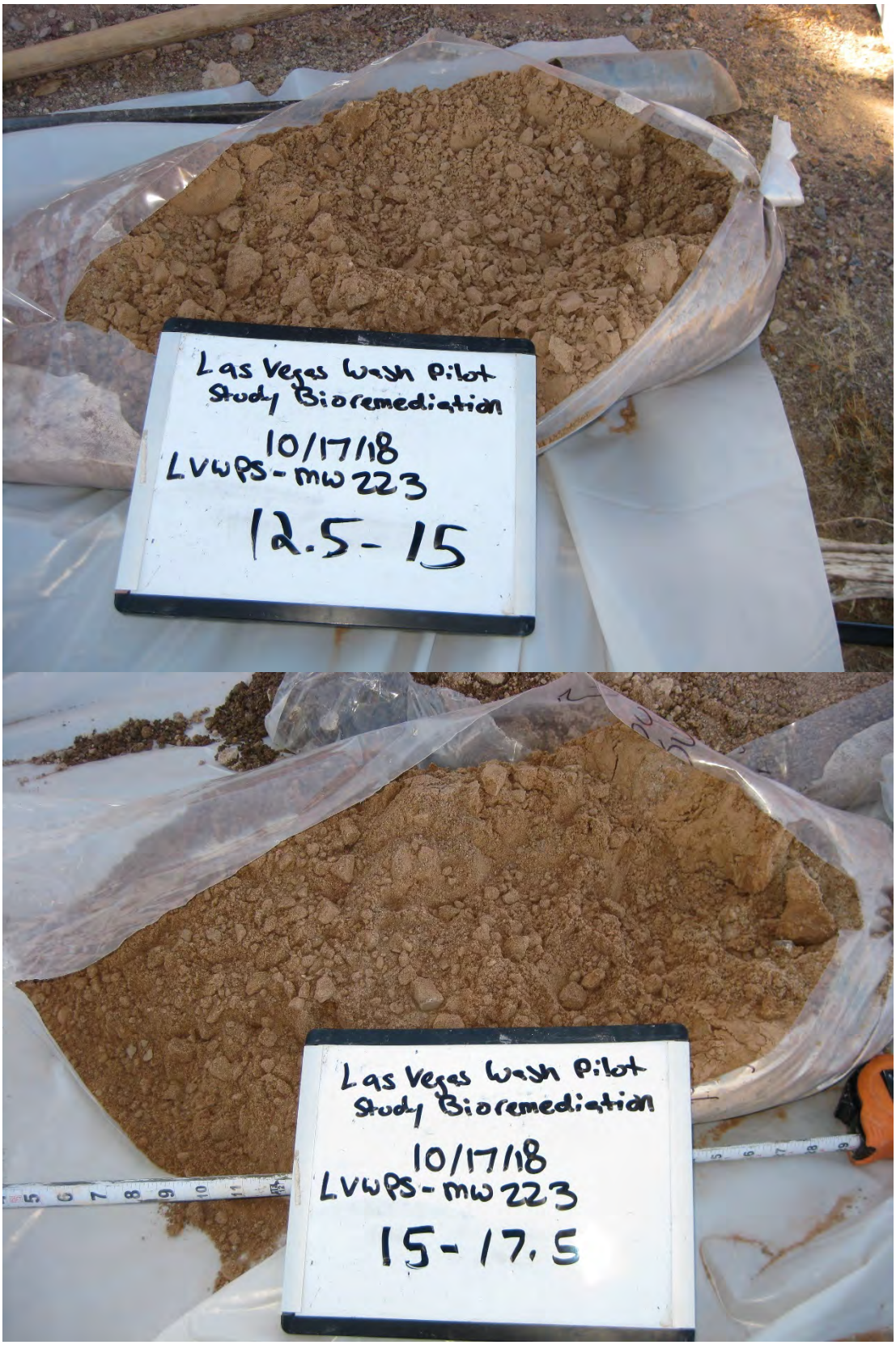
Core Photos
LVWPS-MW223

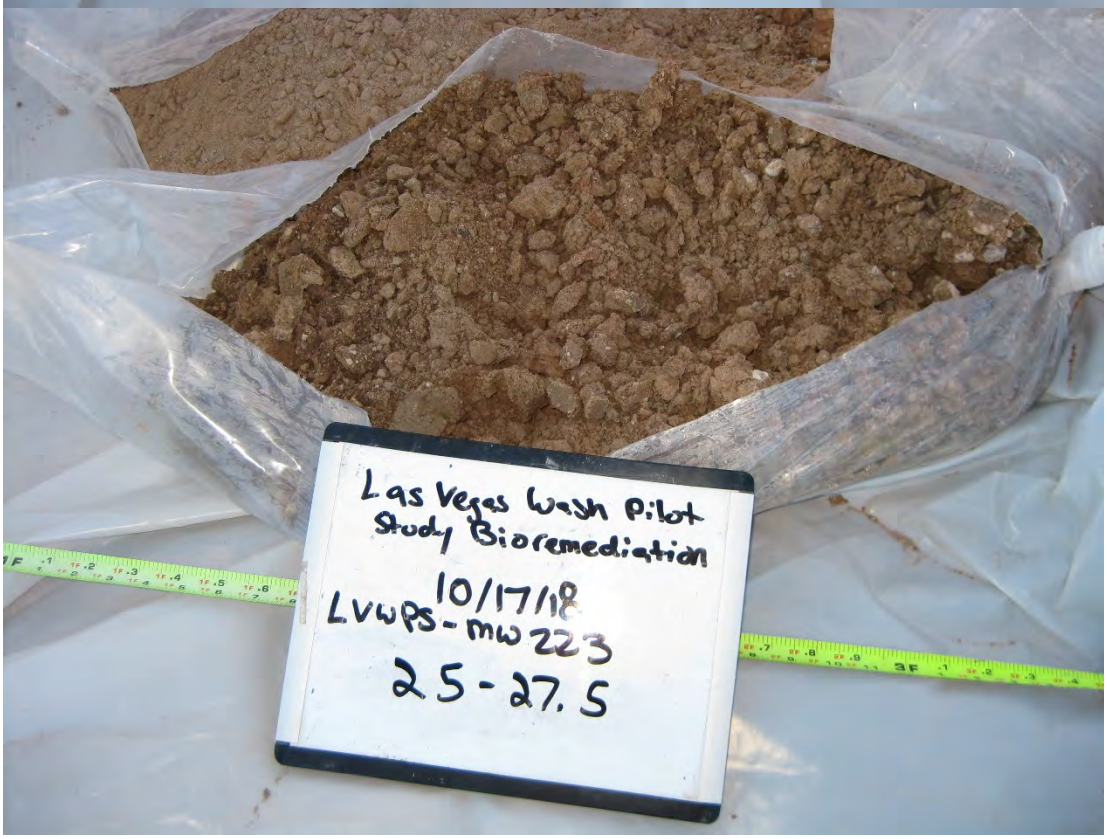

Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
7.5-10
Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
10-12.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
12.5-15
Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
15-17.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw 223
17.5-20

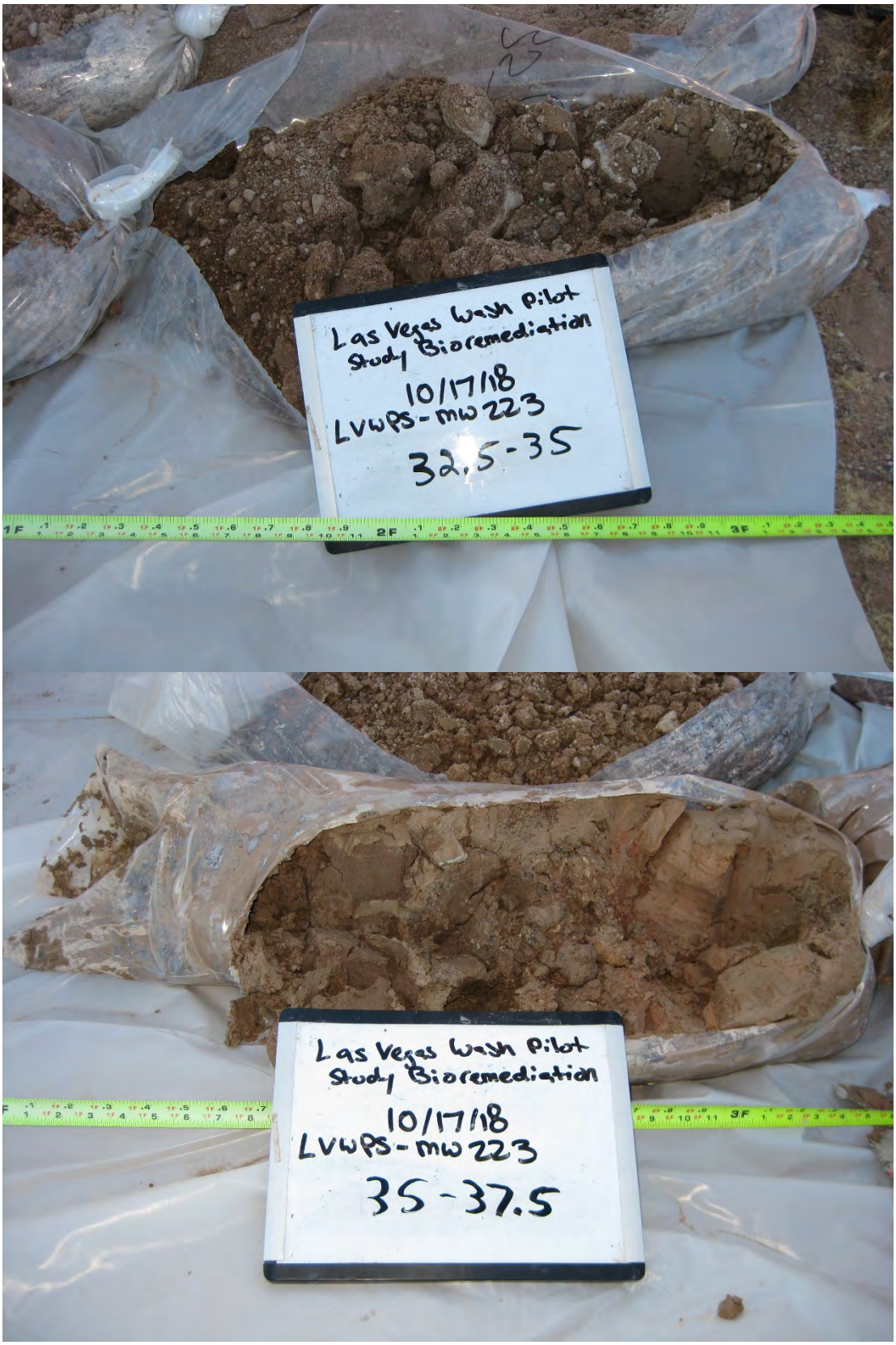

Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw 223
20-22.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
22.5-25


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
25-27.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
27.5-30


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
30-32.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
32.5-35
Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
35-37.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
37.5-40


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
40-42.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
42.5-45
Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
45-47.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
47.5-50
Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
50-52.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
52.5-55
Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
55-57.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
57.5-60


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
60-62.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
62.5-65
Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-mw223
65-67.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
67.5-70


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
70-72.5


Las Vegas Wash Pilot
Study Bioremediation
10/17/18
LVWPS-MW223
72.5-75


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-MW223
75-77.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
77.5-80'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
80-82.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
82.5-85"


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
85-87.5'

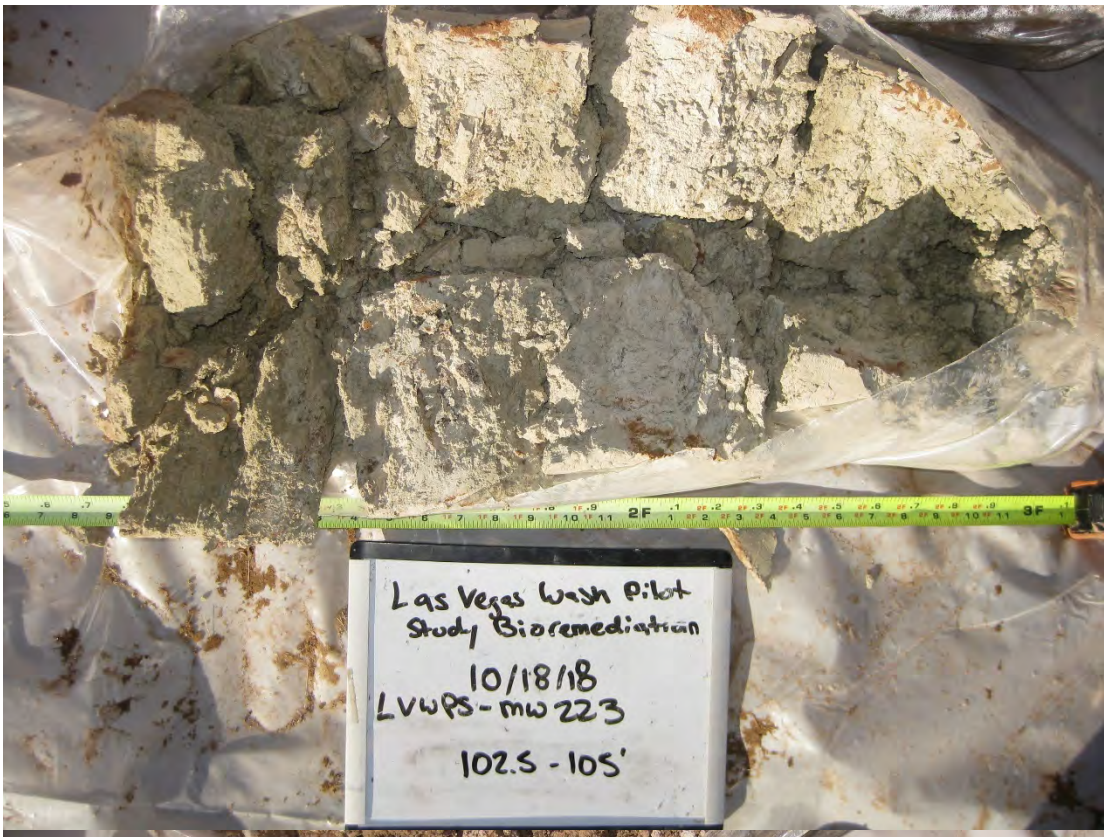

Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
87.5-90'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
90-92.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
92.5-95'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
95-97.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
97.5-100'
Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
100-102.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
102.5 - 105'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
105-107.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
VWPS-MW223
107.5-110'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
VWPS-MW223
110-112.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-MW223
112.5-115'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-MW223
115-117.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
117.5-120'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
120-122.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
122.5-125'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
125-127.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
127.5 - 130'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-mw223
130 - 132.5'


Las Vegas Wash Pilot
Study Bioremediation
10/18/18
LVWPS-MW223
132.5-135'

Core Photos
LVWPS-MW224C

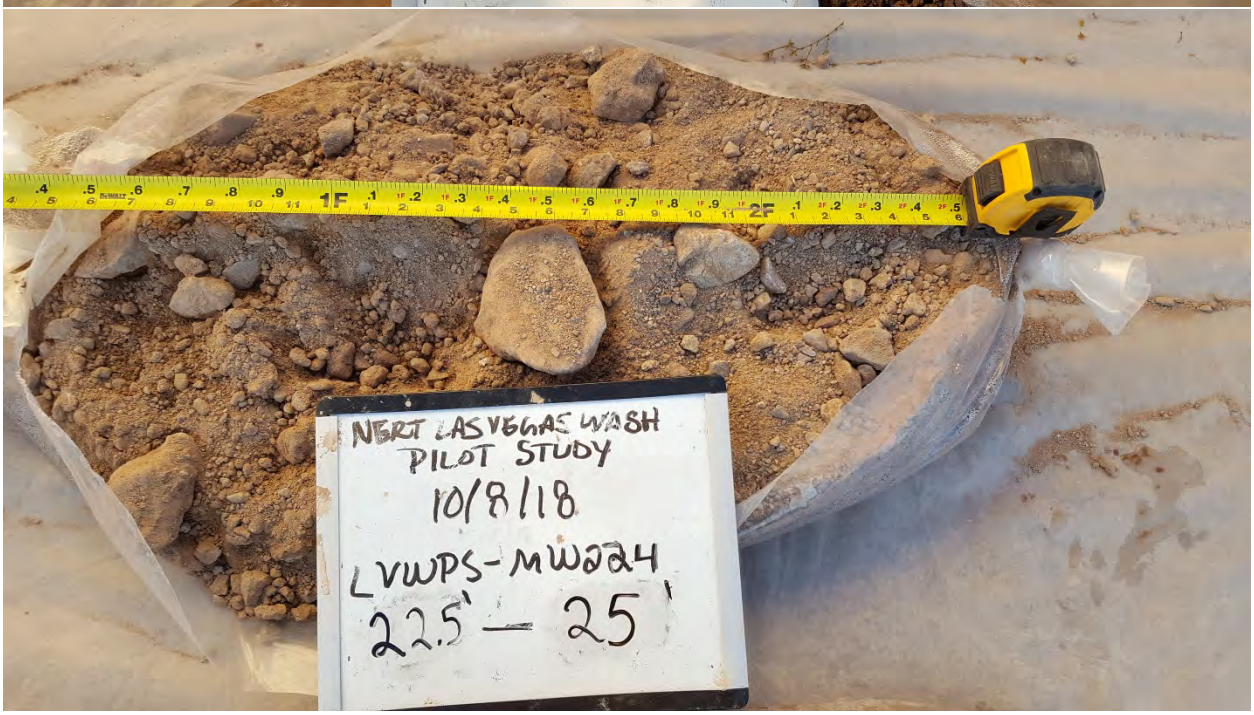

NBRT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
10' – 12.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
12.5' – 15'


NBRT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
15' – 17.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
17.5' – 20'


NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW224
20' — 22.5'

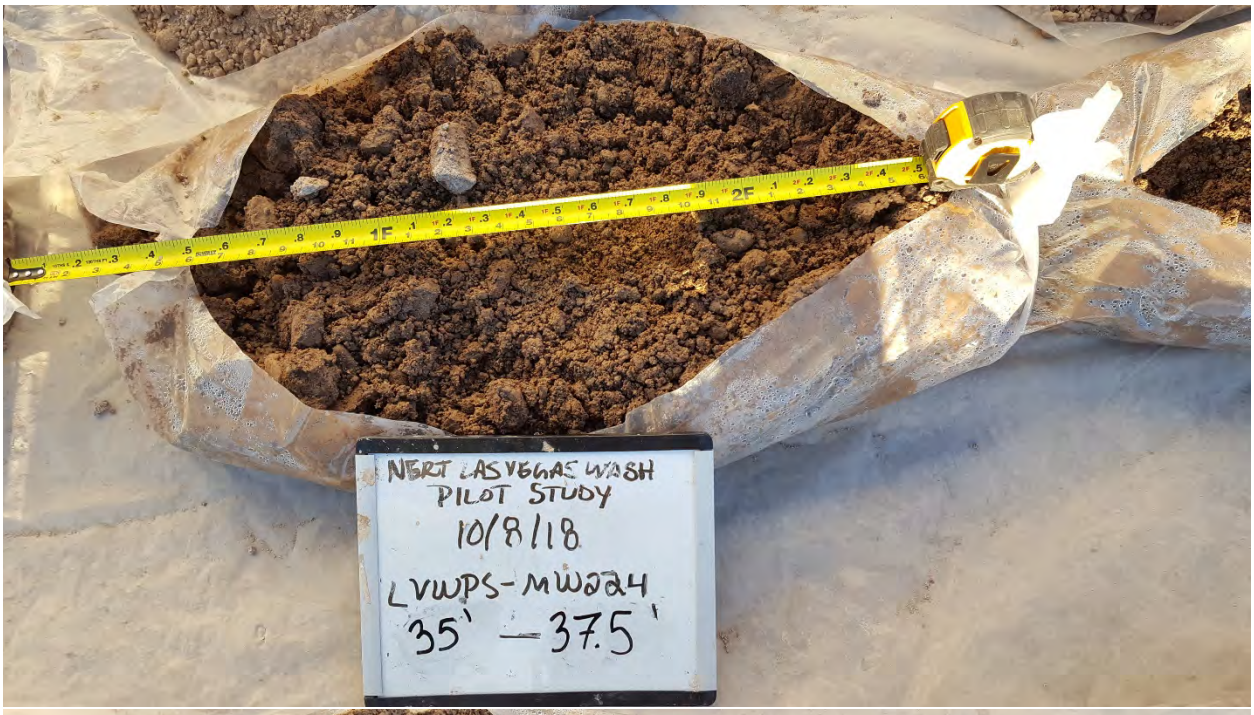

NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW224
22.5' — 25'


NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW224
25' – 27.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW224
27.5' – 30'


NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW224
30' — 32.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW224
32.5' — 35'


NBRT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
35' — 37.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
37.5' — 40'


NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
40' - 42.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/8/18
LVWPS-MW024
42.5' - 45'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
45 — 47.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
47.5 — 50'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
50' — 52.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
52.5' — 55'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
55'-57.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
57.5'-60'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
60' – 62.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
62.5' – 65'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
65' – 67.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
67.5 – 70'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
70 – 72.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
72.5 – 75'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
75' - 77.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
77.5' - 80'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
80' - 82.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
82.5' - 85'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
85' - 87.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
87.5' - 90'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
90' - 92.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW024
92.5 - 95'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324
95' - 97.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324
97.5' - 100'


NERT AS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
100' - 102.5'


NERT AS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
102.5' - 105'


NERT ASTGHAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324
105' - 107.5'


NERT ASTGHAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324,
107.5 - 110


NBRT AS-[illegible] WASH
PILOT STUDY
10/9/18
LVWPS-MW324
110 - 112.5'


NBRT AS-[illegible] WASH
PILOT STUDY
10/9/18
LVWPS-MW324
112.5 - 115'


NERT ASTGHAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324
115' - 117.5'


NERT ASTGHAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324
117.5 - 120'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
120' - 122.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
122.5' - 125'


NEXT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
125' - 127.5'


NEXT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
127.5' - 130'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
130' - 132.5'


NBRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
132.5' - 135'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/13
LVWPS-MW224
135' - 137.5'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/13
LVWPS-MW224
137.5-140'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/13
LVWPS-MW24
140'-142.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/13
LVWPS-MW24
142.5'-145'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
145'-147.5


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
147.5'-150'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
150'-152.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
152.5'-155'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324
155'-157.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW324
157.5'-160'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
160'-162.5'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
162.5'-165'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
165' - 167.5'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
167.5' - 170'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
170' - 172.5'


NSRT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
172.5'-175'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
175'-177.5'
NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
177.5'-180'


NERT LASVegAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
180' - 182.5'
NERT LASVegAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
182.5' - 185'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
135'-137.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW24
187.5'-190'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
190'-192.5'


NERT LAS VEGAS WASH
PILOT STUDY
10/9/18
LVWPS-MW224
192.5'-195'

Core Photos
LVWPS-MW225


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
10-12.5'


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
12.5-15'

LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
15'-17.5

LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
17.5'-20'


LAS VEGAS WASL
Biorem. Pilot Study 10/9/18
LVWPS-MW225
20'-22.5'


LAS VEGAS WASL
Biorem. Pilot Study 10/9/18
LVWPS-MW225
22.5'-25'


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
25-27.5


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
27.5-30


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
30 - 32.5


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
32.5-35'


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
35 - 37.5


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
37.5 - 40


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
40-42.5


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
42.5'-45'


LAS VEGAS WASH
Biorem. Pilot Study 1/19/18
LVWPS-MW225
45-47.5'


LAS VEGAS WASH
Biorem. Pilot Study 1/19/18
LVWPS-MW225
47.5-50'

LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
50'-52.5'

LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
52.5'-55'


LAS VEGAS WASH
Biorem. Pilot Study 12/9/18
LVWPS-MW 225
55'-57.5


LAS VEGAS WASH
Biorem. Pilot Study 12/9/18
LVWPS-MW 225
57.5'- 60'


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
60' – 62.5'
10/9/18


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
62.5' – 65'
10/9/18


LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
65' – 67.5'
LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
67.5' – 70'


LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
70' – 72.5'

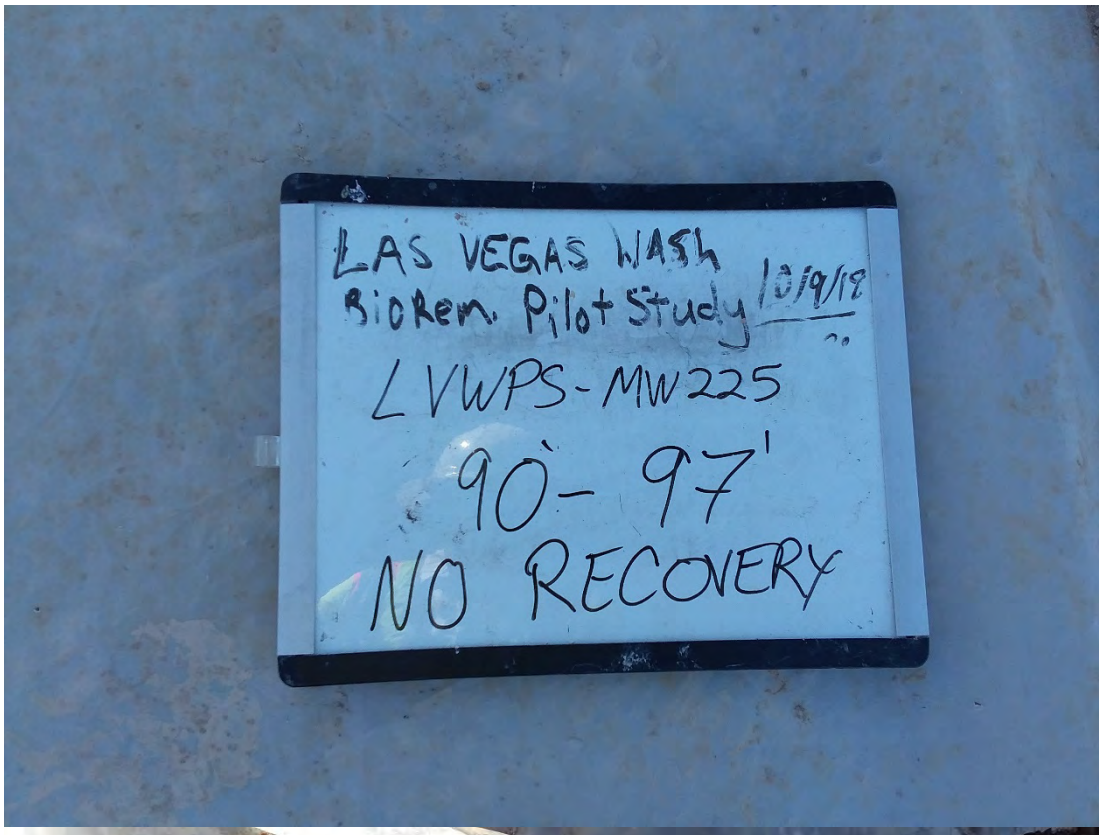

LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
72.5' – 75'


LAS VEGAS WASH
BioRem. Pilot Study 10/9/12
LVWPS-MW225
75' - 77.5'
LAS VEGAS WASH
BioRem. Pilot Study 10/9/12
LVWPS-MW225
77.5' - 80'


LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
80 - 82.5'
LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
82.5' - 85'


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
85' - 87.5'


LAS VEGAS WASH
Biorem. Pilot Study 10/9/18
LVWPS-MW225
87.5' - 90'


LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
90'- 97'
NO RECOVERY


LAS VEGAS WASH
BioRem. Pilot Study 10/9/18
LVWPS-MW225
97'-100'


LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
90'-92.5'
LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
92.5'-95'


LAS VEGAS WASH
10/10/18
BioRem. Pilot Study
LVWPS-MW225
95' - 97.5'


LAS VEGAS WASH
10/10/18
BioRem. Pilot Study
LVWPS-MW225
97.5' - 100'


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/18
100' - 102.5'


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/18
102.5' - 105'


LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
'05' - 107.5'


LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
107.5' - 110'


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/18
110' - 112.5'


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/18
112.5' - 115'


LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
115' - 117.5'


LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
117.5' - 120'


105
LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
120' - 122.5'


125
LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
122.5' - 125'


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
130 - 132.5
10/10/18


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
132.5 - 135
10/10/18


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/15
135-137.5


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/15
137.5-140


LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/18
140 - 142.5

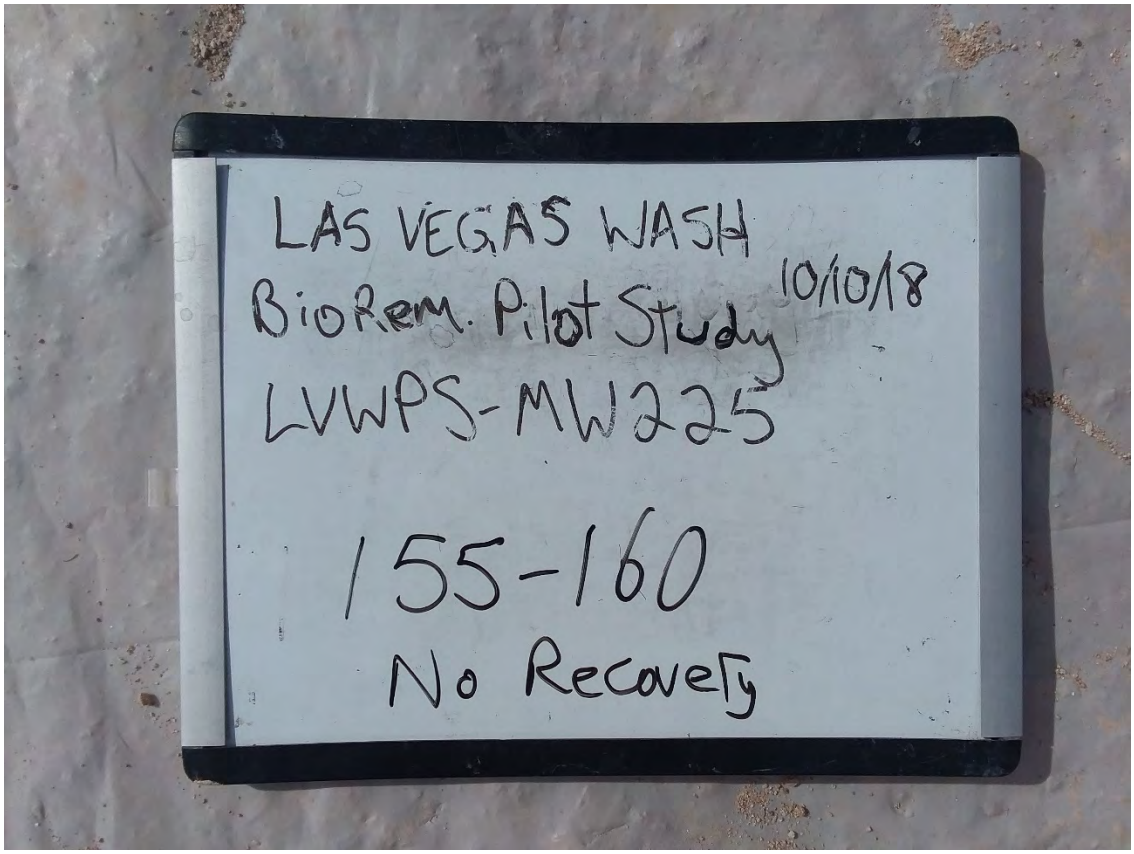

LAS VEGAS WASH
BioRem. Pilot Study
LVWPS-MW225
10/10/18
142.5 - 145

LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
145'- 147.5'

LAS VEGAS WASH
BioRem. Pilot Study 10/10/18
LVWPS-MW225
147.5'- 150'


LAS VEGAS WASH
Biorem. Pilot Study
LVWPS-MW225
10/10/18
150' - 152.5'


LAS VEGAS WASH
Biorem. Pilot Study
LVWPS-MW225
10/10/18
152.5- 155'


LAS VEGAS WASH
BioRem. Pilot Study
10/10/18
LVWPS-MW225
155-160
No Recovery

Core Photos
LVWPS-MW226


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
5'-7.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
7.5'-10'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
10'-12.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
12.5'-15'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
15'-17.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
17.5'-20'


Vegas Ash Pilot Study
LVWPS MW226C
10/22/18
20'-22.5'


Las Vegas Ash Pilot Study
LVWPS MW226C
10/22/18
22.5'-25'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
25'-27.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
27.5'-30'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
30'-32.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
32.5'-35'


Las Vegas Wash Pilot Study
LVWPS-MW226C
10/22/18
35'-37.5'


Las Vegas Wash Pilot Study
LVWPS-MW226C
10/22/18
37.5'-40'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
40'-42.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
42.5'-45'

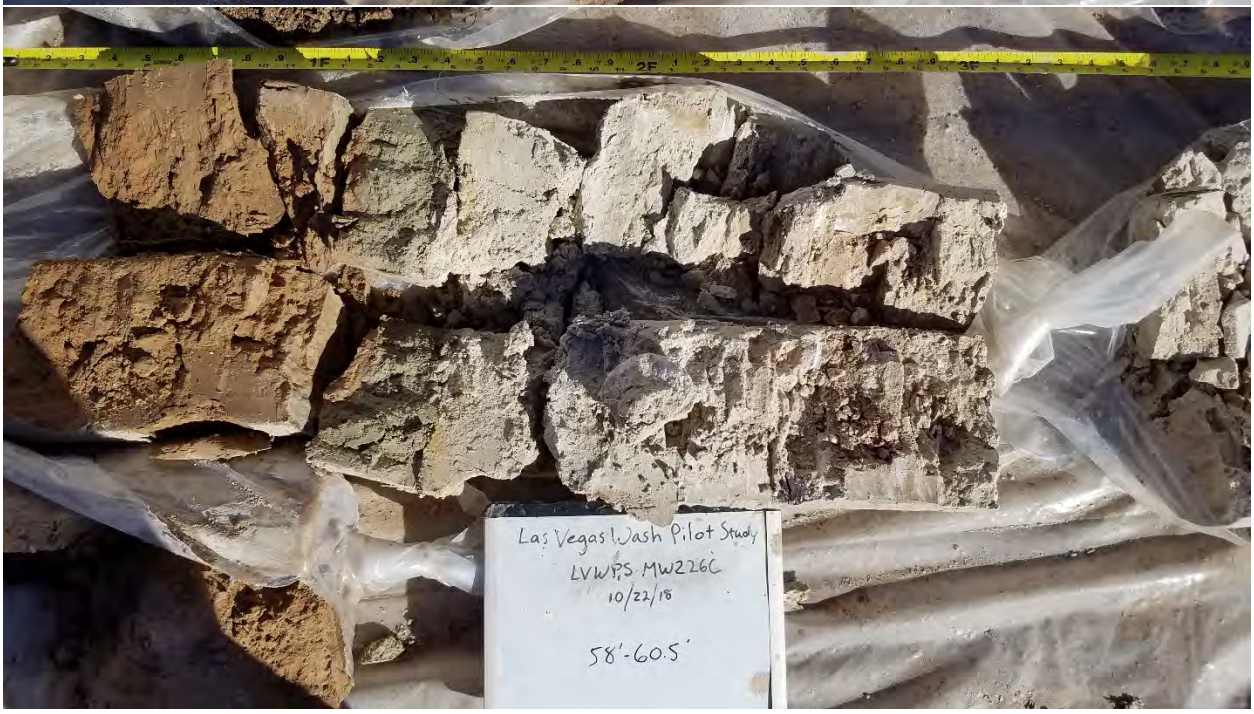

Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
45'-47.5'

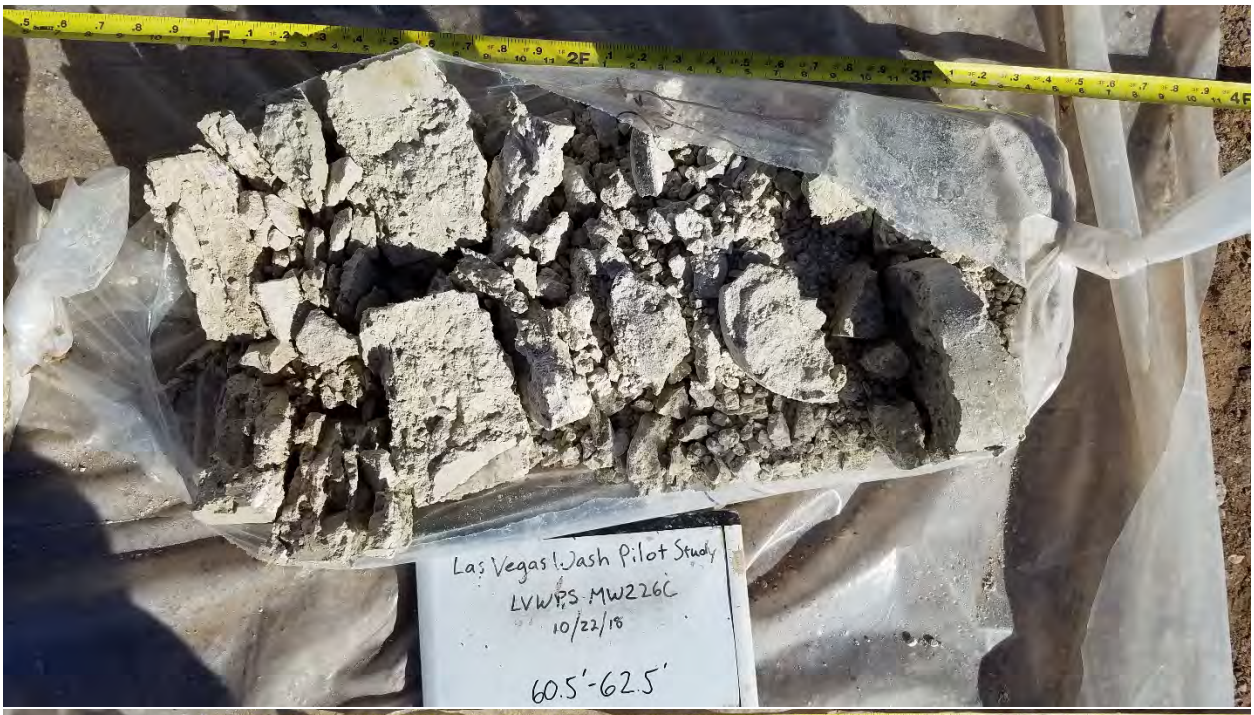

Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
47.5'-50'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
50'-52.5'


gas Wash Pilot Study
LVWPS MW226C
10/22/18
52.5'-55'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
55'-58'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
58'-60.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
60.5'-62.5'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
62.5'-64'


Las Vegas Wash Pilot Study
LVWPS MW226C
10/22/18
64'-65'


-gas Wash Pilot Study
LVWPS MW226C
10/22/18
65'-67.5'


Las Vegas Wash Pilot Study
LVWPS-MW226C
10/22/18
67.5'-70'


Las Vegas Wash Pilot Study
LVWPS-MW226C
10/22/18
70'-72.5'


Las Vegas Wash Pilot Study
LVWPS-MW226C
10/22/18
72.5'-75'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
75-77.5'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
77.5-80'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
80-82.5'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
82.5-85'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
85-87.5'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
87.5-90'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
90-92.5'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
92.5-95'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
95-97.5'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
97.5-100'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
100-102.5'


Las Vegas Wash Pilot Study
Bioremediation
10/23/18
LVWPS-MW226C
102.5-105'

Appendix C
Slug Testing Technical Memorandum

TETRA TECH

TECHNICAL MEMORANDUM

To:	**Dana Grady and Ronnie Britto, Tetra Tech**
From:	Sonya Cadle, Audrey Crockett, Ellyn Swenson, and Jenny Dabbs, Tetra Tech
Date:	May 17, 2019
Subject:	Slug Testing – Las Vegas Wash Bioremediation Pilot Study

1.0 INTRODUCTION

This technical memorandum presents the results of the aquifer slug testing performed as part of the hydrogeological evaluation for the Las Vegas Wash Bioremediation Pilot Study conducted by Tetra Tech, Inc. on behalf of the Nevada Environmental Response Trust.

The locations of the monitoring wells are shown for the Transect 1a study area and the Transect 1b study area in ***Figures 1 and 2***, respectively. The objective of slug testing was to estimate aquifer hydraulic conductivity (K) in the pilot study areas.

2.0 PROCEDURES

Slug testing was performed in May, July, November, and December 2018 on 81 newly installed and three existing monitoring wells (WMW4.9S, NERT4.91S1, and MW-13) within the pilot study areas. The tests consisted of monitoring water level displacements caused by the insertion or removal of a solid slug from a well. Water level displacement was measured using either a Solinst Levelogger or an In-Situ Rugged TROLL 100 pressure transducer, both of which were programmed to collect data at one-second time intervals. The size of the slug was selected to be consistent with the diameter of the well. Well construction information is provided in ***Table 1***.

The slug test data were downloaded from the transducer, and the water level displacement was calculated from the downloaded data. Slug test analysis was performed using the commercially-available AQTESOLV software (HydroSOLVE, 2007). The Bouwer and Rice (1976) and Springer-Gelhar (1991) methods for analyzing slug tests in an unconfined aquifer were used to estimate hydraulic conductivity depending on the rate of recovery, and the Bouwer and Rice (1976) method was used to estimate hydraulic conductivity in confined conditions (Bouwer, 1989). The AQTESOLV interpretation plots are provided as ***Attachment 1***. ***Table 2*** summarizes the results of the slug test analysis; the K values provided for each well represent a mean of the K estimates obtained from

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individual tests at that well for the reported date. Water levels measured during the testing events are summarized in ***Table 3***.

3.0 RESULTS

Many factors can affect slug test results. Some factors determine whether the K from a slug test is representative of the overall formation K. For example, the values estimated from slug tests are strongly influenced by the presence of a low-K well skin, drilling-induced disturbances, highly anisotropic formations, and the quality of well development (Butler, 1998, and Hyder and Butler, 1995). Non-instantaneous or incomplete slug removal, accidental transducer or slug movement after the test began, and other factors may also affect the interpretation of slug test results. Anomalously high estimated hydraulic conductivity values for rising-head (slug out) tests were identified at several wells when compared to both the falling-head (slug in) tests and corresponding nuclear magnetic resonance (NMR) data for the same wells. The unusually high K values are believed to result from near-instantaneous aquifer response to the minor suction created by the rapid removal of the slug from the polyvinyl chloride (PVC) casing. This effect only occurred in very transmissive zones. Therefore, in cases where the well met the above criteria and rising-head test results were more than double the falling-head test results, only falling-head tests were selected for final reporting.

Slug tests were performed in 81 newly installed monitoring wells and three existing wells (NERT4.93S1, WMW4.9S, and MW-13) to estimate location-specific aquifer hydraulic conductivity in the screened interval of the wells. The estimates and range of results from the slug tests are shown in ***Table 2***. Slug testing was not performed in four newly installed monitoring wells screened in the semi-consolidated UMCf (LVWPS-MW103B, LVWPS-MW203C, LVWPS-MW204C, and LVWPS-MW226B) at which water levels had not yet recovered from well development.

Slug test results support the field observation that the hydraulic conductivity generally decreases with depth. In the Transect 1a and Transect 1b study areas, the average hydraulic conductivity in the alluvium was approximately 80 feet per day (ft/day) while the average hydraulic conductivity in the unconsolidated UMCf was significantly lower at approximately 4.1 ft/day. In the western portion of the Transect 1b study area, unconsolidated UMCf, with an average hydraulic conductivity of approximately 1 ft/day, was encountered underlying the alluvium. In the eastern portion of the Transect 1b study area near the bedrock outcrop, coarse-grained UMCf (UMCf-cg), with a hydraulic conductivity averaging 6 ft/day, was encountered below the alluvium.

Hydraulic conductivity estimates for the more consolidated, gypsum-rich deeper portion of the UMCf are significantly lower than the unconsolidated UMCf. Monitoring wells were intentionally screened in more productive zones of the semi-consolidated UMCf, where possible. Slug tests were performed in some of these locations (LVWPS-MW102B, LVWPS-MW107C, LVWPS-108C, LVWPS-MW206E, and LVWPS-MW224C), resulting in an average estimated K of 0.6 ft/day and a range of 0.05 ft/day to 1.4 ft/day. The wide range is likely due to the existence of small, higher K zones within the same unit. In other locations, the hydraulic conductivity of the semi-consolidated UMCf was so low that slug tests could not be performed due to ongoing recovery from well development and groundwater sampling; this was true of four monitoring wells (LVWPS-MW103B, LVWPS-MW203C, LVWPS-MW204C, and LVWPS-MW226B). Although not slug-tested, these four monitoring wells are likely to have a hydraulic conductivity of less than 0.01 ft/day.

4.0 REFERENCES

Bouwer, H. and Rice, R.C. 1976. “A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells.” *Water Resources Research*, Vol. 12, No. 3, pp. 423-428.

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Butler, James J. Jr. 1998. *The Design, Performance, and Analysis of Slug Tests*. CRC Press LLC.

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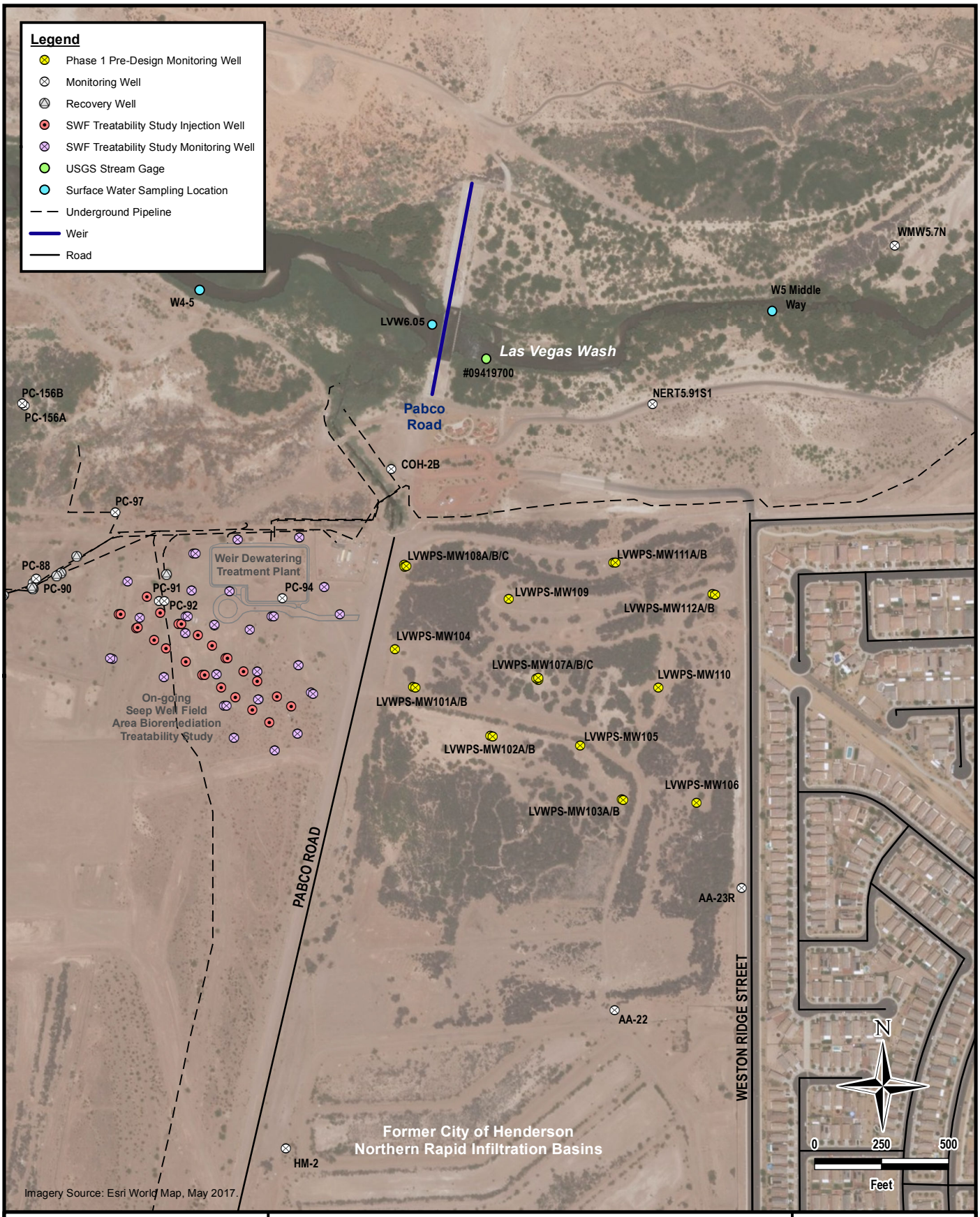
Springer, R.K. and L.W. Gelhar. 1991. “Characterization of large-scale aquifer heterogeneity in glacial outwash by analysis of slug tests with oscillatory response, Cape Cod, Massachusetts” U.S. Geologic Survey. *Water Resources Investigations,* Report 91-4034, pp. 36-40.

Figures



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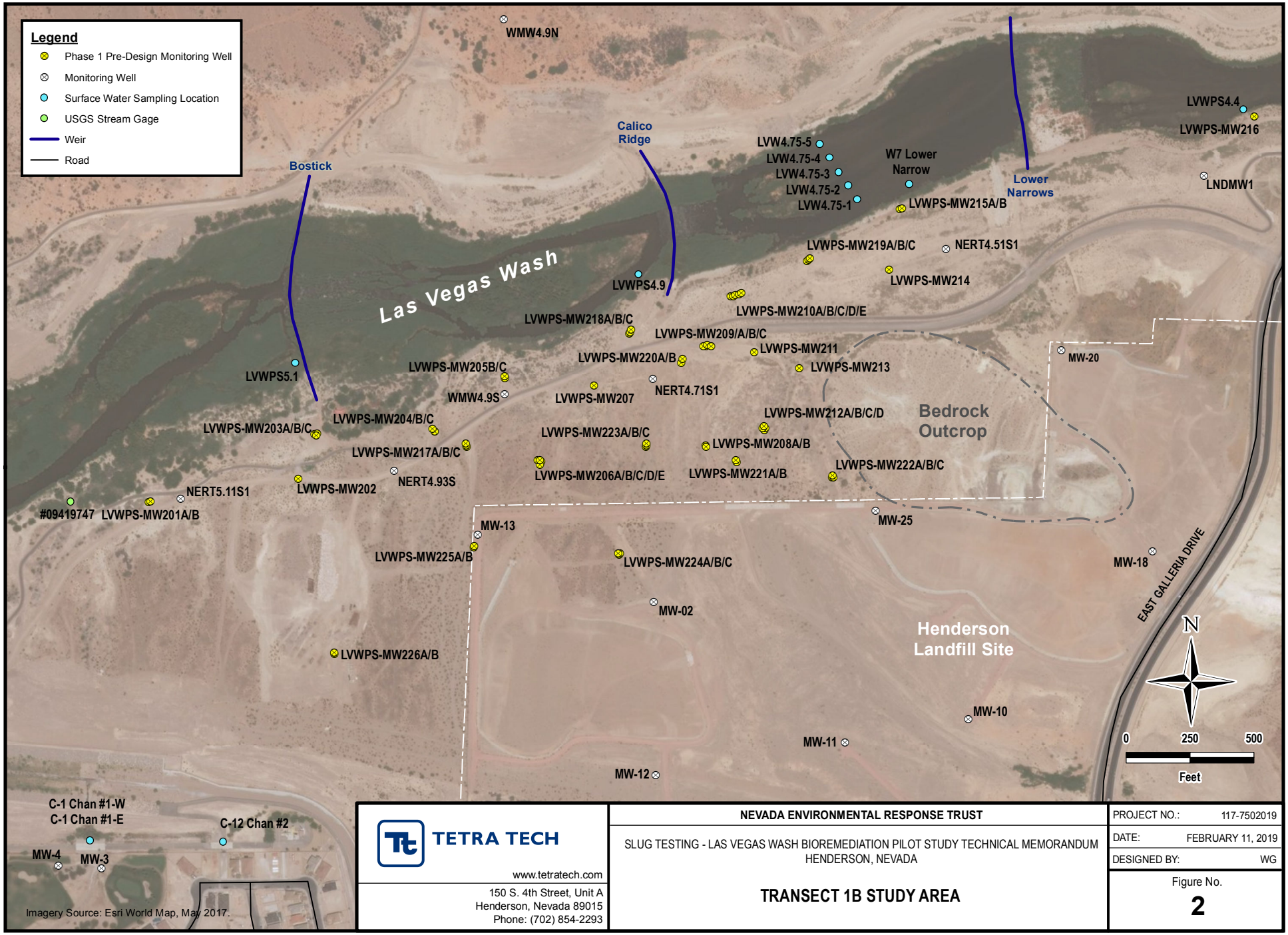
NEVADA ENVIRONMENTAL RESPONSE TRUST

SLUG TESTING - LAS VEGAS WASH BIOREMEDIATION PILOT STUDY TECHNICAL MEMORANDUM
HENDERSON, NEVADA

TRANSECT 1A STUDY AREA

PROJECT NO.:	117-7502019
DATE:	FEBRUARY 11, 2019
DESIGNED BY:	WG

Figure No.
1



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NEVADA ENVIRONMENTAL RESPONSE TRUST

SLUG TESTING - LAS VEGAS WASH BIOREMEDIATION PILOT STUDY TECHNICAL MEMORANDUM
HENDERSON, NEVADA

TRANSECT 1B STUDY AREA

PROJECT NO.:	117-7502019
DATE:	FEBRUARY 11, 2019
DESIGNED BY:	WG

Figure No.
2

Tables

Slug Testing - Las Vegas Wash Bioremediation Pilot Study

Table 1. Well Construction Information

Well	Screened Lithology	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Top of Screen	Bottom of Screen	Well Diameter	Slug Dimensions	
				feet amsl	feet amsl	ft bgs	ft bgs	inches	Diameter (inches)	Length (feet)
LVWPS-MW101A	Alluvium	26732789.49	832678.44	1549.80	1549.34	23.3	33.0	2	1.25	5
LVWPS-MW101B	UMCf	26732788.37	832686.18	1549.57	1549.13	44.8	64.5	2	1.25	5
LVWPS-MW102A	UMCf	26732606.35	832965.93	1547.23	1546.82	47.0	66.6	2	1.25	5
LVWPS-MW102B	UMCf (Semi-Consolidated)	26732605.06	832973.68	1547.14	1546.78	76.8	96.5	2	1.25	5
LVWPS-MW103A	UMCf	26732371.53	833455.96	1548.77	1548.39	29.8	39.5	2	1.25	5
LVWPS-MW103B	UMCf (Semi-Consolidated)	26732368.31	833461.76	1548.93	1548.68	76.8	96.5	2	1.50	3
LVWPS-MW104	Alluvium	26732930.15	832609.25	1548.05	1547.69	23.8	33.5	2	1.25	5
LVWPS-MW105	Alluvium	26732570.24	833300.91	1547.66	1547.32	16.5	26.2	2	1.25	3
LVWPS-MW106	UMCf	26732357.82	833734.57	1549.01	1548.62	30.4	50.1	2	1.25	5
LVWPS-MW107A	Alluvium	26732823.90	833144.18	1548.14	1547.58	24.8	34.5	4	3.00	5
LVWPS-MW107B	UMCf	26732816.68	833144.44	1548.20	1547.82	46.0	65.8	4	3.00	5
LVWPS-MW107C	UMCf (Semi-Consolidated)	26732819.93	833138.10	1548.33	1547.93	100.3	120.0	2	1.25	3
LVWPS-MW108A	Alluvium	26733238.09	832645.51	1543.91	1543.56	20.8	40.7	2	1.25	5
LVWPS-MW108B	UMCf	26733242.52	832652.04	1543.85	1543.33	46.3	66.0	2	1.25	5
LVWPS-MW108C	UMCf (Semi-Consolidated)	26733245.54	832645.33	1544.05	1543.62	99.6	119.3	2	1.25	3
LVWPS-MW109	Alluvium	26733119.00	833034.22	1544.91	1544.63	36.8	51.5	2	1.25	5
LVWPS-MW110	UMCf	26732788.02	833593.18	1545.95	1545.68	47.8	67.5	2	1.25	5
LVWPS-MW111A	Alluvium	26733253.38	833424.95	1541.06	1540.64	20.8	40.5	2	1.25	5
LVWPS-MW111B	UMCf	26733253.32	833432.86	1540.72	1540.22	57.8	77.5	2	1.25	5
LVWPS-MW112A	Alluvium	26733137.42	833795.12	1538.61	1537.99	28.3	48.0	2	1.25	5
LVWPS-MW112B	UMCf	26733134.16	833803.81	1538.84	1538.24	54.3	74.0	2	1.25	3
MW-13	Alluvium	26734740.36	838306.94	1528.41	1529.86	38.0	48.0	4	1.50	5
LVWPS-MW201A	Alluvium	26734867.37	837018.94	1523.10	1522.82	28.2	47.8	4	3.00	5
LVWPS-MW201B	UMCf	26734869.47	837026.36	1522.97	1522.81	60.1	79.8	2	1.50	5
LVWPS-MW202	Alluvium	26734960.16	837604.94	1522.44	1522.04	41.8	61.5	2	1.50	5
LVWPS-MW203A	Alluvium	26735133.07	837668.33	1519.38	1518.99	34.8	54.5	2	1.50	5
LVWPS-MW203B	UMCf	26735134.45	837677.53	1519.31	1519.05	75.1	94.7	4	3.00	5
LVWPS-MW203C	UMCf (Semi-Consolidated)	26735127.54	837675.11	1519.62	1519.23	100.3	120.0	2	NA	NA
LVWPS-MW204	Alluvium	26735143.94	838137.44	1520.86	1520.68	50.3	70.0	2	1.25	3
LVWPS-MW204B	UMCf	26735143.99	838137.39	1520.88	1520.68	101.5	121.2	2	1.50	5
LVWPS-MW204C	UMCf (Semi-Consolidated)	26735154.11	838130.05	1520.66	1520.33	150.5	170.0	4	NA	NA
LVWPS-MW205B	Alluvium	26735351.80	838413.62	1517.41	1517.40	64.9	84.6	2	1.50	5
LVWPS-MW205C	Alluvium	26735359.77	838411.47	1517.33	1517.36	100.3	120.0	2	1.50	5
LVWPS-MW206A	Alluvium	26735026.65	838554.30	1528.94	1528.79	39.8	59.5	2	1.50	5
LVWPS-MW206B	Alluvium	26735020.36	838551.74	1528.85	1528.81	69.9	89.5	4	3.00	5
LVWPS-MW206C	UMCf	26735013.64	838549.64	1529.04	1528.68	100.3	120.0	2	1.50	5
LVWPS-MW206D	UMCf	26735033.40	838541.37	1528.02	1527.87	125.3	145.0	2	1.50	5
LVWPS-MW206E	UMCf (Semi-Consolidated)	26735033.41	838550.08	1529.08	1528.81	195.5	205.0	4	1.50	5
LVWPS-MW207	Alluvium	26735325.36	838761.63	1519.21	1518.96	68.1	87.8	2	1.50	5
LVWPS-MW208A	Alluvium	26735088.71	839198.51	1522.78	1522.63	39.9	59.5	4	3.00	5

Table 1. Well Construction Information

Well	Screened Lithology	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Top of Screen	Bottom of Screen	Well Diameter	Slug Dimensions	
				feet amsl	feet amsl	ft bgs	ft bgs	inches	Diameter (inches)	Length (feet)
LVWPS-MW208B	Alluvium	26735082.39	839200.27	1523.04	1522.84	65.3	85.0	2	1.50	5
LVWPS-MW209	Alluvium	26735476.50	839198.99	1517.32	1516.79	71.3	91.0	2	1.50	5
LVWPS-MW209A	Alluvium	26735476.52	839190.21	1517.44	1517.22	35.3	55.0	2	1.50	5
LVWPS-MW209B	UMCf-cg	26735481.45	839205.01	1517.46	1517.29	110.3	130.0	2	1.50	5
LVWPS-MW209C	UMCf-cg	26735477.82	839218.94	1517.46	1517.07	151.0	170.5	4	3.00	5
LVWPS-MW210A	Alluvium	26735671.03	839297.06	1515.15	1514.72	35.3	55.0	2	1.50	5
LVWPS-MW210B	Alluvium	26735673.80	839305.80	1515.09	1514.64	70.1	89.8	2	1.50	5
LVWPS-MW210C	UMCf-cg	26735676.65	839314.27	1514.97	1514.66	100.3	120.0	2	1.50	3
LVWPS-MW210D	UMCf-cg	26735681.10	839329.86	1514.95	1514.44	130.4	140.0	2	1.50	3
LVWPS-MW210E	UMCf-cg	26735684.19	839338.59	1514.91	1514.48	145.5	165.0	4	1.50	5
LVWPS-MW211	Alluvium	26735455.11	839388.41	1516.71	1516.44	50.0	69.7	2	1.50	5
LVWPS-MW212A	Alluvium	26735150.14	839428.28	1519.62	1519.33	34.3	54.0	2	1.50	5
LVWPS-MW212B	Alluvium	26735157.37	839430.87	1519.27	1519.30	59.8	79.5	2	1.50	5
LVWPS-MW212C	UMCf-cg	26735156.73	839421.91	1519.79	1519.39	100.3	120.0	2	1.50	5
LVWPS-MW212D	UMCf-cg	26735165.66	839425.93	1519.61	1519.29	125.5	145.0	4	3.00	5
LVWPS-MW213	Alluvium	26735391.70	839564.27	1516.70	1516.70	40.1	59.8	2	1.50	5
LVWPS-MW214	Alluvium	26735776.73	839916.30	1508.80	1508.31	34.4	44.0	2	1.50	5
LVWPS-MW215A	Alluvium	26736013.10	839957.91	1492.39	1492.30	13.5	33.2	2	1.50	5
LVWPS-MW215B	Bedrock	26736016.55	839966.09	1492.47	1492.06	40.7	45.3	2	1.50	3
LVWPS-MW216	Alluvium	26736374.70	841345.38	1480.70	1480.45	10.4	20.0	2	1.50	5
LVWPS-MW217A	Alluvium	26735082.73	838263.42	1529.96	1529.77	51.3	71.0	2	1.50	5
LVWPS-MW217B	UMCf	26735089.76	838261.58	1530.13	1530.00	100.3	120.0	2	1.50	5
LVWPS-MW217C	UMCf	26735096.34	838259.77	1530.04	1529.81	155.5	175.0	4	3.00	5
LVWPS-MW218A	Alluvium	26735526.23	838899.57	1516.81	1516.48	35.3	55.0	2	1.50	5
LVWPS-MW218B	UMCf/UMCf-cg	26735533.82	838903.36	1516.69	1516.52	100.3	120.0	2	1.50	5
LVWPS-MW218C	UMCf/UMCf-cg	26735541.25	838906.80	1516.22	1515.51	136.0	155.5	4	1.50	5
LVWPS-MW219A	Alluvium	26735810.87	839594.90	1512.80	1512.41	35.1	49.8	2	1.50	5
LVWPS-MW219B	UMCf/Horse Springs	26735816.52	839600.97	1512.81	1512.43	75.3	95.0	2	1.50	5
LVWPS-MW219C	UMCf/Horse Springs	26735821.37	839606.21	1512.78	1512.26	115.5	135.0	4	1.50	5
LVWPS-MW220A	Alluvium	26735413.51	839103.70	1517.52	1517.10	60.3	80.0	2	1.50	5
LVWPS-MW220B	UMCf-cg	26735427.15	839107.26	1517.62	1517.26	134.5	154.0	4	3.00	5
LVWPS-MW221A	Alluvium	26735024.85	839319.02	1521.16	1520.99	50.3	70.0	2	1.50	5
LVWPS-MW221B	UMCf/UMCf-cg	26735033.09	839316.10	1521.09	1520.94	83.7	103.2	4	1.50	5
LVWPS-MW222A	UMCf/UMCf-cg	26734965.16	839692.31	1522.96	1522.65	80.3	100.0	2	1.50	5
LVWPS-MW222B	UMCf-cg	26734964.89	839697.99	1522.90	1522.65	150.3	170.0	2	1.50	3
LVWPS-MW222C	UMCf-cg	26734971.83	839694.48	1522.82	1522.40	214.0	233.5	4	3.00	5
LVWPS-MW223A	Alluvium	26735083.82	838965.08	1521.57	1521.48	45.3	65.0	2	1.50	5
LVWPS-MW223B	Alluvium	26735090.65	838965.61	1521.52	1521.40	70.3	90.0	2	1.50	5
LVWPS-MW223C	UMCf	26735097.98	838966.20	1521.41	1521.18	95.5	110.0	4	3.00	5
LVWPS-MW224A	Alluvium	26734661.76	838859.96	1528.11	1527.95	55.3	75.0	2	1.50	5

Table 1. Well Construction Information

Well	Screened Lithology	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Top of Screen	Bottom of Screen	Well Diameter	Slug Dimensions	
				feet amsl	feet amsl	ft bgs	ft bgs	inches	Diameter (inches)	Length (feet)
LVWPS-MW224B	UMCf	26734667.53	838863.59	1527.68	1527.74	106.8	126.5	2	1.50	5
LVWPS-MW224C	UMCf (Semi-Consolidated)	26734667.99	838856.30	1527.86	1527.53	174.5	194.0	4	3.00	5
LVWPS-MW225A	Alluvium	26734689.63	838291.93	1528.66	1528.50	49.3	69.0	2	1.50	5
LVWPS-MW225B	UMCf	26734696.00	838292.37	1528.33	1528.05	90.5	110.0	4	1.50	5
LVWPS-MW226A	Alluvium	26734272.67	837745.92	1535.90	1535.65	40.3	55.0	2	1.50	5
LVWPS-MW226B	UMCf (Semi-Consolidated)	26734280.42	837744.66	1535.79	1535.54	77.5	97.0	4	NA	NA
NERT4.93S1	Alluvium	26734990.31	837979.18	1523.83	1523.33	20.0	50.0	4	3.00	5
WMW4.9S	Alluvium	26735290.13	838412.00	1518.01	1518.93	20.0	50.0	4	3.00	5

Notes:

bgs - below ground surface

amsl - above mean sea level

UMCf - Upper Muddy Creek formation

UMCf-cg - Upper Muddy Creek formation - coarse grained facies

UMCf/Horse Springs- Alternating layers of unconsolidated UMCf, semi-consolidated UMCf, and reworked Horse Springs formation.

NA - Not analyzed due to ongoing recovery from well development.

Slug Testing - Las Vegas Wash Bioremediation Pilot Study

Table 2. Slug Test Results

Well	Date	Mean Hydraulic Conductivity		Screened Lithology
		(feet/day)	(cm/sec)	
LVWPS-MW101A	5/22/2018	22	7.61E-03	Alluvium
LVWPS-MW101B	5/22/2018	1.6	5.81E-04	UMCf
LVWPS-MW102A	5/22/2018	3.5	1.23E-03	UMCf
LVWPS-MW102B	5/22/2018	1.0	3.51E-04	UMCf (Semi-Consolidated)
LVWPS-MW103A	5/22/2018	0.4	1.28E-04	UMCf
LVWPS-MW103B *	5/22/2018	NA	NA	UMCf (Semi-Consolidated)
LVWPS-MW104	5/21/2018	2.9	1.02E-03	Alluvium
LVWPS-MW105	5/21/2018	3.9	1.38E-03	Alluvium
LVWPS-MW106	5/22/2018	1.3	4.71E-04	UMCf
LVWPS-MW107A	5/21/2018	85	2.98E-02	Alluvium
LVWPS-MW107B	5/21/2018	0.02	7.16E-06	UMCf
LVWPS-MW107C	5/21/2018	1.4	5.02E-04	UMCf (Semi-Consolidated)
LVWPS-MW108A	5/17/2018	15	5.14E-03	Alluvium
LVWPS-MW108B	5/17/2018	4.5	1.60E-03	UMCf
LVWPS-MW108C	5/18/2018	0.05	1.59E-05	UMCf (Semi-Consolidated)
LVWPS-MW109	5/18/2018	22	7.68E-03	Alluvium
LVWPS-MW110	5/21/2018	0.2	7.56E-05	UMCf
LVWPS-MW111A	5/21/2018	2.5	8.96E-04	Alluvium
LVWPS-MW111B	5/21/2018	1.9	6.80E-04	UMCf
LVWPS-MW112A	5/18/2018	72	2.54E-02	Alluvium
LVWPS-MW112B	5/18/2018	0.001	4.76E-07	UMCf
MW-13	11/29/2018	118	4.17E-02	Alluvium
LVWPS-MW201A	7/10/2018 & 7/18/2018	20	7.18E-03	Alluvium
LVWPS-MW201B	7/10/2018	4.1	1.43E-03	UMCf
LVWPS-MW202	7/9/2018	96	3.38E-02	Alluvium
LVWPS-MW203A	7/10/2018	83	2.92E-02	Alluvium
LVWPS-MW203B	7/11/2018	0.09	3.08E-05	UMCf
LVWPS-MW203C	NA	NA	NA	UMCf (Semi-Consolidated)
LVWPS-MW204	7/10/2018	88	3.09E-02	Alluvium
LVWPS-MW204B	11/28/2018	0.3	1.20E-04	UMCf
LVWPS-MW204C	NA	NA	NA	UMCf (Semi-Consolidated)
LVWPS-MW205B	7/11/2018	115	4.04E-02	Alluvium
LVWPS-MW205C	7/11/2018	79	2.80E-02	Alluvium
LVWPS-MW206A	7/12/2018	83	2.91E-02	Alluvium
LVWPS-MW206B	7/12/2018	191	6.76E-02	Alluvium
LVWPS-MW206C	7/12/2018	3.9	1.36E-03	UMCf
LVWPS-MW206D	11/27/2018	0.4	1.29E-04	UMCf
LVWPS-MW206E	11/29/2018	0.3	1.10E-04	UMCf (Semi-Consolidated)
LVWPS-MW207	7/11/2018	89	3.14E-02	Alluvium
LVWPS-MW208A	7/11/2018	197	6.96E-02	Alluvium
LVWPS-MW208B	7/11/2018	60	2.11E-02	Alluvium
LVWPS-MW209	7/11/2018	83	2.94E-02	Alluvium
LVWPS-MW209A	11/29/2018	417	1.47E-01	Alluvium
LVWPS-MW209B	11/29/2018	38	1.35E-02	UMCf-cg
LVWPS-MW209C	11/26/2018	9.2	3.23E-03	UMCf-cg
LVWPS-MW210A	7/12/2018	79	2.78E-02	Alluvium
LVWPS-MW210B	7/13/2018	88	3.09E-02	Alluvium
LVWPS-MW210C	7/12/2018	0.2	8.21E-05	UMCf-cg
LVWPS-MW210D	11/29/2018	0.3	1.11E-04	UMCf-cg
LVWPS-MW210E	11/28/2018	0.4	1.49E-04	UMCf-cg
LVWPS-MW211	7/12/2018	95	3.34E-02	Alluvium
LVWPS-MW212A	7/13/2018	72	2.54E-02	Alluvium
LVWPS-MW212B	7/13/2018	10	3.46E-03	Alluvium
LVWPS-MW212C	11/28/2018	4.0	1.43E-03	UMCf-cg
LVWPS-MW212D	11/26/2018	0.7	2.57E-04	UMCf-cg

Table 2. Slug Test Results

Well	Date	Mean Hydraulic Conductivity		Screened Lithology
		(feet/day)	(cm/sec)	
LVWPS-MW213	7/12/2018	90	3.16E-02	Alluvium
LVWPS-MW214	7/14/2018	139	4.90E-02	Alluvium
LVWPS-MW215A	7/14/2018	54	1.90E-02	Alluvium
LVWPS-MW215B	7/14/2018	0.4	1.45E-04	Bedrock
LVWPS-MW216	7/14/2018	6.1	2.15E-03	Alluvium
LVWPS-MW217A	11/28/2018	105	3.70E-02	Alluvium
LVWPS-MW217B	11/28/2018	0.9	3.24E-04	UMCf
LVWPS-MW217C	11/26/2018	0.4	1.40E-04	UMCf
LVWPS-MW218A	11/28/2018	83	2.92E-02	Alluvium
LVWPS-MW218B	11/29/2018	3.3	1.17E-03	UMCf/UMCf-cg
LVWPS-MW218C	11/28/2018	2.6	9.27E-04	UMCf/UMCf-cg
LVWPS-MW219A	11/28/2018	117	4.12E-02	Alluvium
LVWPS-MW219B	11/28/2018	1.9	6.71E-04	UMCf/Horse Springs
LVWPS-MW219C	11/27/2018	10	3.53E-03	UMCf/Horse Springs
LVWPS-MW220A	11/28/2018	79	2.80E-02	Alluvium
LVWPS-MW220B	11/27/2018	7.2	2.54E-03	UMCf-cg
LVWPS-MW221A	11/28/2018	9.1	3.22E-03	Alluvium
LVWPS-MW221B	11/27/2018	0.1	4.07E-05	UMCf/UMCf-cg
LVWPS-MW222A	11/27/2018	5.7	2.02E-03	UMCf/UMCf-cg
LVWPS-MW222B	11/27/2018	0.4	1.58E-04	UMCf-cg
LVWPS-MW222C	11/27/2018	0.4	1.31E-04	UMCf-cg
LVWPS-MW223A	11/27/2018	50	1.77E-02	Alluvium
LVWPS-MW223B	11/27/2018	79	2.79E-02	Alluvium
LVWPS-MW223C	11/28/2018	0.5	1.85E-04	UMCf
LVWPS-MW224A	11/29/2018	22	7.73E-03	Alluvium
LVWPS-MW224B	11/29/2018	1.0	3.60E-04	UMCf
LVWPS-MW224C	11/29/2018	0.07	2.58E-05	UMCf (Semi-Consolidated)
LVWPS-MW225A	11/29/2018	111	3.90E-02	Alluvium
LVWPS-MW225B	11/29/2018	1.3	4.68E-04	UMCf
LVWPS-MW226A	11/27/2018	89	3.15E-02	Alluvium
LVWPS-MW226B	NA	NA	NA	UMCf (Semi-Consolidated)
NERT4.93S1	7/12/2018	125	4.40E-02	Alluvium
WMW-4.9S	12/3/2018	2.0	7.02E-04	Alluvium

Notes:

cm/sec - centimeters per second

* - Well tested but data not usable due to ongoing recovery from well development

NA - Not analyzed due to ongoing recovery from well development.

UMCf - Upper Muddy Creek formation

UMCf-cg - Upper Muddy Creek formation - coarse grained facies

UMCf/Horse Springs- Alternating layers of unconsolidated UMCf, semi-consolidated UMCf, and reworked Horse Springs formation.

Slug Testing - Las Vegas Wash Bioremediation Pilot Study

Table 3 - Groundwater Elevation

Well	Date	Depth to Water	Top of Casing Elevation	Groundwater Elevation
		feet bTOC	feet amsl	feet amsl
LVWPS-MW101A	5/22/2018	18.58	1,549.34	1,530.76
LVWPS-MW101B	5/22/2018	9.55	1,549.13	1,539.58
LVWPS-MW102A	5/22/2018	10.58	1,546.82	1,536.24
LVWPS-MW102B	5/22/2018	5.10	1,546.78	1,541.68
LVWPS-MW103A	5/22/2018	20.15	1,548.39	1,528.24
LVWPS-MW103B	10/8/2018	14.15	1,548.68	1,534.53
LVWPS-MW104	5/21/2018	17.12	1,547.69	1,530.57
LVWPS-MW105	5/21/2018	21.38	1,547.32	1,525.94
LVWPS-MW106	5/22/2018	21.35	1,548.62	1,527.27
LVWPS-MW107A	5/21/2018	21.16	1,547.58	1,526.42
LVWPS-MW107B	5/21/2018	16.99	1,547.82	1,530.83
LVWPS-MW107C	5/21/2018	6.29	1,547.93	1,541.64
LVWPS-MW108A	5/17/2018	12.50	1,543.56	1,531.06
LVWPS-MW108B	5/17/2018	5.73	1,543.33	1,537.60
LVWPS-MW108C	5/18/2018	3.40	1,543.62	1,540.22
LVWPS-MW109	5/18/2018	17.07	1,544.63	1,527.56
LVWPS-MW110	5/21/2018	19.60	1,545.68	1,526.08
LVWPS-MW111A	5/21/2018	15.76	1,540.64	1,524.88
LVWPS-MW111B	5/21/2018	12.24	1,540.22	1,527.98
LVWPS-MW112A	5/18/2018	16.46	1,537.99	1,521.53
LVWPS-MW112B	5/18/2018	18.84	1,538.24	1,519.40
MW-13	11/29/2018	35.12	1,529.86	1,494.74
LVWPS-MW201A	7/10/2018 & 7/18/2018	18.03	1,522.82	1,504.79
LVWPS-MW201B	7/10/2018	18.60	1,522.81	1,504.21
LVWPS-MW202	7/9/2018	24.63	1,522.04	1,497.41
LVWPS-MW203A	7/10/2018	21.08	1,518.99	1,497.91
LVWPS-MW203B	7/11/2018	21.96	1,519.05	1,497.09
LVWPS-MW204	7/10/2018	26.17	1,520.68	1,494.51
LVWPS-MW204B	11/28/2018	26.10	1,520.68	1,494.58
LVWPS-MW205B	7/11/2018	25.05	1,517.40	1,492.35
LVWPS-MW205C	7/11/2018	25.34	1,517.36	1,492.02
LVWPS-MW206A	7/12/2018	35.34	1,528.79	1,493.45
LVWPS-MW206B	7/12/2018	35.91	1,528.81	1,492.90
LVWPS-MW206C	7/12/2018	35.75	1,528.68	1,492.93
LVWPS-MW206D	11/27/2018	34.91	1,527.87	1,492.96
LVWPS-MW206E	11/29/2018	36.42	1,528.81	1,492.39
LVWPS-MW207	7/11/2018	27.49	1,518.96	1,491.47
LVWPS-MW208A	7/11/2018	31.17	1,522.63	1,491.46
LVWPS-MW208B	7/11/2018	31.71	1,522.84	1,491.13
LVWPS-MW209	7/11/2018	26.71	1,516.79	1,490.08
LVWPS-MW209A	11/29/2018	27.50	1,517.22	1,489.72
LVWPS-MW209B	11/29/2018	27.62	1,517.29	1,489.67
LVWPS-MW209C	11/26/2018	27.37	1,517.07	1,489.70
LVWPS-MW210A	7/12/2018	25.64	1,514.72	1,489.08
LVWPS-MW210B	7/13/2018	25.40	1,514.64	1,489.24
LVWPS-MW210C	7/12/2018	25.19	1,514.66	1,489.47

Table 3 - Groundwater Elevation

Well	Date	Depth to Water	Top of Casing Elevation	Groundwater Elevation
		feet bTOC	feet amsl	feet amsl
LVWPS-MW210D	11/29/2018	25.24	1,514.44	1,489.20
LVWPS-MW210E	11/28/2018	25.22	1,514.48	1,489.26
LVWPS-MW211	7/12/2018	26.64	1,516.44	1,489.80
LVWPS-MW212A	7/13/2018	28.29	1,519.33	1,491.04
LVWPS-MW212B	7/13/2018	28.55	1,519.30	1,490.75
LVWPS-MW212C	11/28/2018	29.21	1,519.39	1,490.18
LVWPS-MW212D	11/26/2018	28.72	1,519.29	1,490.57
LVWPS-MW213	7/12/2018	26.70	1,516.70	1,490.00
LVWPS-MW214	7/14/2018	26.64	1,508.31	1,481.67
LVWPS-MW215A	7/14/2018	11.42	1,492.30	1,480.88
LVWPS-MW215B	7/14/2018	12.34	1,492.06	1,479.72
LVWPS-MW216	7/14/2018	7.76	1,480.45	1,472.69
LVWPS-MW217A	11/28/2018	36.22	1,529.77	1,493.55
LVWPS-MW217B	11/28/2018	35.86	1,530.00	1,494.14
LVWPS-MW217C	11/26/2018	35.75	1,529.81	1,494.06
LVWPS-MW218A	11/28/2018	26.02	1,516.48	1,490.46
LVWPS-MW218B	11/29/2018	26.35	1,516.52	1,490.17
LVWPS-MW218C	11/28/2018	25.64	1,515.51	1,489.87
LVWPS-MW219A	11/28/2018	27.26	1,512.41	1,485.15
LVWPS-MW219B	11/28/2018	28.60	1,512.43	1,483.83
LVWPS-MW219C	11/27/2018	28.42	1,512.26	1,483.84
LVWPS-MW220A	11/28/2018	27.08	1,517.10	1,490.02
LVWPS-MW220B	11/27/2018	27.36	1,517.26	1,489.90
LVWPS-MW221A	11/28/2018	29.79	1,520.99	1,491.20
LVWPS-MW221B	11/27/2018	30.02	1,520.94	1,490.92
LVWPS-MW222A	11/27/2018	30.93	1,522.65	1,491.72
LVWPS-MW222B	11/27/2018	30.51	1,522.65	1,492.14
LVWPS-MW222C	11/27/2018	27.82	1,522.40	1,494.58
LVWPS-MW223A	11/27/2018	29.83	1,521.48	1,491.65
LVWPS-MW223B	11/27/2018	29.99	1,521.40	1,491.41
LVWPS-MW223C	11/28/2018	30.07	1,521.18	1,491.11
LVWPS-MW224A	11/29/2018	34.73	1,527.95	1,493.22
LVWPS-MW224B	11/29/2018	34.38	1,527.74	1,493.36
LVWPS-MW224C	11/29/2018	34.96	1,527.53	1,492.57
LVWPS-MW225A	11/29/2018	33.59	1,528.50	1,494.91
LVWPS-MW225B	11/29/2018	33.01	1,528.05	1,495.04
LVWPS-MW226A	11/27/2018	37.45	1,535.65	1,498.20
NERT4.93S1	7/12/2018	27.24	1,523.33	1,496.09
WMW-4.9S	12/3/2018	26.40	1,518.84	1,492.44

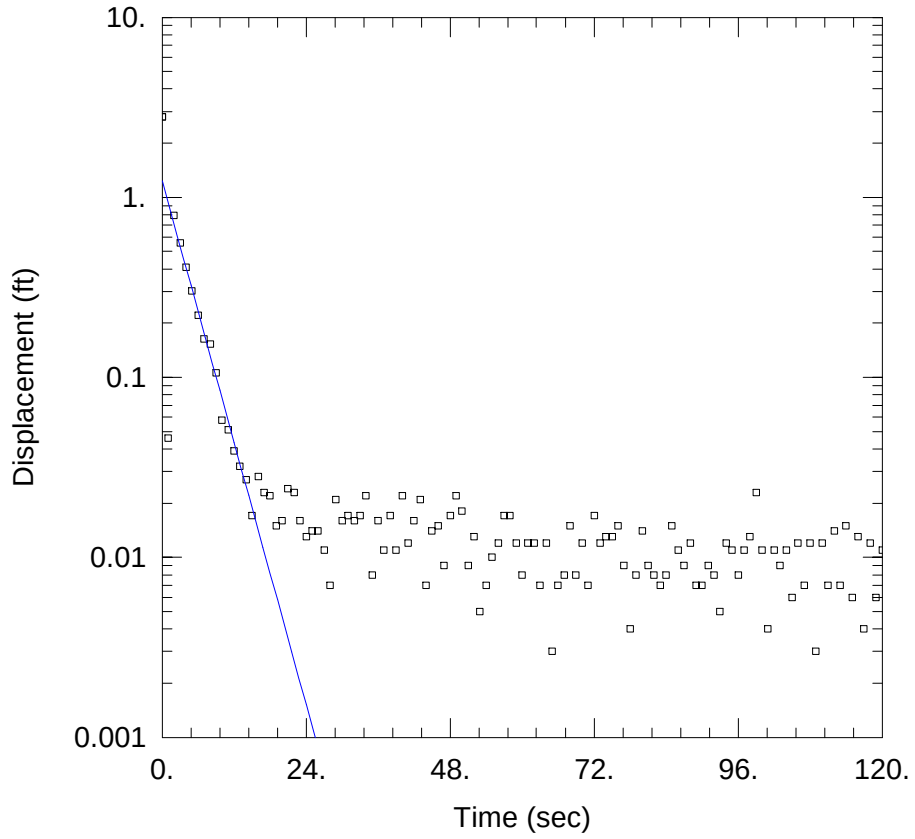
Notes:

bTOC - below top of casing

amsl - above mean sea level

Attachment 1

AQTESOLV Interpretation Plots



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101A_IN1.aqt
Date: 06/04/18 Time: 11:22:38

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 23.41 ft/day
y0 = 1.238 ft

AQUIFER DATA

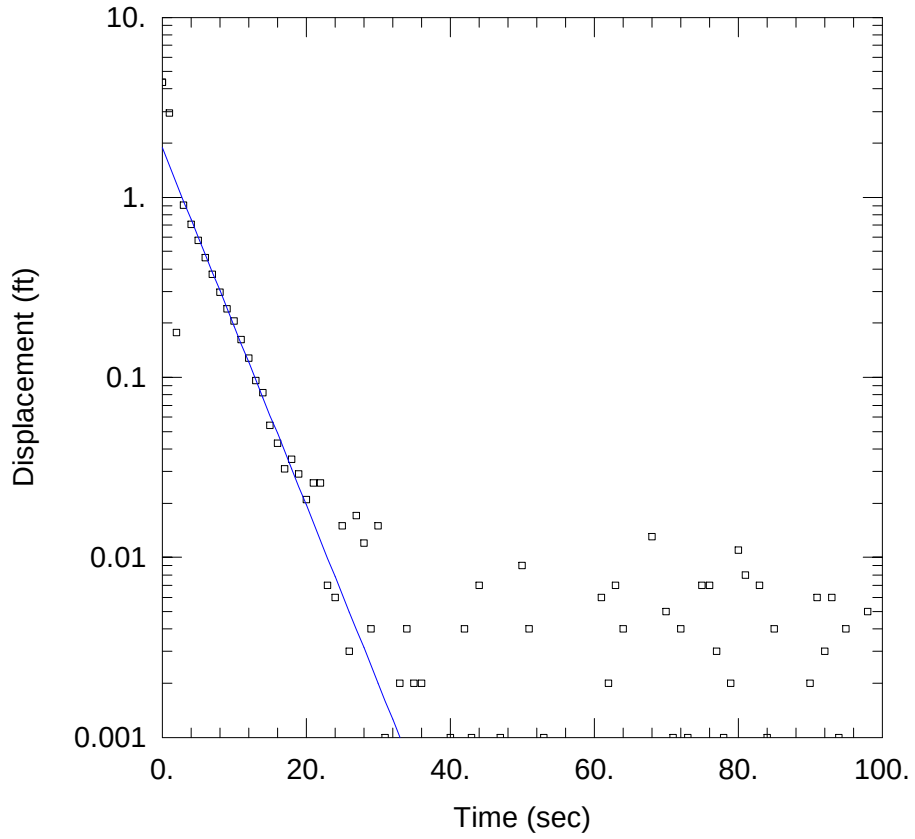
Saturated Thickness: 15.32 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW101A_IN1)

Initial Displacement: 2.794 ft
Total Well Penetration Depth: 14.22 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 13.92 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101A_IN2.aqt
Date: 06/04/18 Time: 11:28:54

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 19.16 ft/day
y0 = 1.89 ft

AQUIFER DATA

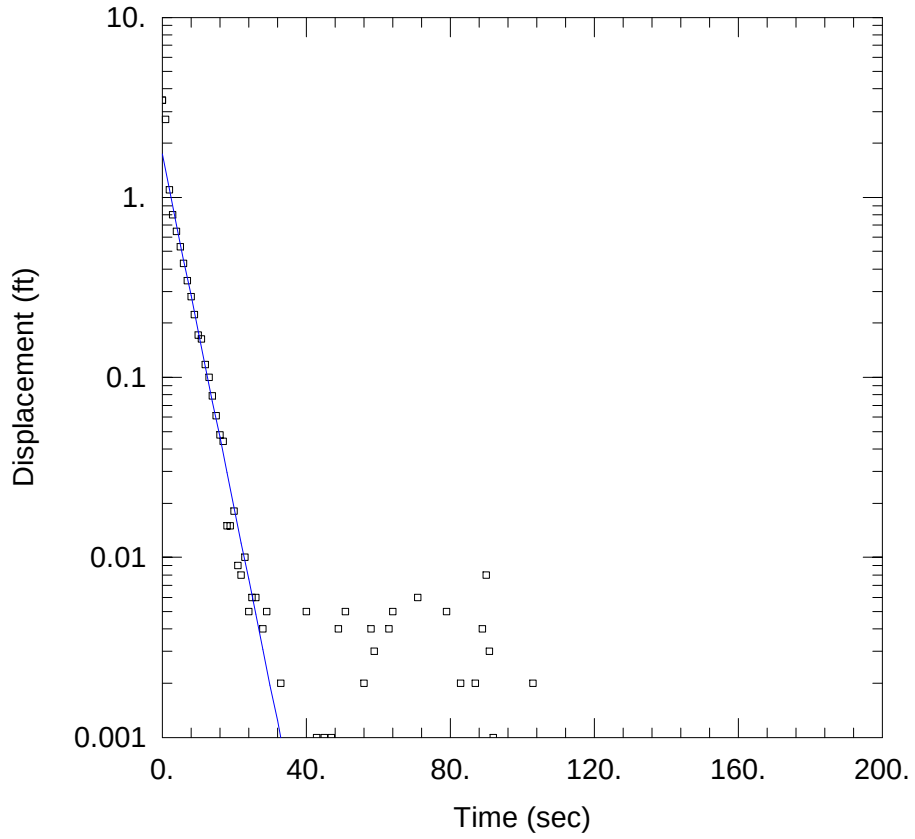
Saturated Thickness: 15.32 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW101A_IN2)

Initial Displacement: 4.349 ft
Total Well Penetration Depth: 14.22 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 13.92 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101A_IN3.aqt
Date: 06/04/18 Time: 11:30:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 18.98 ft/day
y0 = 1.741 ft

AQUIFER DATA

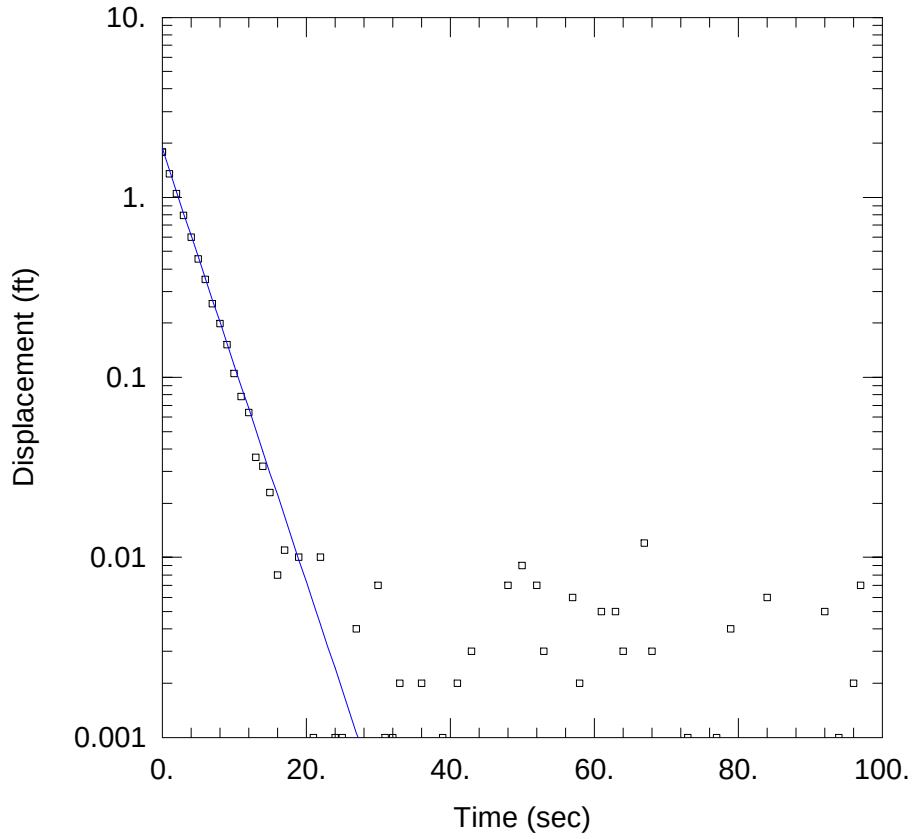
Saturated Thickness: 15.32 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW101A_IN3)

Initial Displacement: 3.476 ft
Total Well Penetration Depth: 14.22 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 13.92 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101A_OUT2.aqt
Date: 06/12/18 Time: 11:05:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 23.22 ft/day
y0 = 1.869 ft

AQUIFER DATA

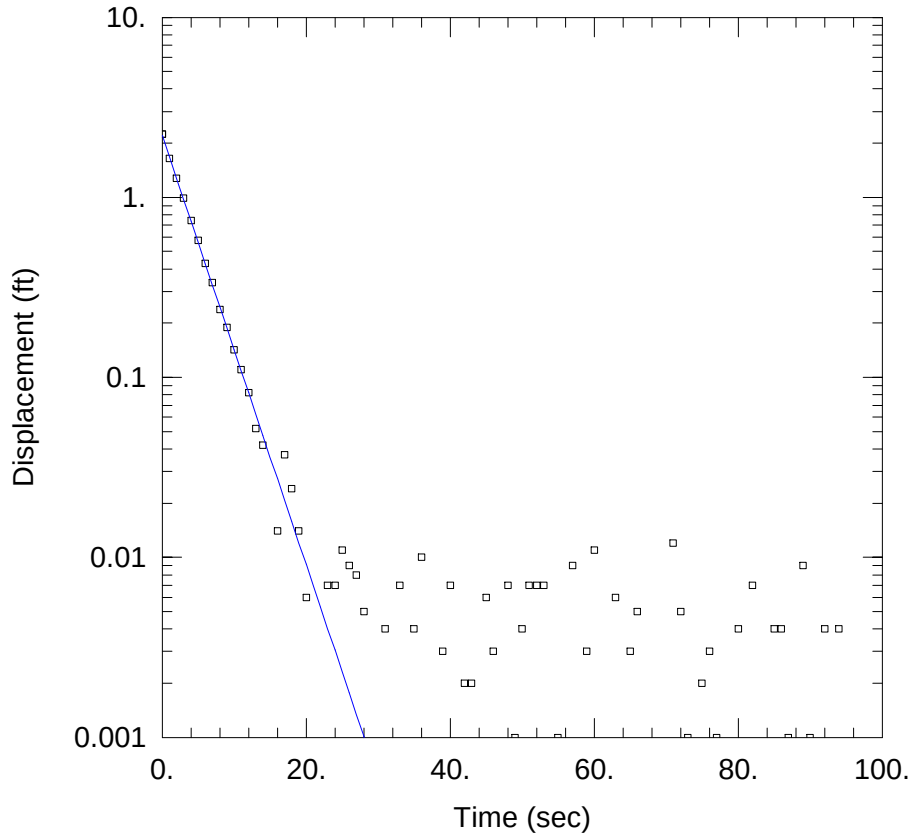
Saturated Thickness: 15.32 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW101A_OUT2)

Initial Displacement: 1.788 ft
Total Well Penetration Depth: 14.22 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 13.92 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101A_OUT3.aqt
Date: 06/12/18 Time: 11:05:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 23.02 ft/day
y0 = 2.215 ft

AQUIFER DATA

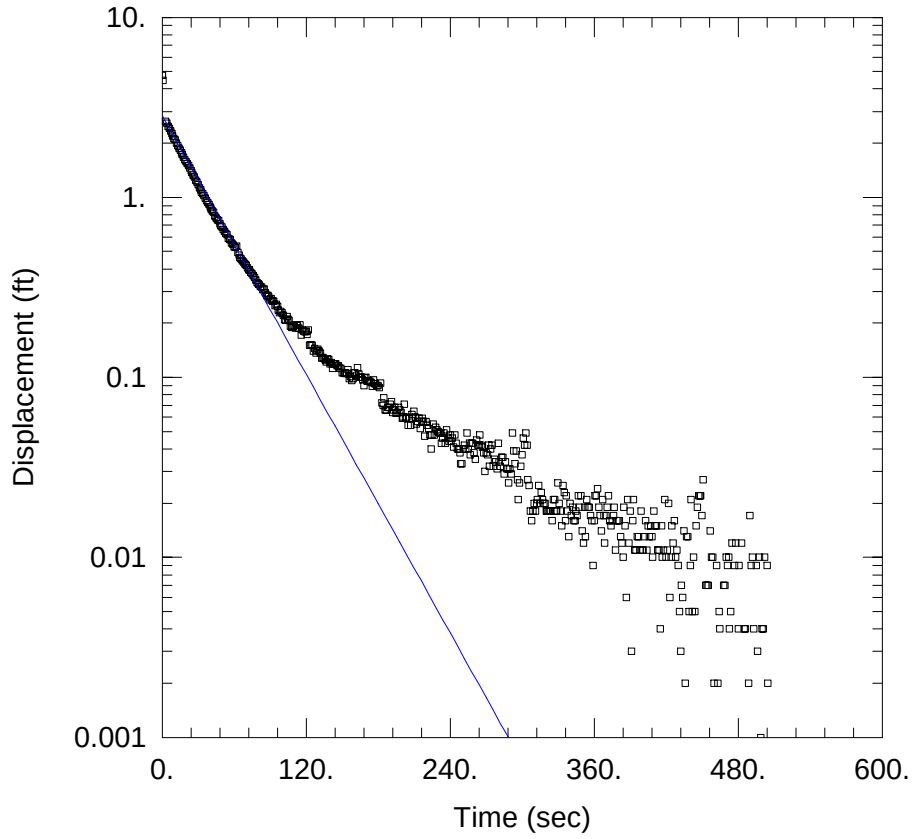
Saturated Thickness: 15.32 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW101A_OUT3)

Initial Displacement: 2.238 ft
Total Well Penetration Depth: 14.22 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 13.92 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101B_IN1.aqt
Date: 06/12/18 Time: 11:16:54

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101B
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.652 ft/day
y0 = 2.838 ft

AQUIFER DATA

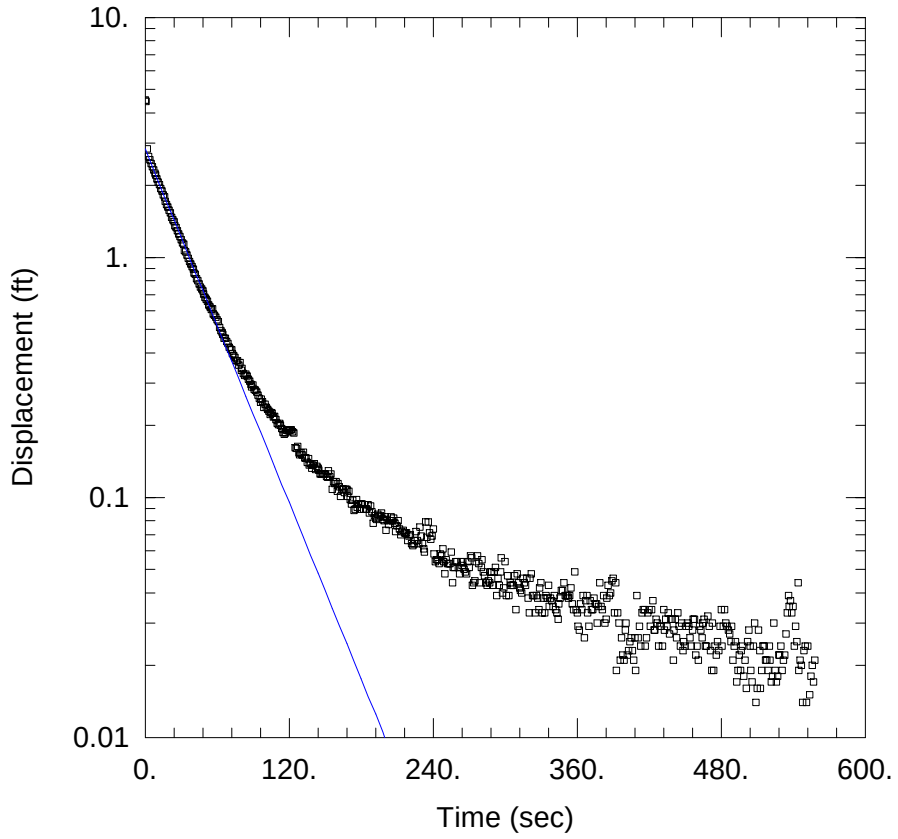
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-101B_IN1)

Initial Displacement: 4.752 ft
Total Well Penetration Depth: 54.65 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 54.4 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101B_IN2.aqt
Date: 06/12/18 Time: 11:17:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101B
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.694 ft/day
y0 = 2.826 ft

