼ ¶ ← ◀ └

x└ &RQWLQXH└ FRPSLOLQJ└ LQIRUPDWLRQ└ IRU└ WKH└ ⊥ ‼ ¶ → └ $QQXDO└ &RPSOHWLRQ└ 5HSRUW└ ♂ GXH└ $SULO└

x└ &RQWLQXH└ GHYHORSPHQW└ RI└ WKH└ ⊥ ‼ ¶ ← └ $PHQGPHQW└ WR└ WKH└ 5$:3└ ♂ GXH└ 0DUFK└ ¶ ⌘ └ ⊥
GHVFULEH└ 5HPRYDO└ $FWLRQ└ DFWLYLWLHV└ WR└ EH└ SHUIRUPHG└ DW└ WKH└ VLWH└ GXULQJ└ ⊥ ‼ ¶ ← ◀ └

└ └ └ └ └ └ └ └ └ └ └ └ └ └ └ └ └ └

4XDUWHUO\└ 5,↕)6└ 3URJUHVV└ 5HSRUW└

$V└ UHTXLUHG└ E\└ 3DUDJUDSK└ ├ ┬ └ RI└ WKH└ 8$2⌘ └ WKH└ IRORZLQJ└ 4XDUWHUO\└ 3URJUHVV└ 5HS
,QYHVWLJDWLRQ└ DQG└)HDVLELOLW\└ 6WXG\└ ♂ 5,↕)6□ └ DFWLYLWLHV└ GHVFULEHV └ ♂ D□ └ WKH└ DFWLRQV└ W
8$2└ GXULQJ└ WKH└ SULRU└ TXDUWHU⌘ └ ♂ E□ └ WKH└ ZRUN└ SODQQHG└ IRU└ WKH└ QH[W└ TXDUWHU⌘ └
HQFRXQWHUHG└ RU└ DQWLFLSDWHG└ LQFOXGLQJ└ DQ└ DFWXDO└ RU└ DQWLFLSDWHG└ GHOD\V└ LQ└ VFKHGXOHV◀ └
└

-XOLH└ 6XOOLYDQ└ ± └ 86└ (3$└ 5HJLRQ└ └
-DQXDU\└ ← ⌘ └ ⊥ ‼ ¶ ← └
3DJH└ ┬ └ RI└ ┤ └

$FWLRQV└ 7DNHQ└ WR└ &RPSO\└ ZLWK└ WKH└ 8$2└

x└ &RQGXFWHG└ PRQWKO\└ SURJUHVV└ FRQIHUHQFH└ FDOOV└ ZLWK└ 8◄ 6◄ └ (3$└ ± └ 2FWREHU└ DQG└ 'HFHPEHU└

x└ 6XEPLWWHG└ -XO\└ DQG└ $XJXVW└ ⊥ ‼ ¶ → └ &QWXUDO└ 5HVRXUFHV└ 0RQLWRULQJ└ 5HSRUW└ IRU└ ([SO
3RWHQWLDO└ (IIHFWV└ ± └ 2FWREHU└ ┬ ⌘ └ ⊥ ‼ ¶ → └

x└ 6XEPLWWHG└ WKH└ 4XDUWHUO\└ 3URJUHVV└ 5HSRUW└ IRU└ WKH└ WKLUG└ TXDUWHU└ RI└ ⊥ ‼ ¶ → └ ± └ 2FWREH

x└ 6XEPLWWHG└ QRWLILFDWLRQ└ WR└ 86$&(└ RI└ SODQQHG└ DFWLRQV└ WR└ LQWDOO└ ICRZ└ PRQLWRULQJ└
/HYLDWKDQ└ &UHHN└ ± └ 2FWREHU└ ¶ ‼ ⌘ └ ⊥ ‼ ¶ → └

x└ 6XEPLWWHG└ 5,↕)6└ 7KUHH└ :HHN└)LHOG└ 6FKHGXOH└ 3URMHFWLRQ└ IRU└ ¶ ‼ ↕ ↕ ¶ → └ WR└ ¶ ‼ ↕ ⊥ →

x└ 6XEPLWWHG└ XSGDWHG└ 5,↕)6└ GRFXPHQW└ WUDFNLQJ└ VSUHDGVKHHW└ ± └ 2FWREHU└ ¶ ├ ⌘ └ ⊥ ‼ ¶ → └

x└ 6XEPLWWHG└ 5,↕)6└ 7KUHH└ :HHN└)LHOG└ 6FKHGXOH└ 3URMHFWLRQ└ IRU└ ¶ ‼ ↕ ¶ ├ ↕ ¶ → └ WR└ ¶ ¶ ↕ ┬

x└ 6XEPLWWHG└ 6HSWHPEHU└ DQG└ 2FWREHU└ ⊥ ‼ ¶ → └ &QWXUDO└ 5HVRXUFHV└ 0RQLWRULQJ└ 5HSRUW└ IRU└ ([S
3RWHQWLDO└ (IIHFWV└ ± └ 2FWREHU└ ⊥ ├ ⌘ └ ⊥ ‼ ¶ → └

x└ 6XEPLWWHG└ $VSHQ└ 6HHS└ DQG└ &8'└ 3URYLVLRQDO└)CRZ└ 'DWD└ IRU└ 6HSWHPEHU└ DQG└ 2FWREHU└ ± └ 1R
⊥ ‼ ¶ → └

x└ 3DUWLFLSDWHG└ LQ└ D└ FDQDJHPHQW└ PHHWLQJ└ ZLWK└ 8◄ 6◄ └ (3$└ UHSUHVHQWDWLYHV└ WR└ GLVFXVV└ WWLD
IRU└ FRPSOHWLRQ└ RI└ WKH└ 5,↕)6└ ± └ 'HFHPEHU└ ¶ ⌘ └ ⊥ ‼ ¶ → └

x└ 6XEPLWWHG└ WWDWXV└ XSGDWH└ IRU└ VXEPLWWDO└ RI└ WKH└ ,QWHULP└ &RPELQHG└ $FLG└ 'UDLQDJH└
,QVHWXLJDWLRQ└)XOO└ 6FDOH└ 'HFRQWXDWLRQ└ 5HSRUW└ ± └ 'HFHPEHU└ ⊥ ¶ ⌘ └ ⊥ ‼ ¶ → └