AQUIFER DATA

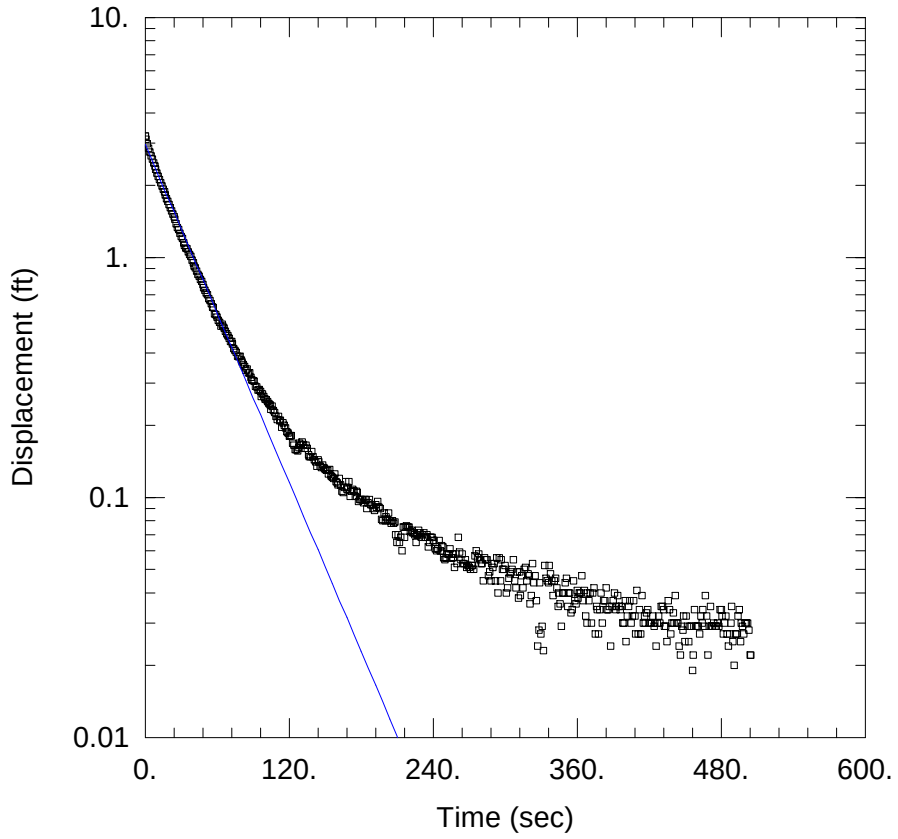
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-101B_IN2)

Initial Displacement: 4.505 ft
Total Well Penetration Depth: 54.65 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 54.4 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101B_OUT1.aqt
Date: 06/12/18 Time: 11:17:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101B
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.62 ft/day
y0 = 2.961 ft

AQUIFER DATA

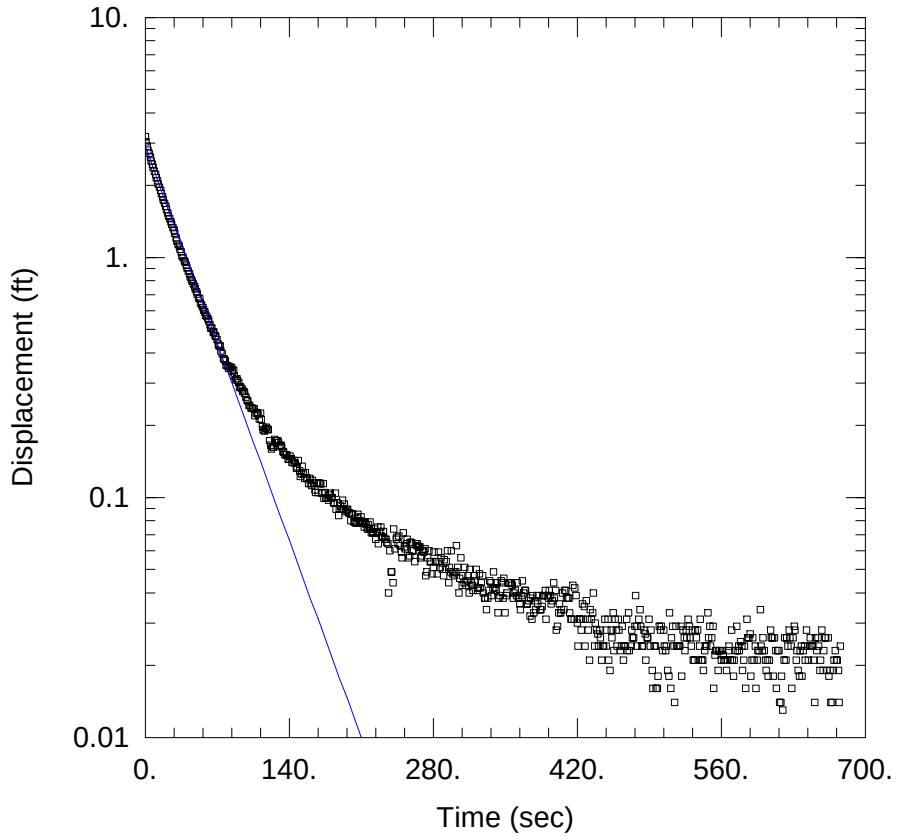
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-101B_OUT1)

Initial Displacement: 3.192 ft
Total Well Penetration Depth: 54.65 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 54.4 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW101B_OUT2.aqt
Date: 06/12/18 Time: 11:18:18

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW101B
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.619 ft/day
y0 = 2.912 ft

AQUIFER DATA

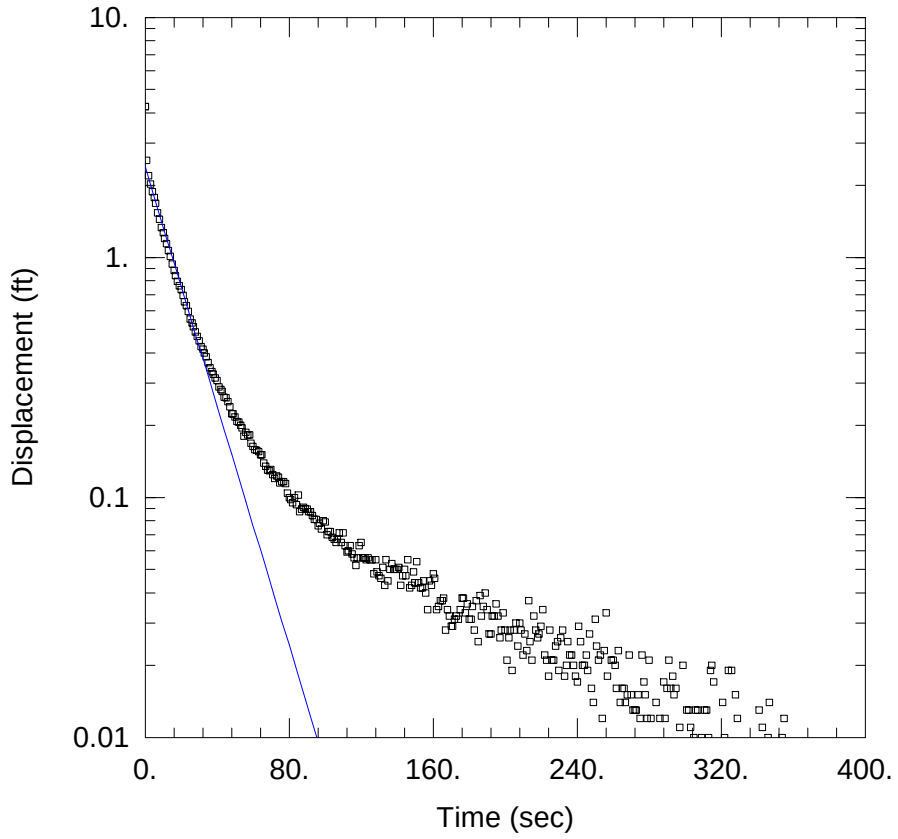
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-101B_OUT2)

Initial Displacement: 3.182 ft
Total Well Penetration Depth: 54.65 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 54.4 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW102A_IN1.aqt
Date: 06/12/18 Time: 11:22:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW102A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.452 ft/day
y0 = 2.379 ft

AQUIFER DATA

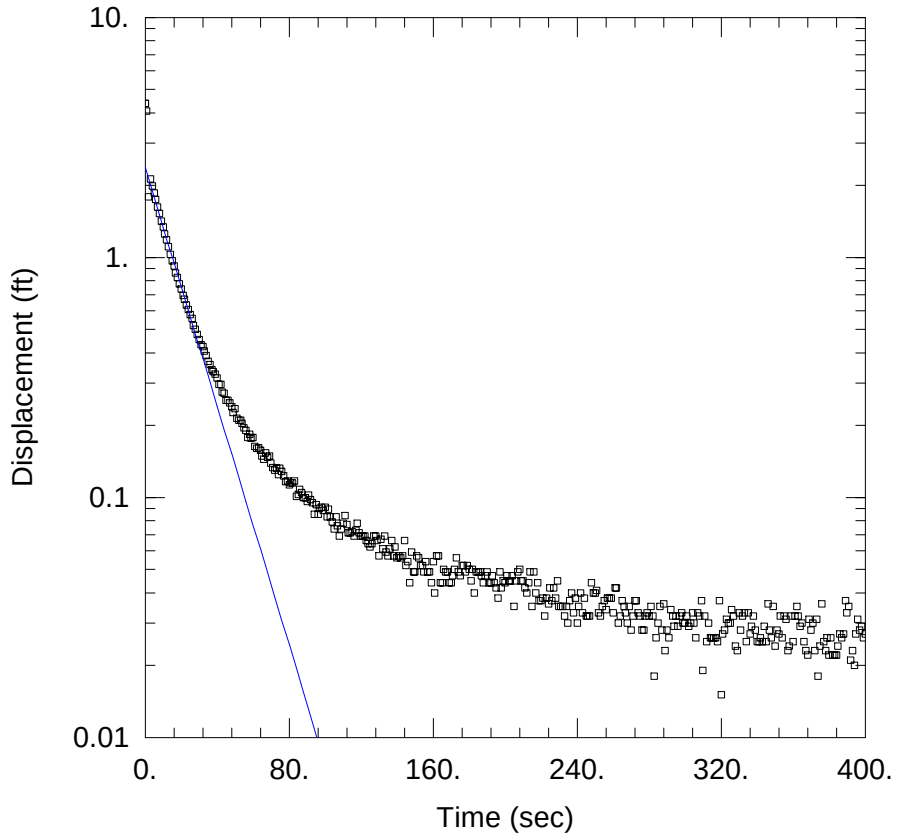
Saturated Thickness: 22.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-102A_IN1)

Initial Displacement: 4.25 ft
Total Well Penetration Depth: 56.21 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 55.77 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW102A_IN2.aqt
Date: 06/12/18 Time: 11:23:00

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW102A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.445 ft/day
y0 = 2.371 ft

AQUIFER DATA

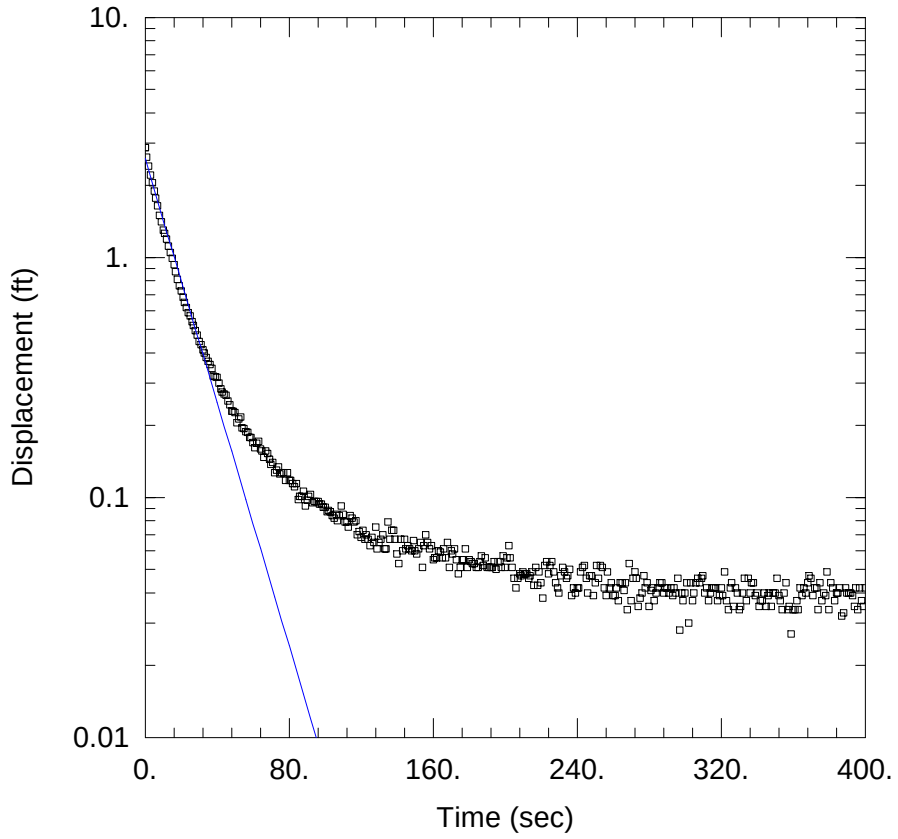
Saturated Thickness: 22.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-102A_IN1)

Initial Displacement: 4.375 ft
Total Well Penetration Depth: 56.21 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 55.77 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW102A_OUT1.aqt
Date: 06/12/18 Time: 11:23:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW102A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.515 ft/day
y0 = 2.575 ft

AQUIFER DATA

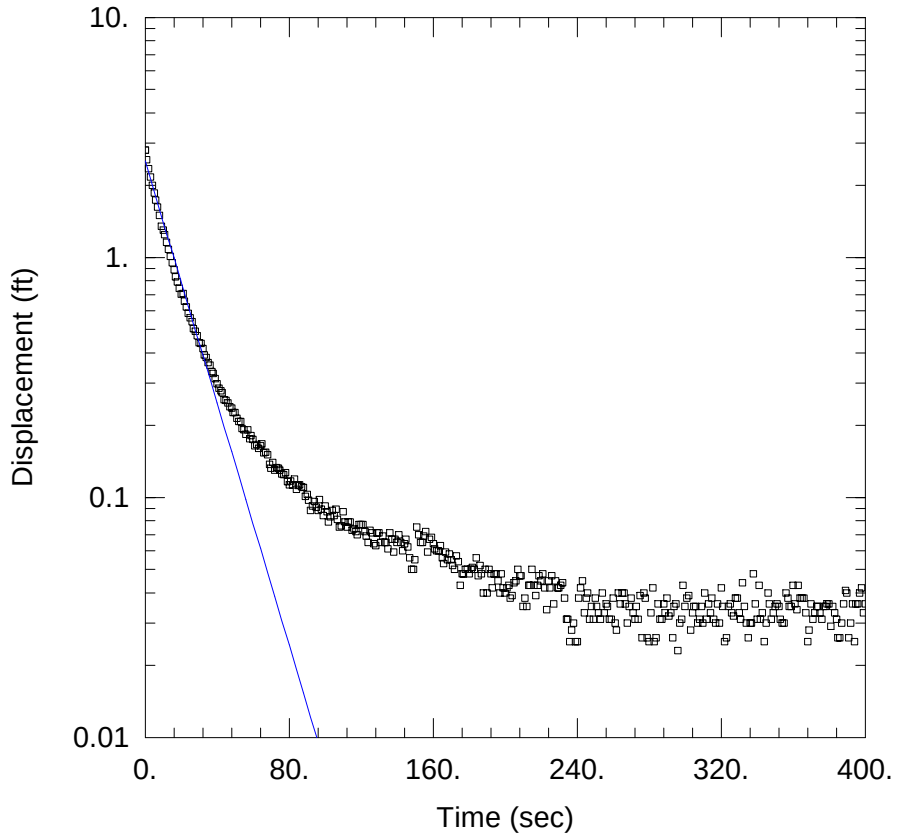
Saturated Thickness: 22.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-102A_OUT1)

Initial Displacement: 2.866 ft
Total Well Penetration Depth: 56.21 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 55.77 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW102A_OUT2.aqt
Date: 06/12/18 Time: 11:23:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW102A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.492 ft/day
y0 = 2.514 ft

AQUIFER DATA

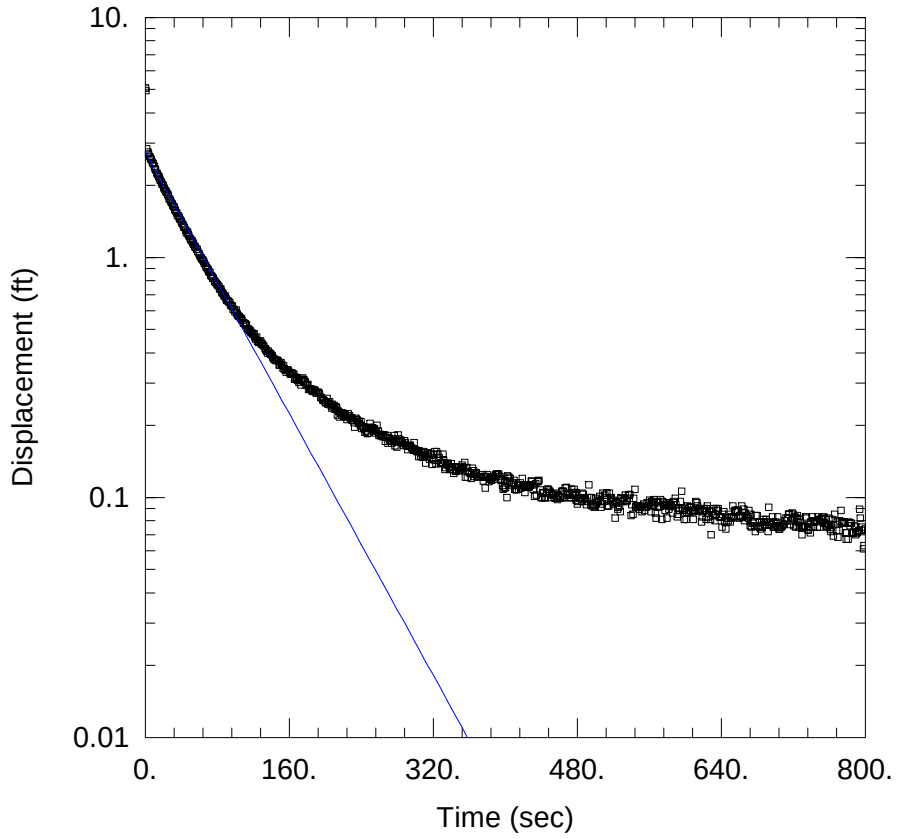
Saturated Thickness: 22.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-102A_OUT2)

Initial Displacement: 2.79 ft
Total Well Penetration Depth: 56.21 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 55.77 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW102B_IN1.aqt
Date: 06/12/18 Time: 11:26:39

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW102B
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.013 ft/day
y0 = 2.753 ft

AQUIFER DATA

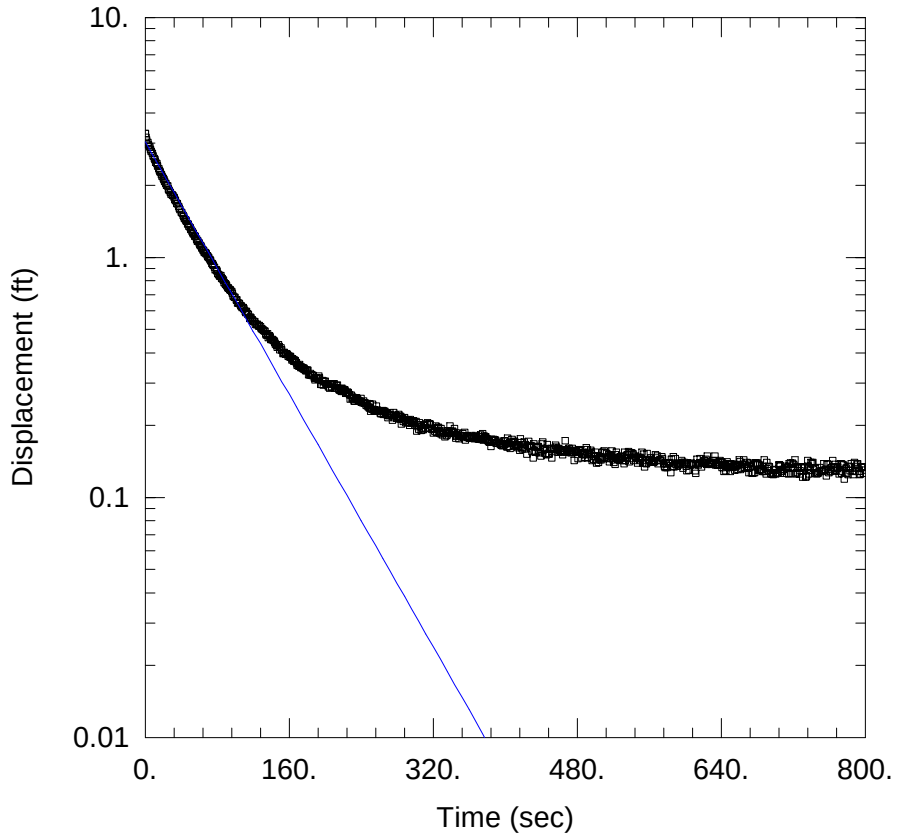
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-102B_IN1)

Initial Displacement: 5.089 ft
Total Well Penetration Depth: 91.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 91.3 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW102B_OUT1.aqt
Date: 06/12/18 Time: 11:27:05

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW102B
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.9773 ft/day
y0 = 3.03 ft

AQUIFER DATA

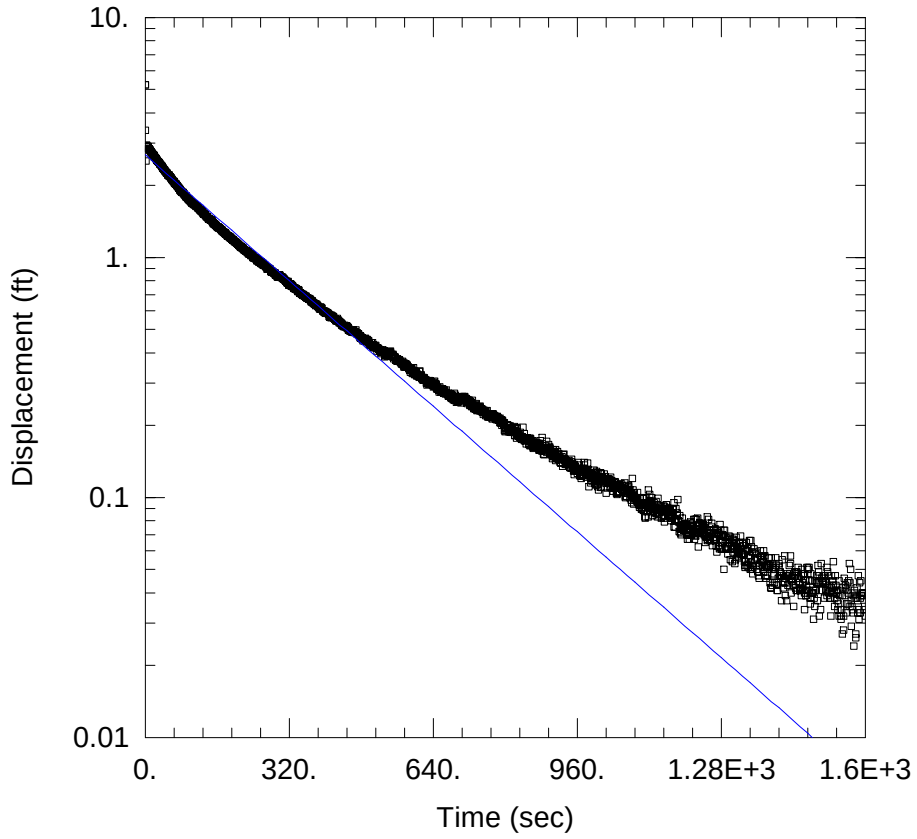
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-102B_OUT1)

Initial Displacement: 3.291 ft
Total Well Penetration Depth: 91.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 91.3 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW103A_IN1.aqt
Date: 06/12/18 Time: 11:33:15

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW103A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3642 ft/day
y0 = 2.671 ft

AQUIFER DATA

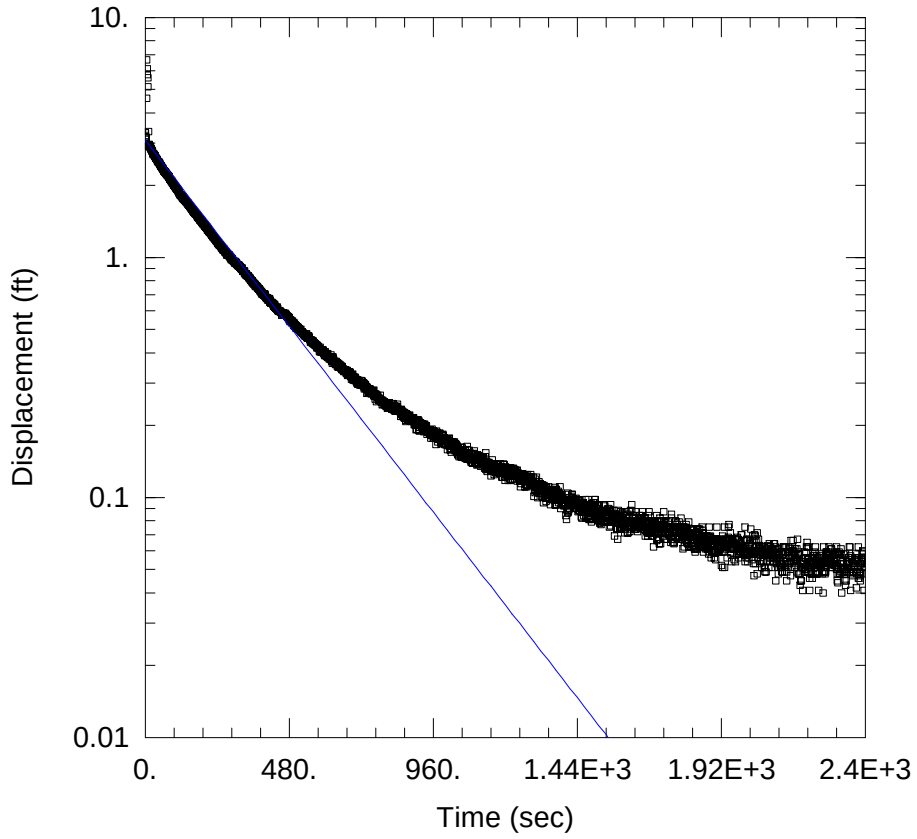
Saturated Thickness: 12.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-103A_IN1)

Initial Displacement: 5.225 ft
Total Well Penetration Depth: 19.35 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 19.05 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW103A_OUT1.aqt
Date: 06/12/18 Time: 11:33:38

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW103A
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.359 ft/day
y0 = 3.078 ft

AQUIFER DATA

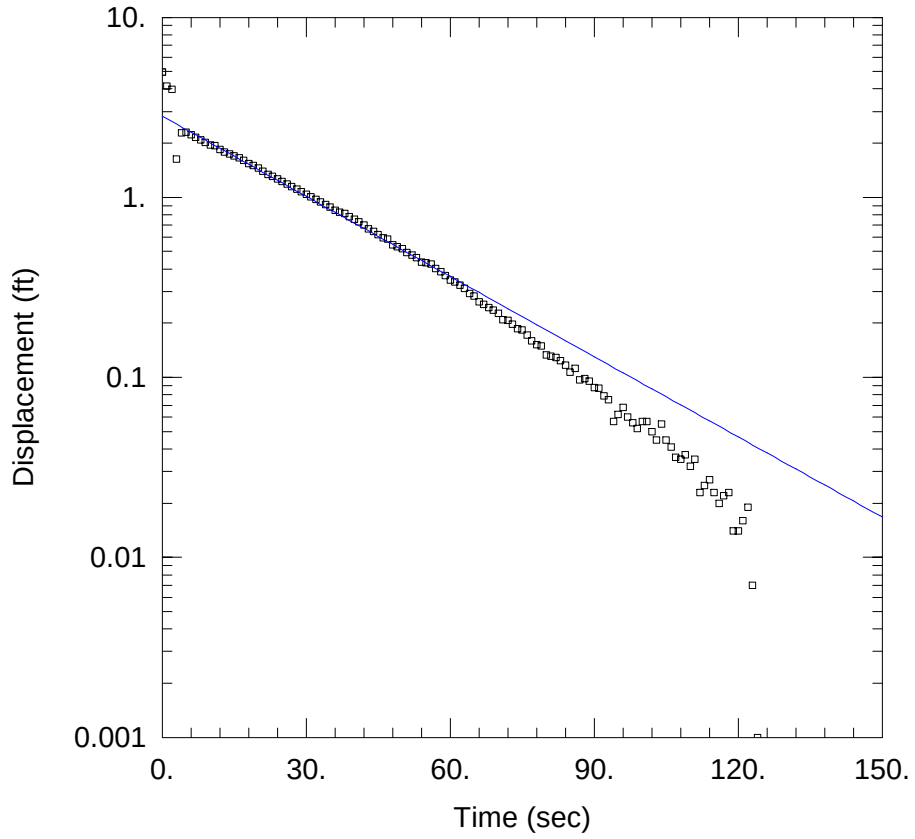
Saturated Thickness: 12.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-103A_OUT1)

Initial Displacement: 3.308 ft
Total Well Penetration Depth: 19.35 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 19.05 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW104_IN1.aqt
Date: 06/12/18 Time: 11:42:48

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW104
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.052 ft/day
y0 = 2.827 ft

AQUIFER DATA

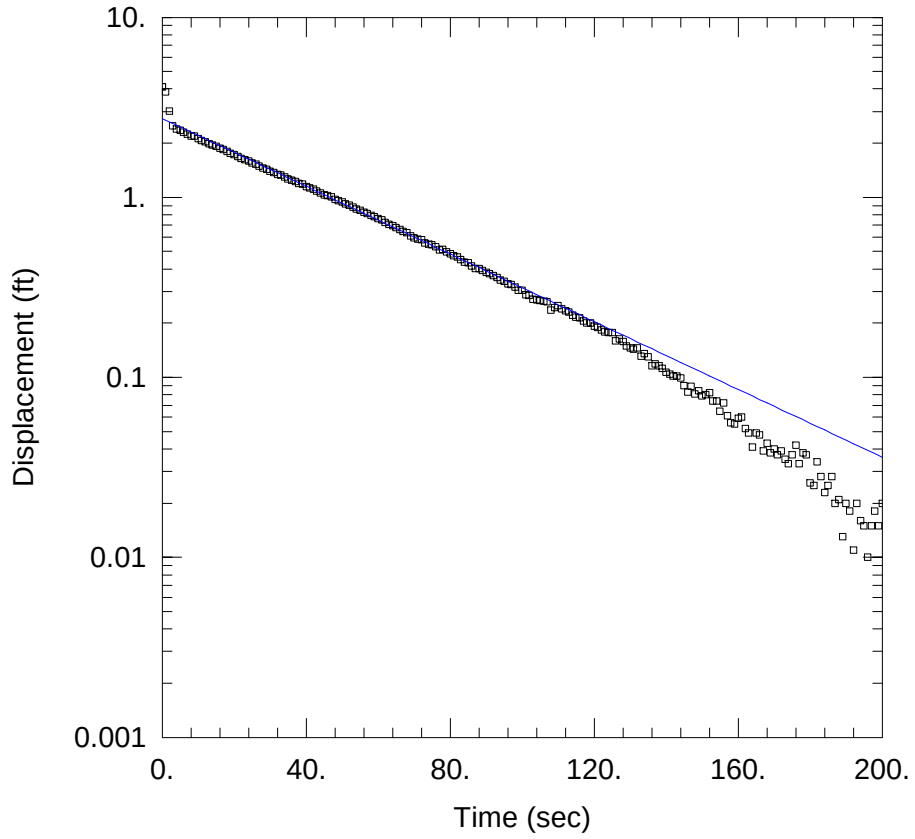
Saturated Thickness: 17.88 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-104_IN1)

Initial Displacement: 4.95 ft
Total Well Penetration Depth: 17.38 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 17.08 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW104_IN2.aqt
Date: 06/12/18 Time: 11:43:05

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW104
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.933 ft/day
y0 = 2.741 ft

AQUIFER DATA

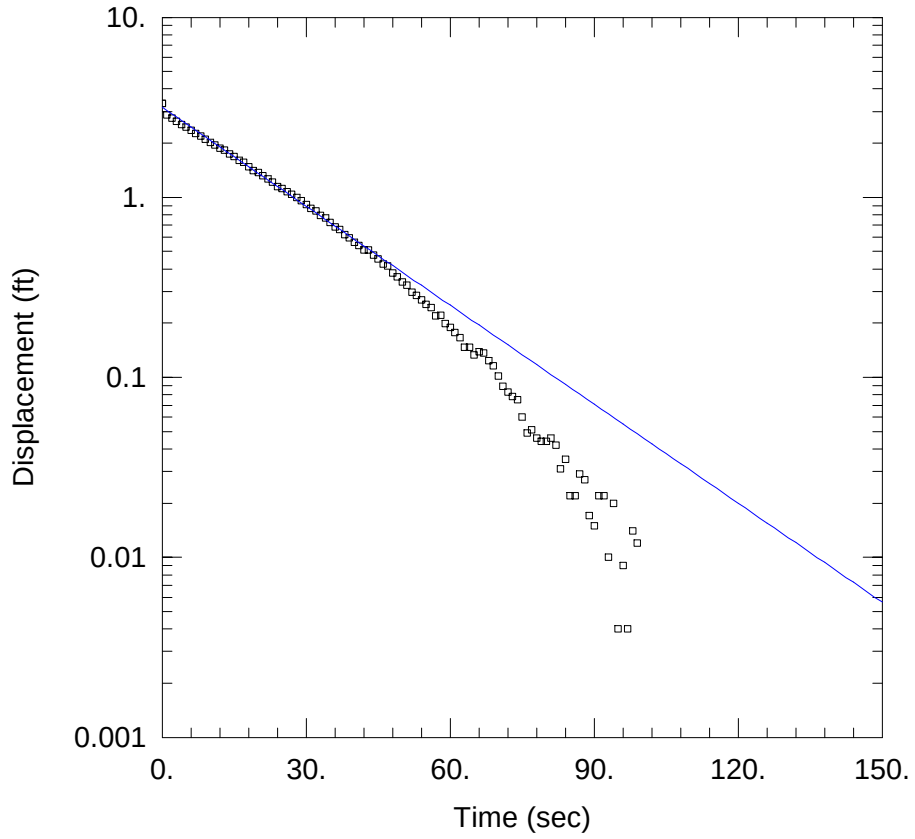
Saturated Thickness: 17.88 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-104_IN2)

Initial Displacement: 4.105 ft
Total Well Penetration Depth: 17.38 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 17.08 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW104_OUT1.aqt
Date: 06/12/18 Time: 11:44:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW104
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.767 ft/day
y0 = 3.165 ft

AQUIFER DATA

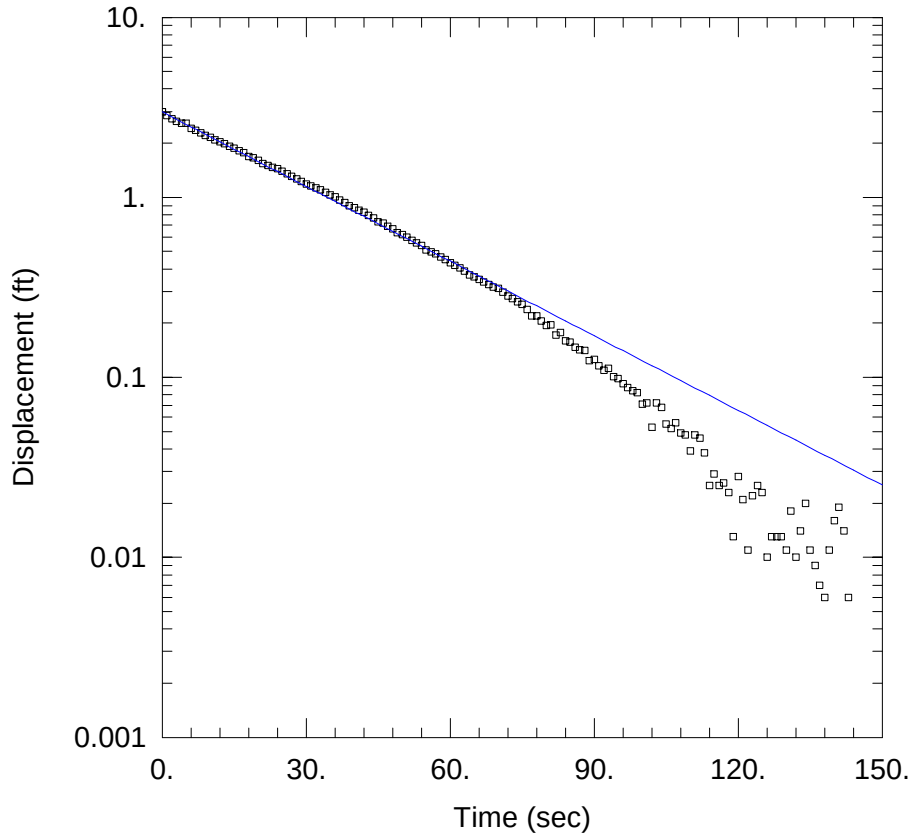
Saturated Thickness: 17.88 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-104_OUT1)

Initial Displacement: 3.336 ft
Total Well Penetration Depth: 17.38 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 17.08 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW104_OUT2.aqt
Date: 06/12/18 Time: 11:45:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW104
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.84 ft/day
y0 = 2.984 ft

AQUIFER DATA

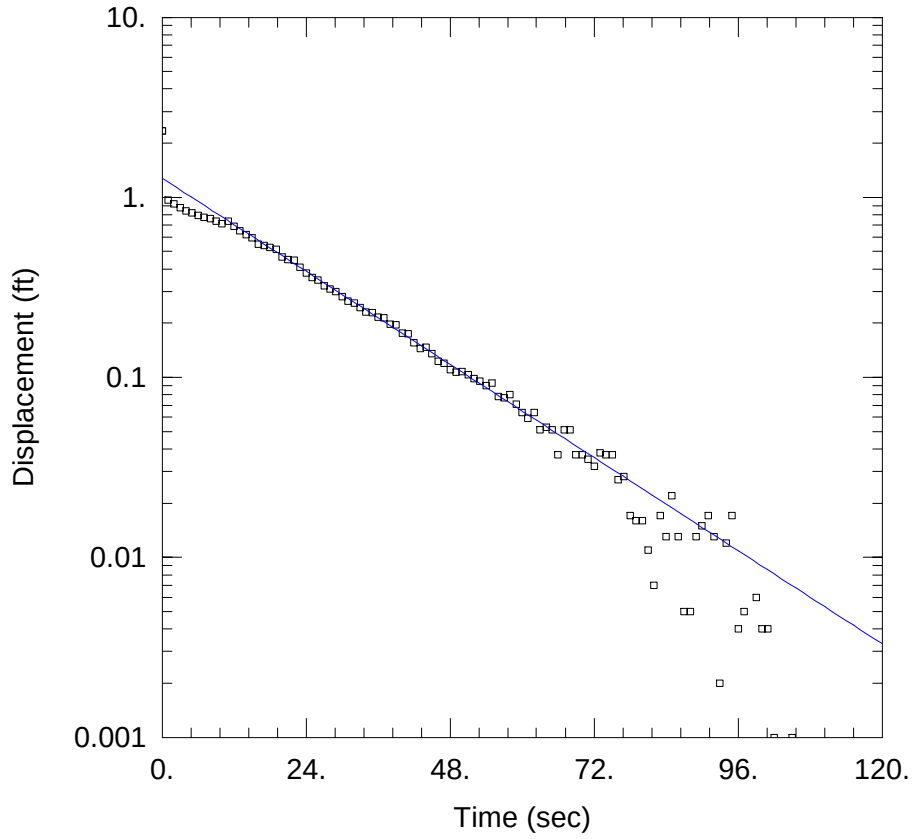
Saturated Thickness: 17.88 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-104_OUT2)

Initial Displacement: 2.98 ft
Total Well Penetration Depth: 17.38 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 17.08 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW105_IN1.aqt
Date: 06/12/18 Time: 11:47:32

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW105
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.815 ft/day
y0 = 1.279 ft

AQUIFER DATA

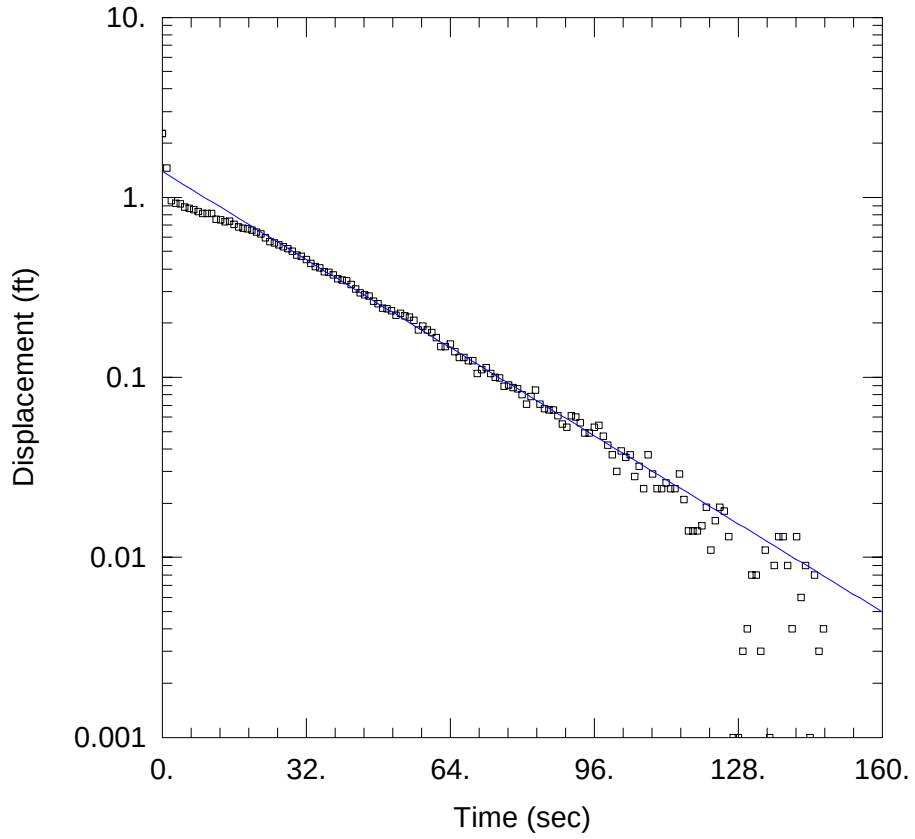
Saturated Thickness: 12. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-105_IN1)

Initial Displacement: 2.336 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 6.17 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW105_IN2.aqt
Date: 06/12/18 Time: 11:48:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW105
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.704 ft/day
y0 = 1.392 ft

AQUIFER DATA

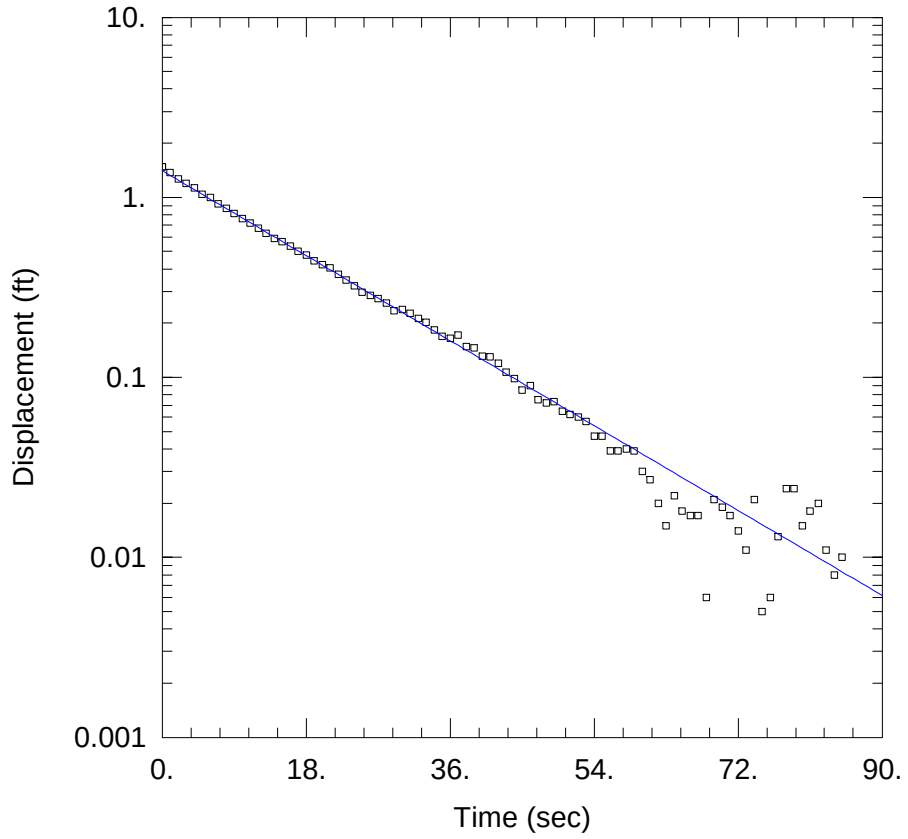
Saturated Thickness: 12. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-105_IN2)

Initial Displacement: 2.259 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 6.17 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW105_OUT1.aqt
Date: 06/12/18 Time: 11:50:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW105
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.638 ft/day
y0 = 1.407 ft

AQUIFER DATA

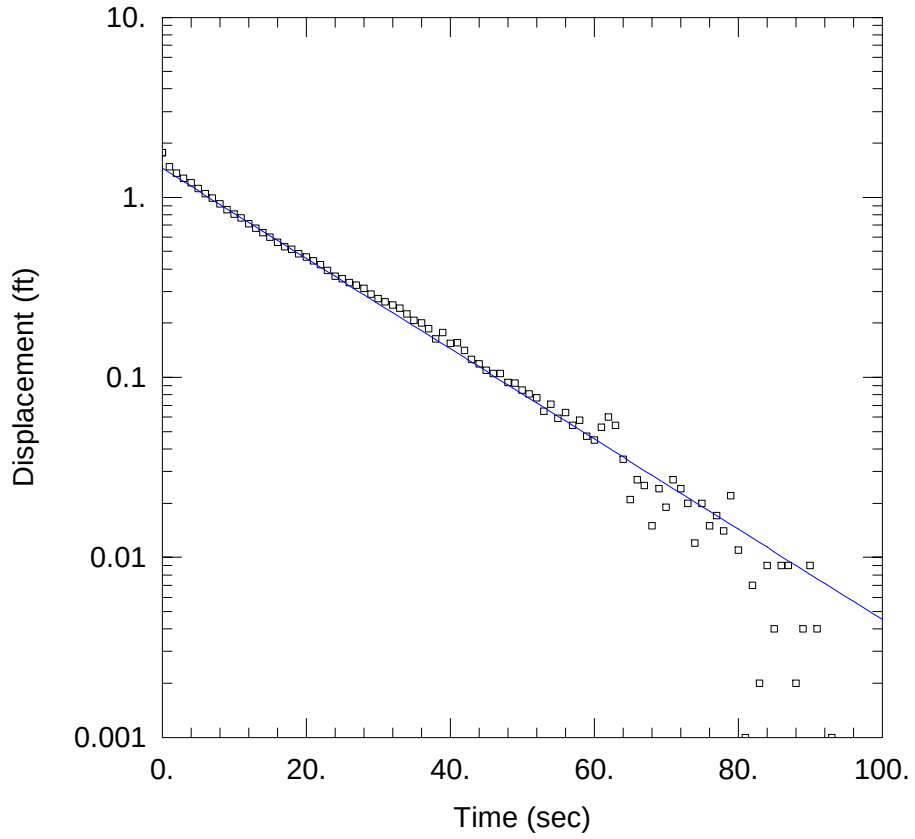
Saturated Thickness: 12. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-105_OUT1)

Initial Displacement: 1.484 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 6.17 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW105_OUT2.aqt
Date: 06/12/18 Time: 11:50:35

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW105
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.435 ft/day
y0 = 1.452 ft

AQUIFER DATA

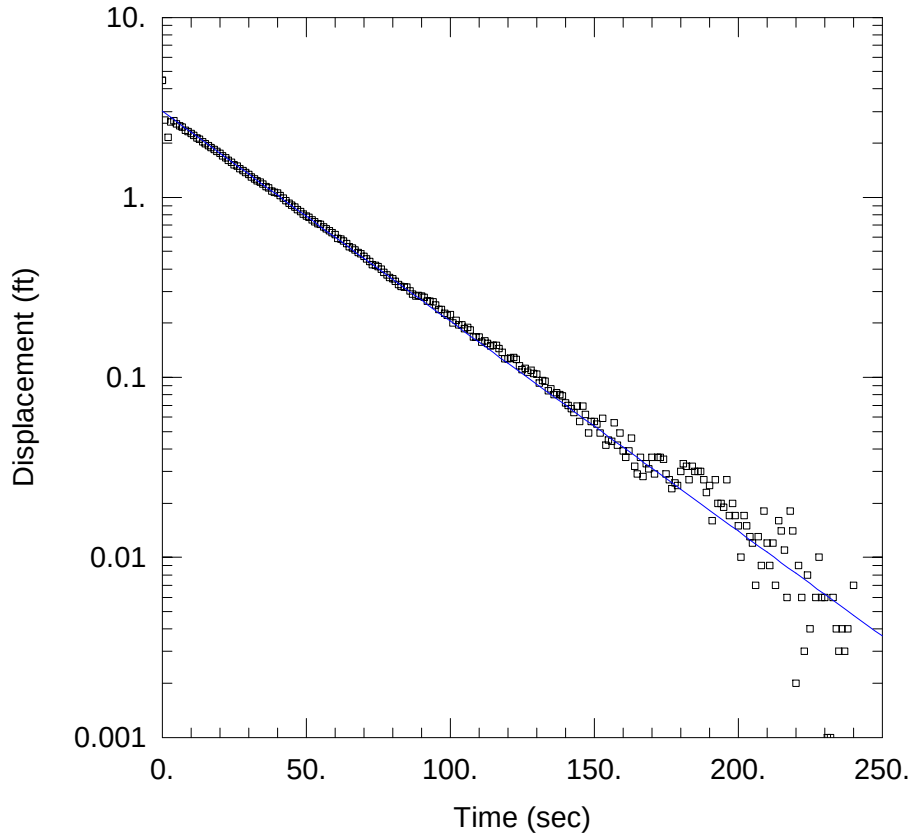
Saturated Thickness: 12. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-105_OUT2)

Initial Displacement: 1.775 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08333 ft

Static Water Column Height: 6.17 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW106_IN1.aqt
Date: 06/12/18 Time: 11:54:42

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW106
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.449 ft/day
y0 = 3.013 ft

AQUIFER DATA

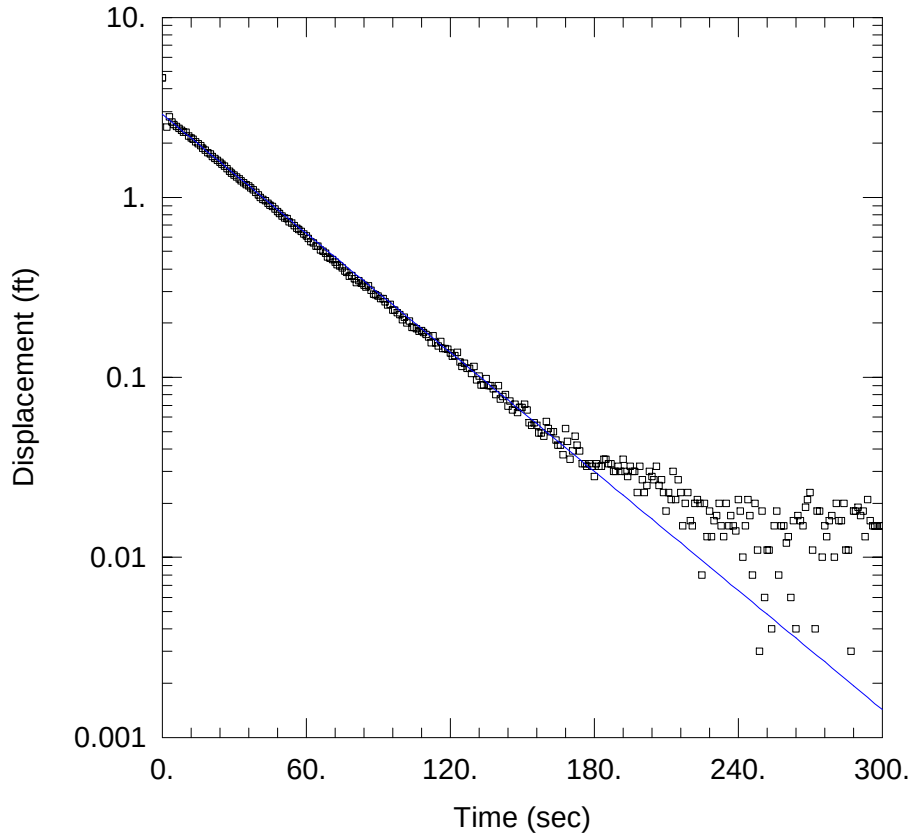
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-106_IN1)

Initial Displacement: 4.481 ft
Total Well Penetration Depth: 28.6 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.35 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW106_IN2.aqt
Date: 06/12/18 Time: 11:57:18

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW106
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.369 ft/day
y0 = 2.897 ft

AQUIFER DATA

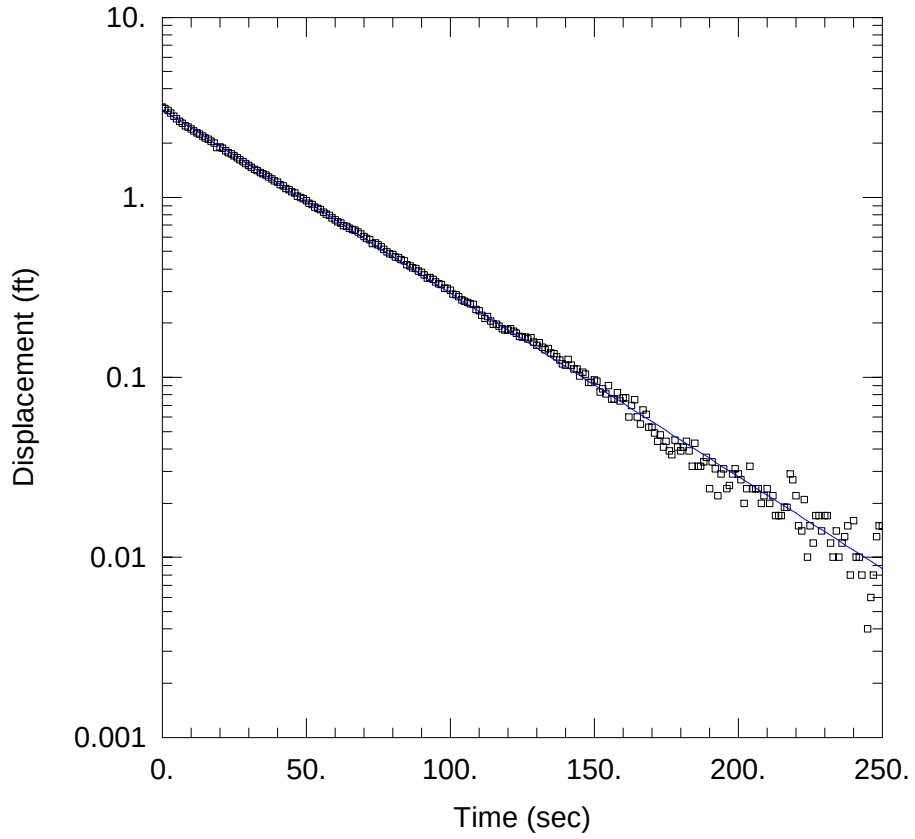
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-106_IN2)

Initial Displacement: 4.602 ft
Total Well Penetration Depth: 28.6 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.35 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW106_OUT1.aqt
Date: 06/12/18 Time: 11:57:32

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW106
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.267 ft/day
y0 = 3.075 ft

AQUIFER DATA

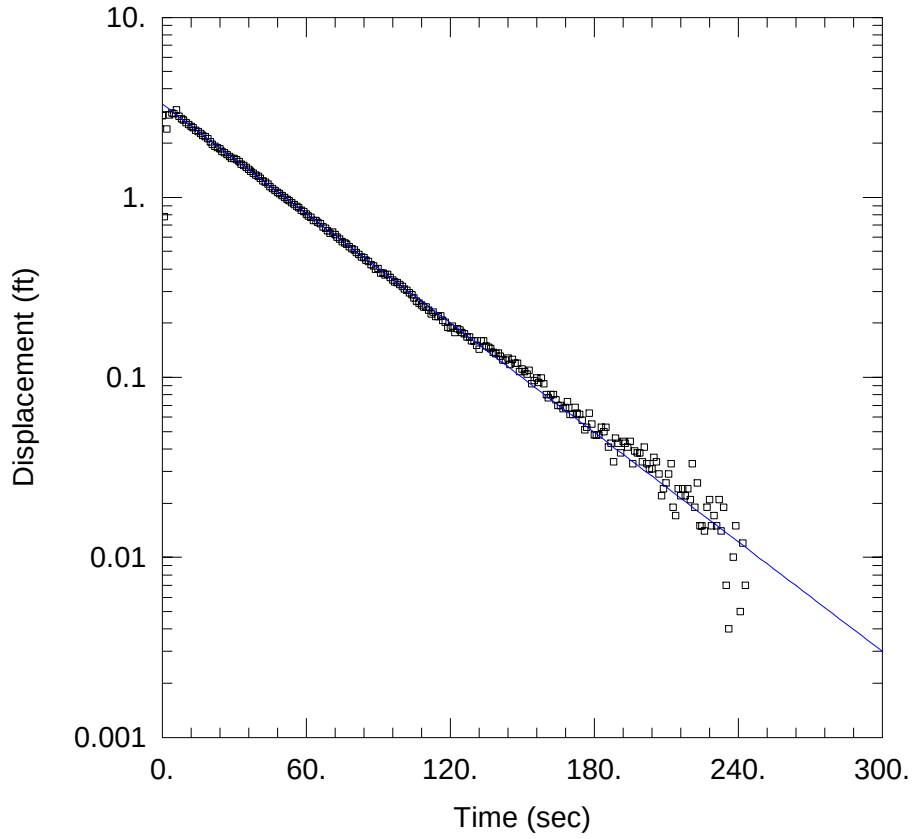
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-106_OUT1)

Initial Displacement: 3.166 ft
Total Well Penetration Depth: 28.6 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.35 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW106_OUT2.aqt
Date: 06/12/18 Time: 11:57:47

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW106
Test Date: 5/22/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.259 ft/day
y0 = 3.3 ft

AQUIFER DATA

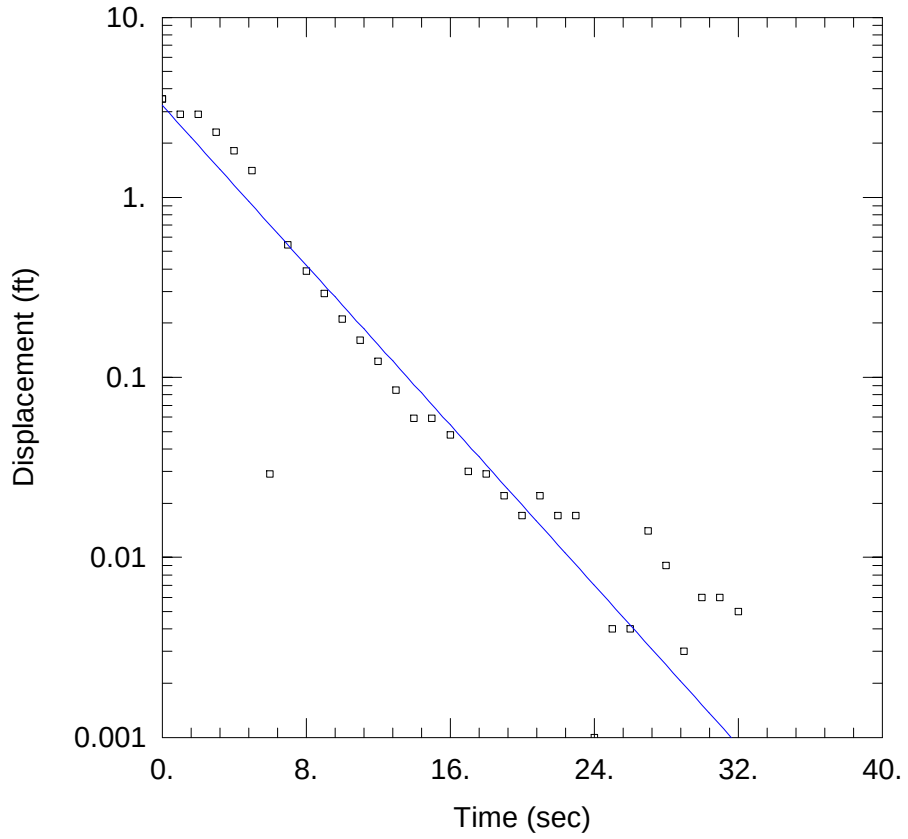
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-106_OUT2)

Initial Displacement: 2.845 ft
Total Well Penetration Depth: 28.6 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.35 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107A_IN1.aqt
Date: 06/12/18 Time: 12:28:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 77.35 ft/day
y0 = 3.253 ft

AQUIFER DATA

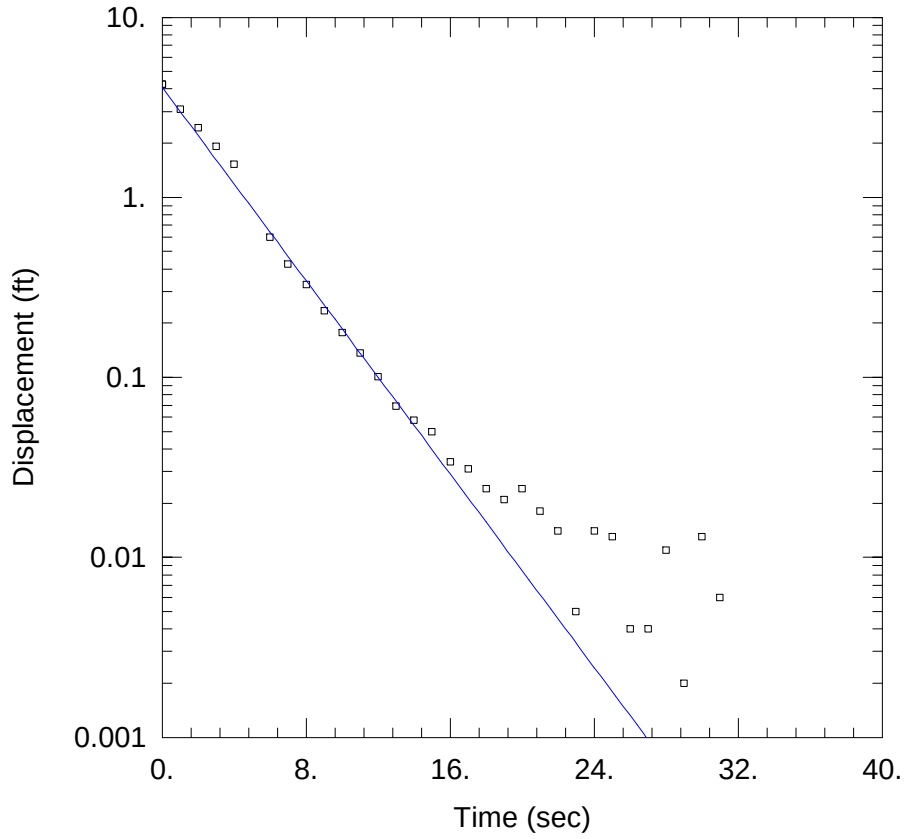
Saturated Thickness: 14.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107A_IN1)

Initial Displacement: 3.535 ft
Total Well Penetration Depth: 13.59 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 13.29 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107A_IN2.aqt
Date: 06/12/18 Time: 12:30:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 93.49 ft/day
y0 = 4.084 ft

AQUIFER DATA

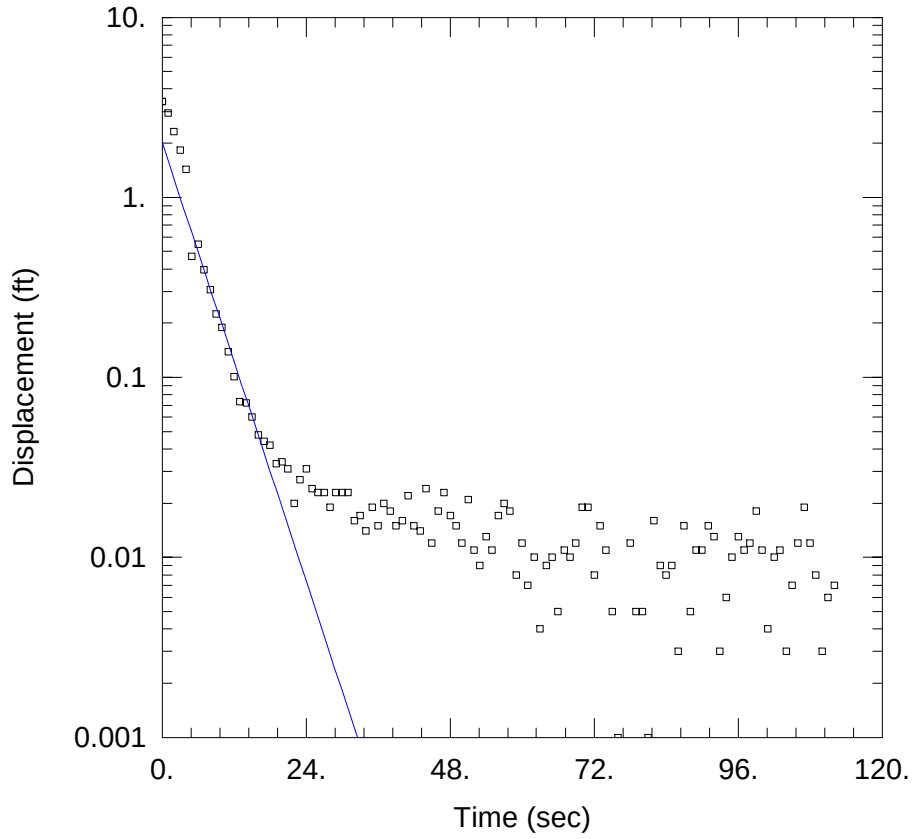
Saturated Thickness: 14.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107A_IN2)

Initial Displacement: 4.265 ft
Total Well Penetration Depth: 13.59 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 13.29 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107A_IN3.aqt
Date: 06/12/18 Time: 12:31:53

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 70.65 ft/day
y0 = 2.016 ft

AQUIFER DATA

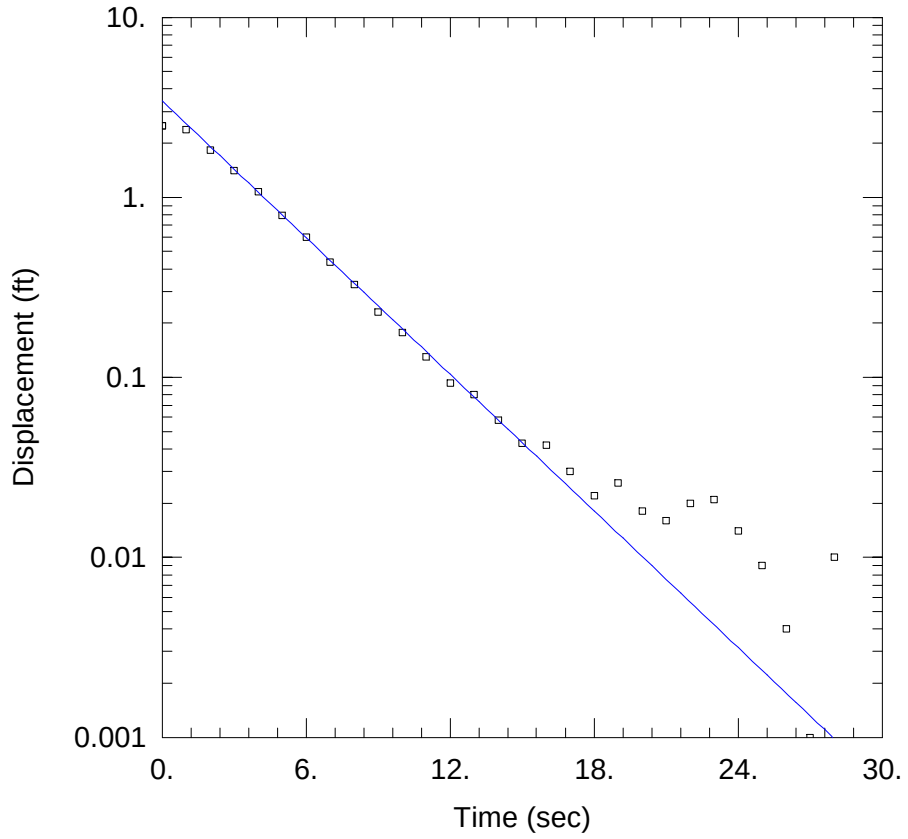
Saturated Thickness: 14.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107A_IN3)

Initial Displacement: 3.394 ft
Total Well Penetration Depth: 13.59 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 13.29 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107A_OUT1.aqt
Date: 06/12/18 Time: 12:32:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 88.16 ft/day
y0 = 3.434 ft

AQUIFER DATA

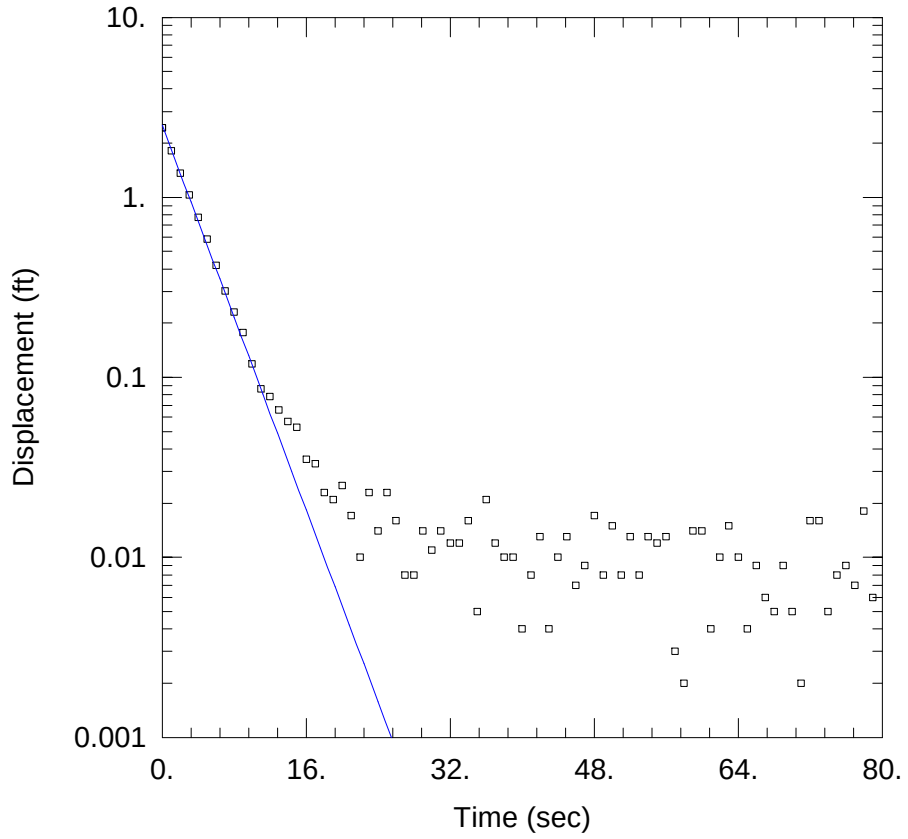
Saturated Thickness: 14.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107A_OUT1)

Initial Displacement: 2.494 ft
Total Well Penetration Depth: 13.59 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 13.29 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107A_OUT2.aqt
Date: 06/12/18 Time: 12:33:02

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 93.01 ft/day
y0 = 2.519 ft

AQUIFER DATA

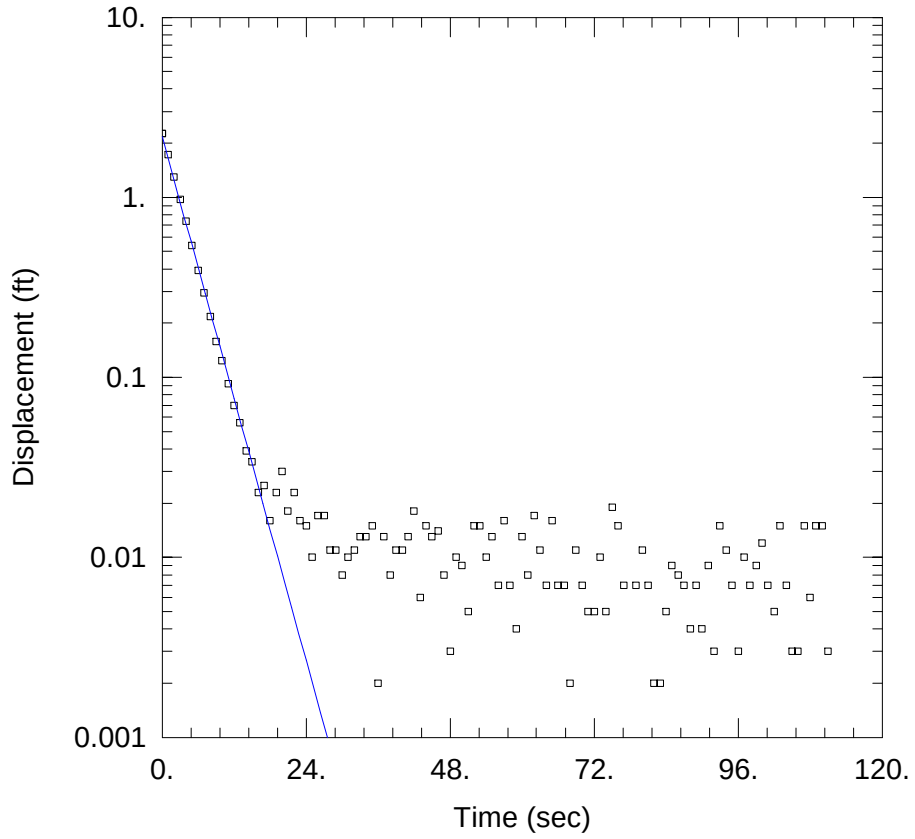
Saturated Thickness: 14.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107A_OUT2)

Initial Displacement: 2.429 ft
Total Well Penetration Depth: 13.59 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 13.29 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107A_OUT3.aqt
Date: 06/12/18 Time: 12:33:54

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 84.48 ft/day
y0 = 2.177 ft

AQUIFER DATA

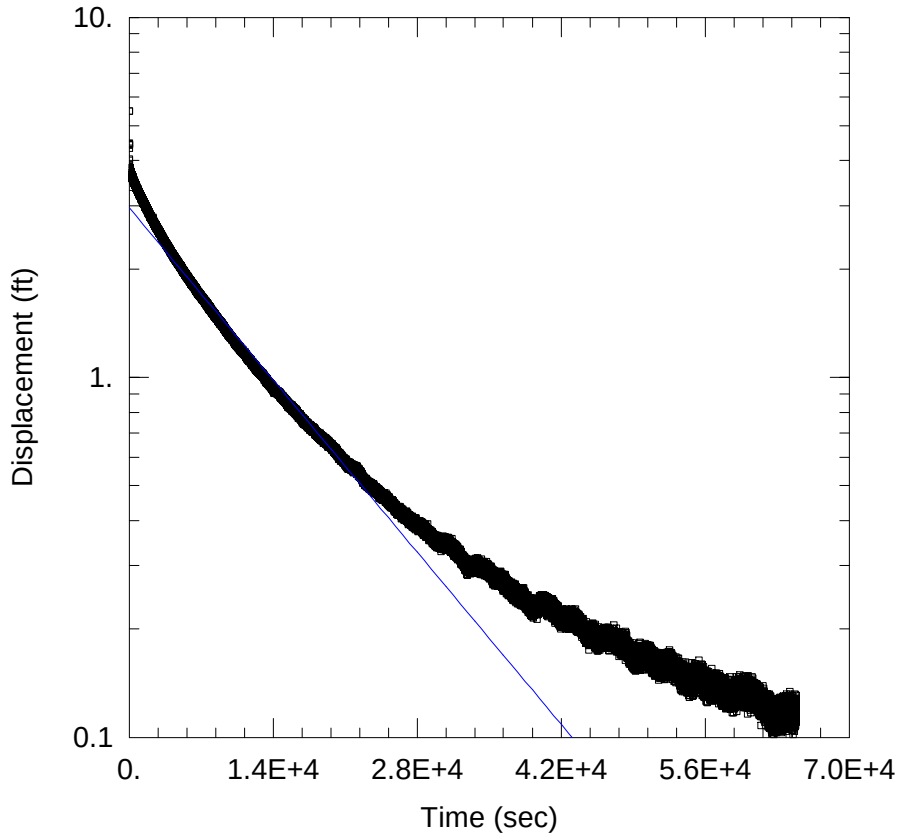
Saturated Thickness: 14.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107A_OUT3)

Initial Displacement: 2.269 ft
Total Well Penetration Depth: 13.59 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 13.29 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107B_IN1.aqt
Date: 06/12/18 Time: 13:14:30

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107B
Test Date: 5/23/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.01752 ft/day
y0 = 2.959 ft

AQUIFER DATA

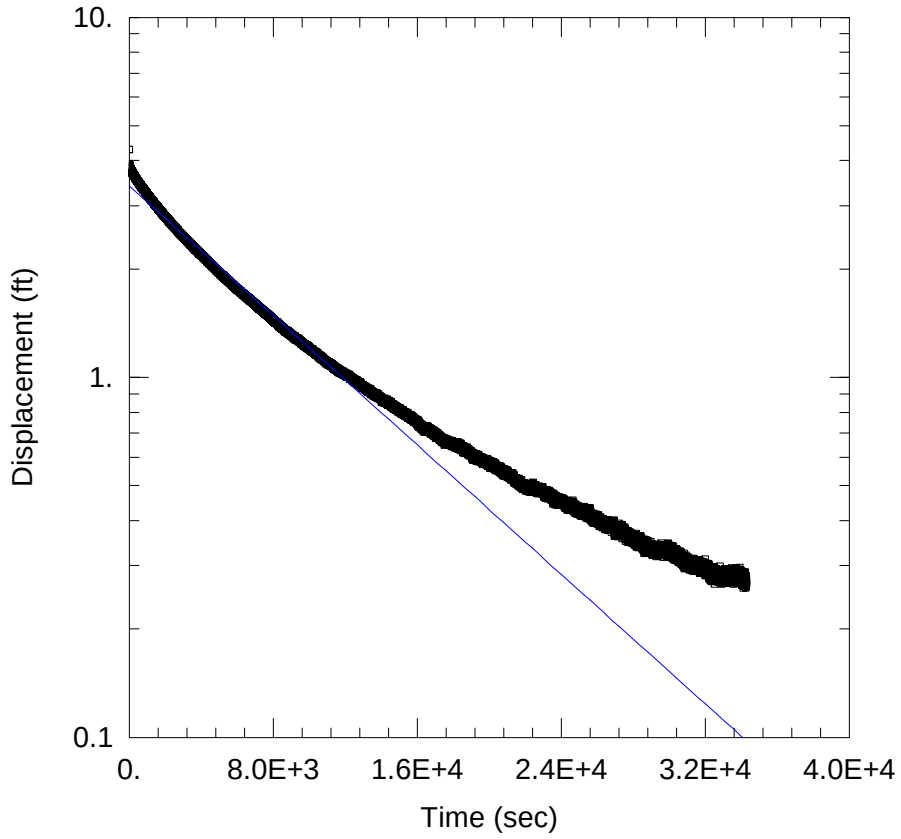
Saturated Thickness: 21.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107B_IN1)

Initial Displacement: 5.484 ft
Total Well Penetration Depth: 50.02 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 49.81 ft
Screen Length: 20. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107B_OUT1.aqt
Date: 06/12/18 Time: 13:16:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107B
Test Date: 5/23/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.02306 ft/day
y0 = 3.402 ft

AQUIFER DATA

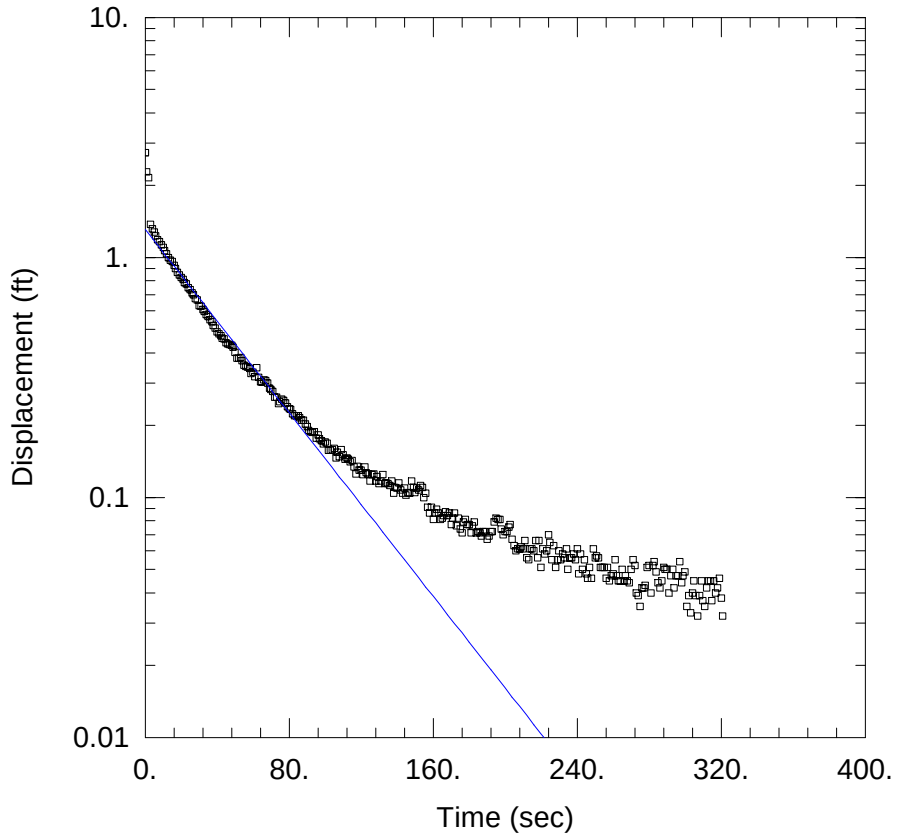
Saturated Thickness: 21.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107B_OUT1)

Initial Displacement: 4.294 ft
Total Well Penetration Depth: 50.02 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 49.81 ft
Screen Length: 20. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107C_IN1.aqt
Date: 06/12/18 Time: 13:21:15

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107C
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.463 ft/day
y0 = 1.309 ft

AQUIFER DATA

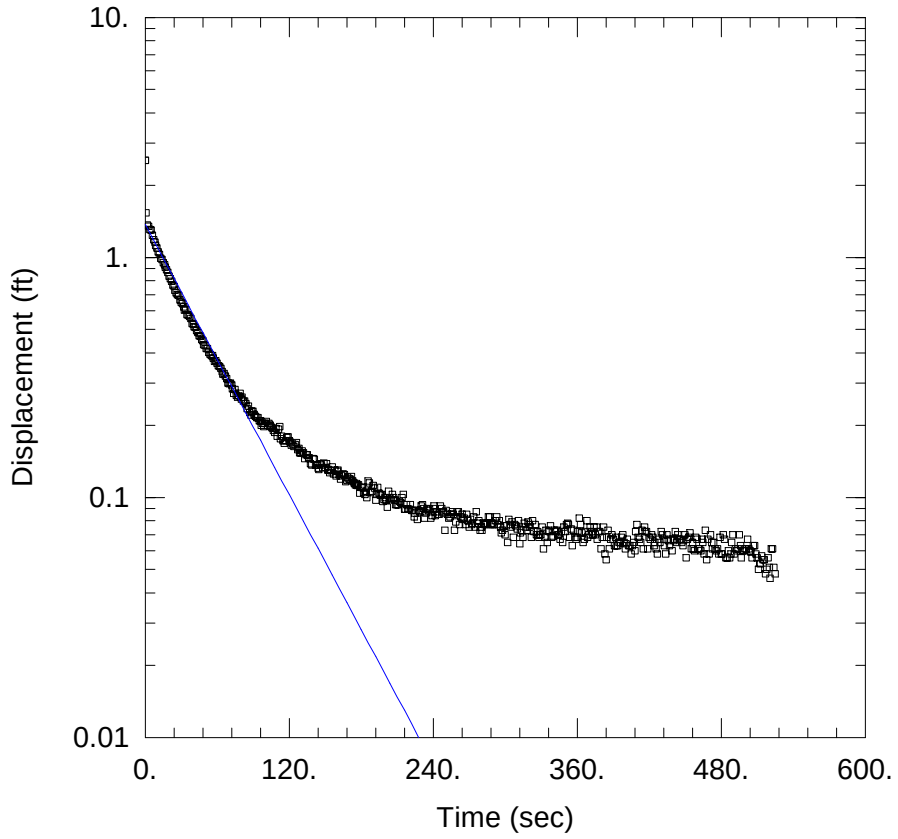
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107C_IN1)

Initial Displacement: 2.732 ft
Total Well Penetration Depth: 114.2 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 113.9 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107C_IN2.aqt
Date: 06/12/18 Time: 13:23:30

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107C
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.436 ft/day
y0 = 1.373 ft

AQUIFER DATA

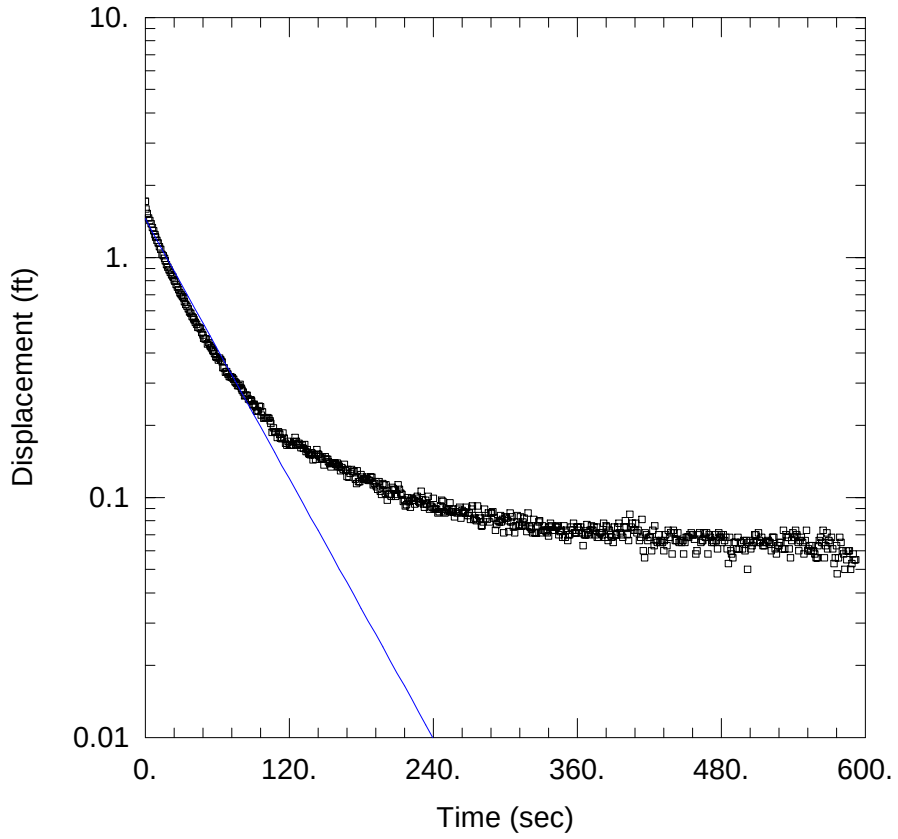
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107C_IN2)

Initial Displacement: 2.528 ft
Total Well Penetration Depth: 114.2 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 113.9 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107C_OUT1.aqt
Date: 06/12/18 Time: 13:24:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107C
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.379 ft/day
y0 = 1.446 ft

AQUIFER DATA

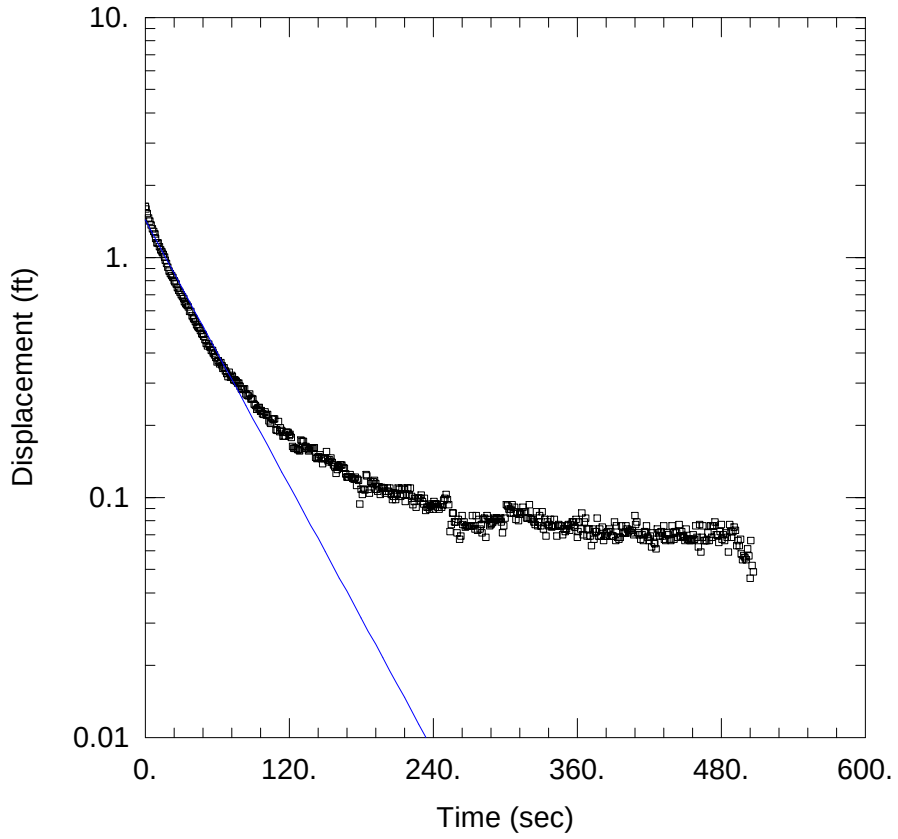
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107C_OUT1)

Initial Displacement: 1.709 ft
Total Well Penetration Depth: 114.2 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 113.9 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW107C_OUT2.aqt
Date: 06/12/18 Time: 13:25:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW107C
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.41 ft/day
y0 = 1.432 ft

AQUIFER DATA

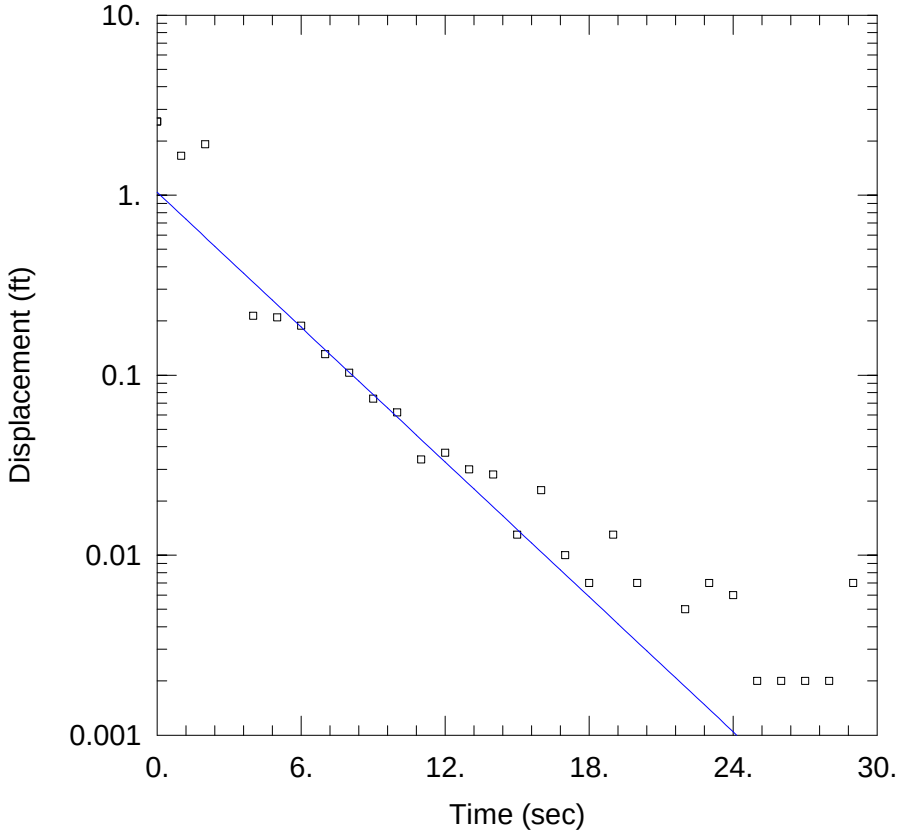
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-107C_OUT2)

Initial Displacement: 1.629 ft
Total Well Penetration Depth: 114.2 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 113.9 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108A_IN1.aqt
Date: 06/12/18 Time: 13:29:48

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108A
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 14.35 ft/day
y0 = 1.037 ft

AQUIFER DATA

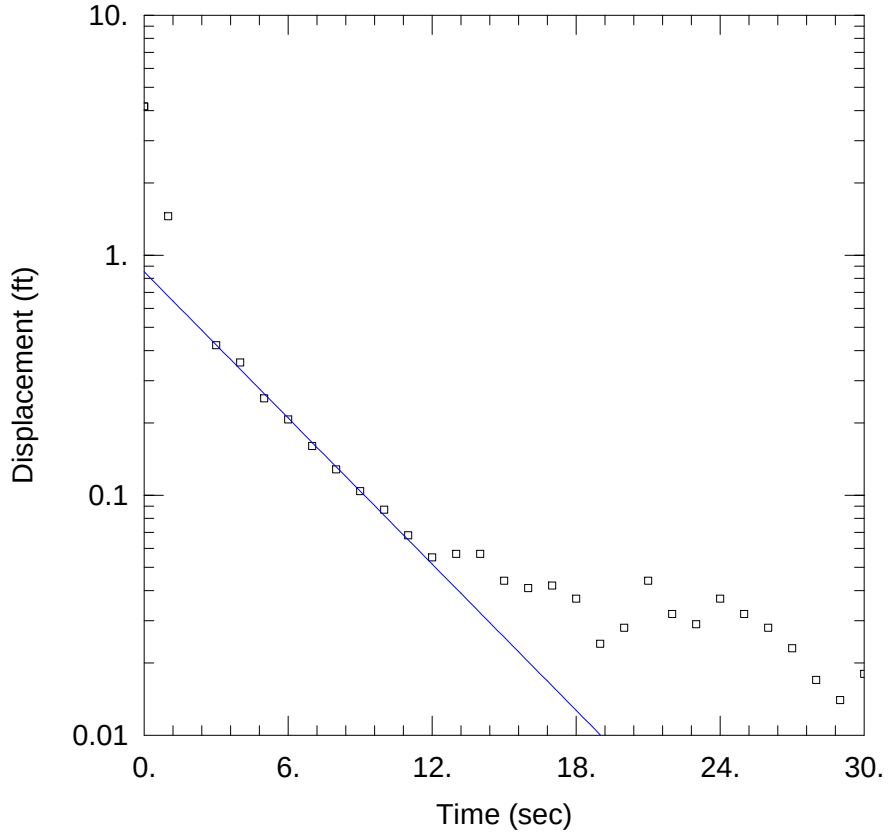
Saturated Thickness: 30. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108A_IN1)

Initial Displacement: 2.559 ft
Total Well Penetration Depth: 27.67 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.55 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108A_IN2.aqt
Date: 06/12/18 Time: 13:30:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108A
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 11.67 ft/day
y0 = 0.8526 ft

AQUIFER DATA

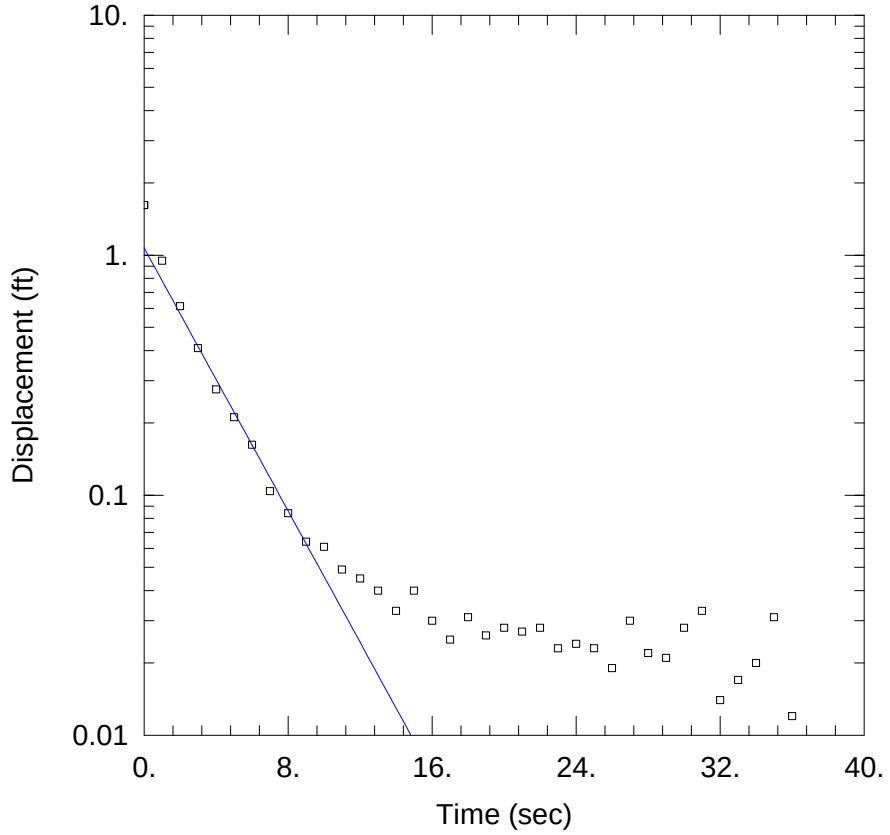
Saturated Thickness: 30. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108A_IN2)

Initial Displacement: 4.158 ft
Total Well Penetration Depth: 27.67 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.55 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108A_OUT1.aqt
Date: 06/12/18 Time: 13:31:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108A
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 15.74 ft/day
y0 = 1.071 ft

AQUIFER DATA

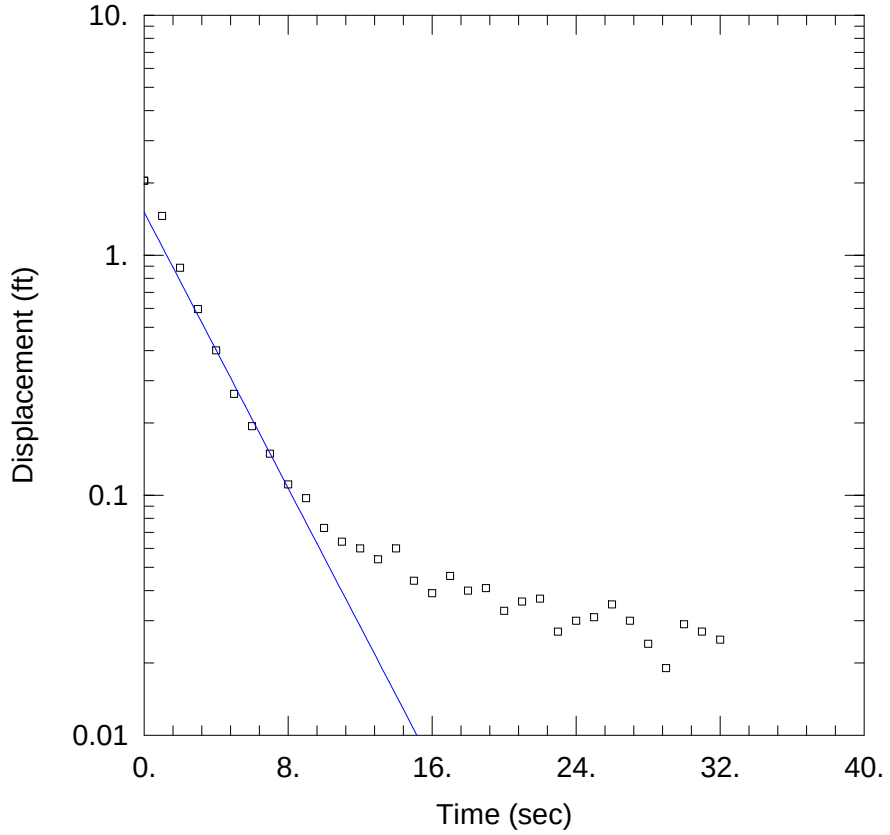
Saturated Thickness: 30. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108A_OUT1)

Initial Displacement: 1.615 ft
Total Well Penetration Depth: 27.67 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.55 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108A_OUT2.aqt
Date: 06/12/18 Time: 13:32:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108A
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 16.54 ft/day
y0 = 1.513 ft