x└ 6XEPLWWHG└ 6LWH└ &KDUDFWHUL]DWLRQ└ 5HSRUW└ RQ└ 'HFHPEHU└ ⊥ ⌘ └ ⊥ ‼ ¶ → └

:RUN└ 3ODQQHG└ IRU└ WKH└ 1H[W└ 4XDUWHU└

x└ &RQGXFW└ PRQWKO\└ SURJUHVV└ FRQIHUHQFH└ FDOOV└ ZLWK└ 8◄ 6◄ └ (3$└ ± └ -DQXDU\⌘ └)HEUXDU\⌘ └ DQ

x└ 6XEPLW└ ,QWHULP└ &RPELQHG└ $FLG└ 'UDLQDJH└ 7UHDWDELOLW\└ ,QVHWXLJDWLRQ└)XOO└ 6FDOH└ 'HFRQWXDW
± └ -DQXDU\└ ⊥ ‼ ¶ ← └

x└ 3DUWLFLSDWH└ LQ└ 8◄ 6◄ └ (3$∂V└ /HYLDWKDQ└ 8SGDWH└ 0HHWLQJ└ LQ└ &DUVRQ└ &LW\⌘ └ 1HYDGD└ ± └)H

x└ 3UHSDUH└ ZLWK└ SUHSDUDWLRQ└ RI└ EDVHOLQH└ ULVN└ DVVHVVPHQW└ DQG└ WKH└ 5,└ 5HSRUW◄ └

x└ &RQWLQXH└ ZRUN└ RQ└ WKH└)6◄ └

3URJHHPV└ (QFRXQWHUHG└ RU└ $QWLFLSDWHG└

1R└ SURJHHPV└ HQFRXQWHUHG└ RU└ DQWLFLSDWHG◄ └ └ $WODQWLF└ 5LFKILHOG└ H[SHFW└ WR└ UHFHLYH└ WKH└ UH
UHYLHZ└ RI└ WKH└ 6LWH└ &KDUDFWHUL]DWLRQ└ 5HSRUW└ ZLWKLQ└ WKH└ QH[W└ ├ ‼ └ GD\V◄ └ └
└
└ └ └ └ └ └ └ └ └ └ └ └ └ └ └ └
└

-XOLH└ 6XOOLYDQ└ ±└ 86└ (3$└ 5HJLRQ└ └
-DQXDU\└ ← ☼ └ ┴ ‼ ¶ ← └
3DJH└ ┤ └ RI└ ┤ └

,I└ \RX└ KDYH└ DQ\└ TXHVWLRQV└ RU└ FRPPHQWV☼ └ SOHDVH└ IHHO└ IUHH└ WR└ FRQWDFW└ PH└ DW└ ♂ ├ ↑ → □
$QWKRQ\◄ %URZQ#ES◄ FRP◄ └
└
└
6LQFHUHO\☼ └
└
└
└ IRU└ └ └
└ └ └
└ └ └ └ └
└
7RQ\└ %URZQ└
3URVHFW└ 0DQDJHU└
└
$WWDFKPHQWV └
7DECH└ ¶ └ ±└ $VSHQ└ 6HHS└ %LRUHDFWRU└ 7UHDWPHQW└ 6\VWHP└ ±└ &RPSOLDQFH└ 6DPSOH└ 5HVXOWV└
7DECH└ ┴ └ ±└ $VSHQ└ 6HHS└ %LRUHDFWRU└ 7UHDWPHQW└ 6\VWHP└ ±└ 5HFHQW└)ORZ☼ └ S+☼ └ DQG└ 253└)
└
└
FF └ └ └ 'RXJODV└ &DUH\☼ └ /DKRQWDQ└ 5HJLRQDO└ :DWHU└ 4XDOLW\└ &RQWURO└ %RDUG└
6FRWW└)HUJXVRQ☼ └ /DKRQWDQ└ 5HJLRQDO└ :DWHU└ 4XDOLW\└ &RQWURO└ %RDUG└
5RQDOG└ +DOVH\☼ └ $WODQWLF└ 5LFKILHOG└ &RPSDQ\└
1DWKDQ└ %ORFN☼ └ %3└ └
-DFN└ 0DUVHULVRQ☼ └ $WODQWLF└ 5LFKILHOG└ &RPSDQ\└
5HJLQDOG└ ,ODR☼ └ $WODQWLF└ 5LFKILHOG└ &RPSDQ\└
$GDP└ &RKHQ☼ └ (VT◄ ☼ └ 'DYLV└ *UDKDP└ └ 6WXEEV└ //3└
'DYH└ 0F&DUWK\☼ └ &RSSHU└ (QYLURQPHQWDO└ &RQVXOWLQJ└
0DUF└ /RPEDUGL☼ └ $PHF└)RWWHU└ :KHHOHU└ (QYLURQPHQW└ └ ,QIUDVWUXFWXUH☼ └ ,QF◄ └
6DQG\└ 5LHVH☼ └ (Q6FL☼ └ ,QF◄ └
└

TABLE 1
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - COMPLIANCE SAMPLE RESULTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Parameter	Basis	December 14, 2017 284ASPINF964 ASB Influent (mg/L)	December 14, 2017 284ASPEFF963 ASB Effluent (mg/L)	Maximum Discharge Criteria[2] (mg/L)	Average Discharge Criteria[2] (mg/L)
pH (s.u.)[1]	Field	3.08	7.55	-	6.0 - 9.0
Aluminum	Dissolved	51	0.44	4.0	2.0
Arsenic	Dissolved	0.0016	< 0.0010	0.34	0.15
Cadmium	Dissolved	0.0022	< 0.0010	0.009	0.004
Calcium	Dissolved	360	320	-	-
Chloride	Total	1.7	1.8	-	-
Chromium	Dissolved	0.0050	0.00051 J	0.97	0.31
Copper	Dissolved	1.2 J	0.0033 J	0.026	0.016
Hardness	Dissolved	1200	1000	-	-
Iron	Dissolved	150	0.24	2.0	1.0
Lead	Dissolved	< 0.0010	< 0.0010 F1	0.136	0.005
Magnesium	Dissolved	84 J	56 J	-	-
Nickel	Dissolved	0.48	0.0076	0.84	0.094
Phosphorous	Dissolved	< 0.20	< 0.20	-	-
Selenium	Total	0.0015 J	0.00067 J	NP	0.005
Sulfate	Total	1900	1900	-	-
Zinc	Dissolved	0.64 B	0.0055 J B	0.21	0.21
Acidity	Total	660	< 2.0	-	-
Alkalinity (Bicarbonate)	Total	< 4.8	290	-	-
Alkalinity (Carbonate)	Total	< 2.4	2.9	-	-
Alkalinity (Hydroxide)	Total	< 1.4	< 1.4	-	-
Alkalinity (Total)	Total	< 4.0	240	-	-
Total Dissolved Solids	Total	2900	3000	-	-
Total Suspended Solids	Total	< 10	11	-	-

Notes:
1. pH values are field measurements and are reported in standard units
2. Discharge criteria and basis for maximum and average values are listed in the Request for Approval of Modifications to the Removal Action at the Leviathan Mine Memorandum (U.S. EPA,

Abbreviations
< - Constituents that were not detected are listed as "<" and the reporting limit is shown.
J - Results noted with "J" are an estimated value or were less than the reporting limit but greater than or equal to the method detection limit.
B - Compound was found in the blank sample
F1 - MS and/or MSD Recovery is outside acceptance limits
mg/L - milligrams per liter
NP - Not Promulgated

TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
01/07/11[2]	8.5	2.92	434.1	6.50	-134.0	5.98	-200.1	-	-	6.08	-216.2	6.15	-4.9
02/01/11[2]	8.0	3.07	423.8	6.75	-332.2	6.86	-279.7	-	-	6.59	-297.0	6.62	-9.3
03/11/11	8.5	3.05	384.7	7.66	-239.2	7.11	-344.7	-	-	6.85	-370.1	7.05	-73.4
04/19/11[3]	30.0	2.61	454.9	-	-	-	-	-	-	-	-	4.72	172.9
04/26/11	29.0	2.91	362.1	7.45	-199.2	6.58	-346.5	7.42	-232.8	6.41	-369.7	7.22	-144.6
05/03/11	27.0	2.90	355.0	7.70	-264.8	6.56	-361.5	7.81	-264.9	6.54	-402.2	7.60	-137.5
05/11/11	24.0	2.84	344.2	6.81	-198.2	6.31	-229.0	6.99	-200.7	6.23	-204.0	6.99	-139.2
05/20/11	17.0	3.03	372.4	8.10	-282.2	7.09	-361.8	7.89	-219.6	6.39	-367.9	7.36	-44.1
06/01/11	17.5	2.92	378.6	8.18	-175.7	7.11	-360.0	8.14	-272.8	6.55	-337.9	7.32	-50.3
06/15/11[4]	15.6	3.18	407.7	-	-	-	-	8.60	-231.3	-	-	8.15	-3.9
06/21/11[4]	14.7	3.09	415.6	-	-	-	-	8.15	-184.2	-	-	-	-
06/28/11[5]	15.0	2.95	204.5	7.66	-503.6	6.94	-581.5	8.44	-458.1	6.93	-581.5	7.52	-85.1
07/06/11	14.0	2.95	237.1	8.37	-50.3	6.98	-525.6	8.10	-382.9	6.75	-550.2	7.81	-249.1
07/13/11	13.8	2.88	352.2	8.46	-312.3	6.83	-412.1	5.43	-48.5	6.67	-420.1	7.84	-37.4
07/19/11	13.0	3.11	304.3	7.27	-462.3	6.93	-434.0	8.40	-407.5	6.85	-436.0	8.0	-86.6
07/28/11	-	2.98	320.8	8.32	-294.3	7.10	-393.6	8.55	-165.4	6.99	-376.0	7.90	-70.4
08/04/11	12.0	3.12	337.7	7.88	-416.0	7.20	-437.3	8.73	-437.5	7.11	-431.8	8.14	-155.7
08/11/11	12.0	2.85	360.2	7.72	-456.0	7.27	-421.6	8.95	-421.9	6.87	-443.0	8.04	-162.8
08/17/11	12.0	3.00	362.5	6.93	-291.8	6.84	-415.5	8.60	-338.3	6.92	-437.7	7.97	-187.8
08/24/11	12.0	3.01	362.8	6.42	-257.0	7.08	-405.5	8.30	-277.9	6.84	-402.2	7.85	-164.4
08/30/11	12.0	2.90	350.9	8.23	-321.5	7.27	-433.4	7.49	-366.0	7.05	-428.0	7.63	-63.5
09/08/11	12.0	2.98	362.2	7.66	-387.0	6.98	-405.5	7.55	-375.2	6.80	-402.3	7.91	-183.6
09/15/11	12.0	3.01	385.0	8.16	-194.0	6.97	-372.7	8.38	-359.1	6.90	-342.6	8.07	-146.1
09/23/11[4]	12.0	2.99	400.1	-	-	-	-	6.81	-142.1	-	-	8.30	-295.9
09/28/11	12.0	2.86	429.9	7.29	-312.1	6.76	-232.9	7.11	-108.4	6.71	-224.1	7.54	-131.1
10/06/11	12.0	2.96	389.0	6.73	-220.1	6.48	-281.5	6.55	-250.8	6.80	-331.8	7.01	-159.3
10/20/11	-	-	-	-	-	-	-	7.50	-375.9	6.93	-365.1	-	-
10/21/11[6]	-	-	-	-	-	-	-	3.14	416.8	6.86	-365.1	-	-