AQUIFER DATA

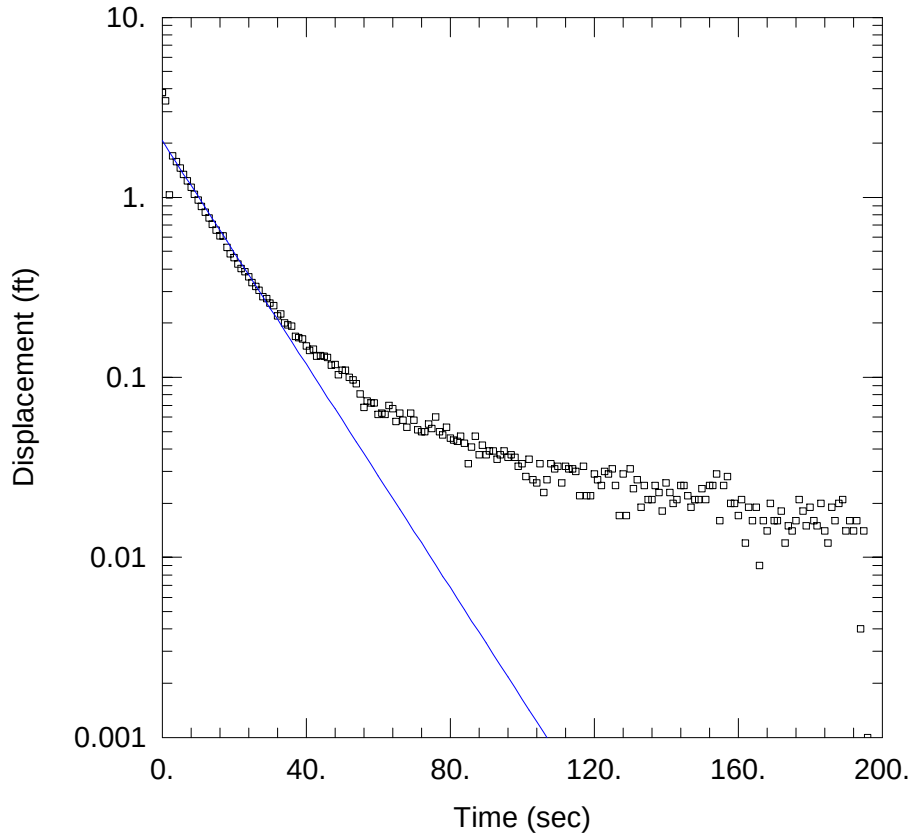
Saturated Thickness: 30. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108A_OUT2)

Initial Displacement: 2.04 ft
Total Well Penetration Depth: 27.67 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.55 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108B_IN1.aqt
Date: 06/12/18 Time: 13:34:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108B
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.339 ft/day
y0 = 2.064 ft

AQUIFER DATA

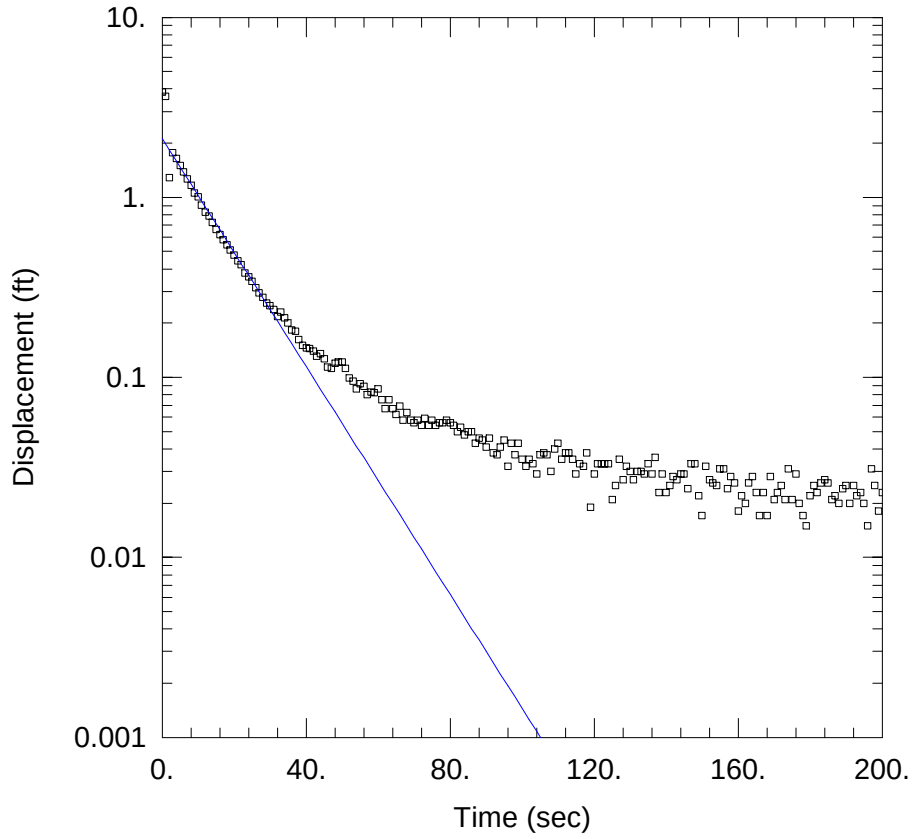
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108B_IN1)

Initial Displacement: 3.834 ft
Total Well Penetration Depth: 59.57 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 59.32 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108B_IN2.aqt
Date: 06/12/18 Time: 13:34:45

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108B
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.429 ft/day
y0 = 2.124 ft

AQUIFER DATA

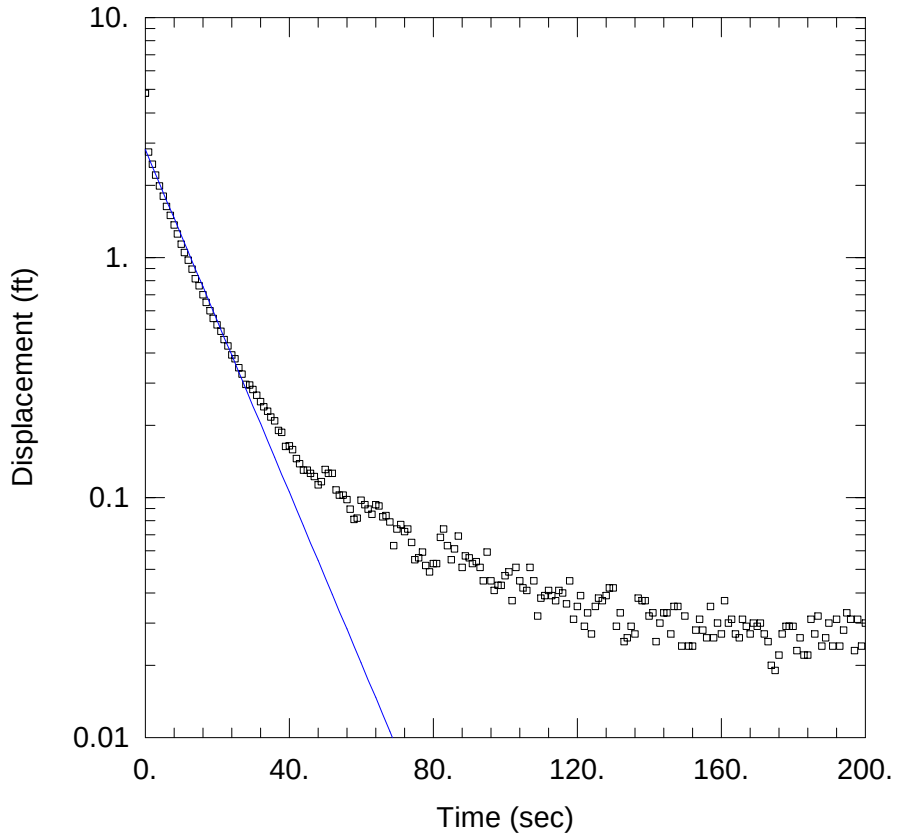
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108B_IN2)

Initial Displacement: 3.857 ft
Total Well Penetration Depth: 59.57 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 59.32 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108B_OUT1.aqt
Date: 06/12/18 Time: 13:35:37

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108B
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.989 ft/day
y0 = 2.816 ft

AQUIFER DATA

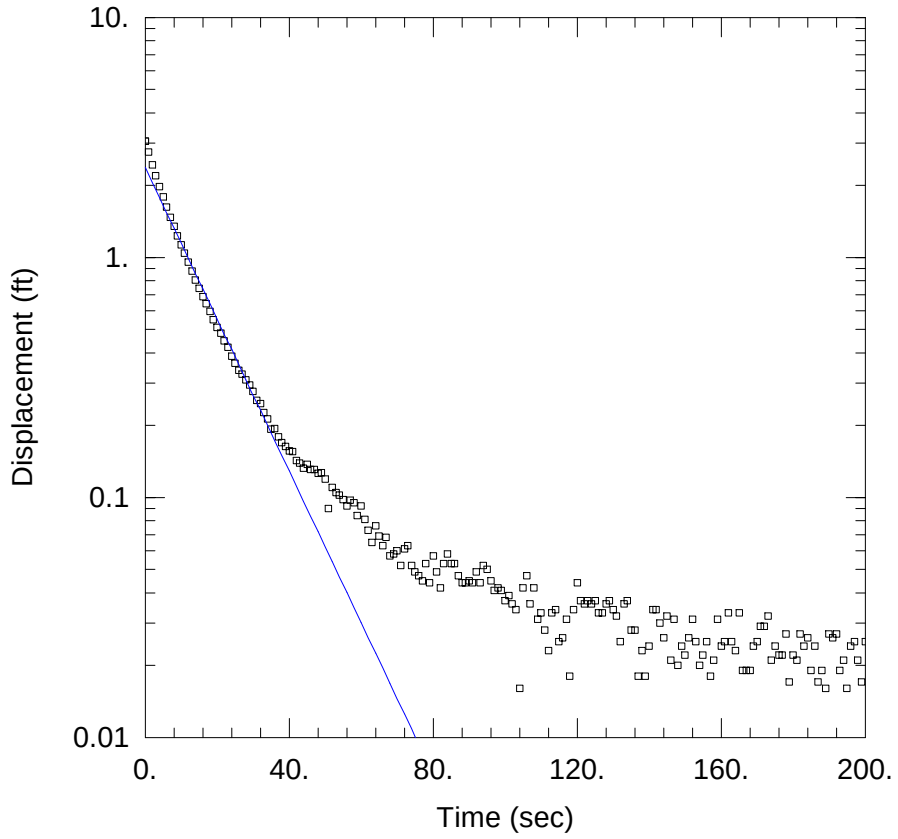
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108B_OUT1)

Initial Displacement: 4.834 ft
Total Well Penetration Depth: 59.57 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 59.32 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108B_OUT2.aqt
Date: 06/12/18 Time: 13:35:58

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108B
Test Date: 5/17/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.422 ft/day
y0 = 2.371 ft

AQUIFER DATA

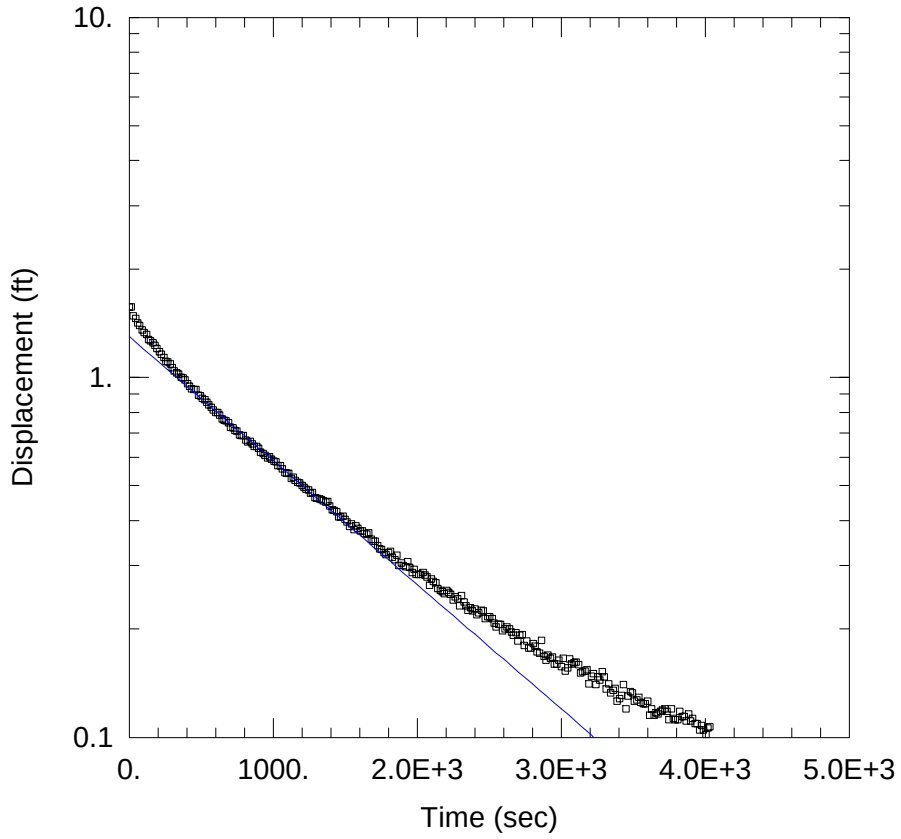
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108B_OUT2)

Initial Displacement: 3.057 ft
Total Well Penetration Depth: 59.57 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 59.32 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108C_IN1.aqt
Date: 06/12/18 Time: 13:39:48

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108C
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.05289 ft/day
y0 = 1.298 ft

AQUIFER DATA

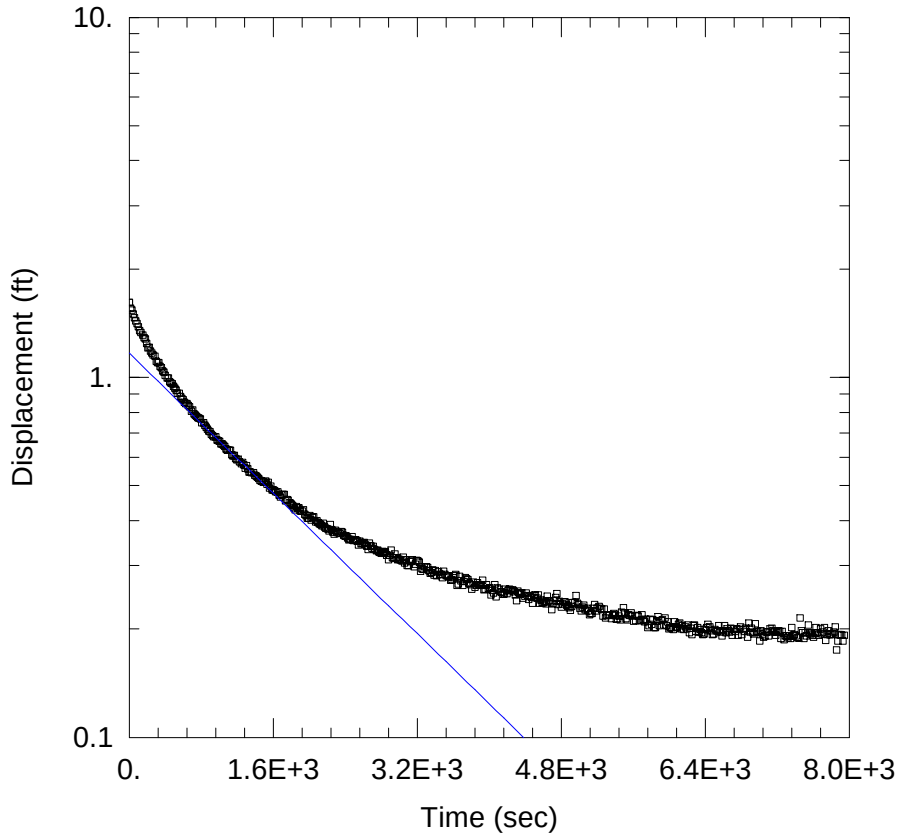
Saturated Thickness: 23.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108C_IN1)

Initial Displacement: 1.566 ft
Total Well Penetration Depth: 116.3 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 116.1 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW108C_OUT1.aqt
Date: 06/12/18 Time: 13:40:07

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW108C
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.03737 ft/day
y0 = 1.167 ft

AQUIFER DATA

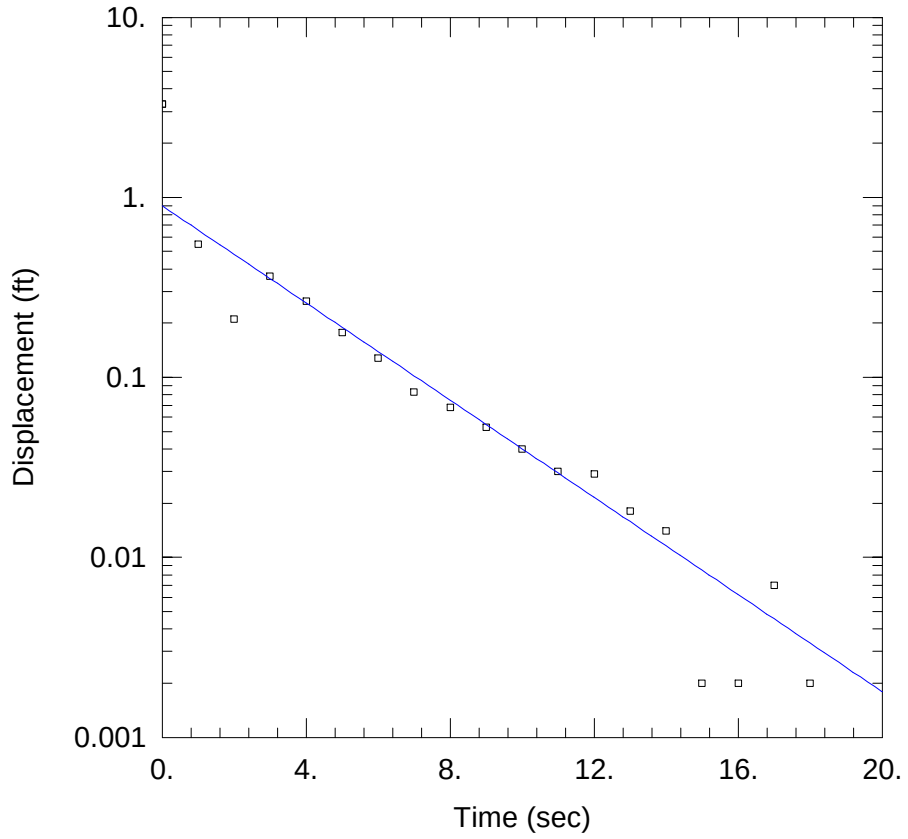
Saturated Thickness: 23.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-108C_OUT1)

Initial Displacement: 1.617 ft
Total Well Penetration Depth: 116.3 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 116.1 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW109_IN1.aqt
Date: 06/12/18 Time: 13:41:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW109
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 21.01 ft/day
y0 = 0.8973 ft

AQUIFER DATA

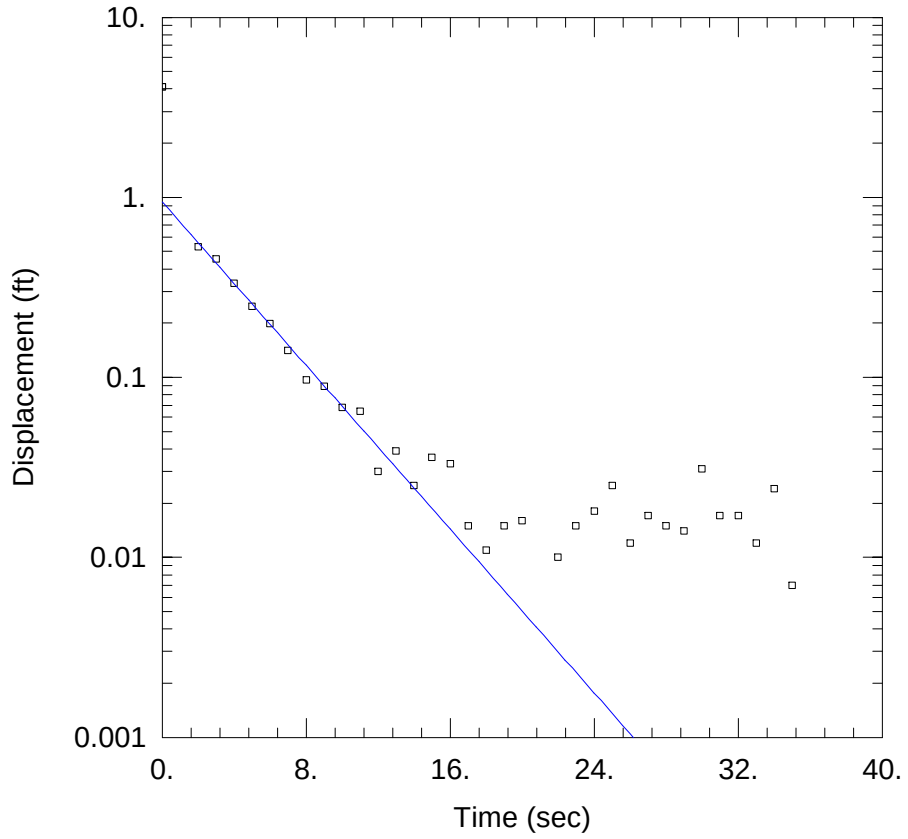
Saturated Thickness: 35.93 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-109_IN1)

Initial Displacement: 3.304 ft
Total Well Penetration Depth: 34.43 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.18 ft
Screen Length: 15. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW109_IN2.aqt
Date: 06/12/18 Time: 13:41:40

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW109
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 17.69 ft/day
y0 = 0.9447 ft

AQUIFER DATA

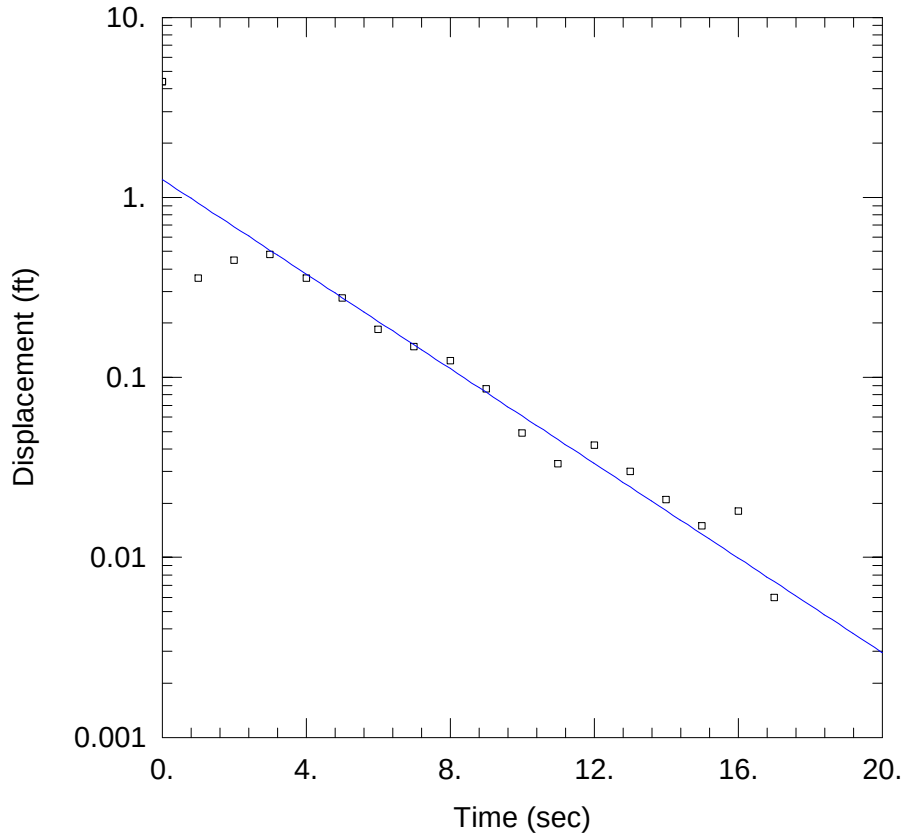
Saturated Thickness: 35.93 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-109_IN2)

Initial Displacement: 4.102 ft
Total Well Penetration Depth: 34.43 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.18 ft
Screen Length: 15. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW109_IN3.aqt
Date: 06/12/18 Time: 13:41:57

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW109
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 20.46 ft/day
y0 = 1.257 ft

AQUIFER DATA

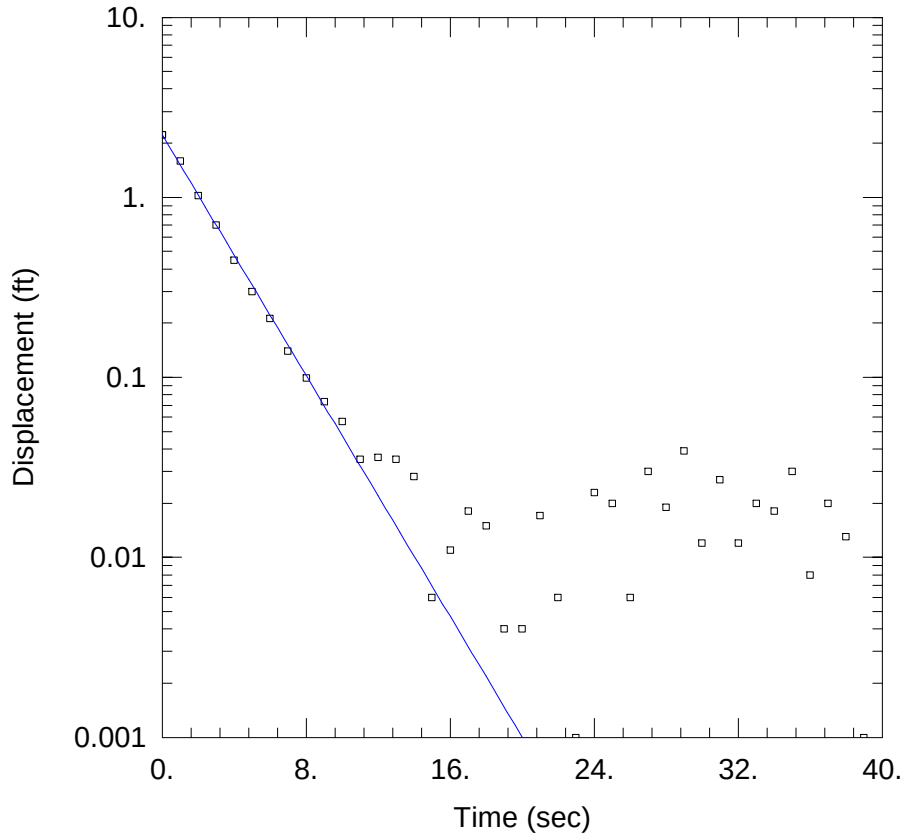
Saturated Thickness: 35.93 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-109_IN3)

Initial Displacement: 4.393 ft
Total Well Penetration Depth: 34.43 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.18 ft
Screen Length: 15. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW109_OUT1.aqt
Date: 06/12/18 Time: 13:42:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW109
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 26.04 ft/day
y0 = 2.229 ft

AQUIFER DATA

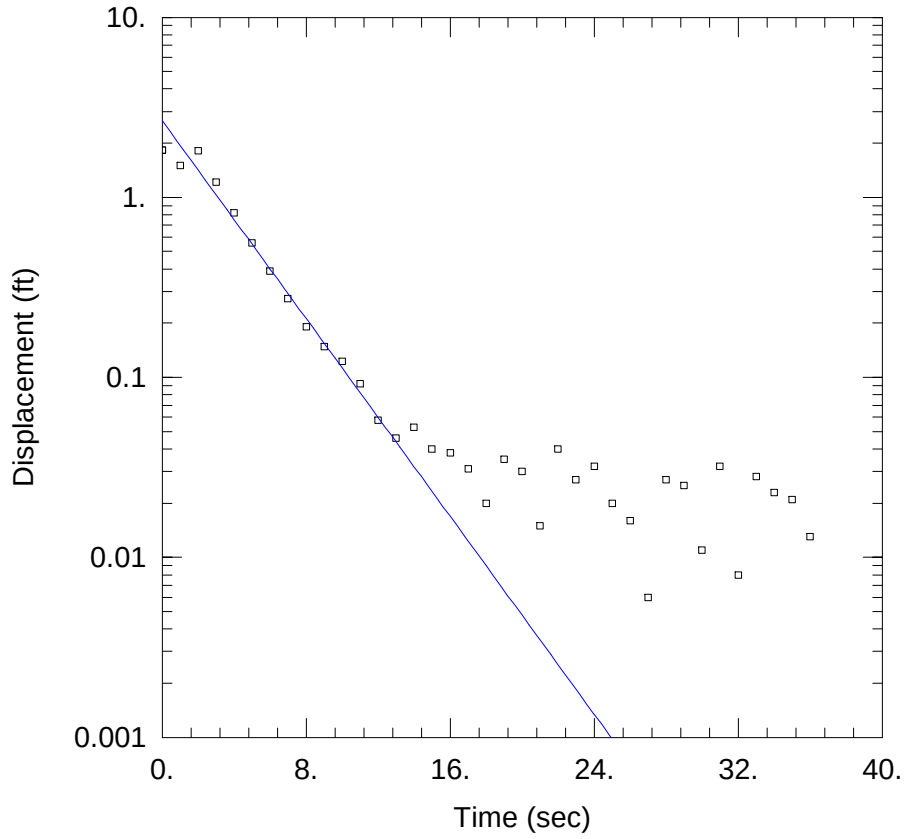
Saturated Thickness: 35.93 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-109_OUT1)

Initial Displacement: 2.23 ft
Total Well Penetration Depth: 34.43 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.18 ft
Screen Length: 15. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW109_OUT2.aqt
Date: 06/12/18 Time: 13:42:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW109
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 21.39 ft/day
y0 = 2.665 ft

AQUIFER DATA

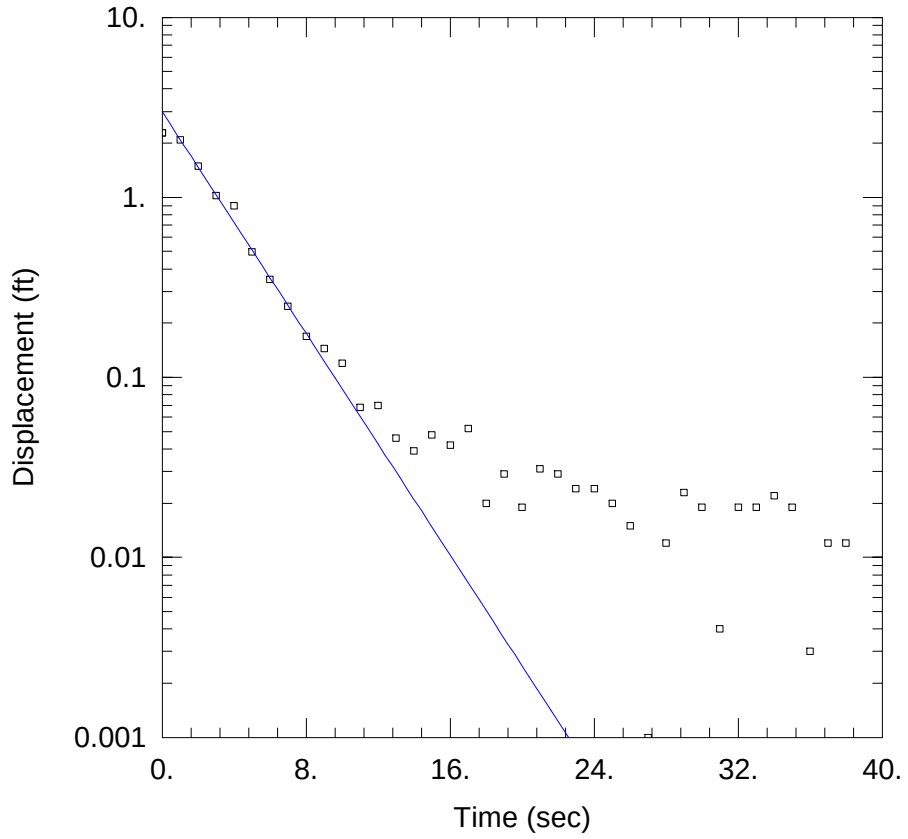
Saturated Thickness: 35.93 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-109_OUT2)

Initial Displacement: 1.824 ft
Total Well Penetration Depth: 34.43 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.18 ft
Screen Length: 15. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW109_OUT3.aqt
Date: 06/12/18 Time: 13:42:43

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW109
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 23.96 ft/day
y0 = 2.988 ft

AQUIFER DATA

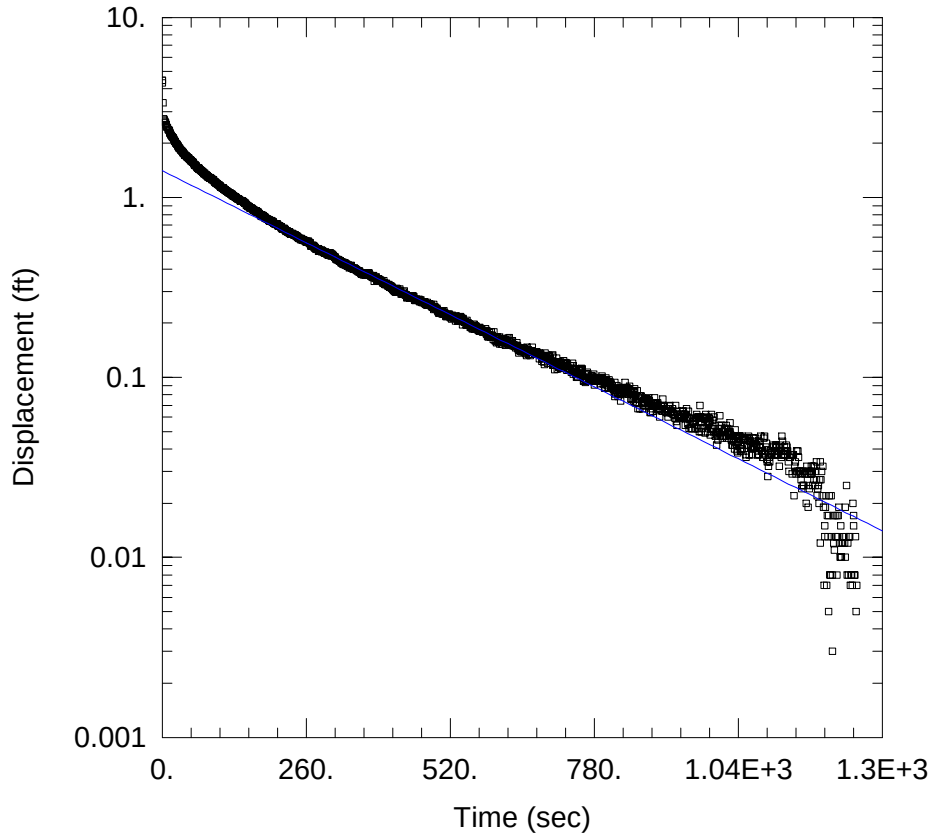
Saturated Thickness: 35.93 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-109_OUT3)

Initial Displacement: 2.283 ft
Total Well Penetration Depth: 34.43 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.18 ft
Screen Length: 15. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW110_IN1.aqt
Date: 06/12/18 Time: 13:43:50

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW110
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.2084 ft/day
y0 = 1.407 ft

AQUIFER DATA

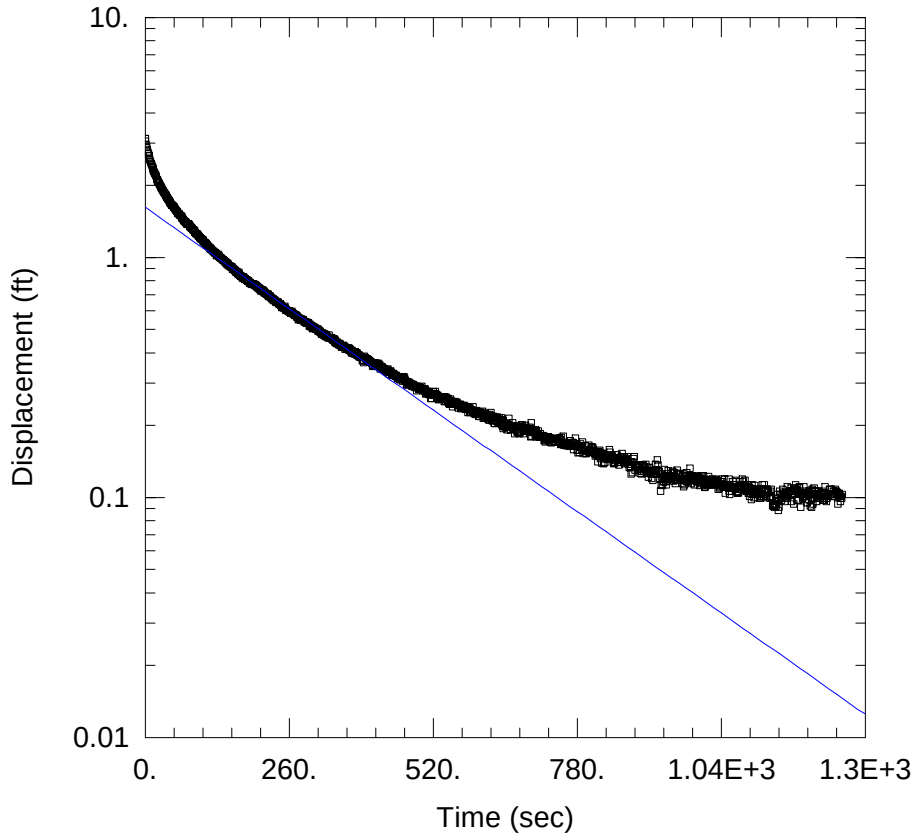
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-110_IN1)

Initial Displacement: 4.469 ft
Total Well Penetration Depth: 48.25 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 48. ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW110_OUT1.aqt
Date: 06/12/18 Time: 13:44:20

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW110
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.2201 ft/day
y0 = 1.618 ft

AQUIFER DATA

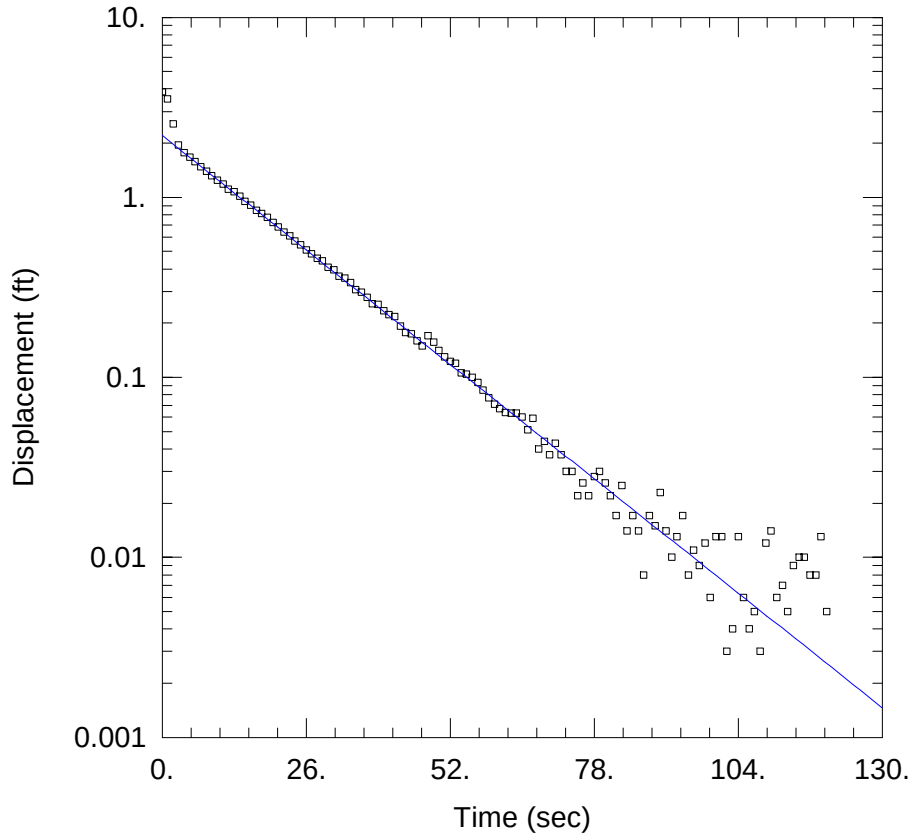
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-110_OUT1)

Initial Displacement: 3.129 ft
Total Well Penetration Depth: 48.25 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 48. ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111A_IN1.aqt
Date: 06/12/18 Time: 13:45:29

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.604 ft/day
y0 = 2.203 ft

AQUIFER DATA

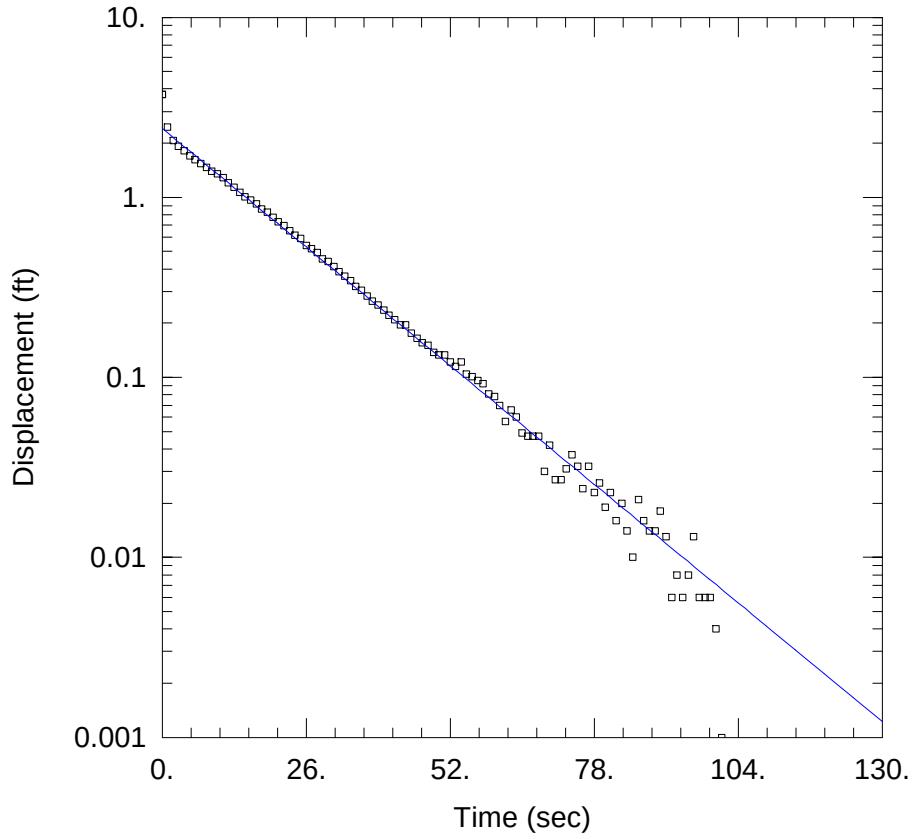
Saturated Thickness: 39.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111A_IN1)

Initial Displacement: 3.846 ft
Total Well Penetration Depth: 23.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 23.19 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111A_IN2.aqt
Date: 06/12/18 Time: 13:45:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.701 ft/day
y0 = 2.414 ft

AQUIFER DATA

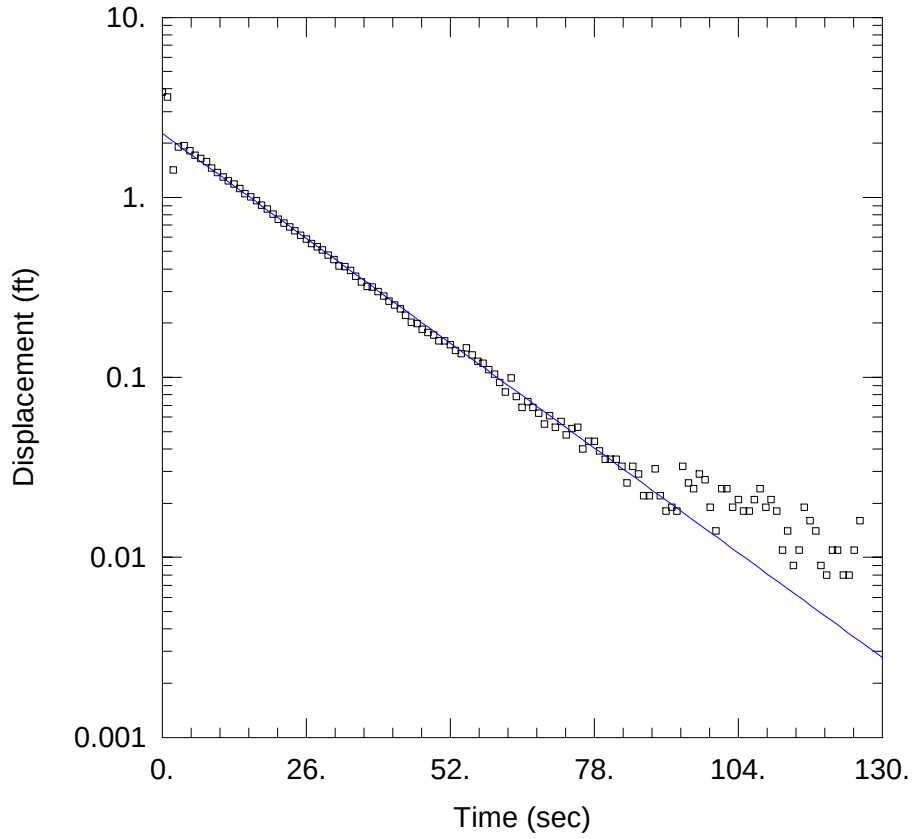
Saturated Thickness: 39.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111A_IN2)

Initial Displacement: 3.728 ft
Total Well Penetration Depth: 23.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 23.19 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111A_IN3.aqt
Date: 06/12/18 Time: 13:46:02

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.386 ft/day
y0 = 2.263 ft

AQUIFER DATA

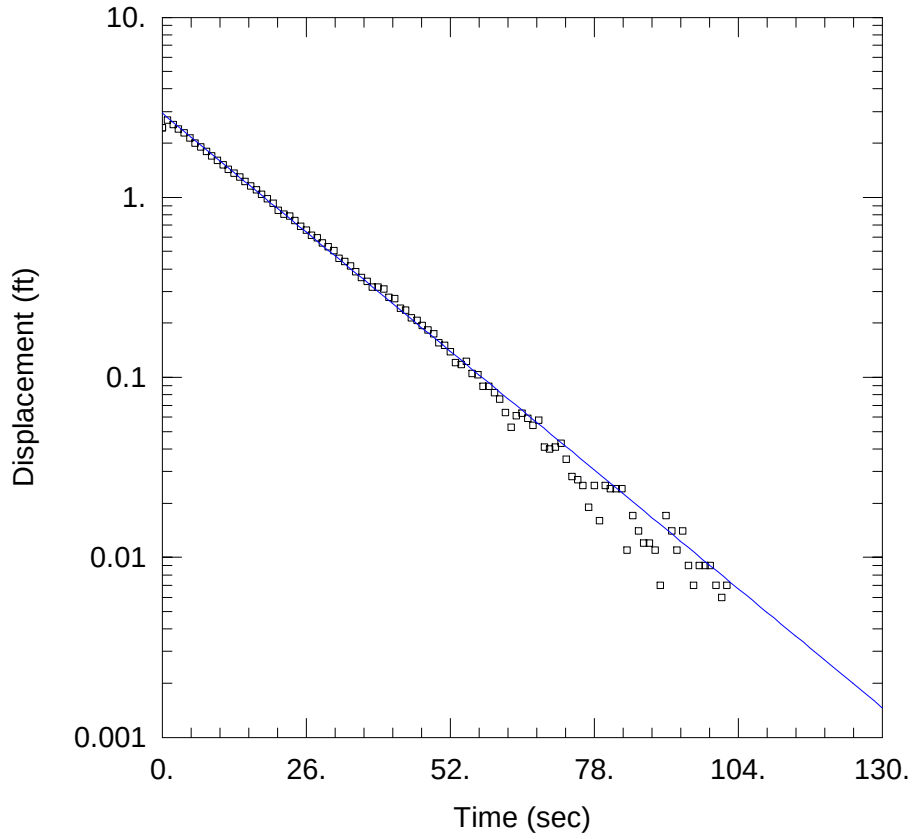
Saturated Thickness: 39.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111A_IN3)

Initial Displacement: 3.854 ft
Total Well Penetration Depth: 23.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 23.19 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111A_OUT1.aqt
Date: 06/12/18 Time: 13:46:15

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.706 ft/day
y0 = 2.931 ft

AQUIFER DATA

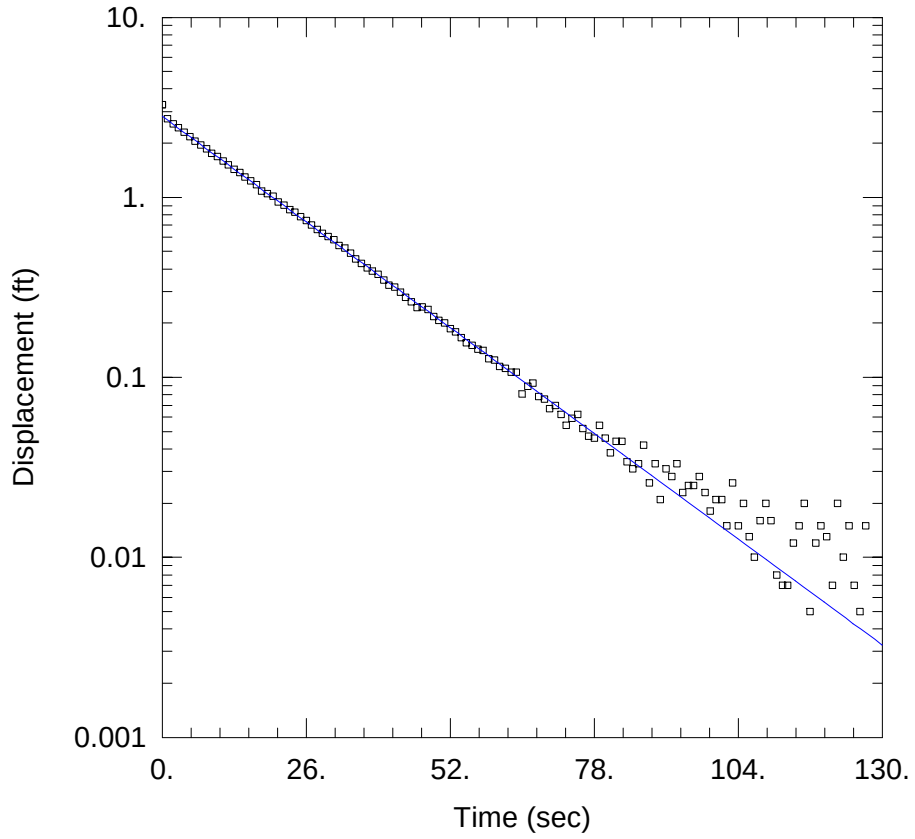
Saturated Thickness: 39.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111A_OUT1)

Initial Displacement: 2.429 ft
Total Well Penetration Depth: 23.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 23.19 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111A_OUT2.aqt
Date: 06/12/18 Time: 13:46:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.407 ft/day
y0 = 2.822 ft

AQUIFER DATA

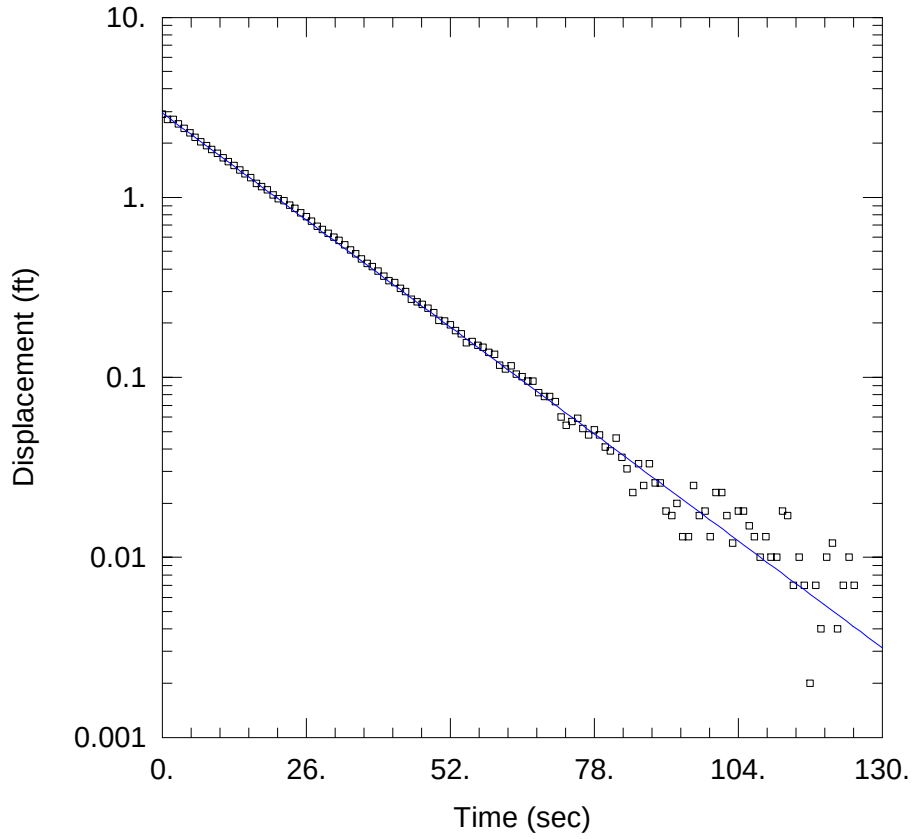
Saturated Thickness: 39.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111A_OUT2)

Initial Displacement: 3.281 ft
Total Well Penetration Depth: 23.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 23.19 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111A_OUT3.aqt
Date: 06/12/18 Time: 13:46:38

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111A
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.436 ft/day
y0 = 2.945 ft

AQUIFER DATA

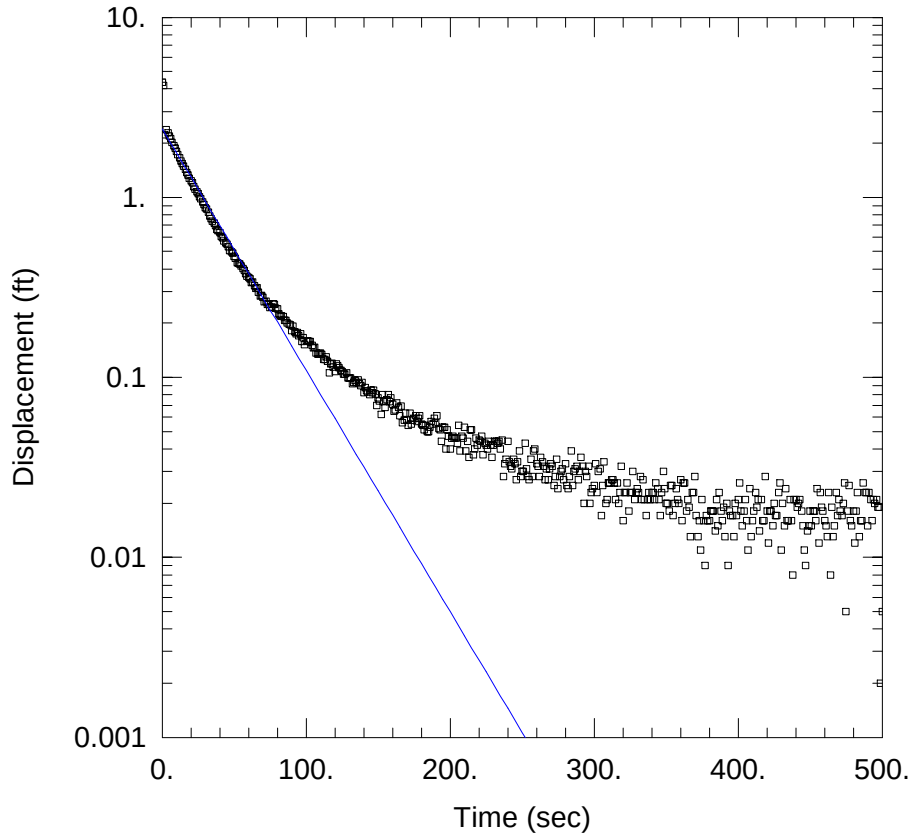
Saturated Thickness: 39.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111A_OUT3)

Initial Displacement: 2.9 ft
Total Well Penetration Depth: 23.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 23.19 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111B_IN1.aqt
Date: 06/12/18 Time: 13:47:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111B
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.904 ft/day
y0 = 2.403 ft

AQUIFER DATA

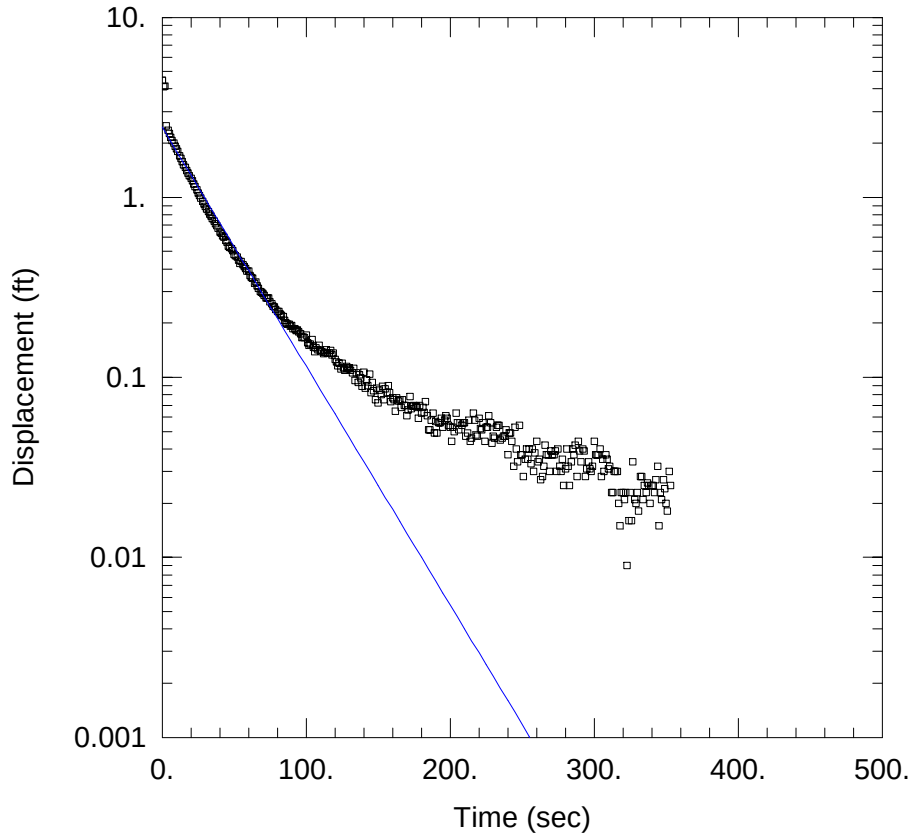
Saturated Thickness: 21.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111B_IN1)

Initial Displacement: 4.357 ft
Total Well Penetration Depth: 66.01 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 65.76 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111B_IN2.aqt
Date: 06/12/18 Time: 13:48:47

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111B
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.884 ft/day
y0 = 2.448 ft

AQUIFER DATA

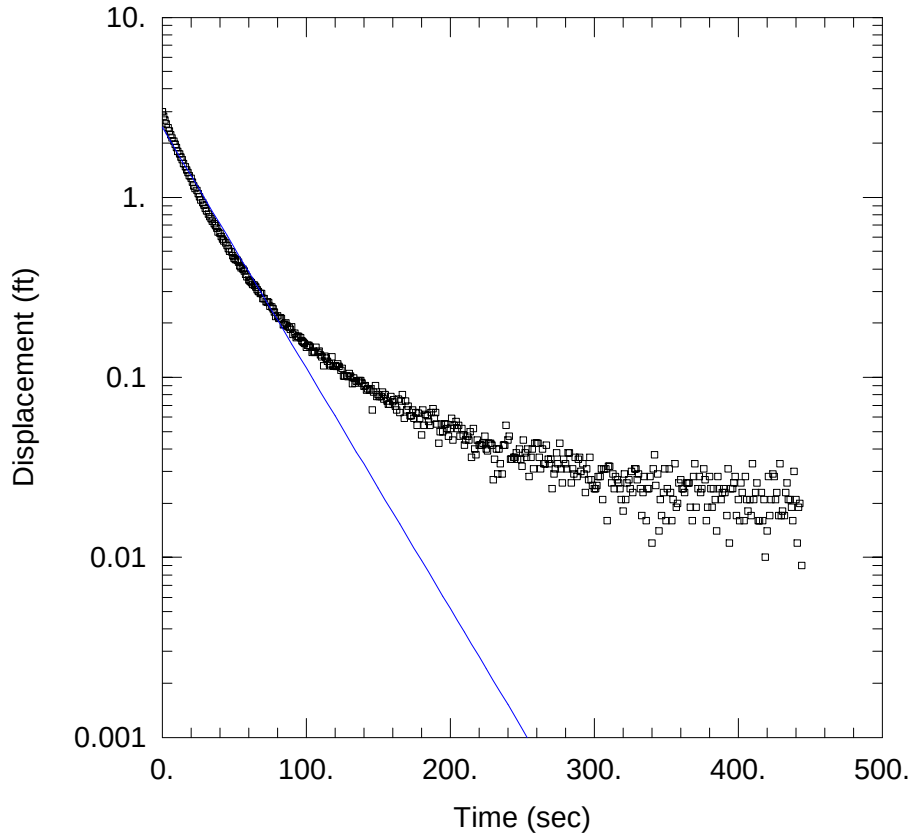
Saturated Thickness: 21.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111B_IN2)

Initial Displacement: 4.46 ft
Total Well Penetration Depth: 66.01 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 65.76 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111B_OUT1.aqt
Date: 06/12/18 Time: 13:49:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111B
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.897 ft/day
y0 = 2.448 ft

AQUIFER DATA

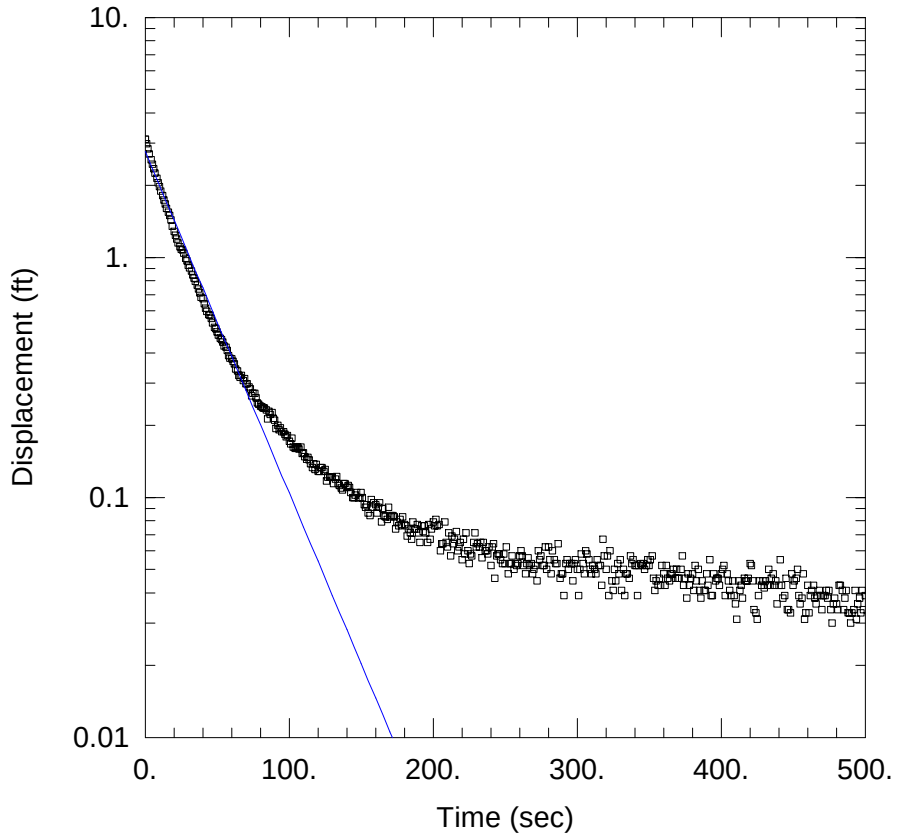
Saturated Thickness: 21.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111B_OUT1)

Initial Displacement: 2.984 ft
Total Well Penetration Depth: 66.01 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 65.76 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW111B_OUT2.aqt
Date: 06/12/18 Time: 13:50:04

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW111B
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.02 ft/day
y0 = 2.764 ft

AQUIFER DATA

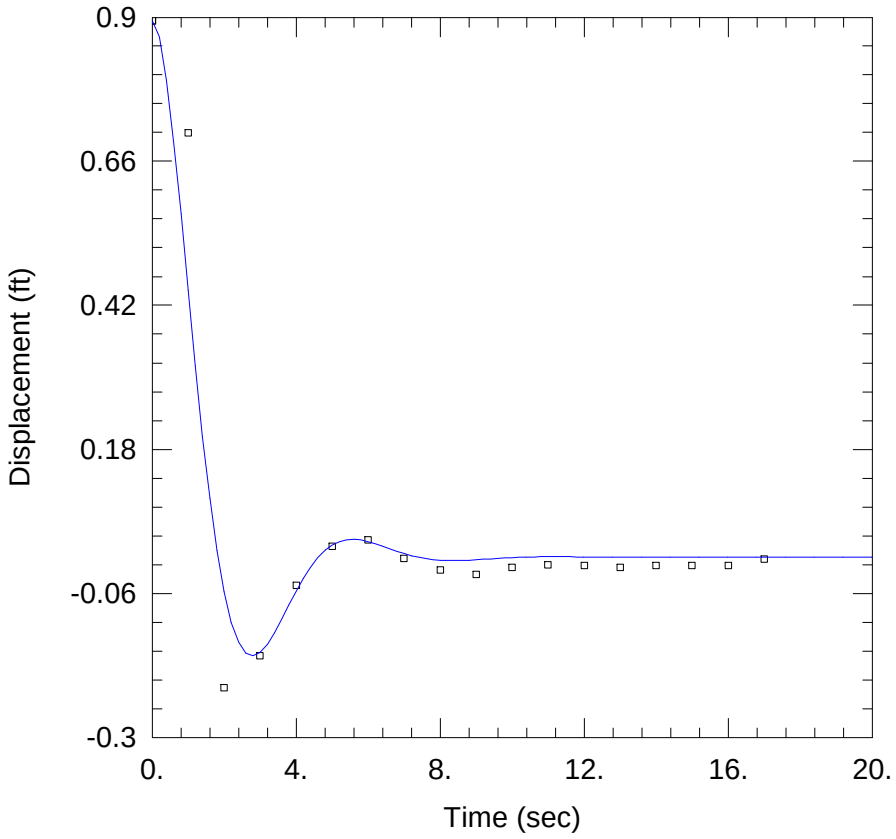
Saturated Thickness: 21.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-111B_OUT2)

Initial Displacement: 3.111 ft
Total Well Penetration Depth: 66.01 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 65.76 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112A_IN1.aqt
Date: 06/12/18 Time: 13:52:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112A
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 68.69 ft/day
Le = 19.56 ft

AQUIFER DATA

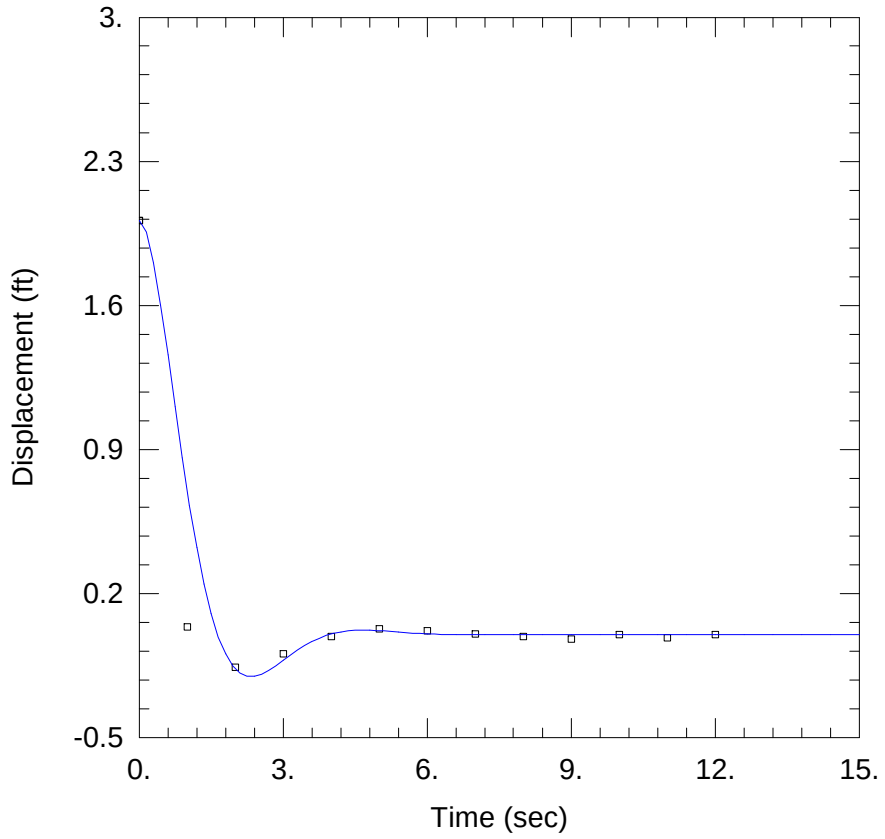
Saturated Thickness: 33.54 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112A_IN1)

Initial Displacement: 0.894 ft
Total Well Penetration Depth: 30.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 30.44 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112A_IN2.aqt
Date: 06/12/18 Time: 13:52:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112A
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 72.04 ft/day
Le = 11.59 ft

AQUIFER DATA

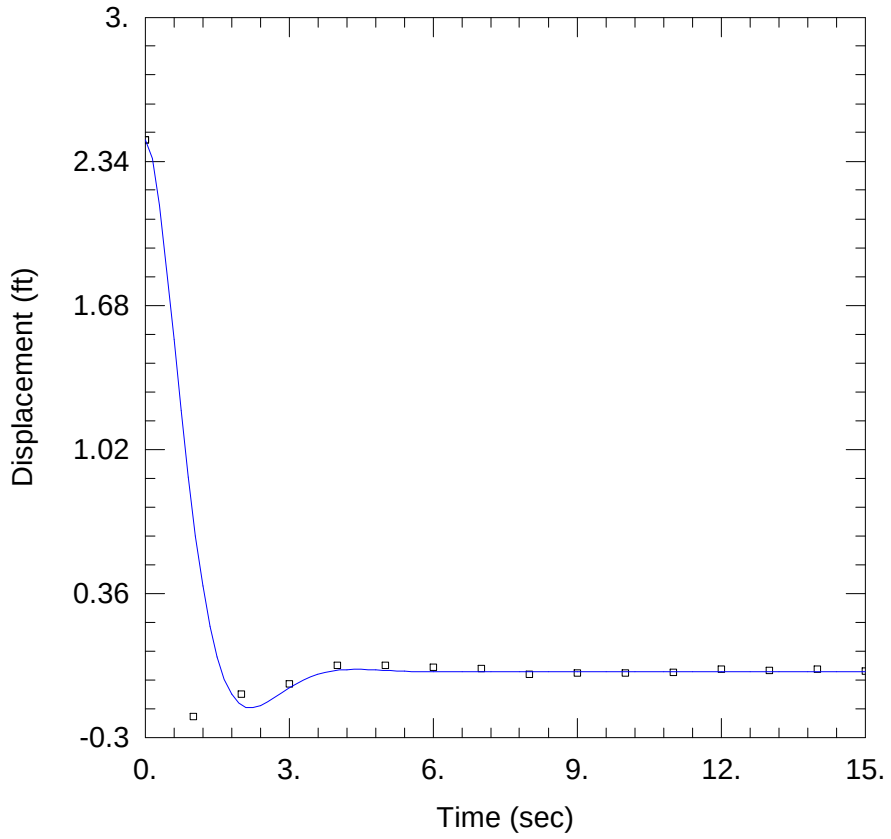
Saturated Thickness: 33.54 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112A_IN2)

Initial Displacement: 2.012 ft
Total Well Penetration Depth: 30.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 30.44 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112A_IN3.aqt
Date: 06/12/18 Time: 13:53:00

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112A
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 73.61 ft/day
Le = 9.08 ft

AQUIFER DATA

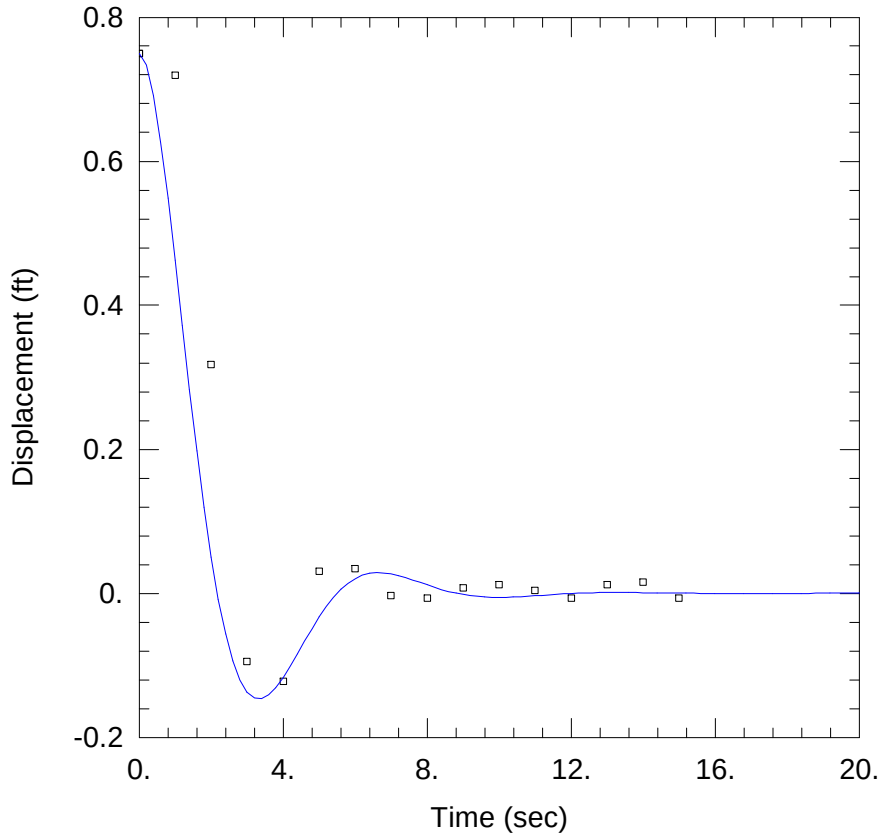
Saturated Thickness: 33.54 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112A_IN3)

Initial Displacement: 2.439 ft
Total Well Penetration Depth: 30.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 30.44 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112A_OUT1.aqt
Date: 06/12/18 Time: 13:53:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112A
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 58.67 ft/day
Le = 28.39 ft

AQUIFER DATA

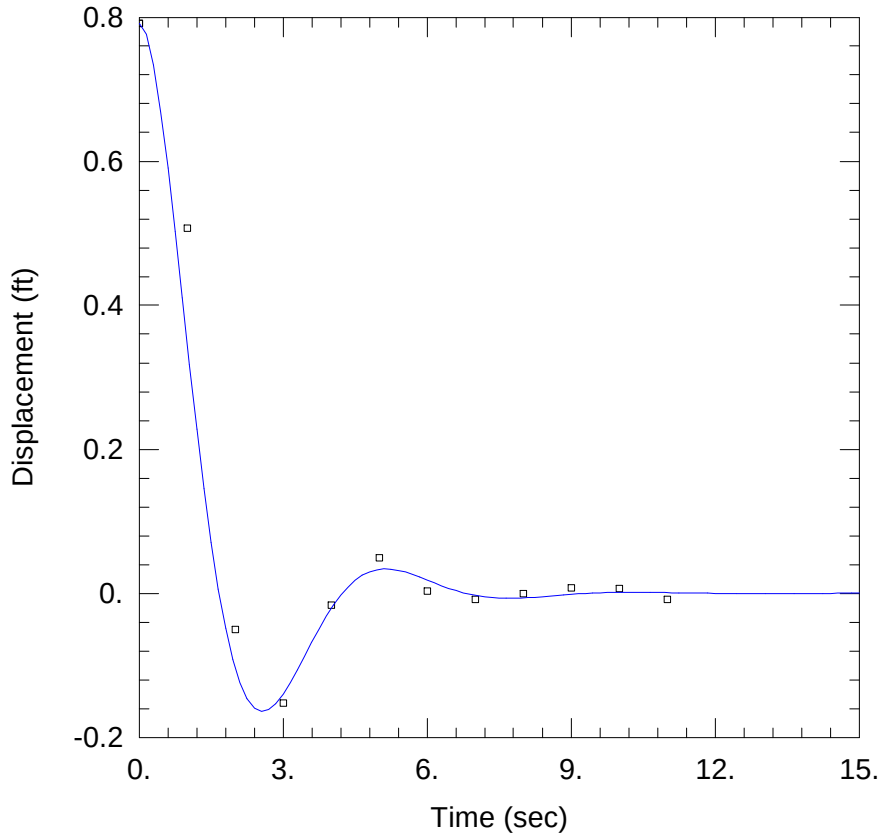
Saturated Thickness: 33.54 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112A_OUT1)

Initial Displacement: 0.75 ft
Total Well Penetration Depth: 30.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 30.44 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112A_OUT2.aqt
Date: 06/12/18 Time: 13:53:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112A
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 77.7 ft/day
Le = 17.18 ft

AQUIFER DATA

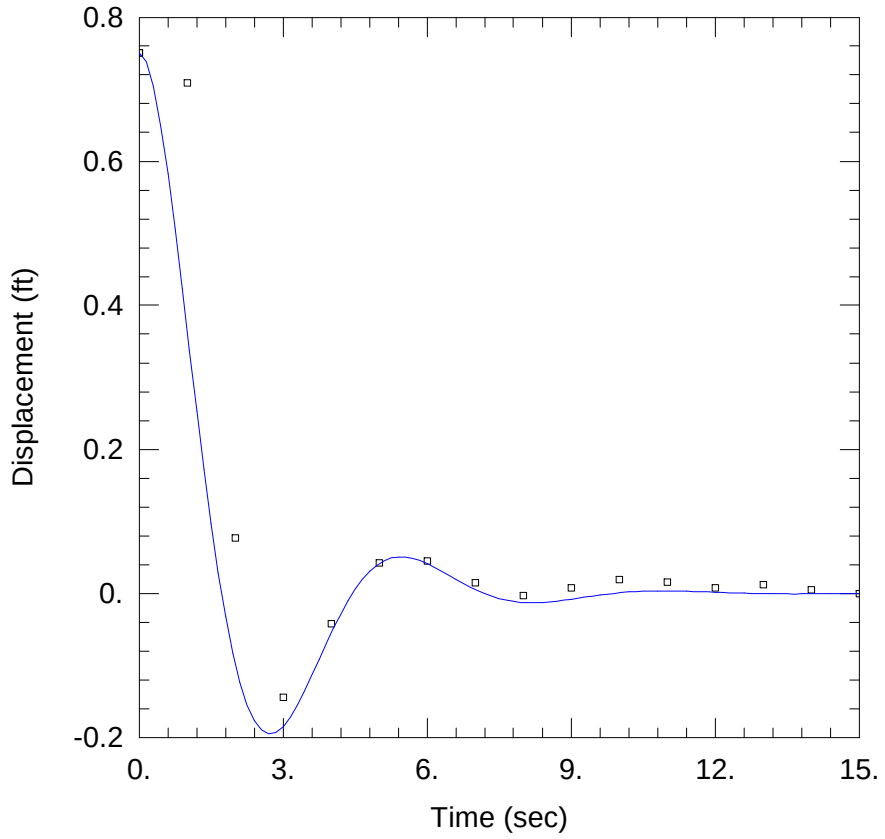
Saturated Thickness: 33.54 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112A_OUT2)

Initial Displacement: 0.792 ft
Total Well Penetration Depth: 30.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 30.44 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112A_OUT3.aqt
Date: 06/12/18 Time: 13:53:59

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112A
Test Date: 5/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 80.9 ft/day
Le = 20.51 ft

AQUIFER DATA

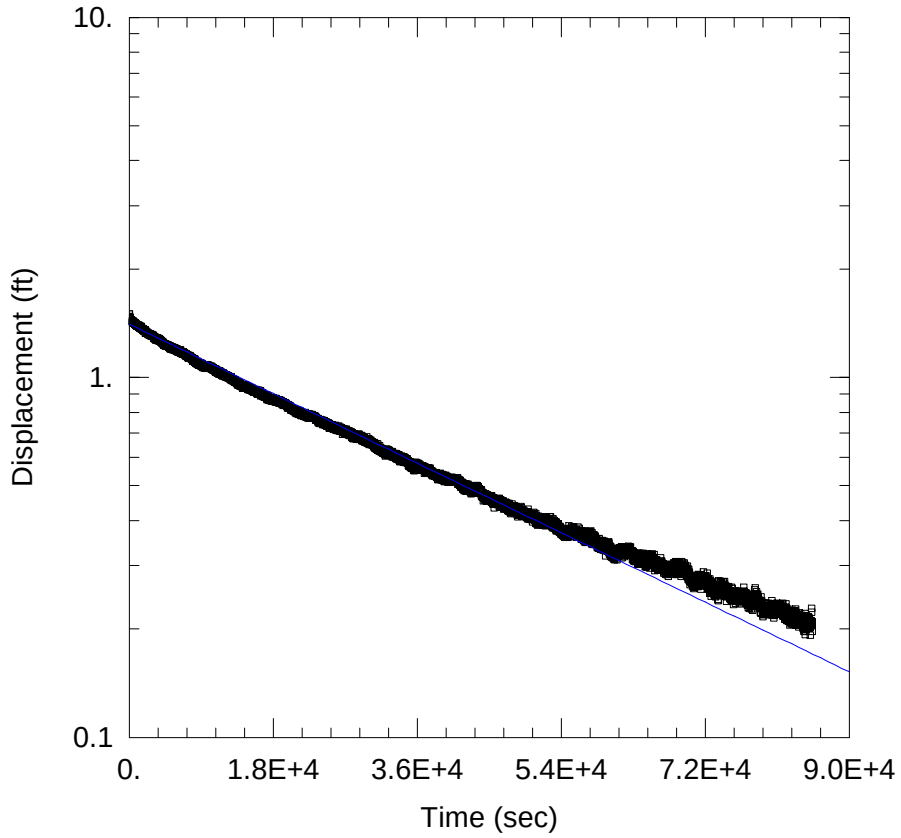
Saturated Thickness: 33.54 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112A_OUT3)

Initial Displacement: 0.751 ft
Total Well Penetration Depth: 30.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 30.44 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112B_IN1.aqt
Date: 06/12/18 Time: 13:55:09

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112B
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.001482 ft/day
y0 = 1.405 ft

AQUIFER DATA

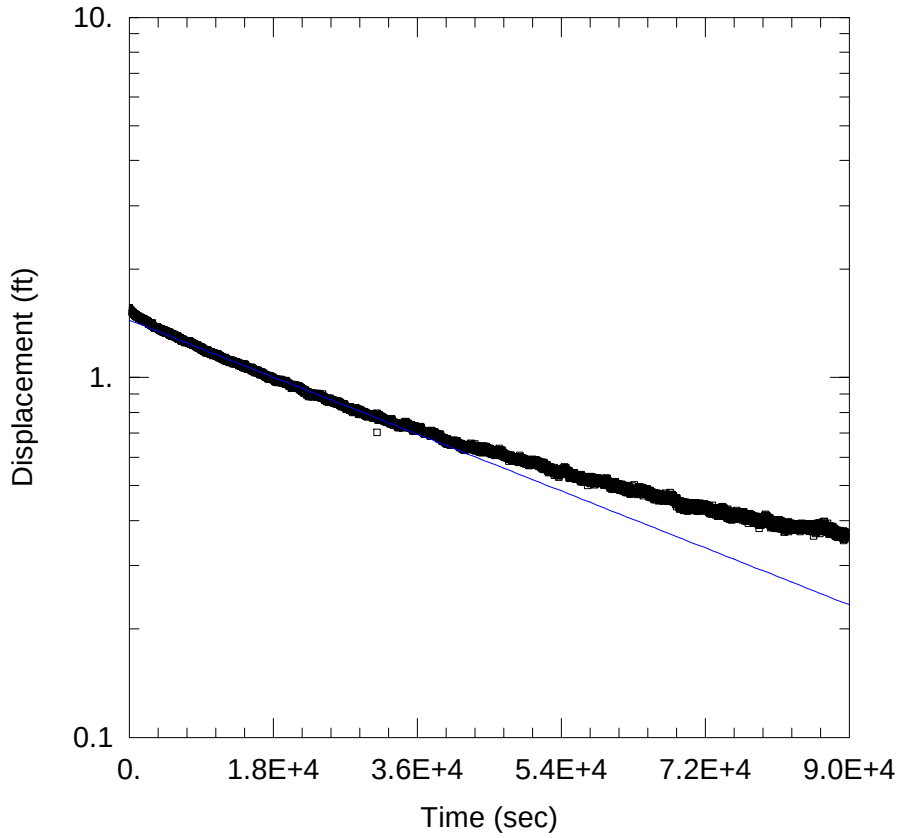
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112B_IN1)

Initial Displacement: 1.497 ft
Total Well Penetration Depth: 54.91 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 54.66 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW112B_OUT1.aqt
Date: 06/12/18 Time: 13:55:25

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW112B
Test Date: 5/21/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.001214 ft/day
y0 = 1.442 ft

AQUIFER DATA

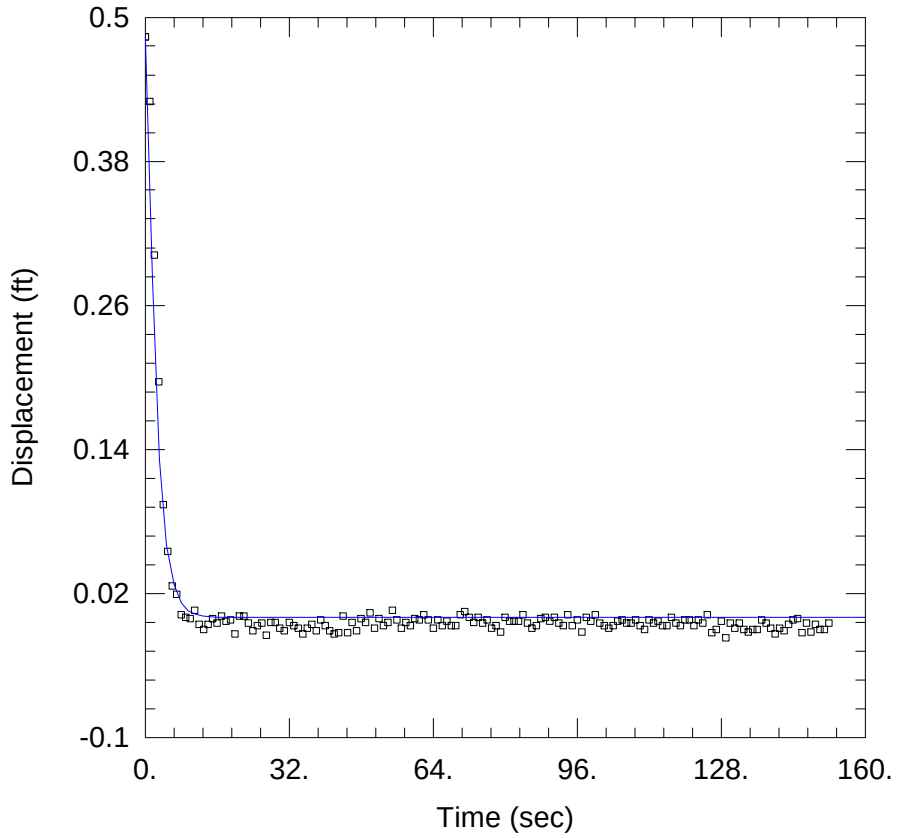
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-112B_OUT1)

Initial Displacement: 1.554 ft
Total Well Penetration Depth: 54.91 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 54.66 ft
Screen Length: 20. ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\MW13_IN1.aqt
Date: 01/28/19 Time: 09:11:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: MW-13
Test Date: 11/29/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 112. ft/day
Le = 31.88 ft

AQUIFER DATA

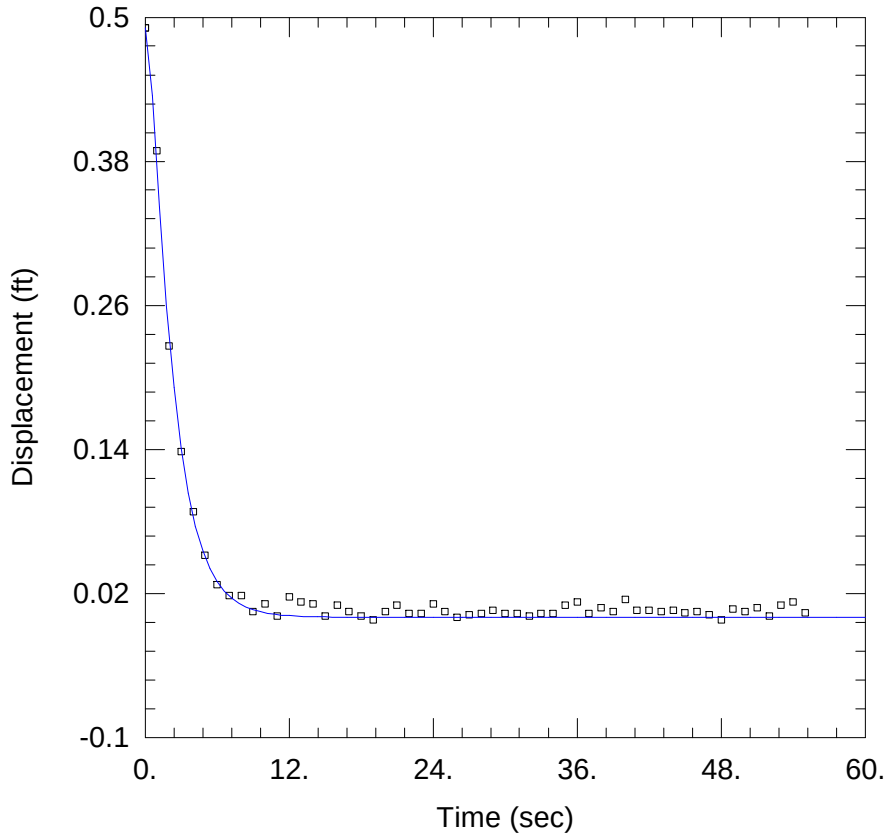
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-13_IN1)

Initial Displacement: 0.484 ft
Total Well Penetration Depth: 12.88 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.88 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\MW13_IN2.aqt
Date: 01/28/19 Time: 09:11:42

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: MW-13
Test Date: 11/29/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 115.2 ft/day
Le = 31.88 ft

AQUIFER DATA

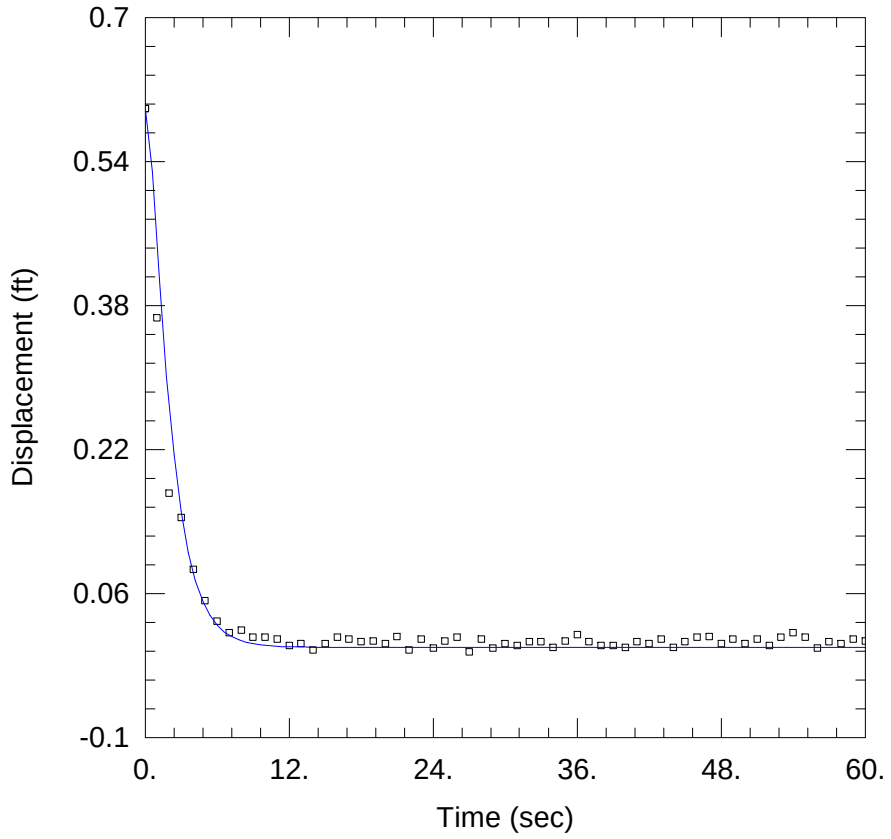
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-13_IN2)

Initial Displacement: 0.491 ft
Total Well Penetration Depth: 12.88 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.88 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\MW13_IN3.aqt
Date: 01/28/19 Time: 09:11:58

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: MW-13
Test Date: 11/29/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 125.1 ft/day
Le = 31.88 ft

AQUIFER DATA

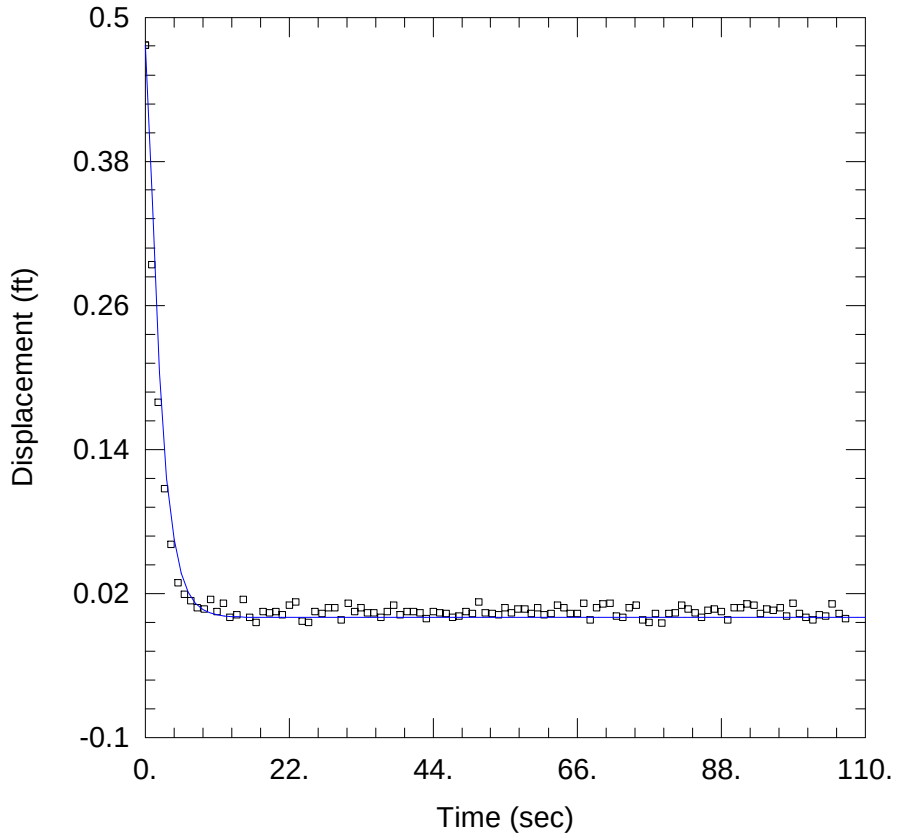
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-13_IN3)

Initial Displacement: 0.599 ft
Total Well Penetration Depth: 12.88 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.88 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\MW13_OUT1.aqt
Date: 01/28/19 Time: 09:12:15

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: MW-13
Test Date: 11/29/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 116. ft/day
Le = 31.88 ft

AQUIFER DATA

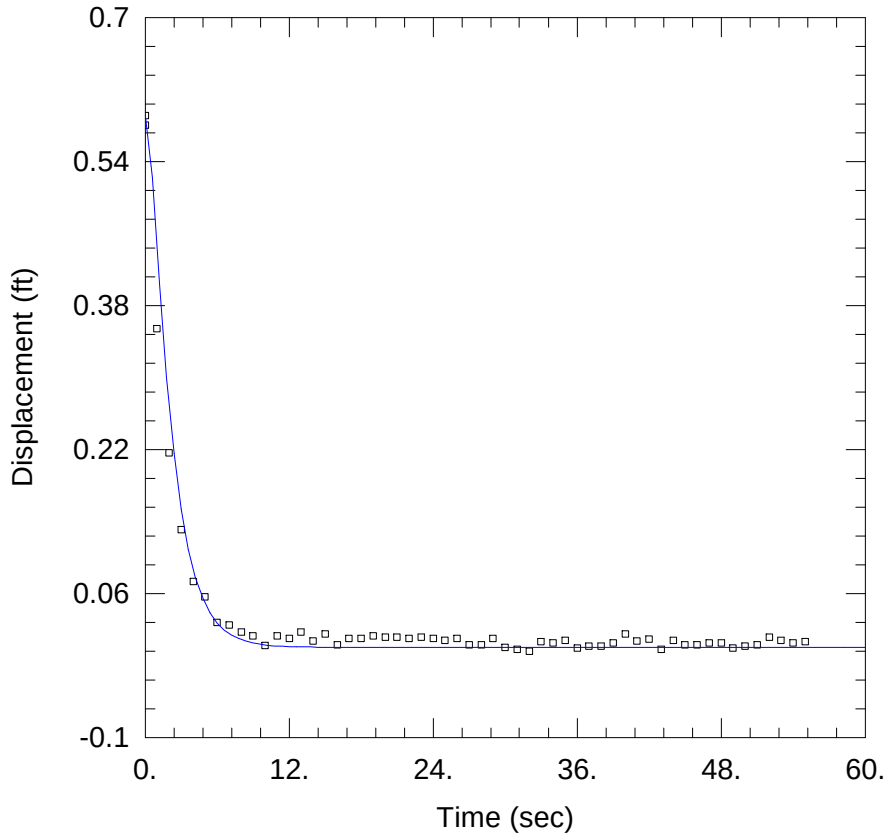
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-13_OUT1)

Initial Displacement: 0.477 ft
Total Well Penetration Depth: 12.88 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.88 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\MW13_OUT2.aqt
Date: 01/28/19 Time: 09:12:29

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: MW-13
Test Date: 11/29/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 122.6 ft/day
Le = 31.88 ft

AQUIFER DATA

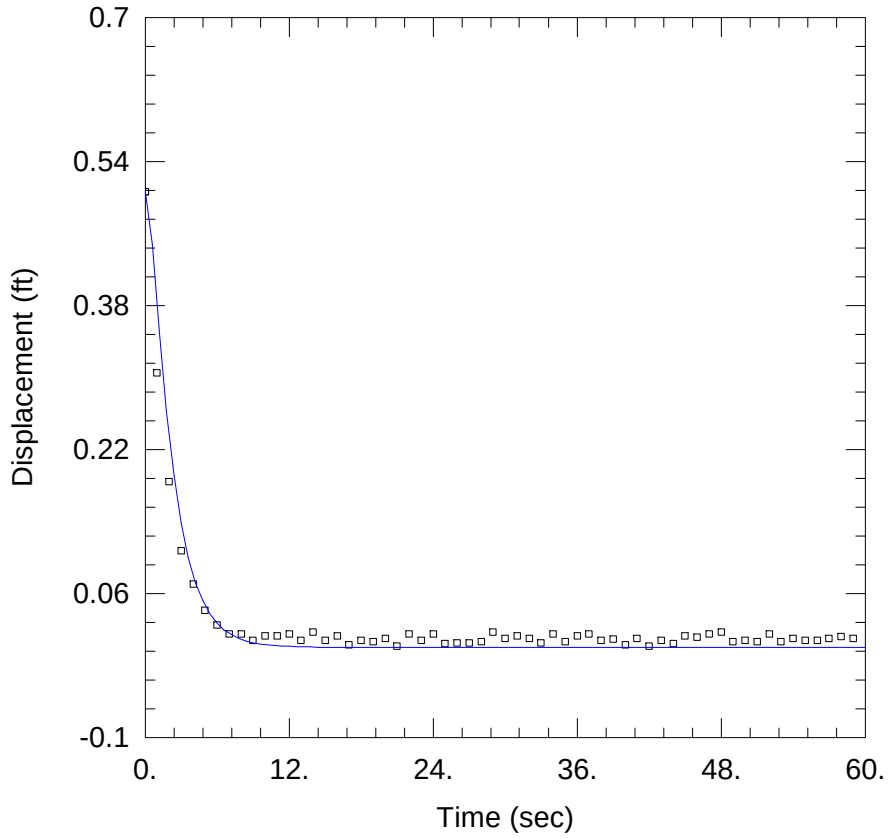
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-13_OUT2)

Initial Displacement: 0.591 ft
Total Well Penetration Depth: 12.88 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.88 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\MW13_OUT3.aqt
Date: 01/28/19 Time: 09:12:50

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: MW-13
Test Date: 11/29/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 119.1 ft/day
Le = 31.88 ft

AQUIFER DATA

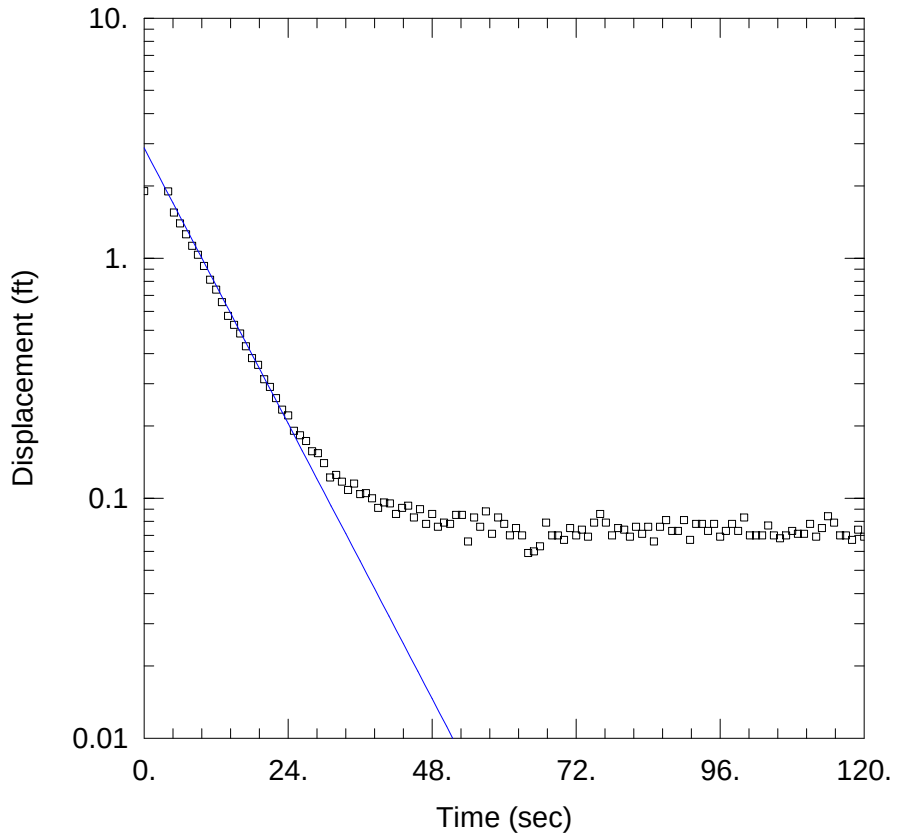
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-13_OUT3)

Initial Displacement: 0.506 ft
Total Well Penetration Depth: 12.88 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.88 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_IN1_0710.aqt
Date: 07/26/18 Time: 09:57:40

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 20.2 ft/day
y0 = 2.877 ft

AQUIFER DATA

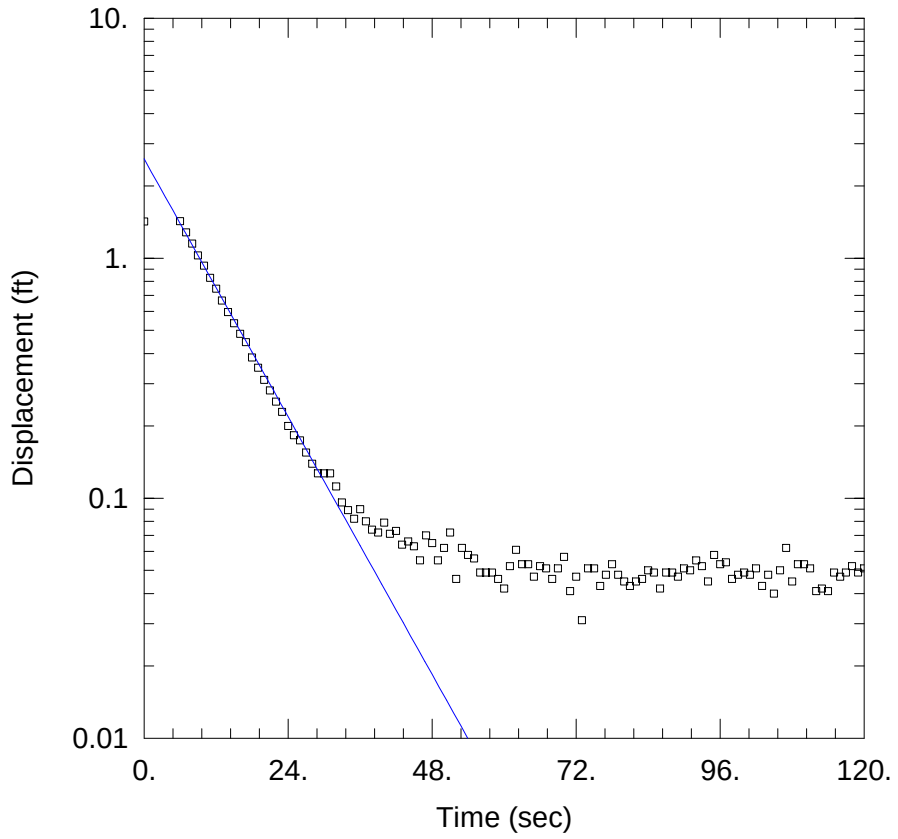
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 1.9 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_IN1_0718.aqt
Date: 07/26/18 Time: 09:57:57

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 18.92 ft/day
y0 = 2.592 ft

AQUIFER DATA

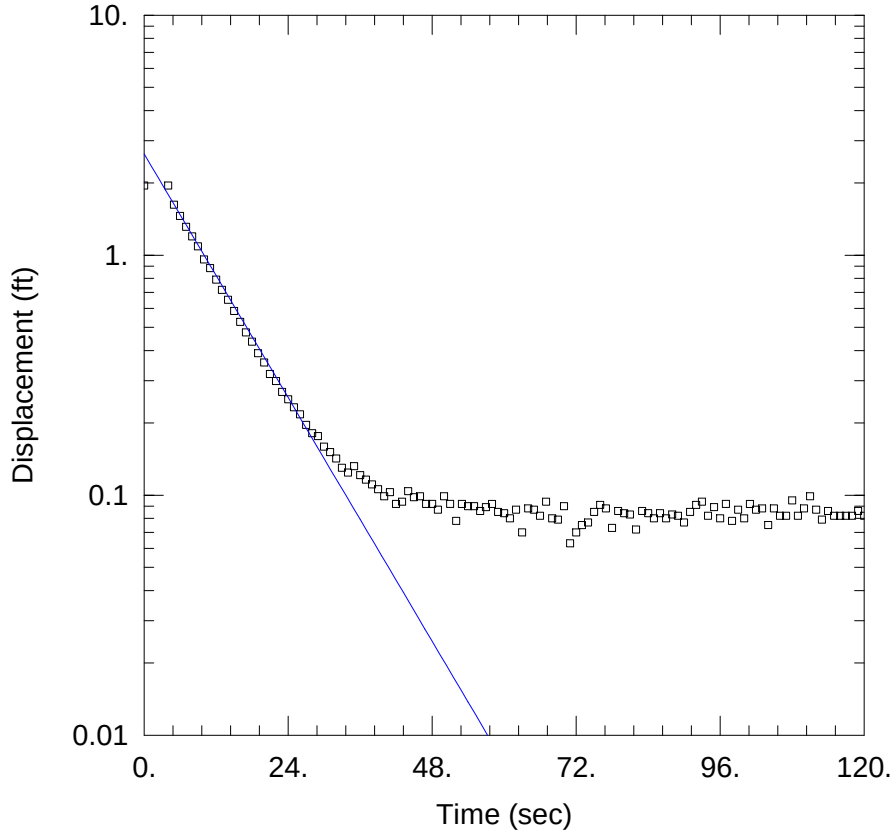
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 1.42 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_IN2_0710.aqt
Date: 07/26/18 Time: 09:58:09

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 17.88 ft/day
y0 = 2.646 ft

AQUIFER DATA

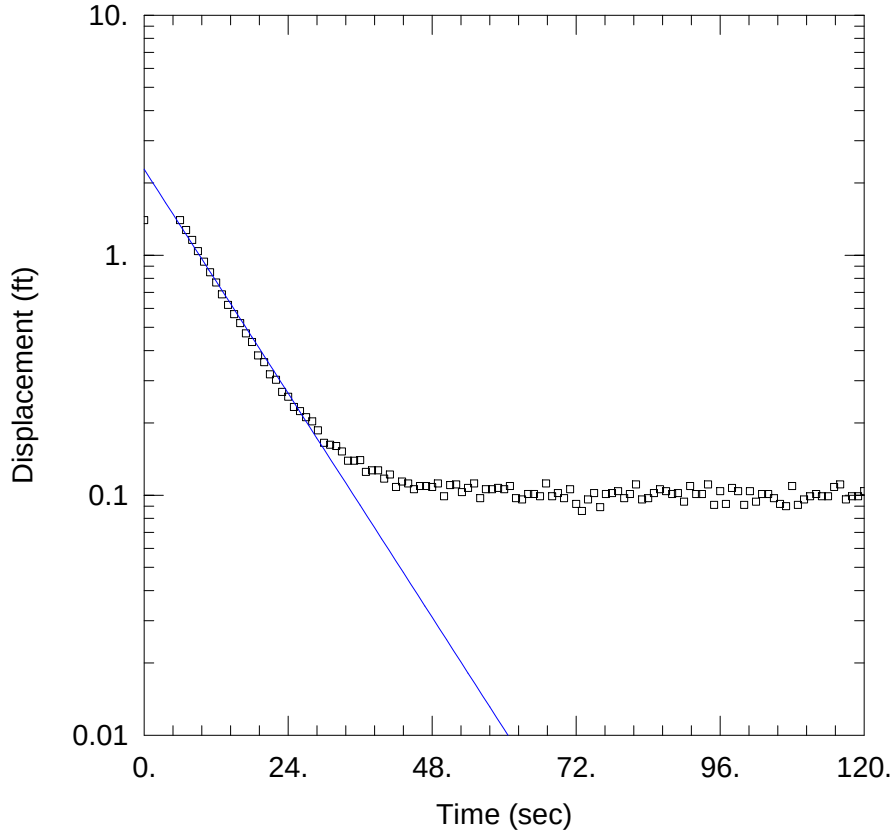
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 1.95 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_IN2_0718.aqt
Date: 07/26/18 Time: 09:58:40

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 16.43 ft/day
y0 = 2.277 ft

AQUIFER DATA

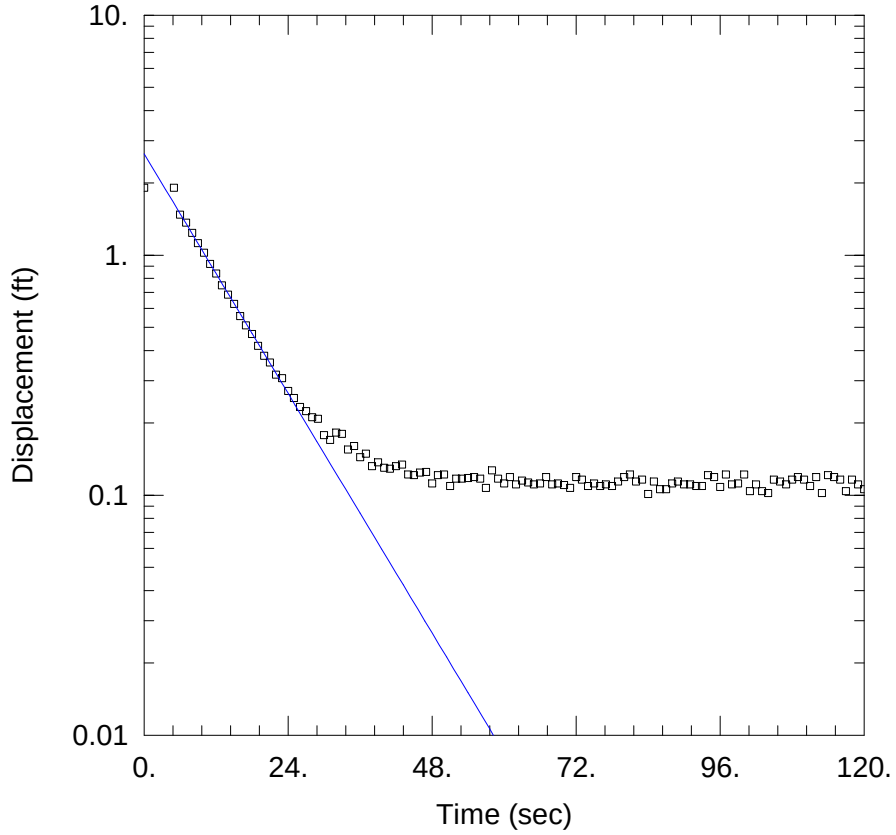
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 1.4 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_IN3_0718.aqt
Date: 07/26/18 Time: 09:58:59

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 17.58 ft/day
y0 = 2.645 ft

AQUIFER DATA

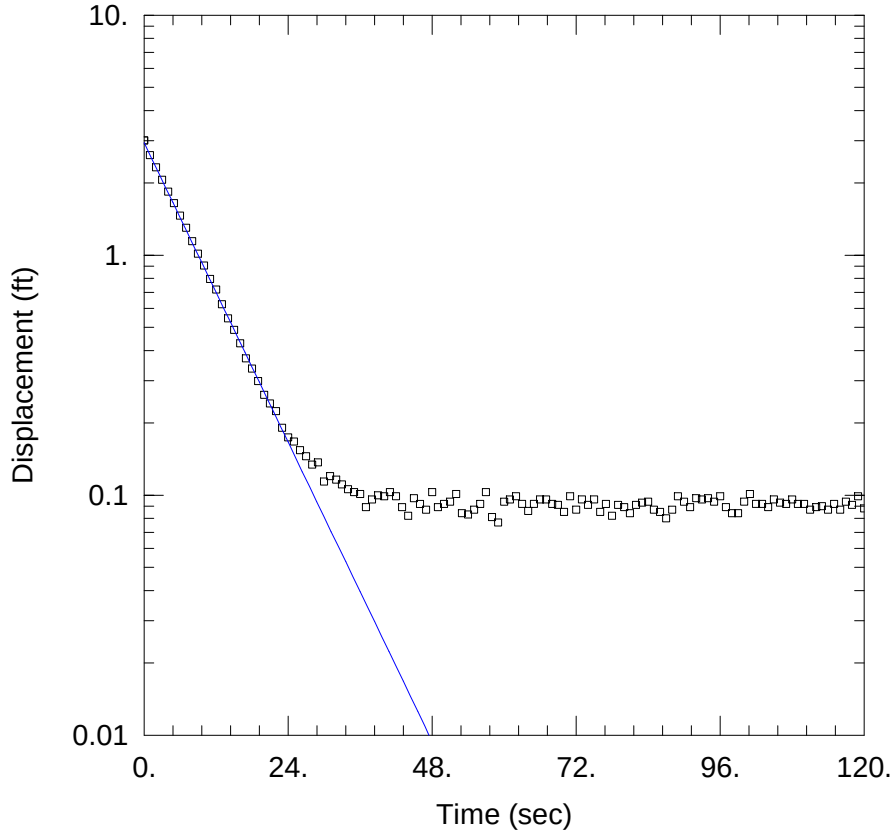
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 1.91 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_OUT1_0710.aqt
Date: 07/26/18 Time: 09:59:10

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 21.96 ft/day
y0 = 2.939 ft

AQUIFER DATA

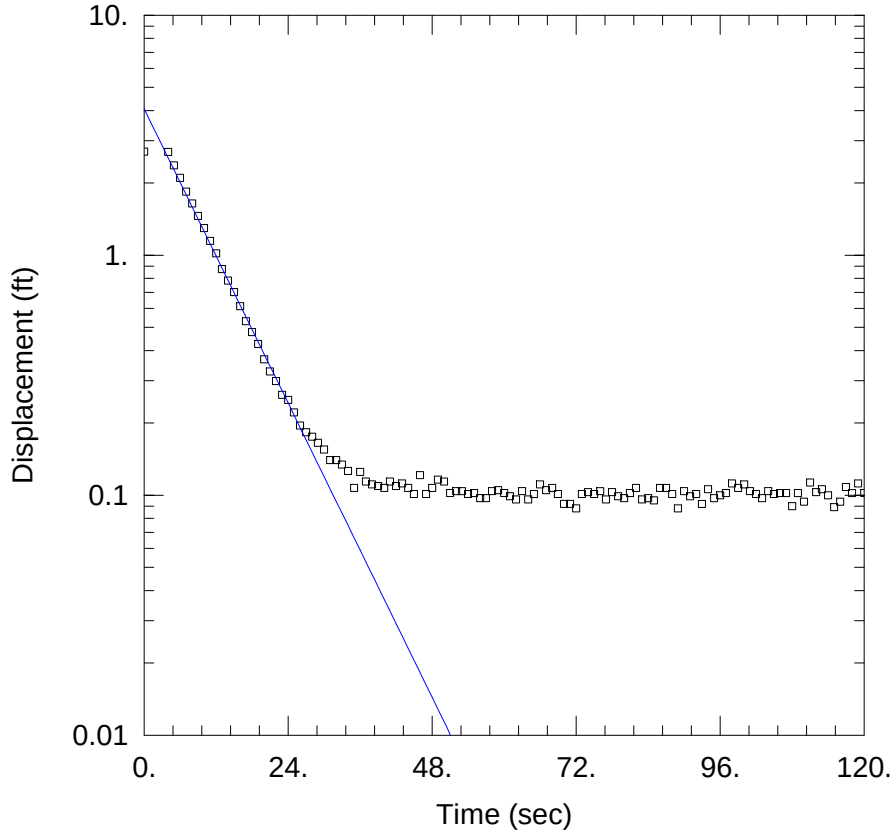
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 3.005 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_OUT1_0718.aqt
Date: 07/26/18 Time: 09:59:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 21.59 ft/day
y0 = 4.074 ft

AQUIFER DATA

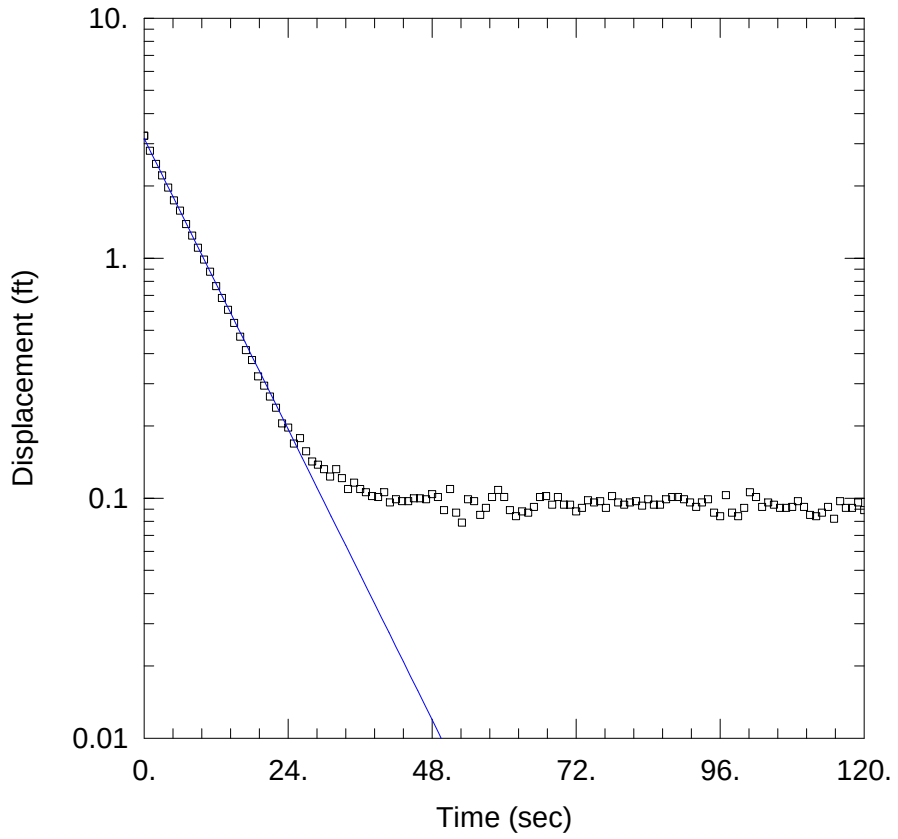
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 2.7 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_OUT2_0710.aqt
Date: 07/26/18 Time: 09:59:33

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 21.33 ft/day
y0 = 3.153 ft

AQUIFER DATA

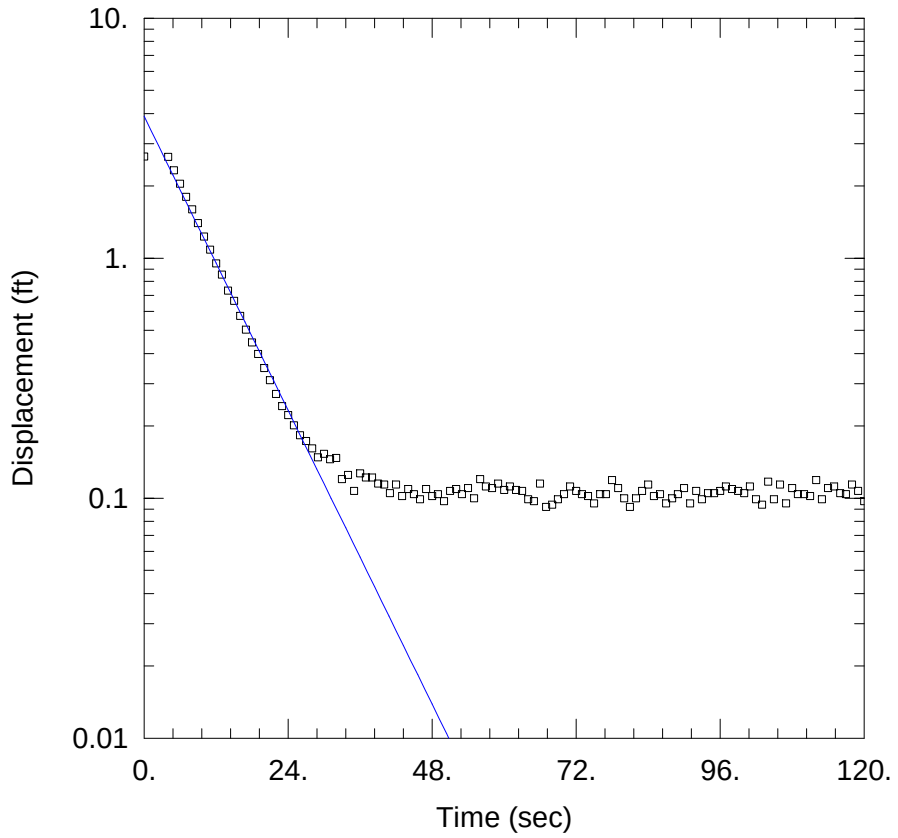
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 3.24 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_OUT2_0718.aqt
Date: 07/26/18 Time: 09:59:43

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 21.57 ft/day
y0 = 3.901 ft

AQUIFER DATA

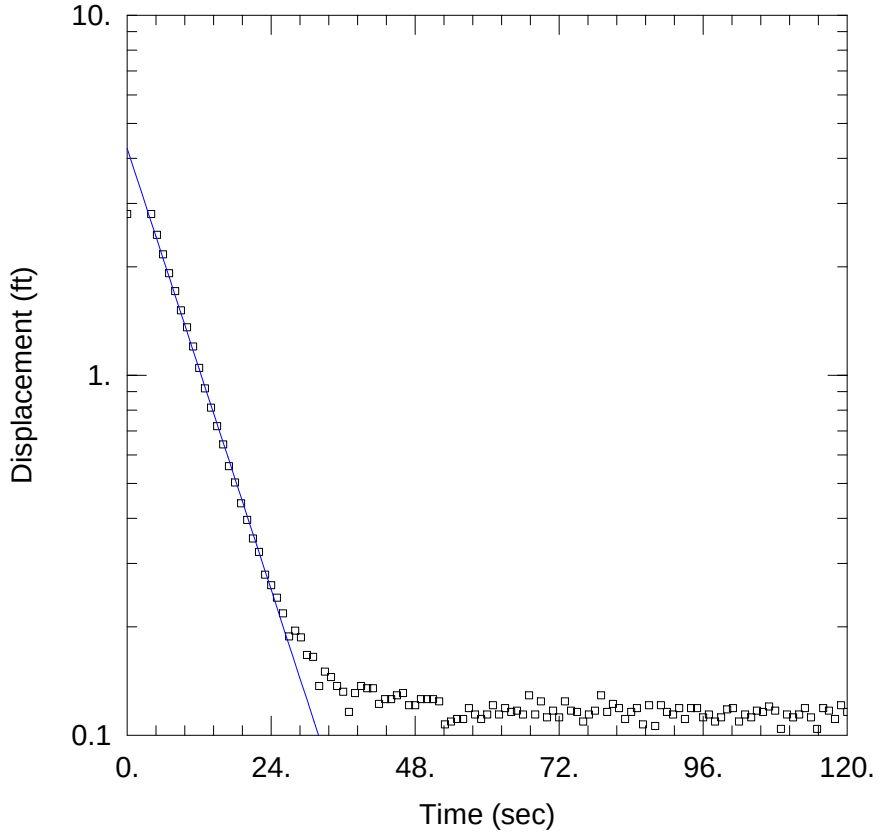
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 2.65 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201A_OUT3_0718.aqt
Date: 07/26/18 Time: 09:59:52

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201A
Test Date: 7/18/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 21.58 ft/day
y0 = 4.268 ft

AQUIFER DATA

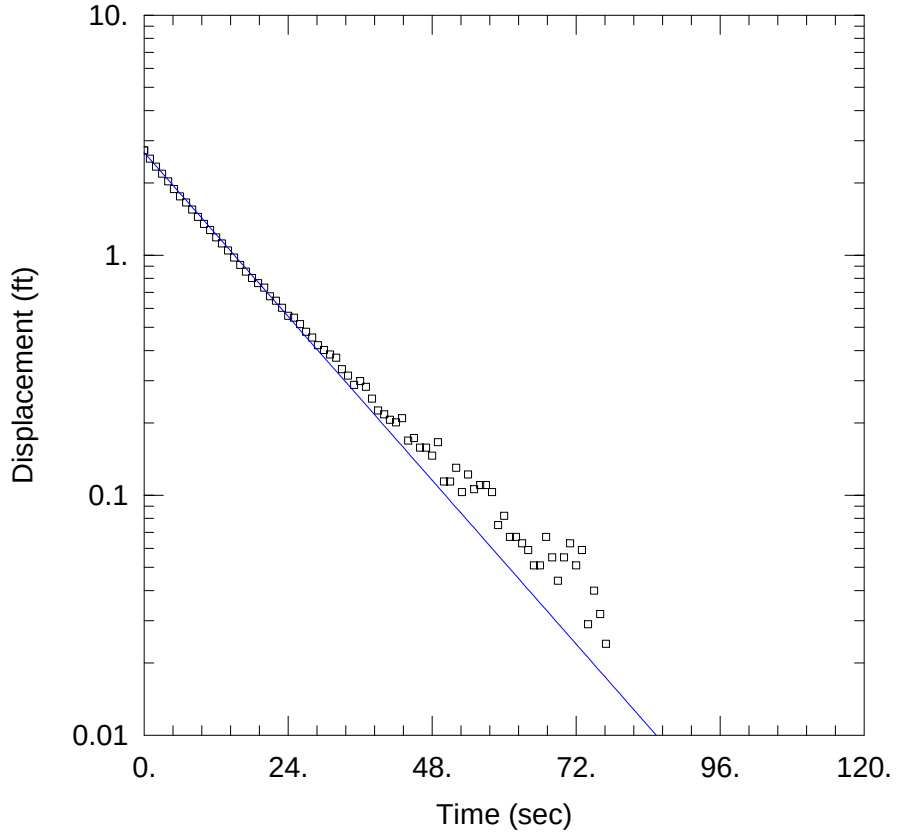
Saturated Thickness: 39.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW201A)

Initial Displacement: 2.8 ft
Total Well Penetration Depth: 29.49 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 29.49 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201B_IN1.aqt
Date: 07/26/18 Time: 10:07:56

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201B
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.042 ft/day
y0 = 2.678 ft

AQUIFER DATA

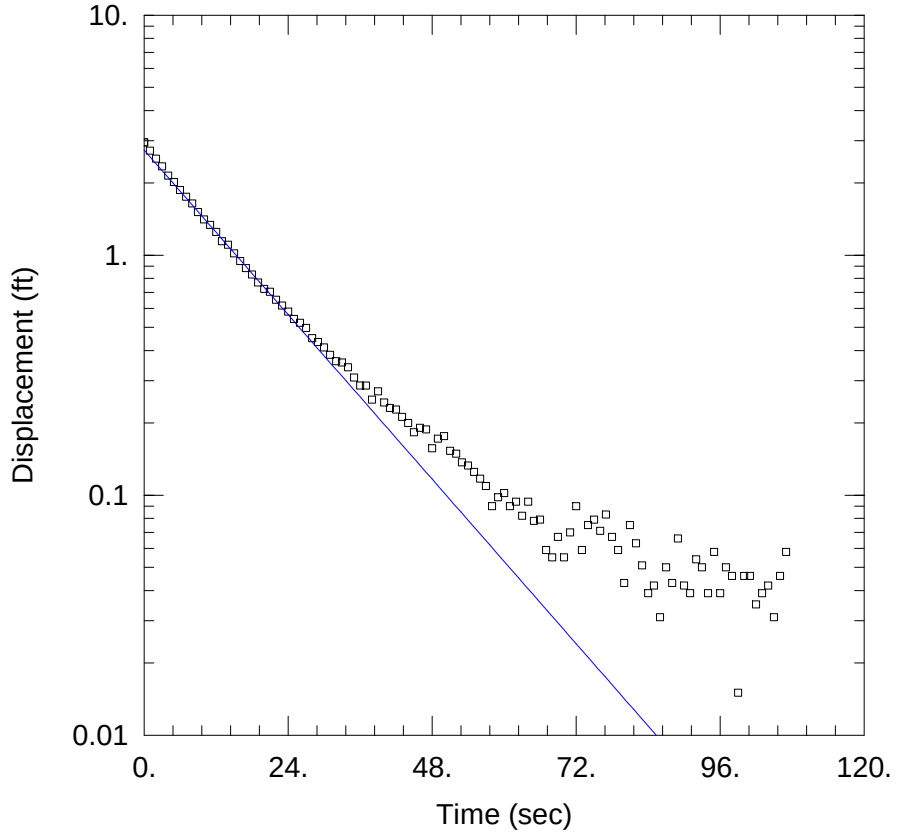
Saturated Thickness: 21.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW201B)

Initial Displacement: 2.73 ft
Total Well Penetration Depth: 60.44 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 60.44 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW201B_OUT1.aqt
Date: 07/26/18 Time: 10:08:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW201B
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.058 ft/day
y0 = 2.74 ft

AQUIFER DATA

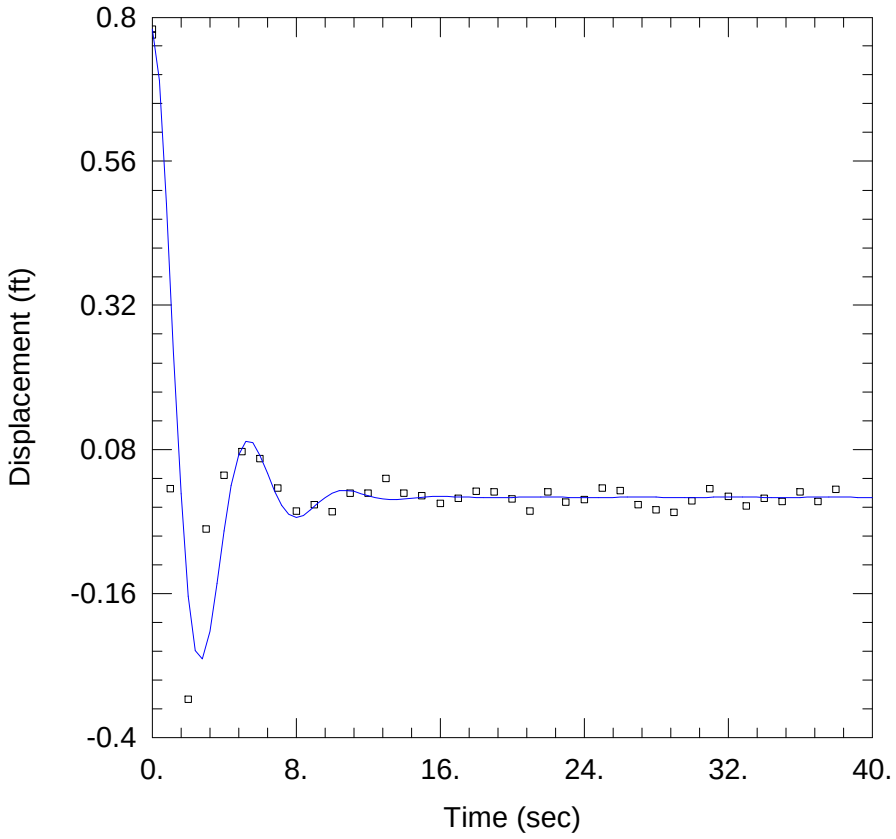
Saturated Thickness: 21.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW201B)

Initial Displacement: 2.95 ft
Total Well Penetration Depth: 60.44 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 62.44 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW202_IN1.aqt
Date: 11/12/18 Time: 10:33:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW202
Test Date: 7/9/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 105. ft/day
Le = 20.94 ft

AQUIFER DATA

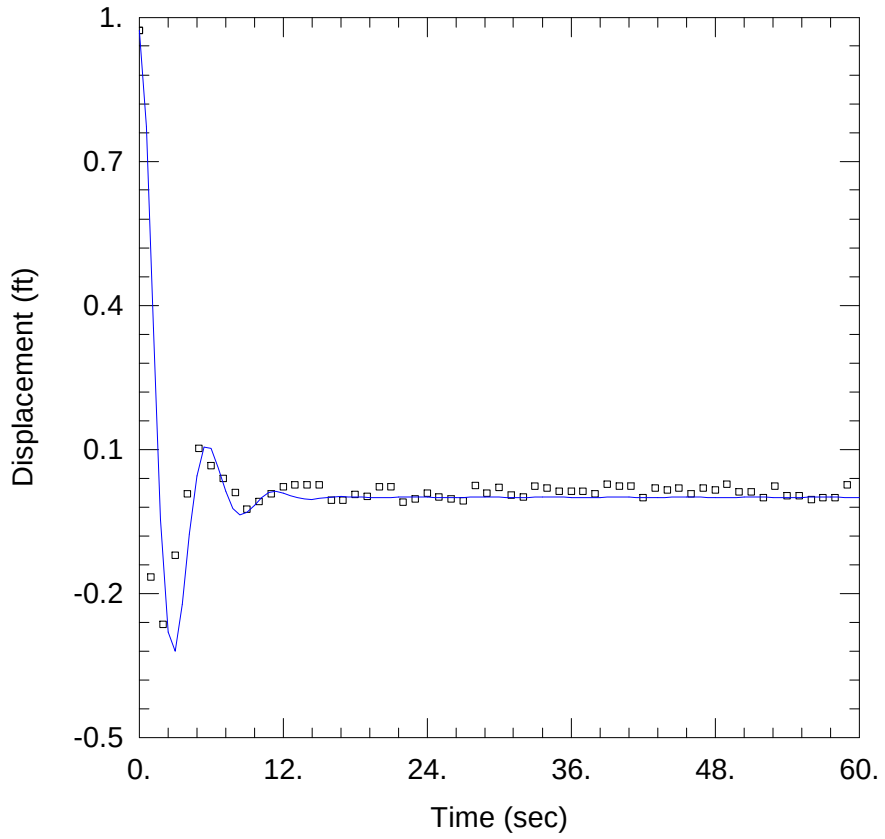
Saturated Thickness: 38.87 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW202)

Initial Displacement: 0.78 ft
Total Well Penetration Depth: 36.52 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 36.52 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW202_IN1_Test2.aqt
Date: 11/12/18 Time: 10:36:40

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW202
Test Date: 7/9/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 96.23 ft/day
Le = 23.34 ft

AQUIFER DATA

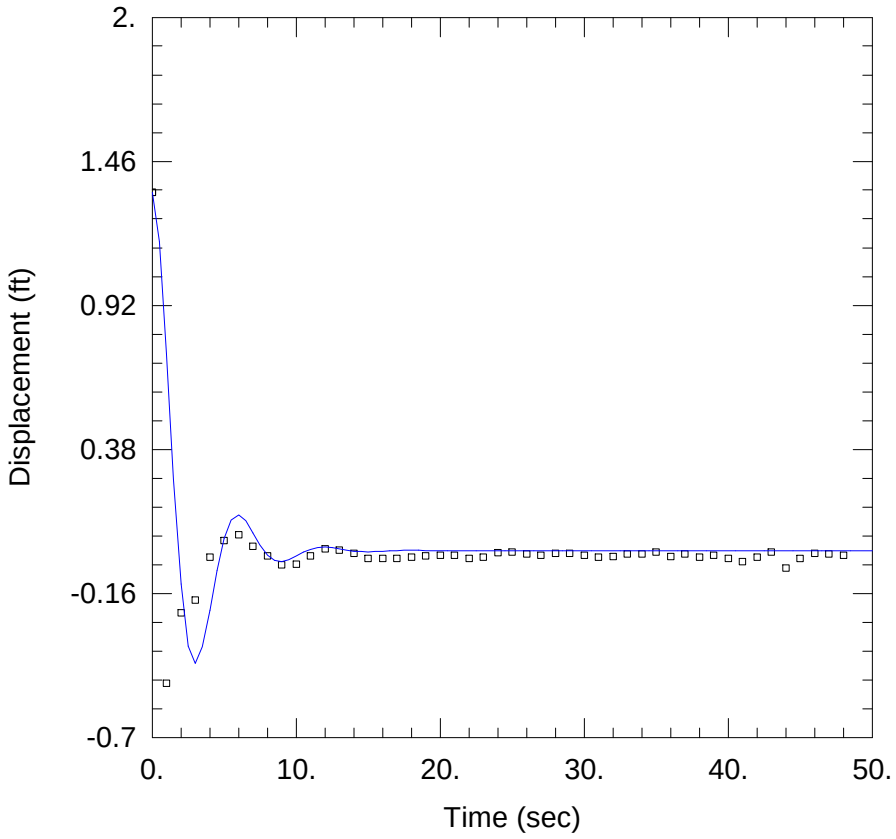
Saturated Thickness: 38.87 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW202)

Initial Displacement: 0.973 ft
Total Well Penetration Depth: 36.52 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 36.52 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW202_IN2.aqt
Date: 11/12/18 Time: 10:41:16

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW202
Test Date: 7/9/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 87.64 ft/day
Le = 25.35 ft

AQUIFER DATA

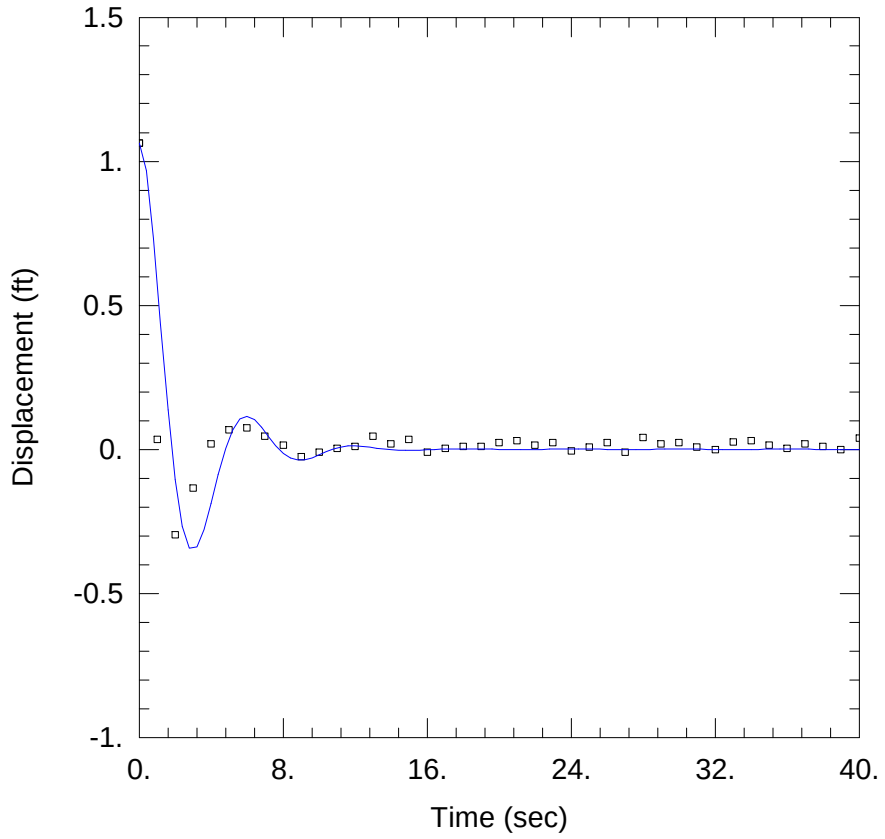
Saturated Thickness: 38.87 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW202)

Initial Displacement: 1.343 ft
Total Well Penetration Depth: 36.52 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 36.52 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW202_IN2_Test2.aqt
Date: 11/12/18 Time: 10:43:02

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW202
Test Date: 7/9/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 90.1 ft/day
Le = 25.68 ft

AQUIFER DATA

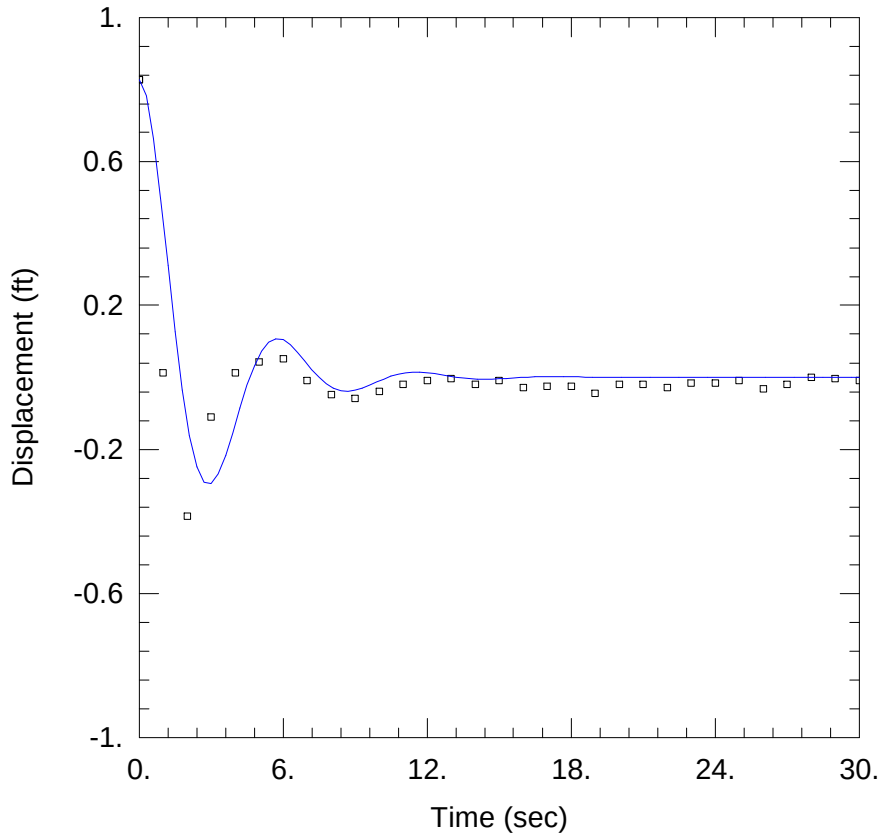
Saturated Thickness: 38.87 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW202)

Initial Displacement: 1.063 ft
Total Well Penetration Depth: 36.52 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 36.52 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW202_IN3_Test2.aqt
Date: 11/12/18 Time: 10:45:29

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW202
Test Date: 7/9/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 99.71 ft/day
Le = 24.54 ft

AQUIFER DATA

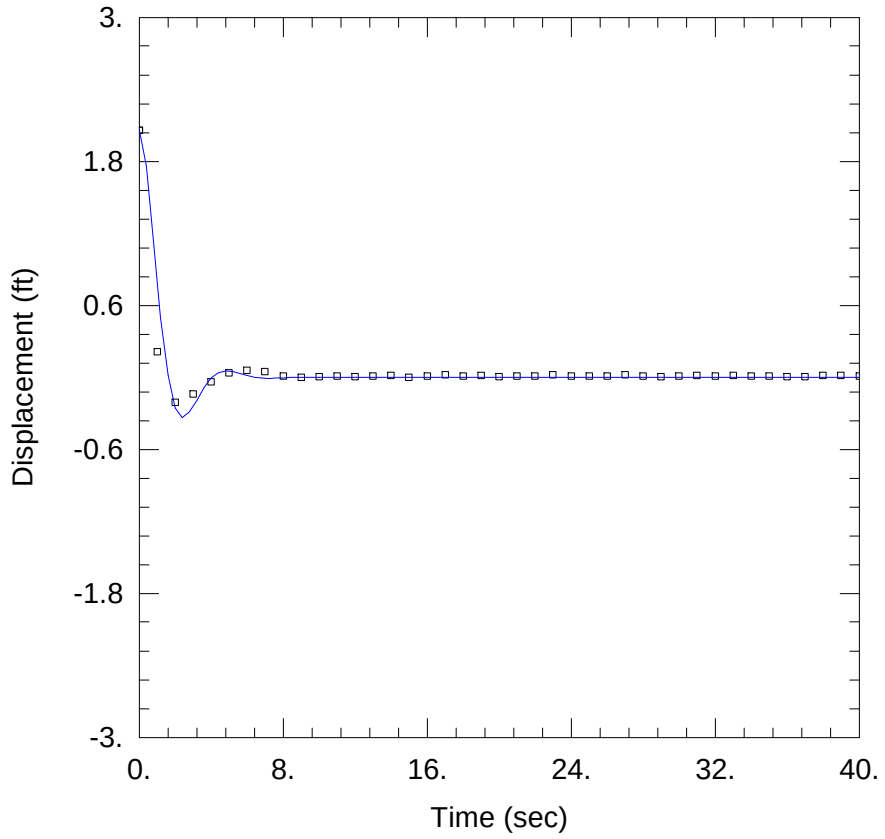
Saturated Thickness: 38.87 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW202)

Initial Displacement: 0.827 ft
Total Well Penetration Depth: 36.52 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 36.52 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203A_IN1.aqt
Date: 11/12/18 Time: 13:24:09

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 75.72 ft/day
Le = 14.31 ft

AQUIFER DATA

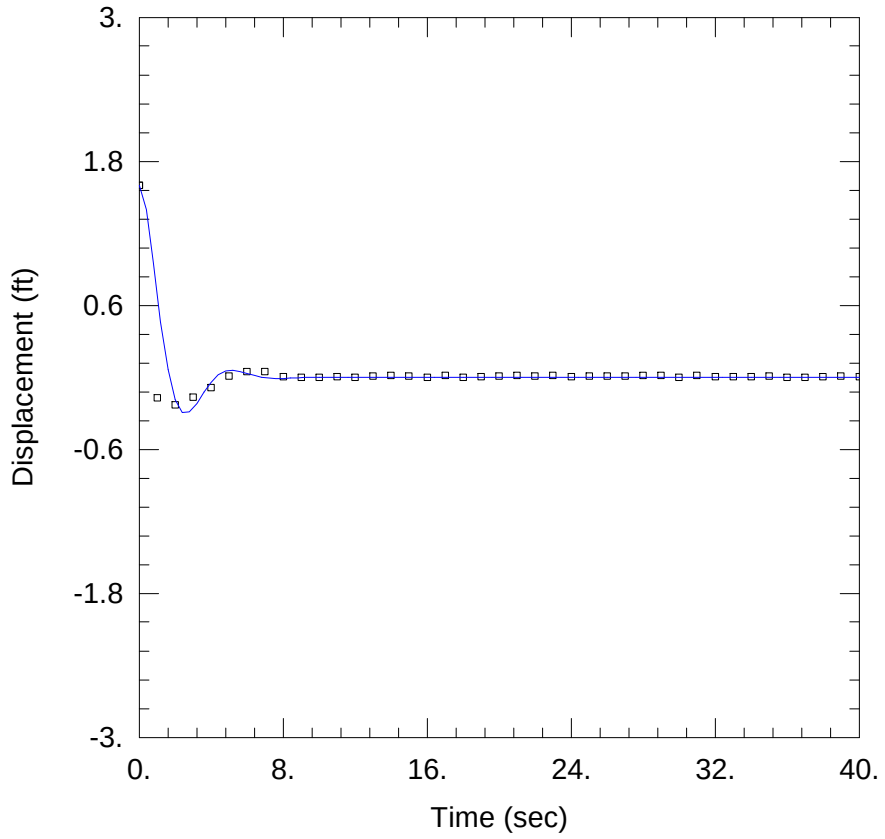
Saturated Thickness: 40.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW203A)

Initial Displacement: 2.058 ft
Total Well Penetration Depth: 32.23 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.23 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203A_IN2.aqt
Date: 11/12/18 Time: 13:28:35

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 74.99 ft/day
Le = 16.76 ft

AQUIFER DATA

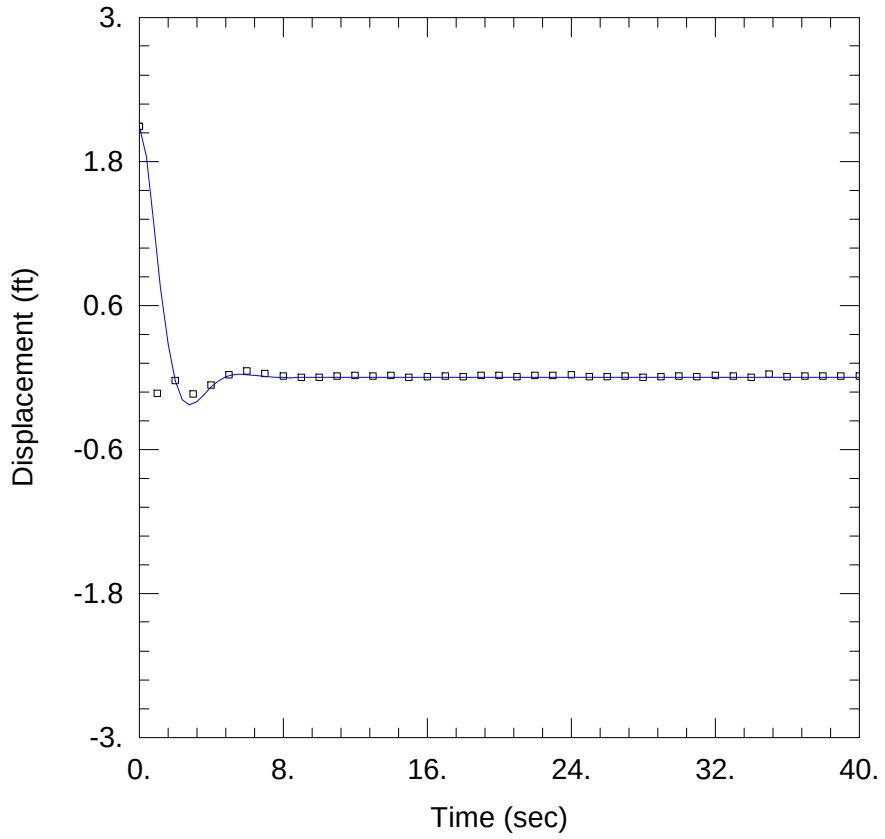
Saturated Thickness: 40.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW203A)

Initial Displacement: 1.599 ft
Total Well Penetration Depth: 32.23 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.23 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203A_IN3.aqt
Date: 11/12/18 Time: 13:35:39

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 60.05 ft/day
Le = 17.15 ft

AQUIFER DATA

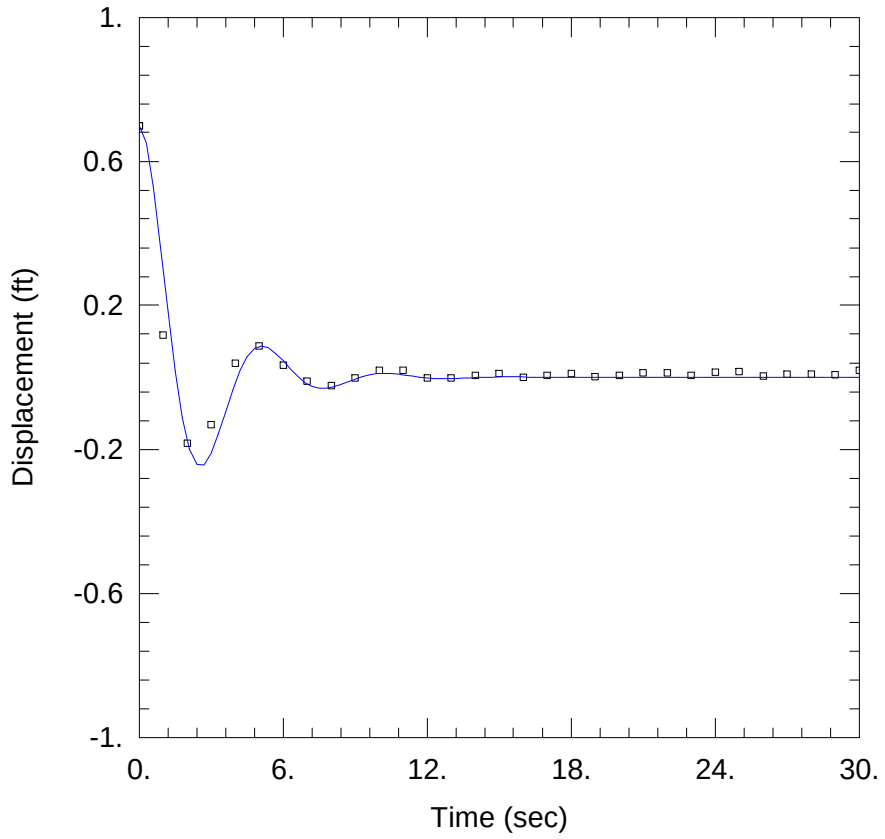
Saturated Thickness: 40.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW203A)

Initial Displacement: 2.089 ft
Total Well Penetration Depth: 32.23 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.23 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203A_OUT1.aqt
Date: 11/12/18 Time: 13:39:08

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 104.7 ft/day
Le = 19.16 ft

AQUIFER DATA

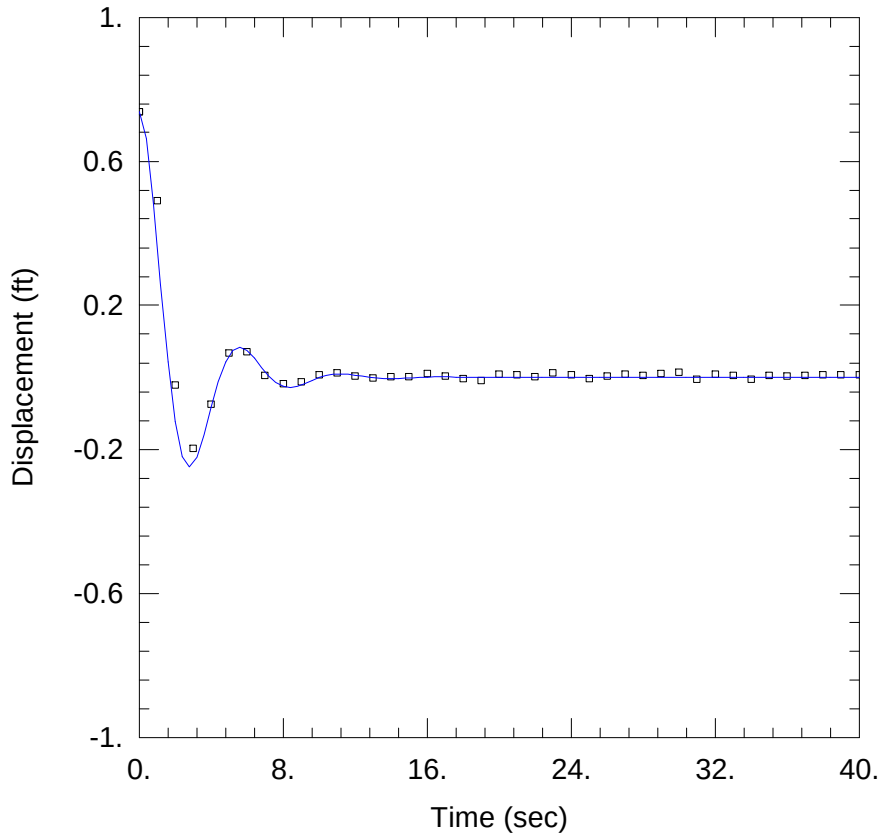
Saturated Thickness: 40.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW203A)

Initial Displacement: 0.699 ft
Total Well Penetration Depth: 32.23 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.23 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203A_OUT2.aqt
Date: 11/12/18 Time: 13:40:26

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 92.48 ft/day
Le = 22.6 ft

AQUIFER DATA

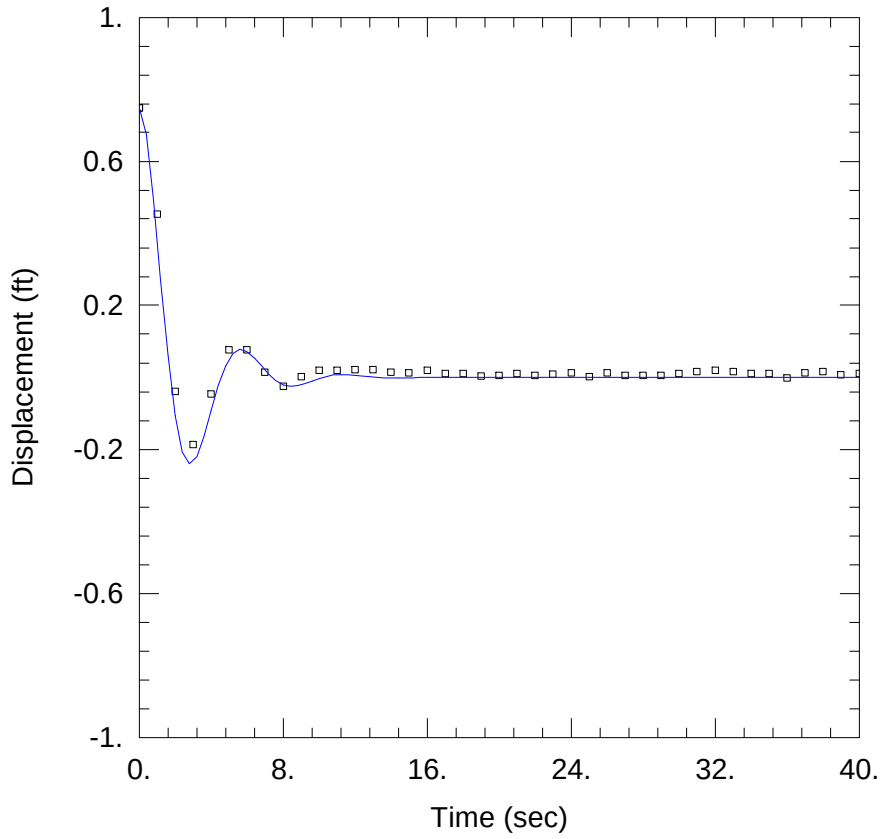
Saturated Thickness: 40.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW203A)

Initial Displacement: 0.738 ft
Total Well Penetration Depth: 32.23 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.23 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203A_OUT3.aqt
Date: 11/12/18 Time: 13:41:06

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203A
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 88.28 ft/day
Le = 23.04 ft

AQUIFER DATA

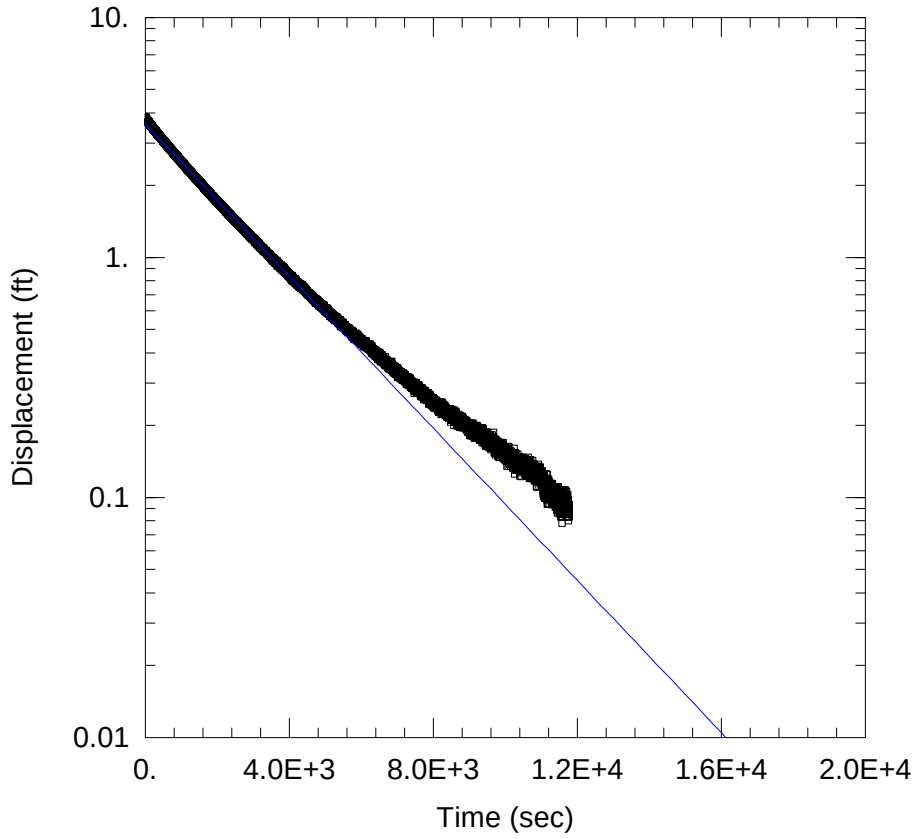
Saturated Thickness: 40.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW203A)

Initial Displacement: 0.748 ft
Total Well Penetration Depth: 32.23 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.23 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203B_IN1.aqt
Date: 11/15/18 Time: 10:31:55

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.08775 ft/day
y0 = 3.602 ft

AQUIFER DATA

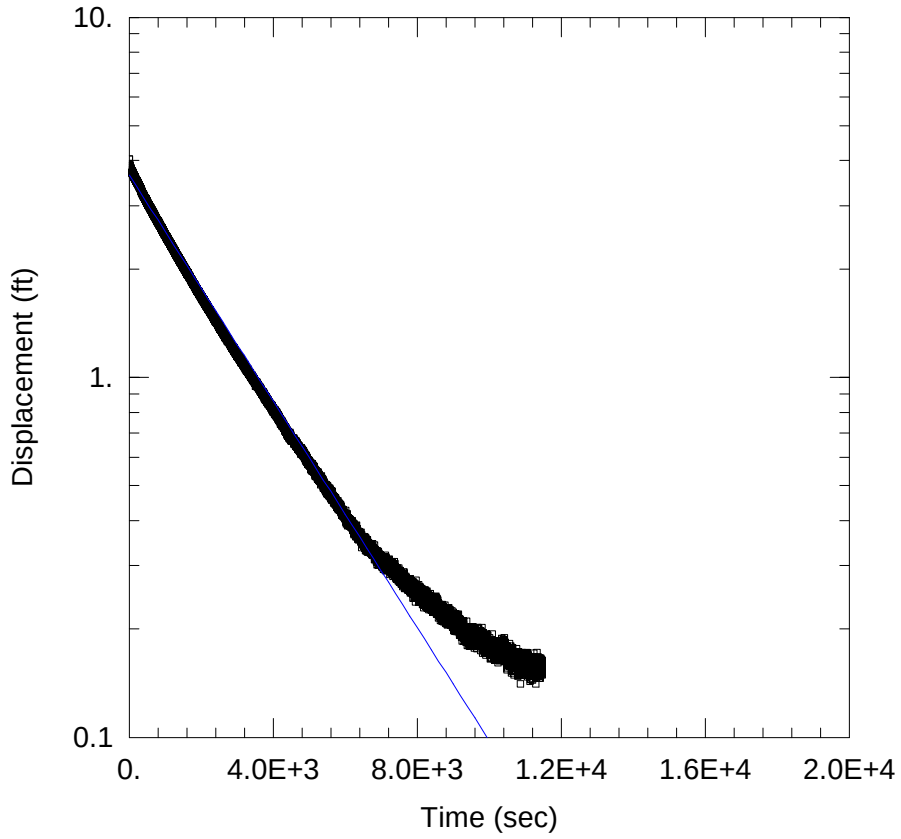
Saturated Thickness: 21. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW203B_IN1)

Initial Displacement: 3.78 ft
Total Well Penetration Depth: 72.29 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 72.29 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW203B_OUT1.aqt
Date: 11/15/18 Time: 08:54:49

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW203B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.08699 ft/day
y0 = 3.652 ft

AQUIFER DATA

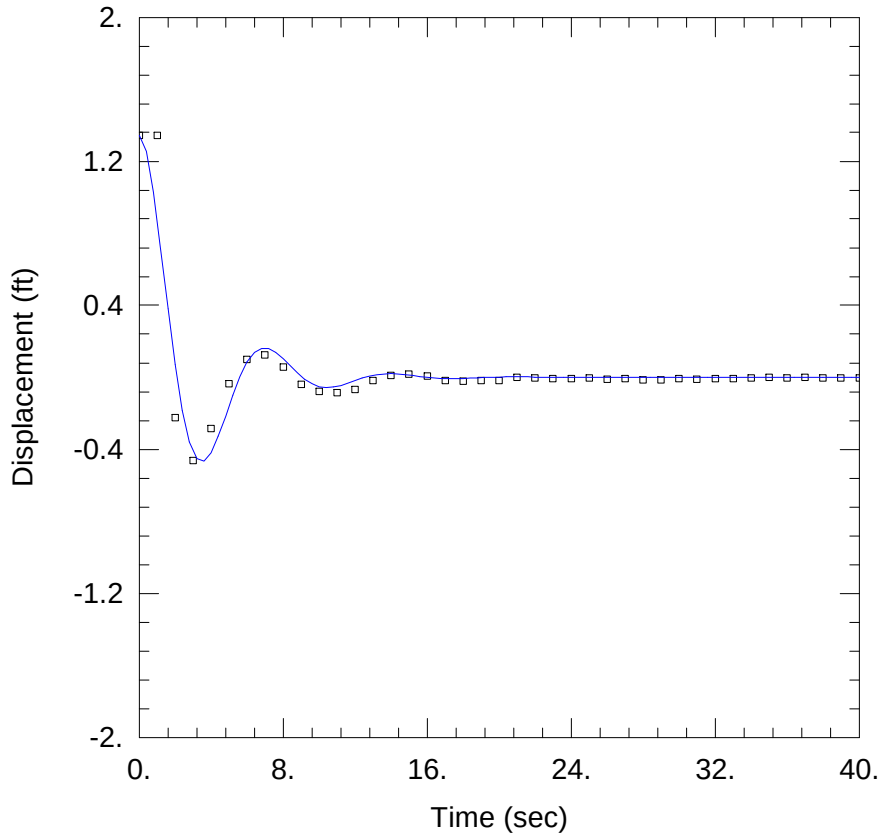
Saturated Thickness: 21. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW203B_IN1)

Initial Displacement: 4.032 ft
Total Well Penetration Depth: 72.29 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 72.29 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW204_IN1.aqt
Date: 11/12/18 Time: 13:43:35

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW204
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 79.03 ft/day
Le = 35.56 ft

AQUIFER DATA

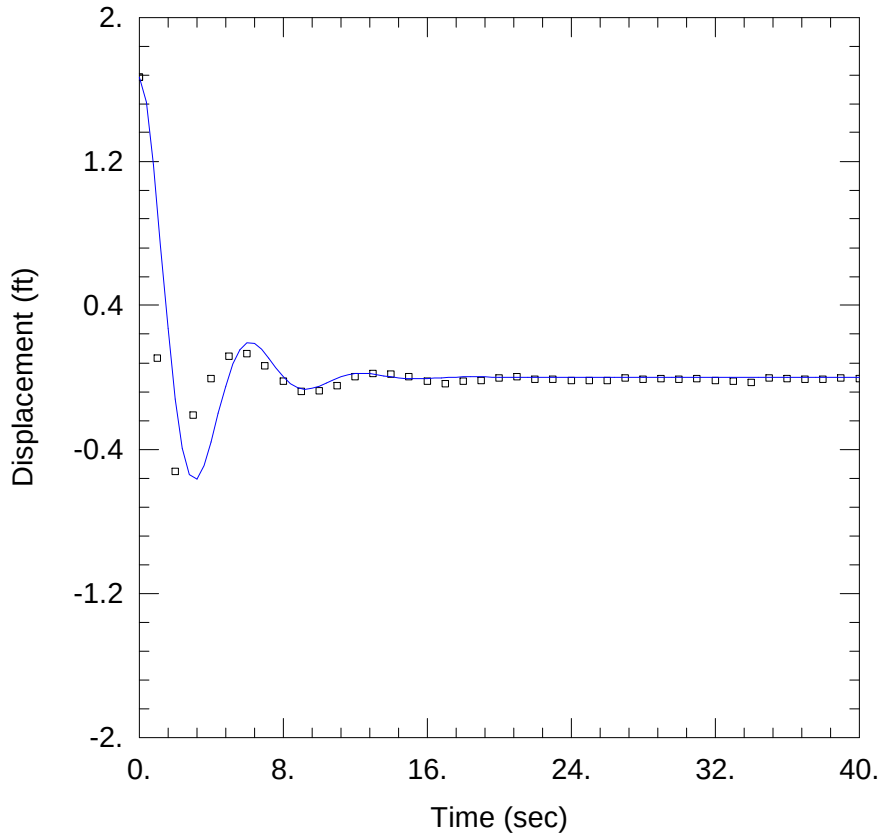
Saturated Thickness: 54.83 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW204)

Initial Displacement: 1.344 ft
Total Well Penetration Depth: 43.36 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 43.35 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW204_IN2.aqt
Date: 11/12/18 Time: 13:45:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW204
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 87.91 ft/day
Le = 27.72 ft

AQUIFER DATA

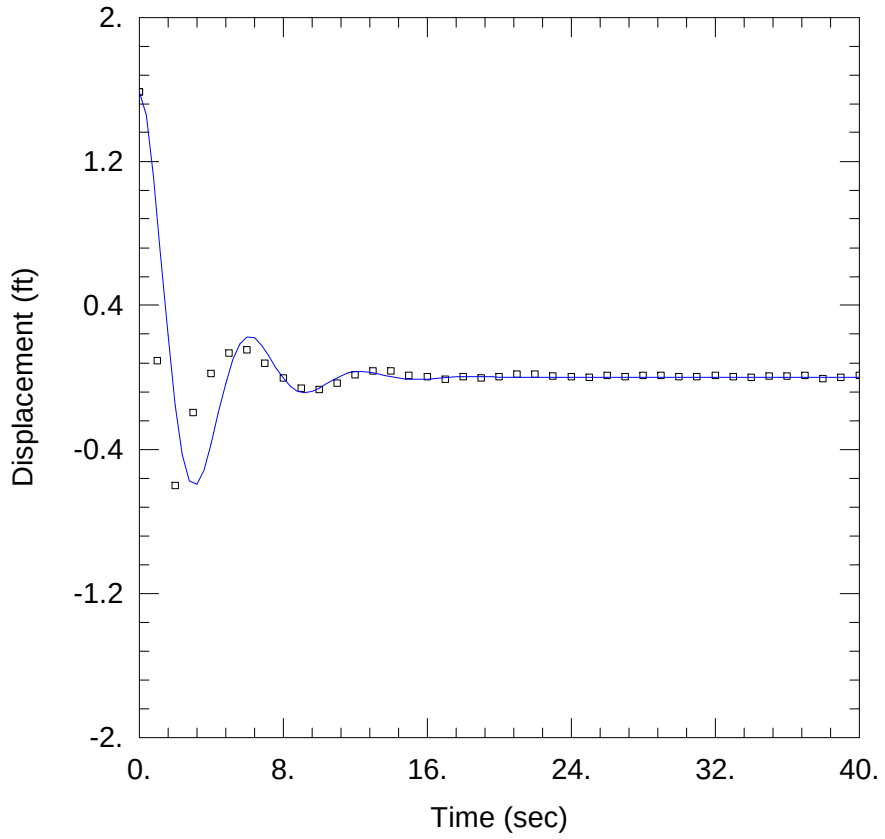
Saturated Thickness: 54.83 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW204)

Initial Displacement: 1.667 ft
Total Well Penetration Depth: 43.36 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 43.35 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW204_IN3.aqt
Date: 11/12/18 Time: 13:46:18

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW204
Test Date: 7/10/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 96.14 ft/day
Le = 28.01 ft

AQUIFER DATA

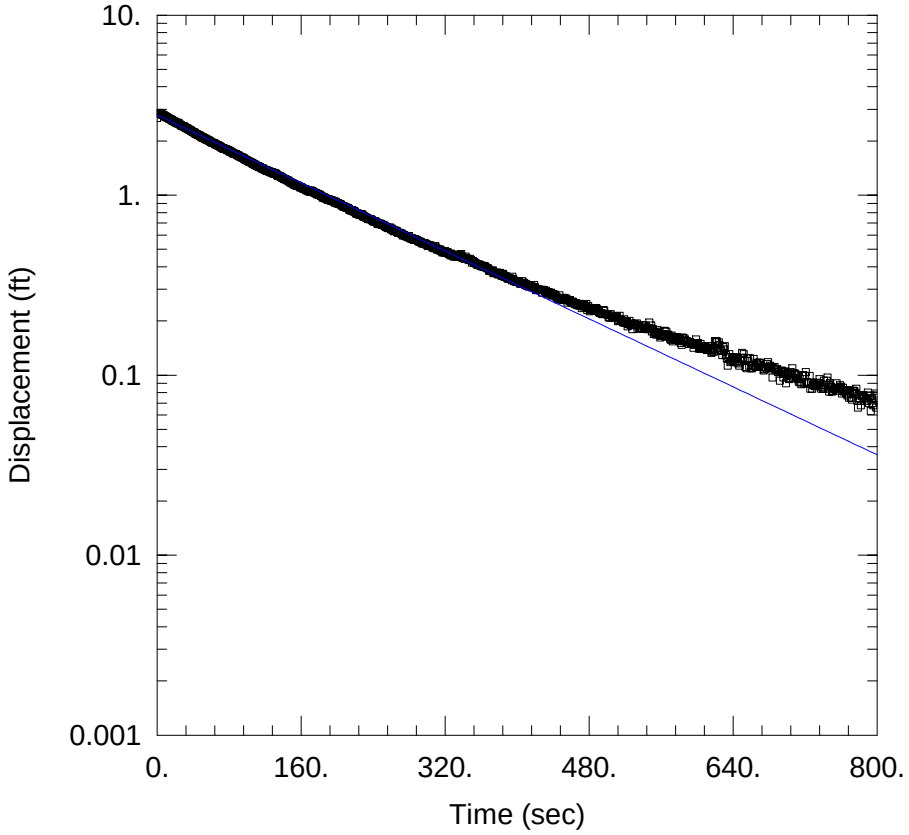
Saturated Thickness: 54.83 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW204)

Initial Displacement: 1.585 ft
Total Well Penetration Depth: 43.36 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 43.35 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW204B_IN1.aqt
Date: 01/15/19 Time: 15:17:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW204B
Test Date: 11/28/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3575 ft/day
y0 = 2.786 ft

AQUIFER DATA

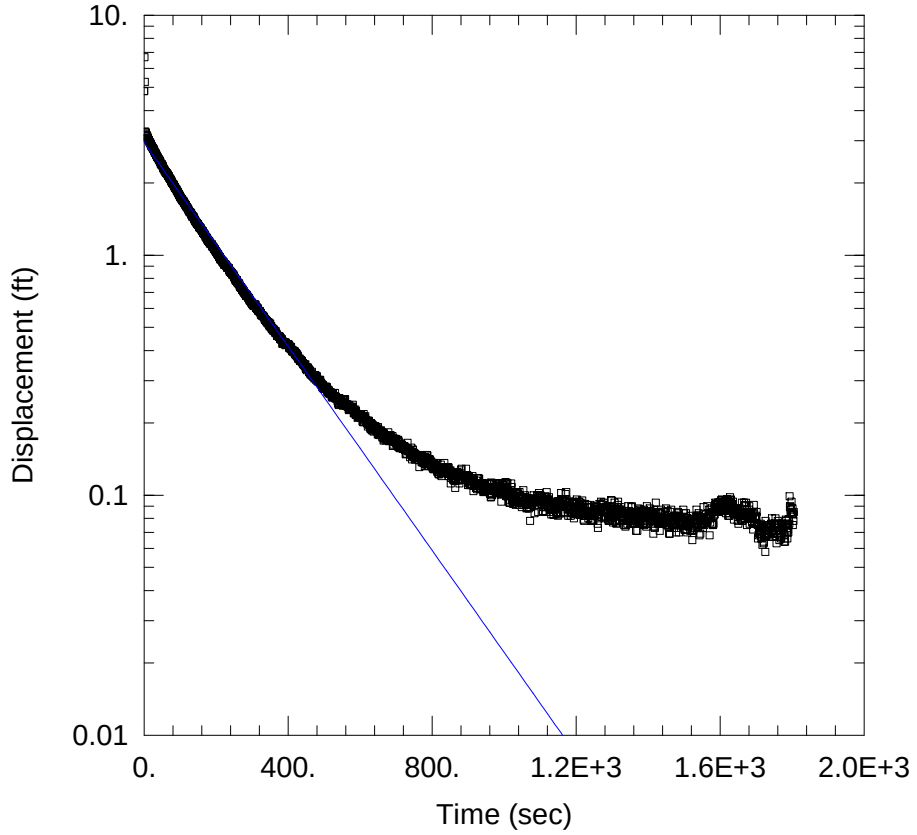
Saturated Thickness: 23.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-204B_IN1)

Initial Displacement: 2.682 ft
Total Well Penetration Depth: 94.76 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 94.76 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW204B_OUT1 .aqt
Date: 01/15/19 Time: 15:18:26

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW204B
Test Date: 11/28/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3219 ft/day
y0 = 2.948 ft

AQUIFER DATA

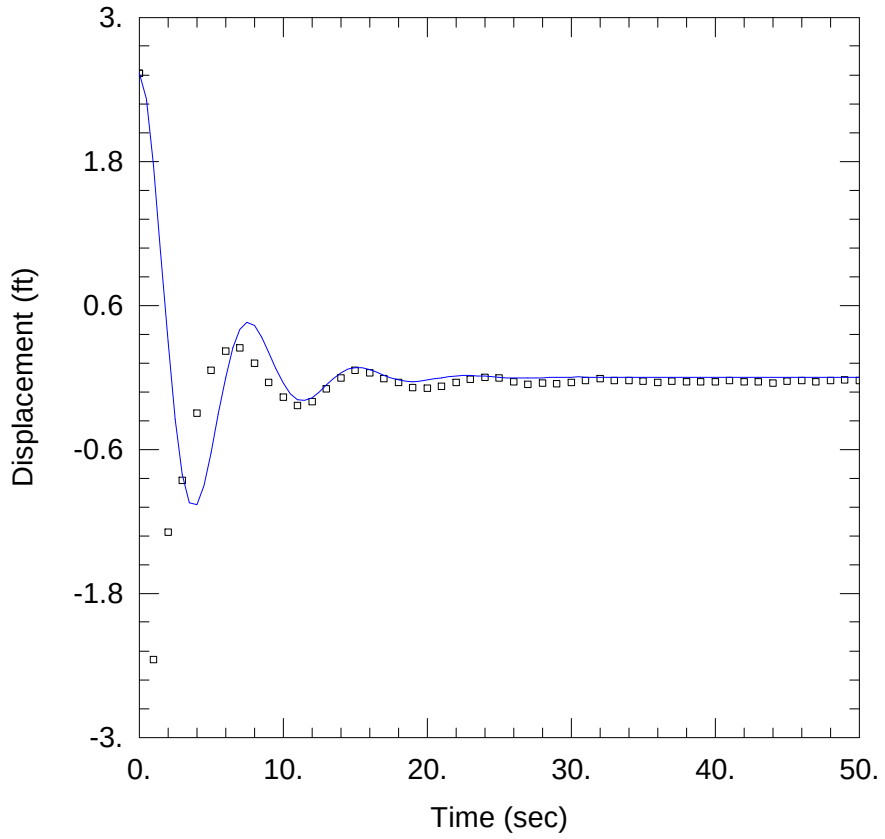
Saturated Thickness: 23.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-204B_OUT1)

Initial Displacement: 4.821 ft
Total Well Penetration Depth: 94.76 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 94.76 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW205B_IN1.aqt
Date: 11/12/18 Time: 13:52:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW205B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 88.69 ft/day
Le = 43.55 ft

AQUIFER DATA

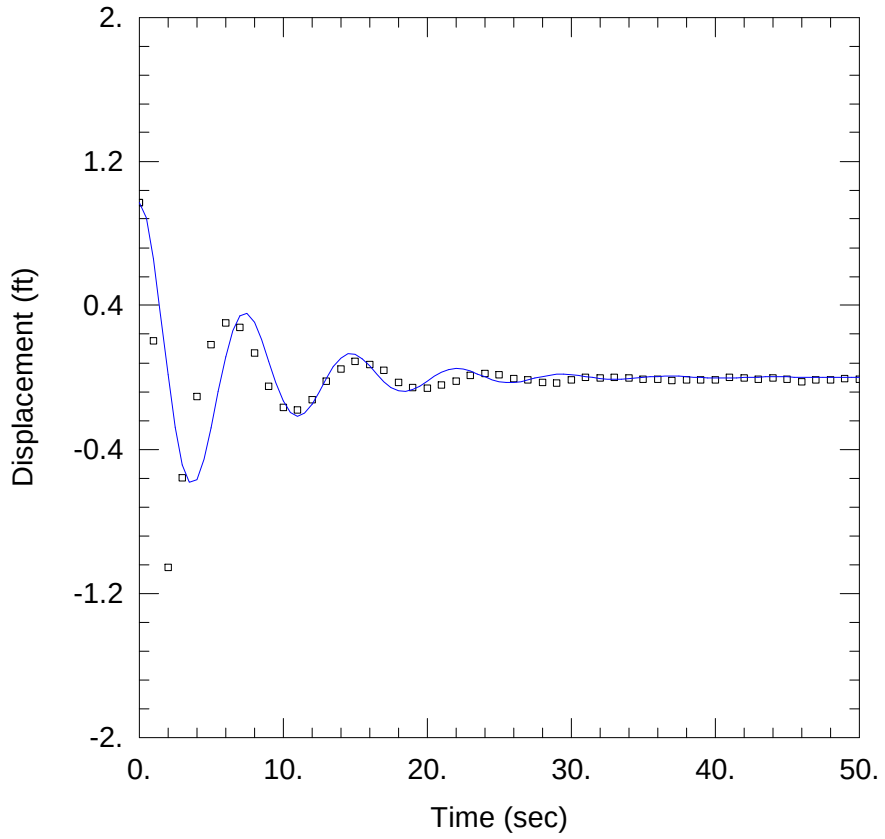
Saturated Thickness: 94.95 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW205B)

Initial Displacement: 2.534 ft
Total Well Penetration Depth: 59.74 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 59.74 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW205B_IN2.aqt
Date: 11/12/18 Time: 13:54:24

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW205B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 153. ft/day
Le = 42.93 ft

AQUIFER DATA

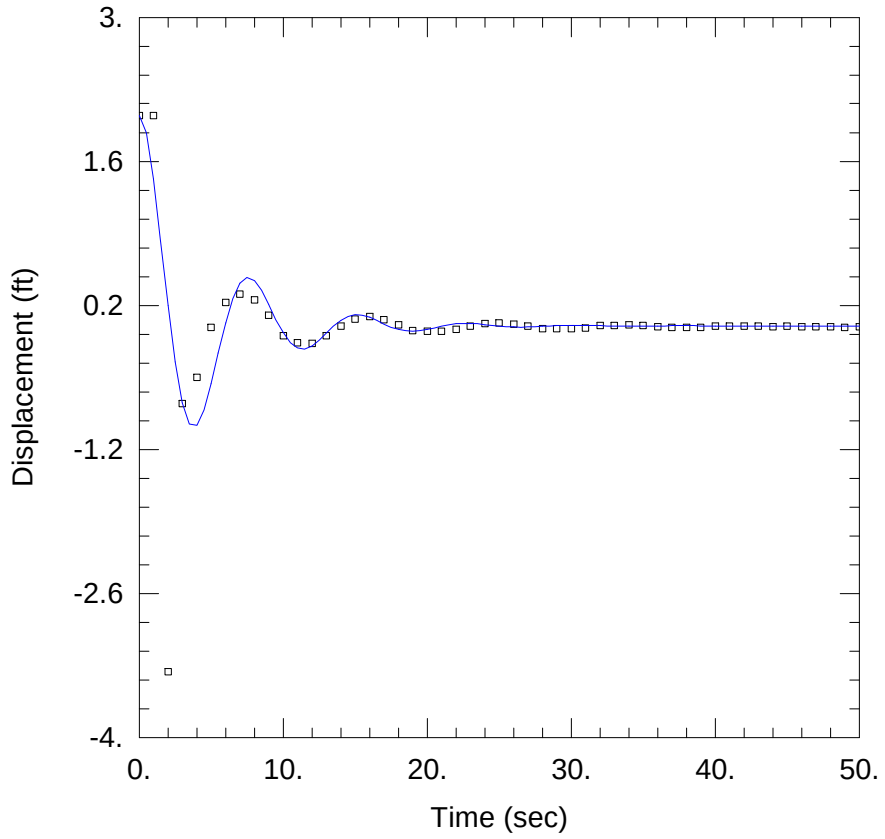
Saturated Thickness: 94.95 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW205B)

Initial Displacement: 0.971 ft
Total Well Penetration Depth: 59.74 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 59.74 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW205B_IN3.aqt
Date: 11/12/18 Time: 13:58:52

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW205B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 102.1 ft/day
Le = 44.19 ft

AQUIFER DATA

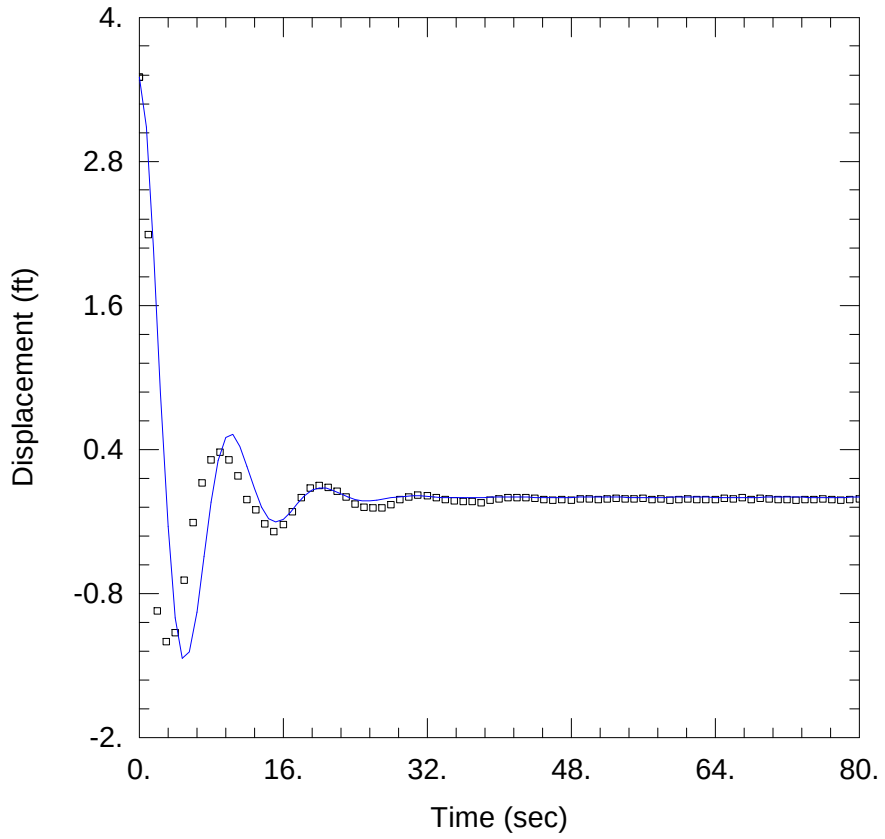
Saturated Thickness: 94.95 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW205B)

Initial Displacement: 2.046 ft
Total Well Penetration Depth: 59.74 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 59.74 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW205C_IN1.aqt
Date: 11/12/18 Time: 14:07:34

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW205C
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 77.01 ft/day
Le = 76.9 ft

AQUIFER DATA

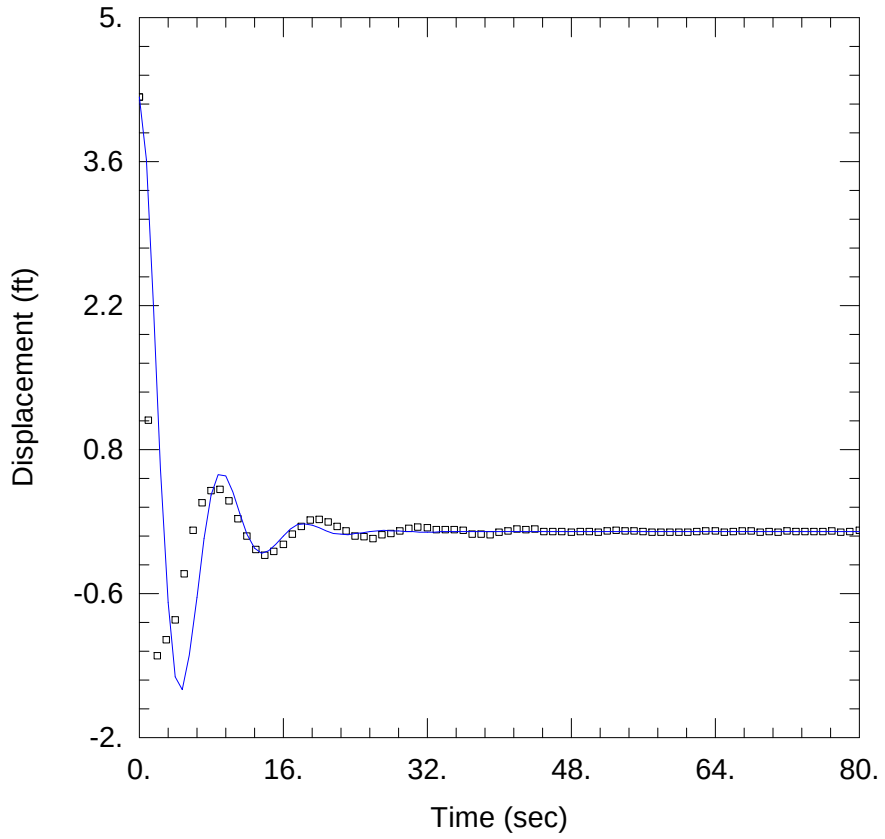
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW205C)

Initial Displacement: 3.5 ft
Total Well Penetration Depth: 94.29 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 94.29 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW205C_IN2.aqt
Date: 11/12/18 Time: 14:08:50

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW205C
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 81.49 ft/day
Le = 61.92 ft

AQUIFER DATA

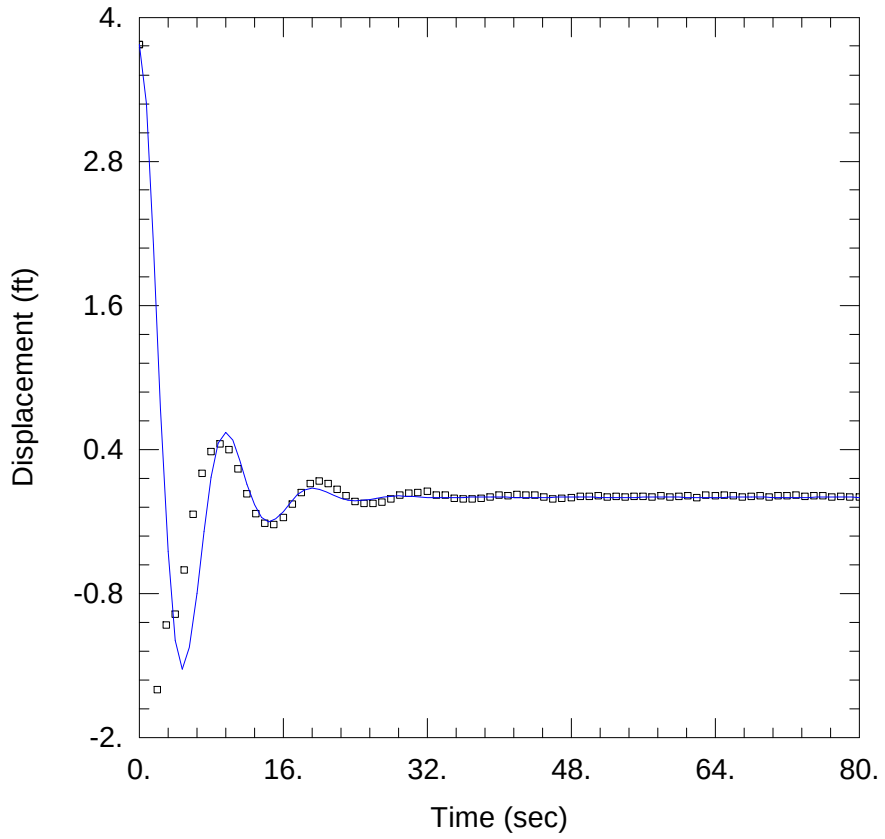
Saturated Thickness: 60.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW205C)

Initial Displacement: 4.226 ft
Total Well Penetration Depth: 94.29 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 94.29 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW205C_IN3.aqt
Date: 11/12/18 Time: 14:11:34

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW205C
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 79.3 ft/day
Le = 68.91 ft

AQUIFER DATA

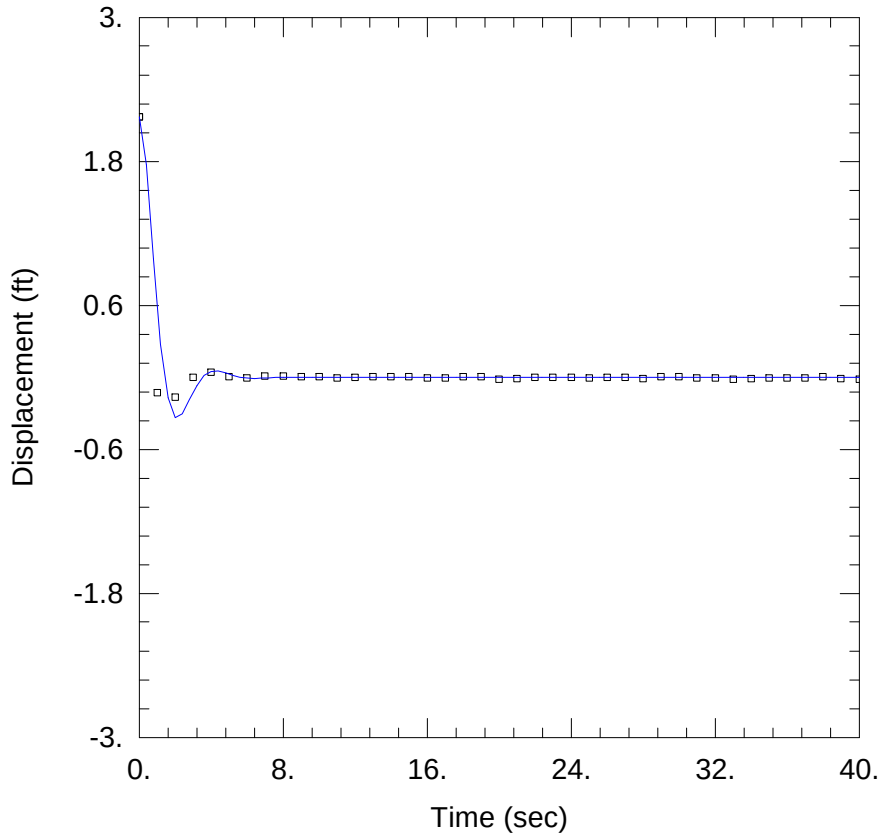
Saturated Thickness: 60.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW205C)

Initial Displacement: 3.776 ft
Total Well Penetration Depth: 94.29 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 94.29 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206A_IN1.aqt
Date: 11/12/18 Time: 14:16:31

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 78.94 ft/day
Le = 10.74 ft

AQUIFER DATA

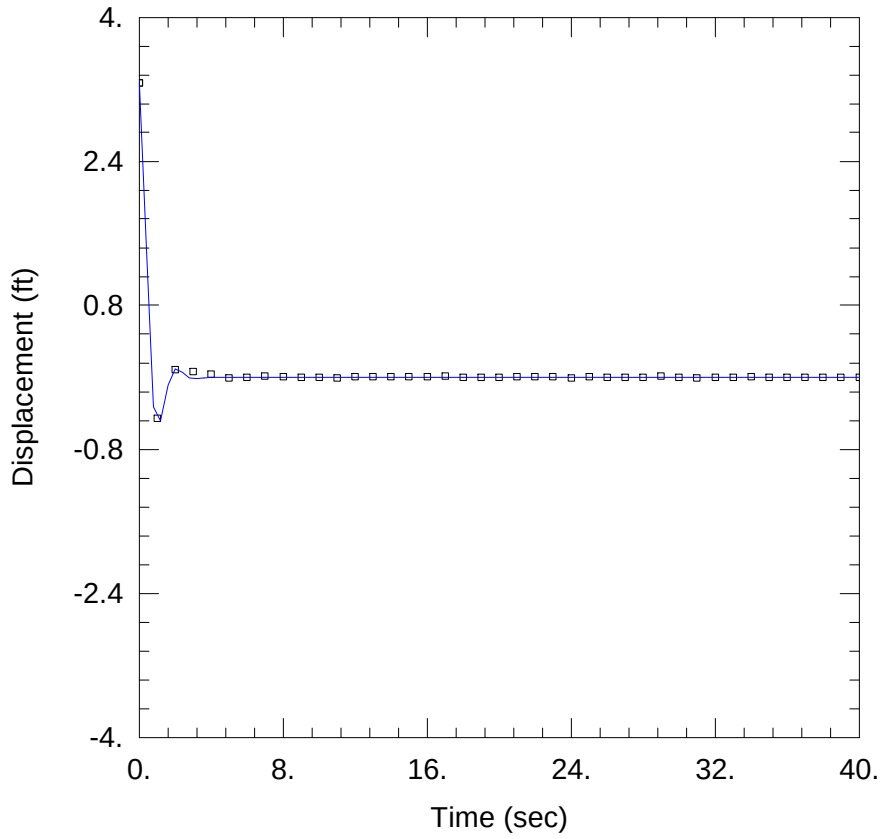
Saturated Thickness: 59.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW206A)

Initial Displacement: 2.173 ft
Total Well Penetration Depth: 23.92 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 23.91 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206A_IN2.aqt
Date: 11/12/18 Time: 14:17:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 165.5 ft/day
Le = 2.647 ft

AQUIFER DATA

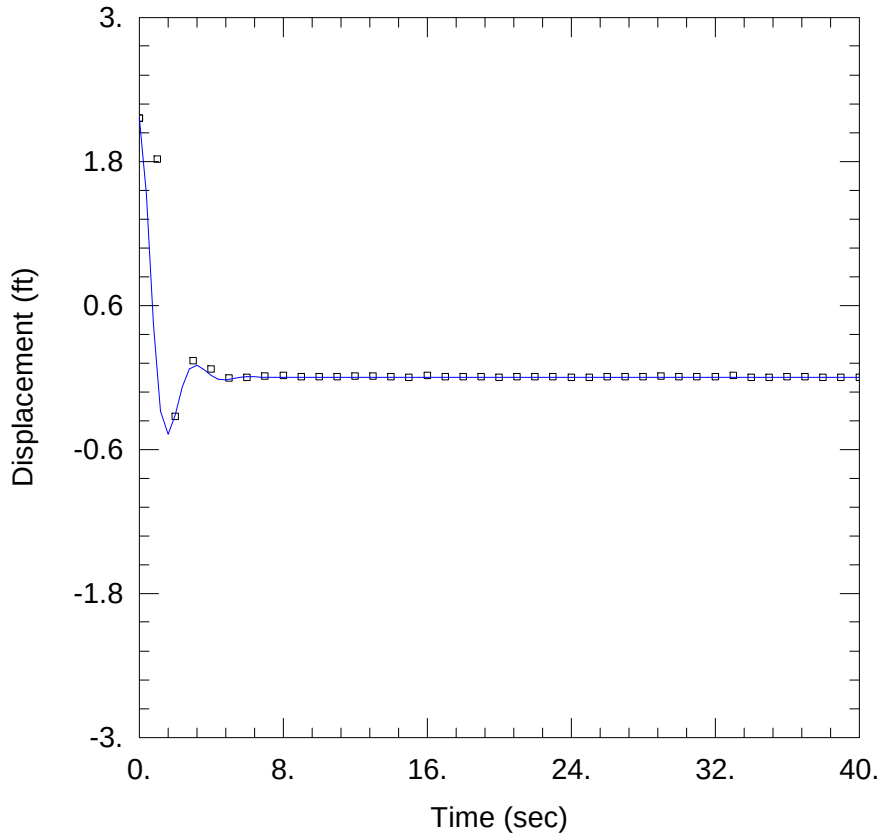
Saturated Thickness: 59.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW206A)