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TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
10/27/11	-	3.13	424.5	-	-	-	-	6.91	-189.7	-	-	-	-
10/28/11	11.5	2.91	375.7	7.26	-186.5	6.68	-246.5	7.41	-215.3	6.84	-265.3	7.10	-159.0
11/08/11	-	3.12	368.8	-	-	-	-	-	-	-	-	-	-
11/10/11	11.8	3.08	369.9	-	-	-	-	7.13	-213.9	-	-	-	-
11/15/11	11.5	3.08	371.9	7.89	-335.8	7.21	-223.6	7.54	-252.3	6.68	-348.3	7.14	-109.9
12/07/11	11.0	2.86	375.4	7.30	-260.8	7.01	-347.1	7.51	-387.9	6.72	-334.1	7.21	-114.9
01/04/12	-	-	-	-	-	7.72	-232.2	8.13	-148.7	6.19	-344.4	7.65	-242.4
01/05/12	10.0	2.65	396.7	7.14	-406.2	8.34	-368.0	8.40	-318.9	6.16	-380.4	8.20	-31.6
02/10/12	9.0	2.70	400.0	8.60	-246.9	7.69	-248.7	-	-	7.15	-264.4	8.04	61.5
03/08/12	8.6	2.43	401.0	8.61	-301.3	8.21	-240.5	-	-	6.89	-296.8	8.47	81.3
04/19/12	8.3	2.92	395.1	8.20	-305.7	6.87	-357.7	8.51	-375.3	6.50	-342.9	7.49	-94.7
04/27/12	9.4	3.15	377.9	8.22	-90.6	7.00	-239.6	8.14	-286.9	6.52	-388.1	7.56	-75.8
05/03/12	7.8	2.99	369.7	7.99	-288.6	7.27	-286.9	8.12	-348.5	6.68	-387.7	7.80	-33.5
05/18/12	-	2.58	394.3	8.04	-220.4	6.84	-251.4	7.58	-313.4	6.67	-281.9	7.64	-106.5
05/30/12	7.8	3.16	363.3	8.06	-287.9	6.94	-431.6	8.38	-348.0	8.97	-420.8	-	-
06/06/12	7.9	2.60	399.6	8.36	-224.6	6.71	-365.3	8.46	-356.2	6.83	-394.2	7.86	-51.7
06/14/12	6.8	3.02	376.8	7.09	-426.9	7.23	-354.6	8.81	-350.3	6.94	-357.8	7.62	-169.2
06/18/12	7.2	2.76	395.4	8.45	-319.4	7.38	-402.1	8.24	-420.6	6.98	-399.7	7.87	-174.3
06/26/12	6.8	3.01	369.3	8.01	-293.3	6.98	-360.6	8.23	-272.9	7.27	-355.7	7.82	-203.7
07/05/12	6.8	2.98	363.9	8.39	-397.1	7.14	-430.6	7.60	-346.7	7.07	-418.4	-	-
07/11/12	5.6	2.82	403.1	8.00	-346.1	7.22	-406.7	7.58	-388.7	6.76	-398.6	7.49	-144.9
07/18/12	6.0	2.85	396.4	8.38	-402.9	7.01	-421.0	7.94	-374.0	6.83	-420.0	7.39	-337.9
07/24/12	6.5	2.72	403.0	8.30	-412.1	6.98	-409.6	7.96	-389.9	6.91	-412.9	7.51	-129.0
08/02/12	5.8	2.81	437.5	8.05	-396.3	7.43	-405.5	8.91	-97.1	7.29	-389.6	-	-
08/06/12	5.3	2.89	395.8	7.92	-353.2	7.72	-446.1	9.50	-16.0	7.71	-428.5	-	-
08/14/12	6.0	2.85	470.5	8.37	-326.7	7.07	-351.8	8.33	-274.0	7.02	-342.5	-	-
08/21/12	5.3	2.83	390.7	8.55	-438.1	7.34	-425.5	8.48	-407.5	7.36	-429.1	7.03	-156.2
08/28/12	5.6	2.78	427.9	8.40	-401.5	7.30	-409.7	8.17	-368.0	7.16	-409.3	7.44	-131.3
09/05/12	5.8	2.95	478.0	8.44	-360.4	7.44	-360.2	8.35	-300.9	7.27	-342.2	8.03	-99.9
09/13/12	5.6	2.91	428.7	8.41	-380.4	7.45	-389.9	8.13	-361.1	7.45	-390.9	7.76	42.5

TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
09/19/12	5.5	2.99	446.9	8.24	-359.8	7.36	-367.1	7.85	-321.5	7.26	-372.9	7.97	9.5
09/26/12	5.4	3.11	482.0	6.60	-311.9	6.76	-333.3	8.27	-261.7	7.07	-357.6	8.09	35.5
09/27/12[7]	-	-	-	-	-	-	-	-	-	-	-	7.82	-124.6
10/01/12	5.5	2.92	461.7	7.87	-360.3	6.72	-362.0	7.48	-299.5	6.42	-345.8	7.58	37.4
10/04/12[7]	-	-	-	-	-	-	-	-	-	-	-	7.71	59.0
10/10/12[7]	5.5	2.49	428.6	8.16	-374.5	6.95	-382.2	7.42	-322.2	6.71	-379.5	7.87	42.9
10/17/12	5.4	2.50	432.0	8.53	-351.0	7.44	-347.6	8.23	-314.7	7.15	-350.8	7.89	2.4
11/07/12[4,8]	5.5	2.46	435.6	-	-	-	-	7.46	67.5	-	-	-	-
11/14/12[8]	5.5	2.52	344.1	7.46	78.0	6.85	52.8	7.32	48.0	6.80	76.5	6.82	104.3
12/11/12	5.0	2.0	454.5	7.7	-37.9	6.9	-101.9	8.0	-109.1	6.5	-291.0	7.21	120.5
01/09/13	5.1	2.25	464.2	6.91	-163.3	6.71	-208.3	-	-	6.41	-231.1	6.84	-19.7
02/07/13	5.0	1.81	435.9	8.91	-190.2	7.17	-289.4	8.89	-158.6	7.17	-269.5	8.60	-39.5
03/01/13	5.0	2.75	502.8	8.21	-174.0	7.67	-249.7	8.47	-223.8	7.14	-224.9	8.42	-133.0
03/22/13[9]	-	-	-	-	-	-	-	-	-	-	-	8.21	81.4
04/11/13	5.0	2.80	484.9	8.45	-102.1	7.27	-247.5	7.70	-198.3	7.07	-264.1	8.07	105.5
05/01/13	5.0	2.91	426.5	8.63	-207.4	7.31	-267.3	7.62	-231.8	7.15	-264.1	7.35	-59.9
05/12/13	5.0	2.88	371.3	8.51	-223.9	7.27	-275.9	7.87	-241.9	7.01	-320.0	-	-
05/20/13	4.5	2.58	352.3	-	-	-	-	-	-	-	-	8.01	83.0
05/21/13	-	-	-	8.42	-412.3	7.23	-420.9	7.59	-379.8	7.05	-419.7	-	-
05/30/13	4.5	2.78	451.2	8.49	-322.8	7.31	-336.2	8.06	-305.5	7.33	-328.3	7.94	-112.2
06/03/13	4.4	2.78	415.2	8.54	-317.8	7.36	-404.4	7.30	-346.5	7.20	-371.6	8.17	-155.7
06/06/13	4.5	2.78	437.8	8.31	-364.1	7.42	-402.9	7.90	-304.1	7.30	-411.2	7.86	-30.2
06/12/13	4.2	2.70	458.6	7.58	-373.1	7.61	-352.8	8.33	-259.9	7.46	-348.2	-	-
06/17/13	4.2	2.87	421.8	8.32	-291.4	7.31	-302.6	8.85	-367.9	7.21	-381.3	7.75	-47.9
06/25/13	4.2	2.60	427.0	8.18	-343.6	7.17	-374.9	7.65	-313.7	7.11	-373.7	7.82	-79.4
07/02/13	4.0	2.61	421.0	8.20	-328.4	7.14	-380.6	7.60	-289.7	7.05	-366.0	7.83	-133.0