Initial Displacement: 3.268 ft
Total Well Penetration Depth: 23.92 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 23.91 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206A_IN3.aqt
Date: 11/12/18 Time: 14:18:20

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 118.9 ft/day
Le = 6.474 ft

AQUIFER DATA

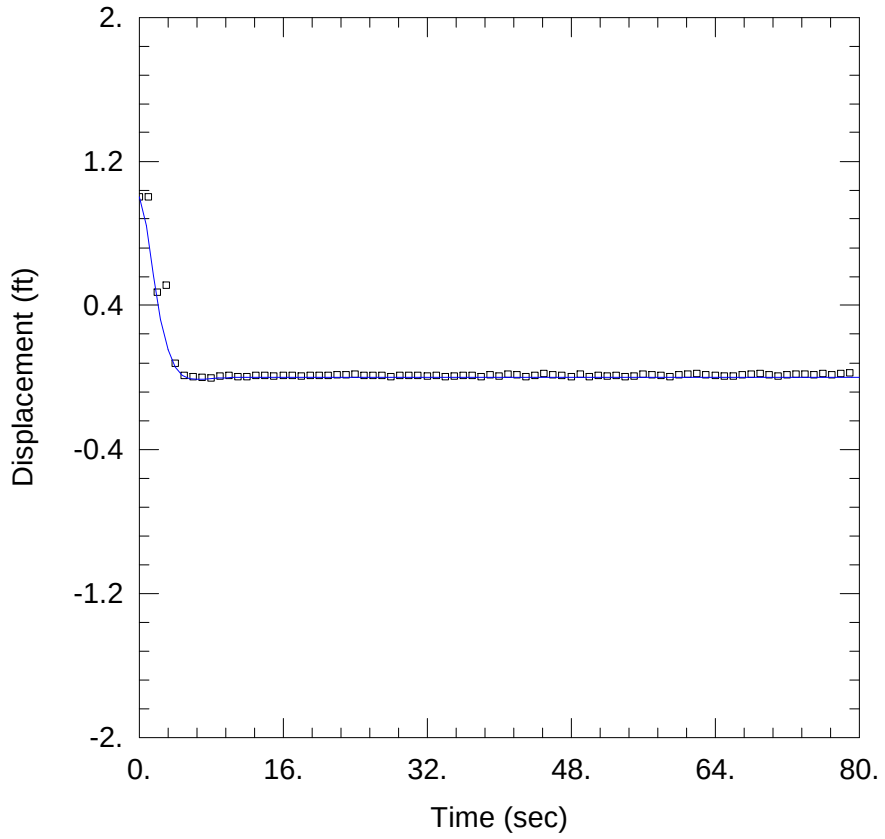
Saturated Thickness: 59.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW206A)

Initial Displacement: 2.161 ft
Total Well Penetration Depth: 23.92 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 23.91 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206A_OUT1.aqt
Date: 11/15/18 Time: 10:33:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 24.01 ft/day
Le = 44.71 ft

AQUIFER DATA

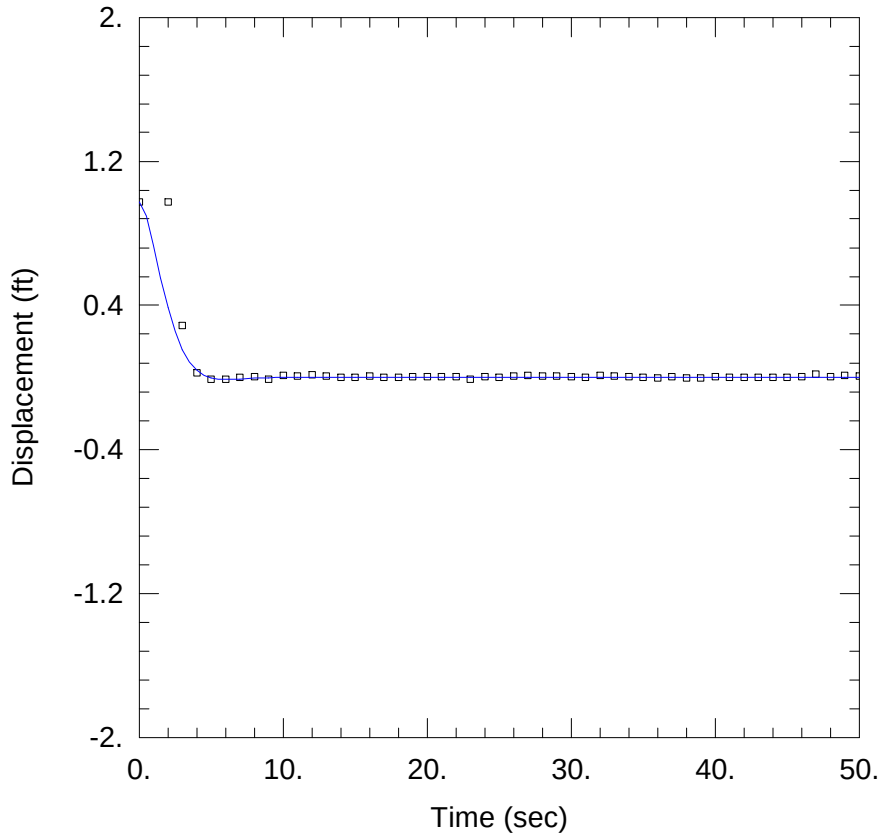
Saturated Thickness: 59.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW206A)

Initial Displacement: 1.003 ft
Total Well Penetration Depth: 23.92 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 23.91 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206A_OUT2.aqt
Date: 11/12/18 Time: 14:21:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 25.38 ft/day
Le = 40.01 ft

AQUIFER DATA

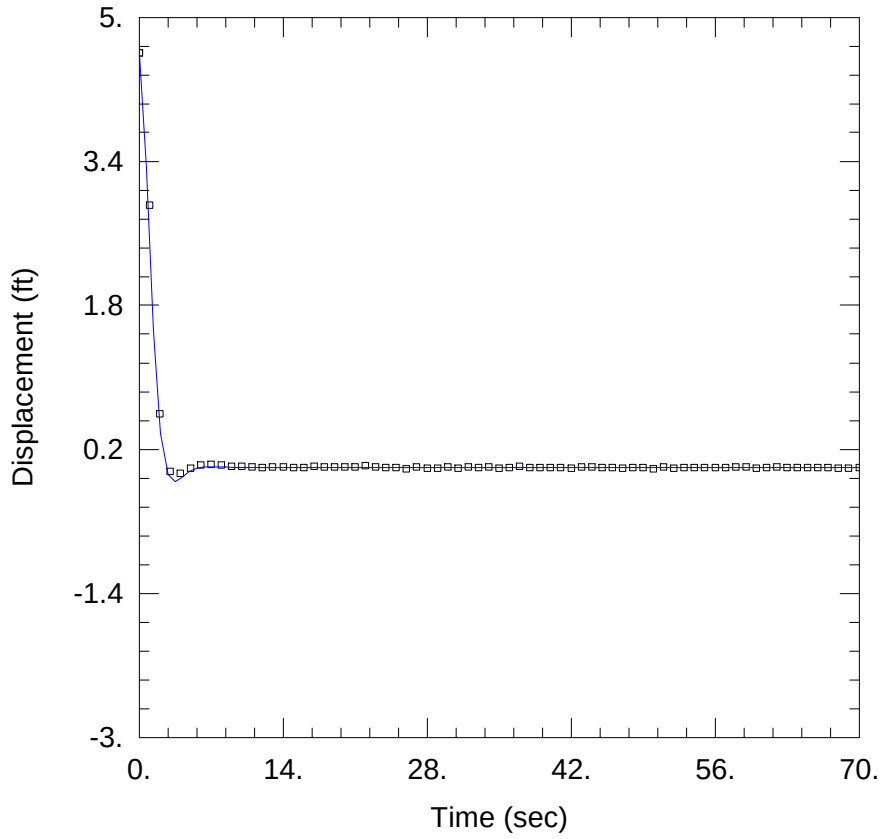
Saturated Thickness: 59.66 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS_MW206A)

Initial Displacement: 0.973 ft
Total Well Penetration Depth: 23.92 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 23.91 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206B_IN1_AC.aqt
Date: 11/15/18 Time: 09:07:03

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206B
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 190. ft/day
Le = 17.71 ft

AQUIFER DATA

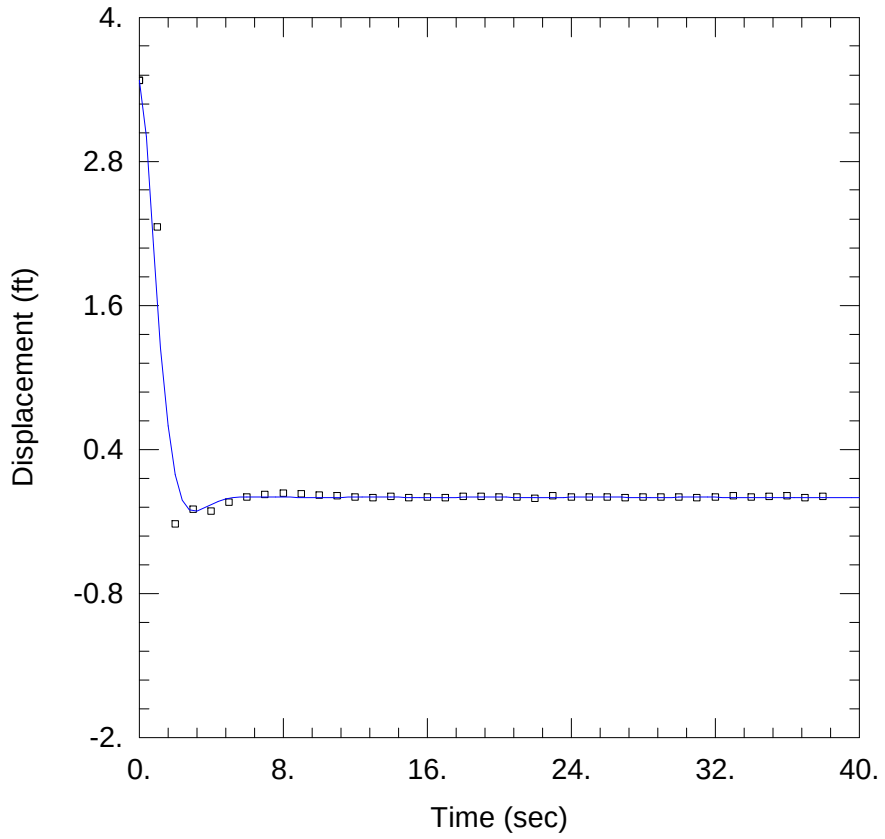
Saturated Thickness: 59.09 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW206B)

Initial Displacement: 4.608 ft
Total Well Penetration Depth: 53.65 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 53.65 ft
Screen Length: 19.59 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206B_IN2.aqt
Date: 11/15/18 Time: 09:08:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206B
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 212. ft/day
Le = 14.06 ft

AQUIFER DATA

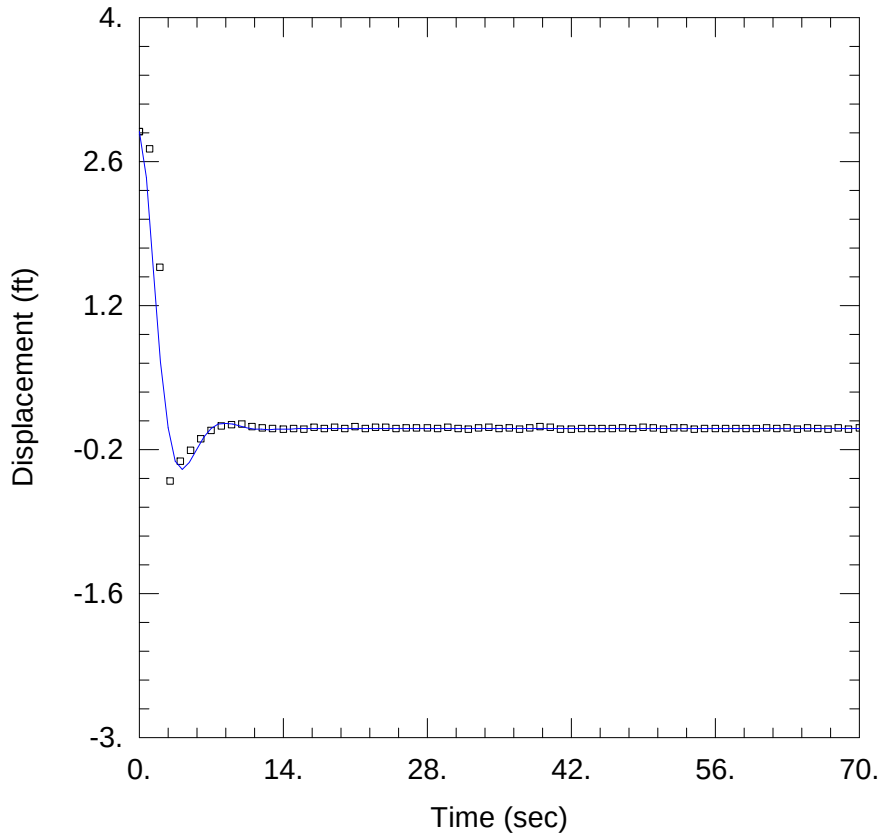
Saturated Thickness: 59.09 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW206B)

Initial Displacement: 3.476 ft
Total Well Penetration Depth: 53.65 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 53.65 ft
Screen Length: 19.59 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206B_IN3.aqt
Date: 11/15/18 Time: 09:09:51

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206B
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 172.6 ft/day
Le = 39.9 ft

AQUIFER DATA

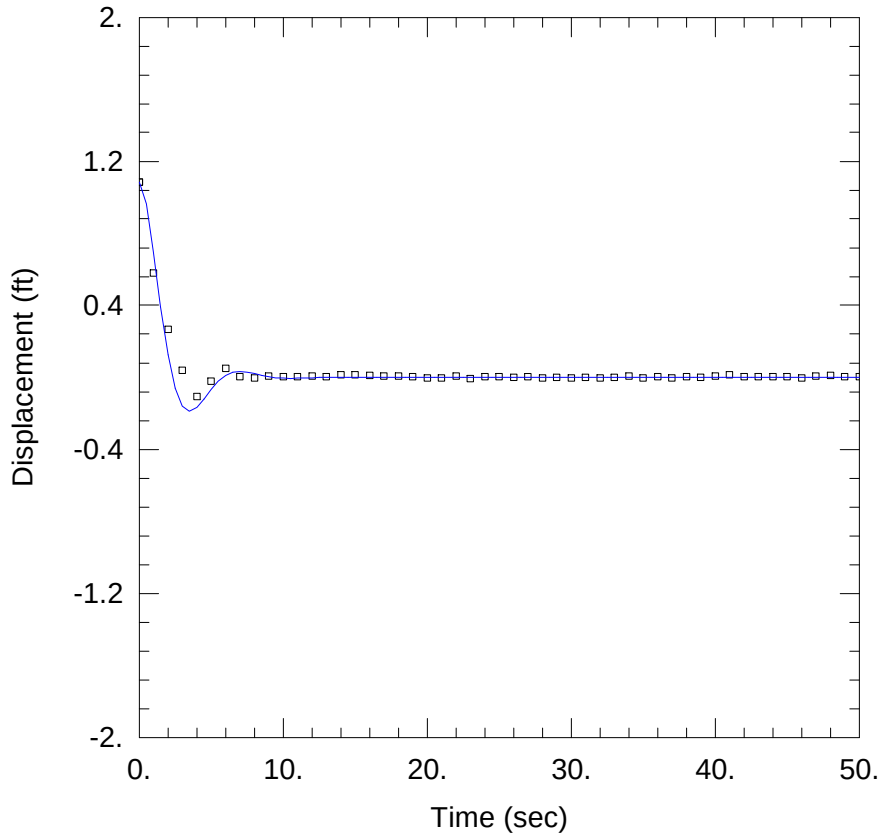
Saturated Thickness: 59.09 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW206B)

Initial Displacement: 2.892 ft
Total Well Penetration Depth: 53.65 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 53.65 ft
Screen Length: 19.59 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206B_OUT1.aqt
Date: 11/15/18 Time: 09:11:02

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206B
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 218.4 ft/day
Le = 30.47 ft

AQUIFER DATA

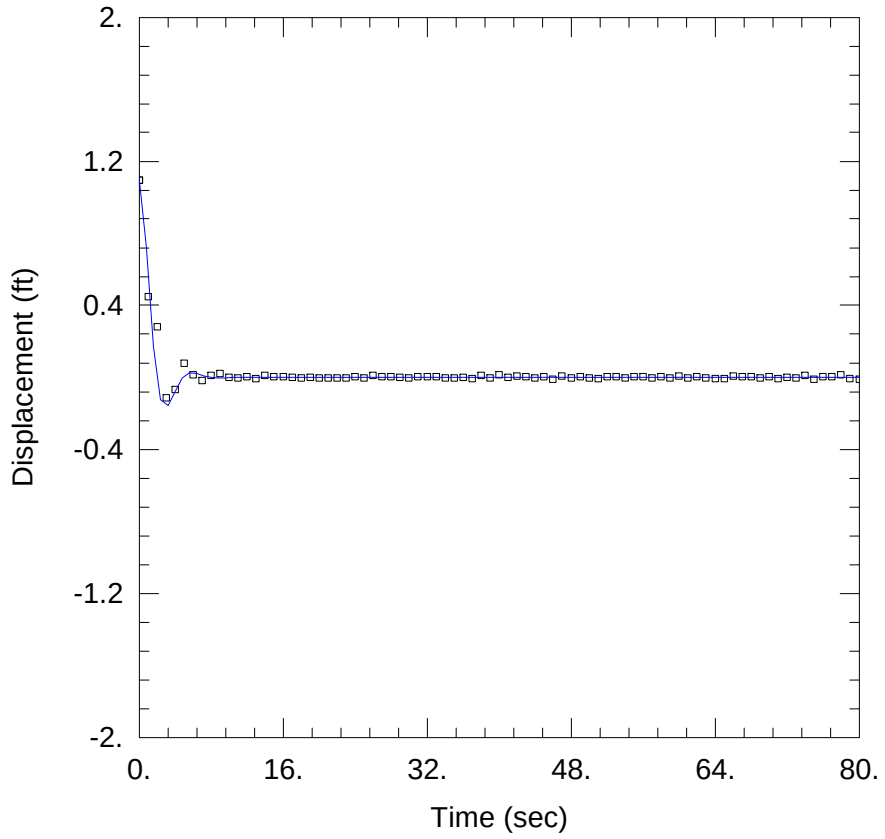
Saturated Thickness: 59.09 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW206B)

Initial Displacement: 1.083 ft
Total Well Penetration Depth: 53.65 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 53.65 ft
Screen Length: 19.59 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206B_OUT2.aqt
Date: 11/15/18 Time: 09:12:00

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206B
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 251.2 ft/day
Le = 20.3 ft

AQUIFER DATA

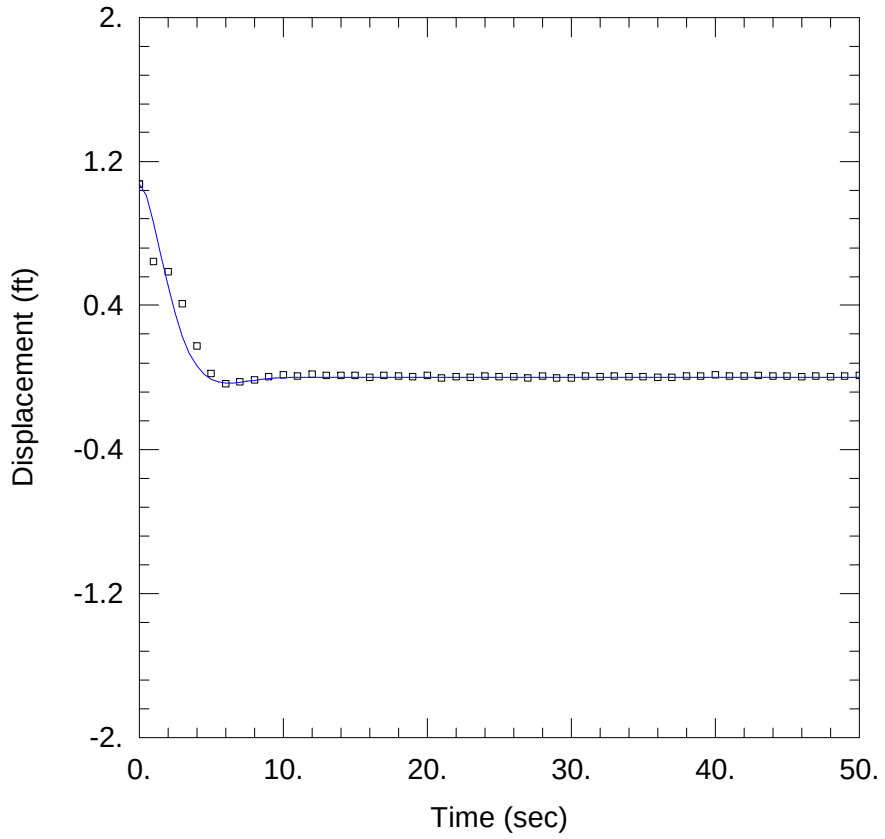
Saturated Thickness: 59.09 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW206B)

Initial Displacement: 1.096 ft
Total Well Penetration Depth: 53.65 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 53.65 ft
Screen Length: 19.59 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206B_OUT3.aqt
Date: 11/12/18 Time: 14:37:38

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206B
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

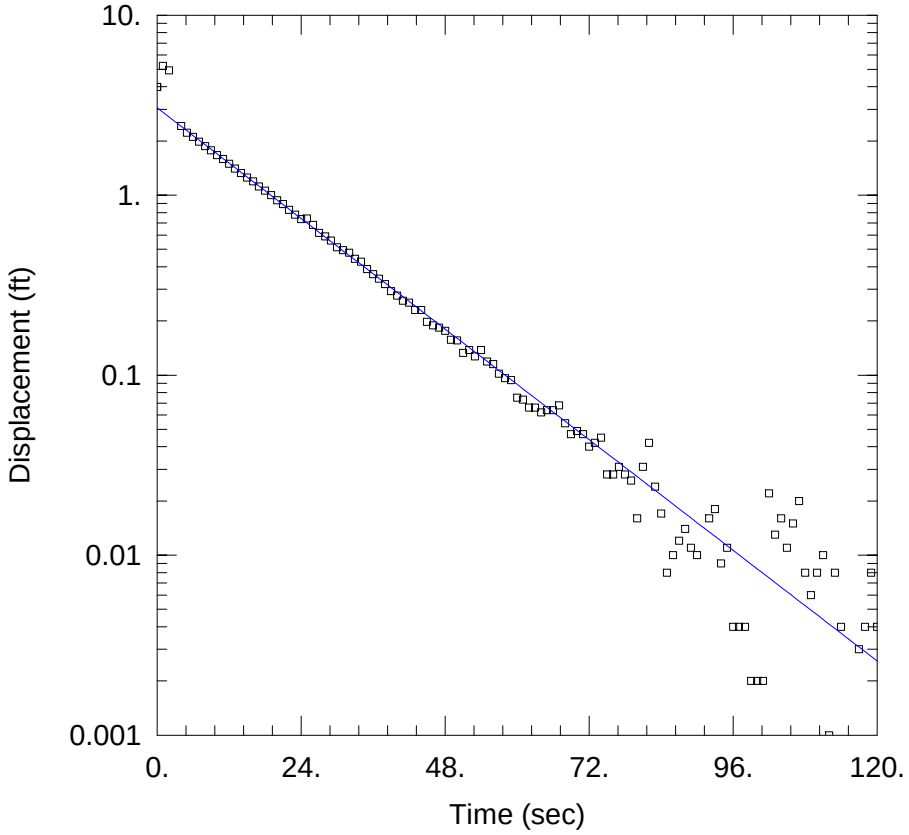
K = 104.7 ft/day
Le = 55.41 ft

AQUIFER DATA

Saturated Thickness: 59.09 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW206B)

Initial Displacement: 1.073 ft
Total Well Penetration Depth: 53.65 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 53.65 ft
Screen Length: 19.59 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206C_IN1.aqt
Date: 07/31/18 Time: 09:21:21

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.815 ft/day
y0 = 3.056 ft

AQUIFER DATA

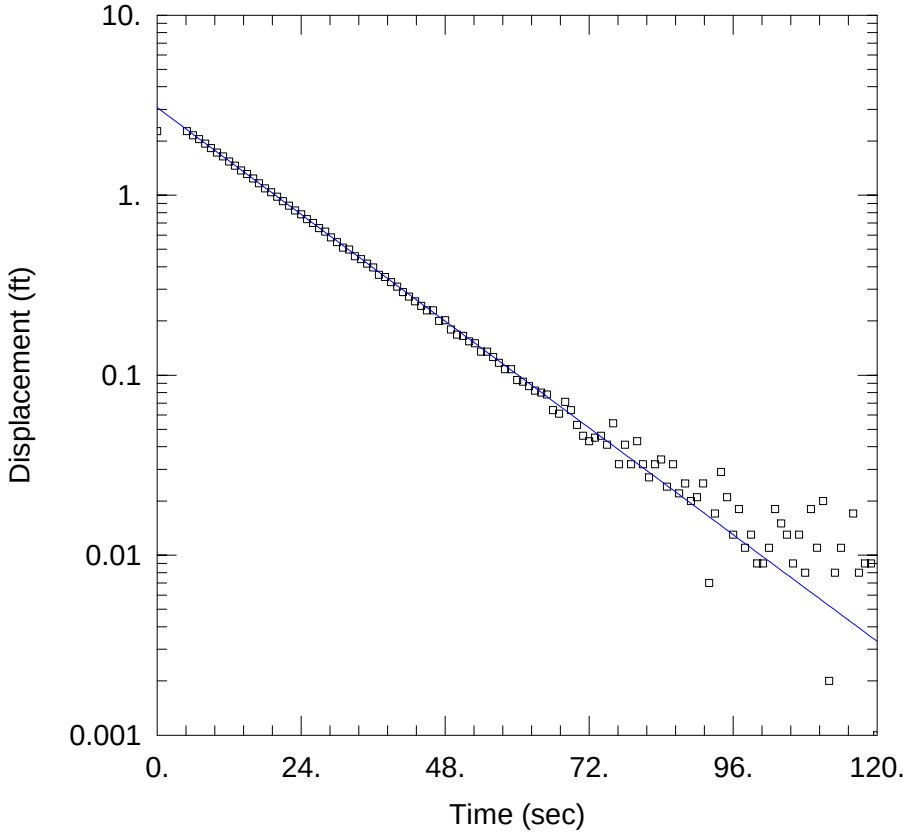
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW206C)

Initial Displacement: 3.994 ft
Total Well Penetration Depth: 84.09 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 84.09 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206C_IN2.aqt
Date: 07/31/18 Time: 09:22:35

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.681 ft/day
y0 = 3.064 ft

AQUIFER DATA

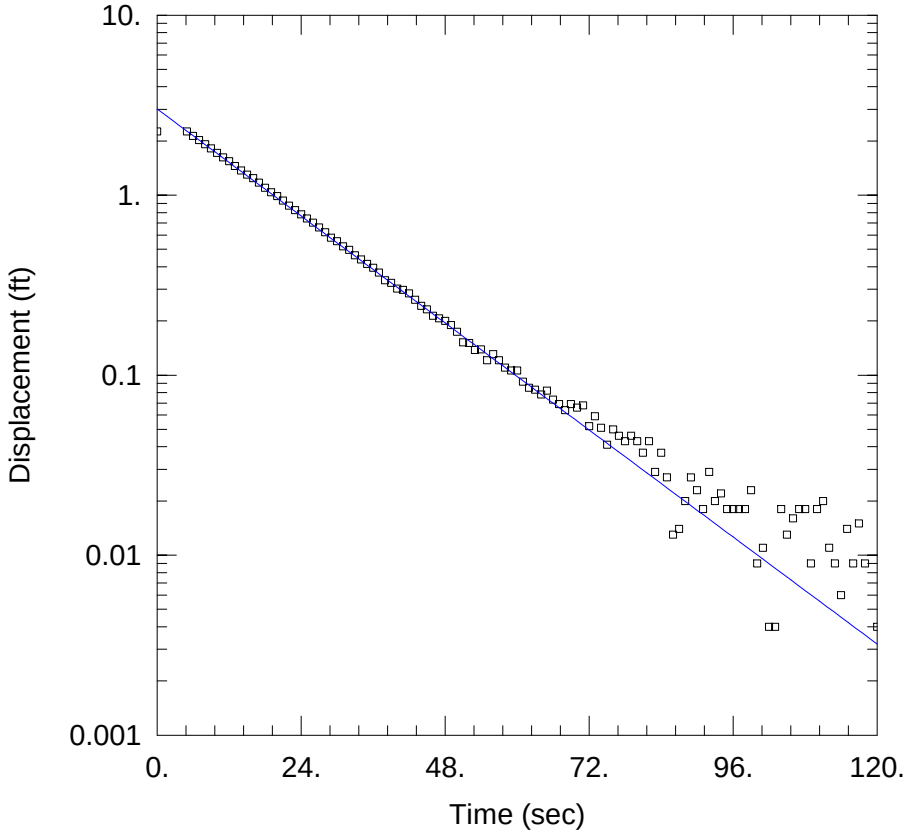
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW206C)

Initial Displacement: 2.272 ft
Total Well Penetration Depth: 84.09 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 84.09 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206C_IN3.aqt
Date: 07/31/18 Time: 09:22:59

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.69 ft/day
y0 = 3.012 ft

AQUIFER DATA

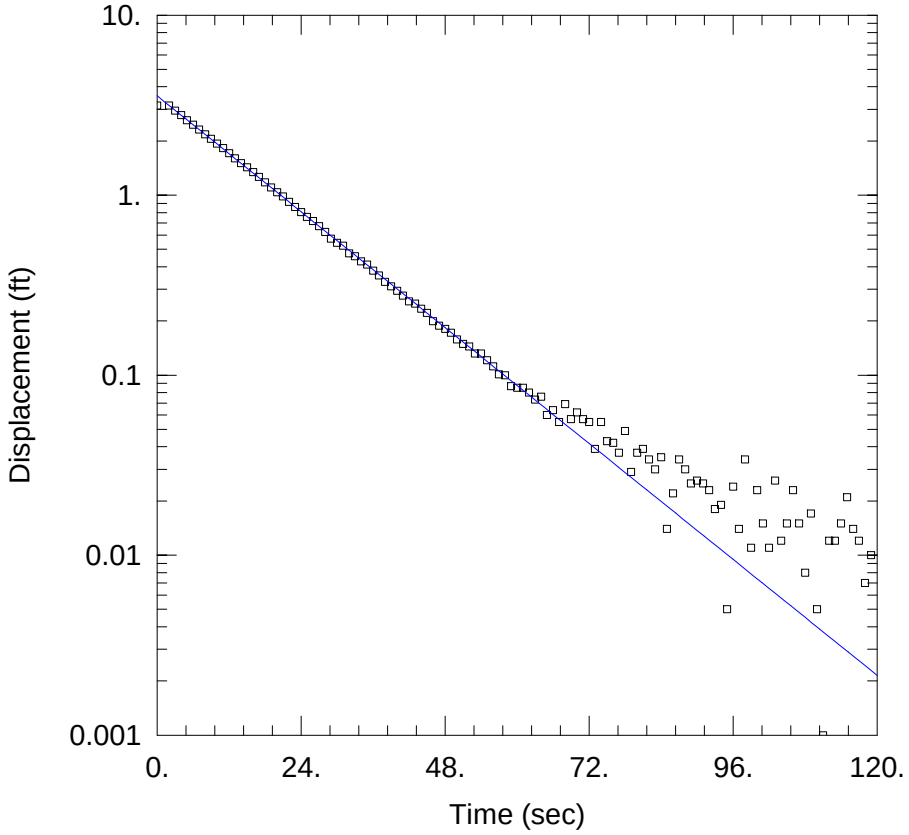
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW206C)

Initial Displacement: 2.26 ft
Total Well Penetration Depth: 84.09 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 84.09 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206C_OUT1.aqt
Date: 07/31/18 Time: 09:23:53

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.997 ft/day
y0 = 3.565 ft

AQUIFER DATA

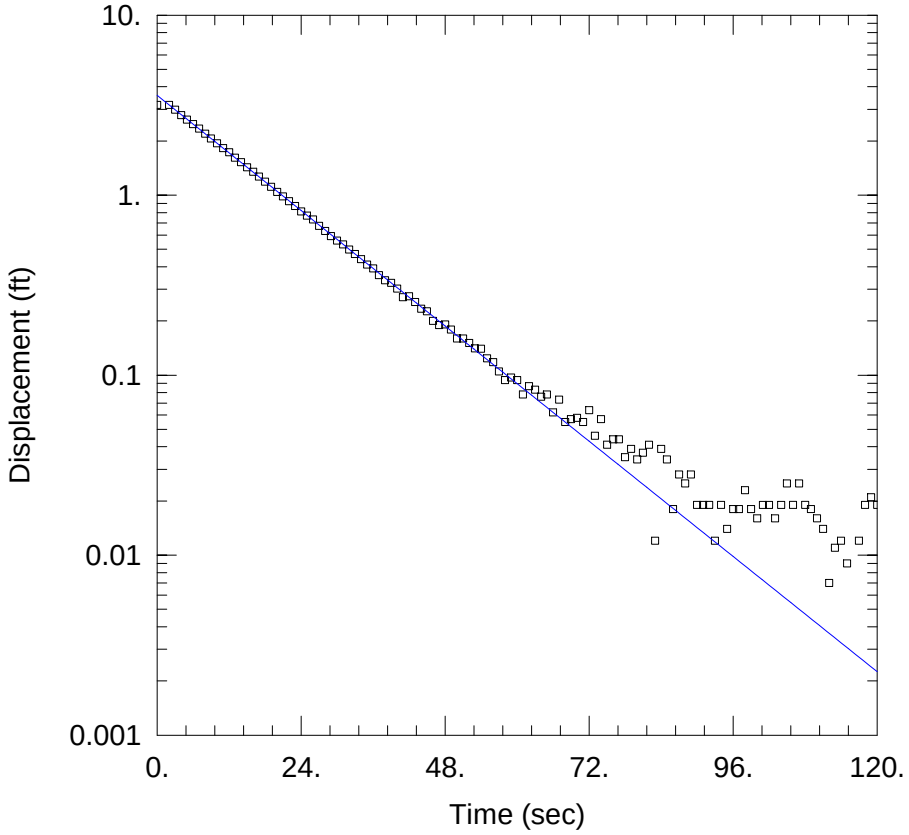
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW206C)

Initial Displacement: 3.151 ft
Total Well Penetration Depth: 84.09 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 84.09 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206C_OUT2.aqt
Date: 07/31/18 Time: 09:24:13

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.975 ft/day
y0 = 3.584 ft

AQUIFER DATA

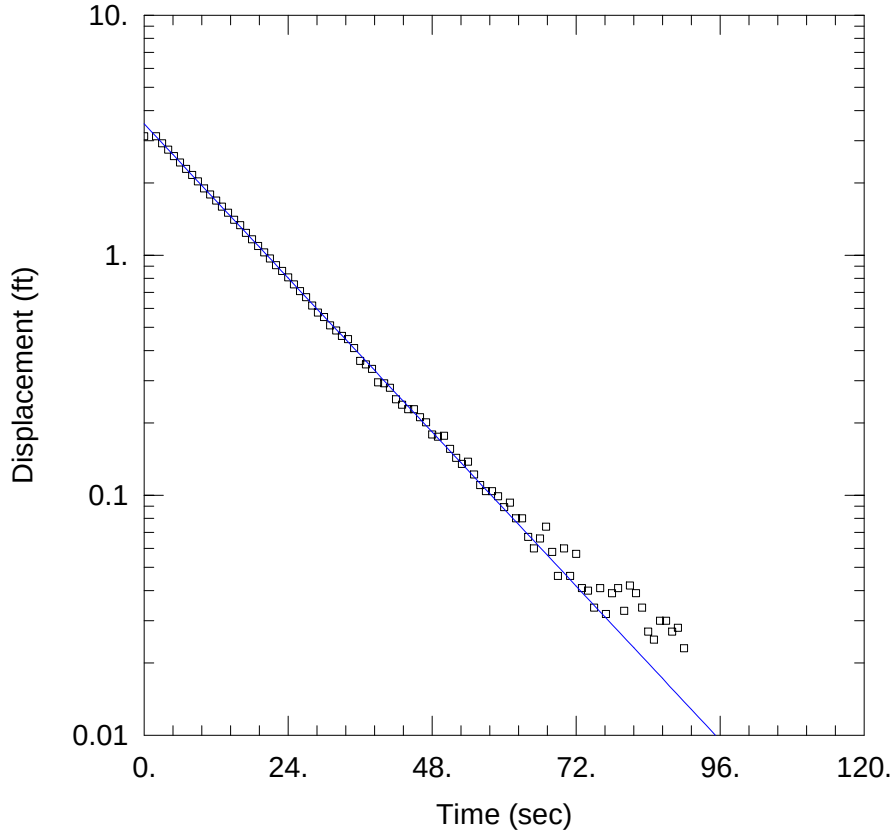
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW206C)

Initial Displacement: 3.169 ft
Total Well Penetration Depth: 84.09 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 84.09 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206C_OUT3.aqt
Date: 07/31/18 Time: 09:24:37

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.984 ft/day
y0 = 3.525 ft

AQUIFER DATA

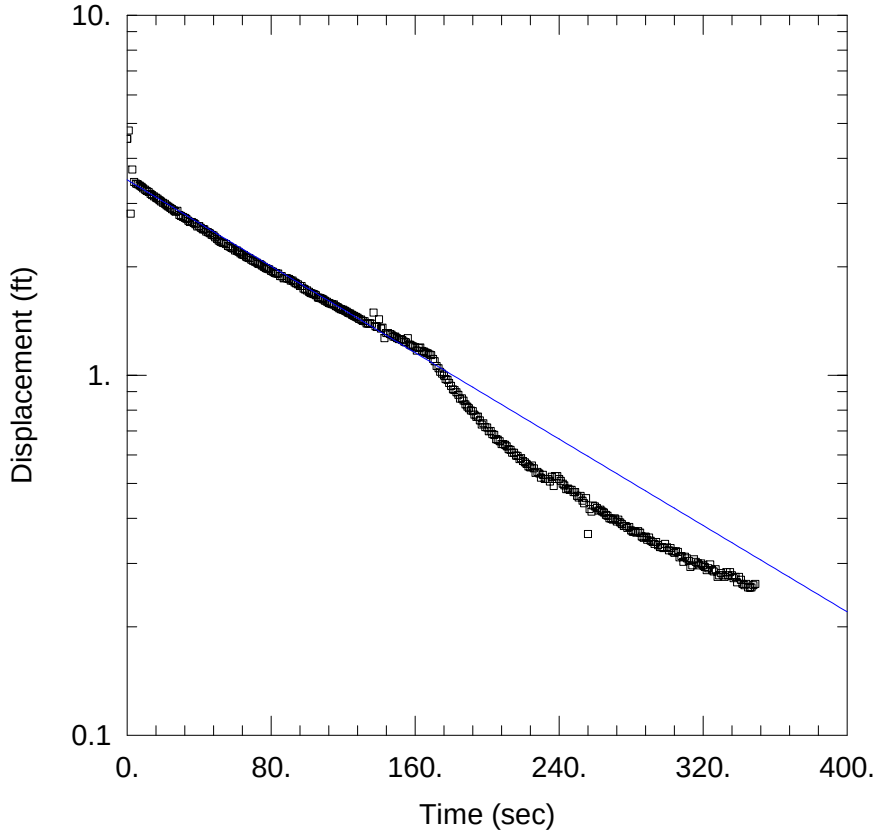
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW206C)

Initial Displacement: 3.127 ft
Total Well Penetration Depth: 84.09 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 84.09 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206D_IN1.aqt
Date: 01/17/19 Time: 12:40:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.4635 ft/day
y0 = 3.488 ft

AQUIFER DATA

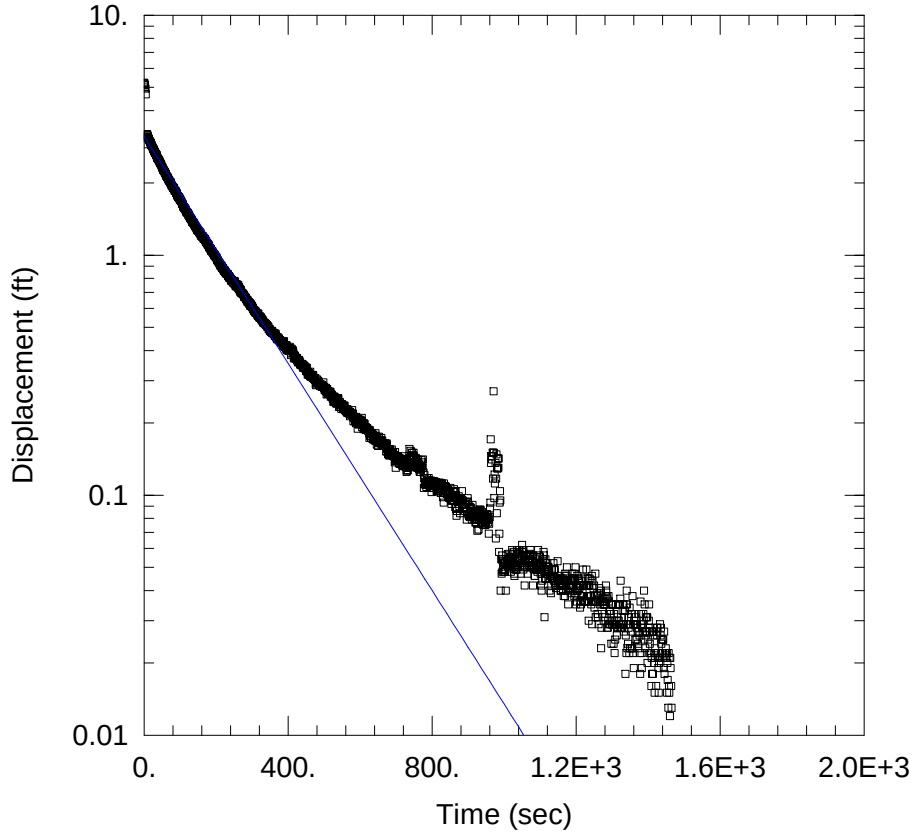
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-206D_IN1)

Initial Displacement: 4.532 ft
Total Well Penetration Depth: 109.8 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 109.8 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206D_IN2.aqt
Date: 01/17/19 Time: 12:40:43

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3656 ft/day
y0 = 3.129 ft

AQUIFER DATA

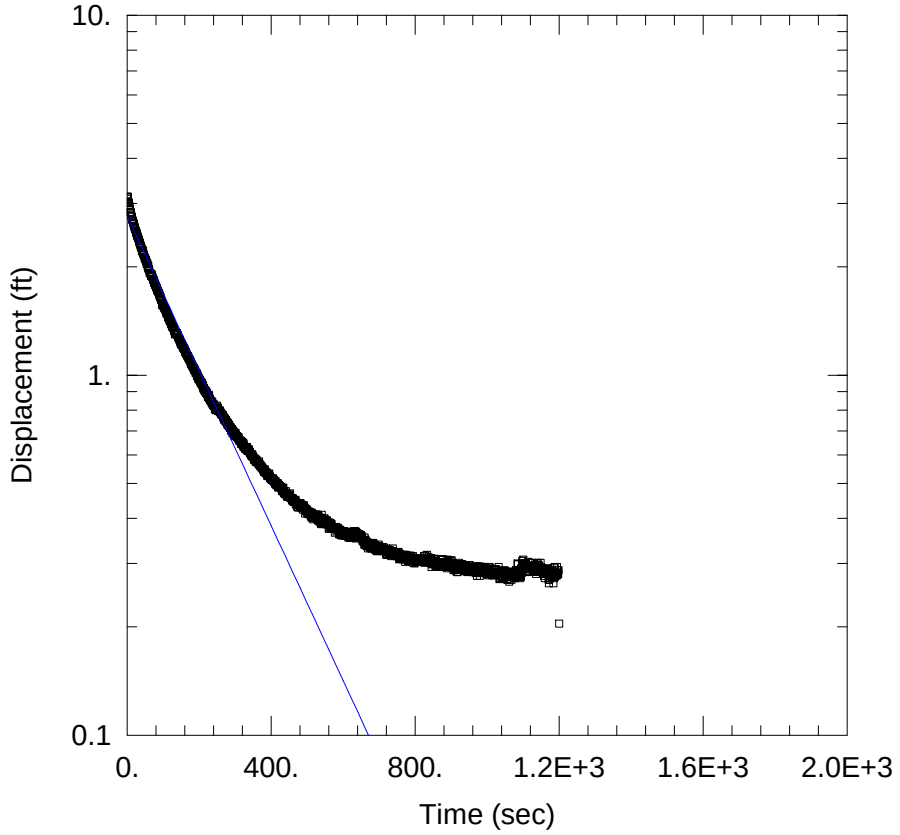
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-206D_IN2)

Initial Displacement: 5.222 ft
Total Well Penetration Depth: 109.8 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 109.8 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206D_OUT1.aqt
Date: 01/17/19 Time: 12:41:06

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3323 ft/day
y0 = 2.769 ft

AQUIFER DATA

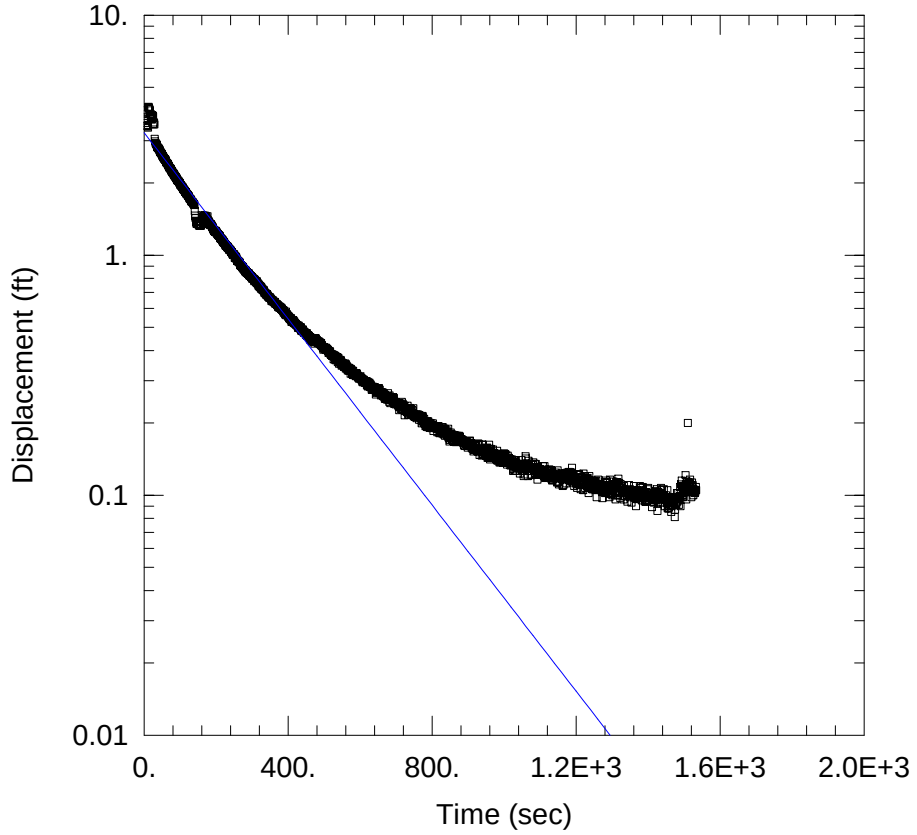
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-206D_OUT1)

Initial Displacement: 3.091 ft
Total Well Penetration Depth: 109.8 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 109.8 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206D_OUT2.aqt
Date: 01/17/19 Time: 12:41:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.2997 ft/day
y0 = 3.237 ft

AQUIFER DATA

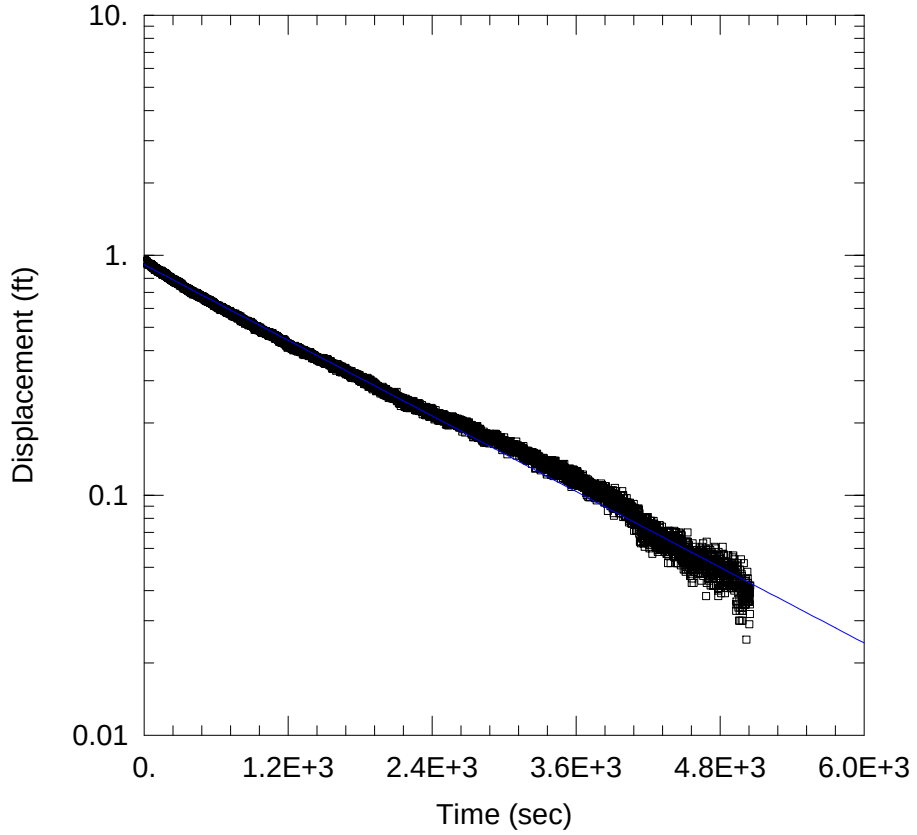
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-206D_OUT2)

Initial Displacement: 4.013 ft
Total Well Penetration Depth: 109.8 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 109.8 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206E_IN1_ES.aqt
Date: 01/17/19 Time: 12:43:08

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206E
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3131 ft/day
y0 = 0.9136 ft

AQUIFER DATA

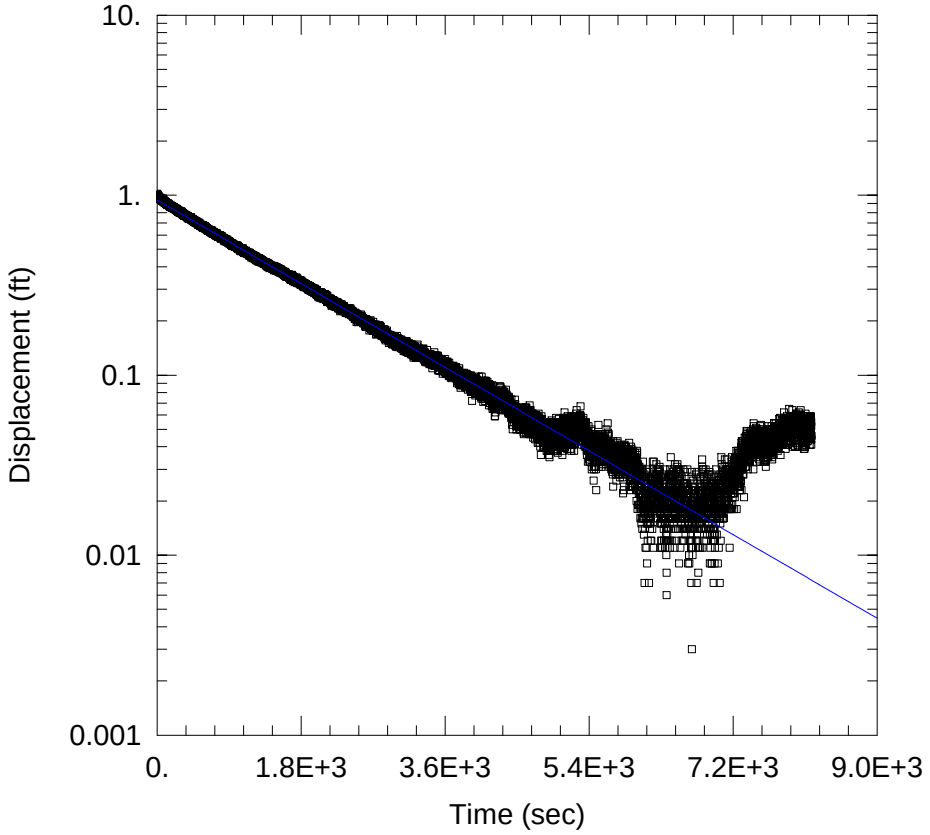
Saturated Thickness: 12.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-206E_IN1)

Initial Displacement: 0.95 ft
Total Well Penetration Depth: 168.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 168.7 ft
Screen Length: 9.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW206E_OUT1_ES.aqt
Date: 01/17/19 Time: 12:43:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW206E
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3078 ft/day
y0 = 0.9413 ft

AQUIFER DATA

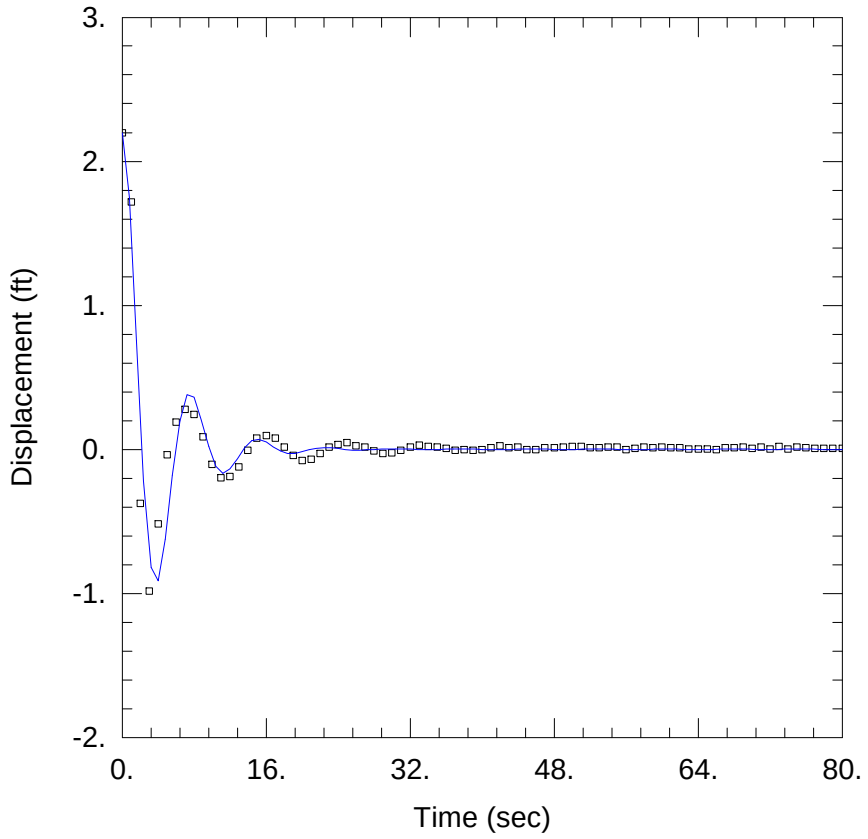
Saturated Thickness: 12.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-206E_OUT1)

Initial Displacement: 1.017 ft
Total Well Penetration Depth: 168.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 168.7 ft
Screen Length: 9.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW207_IN1_v2.aqt
Date: 01/28/19 Time: 09:58:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW207
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 96.05 ft/day
Le = 42.71 ft

AQUIFER DATA

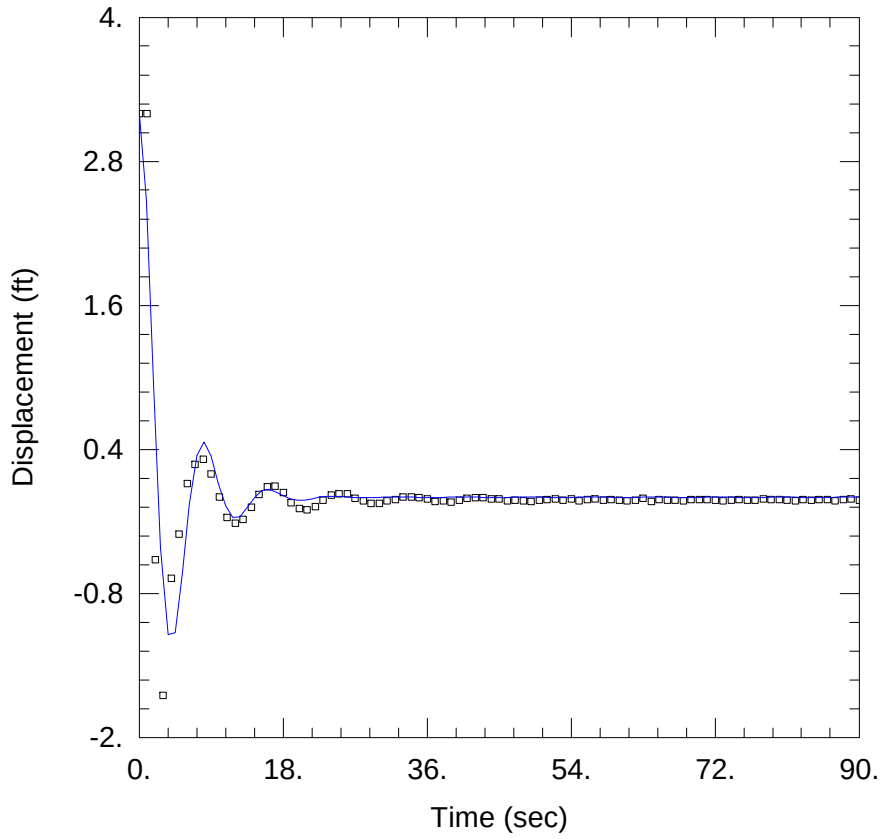
Saturated Thickness: 62.51 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW207)

Initial Displacement: 2.2 ft
Total Well Penetration Depth: 59.76 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 59.76 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW207_IN2_v2.aqt
Date: 01/28/19 Time: 09:59:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW207
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 80.87 ft/day
Le = 47.96 ft

AQUIFER DATA

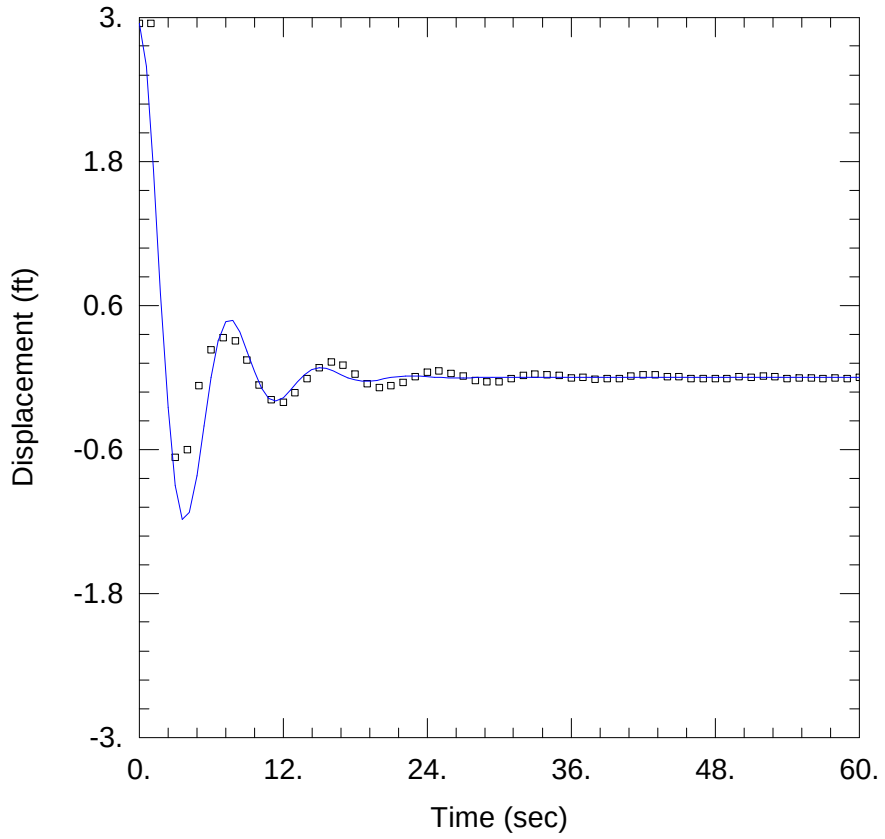
Saturated Thickness: 62.51 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW207)

Initial Displacement: 3.2 ft
Total Well Penetration Depth: 59.76 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 59.76 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW207_IN3_v3.aqt
Date: 01/28/19 Time: 10:00:30

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW207
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 91.32 ft/day
Le = 42.98 ft

AQUIFER DATA

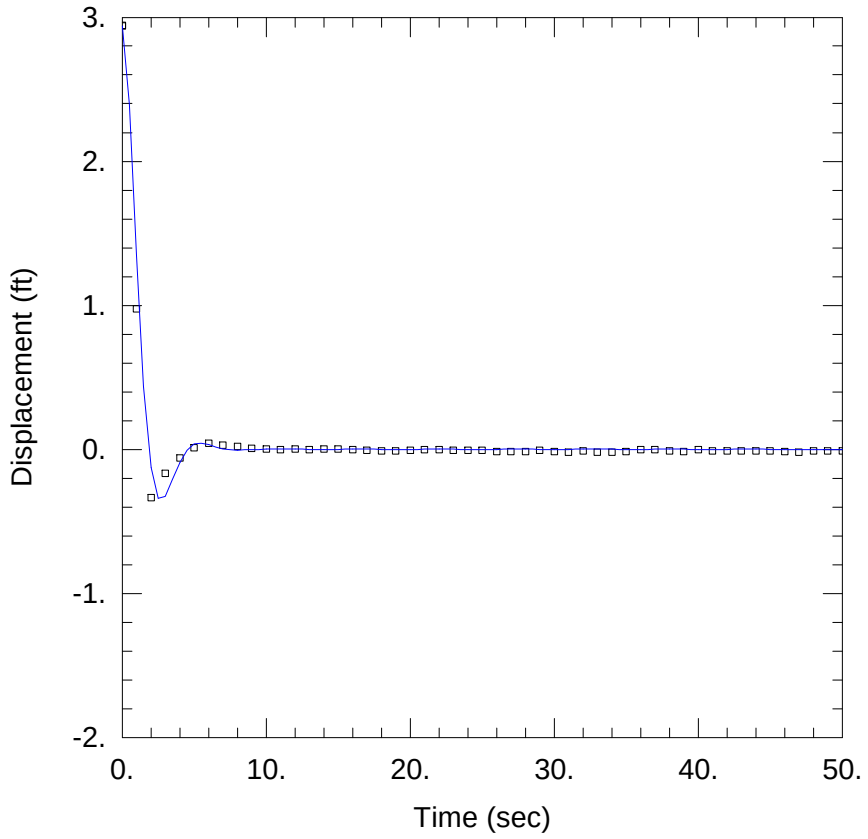
Saturated Thickness: 62.51 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW207)

Initial Displacement: 2.947 ft
Total Well Penetration Depth: 59.76 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 59.76 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW208A_IN1.aqt
Date: 11/12/18 Time: 15:03:04

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW208A
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 224.3 ft/day
Le = 16.21 ft

AQUIFER DATA

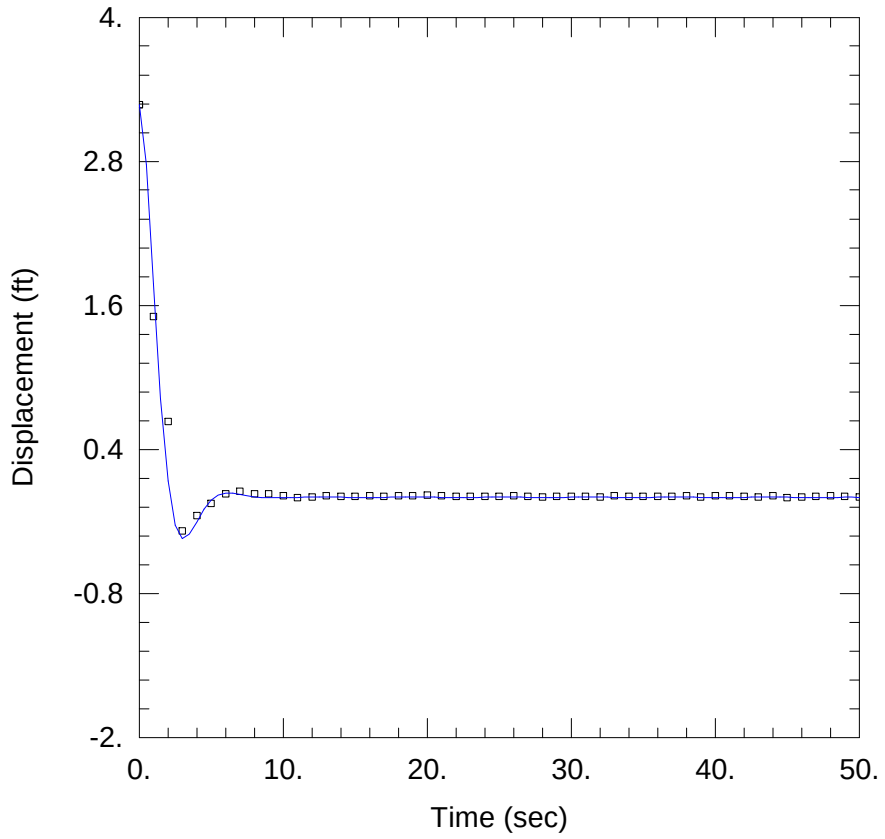
Saturated Thickness: 54.83 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW208A)

Initial Displacement: 2.94 ft
Total Well Penetration Depth: 28.03 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 28.03 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW208A_IN2.aqt
Date: 11/12/18 Time: 15:03:42

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW208A
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 192.3 ft/day
Le = 20.34 ft

AQUIFER DATA

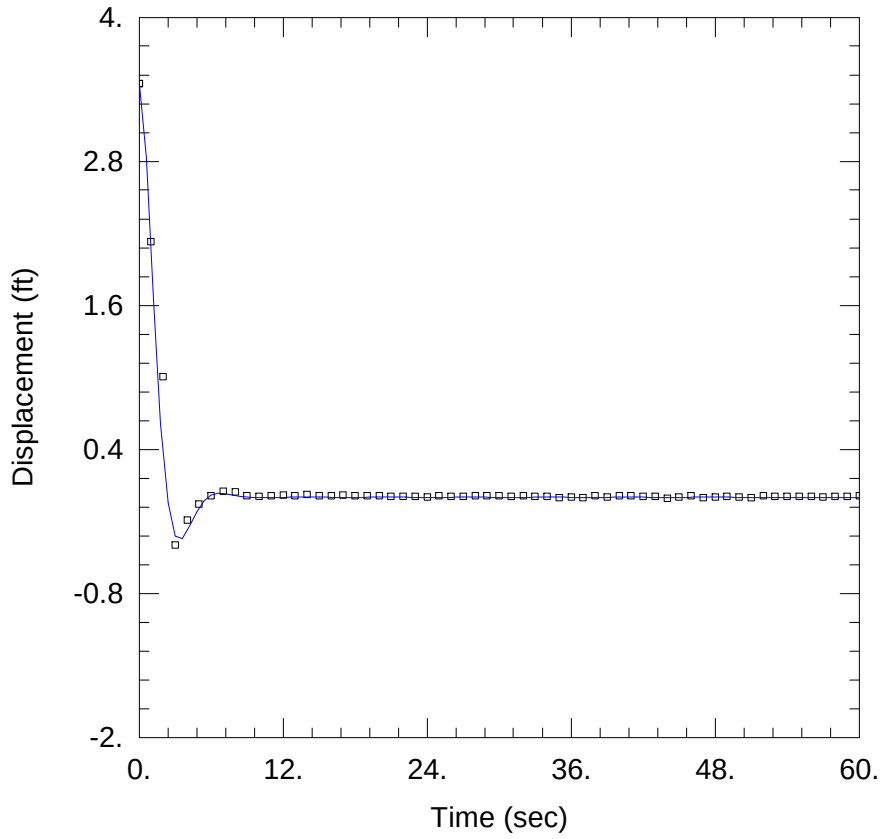
Saturated Thickness: 54.83 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW208A)

Initial Displacement: 3.27 ft
Total Well Penetration Depth: 28.03 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 28.03 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW208A_IN3.aqt
Date: 11/14/18 Time: 11:49:51

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW208A
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 175.4 ft/day
Le = 24.05 ft

AQUIFER DATA

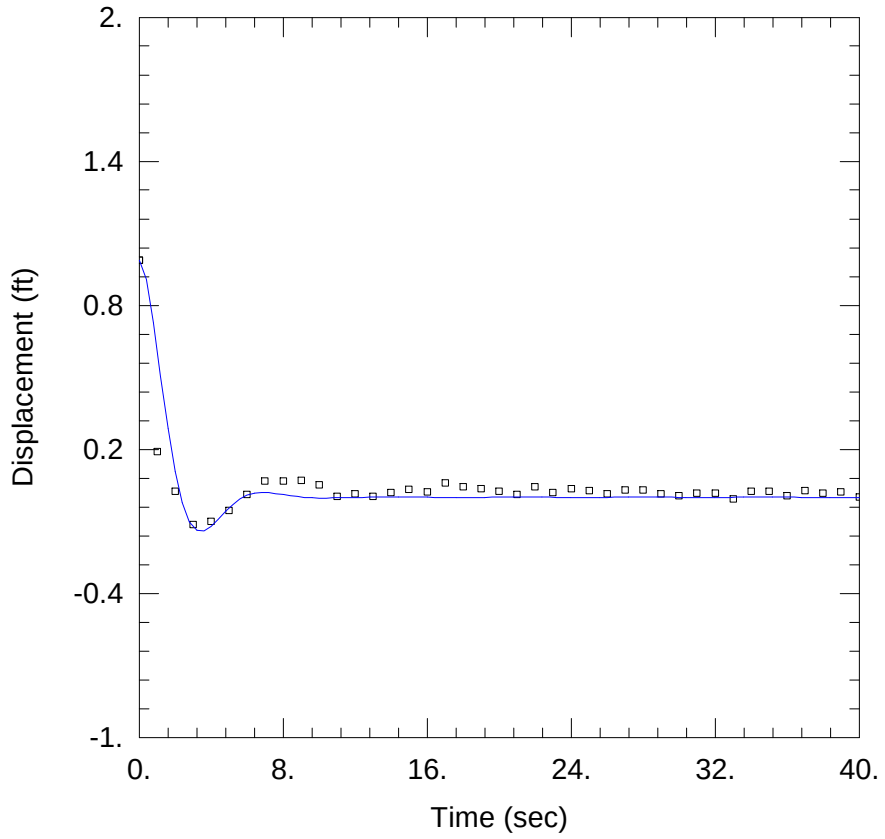
Saturated Thickness: 54.83 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW208A)

Initial Displacement: 3.448 ft
Total Well Penetration Depth: 28.03 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 28.03 ft
Screen Length: 19.6 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW208B_IN1.aqt
Date: 11/14/18 Time: 11:51:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW208B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 58.96 ft/day
Le = 27.75 ft

AQUIFER DATA

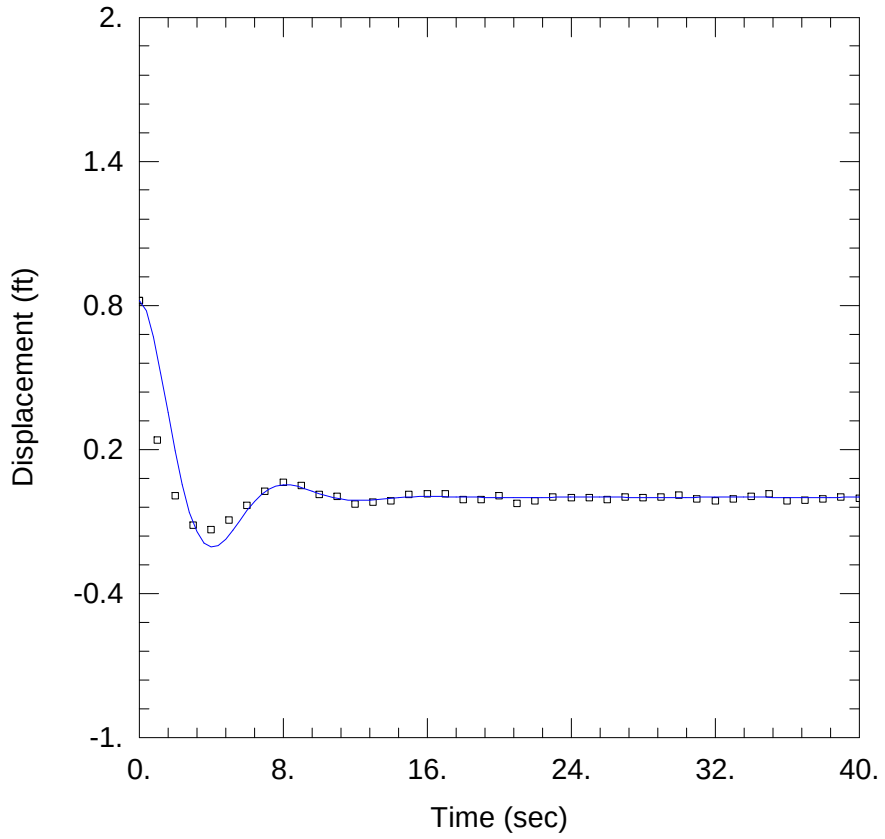
Saturated Thickness: 54.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW208B)

Initial Displacement: 0.987 ft
Total Well Penetration Depth: 52.89 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 52.89 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW208B_IN2.aqt
Date: 11/12/18 Time: 15:07:50

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW208B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 60.67 ft/day
Le = 45.26 ft

AQUIFER DATA

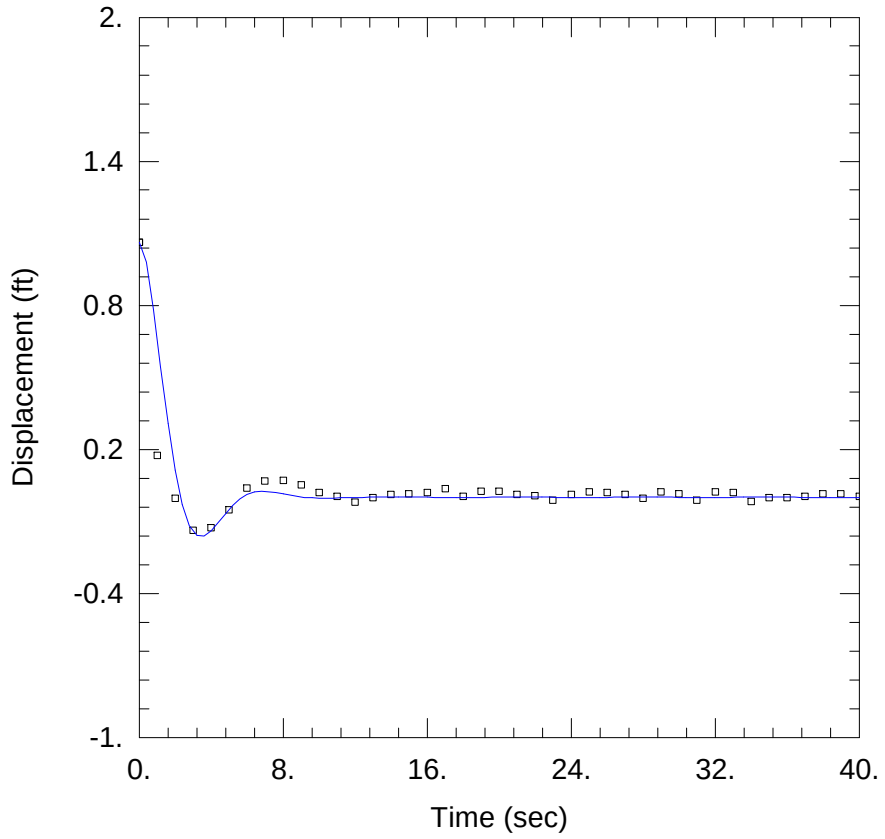
Saturated Thickness: 54.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW208B)

Initial Displacement: 0.819 ft
Total Well Penetration Depth: 52.89 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 52.89 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW208B_IN3.aqt
Date: 11/14/18 Time: 11:52:42

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW208B
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 59.99 ft/day
Le = 28.26 ft

AQUIFER DATA

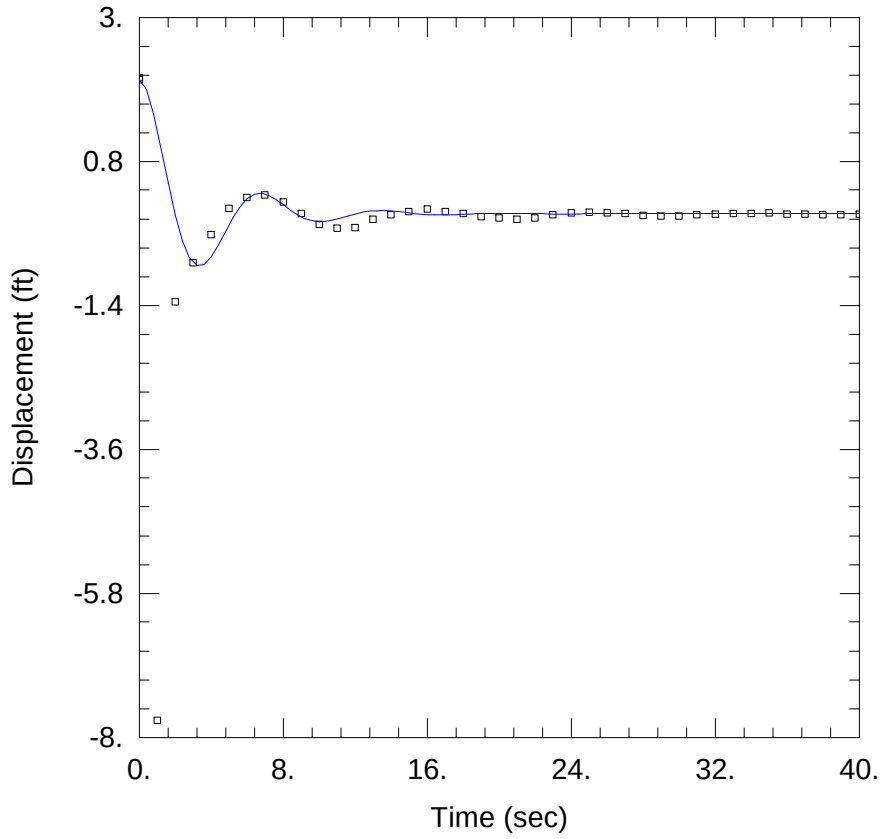
Saturated Thickness: 54.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW208B)

Initial Displacement: 1.062 ft
Total Well Penetration Depth: 52.89 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 52.89 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209_IN1.aqt
Date: 11/13/18 Time: 08:07:48

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 93.56 ft/day
Le = 33.71 ft

AQUIFER DATA

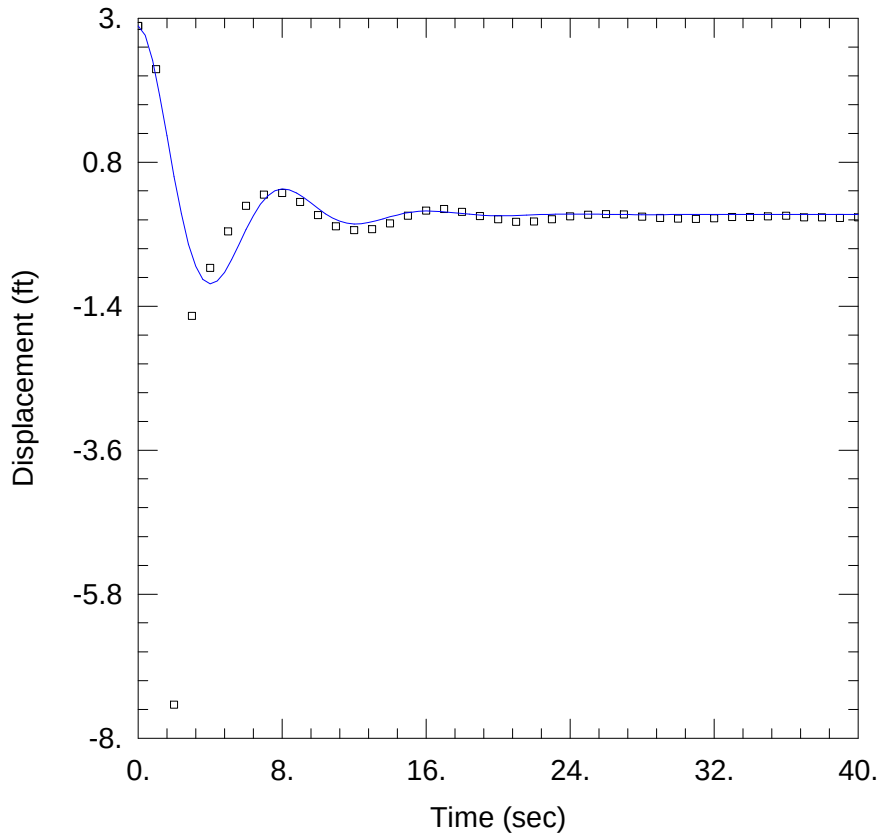
Saturated Thickness: 94.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW209)

Initial Displacement: 2.048 ft
Total Well Penetration Depth: 62.56 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 62.56 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209_IN2.aqt
Date: 07/31/18 Time: 10:03:18

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 73.55 ft/day
Le = 48.1 ft

AQUIFER DATA

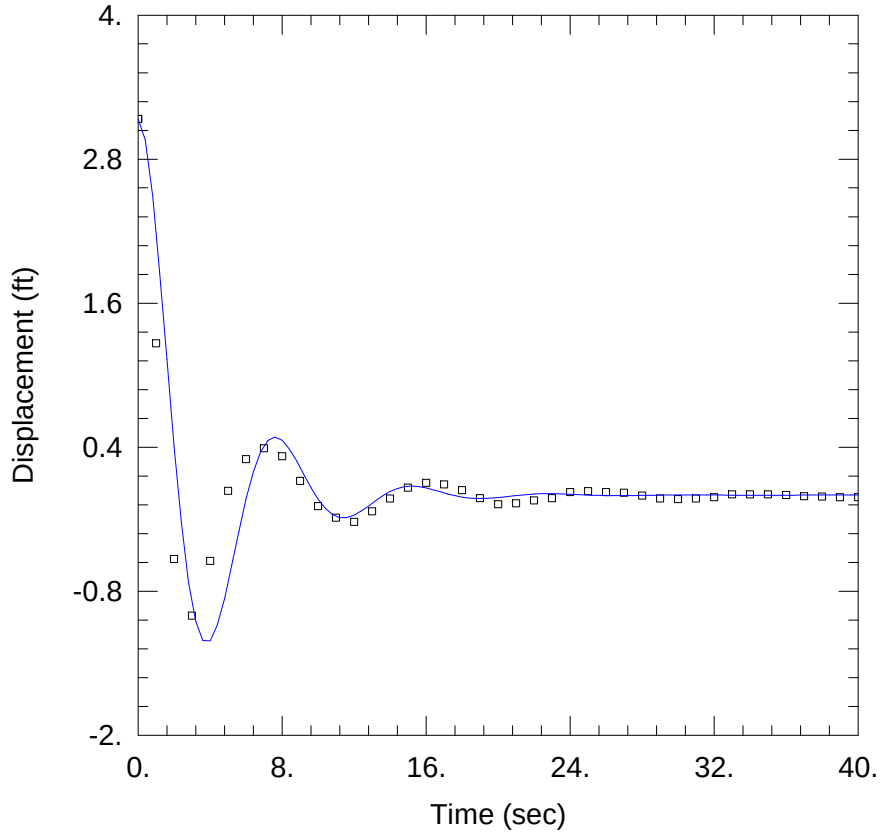
Saturated Thickness: 94.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW209)

Initial Displacement: 2.882 ft
Total Well Penetration Depth: 62.56 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 62.56 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209_IN3.aqt
Date: 07/31/18 Time: 10:03:38

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209
Test Date: 7/11/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 82.69 ft/day
Le = 43.25 ft

AQUIFER DATA

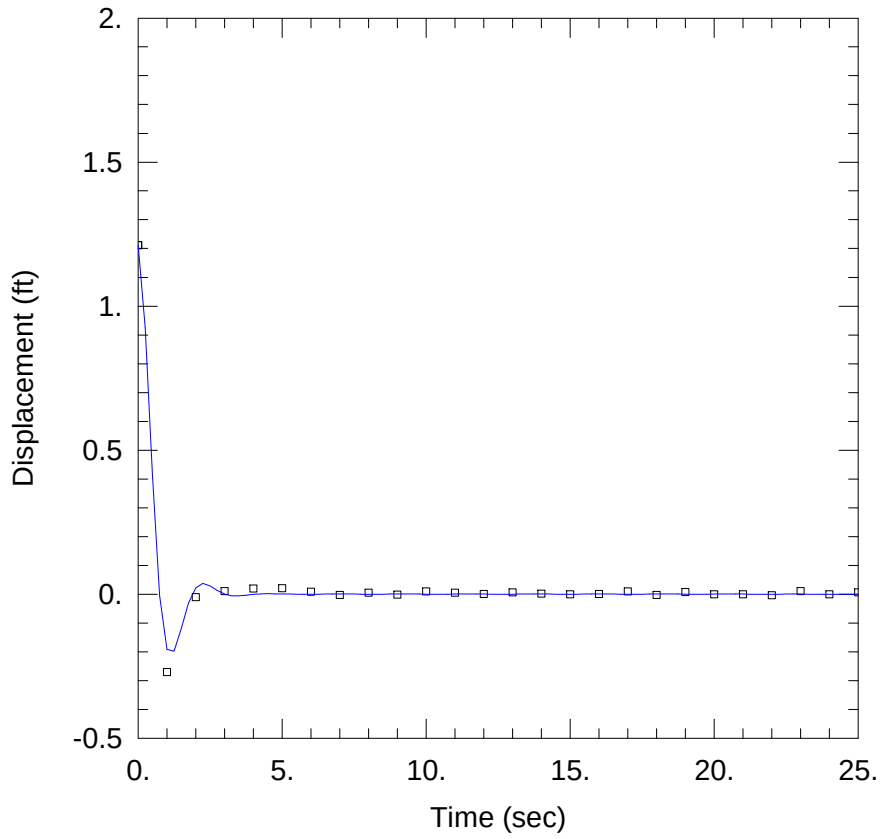
Saturated Thickness: 94.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW209)

Initial Displacement: 3.135 ft
Total Well Penetration Depth: 62.56 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 62.56 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209A_IN1.aqt
Date: 01/17/19 Time: 12:45:10

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 621.7 ft/day
Le = 3.175 ft

AQUIFER DATA

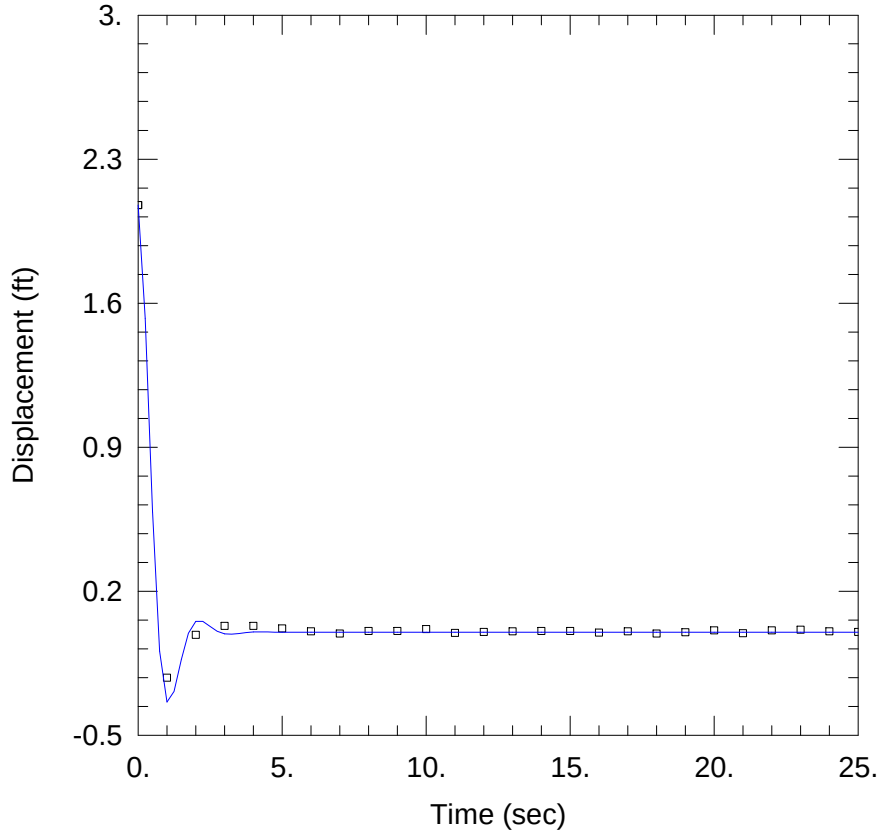
Saturated Thickness: 5.18 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209A_IN1)

Initial Displacement: 1.212 ft
Total Well Penetration Depth: 27.03 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.03 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209A_IN2.aqt
Date: 01/17/19 Time: 12:45:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 625.4 ft/day
Le = 2.754 ft

AQUIFER DATA

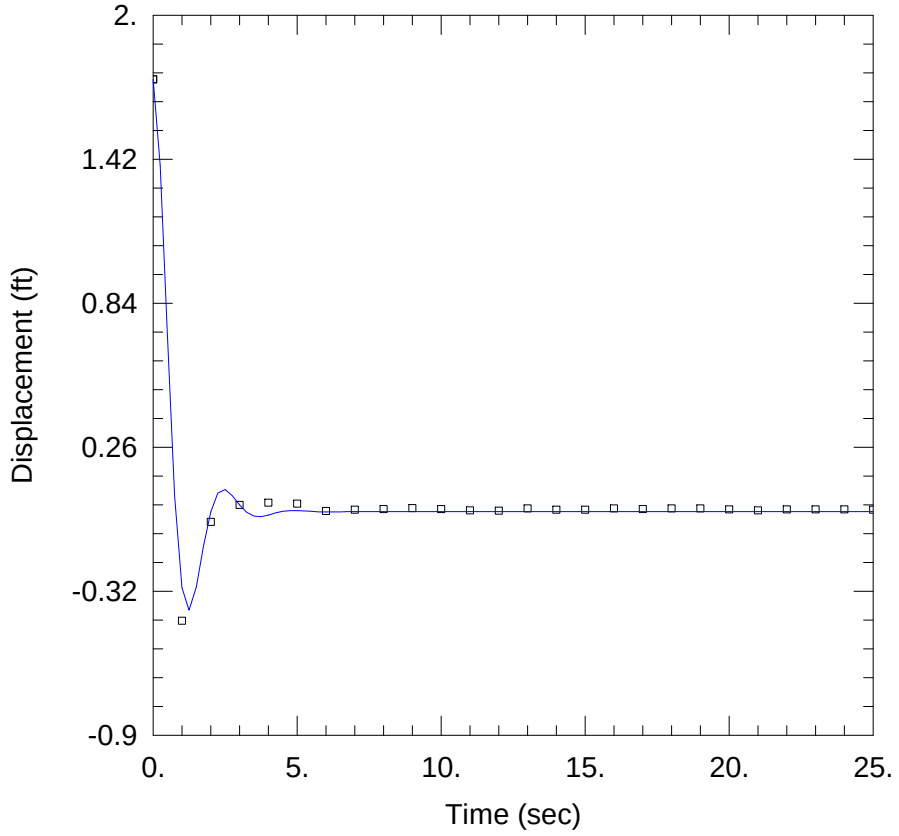
Saturated Thickness: 5.51 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209A_IN2)

Initial Displacement: 2.076 ft
Total Well Penetration Depth: 27.89 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.89 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209A_IN3.aqt
Date: 01/17/19 Time: 12:45:45

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 633.4 ft/day
Le = 3.984 ft

AQUIFER DATA

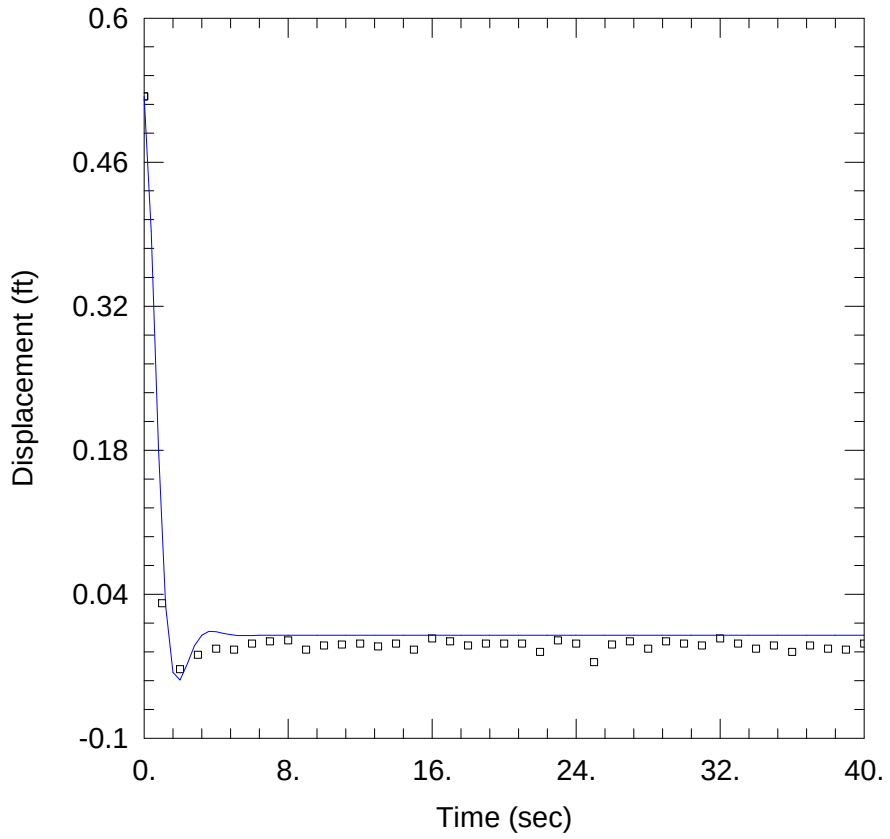
Saturated Thickness: 5.18 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209A_IN3)

Initial Displacement: 1.742 ft
Total Well Penetration Depth: 27.03 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.03 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209A_OUT1.aqt
Date: 01/17/19 Time: 12:46:07

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 323.9 ft/day
Le = 7.048 ft

AQUIFER DATA

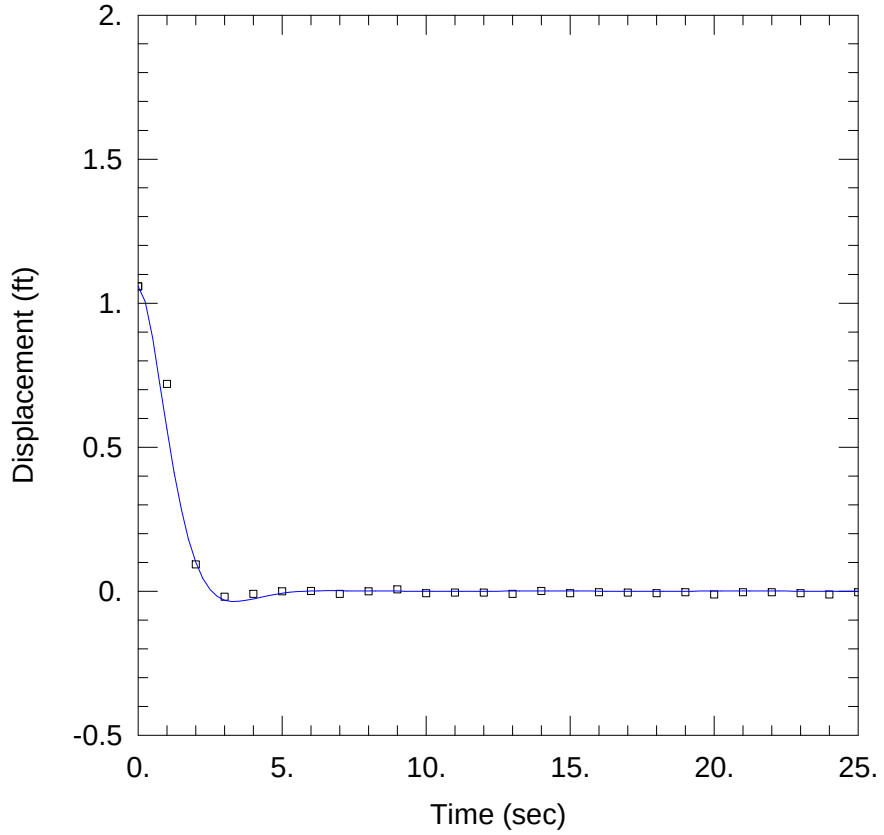
Saturated Thickness: 5.18 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209A_OUT1)

Initial Displacement: 0.524 ft
Total Well Penetration Depth: 27.03 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.03 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209A_OUT2.aqt
Date: 01/17/19 Time: 12:46:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 174.3 ft/day
Le = 16.9 ft

AQUIFER DATA

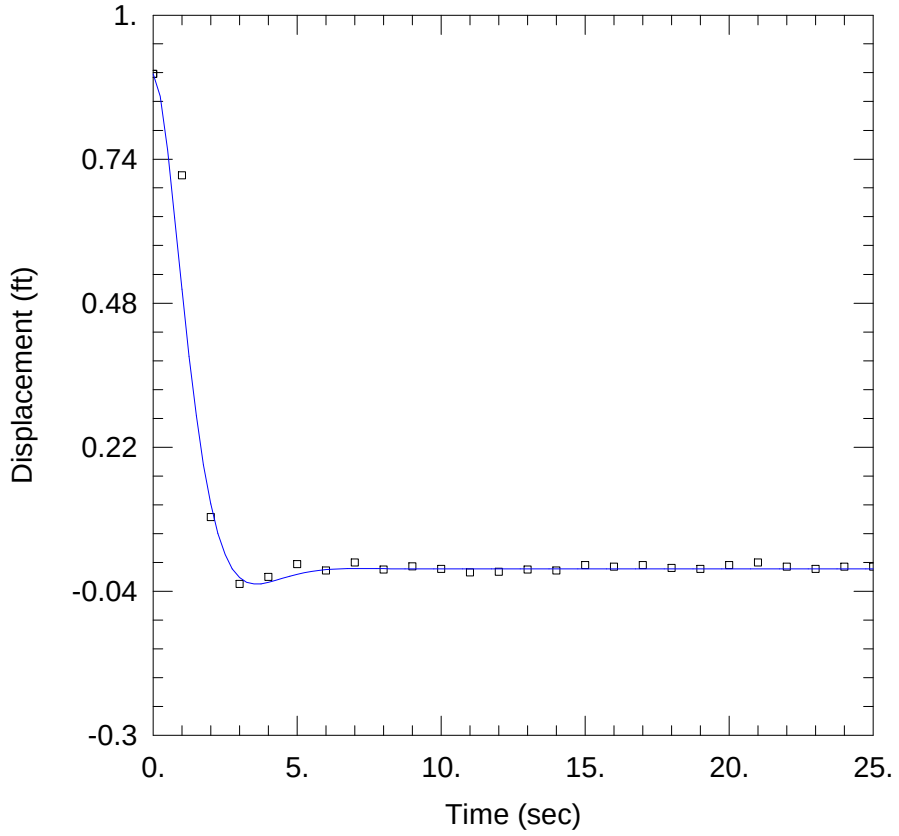
Saturated Thickness: 5.18 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209A_OUT2)

Initial Displacement: 1.058 ft
Total Well Penetration Depth: 27.03 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.03 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209A_OUT3.aqt
Date: 01/17/19 Time: 12:46:47

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 120.4 ft/day
Le = 18.83 ft

AQUIFER DATA

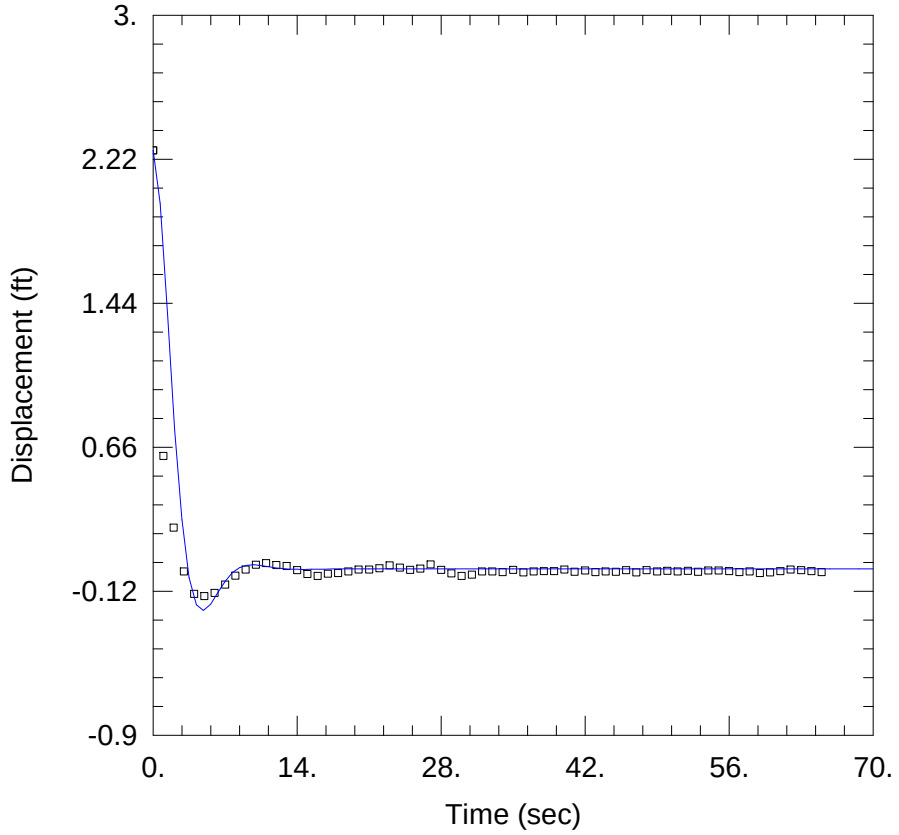
Saturated Thickness: 7.33 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209A_OUT3)

Initial Displacement: 0.894 ft
Total Well Penetration Depth: 27.03 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 27.03 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209B_IN1_revB.aqt
Date: 01/17/19 Time: 12:48:06

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 46.89 ft/day
Le = 48.77 ft

AQUIFER DATA

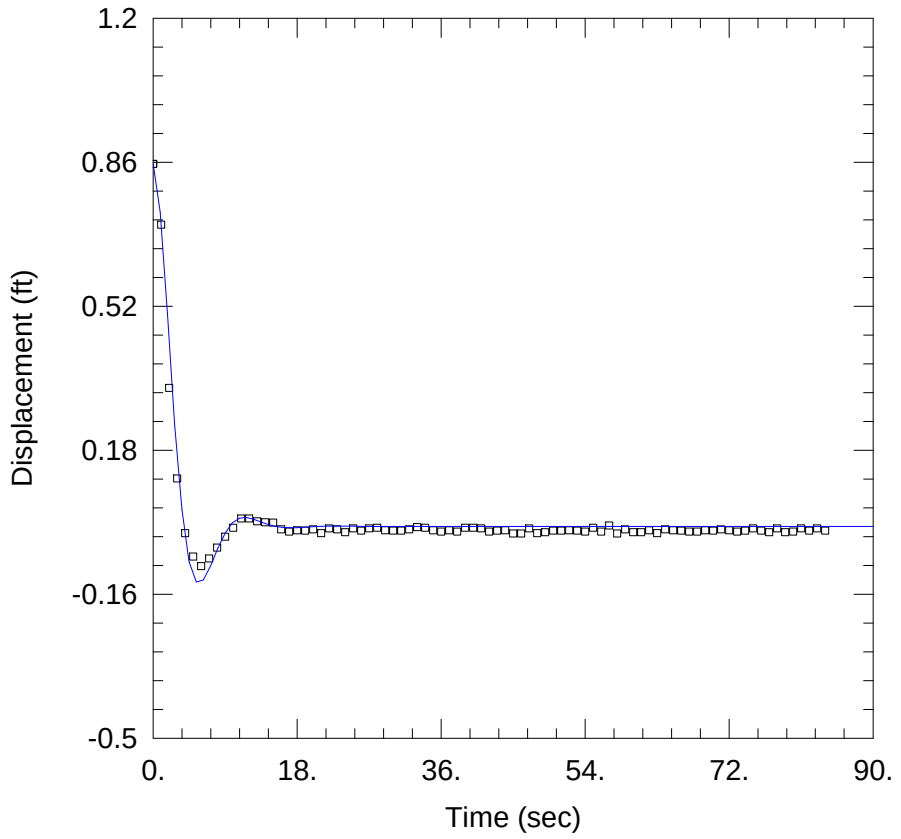
Saturated Thickness: 80.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209B_IN1)

Initial Displacement: 2.268 ft
Total Well Penetration Depth: 102.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 102.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209B_IN2.aqt
Date: 01/17/19 Time: 12:48:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 42.81 ft/day
Le = 79.1 ft

AQUIFER DATA

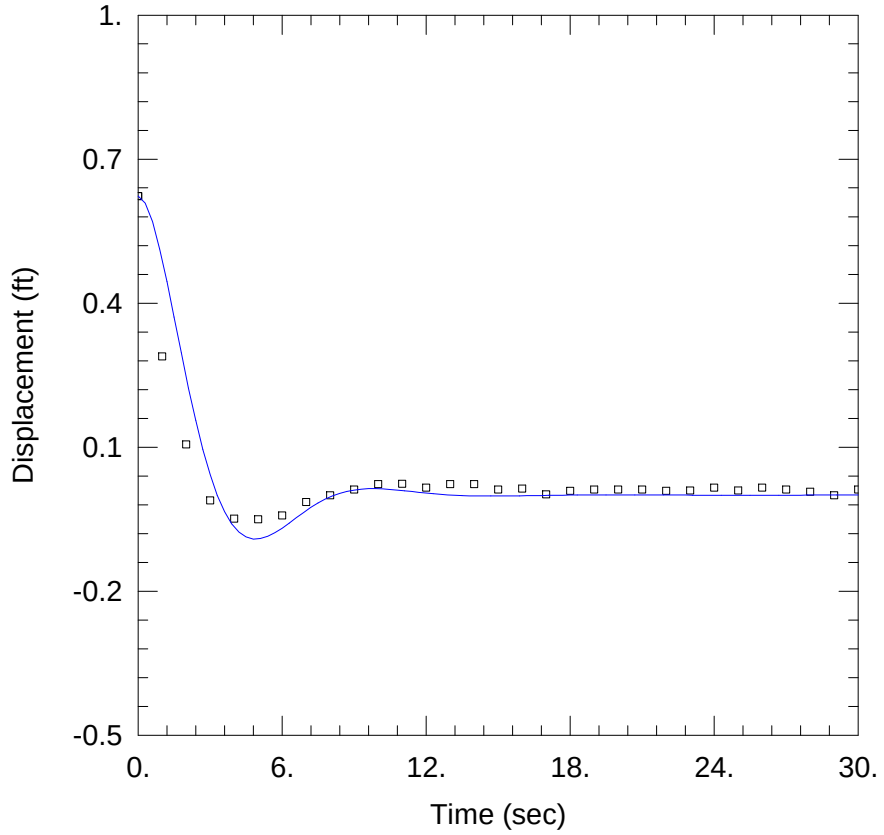
Saturated Thickness: 80.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209B_IN2)

Initial Displacement: 0.856 ft
Total Well Penetration Depth: 102.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 102.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209B_IN3.aqt
Date: 01/17/19 Time: 12:48:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 49.4 ft/day
Le = 56.89 ft

AQUIFER DATA

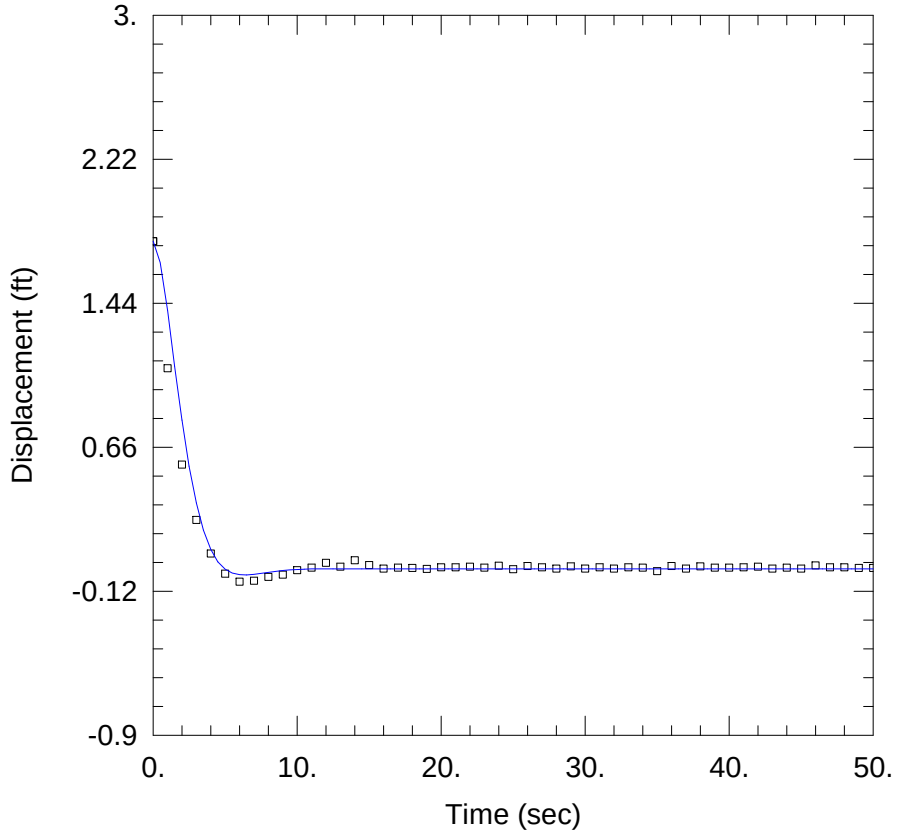
Saturated Thickness: 80.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209B_IN3)

Initial Displacement: 0.623 ft
Total Well Penetration Depth: 102.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 102.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209B_OUT1.aqt
Date: 01/17/19 Time: 12:49:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 34.73 ft/day
Le = 49.71 ft

AQUIFER DATA

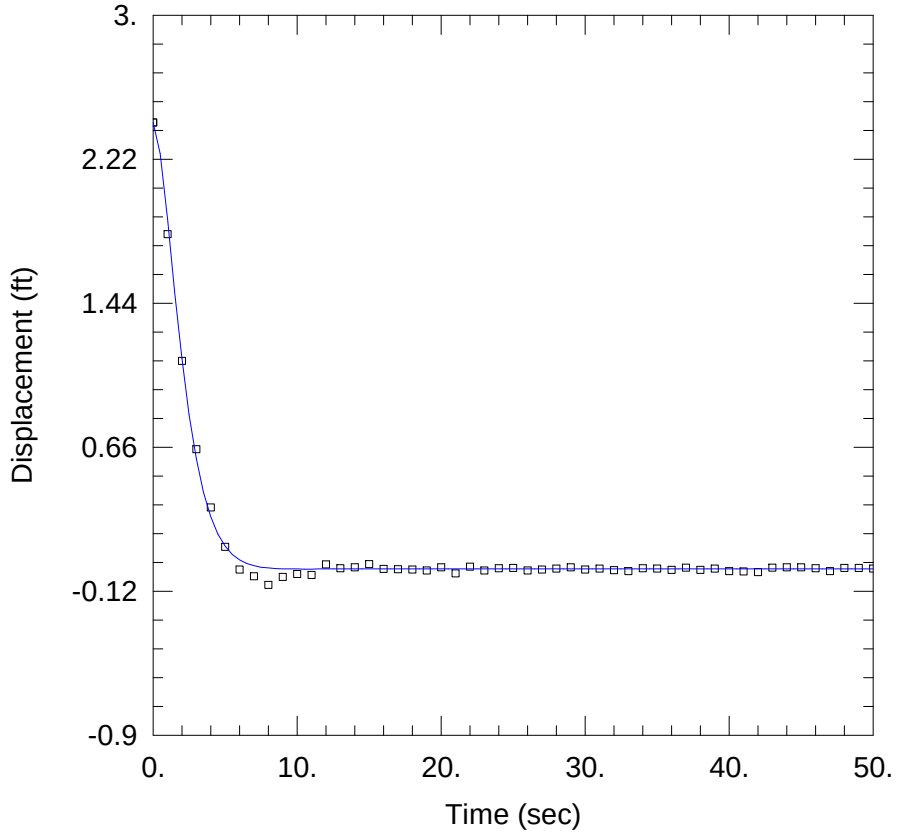
Saturated Thickness: 80.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209B_OUT1)

Initial Displacement: 1.775 ft
Total Well Penetration Depth: 102.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 102.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209B_OUT2.aqt
Date: 01/17/19 Time: 12:49:40

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 30.81 ft/day
Le = 44.03 ft

AQUIFER DATA

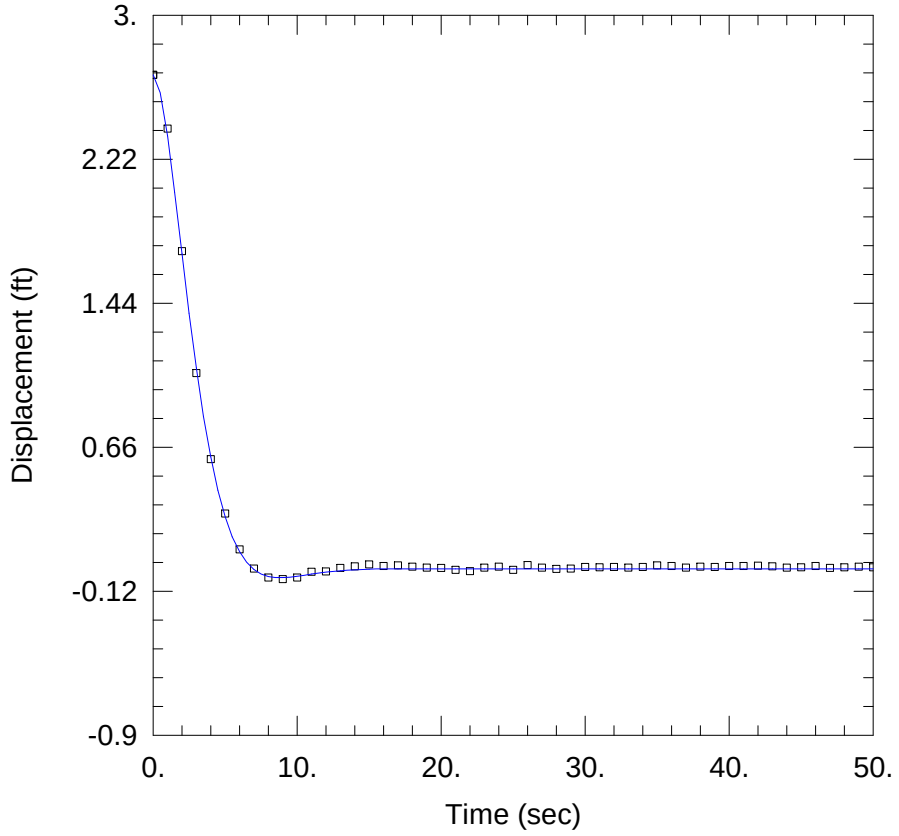
Saturated Thickness: 80.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209B_OUT2)

Initial Displacement: 2.418 ft
Total Well Penetration Depth: 102.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 102.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209B_OUT3.aqt
Date: 01/17/19 Time: 12:49:57

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 24.81 ft/day
Le = 95.41 ft

AQUIFER DATA

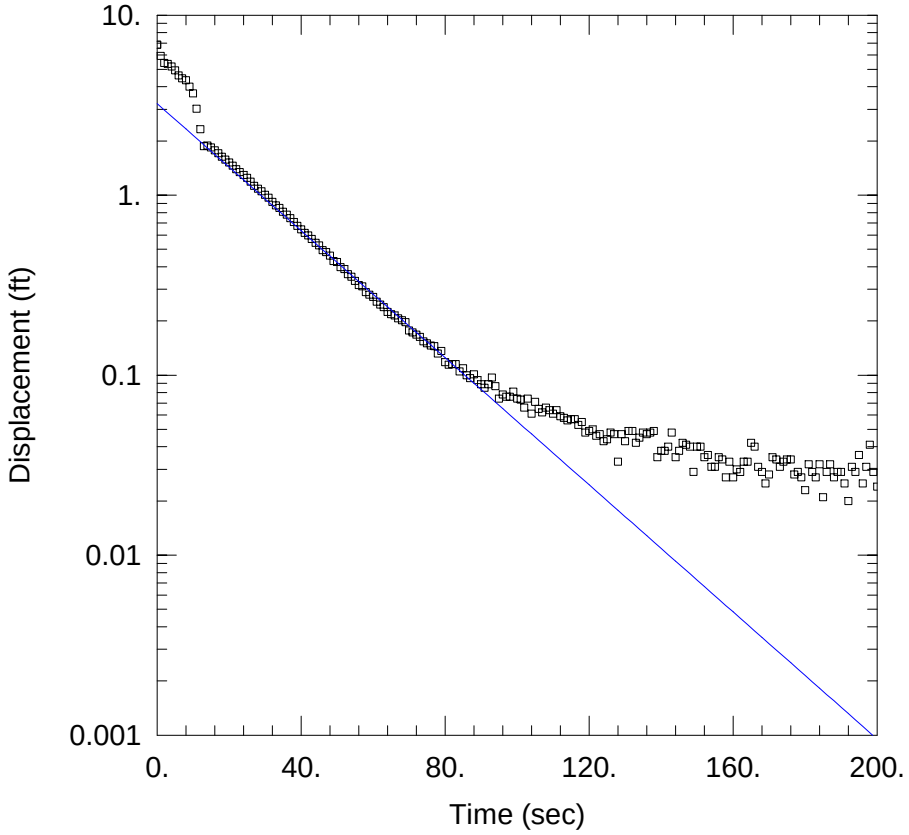
Saturated Thickness: 80.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209B_OUT3)

Initial Displacement: 2.677 ft
Total Well Penetration Depth: 102.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 102.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209C_IN1.aqt
Date: 01/17/19 Time: 12:51:08

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 10.79 ft/day
y0 = 3.226 ft

AQUIFER DATA

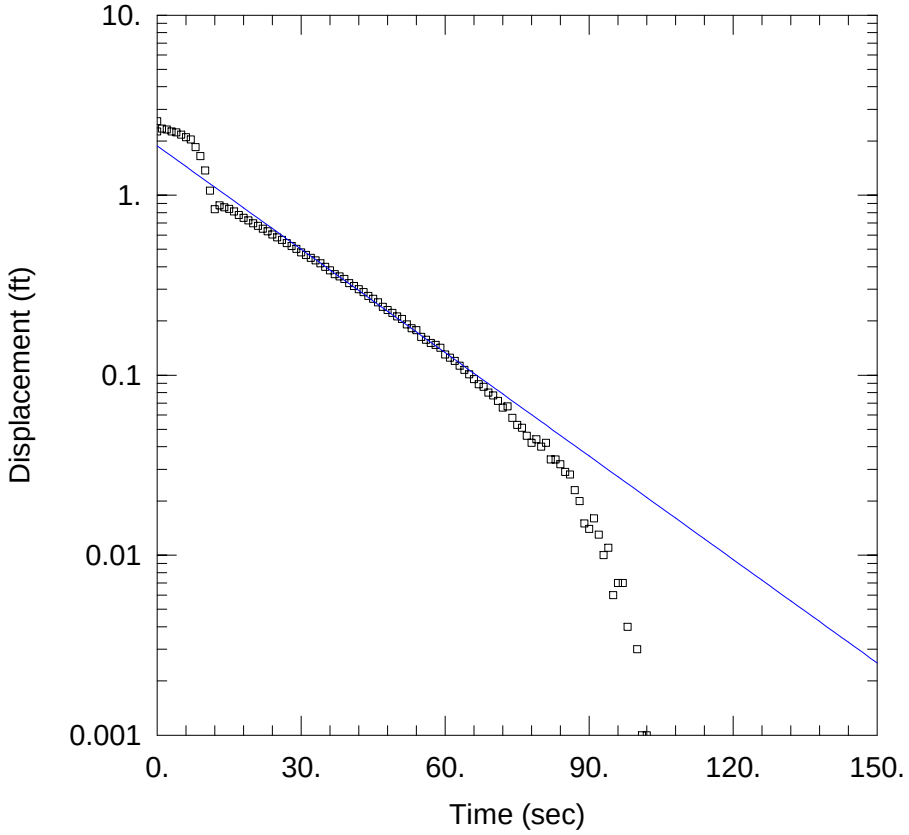
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209C_IN1)

Initial Displacement: 6.835 ft
Total Well Penetration Depth: 142.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 142.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209C_IN2.aqt
Date: 01/17/19 Time: 12:51:25

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 11.71 ft/day
y0 = 1.881 ft

AQUIFER DATA

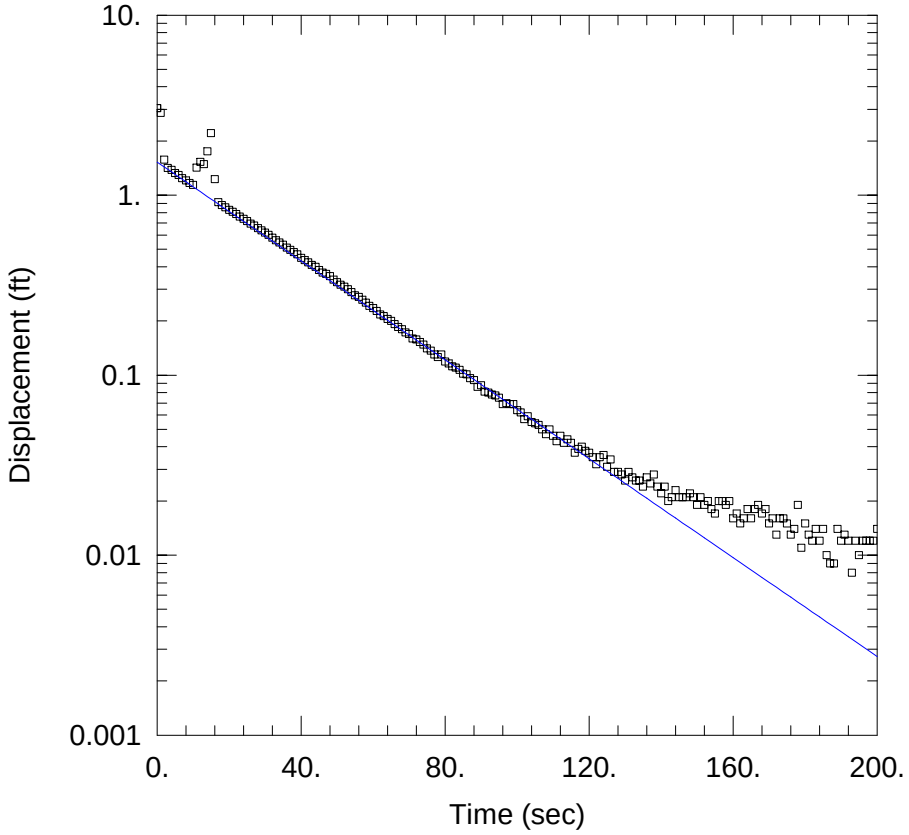
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209C_IN2)

Initial Displacement: 2.257 ft
Total Well Penetration Depth: 142.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 142.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209C_OUT1.aqt
Date: 01/17/19 Time: 12:51:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 8.395 ft/day
y0 = 1.528 ft

AQUIFER DATA

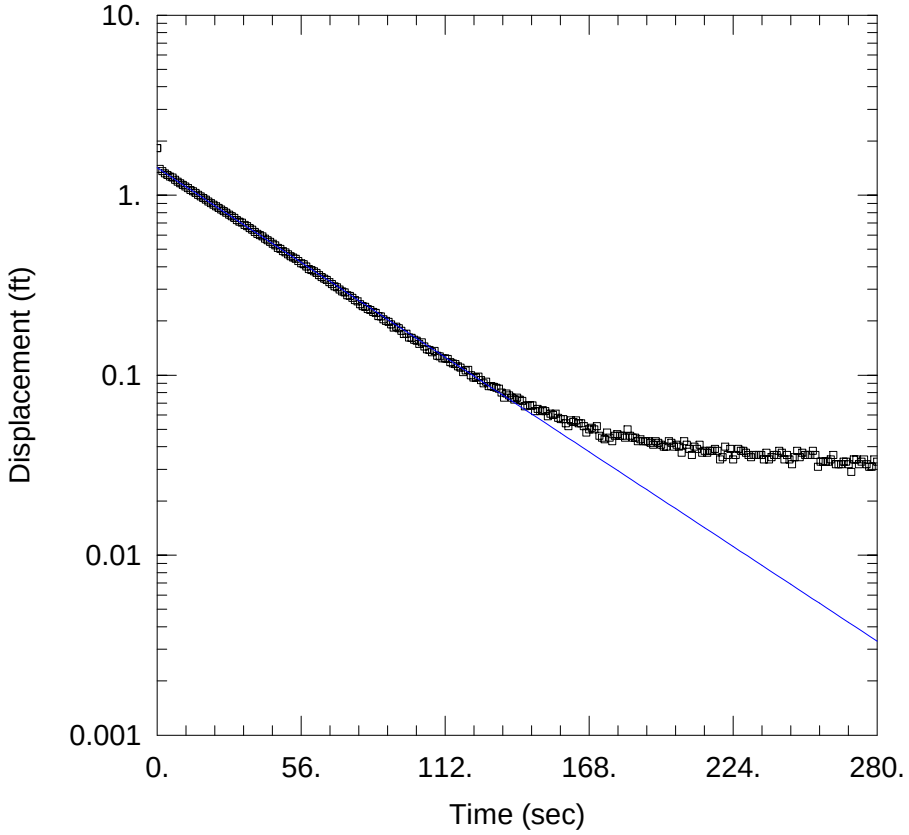
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209C_OUT1)

Initial Displacement: 3.042 ft
Total Well Penetration Depth: 142.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 142.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW209C_OUT2.aqt
Date: 01/17/19 Time: 12:51:55

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW209C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 5.74 ft/day
y0 = 1.42 ft

AQUIFER DATA

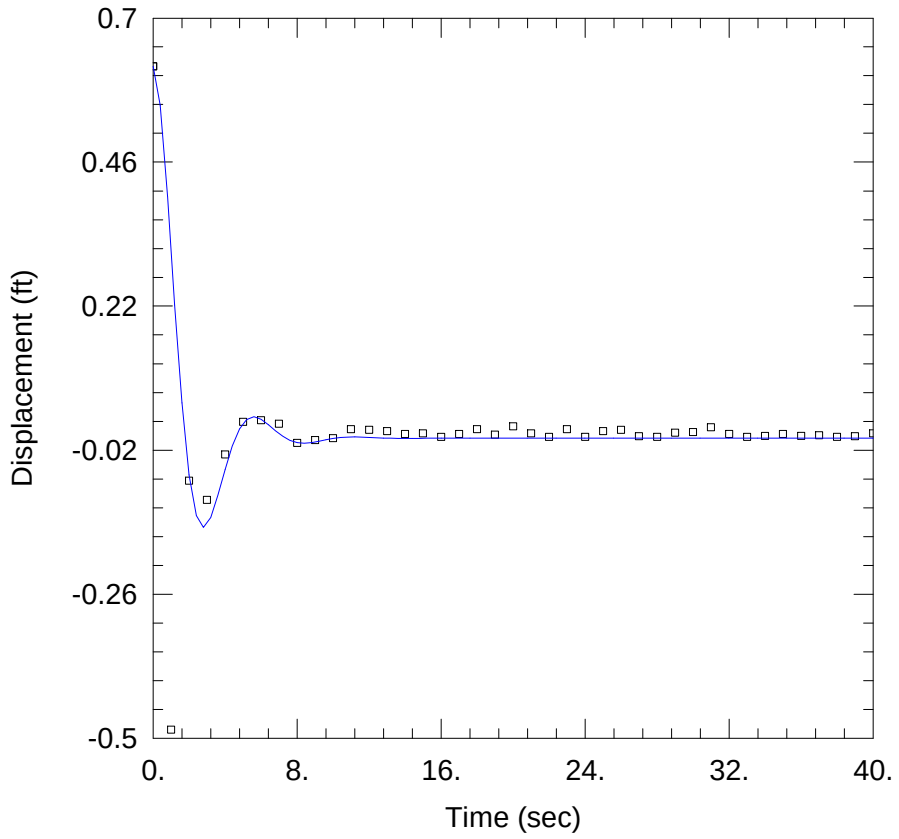
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-209C_OUT2)

Initial Displacement: 1.828 ft
Total Well Penetration Depth: 142.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 142.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210A_IN1.aqt
Date: 07/31/18 Time: 10:09:05

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 69.73 ft/day
Le = 21.04 ft

AQUIFER DATA

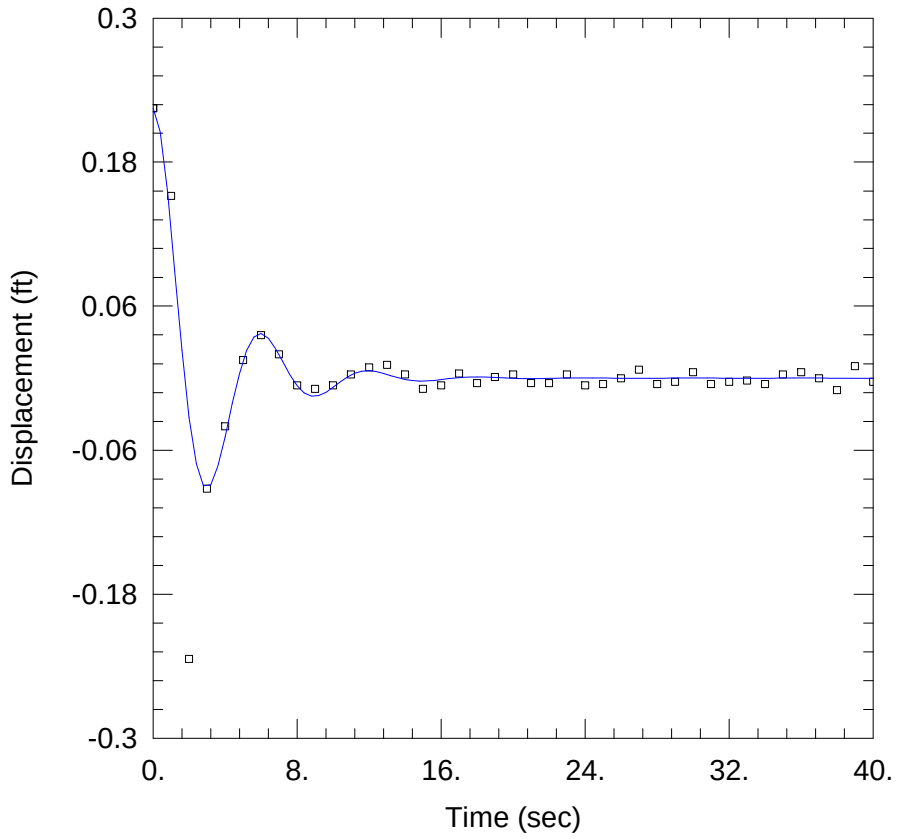
Saturated Thickness: 124.4 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210A)

Initial Displacement: 0.62 ft
Total Well Penetration Depth: 28.88 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 28.88 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210A_IN2.aqt
Date: 07/31/18 Time: 10:09:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 93.24 ft/day
Le = 26.73 ft

AQUIFER DATA

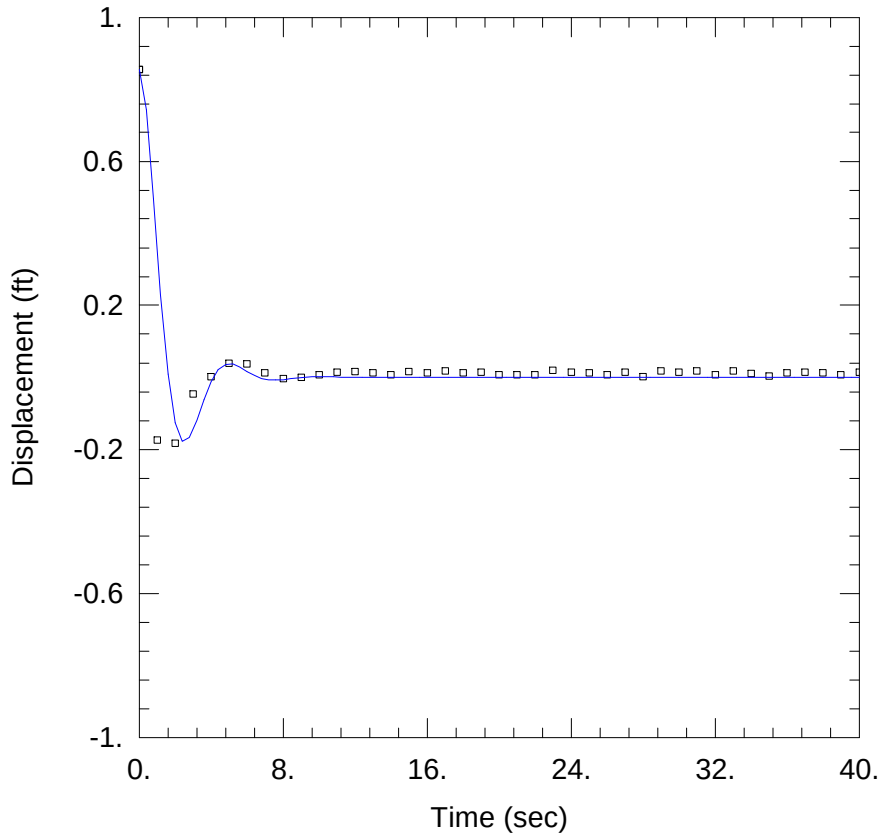
Saturated Thickness: 124.4 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210A)

Initial Displacement: 0.225 ft
Total Well Penetration Depth: 28.88 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 28.88 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210A_IN3.aqt
Date: 11/14/18 Time: 11:55:37

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210A
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 73.67 ft/day
Le = 16.41 ft

AQUIFER DATA

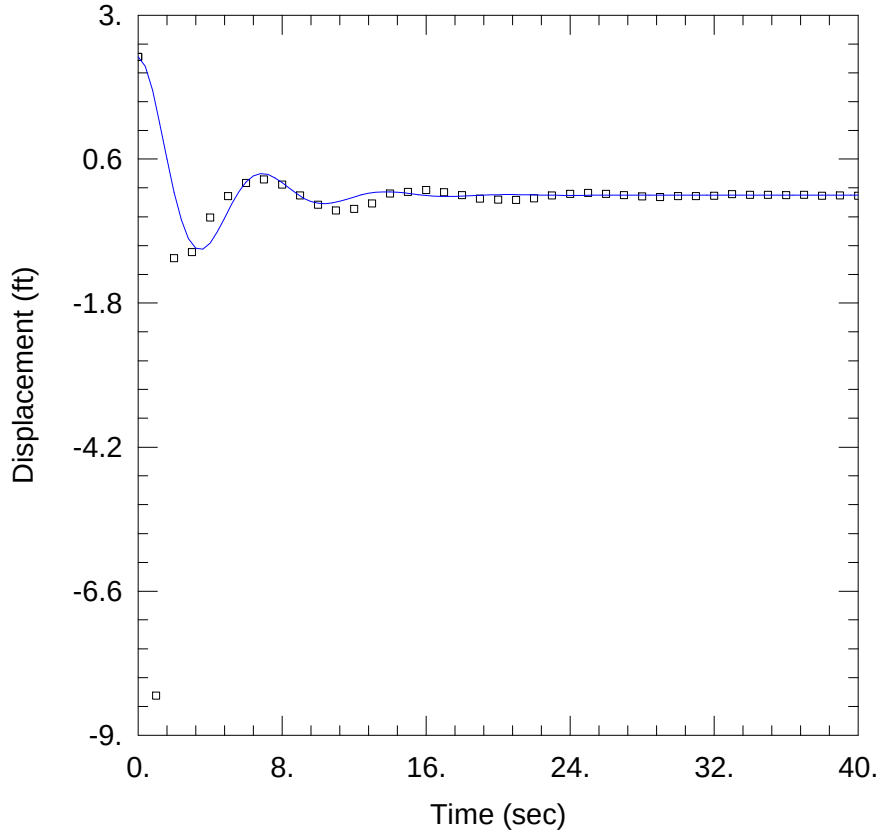
Saturated Thickness: 124.4 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210A)

Initial Displacement: 0.855 ft
Total Well Penetration Depth: 28.88 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 28.88 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210B_IN1.aqt
Date: 07/31/18 Time: 10:20:04

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 90.9 ft/day
Le = 35.55 ft

AQUIFER DATA

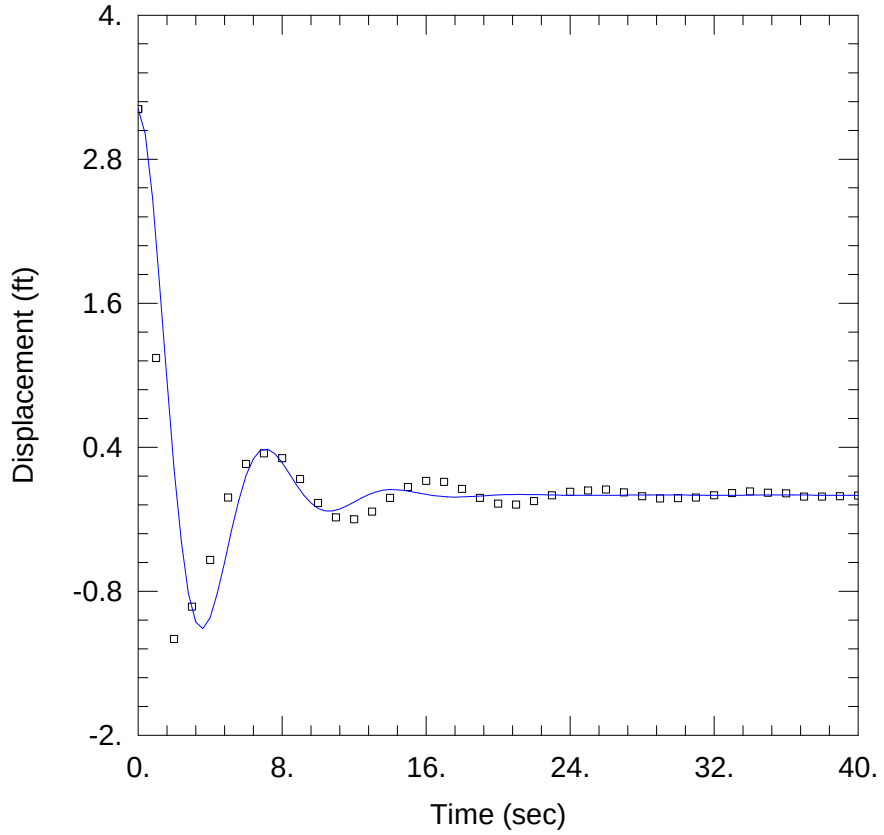
Saturated Thickness: 124.6 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210B)

Initial Displacement: 2.303 ft
Total Well Penetration Depth: 63.75 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 63.75 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210B_IN2.aqt
Date: 07/31/18 Time: 10:20:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 79.01 ft/day
Le = 36.56 ft

AQUIFER DATA

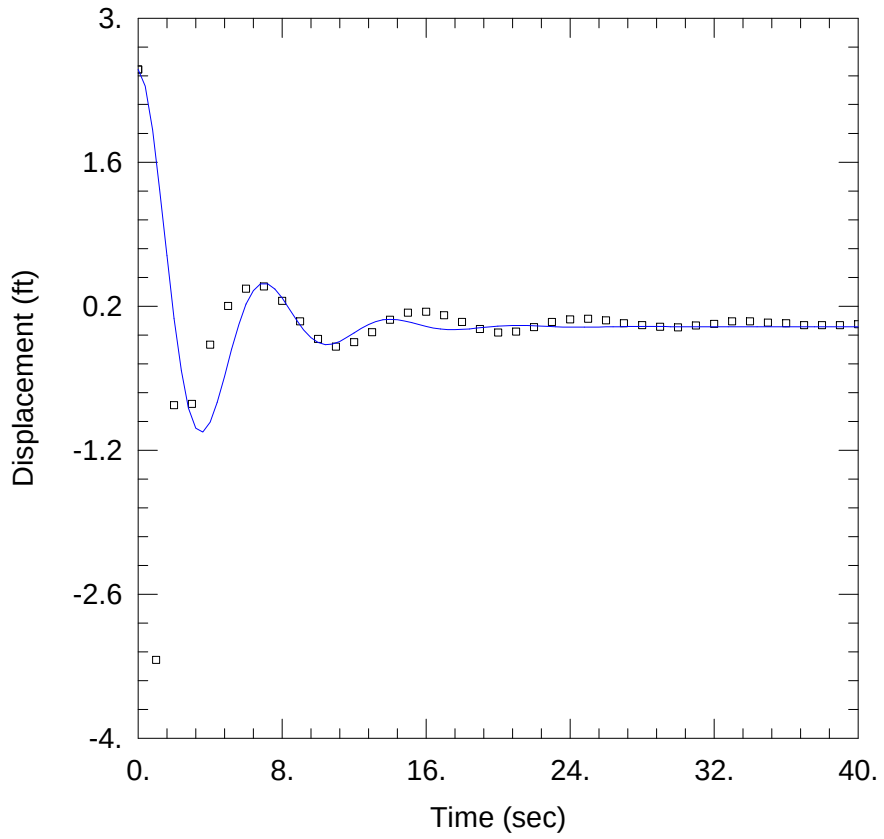
Saturated Thickness: 124.6 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210B)

Initial Displacement: 3.218 ft
Total Well Penetration Depth: 63.75 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 63.75 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210B_IN3.aqt
Date: 07/31/18 Time: 10:20:37

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 92.83 ft/day
Le = 37. ft

AQUIFER DATA

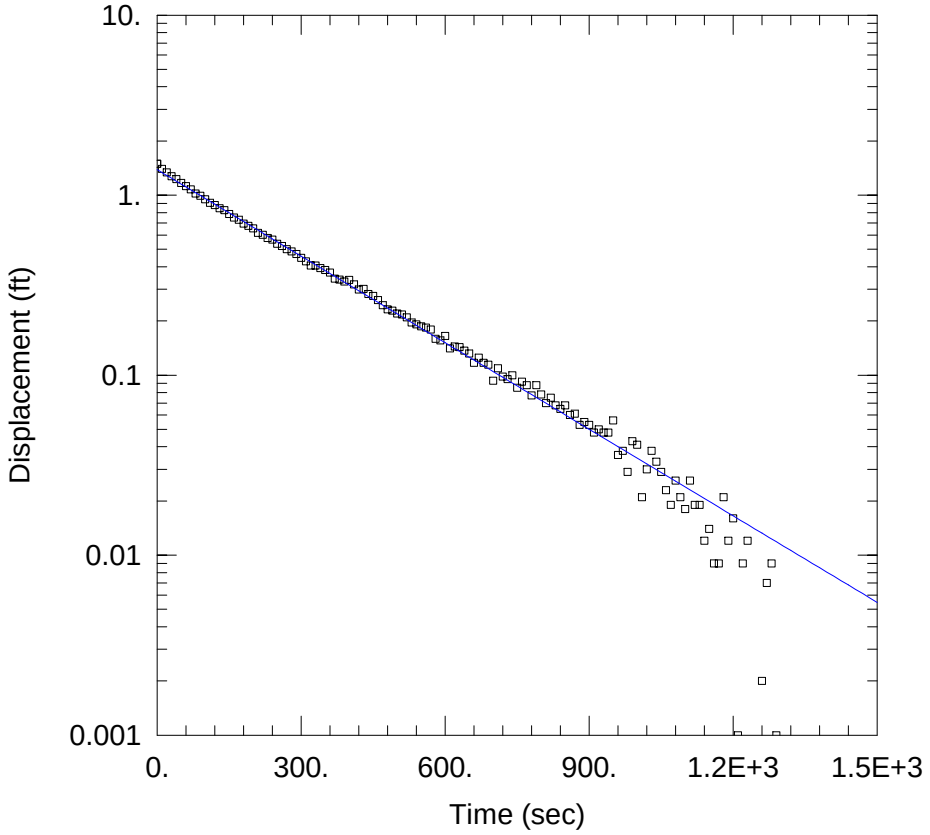
Saturated Thickness: 124.6 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210B)

Initial Displacement: 2.5 ft
Total Well Penetration Depth: 63.75 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 63.75 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210C_IN1.aqt
Date: 07/31/18 Time: 10:28:59

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.2427 ft/day
y0 = 1.387 ft

AQUIFER DATA

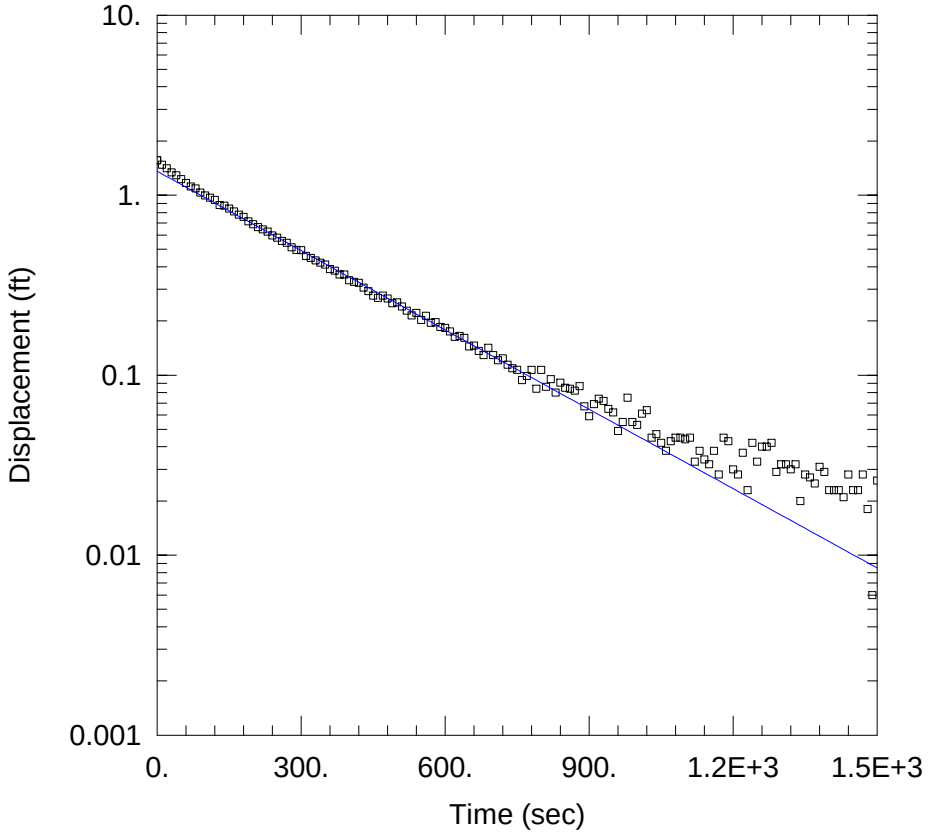
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210C)

Initial Displacement: 1.492 ft
Total Well Penetration Depth: 94.8 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 94.8 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210C_OUT1.aqt
Date: 07/31/18 Time: 10:29:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210C
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.2225 ft/day
y0 = 1.358 ft

AQUIFER DATA

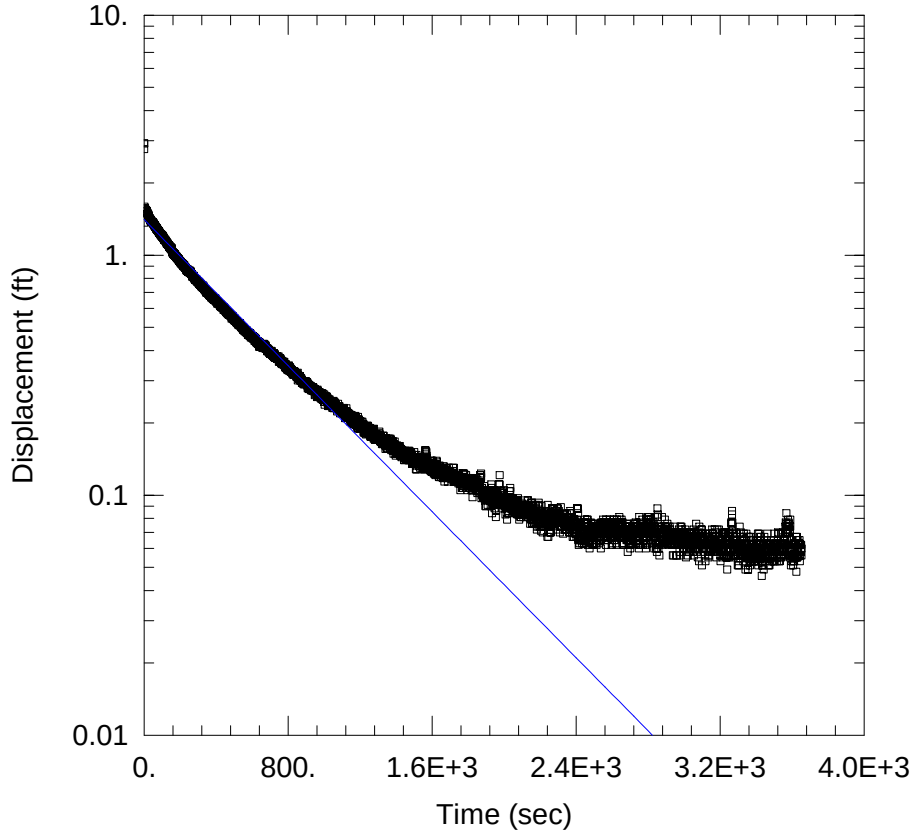
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW210C)

Initial Displacement: 1.561 ft
Total Well Penetration Depth: 94.8 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 94.8 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210D_IN1.aqt
Date: 01/17/19 Time: 12:54:13

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.23 ft/day
y0 = 1.407 ft

AQUIFER DATA

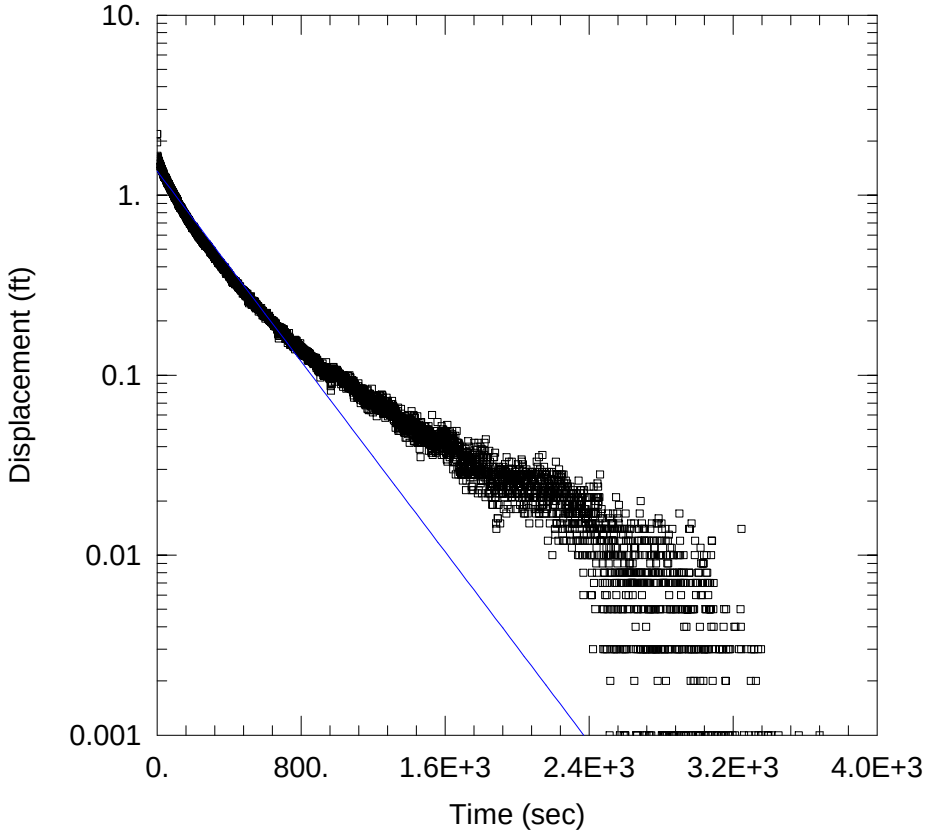
Saturated Thickness: 69.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-210D_IN1)

Initial Displacement: 2.926 ft
Total Well Penetration Depth: 114.2 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 114.2 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210D_OUT1.aqt
Date: 01/17/19 Time: 12:54:30

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3996 ft/day
y0 = 1.36 ft

AQUIFER DATA

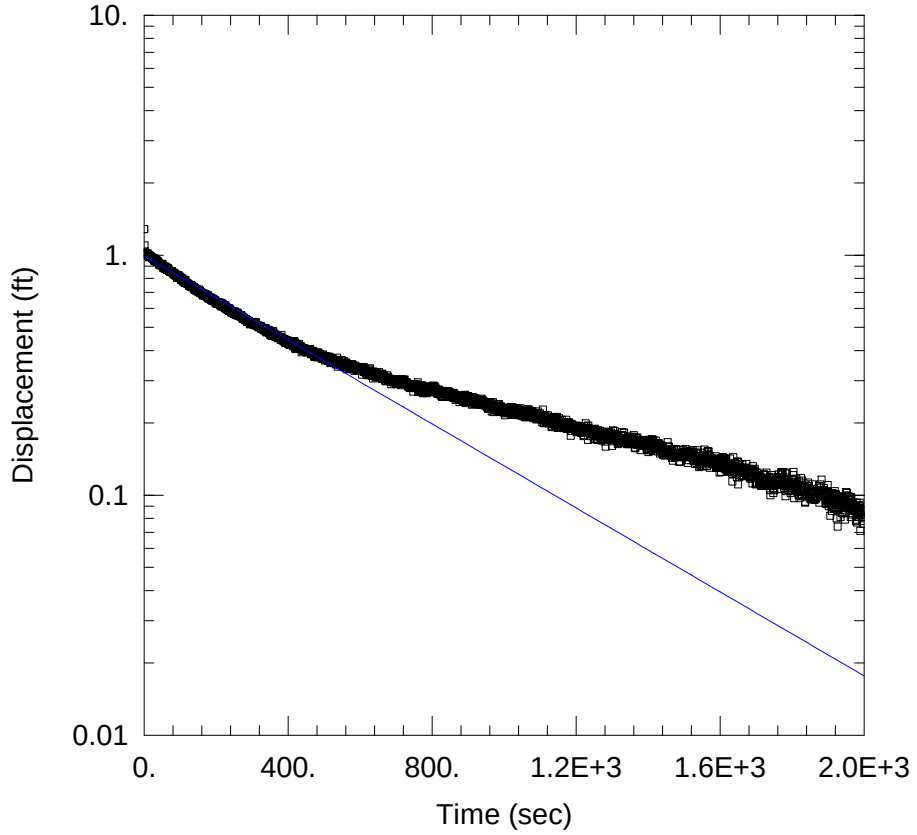
Saturated Thickness: 69.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-210D_OUT1)

Initial Displacement: 2.186 ft
Total Well Penetration Depth: 114.2 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 114.2 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210E_IN1.aqt
Date: 01/17/19 Time: 12:55:32

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210E
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.5333 ft/day
y0 = 0.9934 ft

AQUIFER DATA

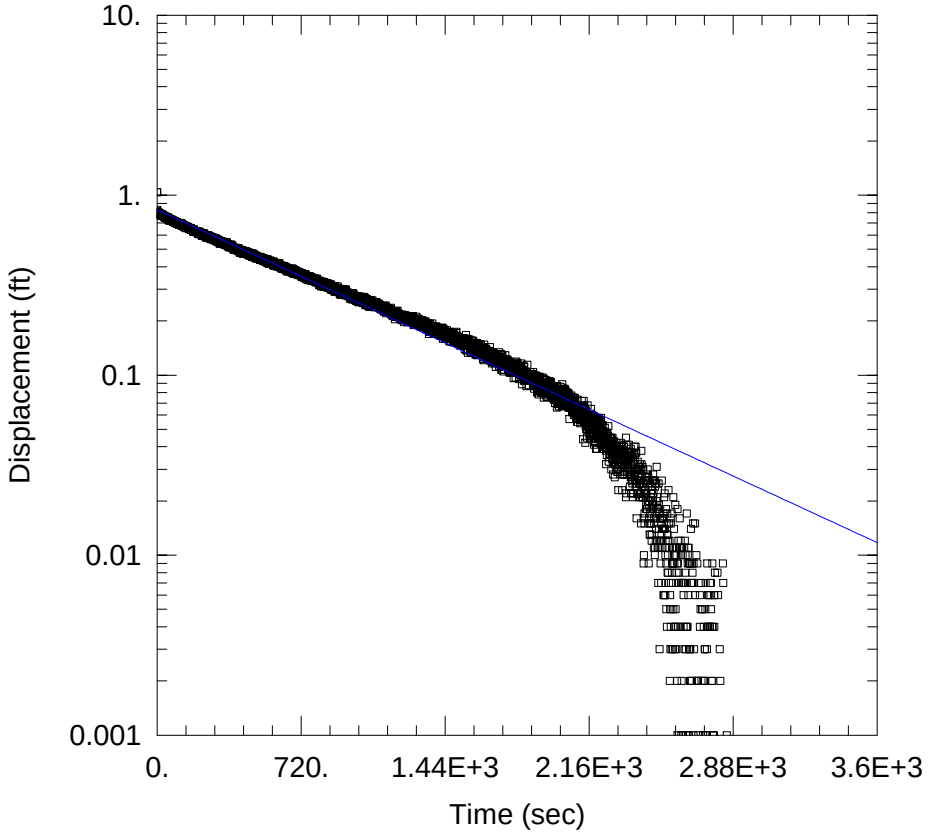
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-210E_IN1)

Initial Displacement: 1.285 ft
Total Well Penetration Depth: 138.8 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 138.8 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW210E_OUT1.aqt
Date: 01/17/19 Time: 12:55:50

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW210E
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.313 ft/day
y0 = 0.8295 ft

AQUIFER DATA

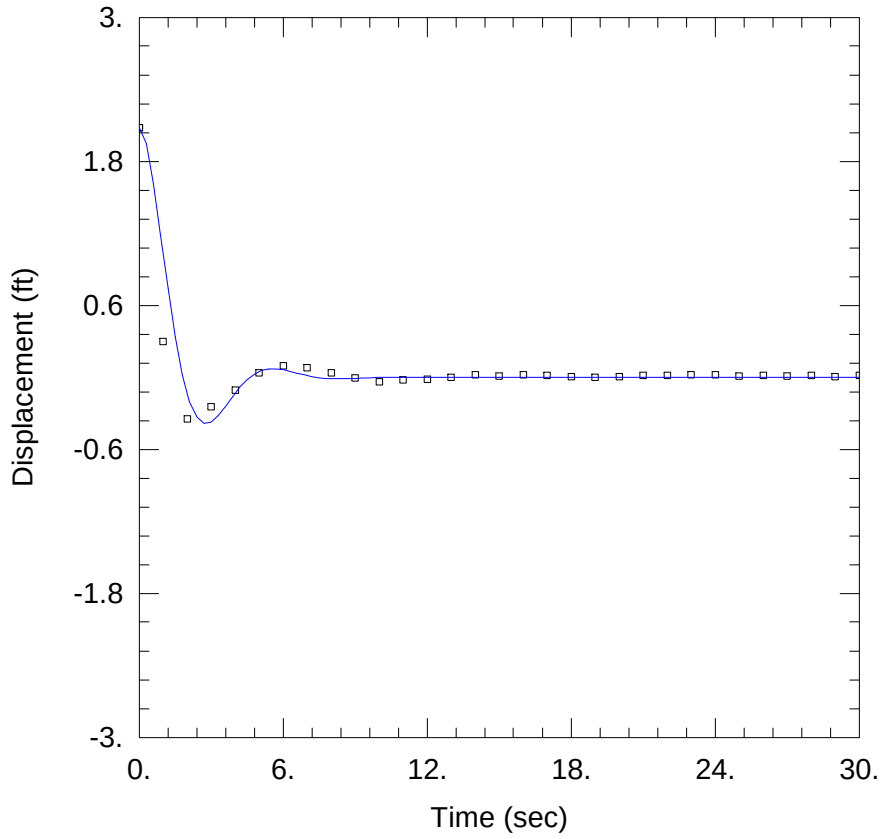
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-210E_OUT1)

Initial Displacement: 1.038 ft
Total Well Penetration Depth: 138.8 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 138.8 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW211_IN1.aqt
Date: 11/14/18 Time: 08:29:37

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW211
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 70.05 ft/day
Le = 19.59 ft

AQUIFER DATA

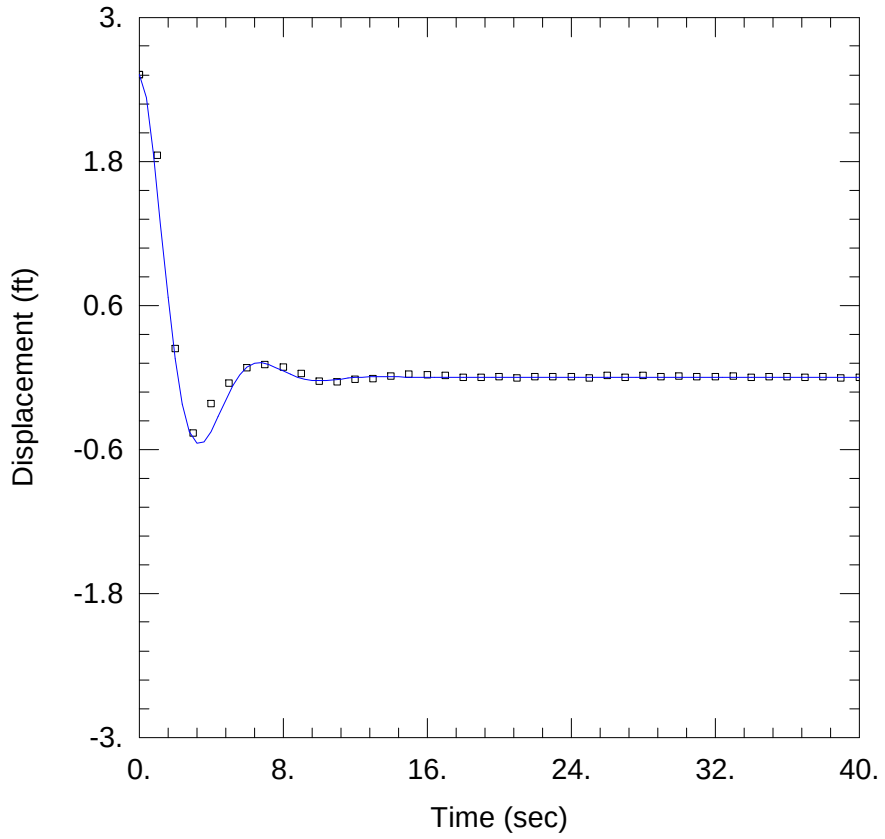
Saturated Thickness: 66.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW211)

Initial Displacement: 2.08 ft
Total Well Penetration Depth: 42.59 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 42.59 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW211_IN2.aqt
Date: 11/14/18 Time: 08:30:24

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW211
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 62.08 ft/day
Le = 29.51 ft

AQUIFER DATA

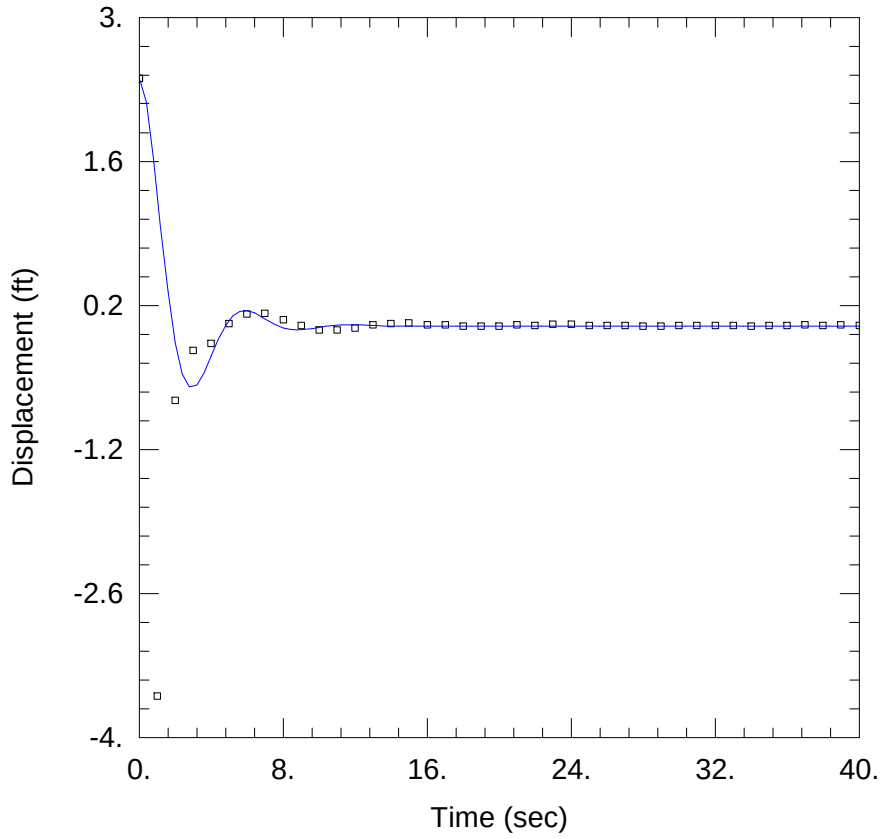
Saturated Thickness: 66.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW211)

Initial Displacement: 2.525 ft
Total Well Penetration Depth: 42.59 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 42.59 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW211_IN3.aqt
Date: 11/14/18 Time: 08:31:16

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW211
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 75.19 ft/day
Le = 23.42 ft

AQUIFER DATA

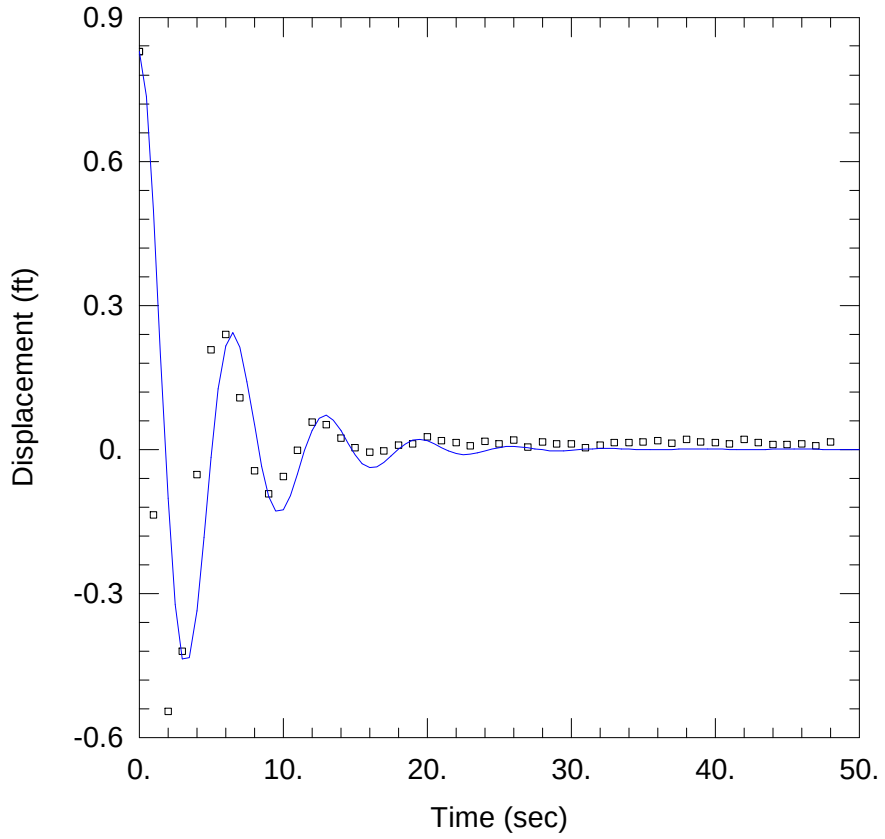
Saturated Thickness: 66.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW211)

Initial Displacement: 2.404 ft
Total Well Penetration Depth: 42.59 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 42.59 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW211_OUT1.aqt
Date: 11/14/18 Time: 08:32:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW211
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 135. ft/day
Le = 32.86 ft

AQUIFER DATA

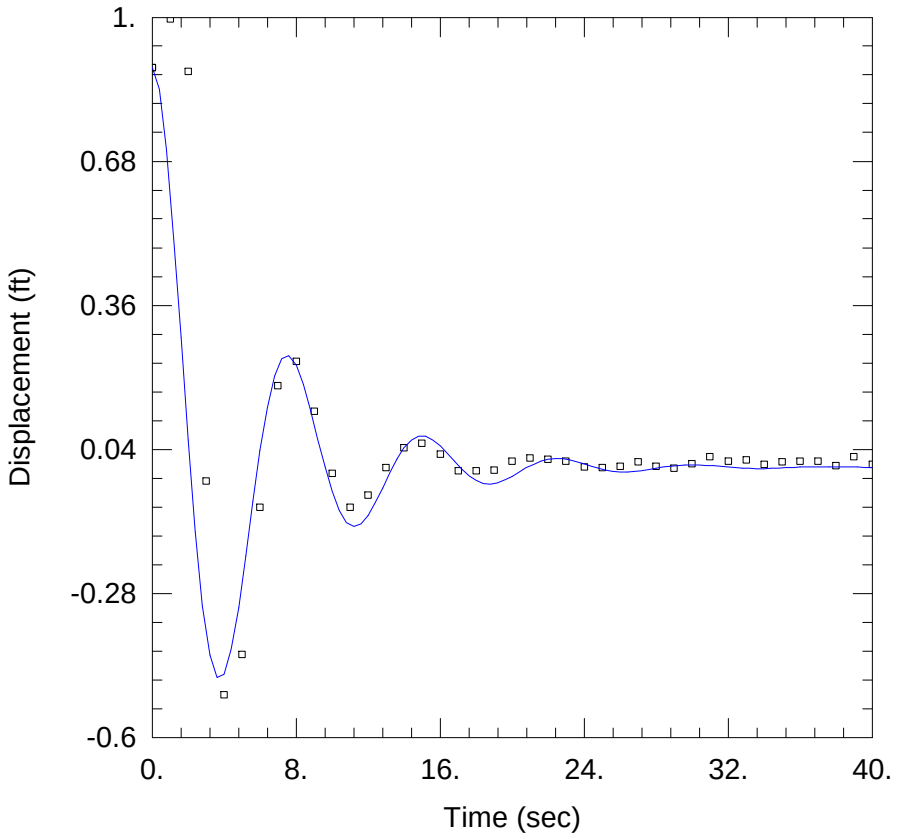
Saturated Thickness: 66.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW211)

Initial Displacement: 0.829 ft
Total Well Penetration Depth: 42.59 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 42.59 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW211_OUT2.aqt
Date: 11/14/18 Time: 08:33:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW211
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 112.3 ft/day
Le = 43.98 ft

AQUIFER DATA

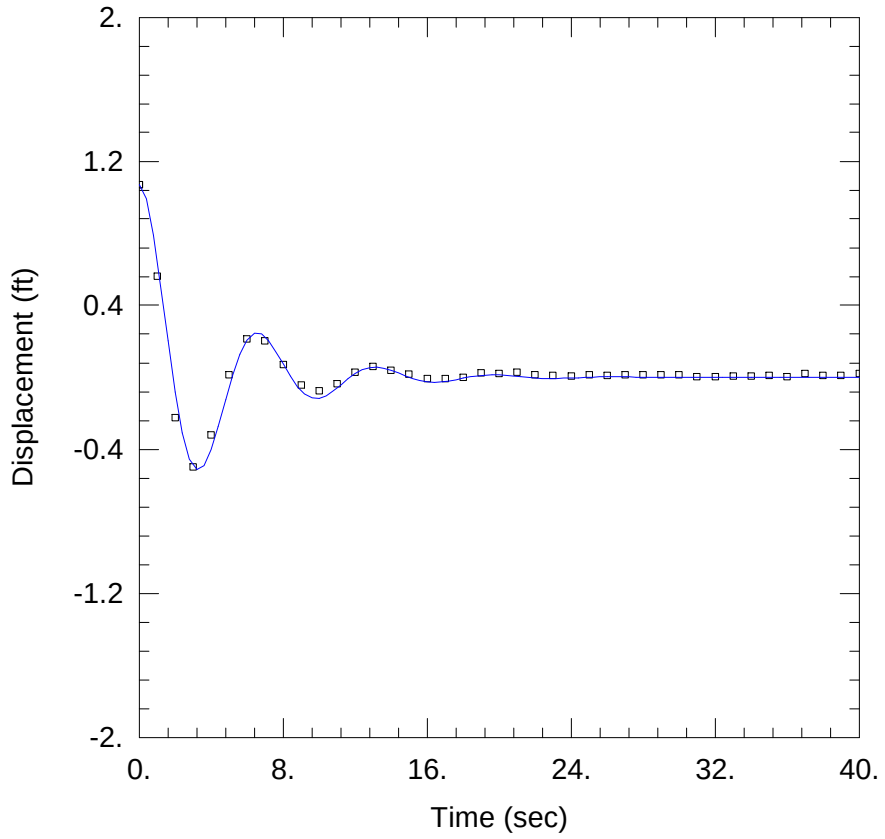
Saturated Thickness: 66.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW211)

Initial Displacement: 0.889 ft
Total Well Penetration Depth: 42.59 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 42.59 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW211_OUT3.aqt
Date: 11/14/18 Time: 08:34:51

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW211
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 112.8 ft/day
Le = 33.23 ft

AQUIFER DATA

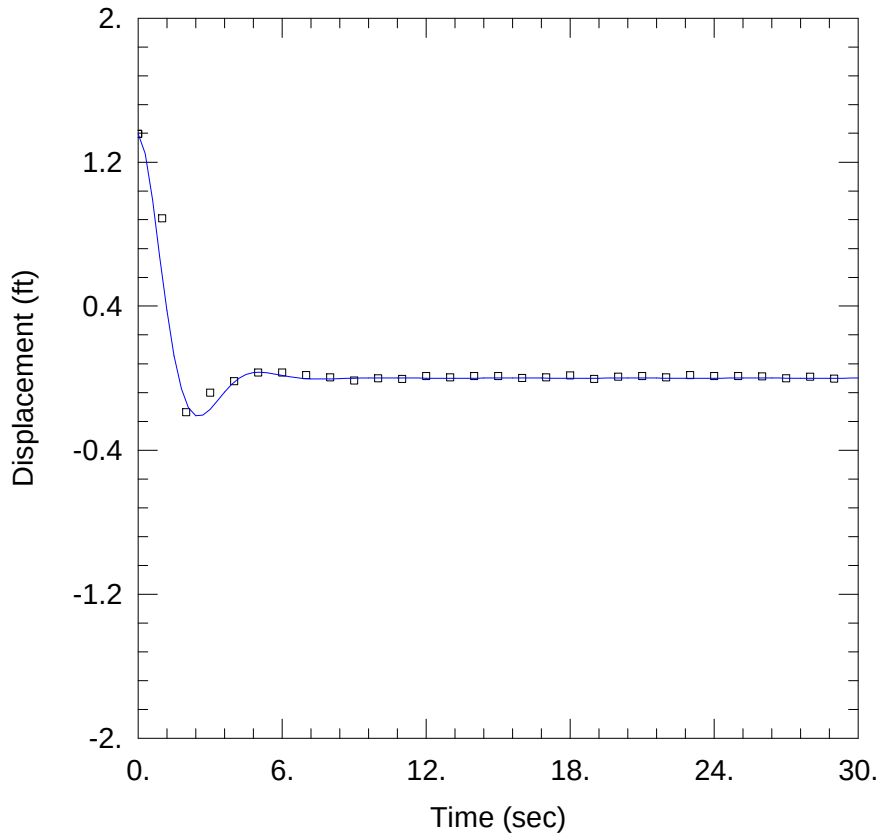
Saturated Thickness: 66.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW211)

Initial Displacement: 1.069 ft
Total Well Penetration Depth: 42.59 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 42.59 ft
Screen Length: 19.65 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212A_IN1.aqt
Date: 01/15/19 Time: 09:06:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212A
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 67.1 ft/day
Le = 15.4 ft

AQUIFER DATA

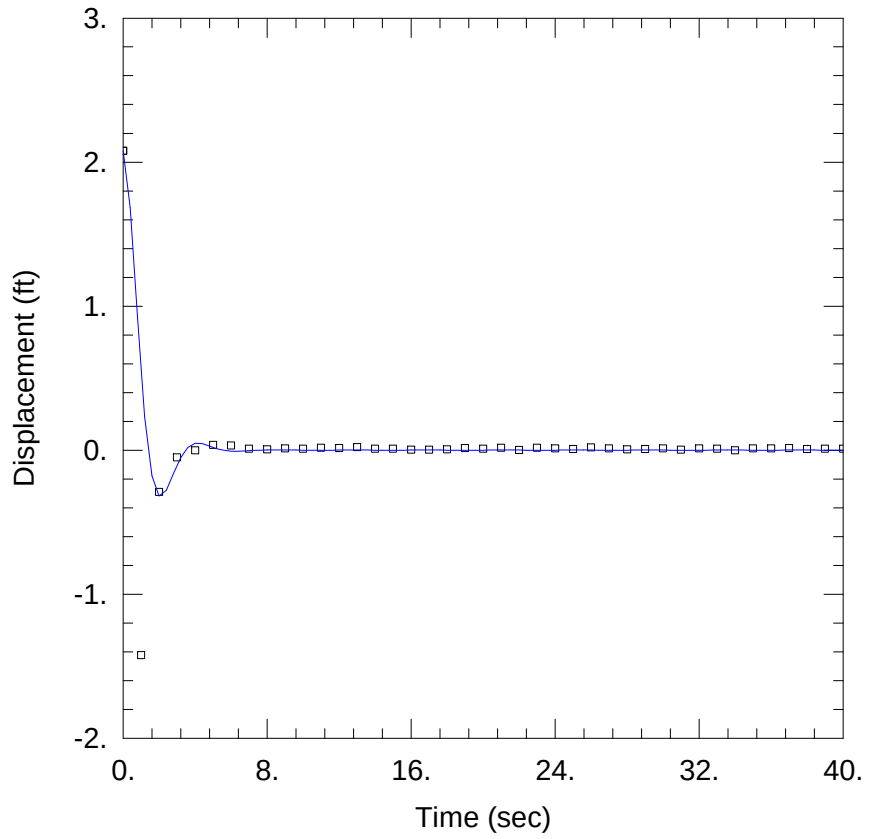
Saturated Thickness: 46.71 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212A)

Initial Displacement: 1.357 ft
Total Well Penetration Depth: 25.07 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 25.07 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212A_IN2.aqt
Date: 01/15/19 Time: 09:06:57

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212A
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 81.56 ft/day
Le = 10.34 ft

AQUIFER DATA

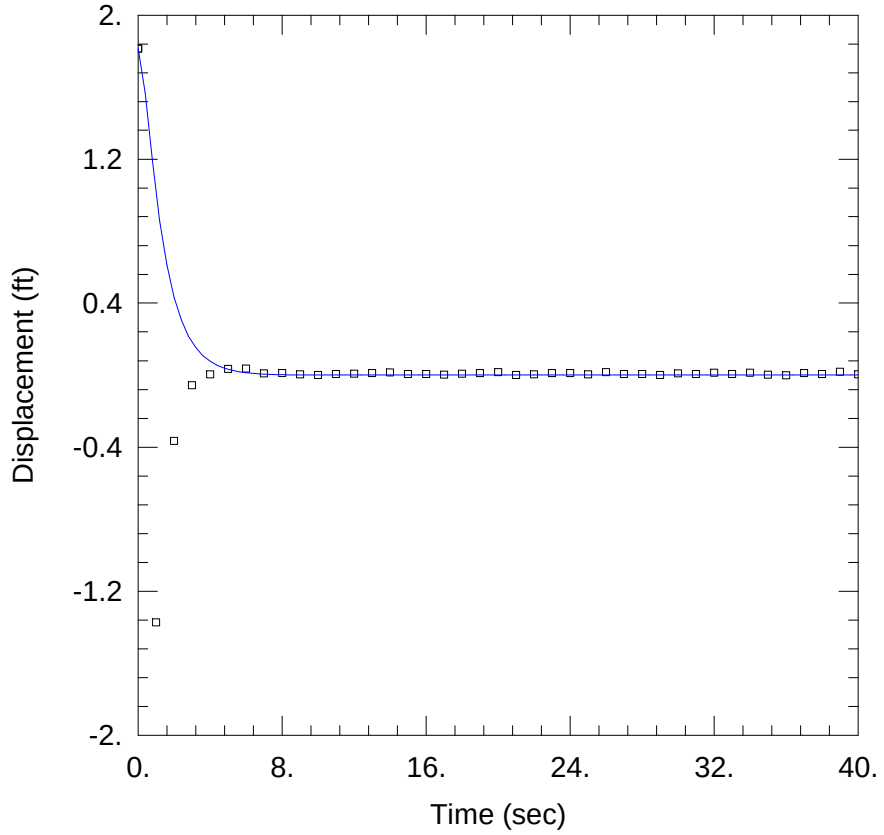
Saturated Thickness: 46.71 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212A)

Initial Displacement: 2.08 ft
Total Well Penetration Depth: 25.07 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 25.07 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212A_IN3.aqt
Date: 01/15/19 Time: 09:12:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212A
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 32.37 ft/day
Le = 11.27 ft

AQUIFER DATA

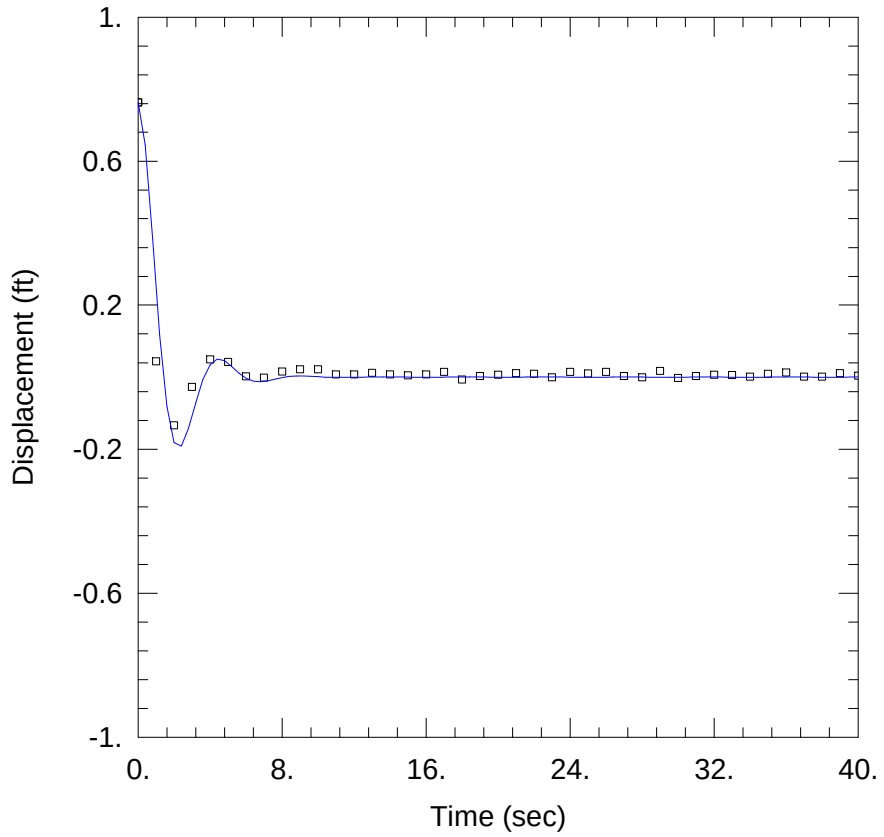
Saturated Thickness: 46.71 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212A)

Initial Displacement: 1.815 ft
Total Well Penetration Depth: 25.07 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 25.07 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212A_OUT1.aqt
Date: 01/15/19 Time: 09:08:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212A
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 91.06 ft/day
Le = 13.81 ft

AQUIFER DATA

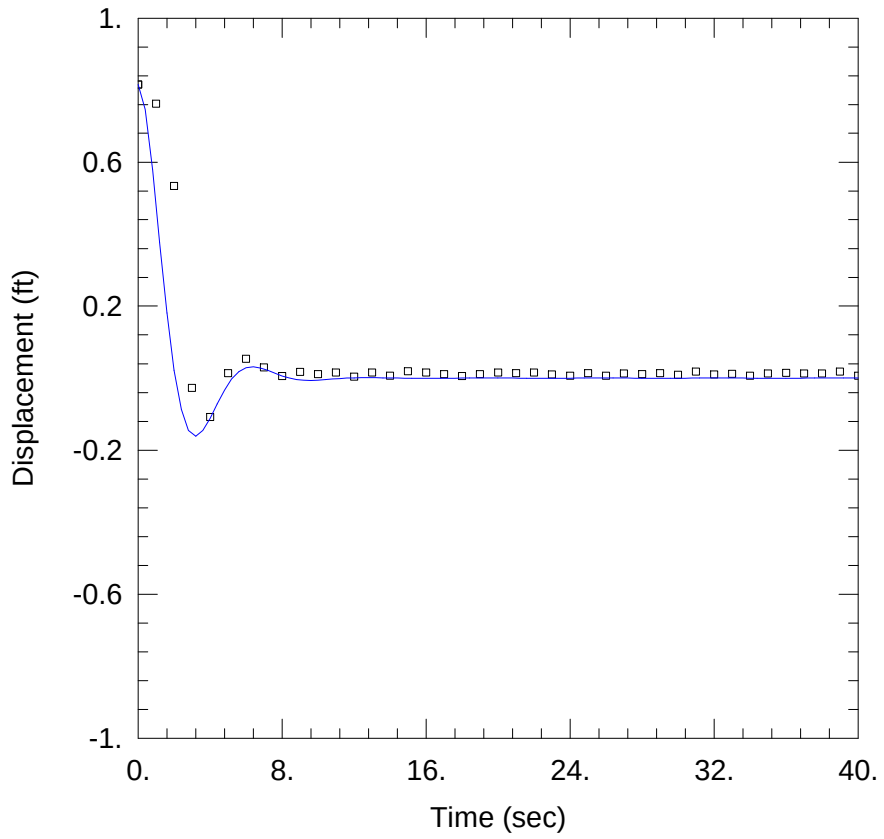
Saturated Thickness: 46.71 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212A)

Initial Displacement: 0.763 ft
Total Well Penetration Depth: 25.07 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 25.07 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212A_OUT2.aqt
Date: 01/15/19 Time: 09:08:30

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212A
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 57.3 ft/day
Le = 25.89 ft

AQUIFER DATA

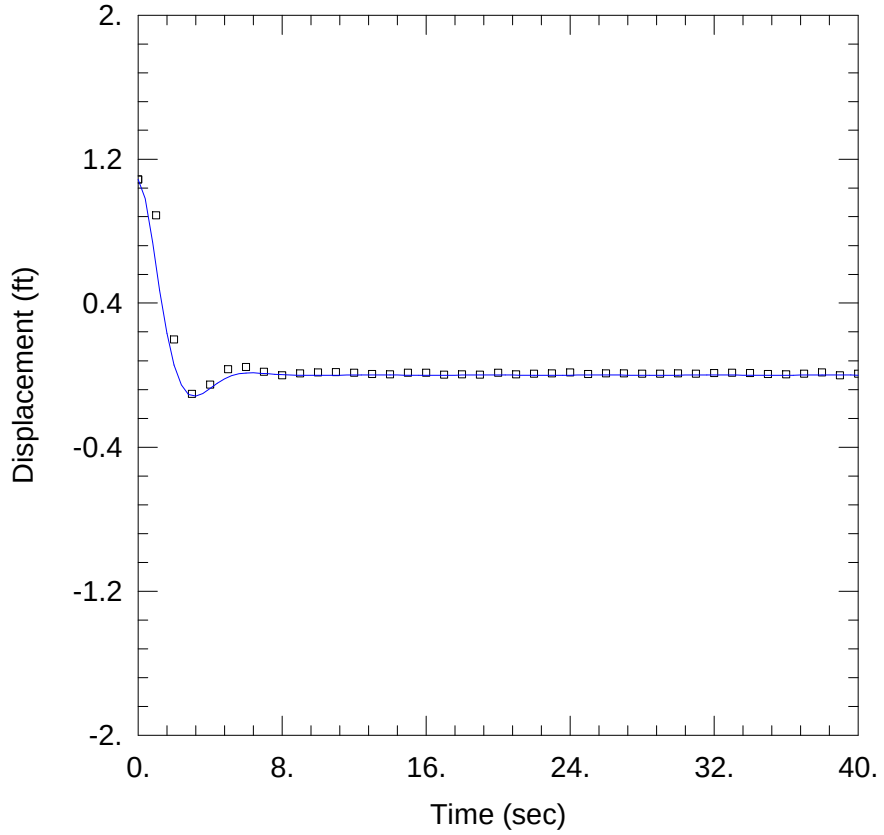
Saturated Thickness: 46.71 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212A)

Initial Displacement: 0.816 ft
Total Well Penetration Depth: 25.07 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 25.07 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212A_OUT3.aqt
Date: 01/15/19 Time: 09:08:49

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212A
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 50.3 ft/day
Le = 21.16 ft

AQUIFER DATA

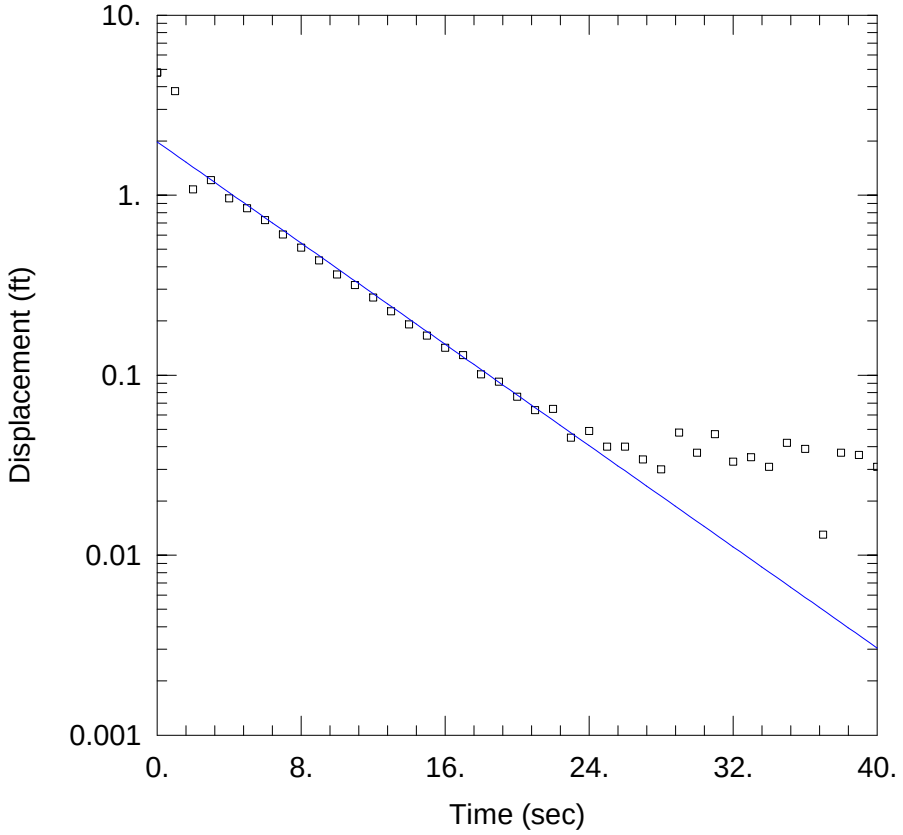
Saturated Thickness: 46.71 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212A)

Initial Displacement: 1.088 ft
Total Well Penetration Depth: 25.07 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 25.07 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212B_IN1.aqt
Date: 01/15/19 Time: 09:17:13

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 9.732 ft/day
y0 = 1.976 ft

AQUIFER DATA

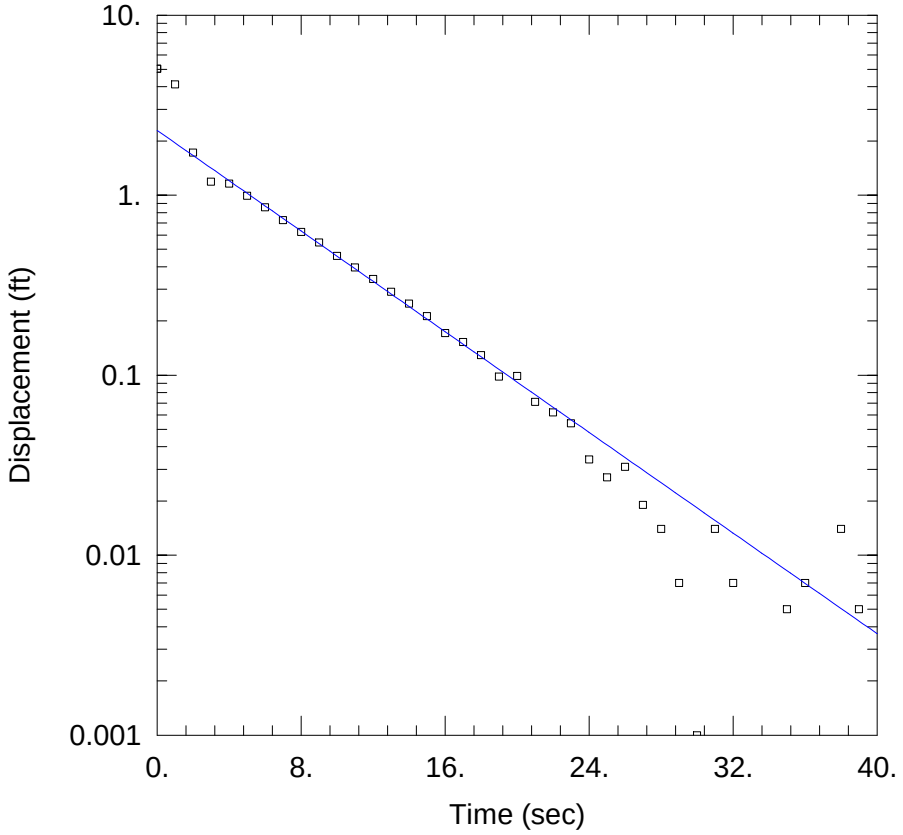
Saturated Thickness: 46.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212B)

Initial Displacement: 4.799 ft
Total Well Penetration Depth: 50.98 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 50.98 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212B_IN2.aqt
Date: 01/15/19 Time: 09:18:18

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 9.678 ft/day
y0 = 2.289 ft

AQUIFER DATA

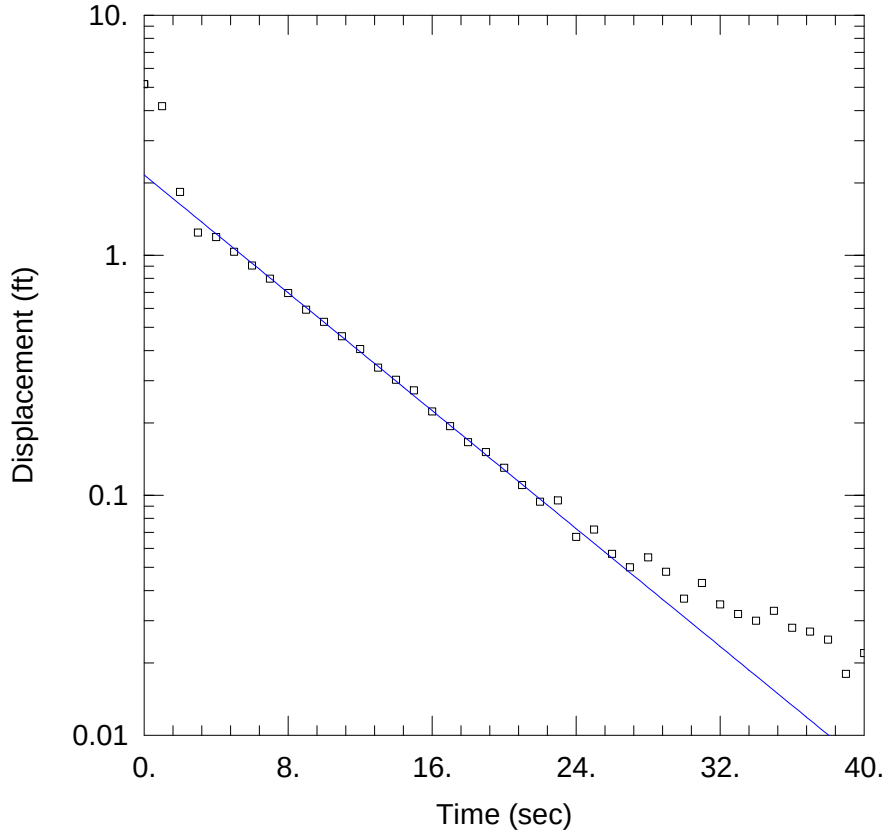
Saturated Thickness: 46.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212B)

Initial Displacement: 5.047 ft
Total Well Penetration Depth: 50.98 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 50.98 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212B_IN3.aqt
Date: 01/15/19 Time: 09:18:50

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 8.499 ft/day
y0 = 2.159 ft

AQUIFER DATA

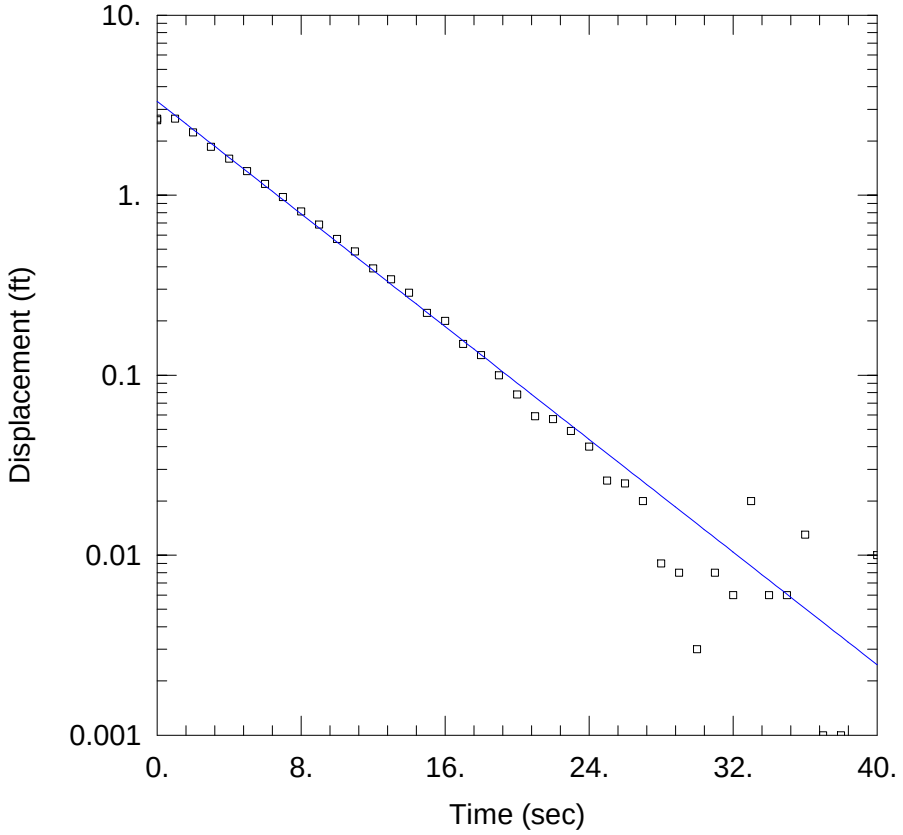
Saturated Thickness: 46.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212B)

Initial Displacement: 5.161 ft
Total Well Penetration Depth: 50.98 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 50.98 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212B_OUT1.aqt
Date: 01/15/19 Time: 09:19:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 10.84 ft/day
y0 = 3.324 ft