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TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
07/09/13	4.0	2.59	442.9	8.39	-315.0	7.26	-359.2	7.81	-284.7	7.31	-366.7	7.73	-27.7
07/16/13	3.6	2.65	395.0	8.27	-373.7	7.35	-407.0	8.07	-323.9	7.15	-400.9	7.76	-86.3
07/23/13	4.0	2.60	407.3	8.24	-354.3	7.30	-388.2	7.56	-347.2	7.34	-367.9	7.86	-19.9
07/30/13	4.1	2.59	399.7	8.27	-396.8	7.26	-419.2	7.32	-428.9	7.35	-428.9	-	-
08/06/13	4.0	2.48	443.2	8.34	-368.1	7.23	-373.9	7.63	-325.1	7.33	-378.2	8.25	-38.0
08/14/13	4.0	2.60	428.5	8.26	-371.9	7.18	-378.9	7.49	-327.5	7.08	-375.6	7.36	-91.0
08/20/13	4.0	2.47	434.3	8.90	-371.3	7.48	-316.5	7.74	-313.3	7.23	-314.7	7.47	-4.6
09/09/13	3.6	2.33	426.3	7.69	-58.3	7.43	-231.7	7.96	-110.7	7.21	-241.3	7.50	-3.7
09/17/13	3.5	2.57	417.8	8.15	-232.2	7.06	-257.7	7.41	-259.1	7.03	-330.3	6.89	26.1
09/24/13	3.5	2.46	430.9	8.11	-356.3	7.31	-383.6	7.83	-222.8	6.72	-352.3	7.86	35.9
10/02/13	3.6	2.31	440.1	7.99	-332.5	6.33	-372.0	7.67	-341.9	6.85	-381.4	8.00	-214.0
10/07/13	3.6	2.26	448.6	7.89	-301.4	6.64	-314.9	7.30	-297.5	6.63	-320.2	-	-
10/16/13[4]	3.6	2.62	430.5	-	-	-	-	8.06	-12.0	-	-	-	-
10/22/13[4]	3.5	2.45	432.4	-	-	-	-	7.55	72.0	-	-	6.81	99.7
10/30/13	3.6	2.28	427.0	7.75	-356.4	6.79	-353.6	7.56	-304.9	6.84	-354.7	-	-
11/05/13	3.1	2.13	452.6	8.47	-295.5	7.08	-344.9	7.53	-275.8	7.00	-316.2	7.13	97.5
12/11/13	3.5	2.47	415.7	-	-	-	-	-	-	-	-	7.81	-181.7
12/12/13	-	-	-	6.45	-266.6	6.47	-314.7	6.57	-315.5	7.14	-252.3	-	-
01/02/14	3.2	4.10	392.7	7.30	-249.7	6.25	-244.2	7.91	-222.3	6.90	-257.3	7.50	-144.2
02/13/14	3.5	2.46	416.2	8.2	-289.3	7.34	-352.4	6.97	-298.4	7.23	-351.2	7.68	-293.3
03/12/14	3.0	2.58	516.4	8.31	-184.1	7.52	-291.8	7.85	-343.3	7.19	-279.1	7.04	54.1
04/15/14	2.8	2.81	458	8.02	-205.1	7.11	-346.6	8.1	-255.6	7.29	-374.1	8.03	-151.2
05/08/14	2.0	2.7	221	8.42	-259.2	7.03	-14.3	7.69	-300	6.7	-324.7	7.49	-83.4
05/13/14	2.5	2.81	466.3	8.63	-265.4	7.05	-303	7.93	-314.6	6.9	-309.6	7.93	-90.1
05/28/14	2.7	2.82	437.2	8.27	-380	7.3	-398.5	7.47	-351.5	7.22	-408.2	8.03	-142.1
06/03/14	2.5	2.90	502.6	8.41	-306.0	7.41	-314.6	7.43	-290.2	7.33	-321.1	7.35	-52.0

TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
06/09/14	2.0	2.93	443.4	8.24	-351	7.4	-369.8	7.54	-343.2	7.25	-361.8	-	-
06/17/14	2.5	2.74	439.7	8.3	-355.5	7.32	-381.1	6.83	-273.5	7.39	-393.5	-	-
06/24/14	2.0	2.97	419.3	8.33	-365.2	7.38	-392.8	7.29	-320.1	7.32	-387.1	-	-
07/02/14	1.8	2.71	425	8.28	-369.4	7.37	-403.1	7.56	-357.4	7.34	-397	-	-
07/08/14	2.0	2.81	411.6	8.25	-386.7	7.36	-399.9	7.49	-345.8	7.34	-369.8	-	-
07/16/14	2.4	2.59	433.2	8.32	-375.2	7.54	-401.3	7.54	-328.3	7.49	-396.1	8.07	-221.8
07/23/14	2.2	2.88	433	8.33	-365.2	7.3	-366.1	7.11	-305.8	7.16	346.2	7.87	-170.2
07/29/14	2.0	2.82	463.4	8.31	-325.7	7.38	-342.5	7.64	-294.2	7.30	-345.7	8.33	-203.2
08/06/14	2.0	2.96	568.7	8.48	-281.3	7.68	-317.9	7.87	-253	7.63	-313.1	8.34	-93.8
08/12/14	2.0	2.74	490.3	8.41	-259.4	7.32	-334.4	7.60	-271.0	7.30	-333.3	7.74	-96.4
08/19/14	2.1	2.88	496.4	8.45	-237.3	7.41	-317.7	7.53	-276.4	7.38	-312.1	7.32	-95.4
08/26/14	2.2	2.95	505.1	8.51	-247.4	7.55	-306.3	7.77	-242.2	7.48	-297.2	7.54	-43
09/02/14	2.0	2.8	512.8	8.5	-276.8	7.54	-318.9	7.71	-224.1	7.45	-331.7	8.33	-113
09/9/2014[10]	1.9	2.86	498.1	-	-	-	-	-	-	-	-	7.81	-190
09/15/2014[10]	1.8	2.83	482.7	-	-	-	-	-	-	-	-	7.9	69.4
09/22/14	2.0	2.86	482.6	8.34	-277.5	7.42	-316.8	7.85	-248.5	7.25	-299.5	8.11	-21.6
09/30/14	2.2	2.8	479.2	8.19	-279.2	7.41	-335.4	7.91	-249.4	7.40	-332.4	-	-
10/06/14	2.0	2.62	484.9	8.33	-241.5	7.52	-248.4	7.91	-247.2	7.56	-225.6	-	-
10/14/14	2.0	2.91	155.6	8.36	-402.9	7.69	-411.4	7.94	-350.9	7.54	-428.8	-	-
10/23/14	1.8	2.87	480.3	8.83	-309.2	8.12	-332	7.76	-277.3	7.91	-326.9	7.77	122
10/29/14	2.2	2.75	475	7.94	-277.2	7.34	-285	7.34	-215.9	7.27	-281.6	-	-
11/05/14	2.3	2.86	462.2	8.26	-263.7	7.48	-267.5	7.45	-193.3	7.63	-316.7	7.21	163
11/10/14	2.0	2.71	486.9	8.29	-227.3	7.50	-292.3	8.10	-275.2	7.30	-273.5	7.22	174.5
12/09/14	2.0	2.77	471.2	8.33	-271.3	7.50	-316.2	7.81	-255.6	7.43	-318	7.61	9.7
01/14/15	2.2	2.35	455.3	8.01	-322.1	7.52	-306.7	8.38	-296.3	7.39	-360.1	7.47	-216.2
02/04/15	2.0	2.64	490	8.35	-311.5	7.76	-306.3	7.80	-276.3	7.69	-301.6	7.5	-88.9
03/17/15	1.9	2.33	498.5	8.9	-338.9	7.35	-318.9	7.10	-245.1	7.04	-294.4	7.33	156.9
04/14/15	1.6	2.88	452	8.72	-296.4	7.62	-299.8	8.02	-247.2	7.51	-303.3	8.32	16.7
04/22/15	1.6	2.79	434.5	8.53	-273.6	7.49	-257.2	7.67	-304.8	7.27	-247.9	8.03	66.7
04/29/15	1.6	2.80	460.2	8.61	-333.7	7.78	-302.9	7.88	-280.5	7.48	-333.3	7.72	52.0

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TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
05/06/15	1.4	2.73	494.6	8.48	-302.4	7.92	-337.1	7.80	-279.8	7.58	-361.7	8.36	10.1
05/12/15	1.5	2.75	482.5	8.49	-333.8	7.74	-294.9	7.25	-249.5	7.38	-320.9	7.68	42.7
05/27/15	1.8	2.59	471.5	8.13	-326.5	8.30	-318.5	7.10	-281.5	7.26	-338	7.15	-261.8
06/03/15	1.4	2.95	433.6	8.27	-331.3	8.10	-302.2	7.54	-254.3	7.29	-294.7	-	-
06/09/15	1.4	2.79	454.8	8.21	-289.1	8.11	-269.8	6.79	-248.1	7.07	-267.3	-	-
06/16/15	1.3	2.65	385	8.35	-404.4	8.32	-377.3	7.41	-356.7	7.40	-402.1	7.85	-217.3
07/01/15	1.7	2.77	301.2	8.09	-383.2	7.14	-407.6	6.68	-321.6	6.92	-394.6	-	-
07/08/15	2.0	2.69	385.3	7.9	-327	7.58	-399.6	7.45	-338.2	7.59	-400.2	-	-
07/14/15	1.4	2.85	381.3	9.77	-467.5	7.38	-370	7.12	-322.7	7.41	-405.2	8.18	-211.9
07/16/15	1.4	2.84	383.4	8.16	-346	7.08	-383.8	7.28	-331.0	6.88	-370	8.19	-271.7
07/21/15	1.6	2.66	389	8.04	-308.1	7.32	-355.3	7.31	-291.3	7.25	-305.5	7.7	-159.7
07/28/15	1.2	2.94	338.7	8.37	-328.3	7.53	-366.9	7.51	-315.7	7.50	-348.1	8.10	-156.1
08/03/15	1.2	2.74	376.5	8.29	-371.3	7.66	-382.6	7.48	-334.5	7.28	-379.1	7.68	-94.2
08/14/2015[10]	2.2	2.40	413.6	-	-	-	-	-	-	-	-	-	-
08/20/2015[10]	1.2	2.74	393.3	-	-	-	-	-	-	-	-	-	-
08/26/2015[10]	1.0	2.55	344.7	-	-	-	-	-	-	-	-	-	-
09/04/15	1.2	2.75	416.3	8.16	-383.5	7.60	-402.7	7.57	-355.4	7.57	-407.9	-	-
09/10/15	1.1	2.78	362.2	7.98	-360.1	7.26	-360.9	7.65	-347.8	7.11	-399.7	-	-
09/18/15	1.2	2.53	284.4	7.92	-343.1	7.20	-383.6	7.75	-353.9	7.14	-388.9	-	-
09/23/15	1.2	2.76	365.0	8.34	-450.9	7.76	-442.9	7.80	-347.6	7.50	-419.6	-	-
09/30/15	1.3	2.74	365.0	8.17	-378.7	7.58	-431.1	7.31	-367.5	7.41	-408.3	-	-
10/07/15	1.3	2.66	367.5	8.06	-320.7	7.54	-370.4	6.89	-333.9	7.28	-388.9	-	-
10/14/15	1.3	2.79	356	8.32	-343.6	7.80	-362.3	7.10	-298.1	7.42	-396.5	-	-
10/22/15	1.2	2.81	348.1	8.51	-292.8	7.55	-367.9	7.58	-270.5	7.74	-384.4	7.53	107.5
11/12/15	1.2	2.61	392.3	8.35	-312.9	7.70	-341.8	7.52	-295.8	7.61	-376.8	8.29	-106.4
12/02/15	1.4	2.26	407.3	8.7	-354.3	7.11	-377.1	7.08	-330.5	6.99	-370.5	7.03	-96.1
01/12/16	1.4	2.24	419.7	8.4	-371.9	7.23	-408.1	9.89	-262.1	7.52	-399.9	7.92	-148.6
03/17/16	3.6	2.54	424	7.48	-209.6	7.46	-343.7	6.87	-258.7	7.25	-357.4	7.48	209.2
04/18/16	3.5	2.71	411.2	7.47	-199.6	7.76	-173.4	7.02	-188.8	8.09	-315.9	7.89	-45.1
05/11/16	5.4	2.89	383.9	7.69	-234.8	7.39	-350	6.19	-316.9	7.05	-366.7	7.34	-112.4

TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
05/18/16	7.0	2.69	398.6	8.3	-241.7	7.35	-362.6	5.54	-266.5	7.24	-356.9	7.59	-124.5
05/26/16	5.0	2.72	399.2	7.91	-229.7	7.93	-248.3	6.80	-311.4	7.08	-354.7	7.53	50.5
05/31/16	5.2	2.85	400.5	8.05	-229.7	7.75	-306.7	7.15	311.9	6.81	-338.7	7.42	-108.5
06/06/16	6.0	2.58	418.4	8.49	-249.6	7.64	-379.1	7.38	-356.3	7.25	-394.4	7.67	-96.9
06/14/16	4.2	2.33	446.8	8.32	-247.3	8.33	-368.8	7.25	-335.2	7.45	-386.9	7.59	-24.9
06/21/16	5.2	2.86	479	8.26	-136.9	7.38	-275.5	7.48	-279.8	7.36	-311.9	7.83	-23.4
06/28/16	5.0	2.98	489.7	7.83	-267.7	7.15	-276.7	7.21	-233.3	7.15	-298.1	7.90	-53.4
07/06/16	5.2	3.08	465.1	8.02	-255.6	7.27	-286.2	7.05	-224.6	7.32	-294.7	7.54	-59.2
07/12/16	5.3	2.65	478.3	8.64	-273.2	7.16	-300.1	7.26	-271.5	7.21	-299.9	7.42	383
07/19/16	5.2	2.91	499.7	8.32	-252	7.16	-284.4	7.34	-257.8	7.24	-312.5	7.31	27
07/26/16	5.0	2.86	486.6	8.57	-272	7.29	-229.7	6.97	-98.2	7.09	-214.7	7.27	-10.6
08/03/16	5.0	2.52	468.3	8.42	-314.8	7.21	-340.6	7.12	-306.4	7.16	-353	7.43	10.6
08/09/16	5.0	3.36	-52.1	8.14	-338	7.10	-328.7	7.50	-325.5	7.43	-358.6	8.17	-77.8
08/16/16	5.0	2.73	472.7	8.66	-290.1	7.27	-339.0	7.23	-279.0	7.31	-349.5	8.41	-189.6
08/24/16	5.0	2.80	461.5	8.11	-313.8	7.16	-334.6	6.88	-275.0	7.19	295.0	-	-
08/31/16	4.5	2.43	493.3	7.89	-313.0	7.08	-323.8	7.11	-295.7	7.45	-391.9	-	-
09/07/16	4.8	2.84	444.3	8.25	-319.7	7.45	-328.7	7.72	-302.2	7.53	-312.7	-	-
09/12/16[7]	4.5	2.59	497.7	8.24	-285.1	7.38	-300.5	7.72	-281.9	7.27	-311.2	8.37	-95.4
09/20/16	5.0	2.15	500.9	7.67	-296.1	7.02	-303.8	7.26	-251.5	6.93	-299.4	-	-
09/28/16	4.5	2.38	442.5	8.15	-317.8	7.52	-353.0	7.31	-275.7	7.40	-373.8	-	-
10/06/16	4.9	2.69	425.8	8.32	-281.3	7.38	-296	7.78	-267.1	7.26	-293.3	-	-
10/13/16	4.5	2.6	435.7	9.96	-361.9	7.57	-364.3	7.47	-287.1	7.45	-349.4	8.03	105.3
10/20/16	5.0	2.18	463.8	8.06	-298.2	7.36	-356.7	7.70	-302.5	7.50	-370.1	8.33	-142.5
11/08/16	4.8	2.56	417.2	9.04	-386.7	7.39	-370.1	7.35	-281.7	7.30	-376.2	7.77	59.2
12/02/16	4.5	2.13	453.2	7.68	-297.3	7.11	-295.1	7.44	-290.9	7.01	-333.4	7.58	-208.1
1/6/2017[11]	5.0	0.95	495	-	-	-	-	-	-	-	-	7.77	-204.7
02/01/17	5.5	2.77	425.5	8.98	-293.7	8.50	-341.9	8.23	-386.9	8.24	-367.9	7.44	-231.9
03/21/17	15.0	2.72	273.5	-	-	-	-	9.64	-62.5	-	-	6.84	-13.5
04/10/17	28.0	2.84	379.1	-	-	-	-	6.75	-159.0	-	-	6.36	-23.9

TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
04/12/17	25.5	1.98	440	7.46	-391.2	6.75	-176.6	7.99	-227.8	6.57	-212.5	5.73	-114.0
04/21/17	32.3	2.92	427.1	7.23	-110.2	6.42	-191.8	6.71	-7.3	6.43	-233.8	6.26	16.7
04/26/17	-	2.97	403.1	7.27	-293.4	6.92	-138.2	6.44	89.3	6.53	-214.6	6.75	40.6
04/28/17	36.4	-	-	-	-	-	-	-	-	-	-	-	-
05/03/17	30.0	2.93	446.6	8.32	-229.2	7.68	-228.7	8.32	-29.8	6.94	-265.8	6.48	68.8
05/11/17	26.0	2.76	479.7	8.76	212.0	7.80	-301.7	8.89	-122.9	7.24	-269.6	7.27	2.1
05/12/17	-	2.84	365.8	-	-	-	-	-	-	-	-	7.37	77.2
05/18/17	-	2.95	357.2	8.16	-332.2	7.23	-332.3	8.12	-55.4	7.01	-325.4	-	-
05/24/17	-	2.88	467.9	8.4	-289.4	7.52	-296.5	8.81	-261.9	6.90	-289.9	6.52	-8.5
06/01/17	19.3	3.07	593.9	8.13	-245.2	7.07	-339.5	7.55	-378.2	6.92	-261.8	7.65	-41.4
06/05/17	18.3	-	-	-	-	-	-	-	-	-	-	-	-
06/06/17	-	3.05	318.2	7.72	-443.8	7.20	-439.1	8.50	-178.2	7.08	-453.9	7.65	57.0
06/13/17	18.0	-	-	-	-	-	-	-	-	-	-	-	-
06/14/17	-	2.97	392.7	7.57	-196.2	7.04	-340.6	8.18	-238.1	6.66	-367.6	7.75	-95.7
06/15/17	-	2.59	420.8	-	-	-	-	-	-	-	-	7.63	77.8
06/21/17	16.2	2.98	392.5	8.63	-326.4	7.24	-397.6	8.46	-361.6	6.85	-398.1	-	-
06/28/17	-	2.99	385.8	-	-	-	-	8.03	-244.0	-	-	-	-
06/29/17	14.6	-	-	-	-	-	-	-	-	-	-	-	-
07/06/17	-	3.00	389.9	8.32	-294.7	7.98	-242.3	8.19	-300.9	6.86	-399.3	7.90	-180.1
07/07/17	15.6	-	-	-	-	-	-	-	-	-	-	-	-
07/12/17	16.0	3.00	384.5	8.32	-369.9	7.09	-404.1	8.33	-418.0	6.80	-417.6	-	-
07/13/17	-	3.00	392.1	-	-	-	-	-	-	-	-	7.71	-173.6
07/20/17	17.5	3.08	366.2	8.3	-391.8	7.58	-416.7	8.09	-418.6	7.12	-419.5	7.84	-153.6
07/27/17	14.5	2.67	383.1	-	-	-	-	8.64	-406.5	-	-	7.97	-245.6
08/02/17	13.2	2.87	491.7	8.19	-299.4	7.57	-296.6	8.65	-269.8	7.05	-296.0	8.34	-84.8
08/09/17	15.0	3.03	485.7	7.88	-153.8	7.57	-256.6	7.60	-266.7	7.00	-304.5	-	-
08/16/17	14.7	2.88	370.7	8.26	-287.3	7.92	-359.8	9.15	-178.8	7.38	-399.8	7.25	12

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TABLE 2
ASPEN SEEP BIOREACTOR TREATMENT SYSTEM - RECENT FLOW, pH, AND ORP FIELD MEASUREMENTS
DECEMBER 2017 MONTHLY SUMMARY
Draft - Provisional Data

Date	Aspen Seep Bioreactor Influent[1]			Manhole 1 or 2 (Biocell 1 Influent)		Manhole 4 or 5 (Biocell 1 Effluent/Biocell 2 Influent)		Manhole 6 (NaOH dosing location)		Manhole 7 or 9 (Biocell 2 Effluent)		Aspen Seep Bioreactor Effluent	
	Flow (gpm)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)	pH (s.u.)	ORP (mV)
08/23/17	15.0	2.89	374.3	8.42	-297.2	7.49	-406.5	8.74	-380.5	6.57	-412.2	8.03	53.1
08/29/17	13.0	2.77	414.8	8.32	-310.2	7.45	-366.8	9.02	-283.1	6.70	-390.9	8.30	25.0
09/07/17	15.0	2.94	401.6	8.40	-445.3	7.70	-372.3	8.45	-295.6	6.84	-421.8	8.14	42.4
09/14/17	15.5	2.81	394.3	-	-	-	-	7.11	-171.3	-	-	7.51	-133.6
09/27/17	14.0	3.08	263.9	9.00	-479.7	8.45	-529.5	9.02	-31.9	7.66	-502.8	7.36	105.9
10/06/17	15.0	3.00	-146.2	8.86	-272.1	8.08	-342.0	6.14	-153.3	7.21	-410.0	-	-
10/12/17	12.0	-	-	-	-	-	-	-	-	-	-	-	-
10/13/17	-	2.94	366.2	9.14	-271.9	8.86	-340.5	9.55	-191.1	7.16	-394.3	8.00	99.2
10/19/17	13.0	2.83	384.3	8.14	-249.2	6.92	-352.9	8.29	-184.1	6.97	-376.2	7.44	94.1
10/26/17	13.0	2.95	392.8	8.35	-227.5	7.29	-356.6	8.20	-195.7	7.03	-378.8	7.65	96.2
11/08/17	12.0	2.65	396.5	8.24	-229.0	7.55	-352.4	8.20	-196.9	7.28	-357.4	7.58	117.7
12/14/17	12.0	3.08	361.8	8.80	-184.7	7.83	-313.2	9.44	-162.2	7.04	-297.5	7.55	100.2

Notes
[1] Aspen Seep Bioreactor influent flow rate measurements are field measurements collected with a graduated bucket and stop watch.
[2] Low pH measurements due to power outage and associated chemical pump downtime during the inverter failure on 11/29/10.
[3] Low pH measurements due to increase in system flow rates; chemical dosing rates lagged behind these system flow rate increases and were unable to prevent decrease in system pH.
[4] Field measurements at intermediate bioreactor manholes were not collected when recirculation operations were interrupted due to sludge dewatering operations, biocell flushing, or other maintenance activities.
[5] ORP measurements may be inaccurate due to probe calibration issues.
[6] Low pH measurements due to a power outage and associated chemical pump shutdown.
[7] Effluent parameters were collected at the sludge dewatering filtrate discharge.
[8] High ORP measurements in manholes due to recirculation system downtime.
[9] Effluent only parameters were collected during effluent launder screen repairs.
[10] Influent only parameters were collected during Aspen solids management.

Abbreviations
"-" - not measured, not recorded, or bioreactor operation did not have flow at given location on the specified date.
gpm - gallons per minute
mV - millivolts
ORP - oxidation/reduction potential
s.u. - standard unit