AQUIFER DATA

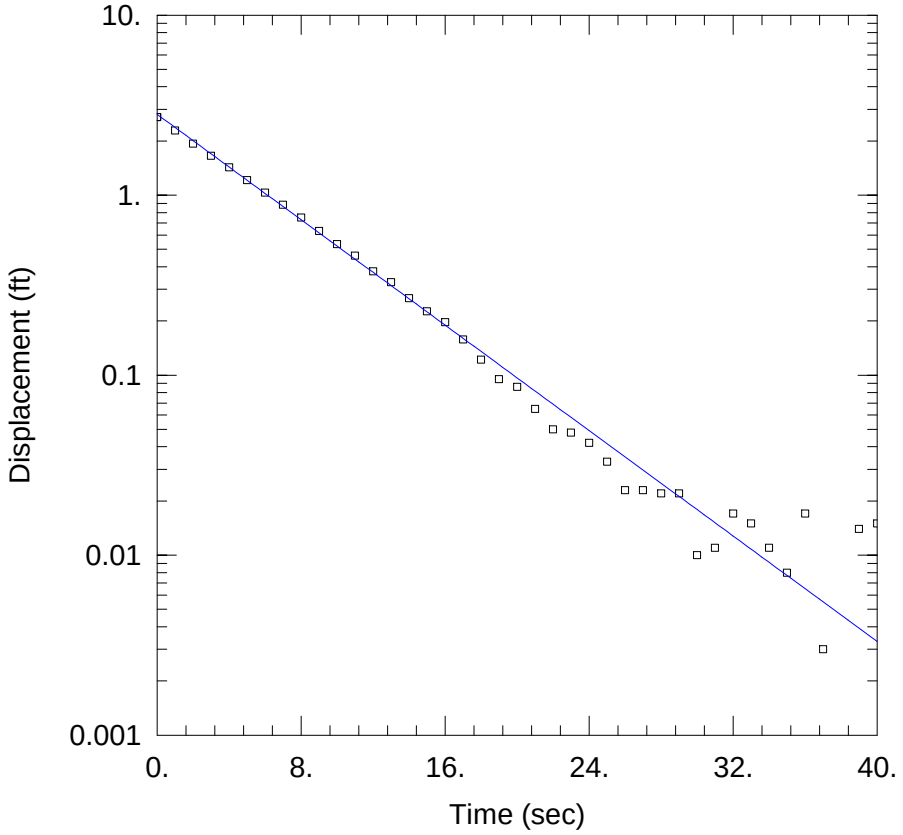
Saturated Thickness: 46.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212B)

Initial Displacement: 2.655 ft
Total Well Penetration Depth: 50.98 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 50.98 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212B_OUT2.aqt
Date: 01/15/19 Time: 09:20:00

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 10.13 ft/day
y0 = 2.811 ft

AQUIFER DATA

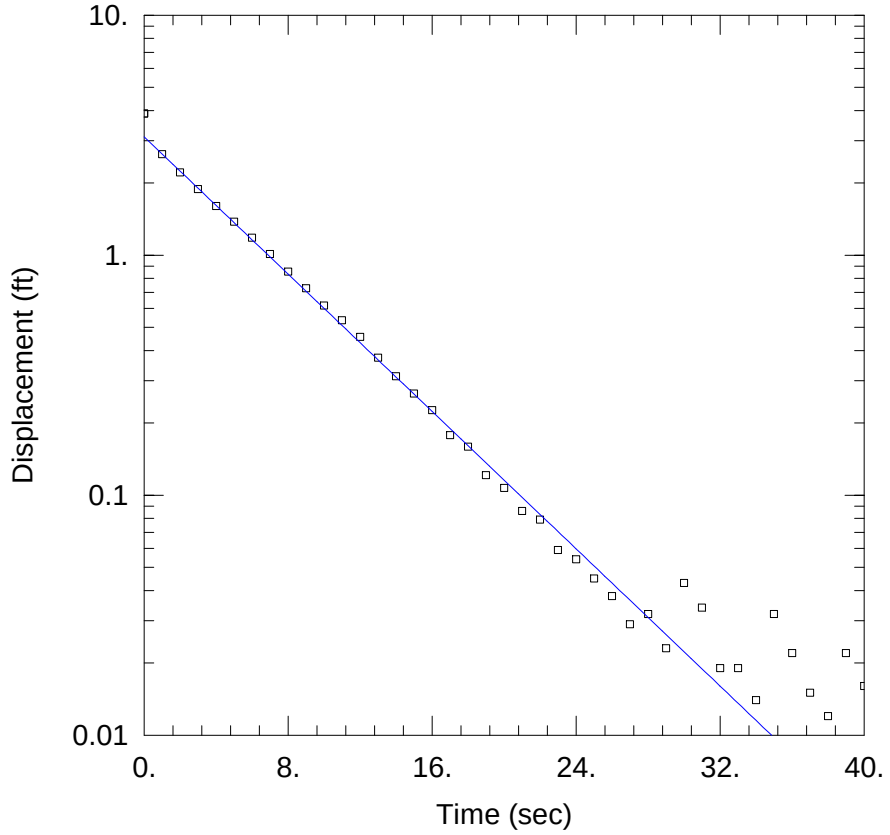
Saturated Thickness: 46.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212B)

Initial Displacement: 2.71 ft
Total Well Penetration Depth: 50.98 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 50.98 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212B_OUT3.aqt
Date: 01/15/19 Time: 09:20:37

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212B
Test Date: 7/13/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 9.902 ft/day
y0 = 3.112 ft

AQUIFER DATA

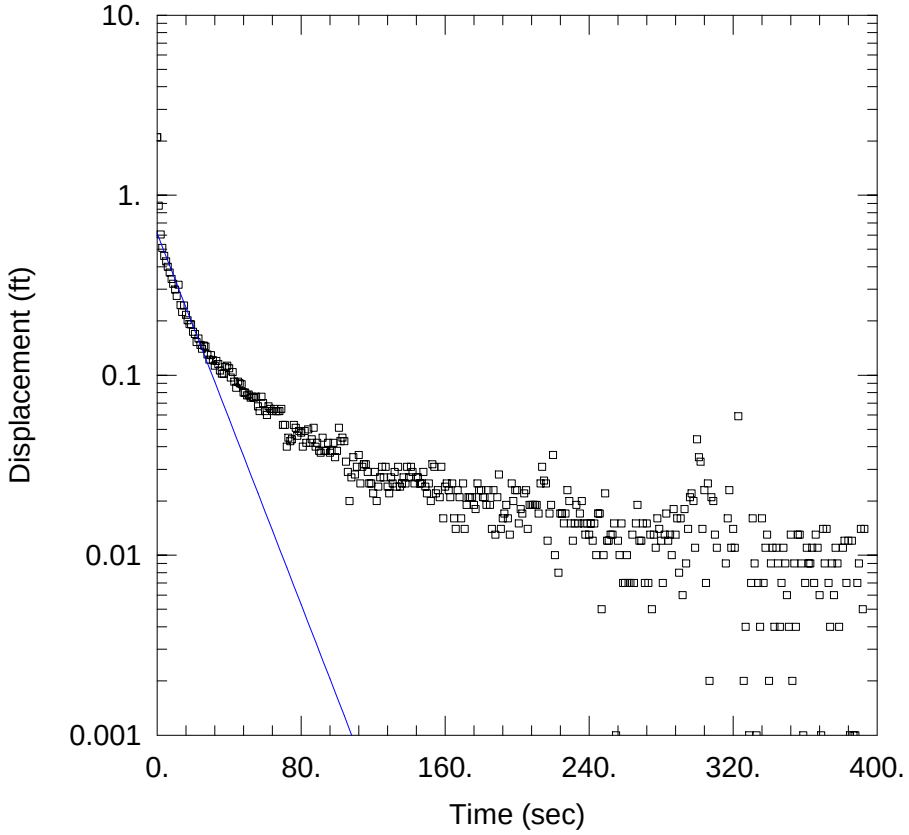
Saturated Thickness: 46.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW212B)

Initial Displacement: 3.885 ft
Total Well Penetration Depth: 50.98 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 50.98 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212C_IN1.aqt
Date: 01/17/19 Time: 12:56:58

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.885 ft/day
y0 = 0.6156 ft

AQUIFER DATA

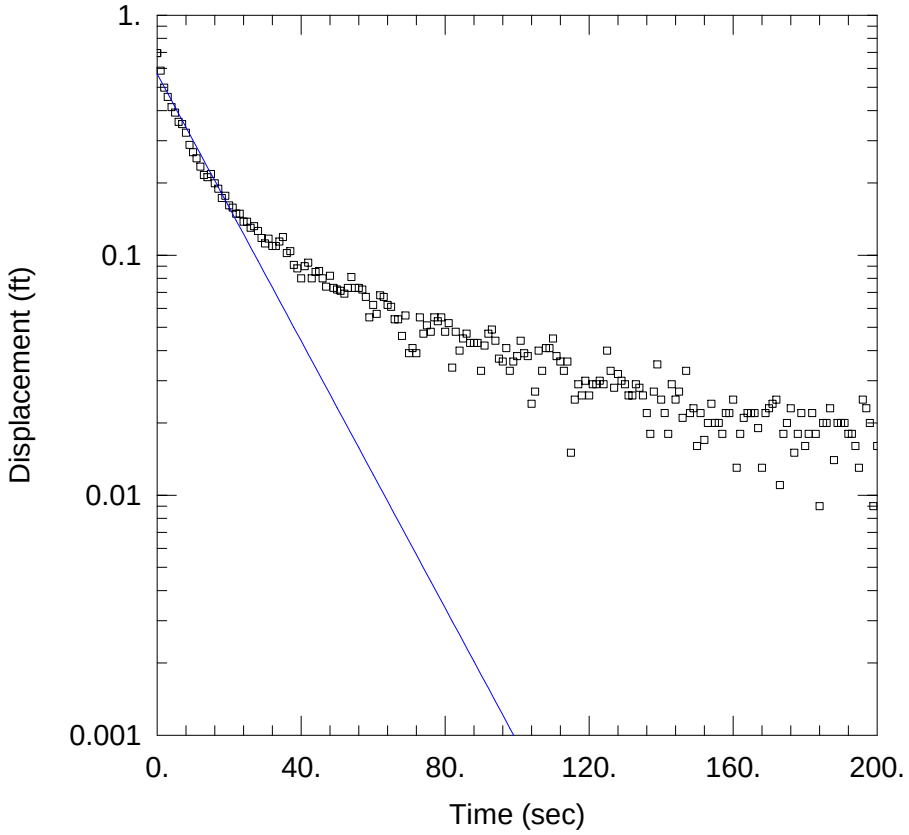
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212C_IN1)

Initial Displacement: 2.097 ft
Total Well Penetration Depth: 90.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 90.69 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212C_IN2.aqt
Date: 01/17/19 Time: 12:57:17

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.191 ft/day
y0 = 0.57 ft

AQUIFER DATA

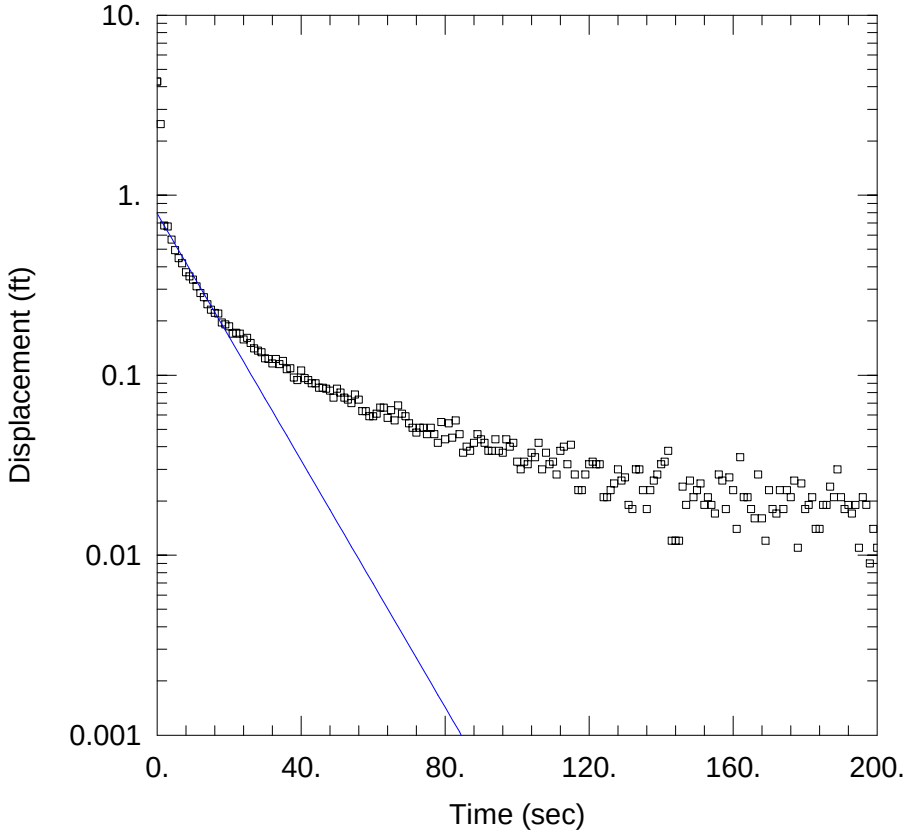
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212C_IN2)

Initial Displacement: 0.695 ft
Total Well Penetration Depth: 90.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 90.69 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212C_IN3.aqt
Date: 01/17/19 Time: 12:57:33

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 5.168 ft/day
y0 = 0.7918 ft

AQUIFER DATA

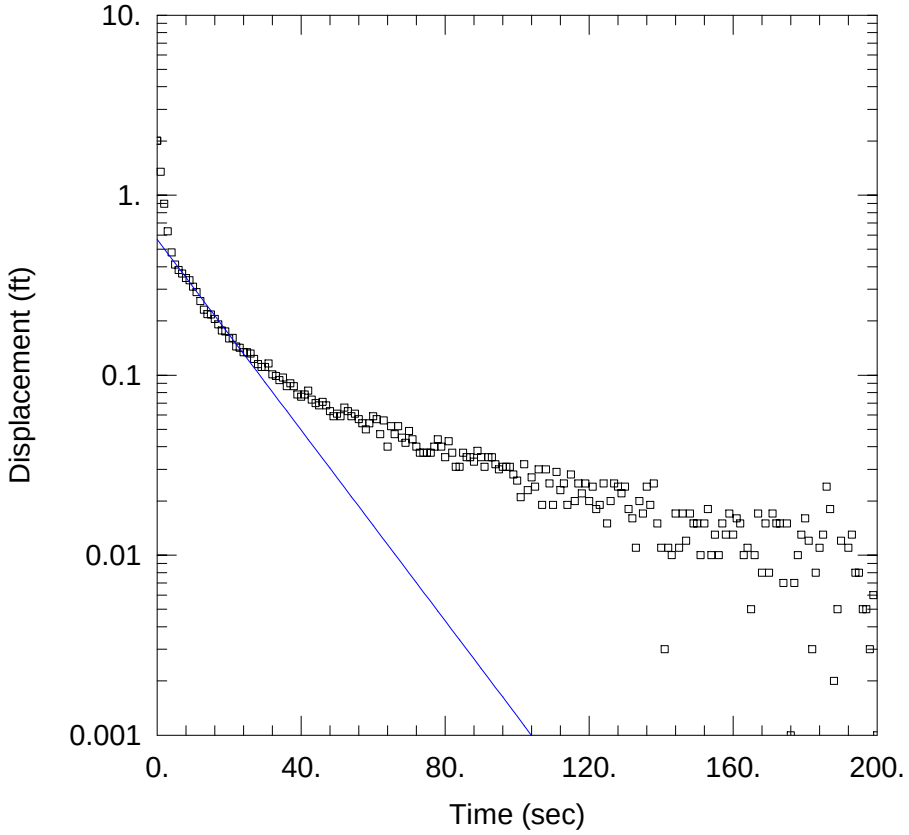
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212C_IN3)

Initial Displacement: 4.281 ft
Total Well Penetration Depth: 91.01 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 91.01 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212C_OUT1.aqt
Date: 01/17/19 Time: 12:58:04

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.99 ft/day
y0 = 0.5682 ft

AQUIFER DATA

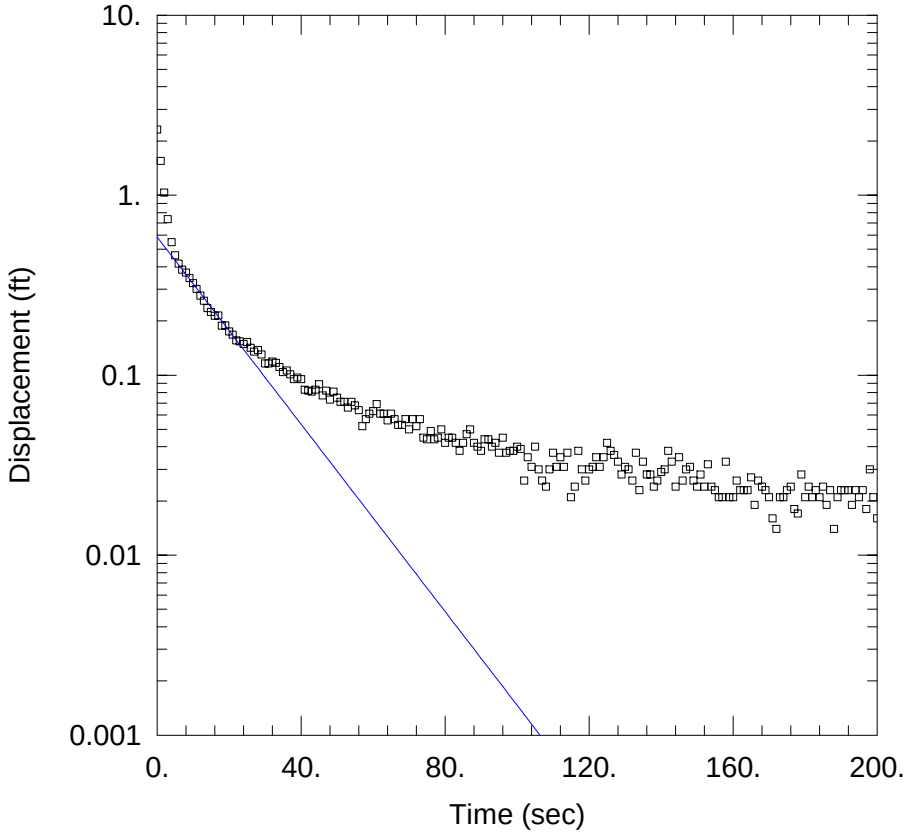
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212C_OUT1)

Initial Displacement: 2.008 ft
Total Well Penetration Depth: 90.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 90.69 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212C_OUT2.aqt
Date: 01/17/19 Time: 12:58:33

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.919 ft/day
y0 = 0.586 ft

AQUIFER DATA

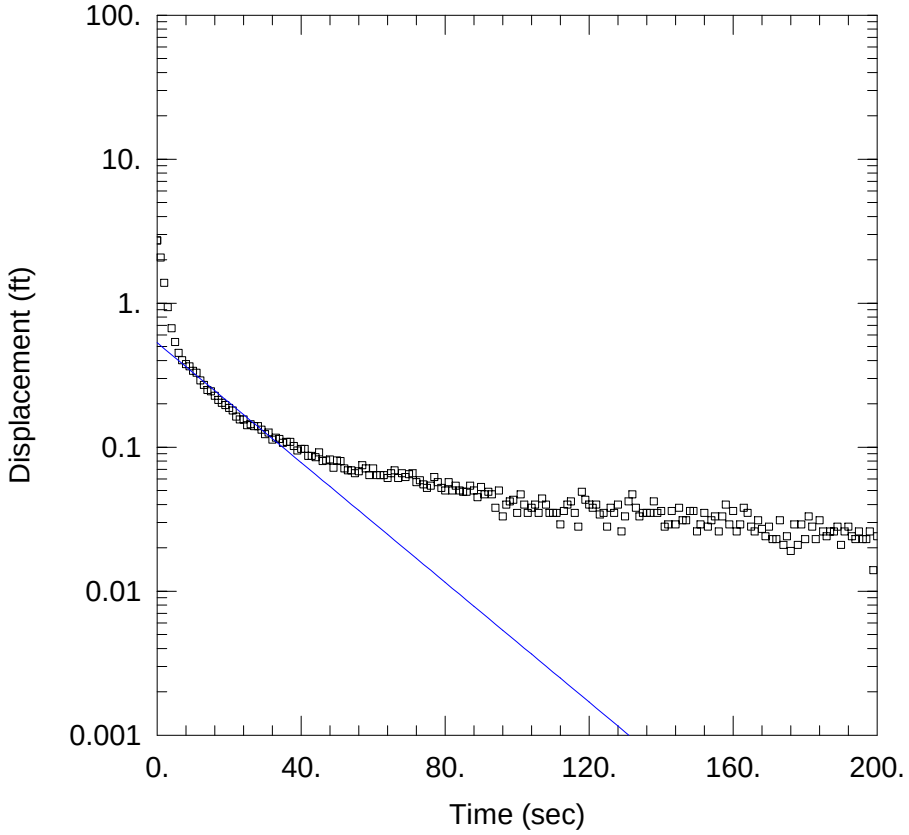
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212C_OUT2)

Initial Displacement: 2317. ft
Total Well Penetration Depth: 90.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 90.69 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212C_OUT3.aqt
Date: 01/17/19 Time: 12:58:52

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.132 ft/day
y0 = 0.5306 ft

AQUIFER DATA

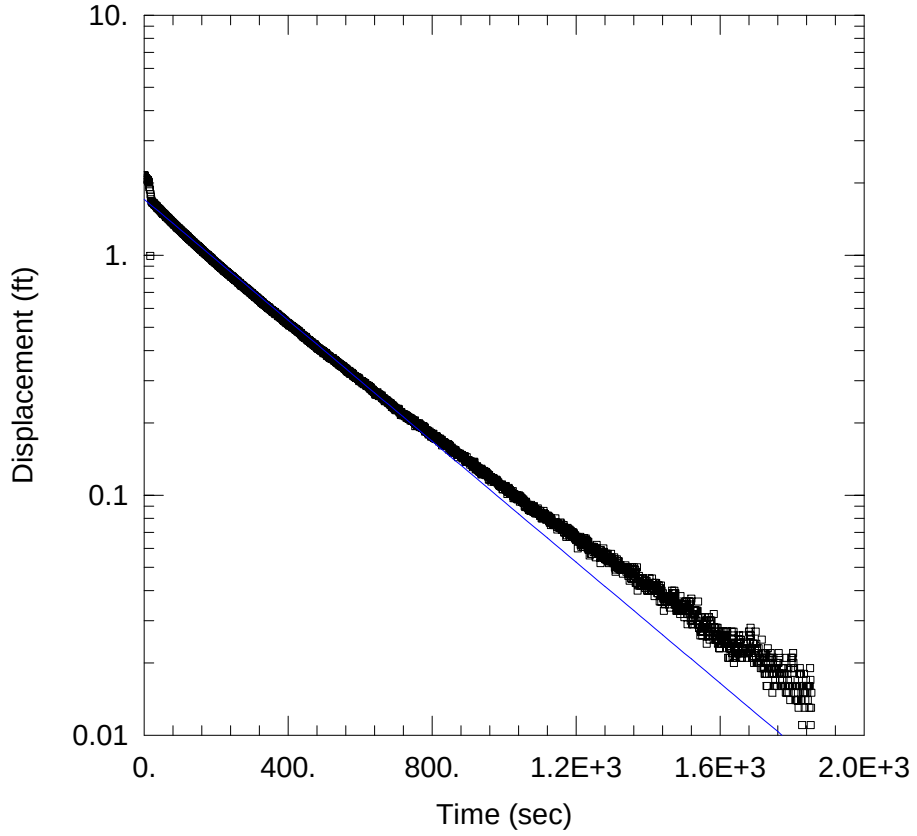
Saturated Thickness: 22.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212C_OUT3)

Initial Displacement: 2.725 ft
Total Well Penetration Depth: 90.69 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 90.69 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212D_IN1.aqt
Date: 01/17/19 Time: 13:00:08

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.7504 ft/day
y0 = 1.711 ft

AQUIFER DATA

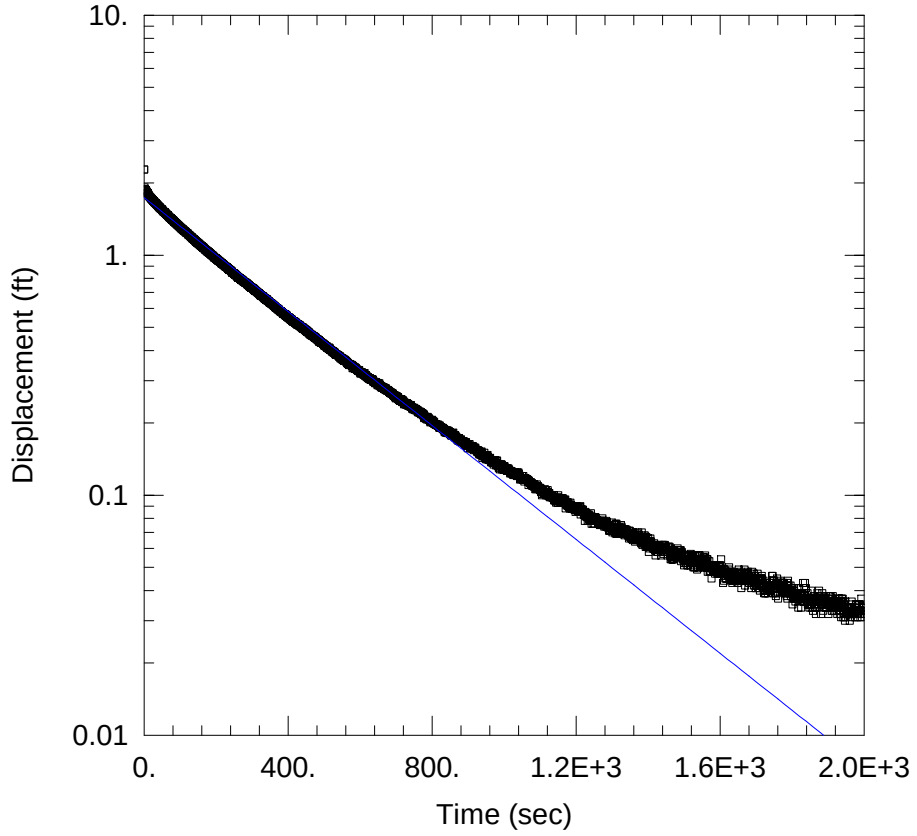
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212D_IN1)

Initial Displacement: 2.152 ft
Total Well Penetration Depth: 116.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 116.6 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW212D_OUT1.aqt
Date: 01/17/19 Time: 13:00:25

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW212D
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.7066 ft/day
y0 = 1.737 ft

AQUIFER DATA

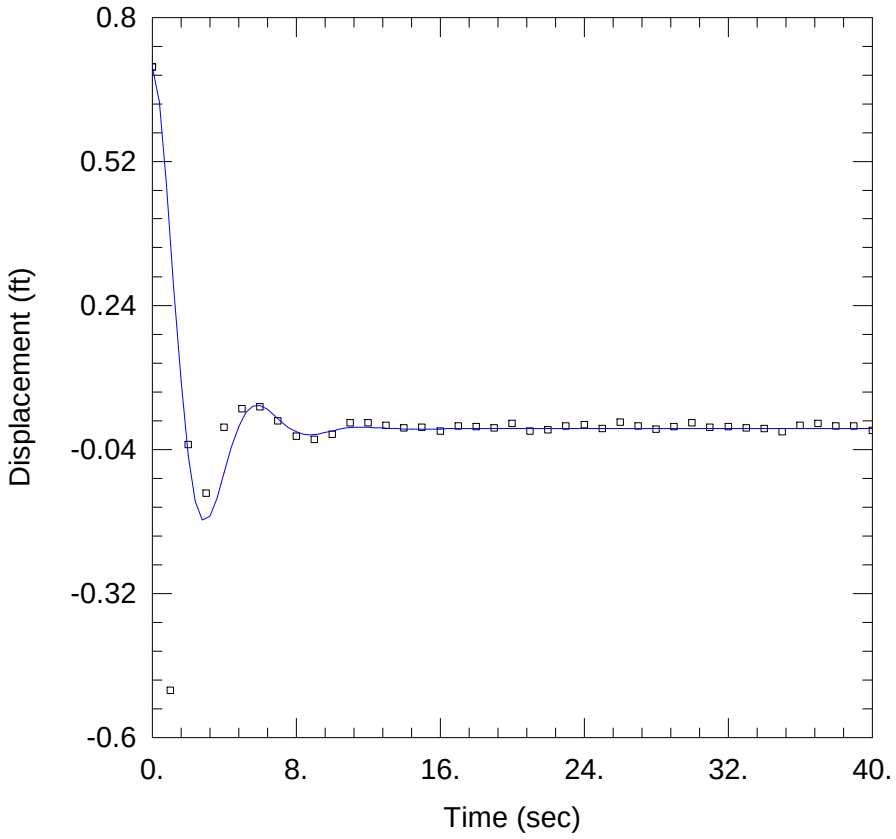
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-212D_OUT1)

Initial Displacement: 2.271 ft
Total Well Penetration Depth: 116.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 116.6 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW213_IN1.aqt
Date: 11/14/18 Time: 08:44:05

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW213
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 73.77 ft/day
Le = 23.32 ft

AQUIFER DATA

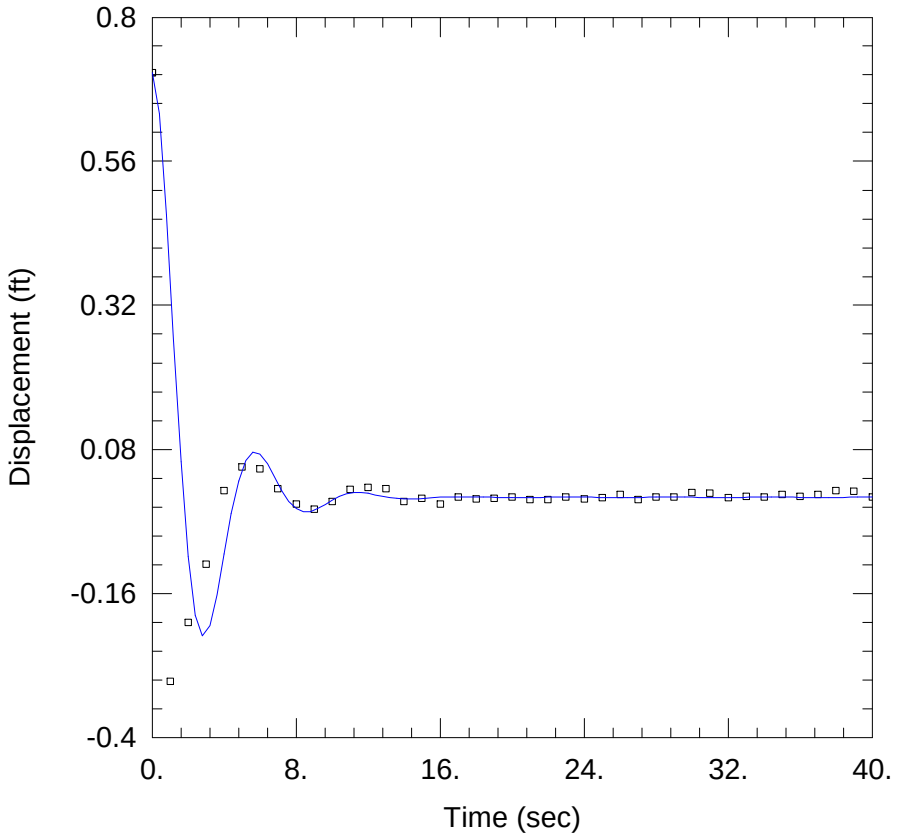
Saturated Thickness: 48.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW213)

Initial Displacement: 0.703 ft
Total Well Penetration Depth: 33.15 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 33.15 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW213_IN2.aqt
Date: 11/14/18 Time: 08:45:08

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW213
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 87.52 ft/day
Le = 23.51 ft

AQUIFER DATA

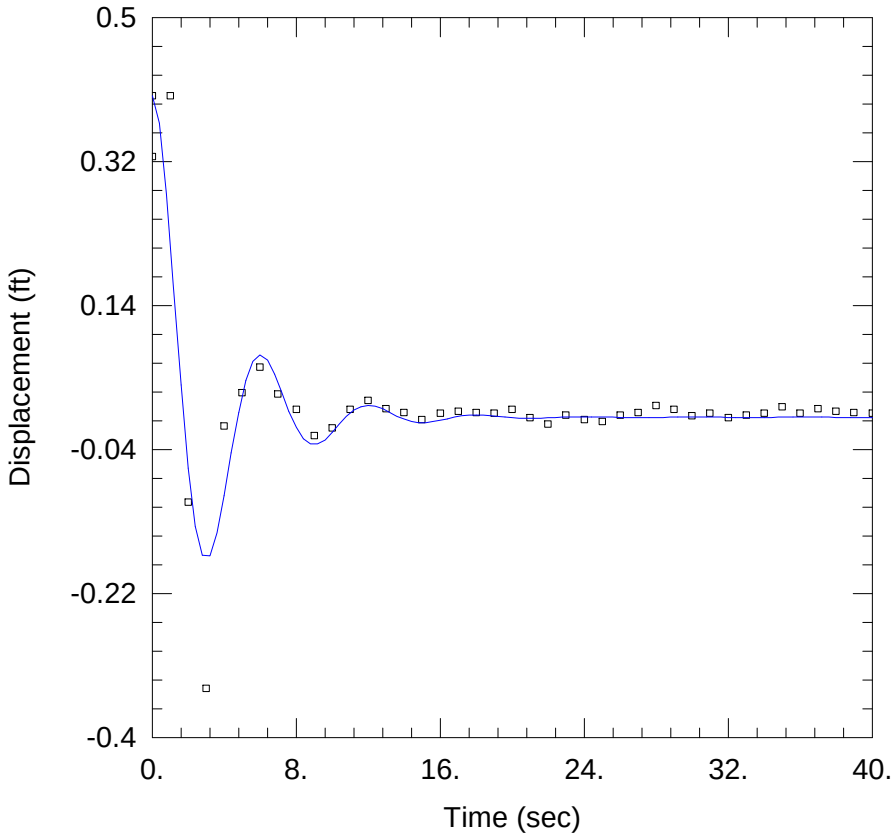
Saturated Thickness: 48.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW213)

Initial Displacement: 0.708 ft
Total Well Penetration Depth: 33.15 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 33.15 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW213_IN3.aqt
Date: 11/14/18 Time: 08:46:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW213
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 107.5 ft/day
Le = 27.48 ft

AQUIFER DATA

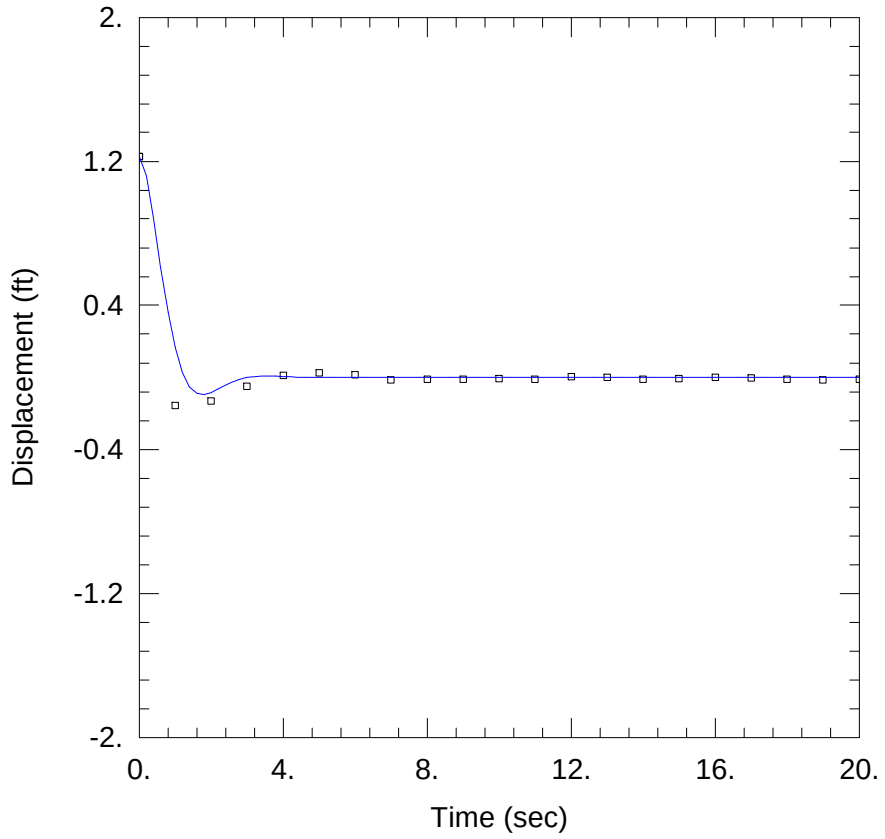
Saturated Thickness: 48.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW213)

Initial Displacement: 0.402 ft
Total Well Penetration Depth: 33.15 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 33.15 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW214_IN1.aqt
Date: 11/14/18 Time: 09:12:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW214
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 160.1 ft/day
Le = 6.077 ft

AQUIFER DATA

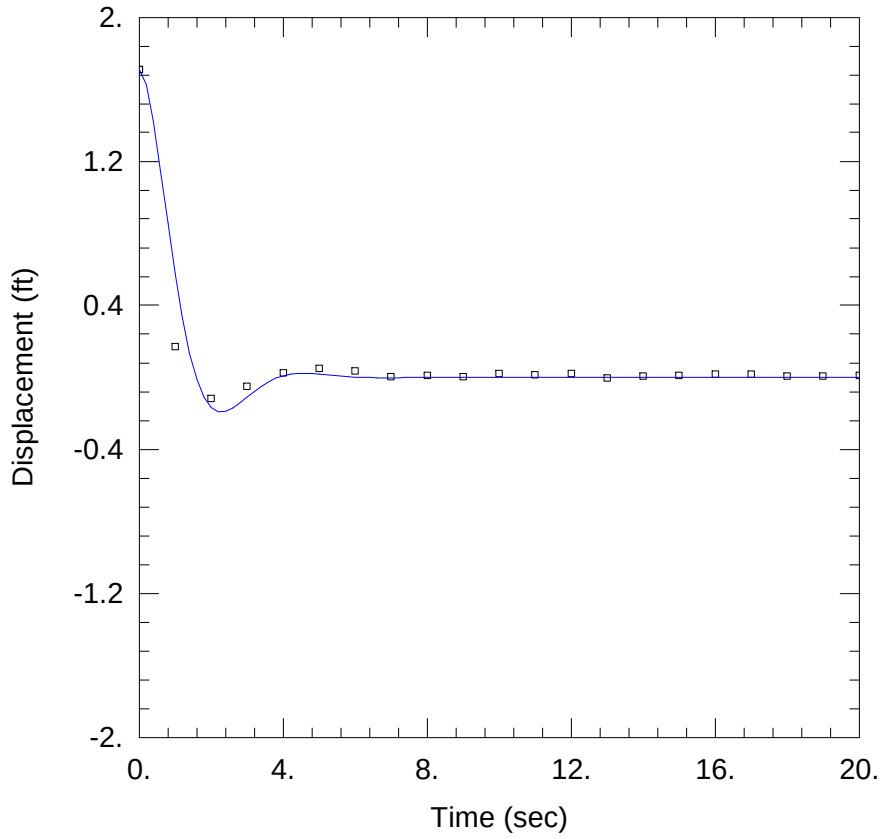
Saturated Thickness: 18.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW214)

Initial Displacement: 1.228 ft
Total Well Penetration Depth: 16.22 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 16.22 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW214_IN2.aqt
Date: 11/14/18 Time: 09:13:07

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW214
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 128.3 ft/day
Le = 11.47 ft

AQUIFER DATA

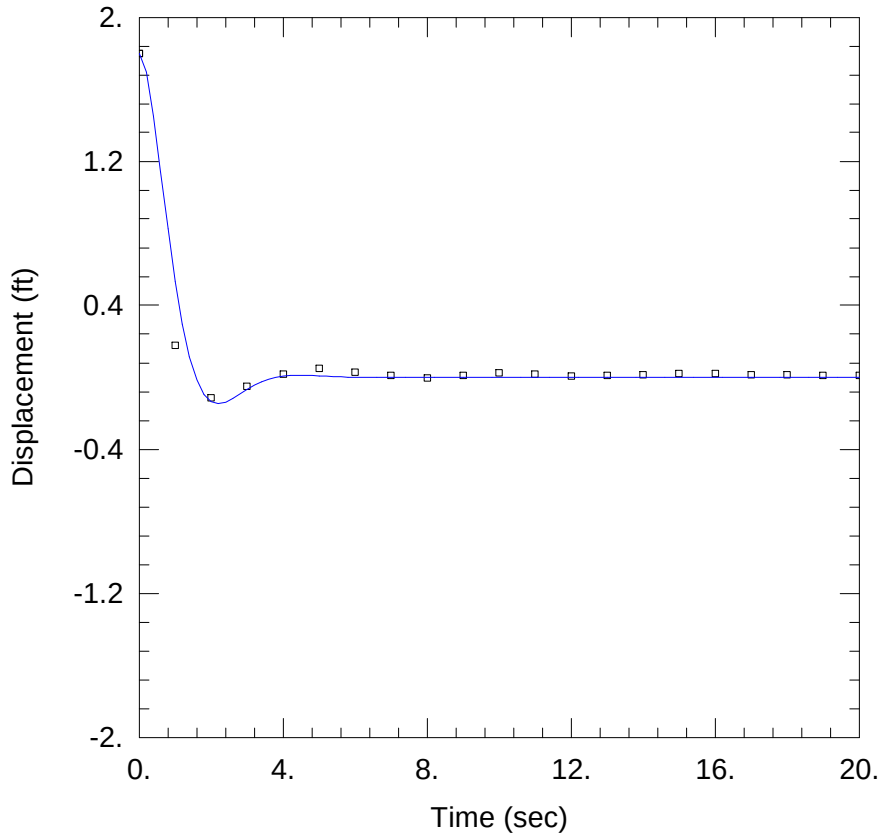
Saturated Thickness: 18.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW214)

Initial Displacement: 1.71 ft
Total Well Penetration Depth: 16.22 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 16.22 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW214_IN3.aqt
Date: 11/14/18 Time: 09:14:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW214
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 128.1 ft/day
Le = 9.596 ft

AQUIFER DATA

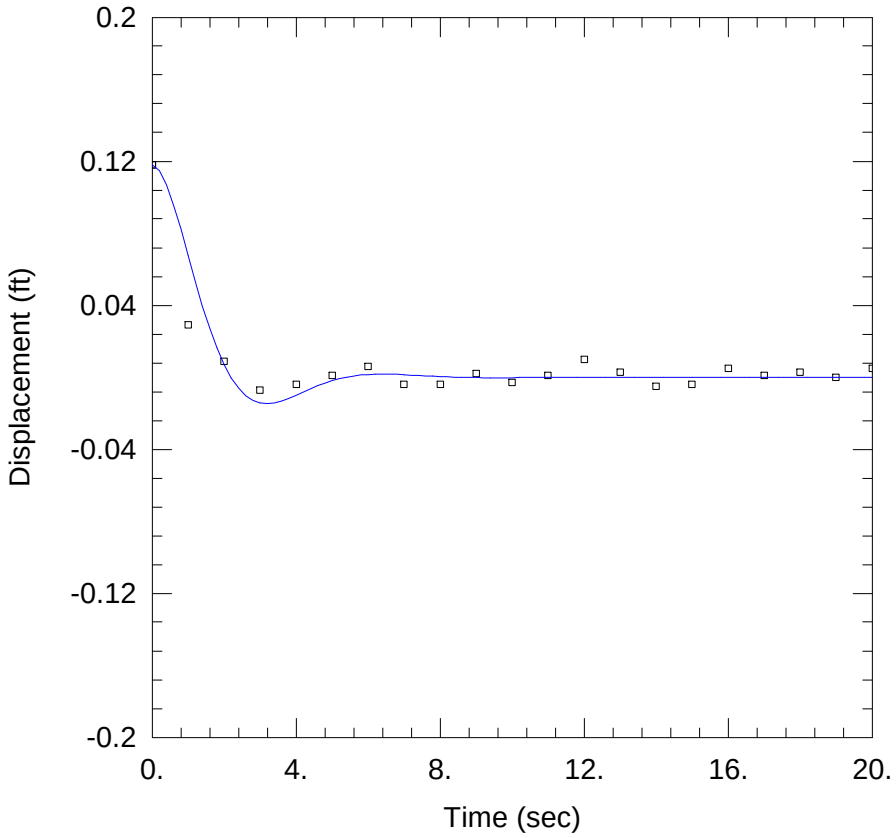
Saturated Thickness: 18.36 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW214)

Initial Displacement: 1.8 ft
Total Well Penetration Depth: 16.22 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 16.22 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215A_IN1.aqt
Date: 11/14/18 Time: 09:28:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215A
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 52.01 ft/day
Le = 22.91 ft

AQUIFER DATA

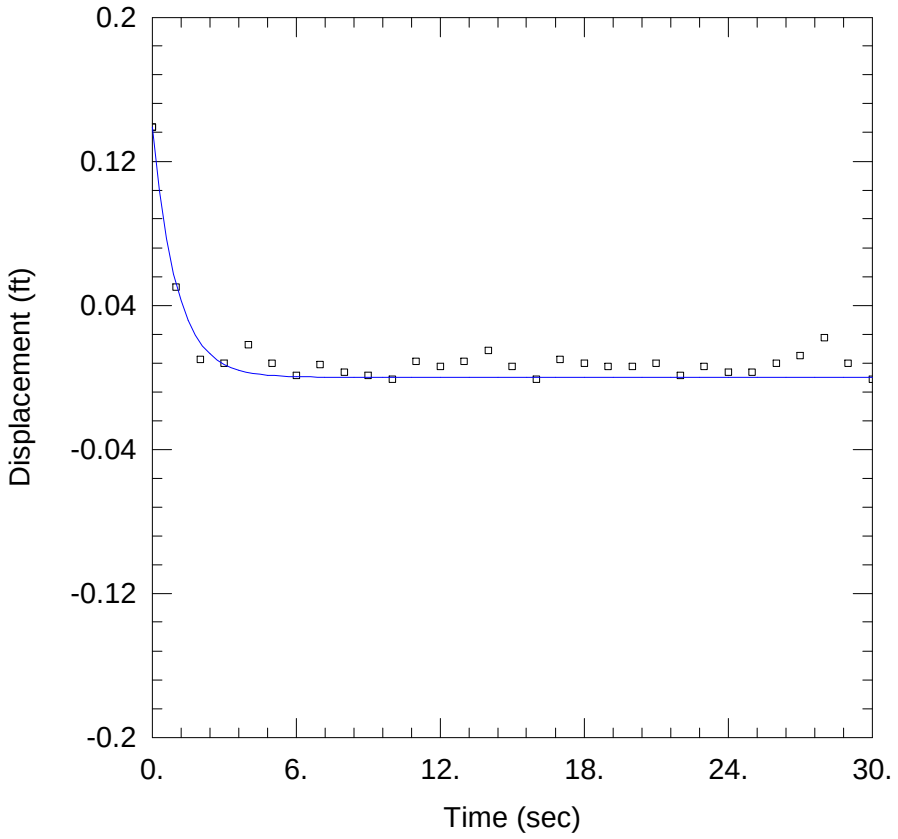
Saturated Thickness: 23.58 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215A)

Initial Displacement: 0.118 ft
Total Well Penetration Depth: 21.53 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 21.53 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215A_IN2.aqt
Date: 11/14/18 Time: 09:31:54

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215A
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 47.91 ft/day
Le = 0.1 ft

AQUIFER DATA

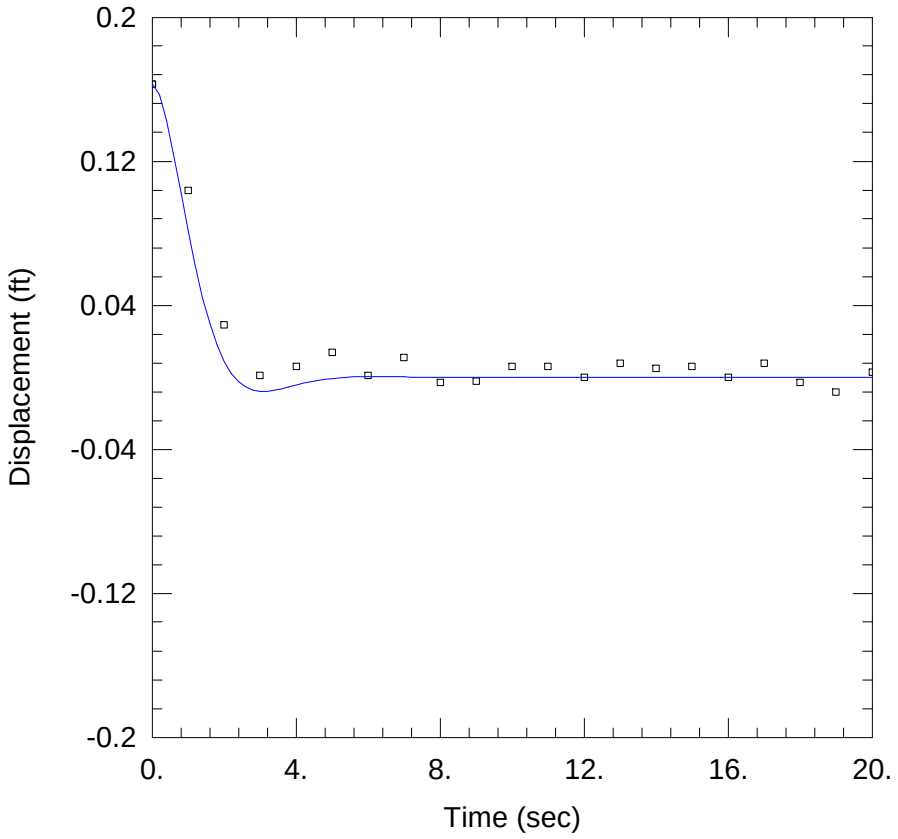
Saturated Thickness: 23.58 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215A)

Initial Displacement: 0.139 ft
Total Well Penetration Depth: 21.53 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 21.53 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215A_IN3.aqt
Date: 11/14/18 Time: 09:35:06

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215A
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 49.83 ft/day
Le = 15.85 ft

AQUIFER DATA

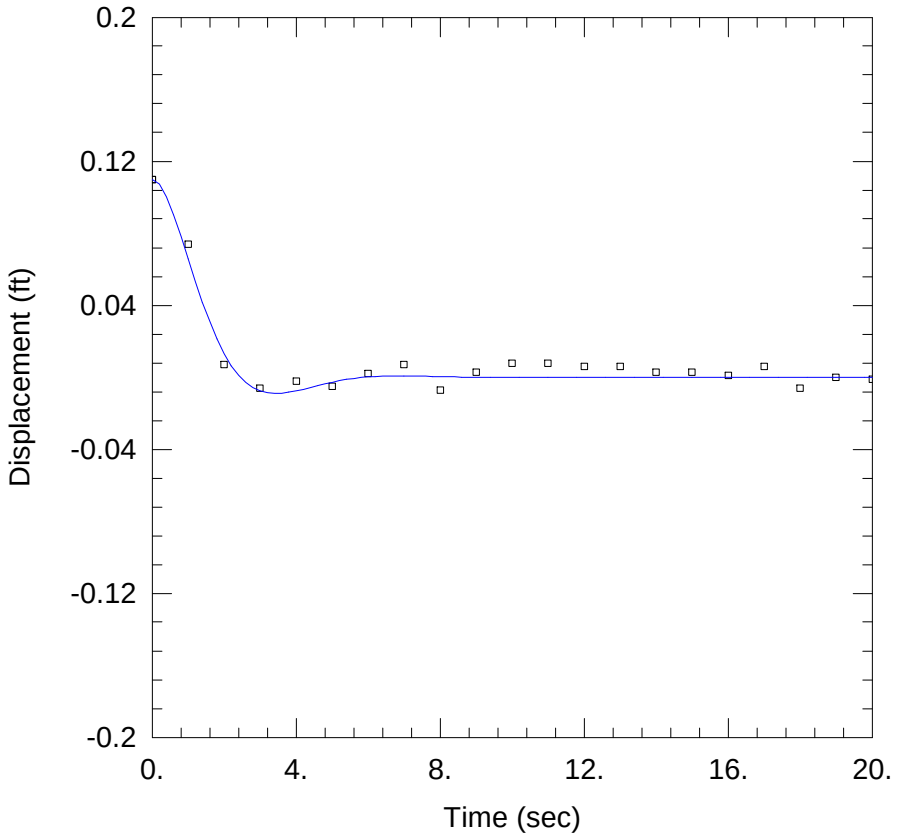
Saturated Thickness: 23.58 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215A)

Initial Displacement: 0.163 ft
Total Well Penetration Depth: 21.53 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 21.53 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215A_OUT1.aqt
Date: 11/14/18 Time: 09:35:56

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215A
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 45.67 ft/day
Le = 23.56 ft

AQUIFER DATA

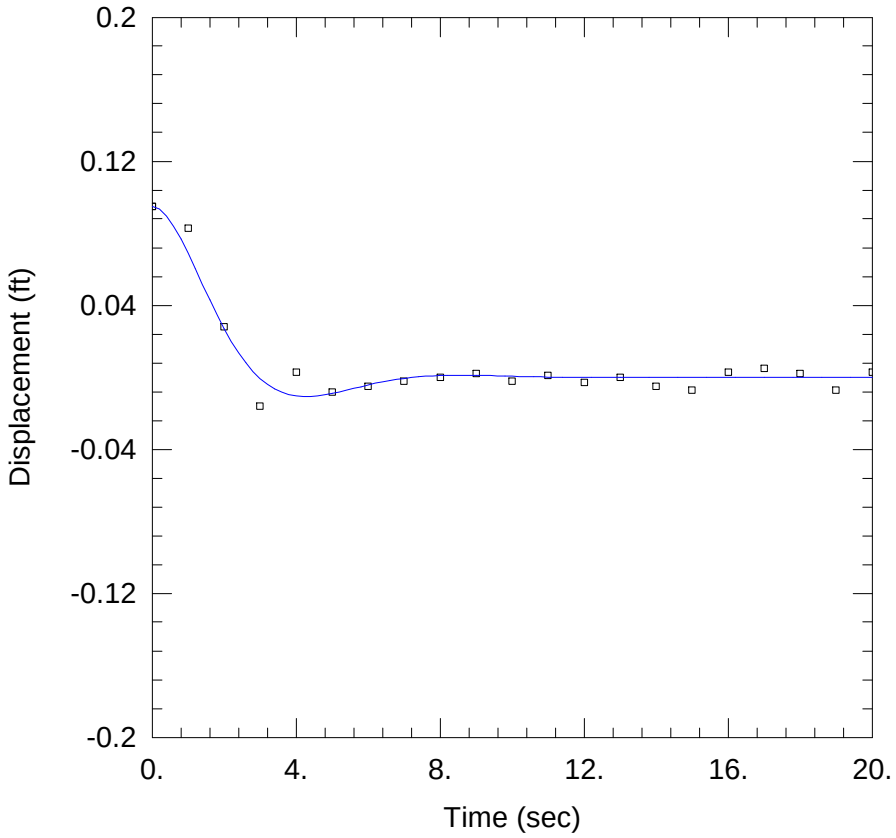
Saturated Thickness: 23.58 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215A)

Initial Displacement: 0.11 ft
Total Well Penetration Depth: 21.53 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 21.53 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215A_OUT2.aqt
Date: 11/14/18 Time: 09:38:33

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215A
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 38.15 ft/day
Le = 40.13 ft

AQUIFER DATA

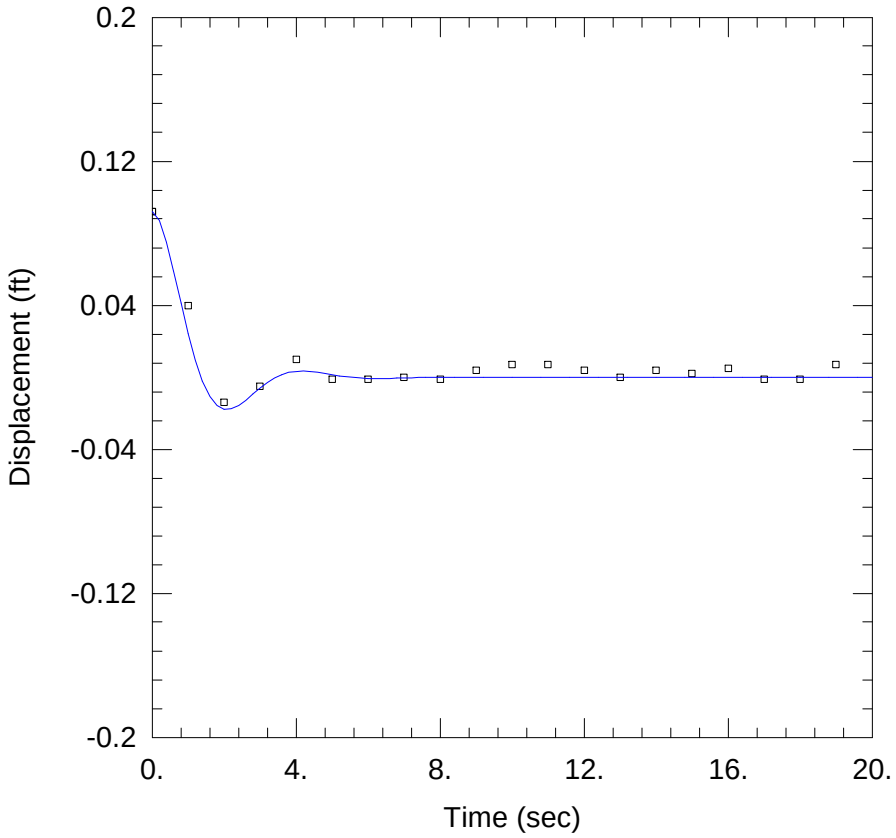
Saturated Thickness: 23.58 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215A)

Initial Displacement: 0.095 ft
Total Well Penetration Depth: 21.53 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 21.53 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215A_OUT3.aqt
Date: 11/14/18 Time: 09:40:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215A
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 89.76 ft/day
Le = 11.07 ft

AQUIFER DATA

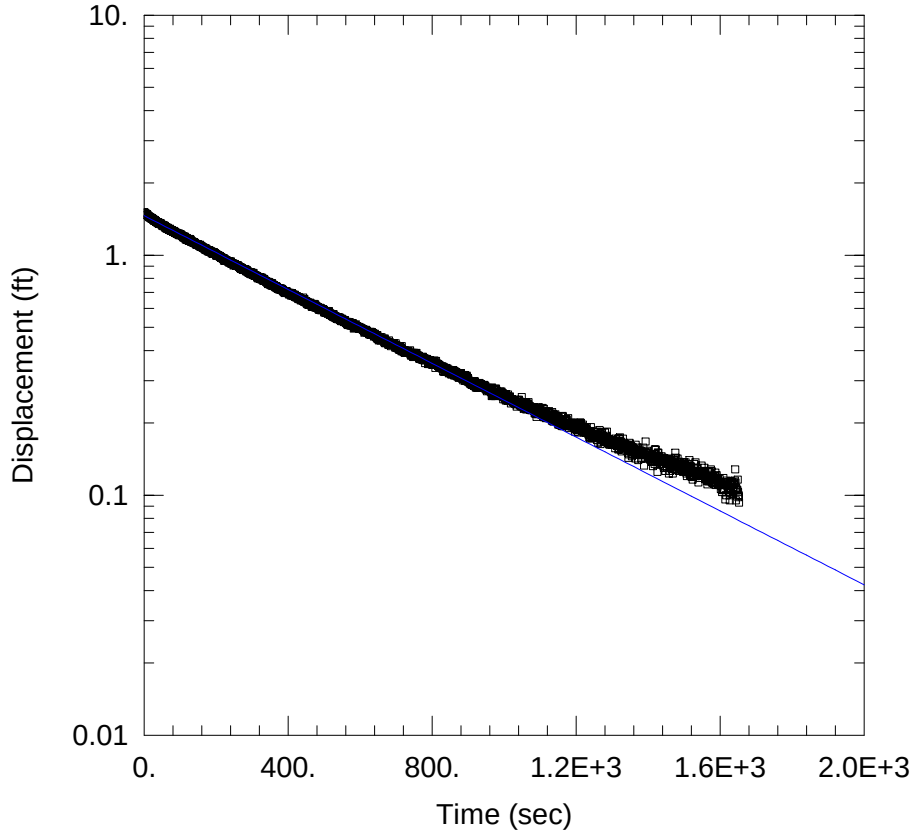
Saturated Thickness: 23.58 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215A)

Initial Displacement: 0.092 ft
Total Well Penetration Depth: 21.53 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 21.53 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215B_IN1.aqt
Date: 08/16/18 Time: 10:10:14

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215B
Test Date: 7/17/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.368 ft/day
y0 = 1.461 ft

AQUIFER DATA

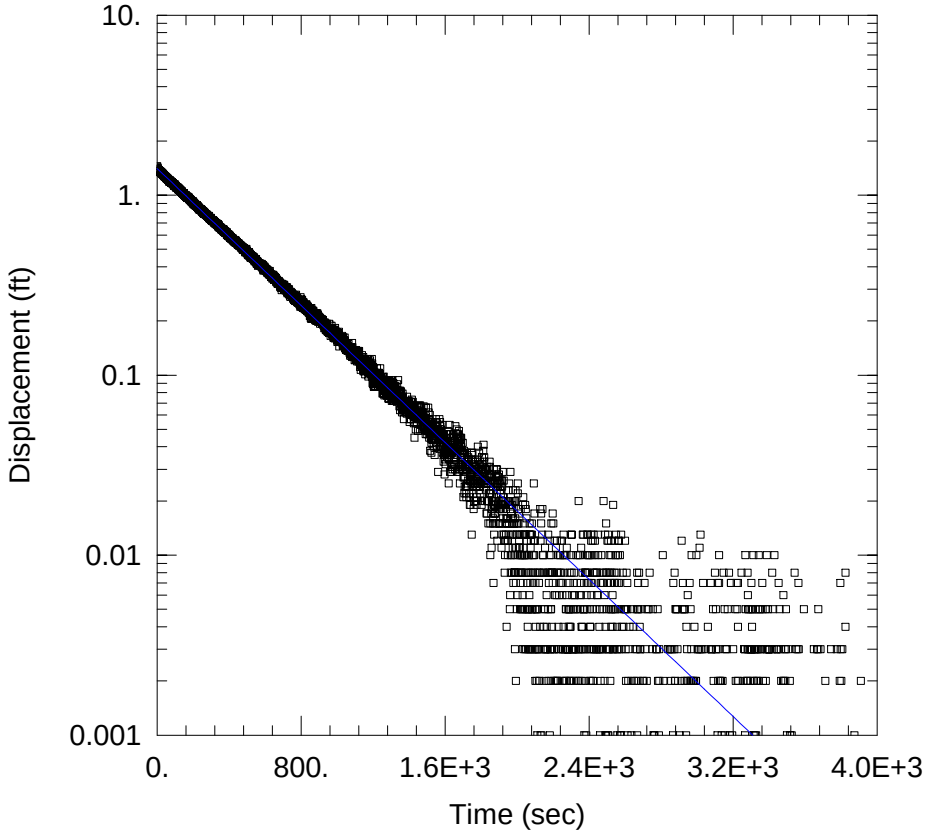
Saturated Thickness: 7.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215B)

Initial Displacement: 1.5 ft
Total Well Penetration Depth: 32.49 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.49 ft
Screen Length: 4.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW215B_OUT1.aqt
Date: 08/16/18 Time: 09:53:01

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW215B
Test Date: 7/17/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.4553 ft/day
y0 = 1.407 ft

AQUIFER DATA

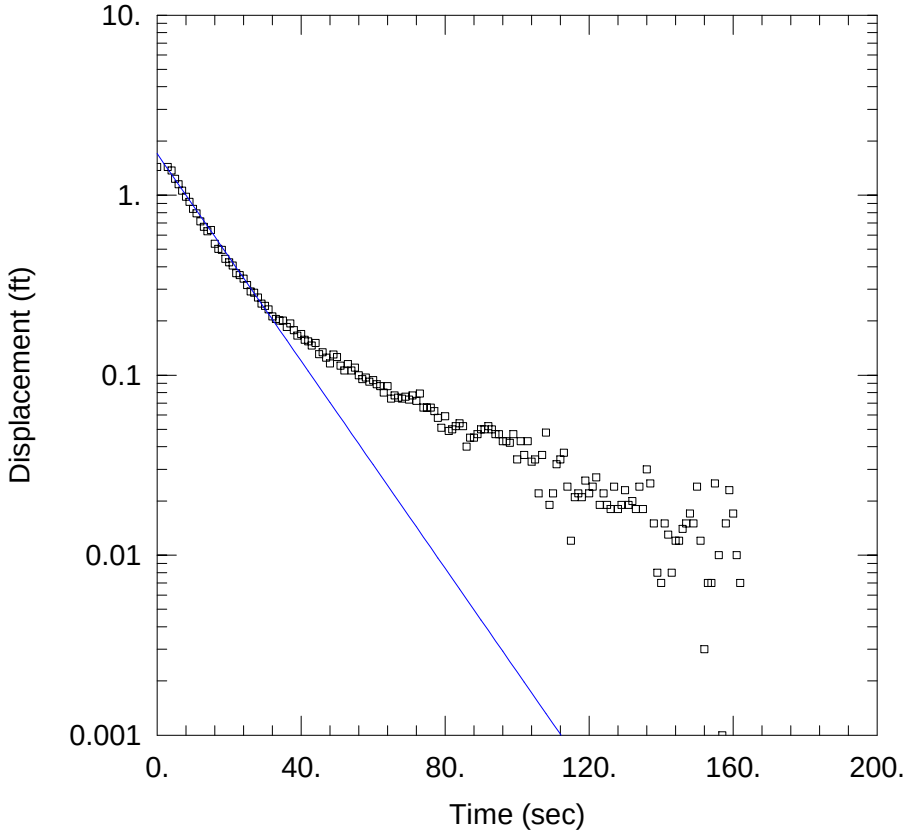
Saturated Thickness: 7.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW215B)

Initial Displacement: 1.448 ft
Total Well Penetration Depth: 32.49 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 32.49 ft
Screen Length: 4.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW216_IN1.aqt
Date: 07/31/18 Time: 13:23:58

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW216
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.535 ft/day
y0 = 1.702 ft

AQUIFER DATA

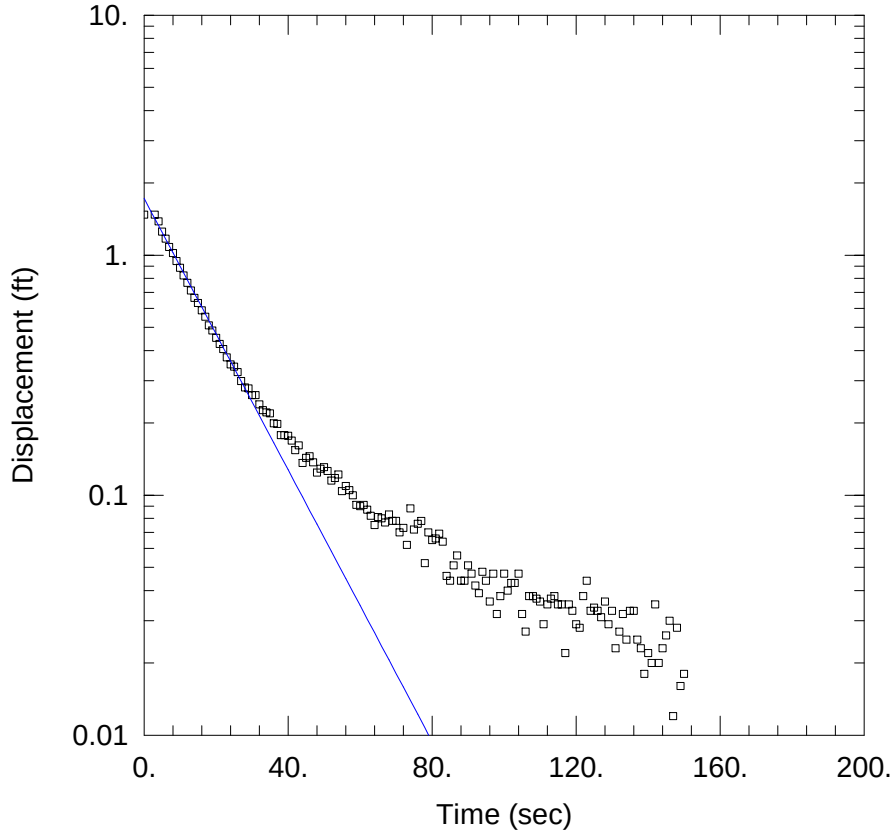
Saturated Thickness: 13.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW216)

Initial Displacement: 1.431 ft
Total Well Penetration Depth: 11.93 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 11.93 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW216_IN2.aqt
Date: 07/31/18 Time: 13:24:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW216
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.435 ft/day
y0 = 1.724 ft

AQUIFER DATA

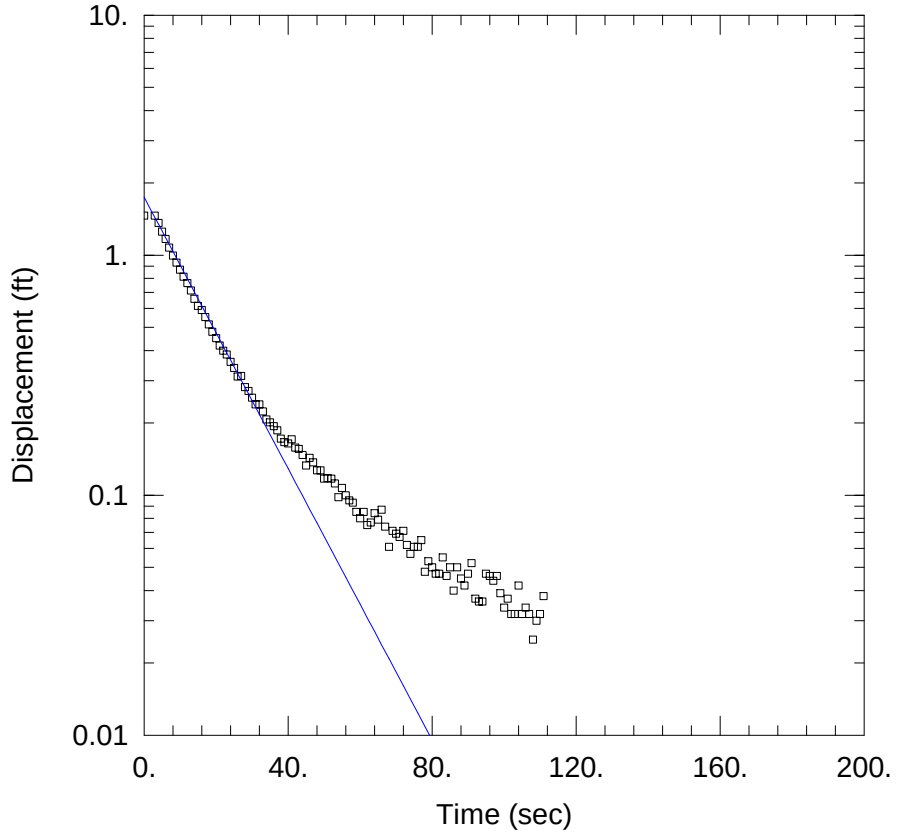
Saturated Thickness: 13.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW216)

Initial Displacement: 1.474 ft
Total Well Penetration Depth: 11.93 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 11.93 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW216_IN3.aqt
Date: 07/31/18 Time: 13:24:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW216
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.433 ft/day
y0 = 1.744 ft

AQUIFER DATA

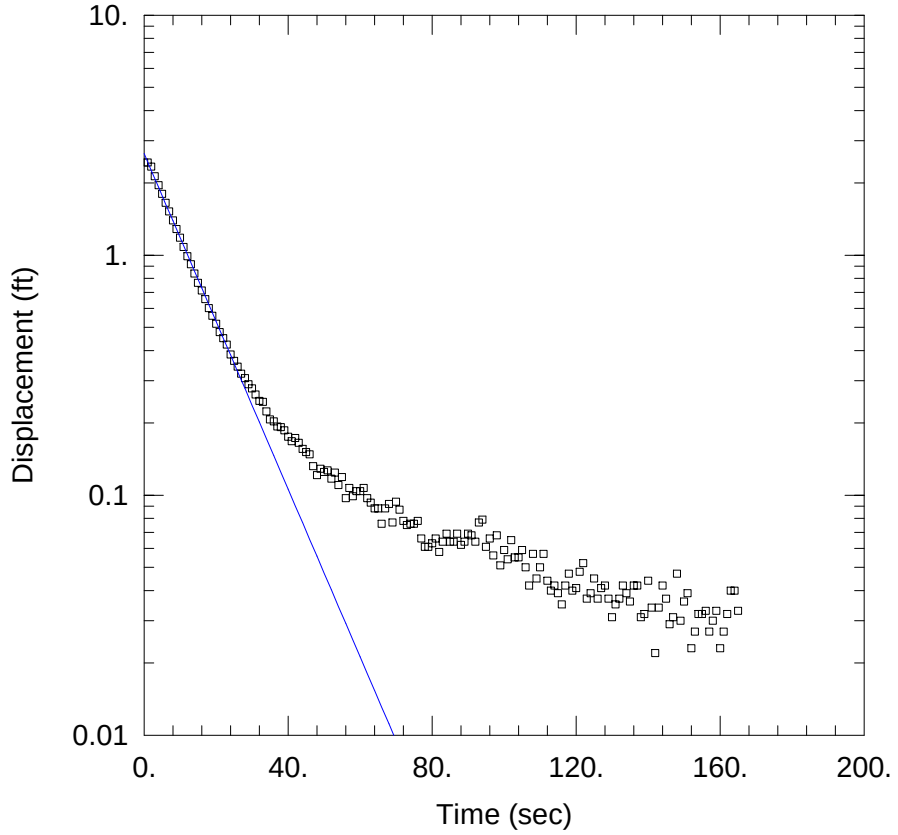
Saturated Thickness: 13.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW216)

Initial Displacement: 1.46 ft
Total Well Penetration Depth: 11.93 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 11.93 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW216_OUT1.aqt
Date: 07/31/18 Time: 13:24:34

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW216
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.716 ft/day
y0 = 2.647 ft

AQUIFER DATA

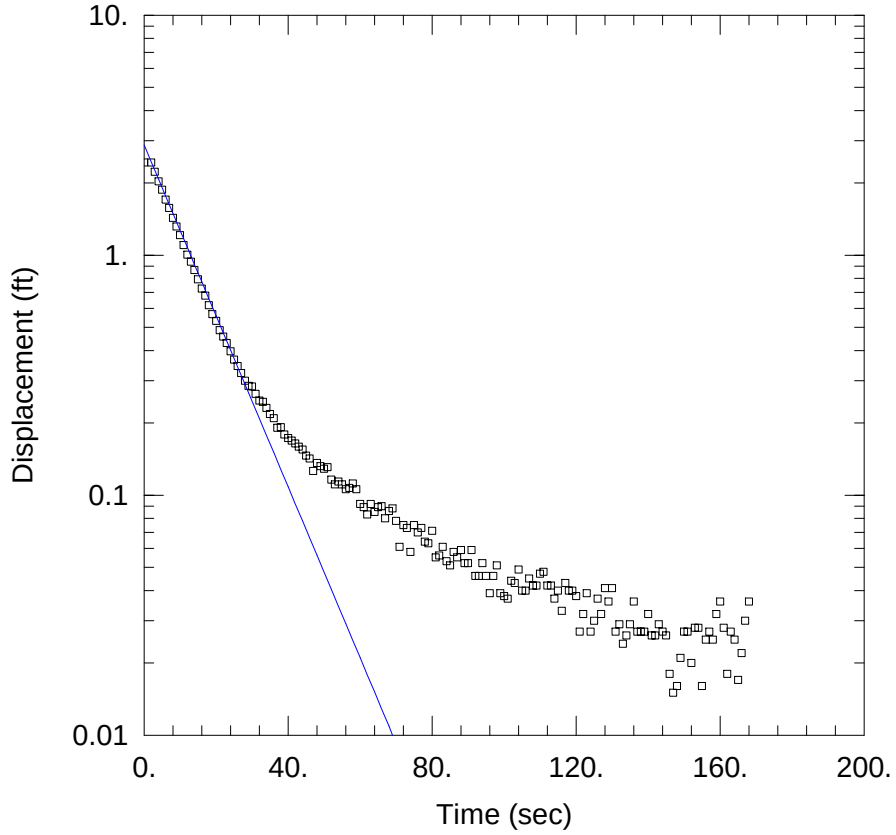
Saturated Thickness: 13.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW216)

Initial Displacement: 2.429 ft
Total Well Penetration Depth: 11.93 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 11.93 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW216_OUT2.aqt
Date: 07/31/18 Time: 13:24:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW216
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.845 ft/day
y0 = 2.88 ft

AQUIFER DATA

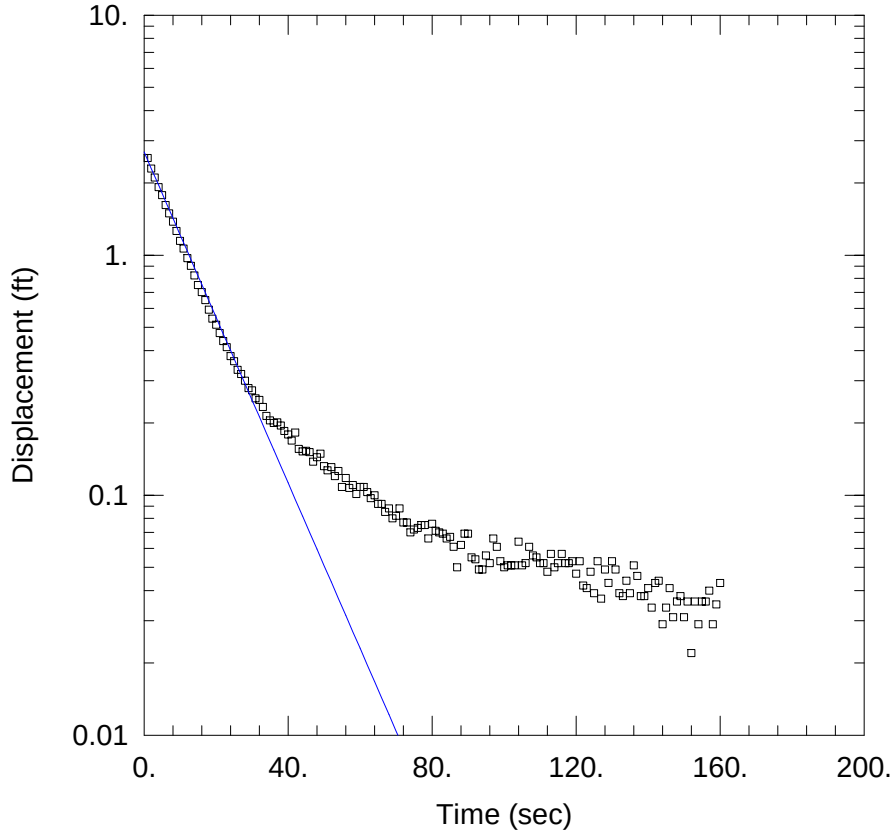
Saturated Thickness: 13.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW216)

Initial Displacement: 2.432 ft
Total Well Penetration Depth: 11.93 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 11.93 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW216_OUT3.aqt
Date: 07/31/18 Time: 13:24:56

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW216
Test Date: 7/14/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.626 ft/day
y0 = 2.692 ft

AQUIFER DATA

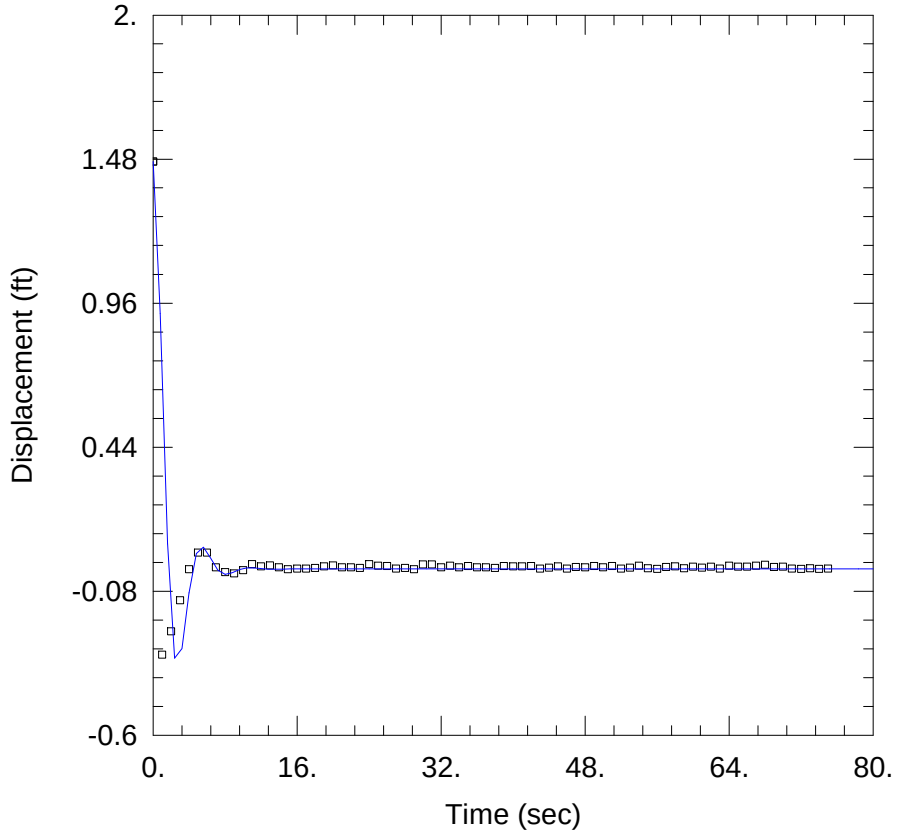
Saturated Thickness: 13.24 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-MW216)

Initial Displacement: 2.537 ft
Total Well Penetration Depth: 11.93 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 11.93 ft
Screen Length: 9.6 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217A_IN1.aqt
Date: 01/17/19 Time: 13:01:29

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 76.56 ft/day
Le = 19.48 ft

AQUIFER DATA

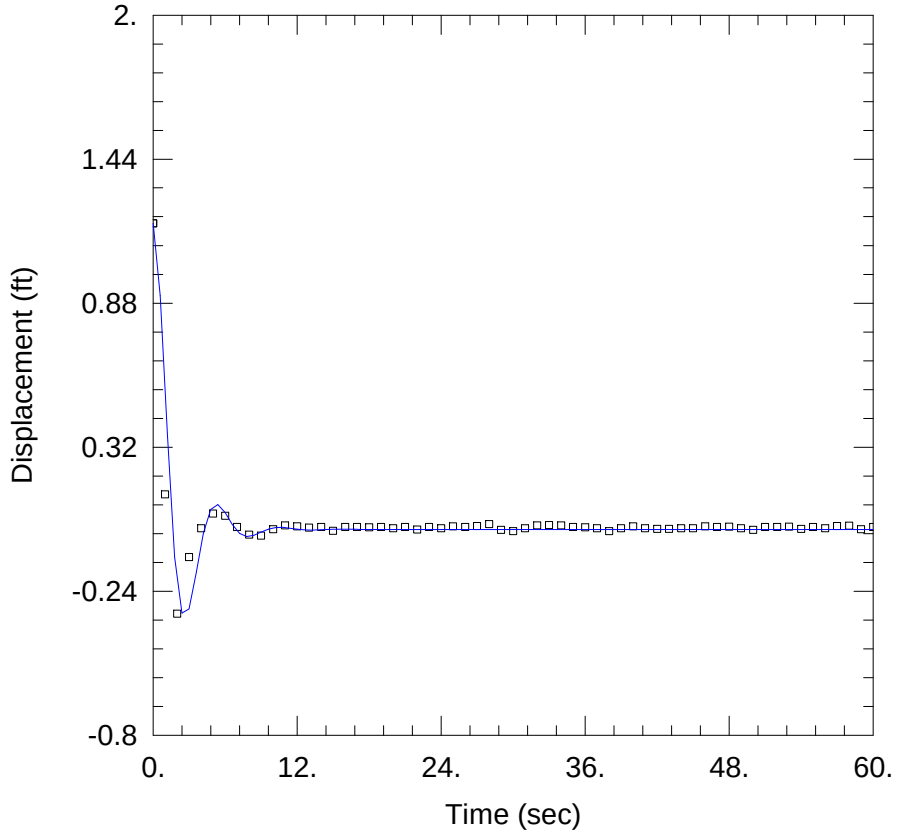
Saturated Thickness: 58.78 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217A_IN1)

Initial Displacement: 1.471 ft
Total Well Penetration Depth: 34.02 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.02 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217A_IN3.aqt
Date: 01/17/19 Time: 13:02:13

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 87.02 ft/day
Le = 19.52 ft

AQUIFER DATA

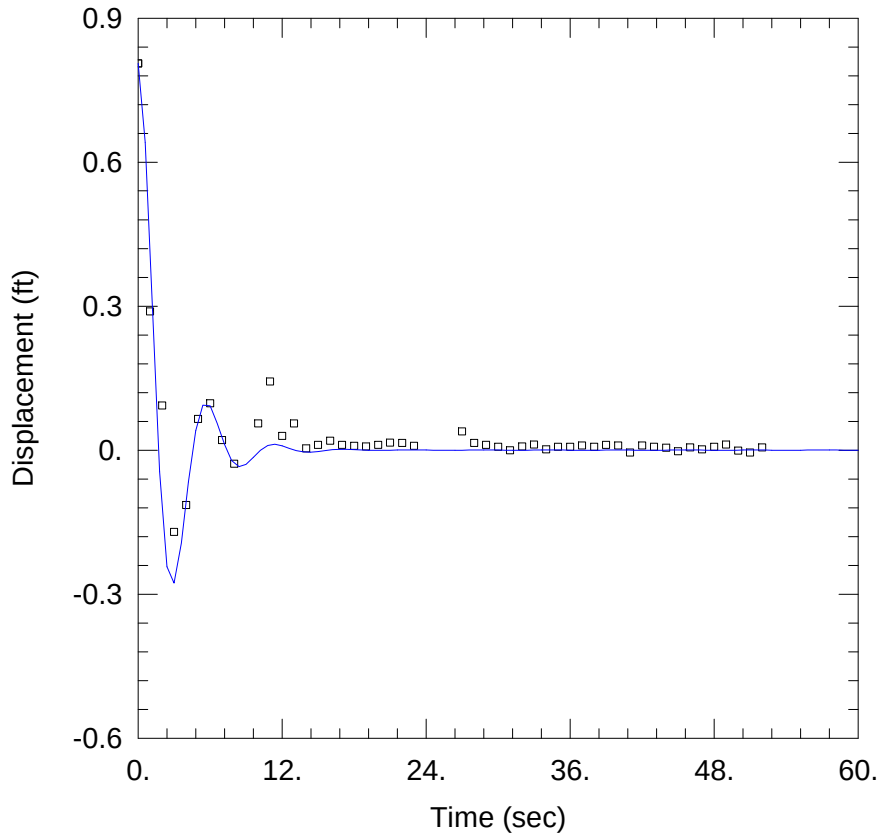
Saturated Thickness: 58.83 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217A_IN3)

Initial Displacement: 1.19 ft
Total Well Penetration Depth: 34.95 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.95 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217A_OUT1.aqt
Date: 01/17/19 Time: 13:02:31

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 91.86 ft/day
Le = 23.55 ft

AQUIFER DATA

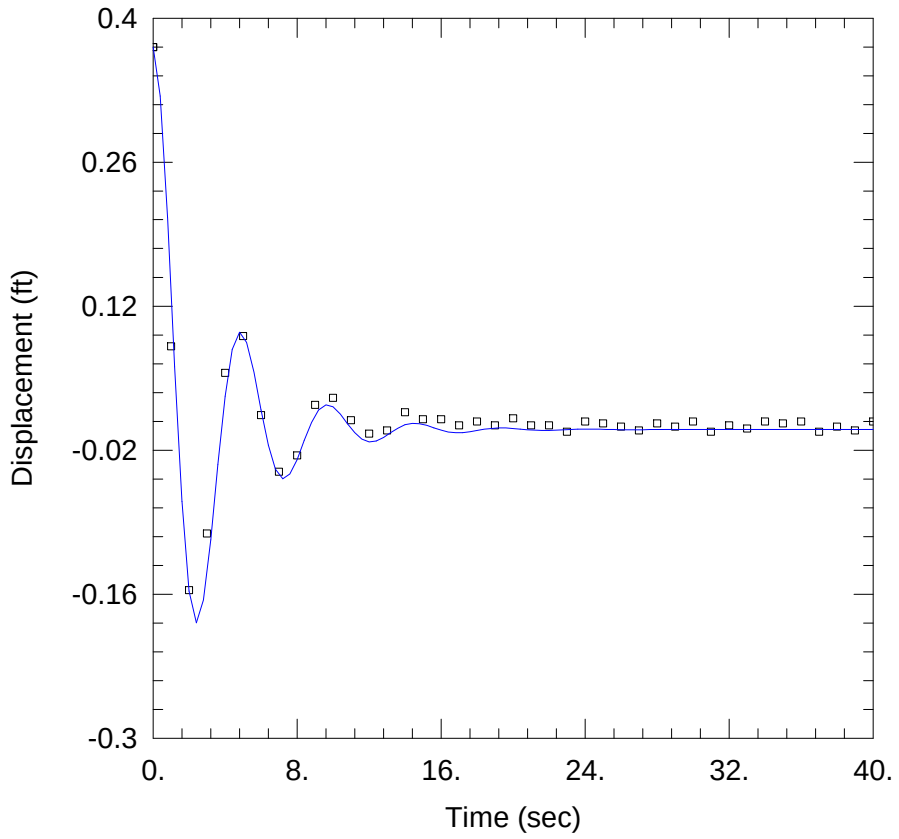
Saturated Thickness: 58.78 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217A_OUT1)

Initial Displacement: 0.806 ft
Total Well Penetration Depth: 34.02 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.02 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217A_OUT2.aqt
Date: 01/17/19 Time: 13:02:53

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 157. ft/day
Le = 18.22 ft

AQUIFER DATA

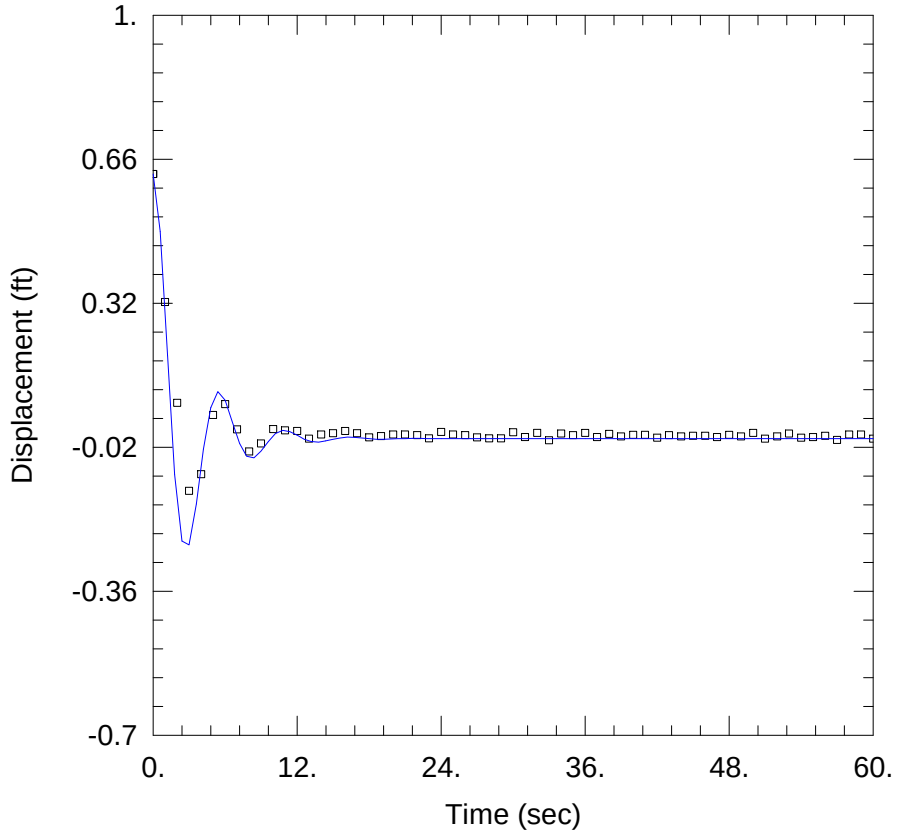
Saturated Thickness: 58.78 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217A_OUT2)

Initial Displacement: 0.372 ft
Total Well Penetration Depth: 34.02 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.02 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217A_OUT3.aqt
Date: 01/17/19 Time: 13:03:12

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 112.4 ft/day
Le = 22.57 ft

AQUIFER DATA

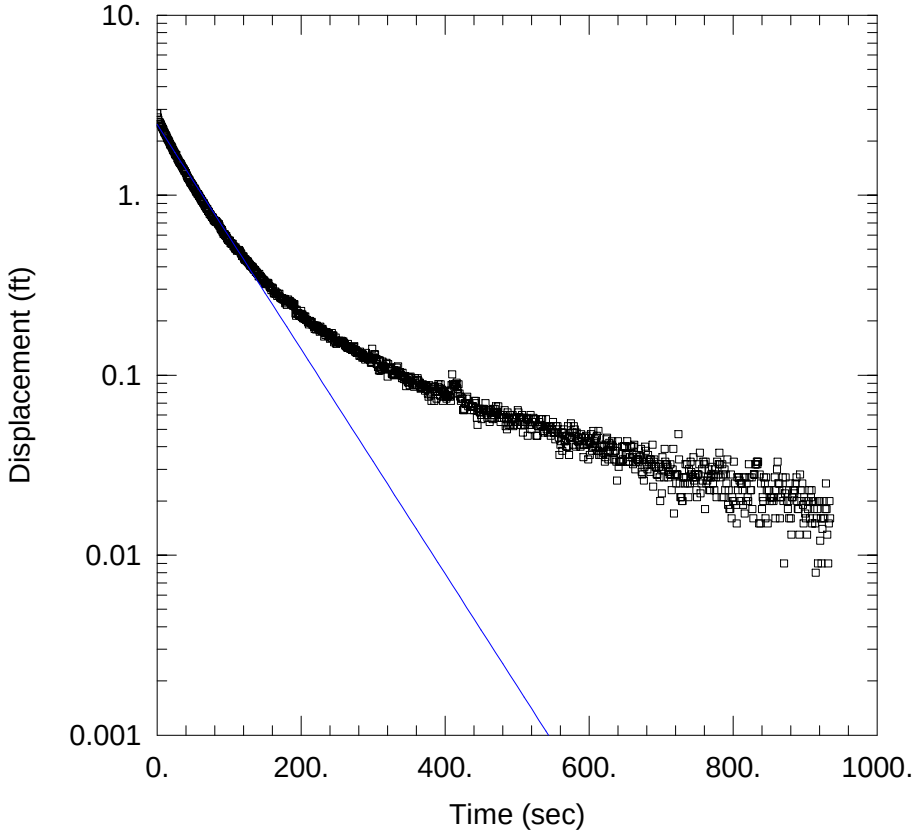
Saturated Thickness: 58.78 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217A_OUT3)

Initial Displacement: 0.625 ft
Total Well Penetration Depth: 34.02 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.02 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217B_IN1.aqt
Date: 01/17/19 Time: 13:04:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.9303 ft/day
y0 = 2.468 ft

AQUIFER DATA

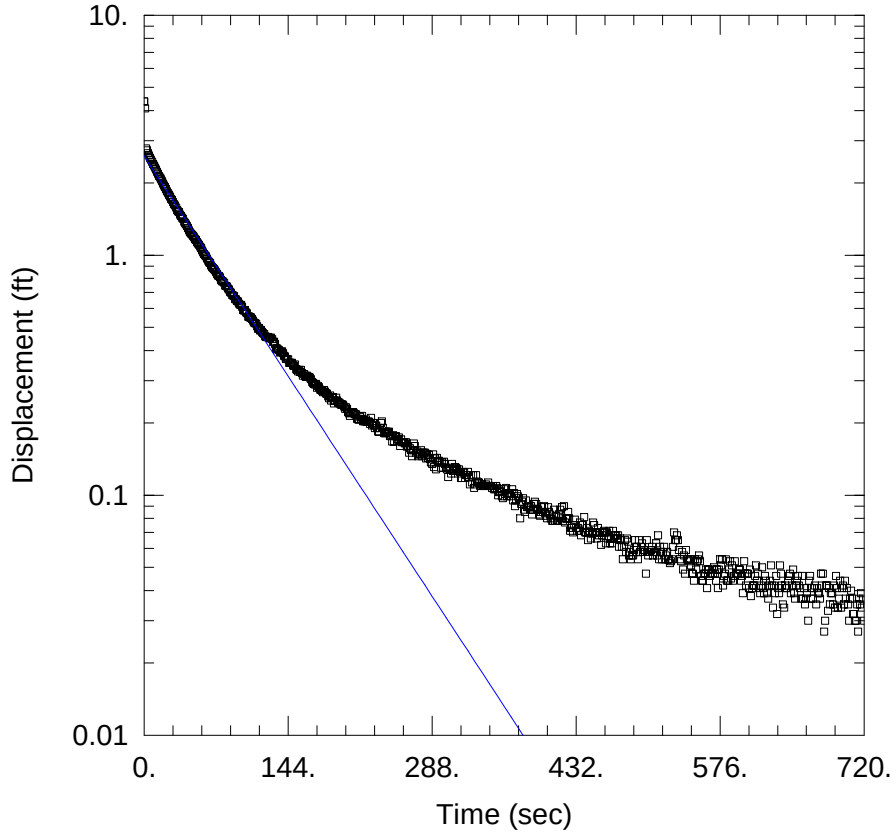
Saturated Thickness: 59.14 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217B_IN1)

Initial Displacement: 2.848 ft
Total Well Penetration Depth: 84.16 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 84.16 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217B_IN2.aqt
Date: 01/17/19 Time: 13:04:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.9485 ft/day
y0 = 2.582 ft

AQUIFER DATA

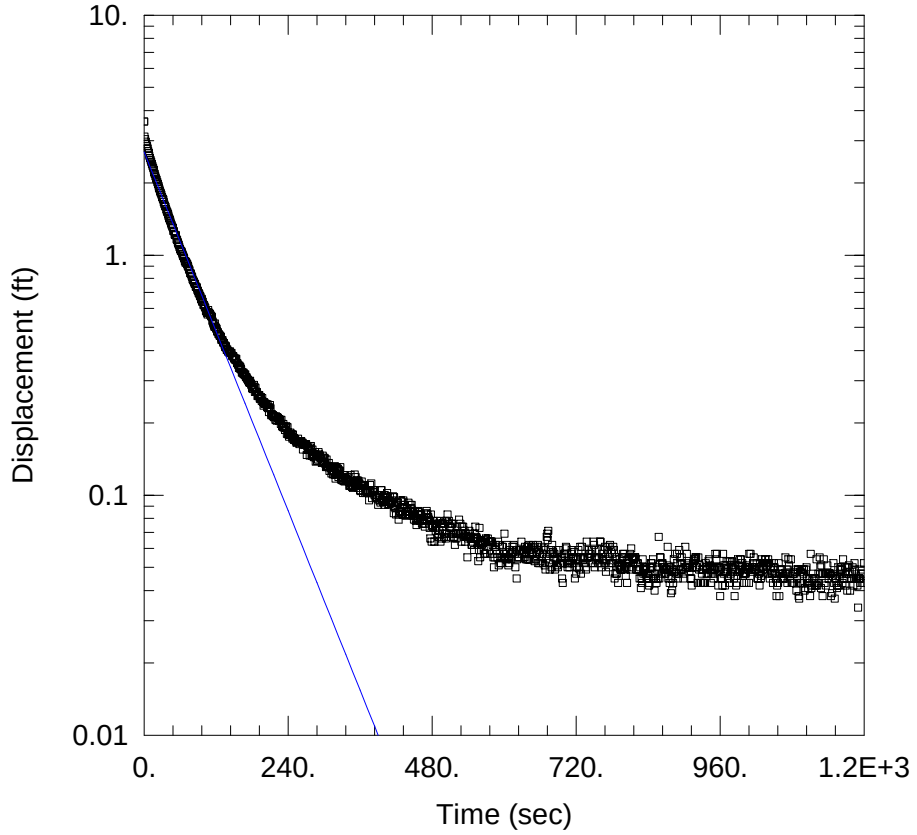
Saturated Thickness: 59.14 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217B_IN2)

Initial Displacement: 4.376 ft
Total Well Penetration Depth: 84.16 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 84.16 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217B_OUT1.aqt
Date: 01/17/19 Time: 13:05:02

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.9291 ft/day
y0 = 2.695 ft

AQUIFER DATA

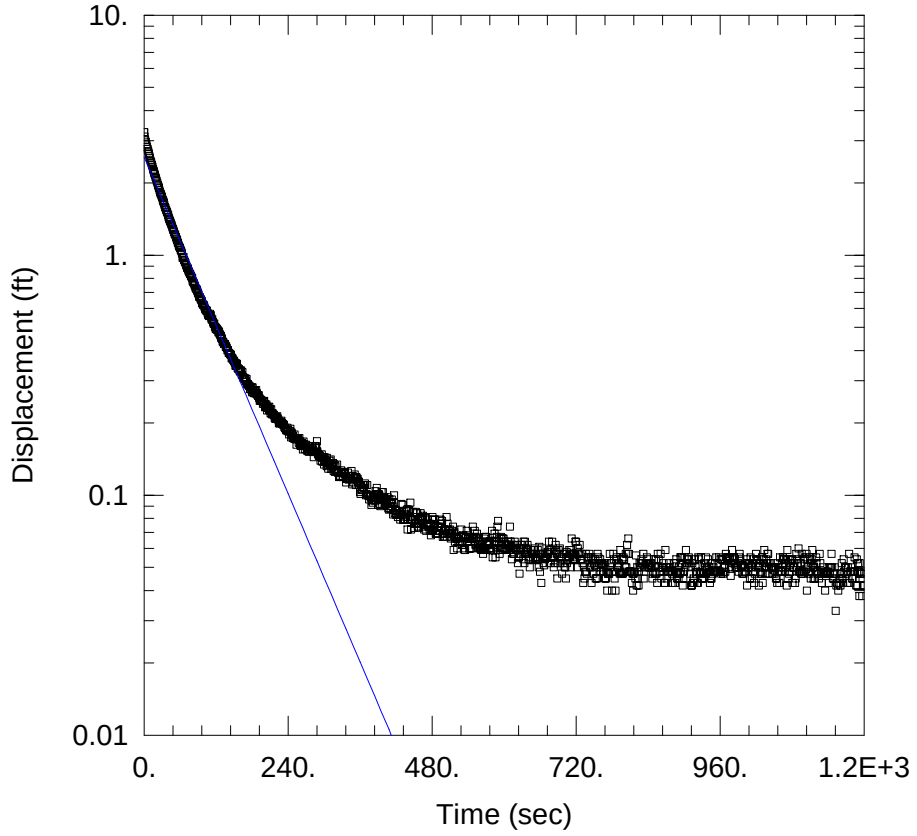
Saturated Thickness: 59.14 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217B_OUT1)

Initial Displacement: 3.607 ft
Total Well Penetration Depth: 84.16 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 84.16 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217B_OUT2.aqt
Date: 01/17/19 Time: 13:05:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.8714 ft/day
y0 = 2.564 ft

AQUIFER DATA

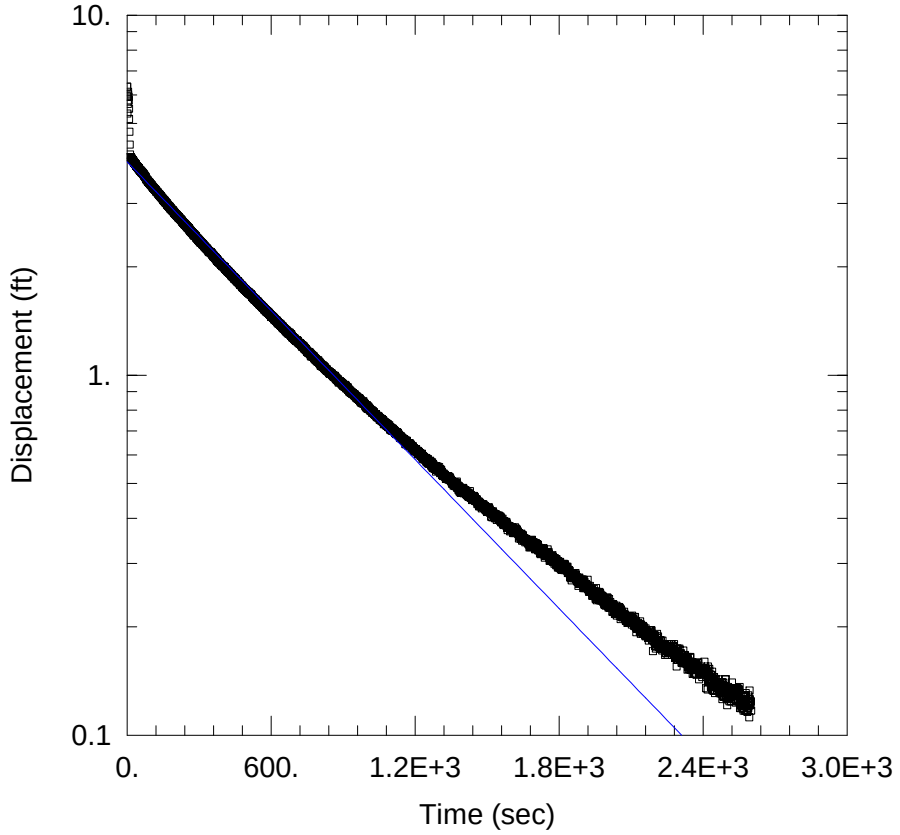
Saturated Thickness: 59.14 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217B_OUT2)

Initial Displacement: 3.256 ft
Total Well Penetration Depth: 84.16 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 84.16 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217C_IN1.aqt
Date: 01/17/19 Time: 13:06:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.4203 ft/day
y0 = 3.915 ft

AQUIFER DATA

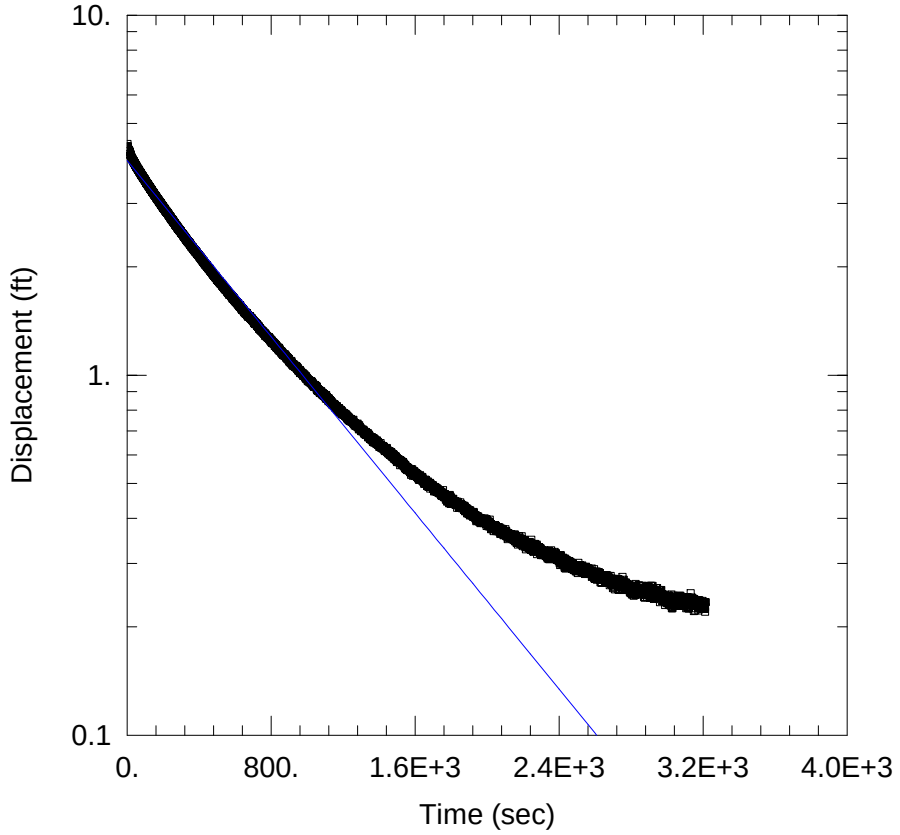
Saturated Thickness: 117. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217C_IN1)

Initial Displacement: 6.323 ft
Total Well Penetration Depth: 139.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 139.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW217C_OUT1.aqt
Date: 01/17/19 Time: 13:06:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW217C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.373 ft/day
y0 = 3.948 ft

AQUIFER DATA

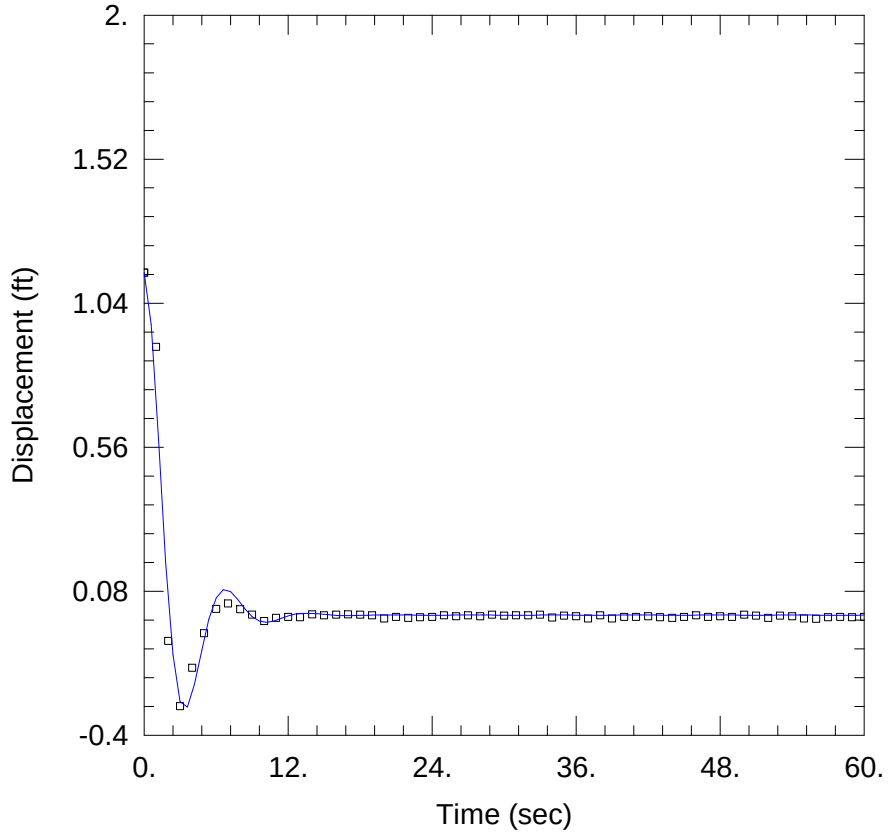
Saturated Thickness: 117. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-217C_OUT1)

Initial Displacement: 4.267 ft
Total Well Penetration Depth: 139.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 139.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218A_IN3.aqt
Date: 01/17/19 Time: 13:07:54

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 62.7 ft/day
Le = 31.84 ft

AQUIFER DATA

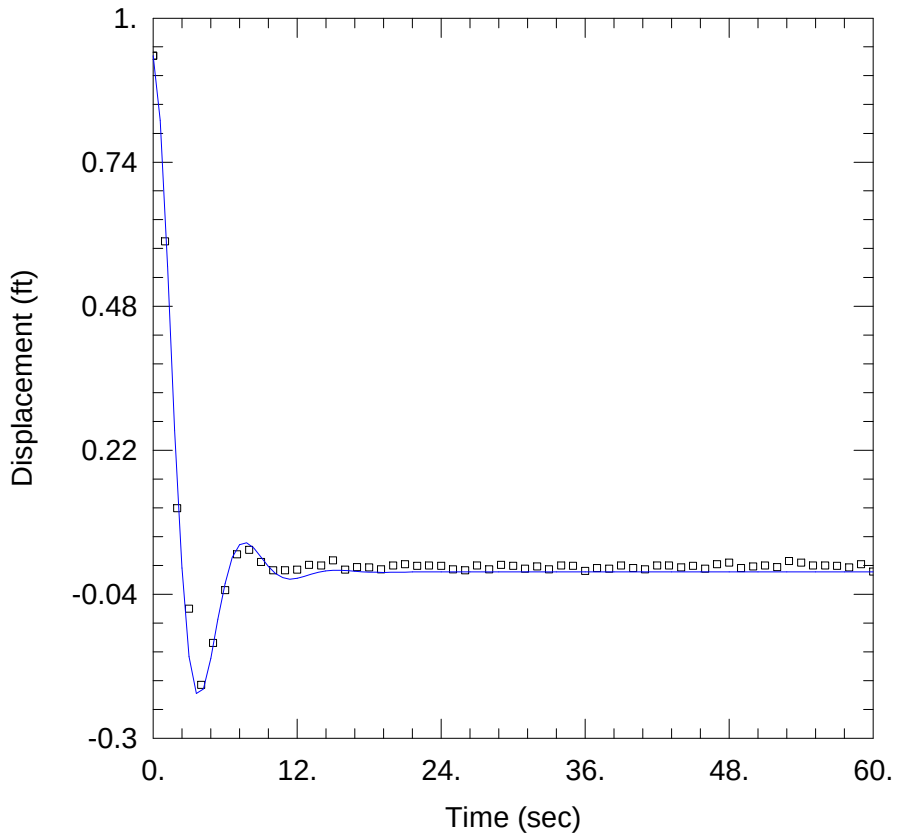
Saturated Thickness: 71.98 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218A_IN3)

Initial Displacement: 1.142 ft
Total Well Penetration Depth: 28.46 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.46 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218A_IN4.aqt
Date: 01/17/19 Time: 13:08:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 51.93 ft/day
Le = 39.2 ft

AQUIFER DATA

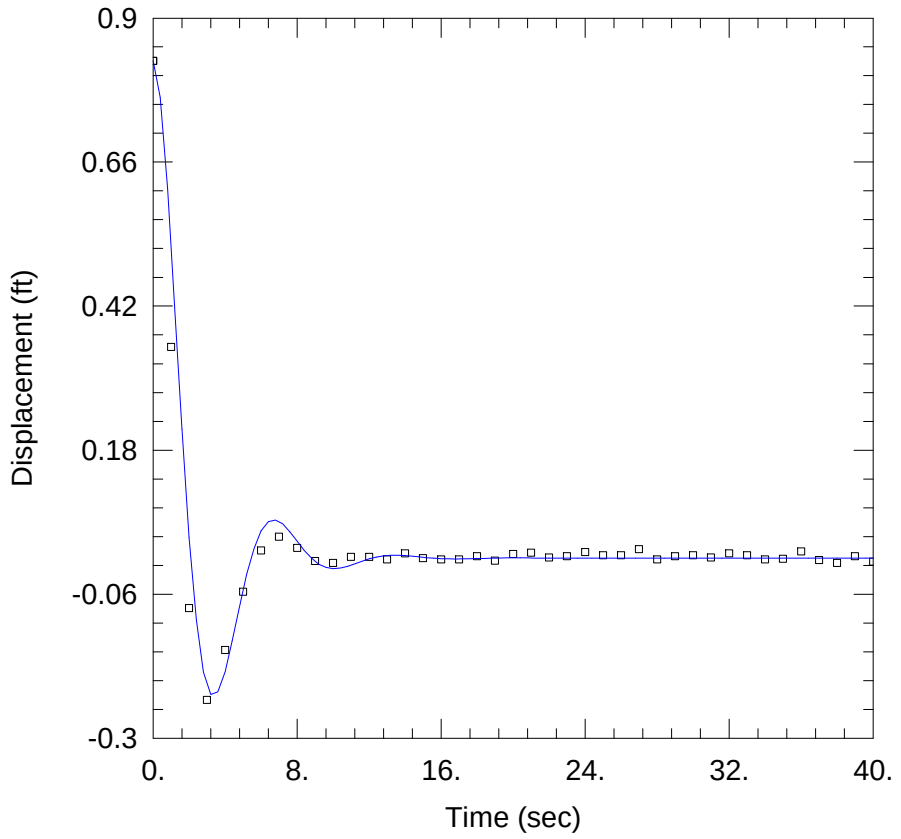
Saturated Thickness: 71.98 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218A_IN4)

Initial Displacement: 0.932 ft
Total Well Penetration Depth: 28.46 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.46 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218A_IN5.aqt
Date: 01/17/19 Time: 13:08:42

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 63.59 ft/day
Le = 31.38 ft

AQUIFER DATA

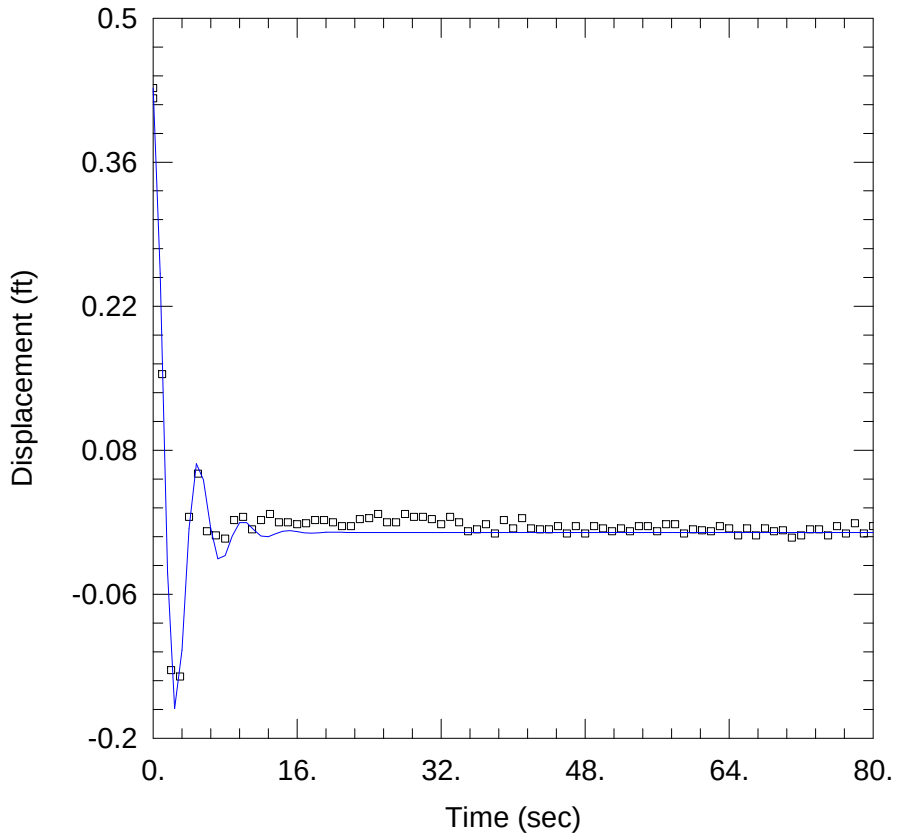
Saturated Thickness: 71.98 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218A_IN5)

Initial Displacement: 0.829 ft
Total Well Penetration Depth: 28.46 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.46 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218A_OUT3.aqt
Date: 01/17/19 Time: 13:09:02

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 111.9 ft/day
Le = 18.73 ft

AQUIFER DATA

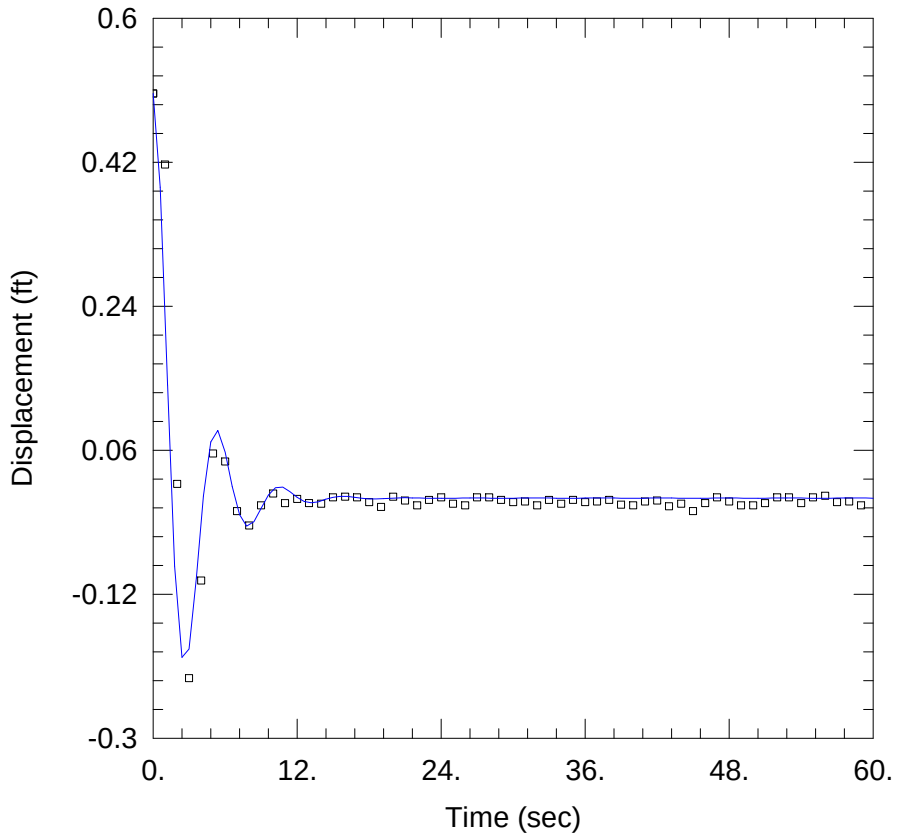
Saturated Thickness: 72.12 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218A_OUT3)

Initial Displacement: 0.432 ft
Total Well Penetration Depth: 28.96 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.96 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218A_OUT4.aqt
Date: 01/17/19 Time: 16:52:56

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 108.5 ft/day
Le = 20.94 ft

AQUIFER DATA

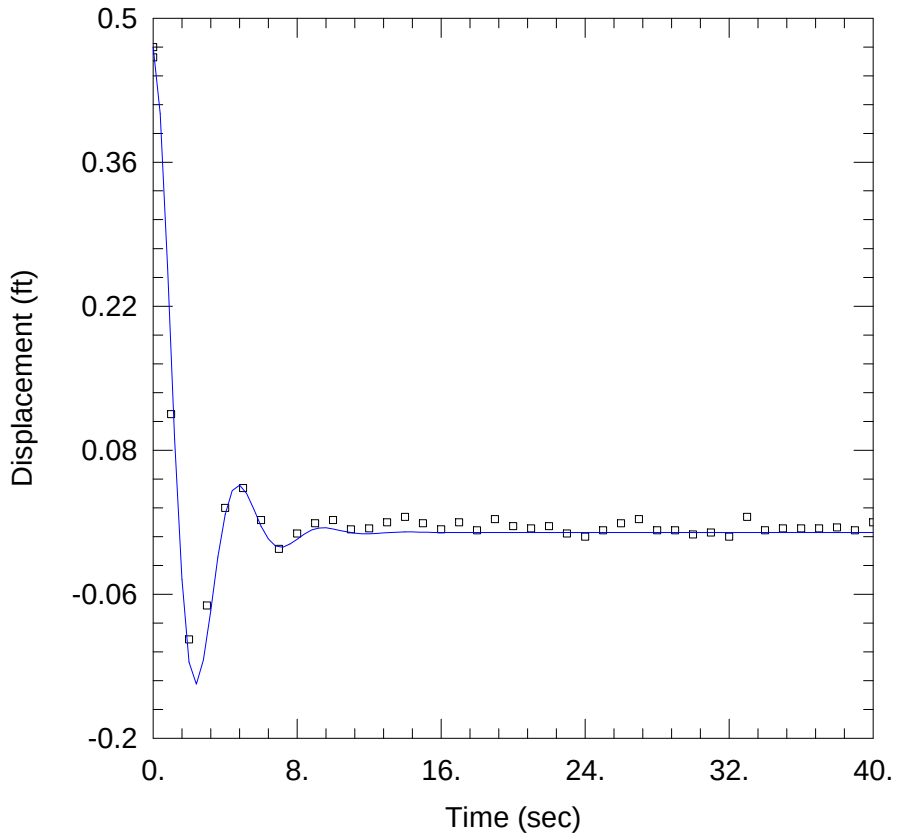
Saturated Thickness: 71.98 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218A_OUT4)

Initial Displacement: 0.506 ft
Total Well Penetration Depth: 28.46 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.46 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218A_OUT5.aqt
Date: 01/17/19 Time: 16:53:23

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 97.23 ft/day
Le = 16.04 ft

AQUIFER DATA

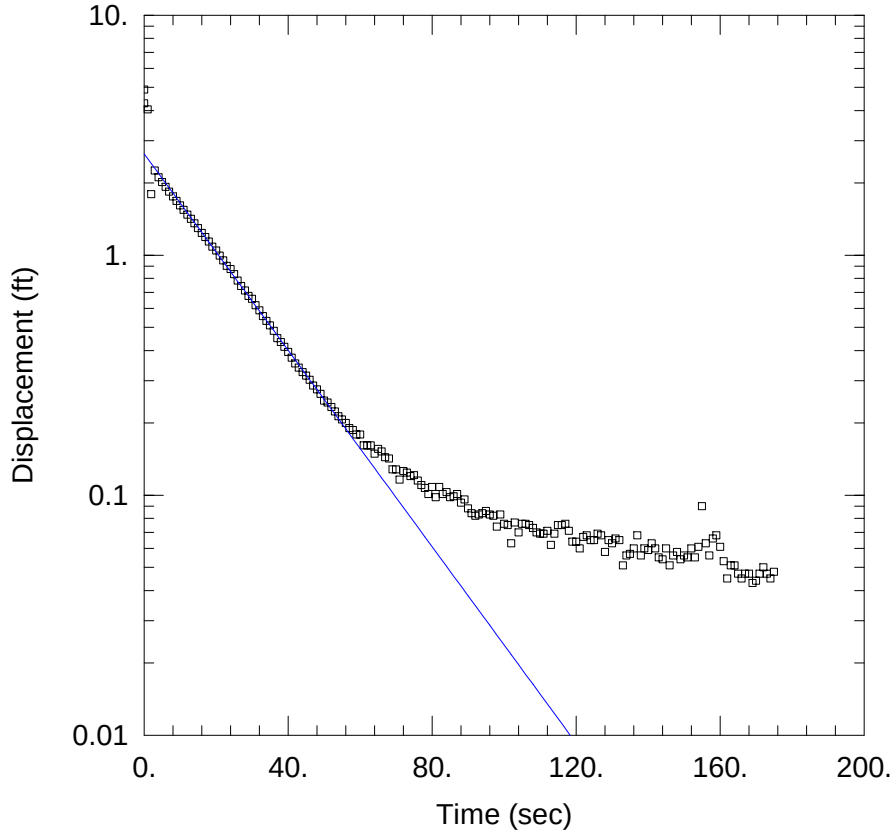
Saturated Thickness: 71.98 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218A_OUT5)

Initial Displacement: 0.472 ft
Total Well Penetration Depth: 28.46 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 28.46 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218B_IN1.aqt
Date: 01/17/19 Time: 13:10:59

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.095 ft/day
y0 = 2.646 ft

AQUIFER DATA

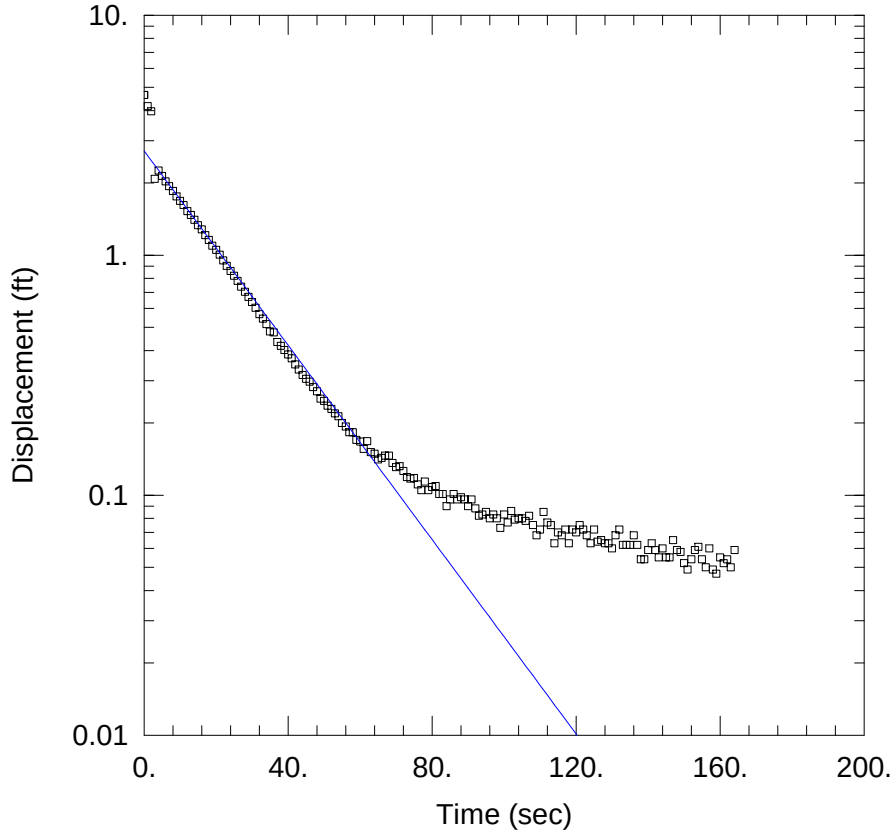
Saturated Thickness: 21.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218B_IN1)

Initial Displacement: 4.902 ft
Total Well Penetration Depth: 93.48 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 93.48 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218B_IN2.aqt
Date: 01/17/19 Time: 13:11:16

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.062 ft/day
y0 = 2.719 ft

AQUIFER DATA

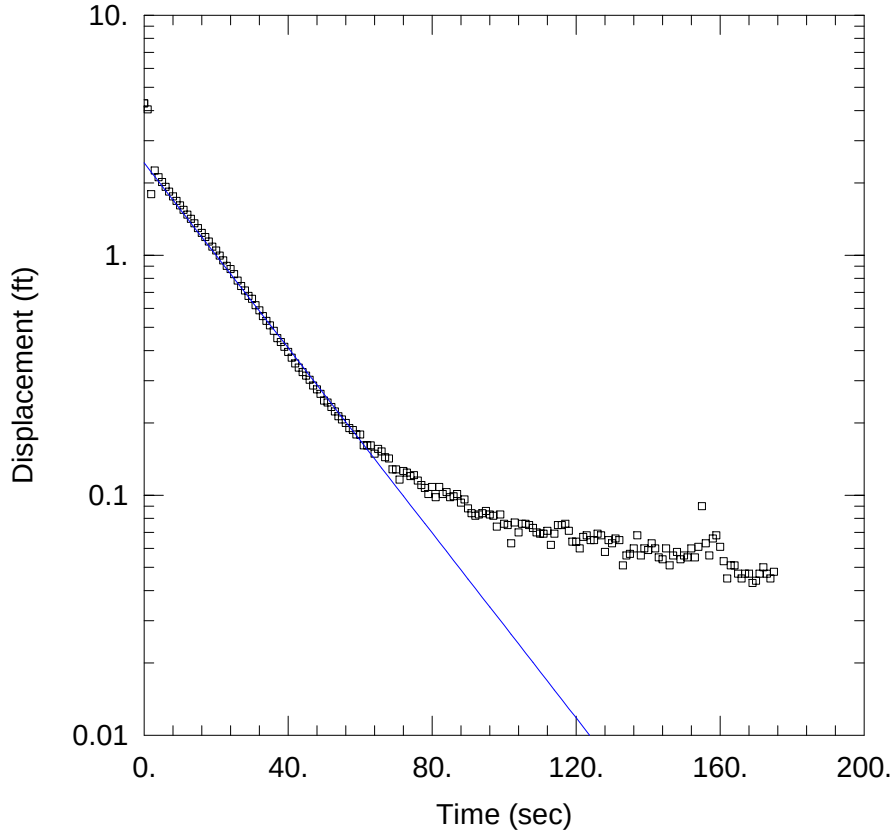
Saturated Thickness: 21.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218B_IN2)

Initial Displacement: 4.655 ft
Total Well Penetration Depth: 93.48 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 93.48 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218B_IN3.aqt
Date: 01/17/19 Time: 13:11:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.918 ft/day
y0 = 2.422 ft

AQUIFER DATA

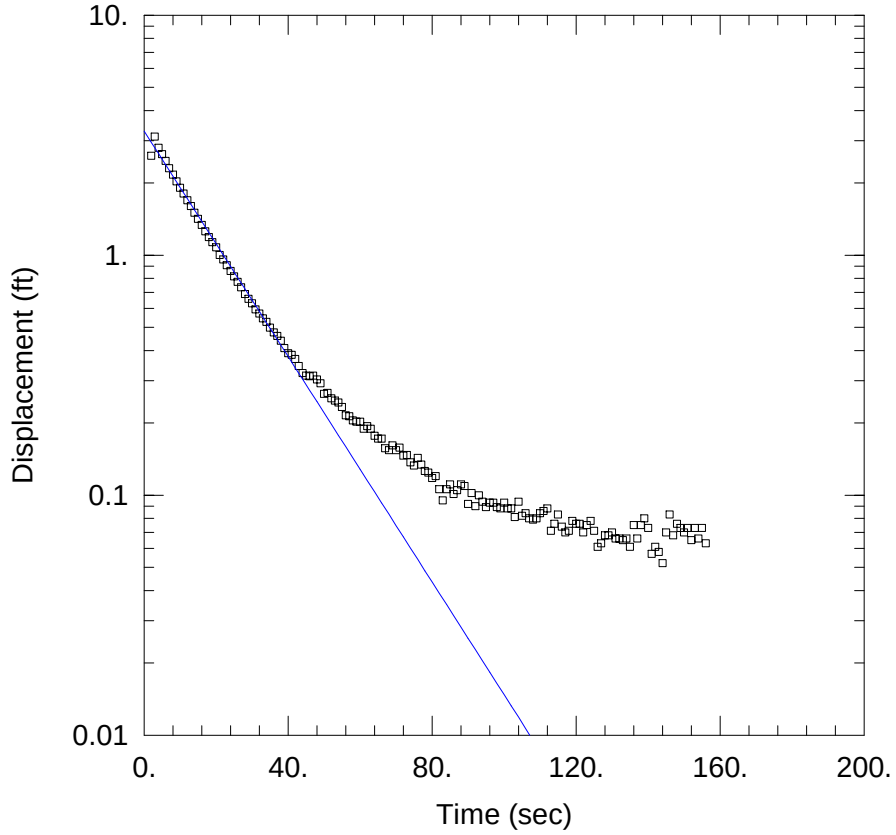
Saturated Thickness: 21.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218B_IN3)

Initial Displacement: 4.298 ft
Total Well Penetration Depth: 94.48 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 93.48 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218B_OUT1.aqt
Date: 01/17/19 Time: 13:11:55

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.552 ft/day
y0 = 3.288 ft

AQUIFER DATA

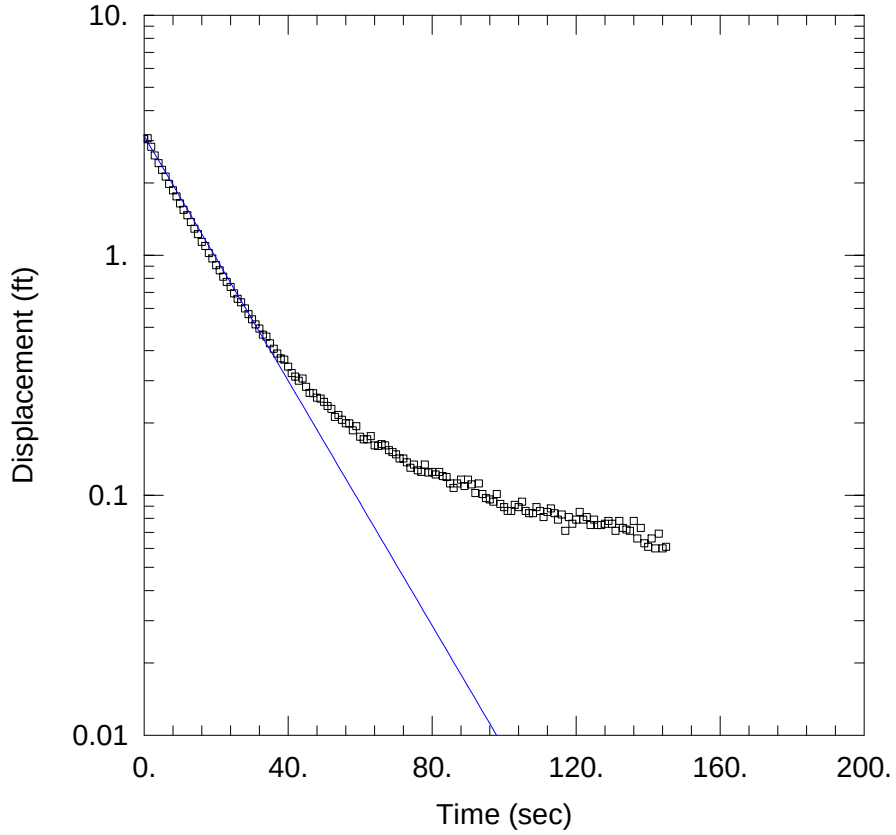
Saturated Thickness: 21.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218B_OUT1)

Initial Displacement: 0.005 ft
Total Well Penetration Depth: 93.48 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 93.48 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218B_OUT2.aqt
Date: 01/17/19 Time: 13:12:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.857 ft/day
y0 = 3.142 ft

AQUIFER DATA

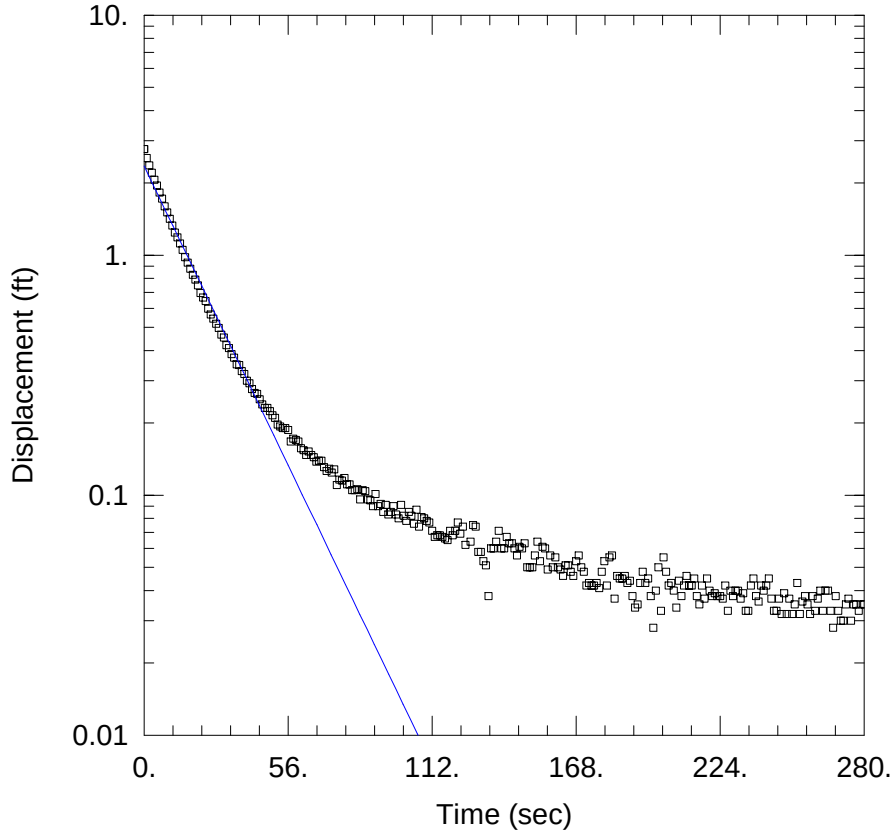
Saturated Thickness: 21.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218B_OUT2)

Initial Displacement: 3.044 ft
Total Well Penetration Depth: 93.48 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 93.48 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218B_OUT3.aqt
Date: 01/17/19 Time: 13:12:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.364 ft/day
y0 = 2.348 ft

AQUIFER DATA

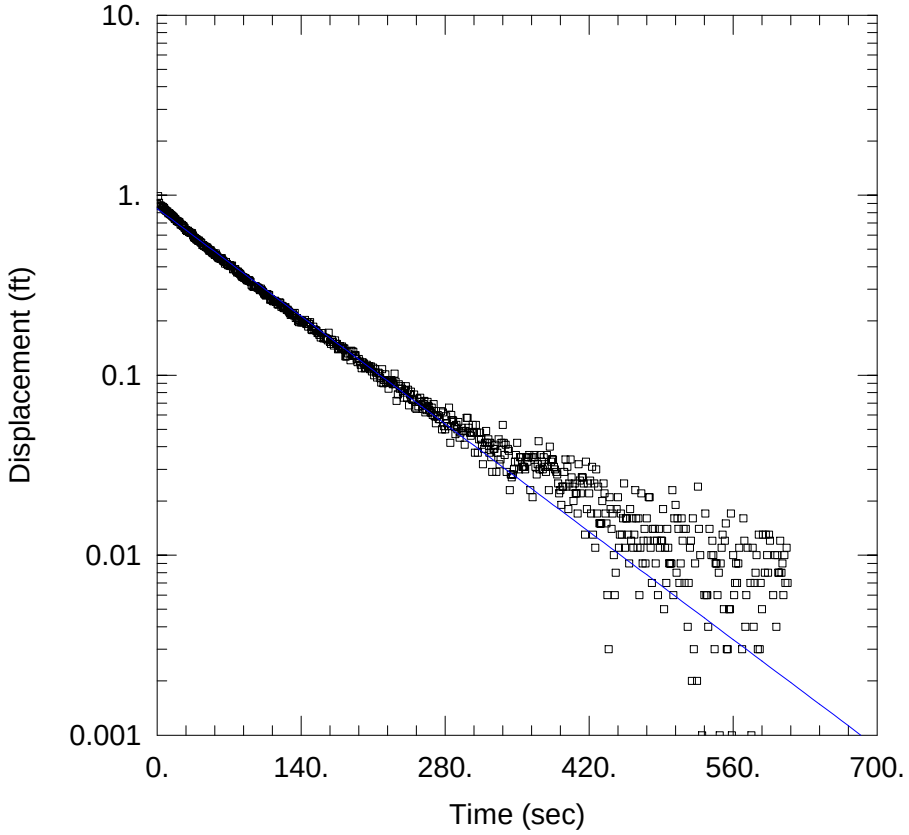
Saturated Thickness: 21.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218B_OUT3)

Initial Displacement: 2.77 ft
Total Well Penetration Depth: 93.48 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 93.48 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218c_IN1.aqt
Date: 01/17/19 Time: 13:13:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.584 ft/day
y0 = 0.8432 ft

AQUIFER DATA

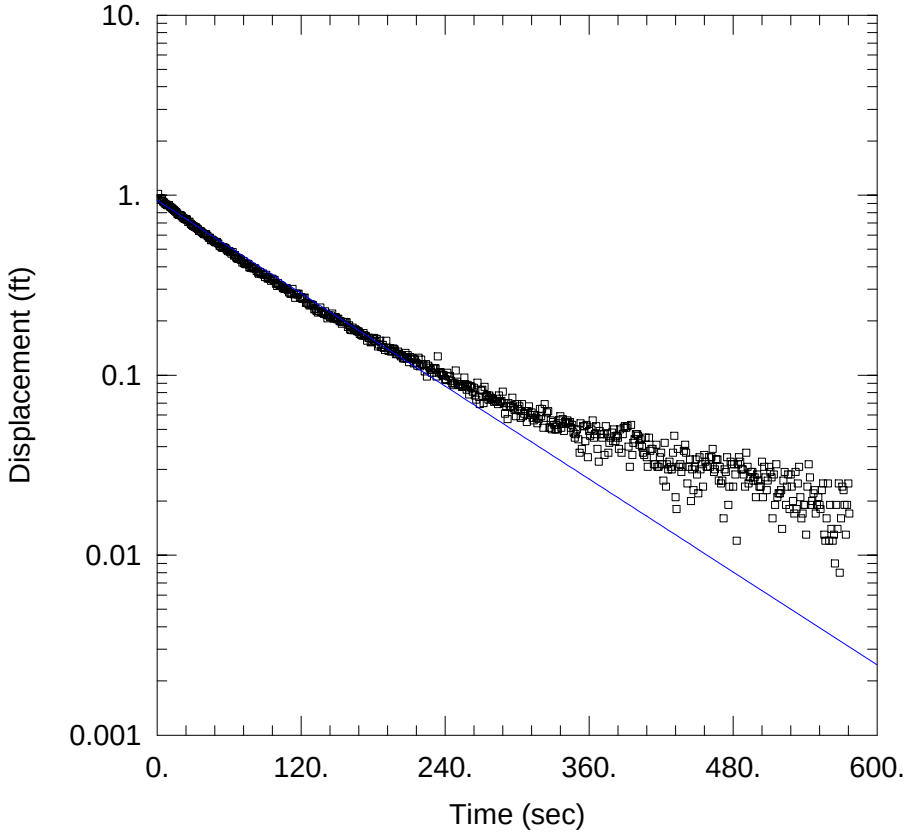
Saturated Thickness: 22.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218C_IN1)

Initial Displacement: 0.893 ft
Total Well Penetration Depth: 130.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 130.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218c_IN2.aqt
Date: 01/17/19 Time: 13:13:59

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.599 ft/day
y0 = 0.9352 ft

AQUIFER DATA

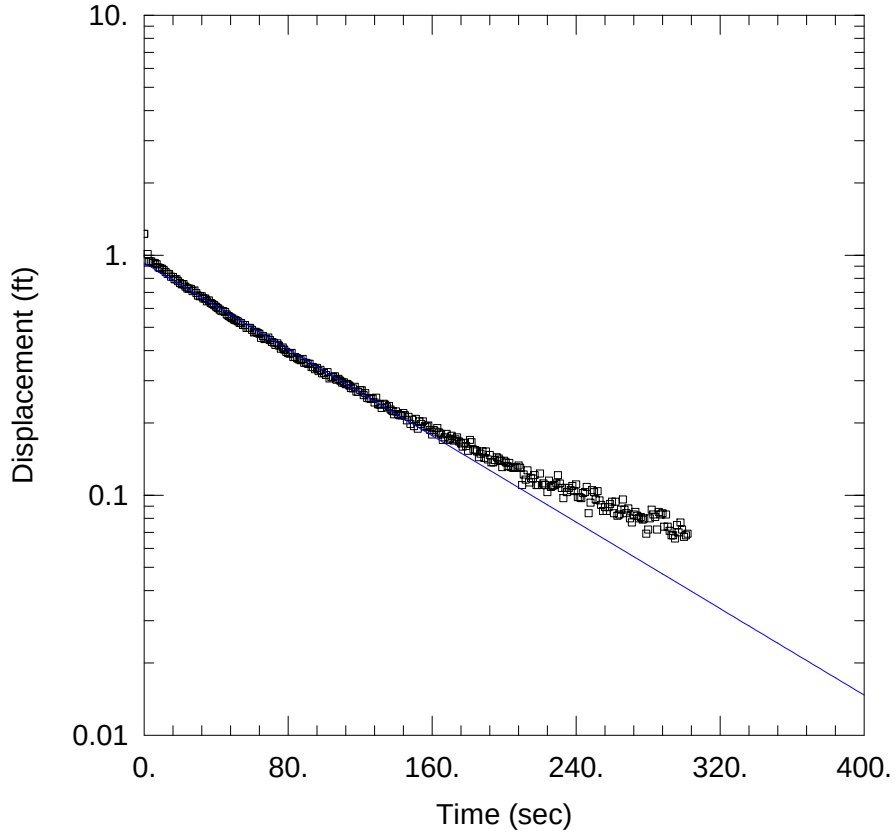
Saturated Thickness: 22.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218C_IN2)

Initial Displacement: 0.941 ft
Total Well Penetration Depth: 130.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 130.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218c_IN3.aqt
Date: 01/17/19 Time: 13:14:17

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.72 ft/day
y0 = 0.9281 ft

AQUIFER DATA

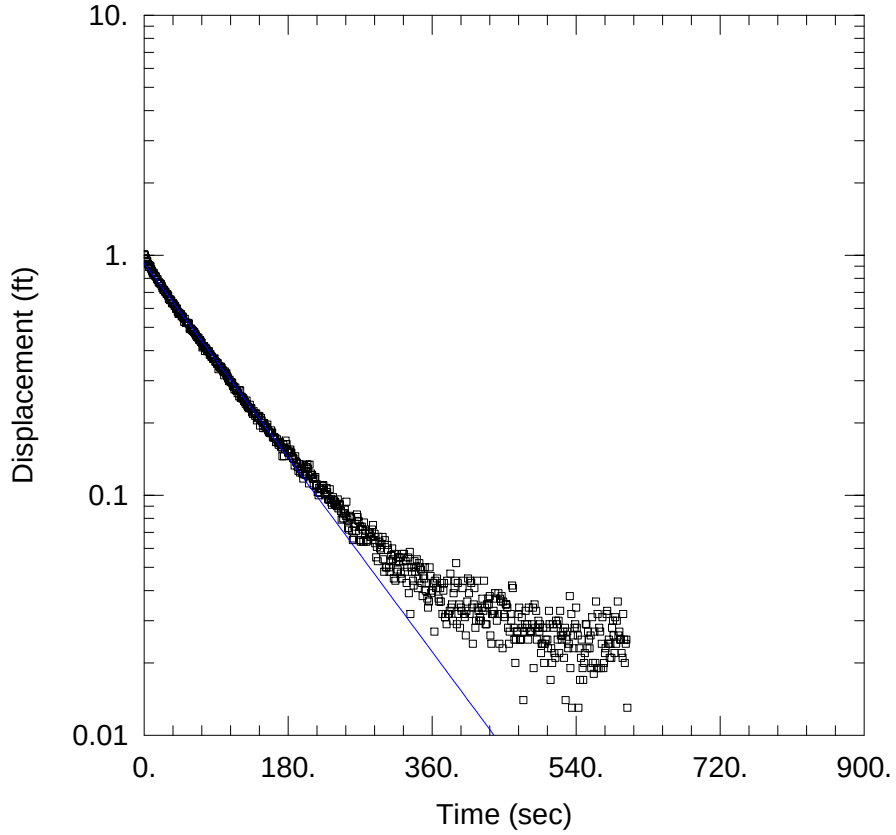
Saturated Thickness: 22.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218C_IN3)

Initial Displacement: 1.228 ft
Total Well Penetration Depth: 130.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 130.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218c_OUT2.aqt
Date: 01/17/19 Time: 13:14:33

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.717 ft/day
y0 = 0.9251 ft

AQUIFER DATA

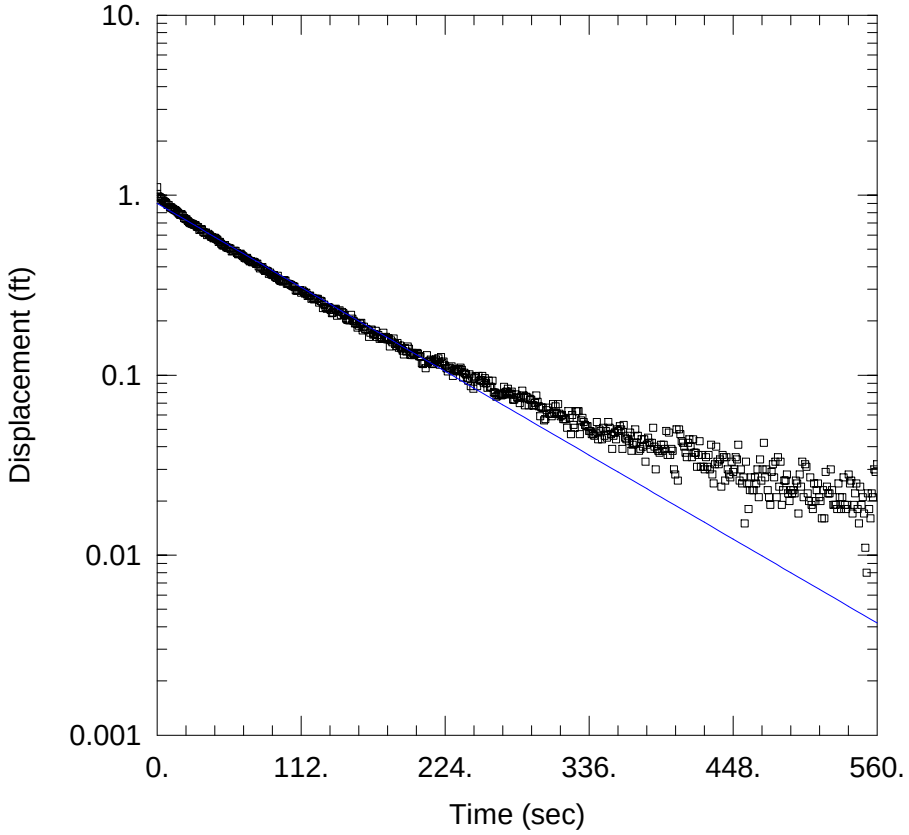
Saturated Thickness: 22.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218C_OUT2)

Initial Displacement: 1.008 ft
Total Well Penetration Depth: 130.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 130.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW218c_OUT3.aqt
Date: 01/17/19 Time: 13:14:52

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW218C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.516 ft/day
y0 = 0.8999 ft

AQUIFER DATA

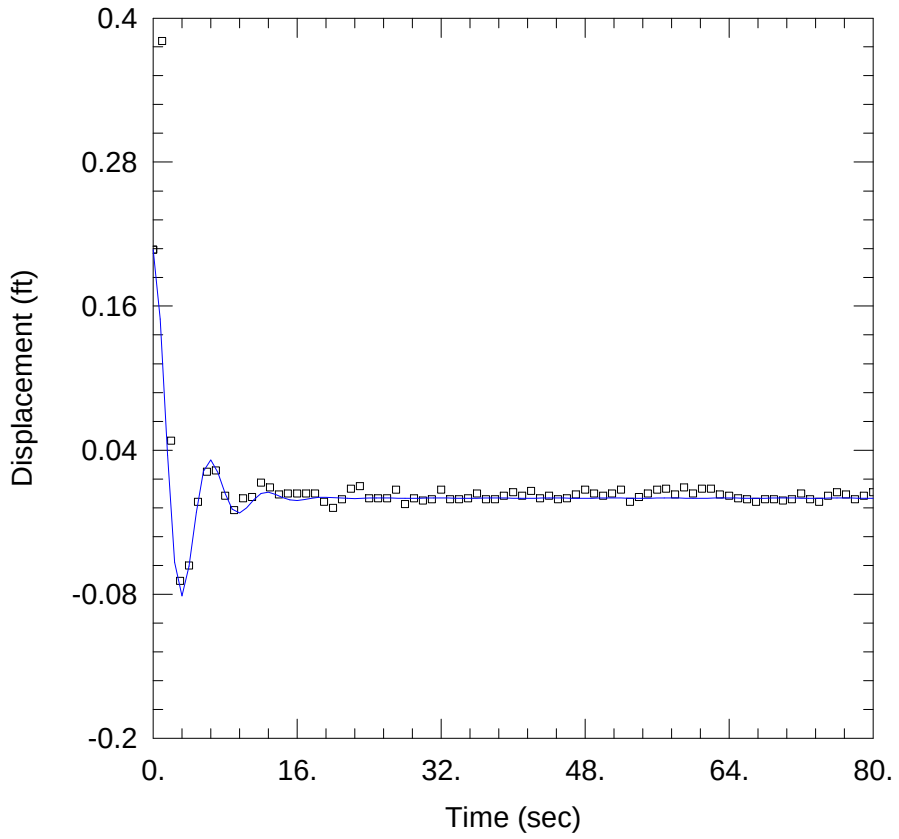
Saturated Thickness: 22.7 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-218C_OUT3)

Initial Displacement: 1.108 ft
Total Well Penetration Depth: 130.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 130.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219A_IN1.aqt
Date: 01/17/19 Time: 13:16:57

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 126.7 ft/day
Le = 29.92 ft

AQUIFER DATA

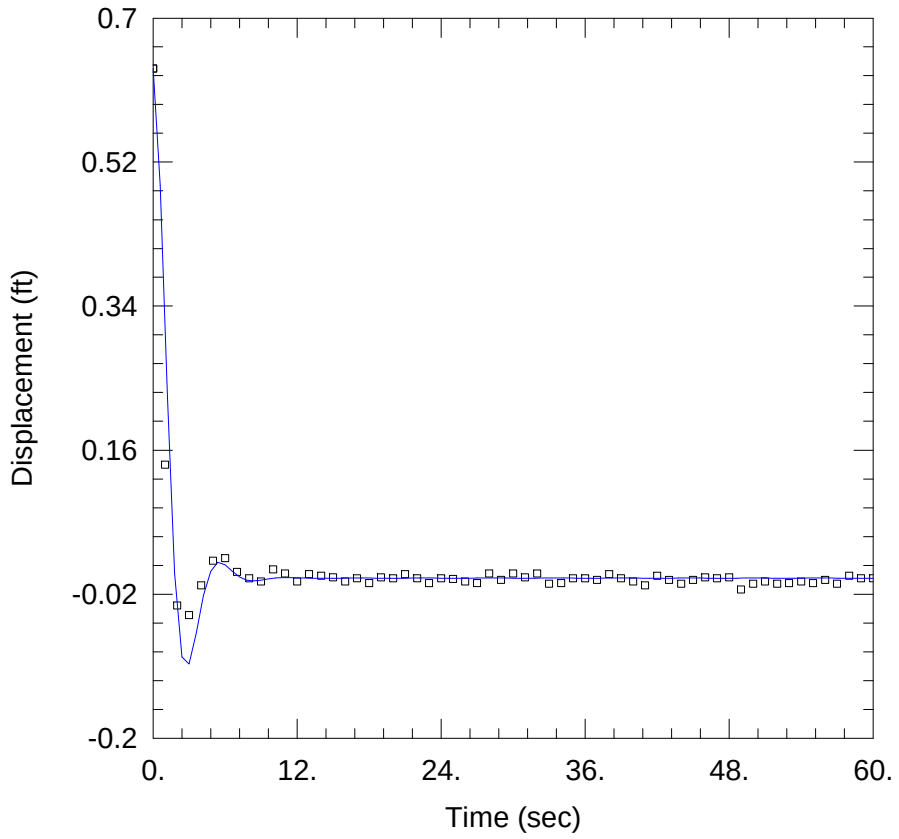
Saturated Thickness: 17.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219A_IN1)

Initial Displacement: 0.207 ft
Total Well Penetration Depth: 22.15 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 22.15 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219A_IN2.aqt
Date: 01/17/19 Time: 13:17:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 93.4 ft/day
Le = 19.02 ft

AQUIFER DATA

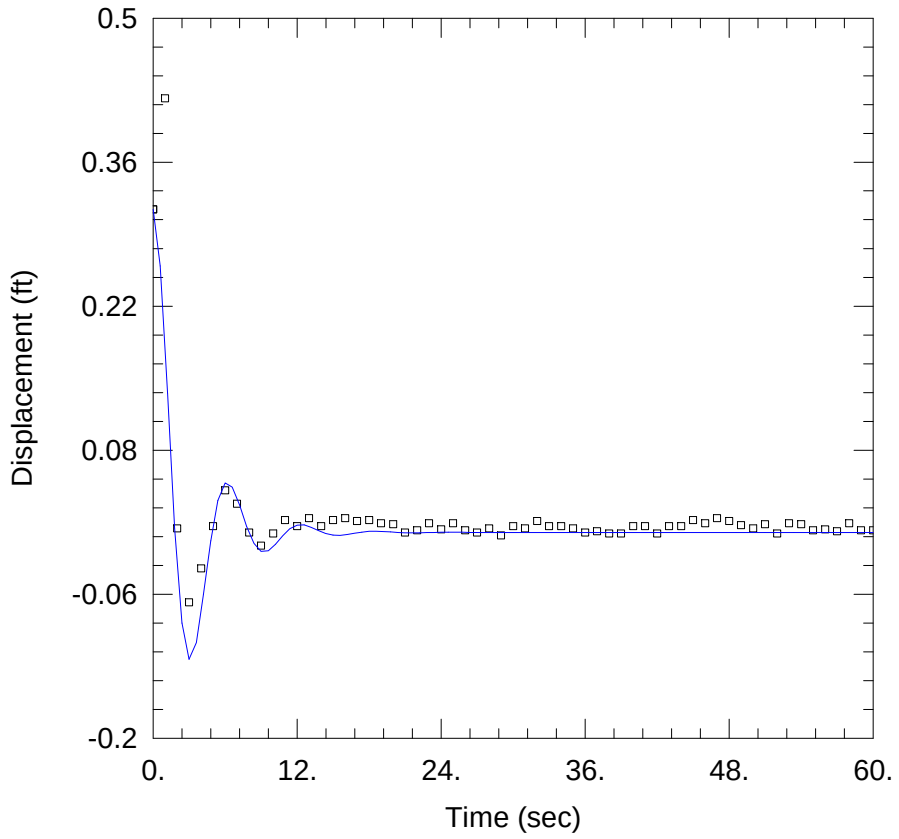
Saturated Thickness: 17.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219A_IN2)

Initial Displacement: 0.637 ft
Total Well Penetration Depth: 22.15 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 22.15 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219A_IN3.aqt
Date: 01/17/19 Time: 13:17:31

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 130.3 ft/day
Le = 28.44 ft

AQUIFER DATA

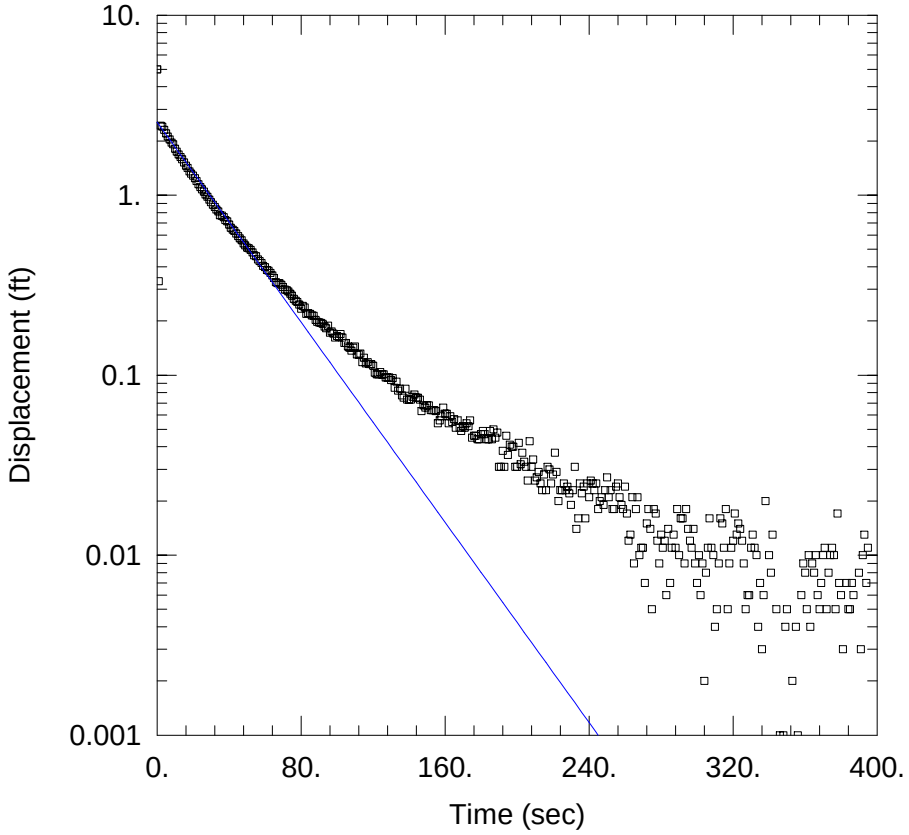
Saturated Thickness: 17.3 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219A_IN3)

Initial Displacement: 0.314 ft
Total Well Penetration Depth: 22.15 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 22.15 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219B_IN1.aqt
Date: 01/17/19 Time: 13:20:56

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.002 ft/day
y0 = 2.545 ft

AQUIFER DATA

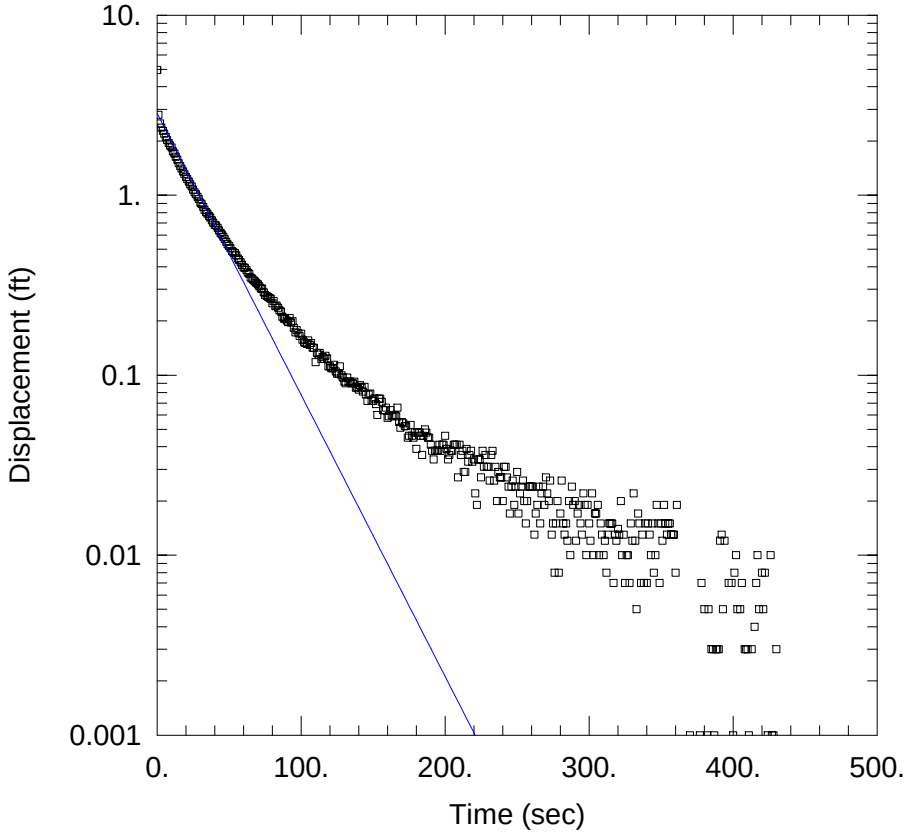
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219B_IN1)

Initial Displacement: 5.006 ft
Total Well Penetration Depth: 66.14 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 66.14 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219B_IN2.aqt
Date: 01/17/19 Time: 13:23:01

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.255 ft/day
y0 = 2.854 ft

AQUIFER DATA

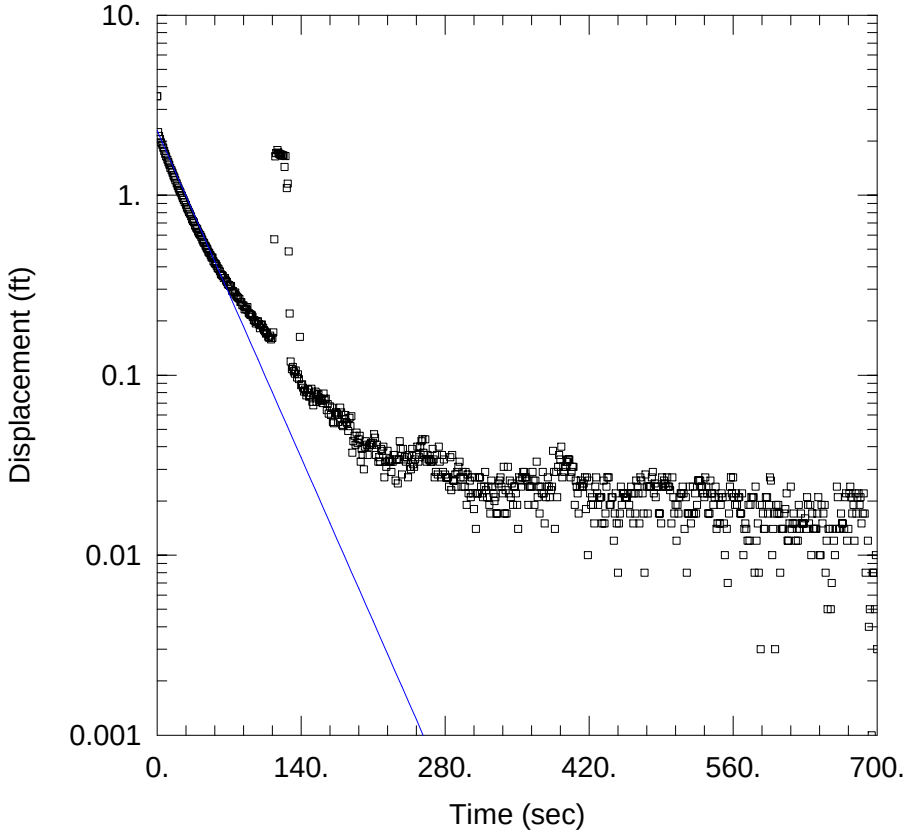
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219B_IN2)

Initial Displacement: 4.964 ft
Total Well Penetration Depth: 66.14 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 66.14 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219B_OUT1.aqt
Date: 01/17/19 Time: 13:22:32

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.871 ft/day
y0 = 2.289 ft

AQUIFER DATA

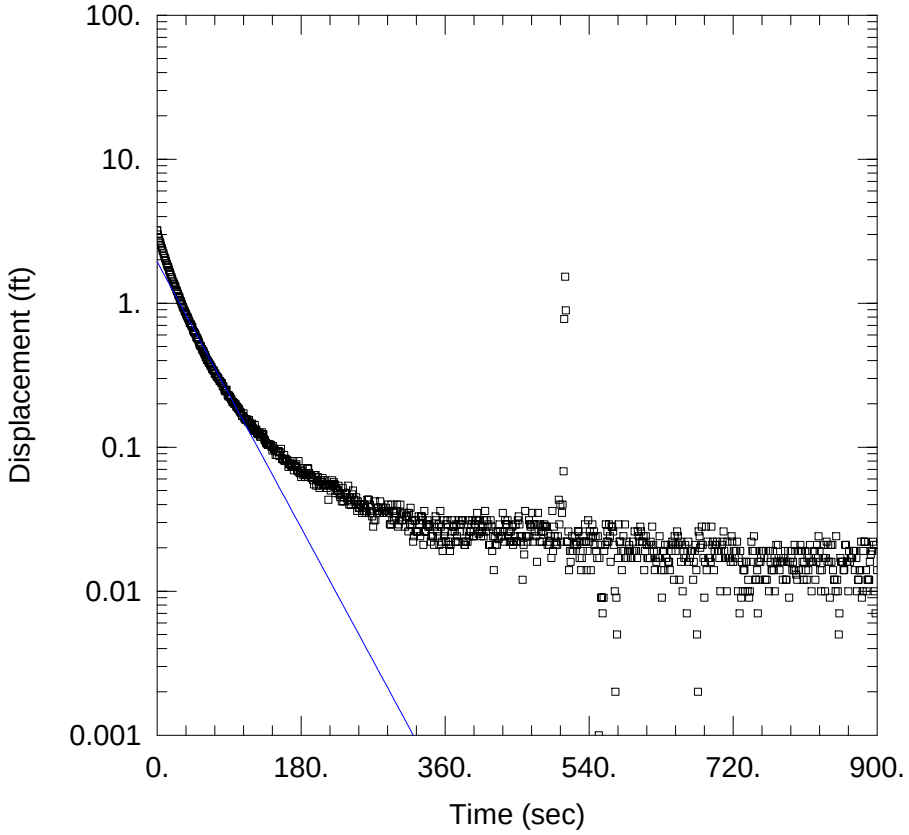
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219B_OUT1)

Initial Displacement: 3.539 ft
Total Well Penetration Depth: 66.14 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 66.14 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219B_OUT2.aqt
Date: 01/17/19 Time: 13:23:43

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.48 ft/day
y0 = 1.945 ft

AQUIFER DATA

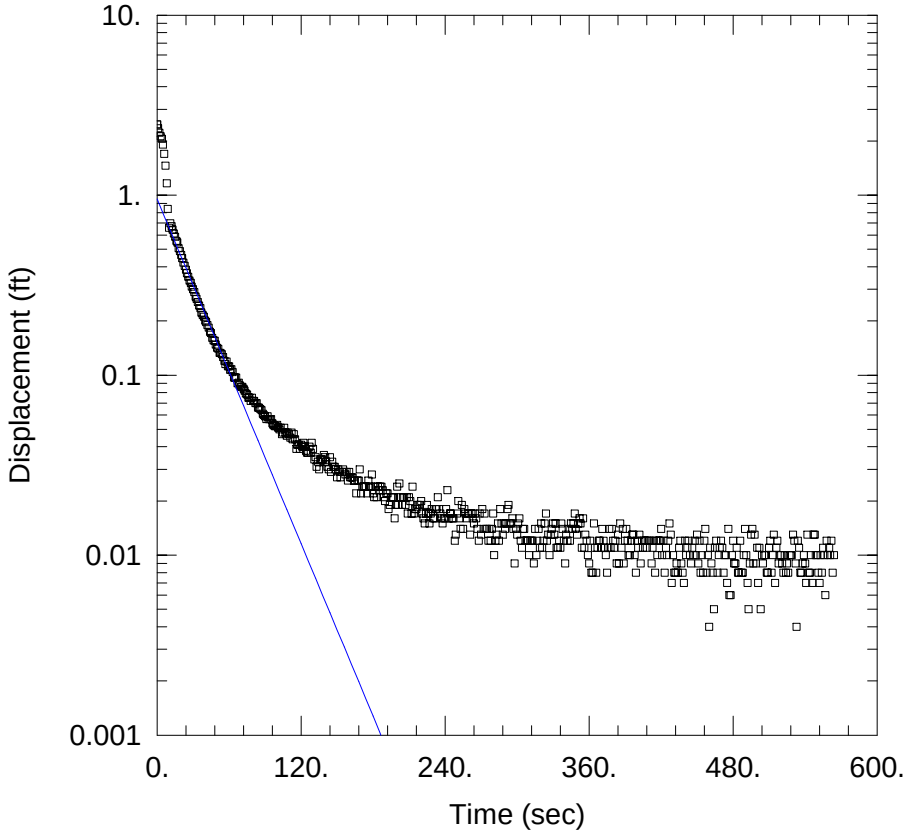
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219B_OUT2)

Initial Displacement: 3.195 ft
Total Well Penetration Depth: 66.14 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 66.14 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219C_IN1.aqt
Date: 01/17/19 Time: 13:25:45

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 9.383 ft/day
y0 = 0.952 ft

AQUIFER DATA

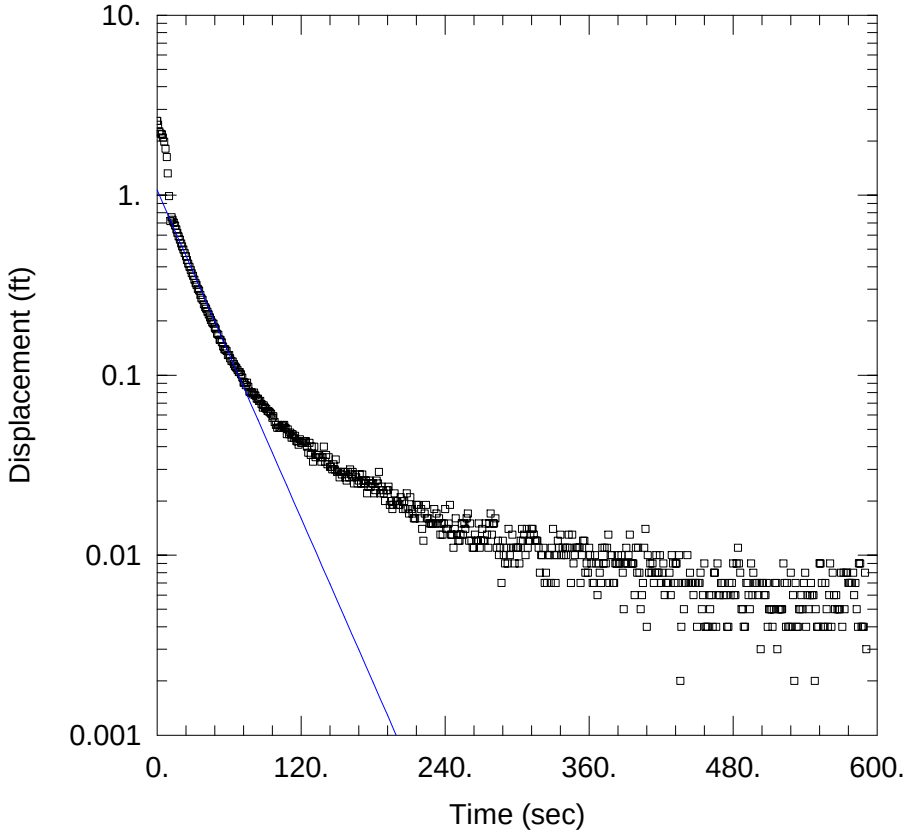
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219C_IN1)

Initial Displacement: 2.47 ft
Total Well Penetration Depth: 106.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 106.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219C_IN2.aqt
Date: 01/17/19 Time: 13:26:09

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 8.936 ft/day
y0 = 1.068 ft

AQUIFER DATA

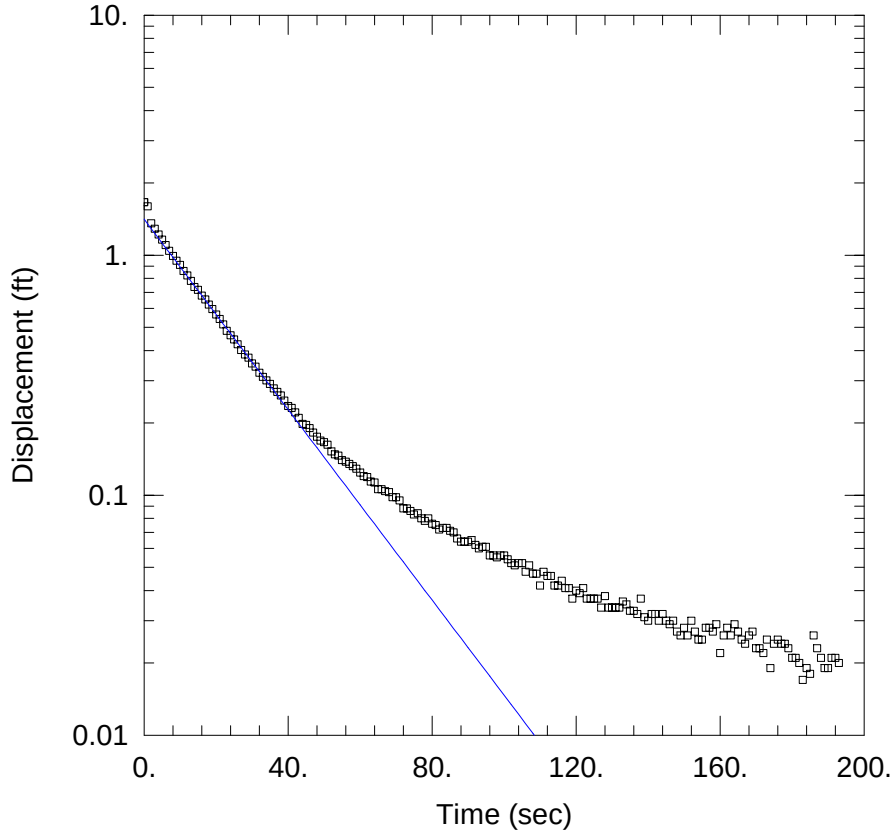
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219C_IN2)

Initial Displacement: 2.59 ft
Total Well Penetration Depth: 106.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 106.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW219C_OUT2.aqt
Date: 01/17/19 Time: 13:26:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW219C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 11.66 ft/day
y0 = 1.411 ft

AQUIFER DATA

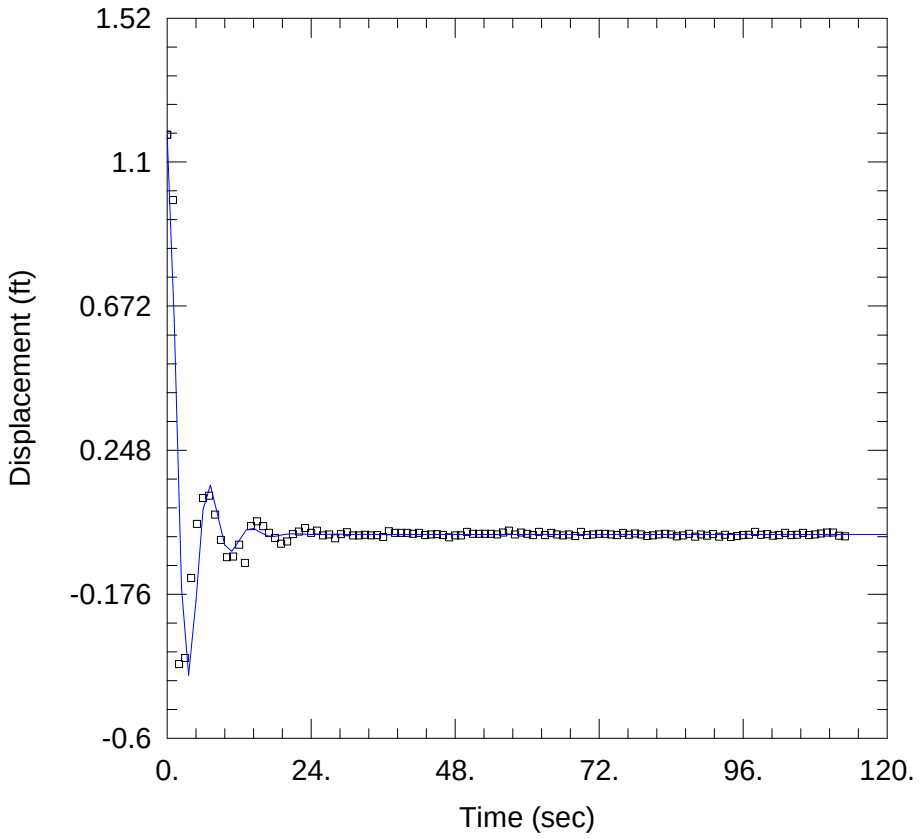
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-219C_OUT2)

Initial Displacement: 1.66 ft
Total Well Penetration Depth: 106.3 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 106.3 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220A_IN1.aqt
Date: 01/17/19 Time: 13:27:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 80.37 ft/day
Le = 35.94 ft

AQUIFER DATA

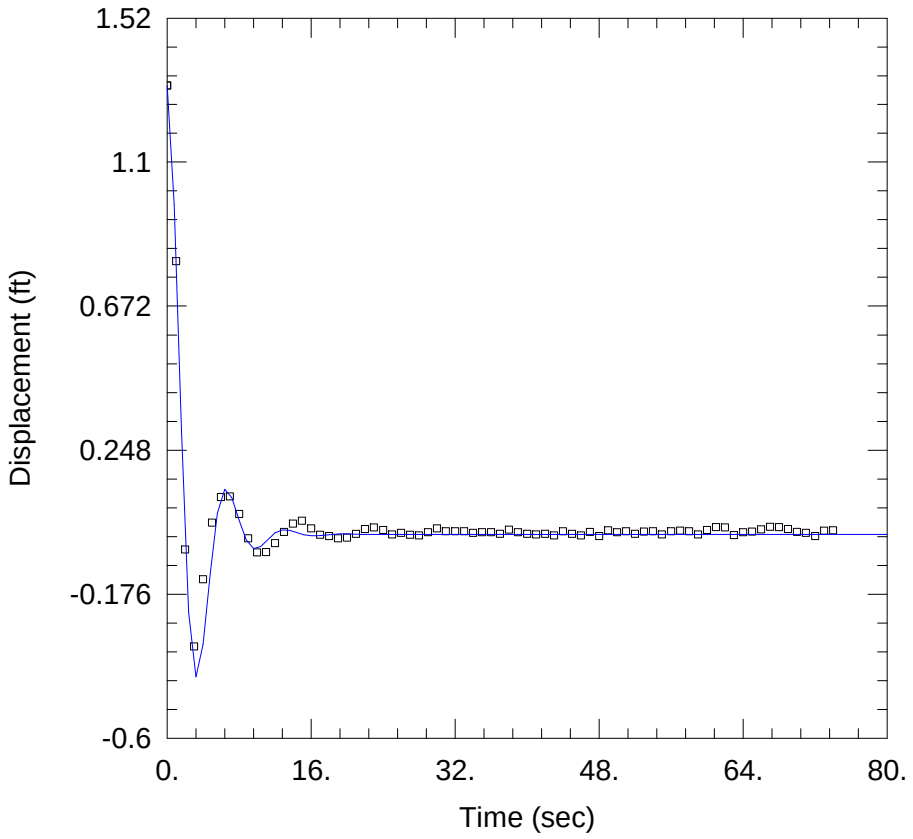
Saturated Thickness: 79.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220A_IN1)

Initial Displacement: 1.177 ft
Total Well Penetration Depth: 52.3 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 52.3 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220A_IN2.aqt
Date: 01/17/19 Time: 13:28:01

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 79.57 ft/day
Le = 30.69 ft

AQUIFER DATA

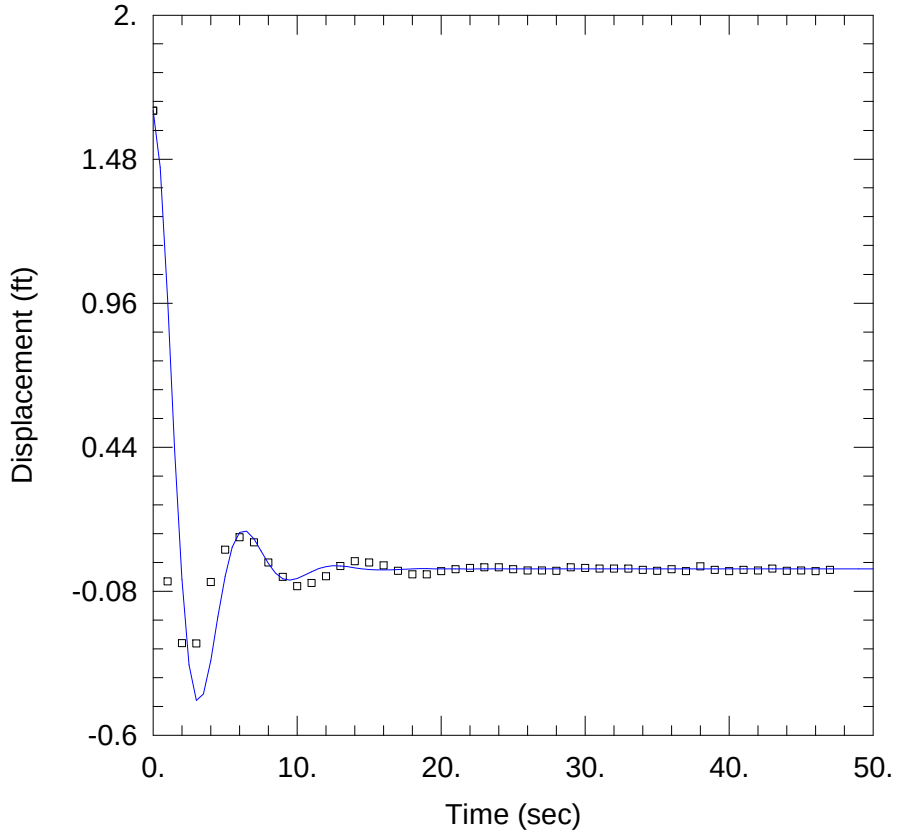
Saturated Thickness: 79.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220A_IN2)

Initial Displacement: 1.322 ft
Total Well Penetration Depth: 52.3 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 52.3 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220A_IN3.aqt
Date: 01/17/19 Time: 13:28:24

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 77.86 ft/day
Le = 28.07 ft

AQUIFER DATA

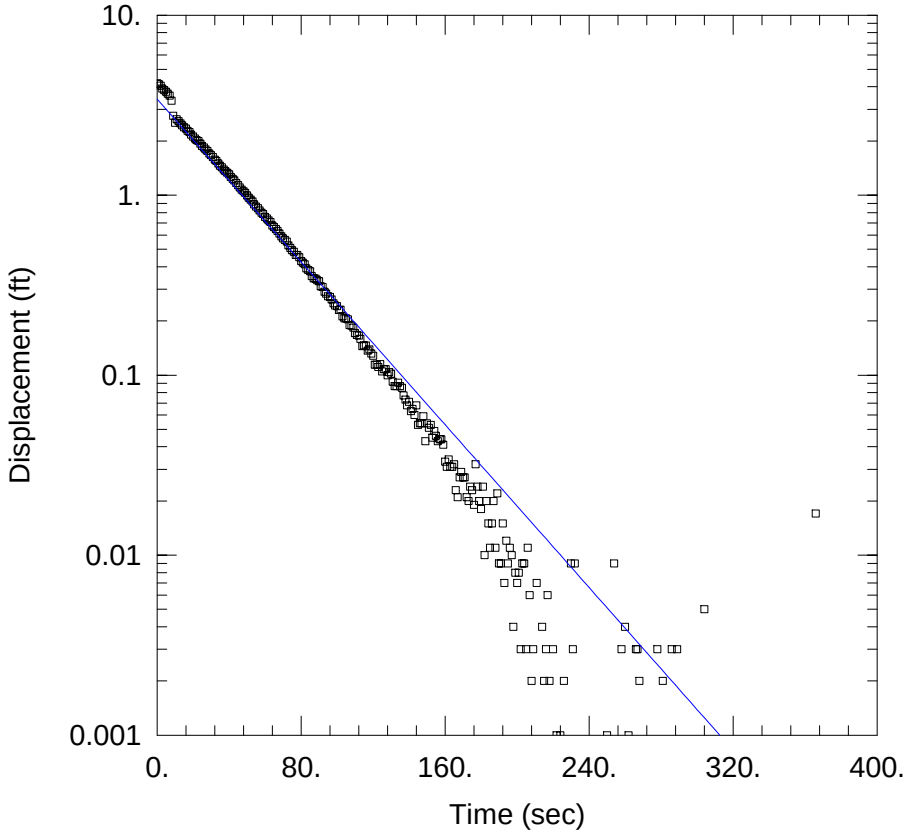
Saturated Thickness: 79.92 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220A_IN3)

Initial Displacement: 1.655 ft
Total Well Penetration Depth: 52.3 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 52.3 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220B_IN1.aqt
Date: 01/17/19 Time: 13:30:24

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 6.788 ft/day
y0 = 3.415 ft

AQUIFER DATA

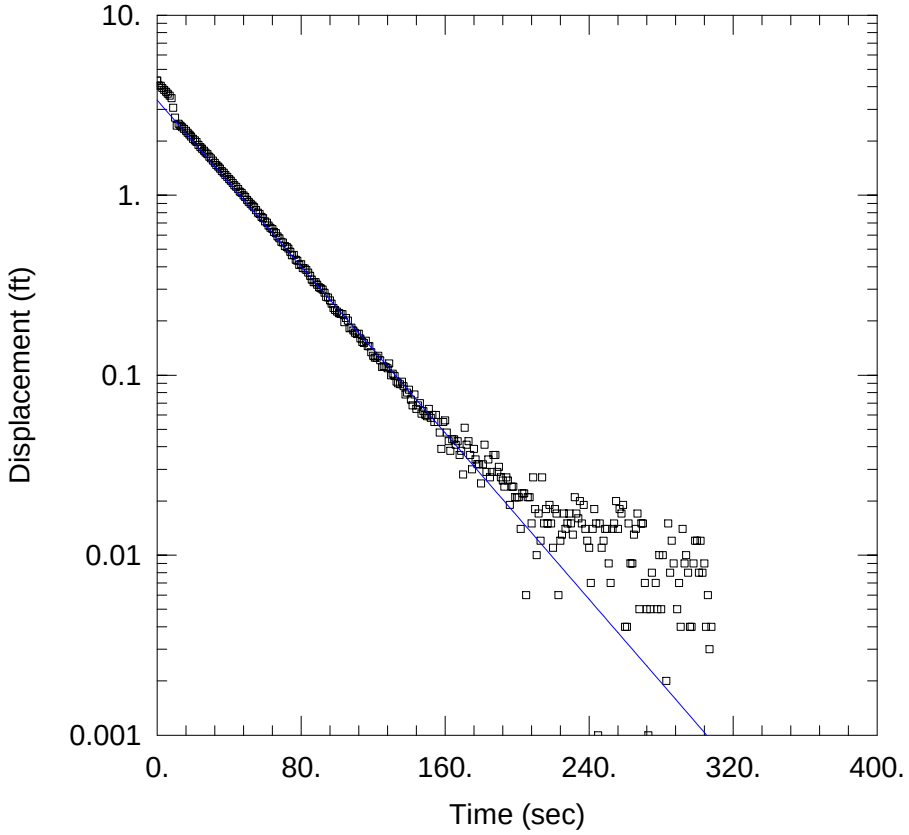
Saturated Thickness: 79.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220B_IN1)

Initial Displacement: 4.178 ft
Total Well Penetration Depth: 124.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 124.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220B_IN2.aqt
Date: 01/17/19 Time: 13:30:43

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 6.938 ft/day
y0 = 3.374 ft

AQUIFER DATA

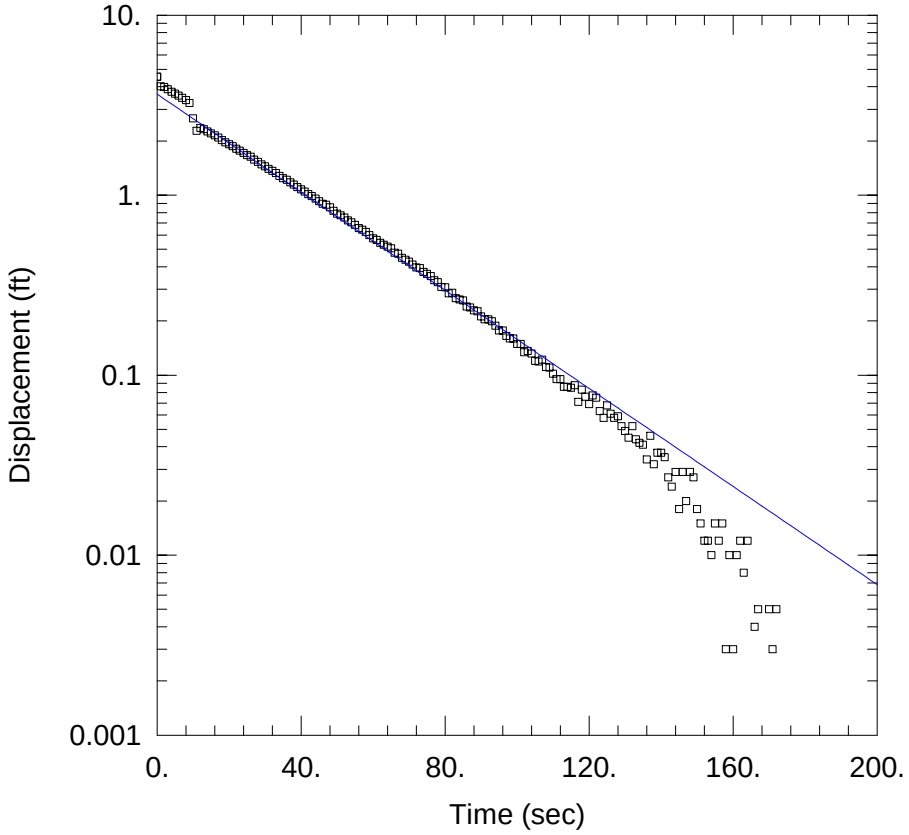
Saturated Thickness: 79.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220B_IN2)

Initial Displacement: 4.323 ft
Total Well Penetration Depth: 124.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 124.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220B_IN3.aqt
Date: 01/17/19 Time: 13:31:08

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 8.179 ft/day
y0 = 3.639 ft

AQUIFER DATA

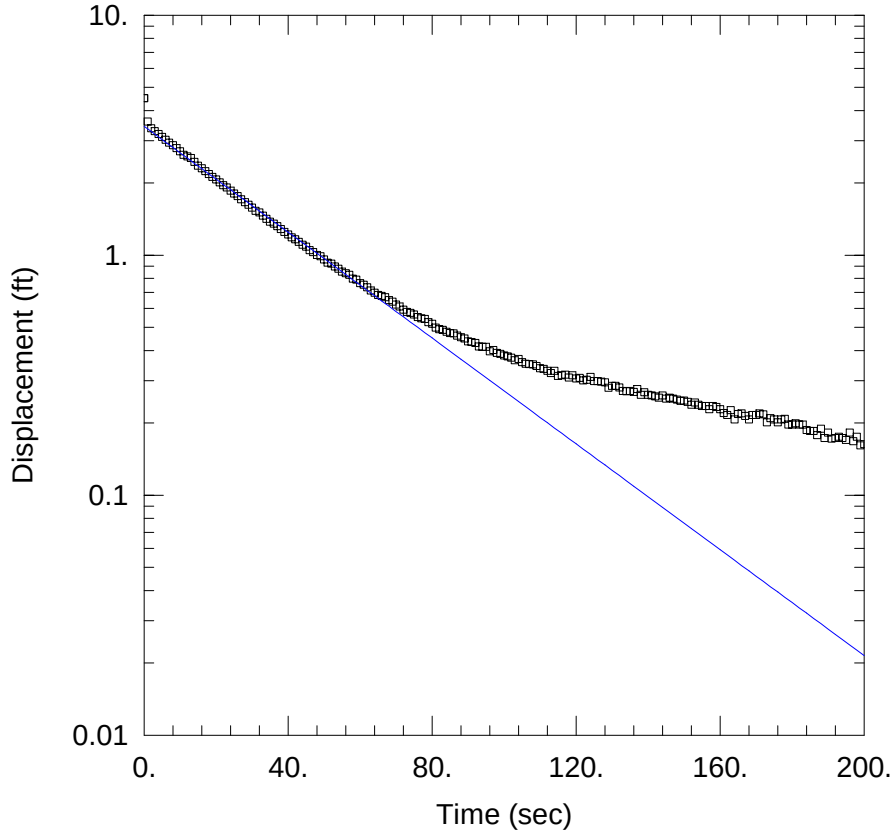
Saturated Thickness: 79.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220B_IN3)

Initial Displacement: 4.543 ft
Total Well Penetration Depth: 124.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 124.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220B_OUT2.aqt
Date: 01/17/19 Time: 13:31:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 6.621 ft/day
y0 = 3.442 ft

AQUIFER DATA

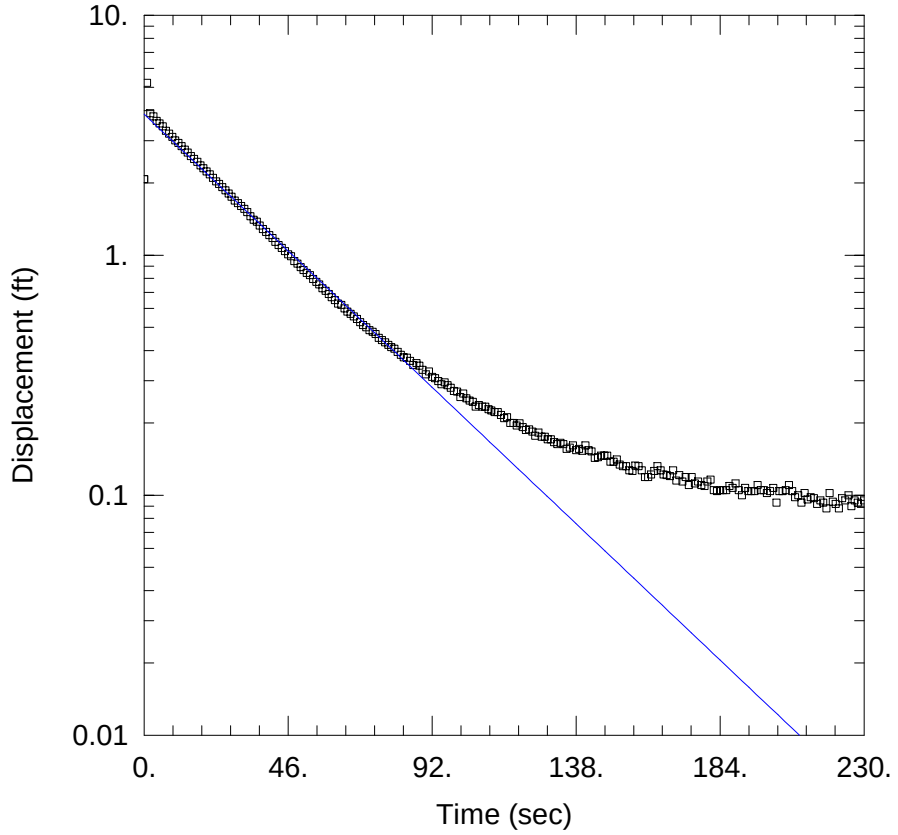
Saturated Thickness: 79.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220B_OUT2)

Initial Displacement: 4.511 ft
Total Well Penetration Depth: 124.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 124.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW220B_OUT3.aqt
Date: 01/17/19 Time: 13:31:45

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW220B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 7.423 ft/day
y0 = 3.866 ft

AQUIFER DATA

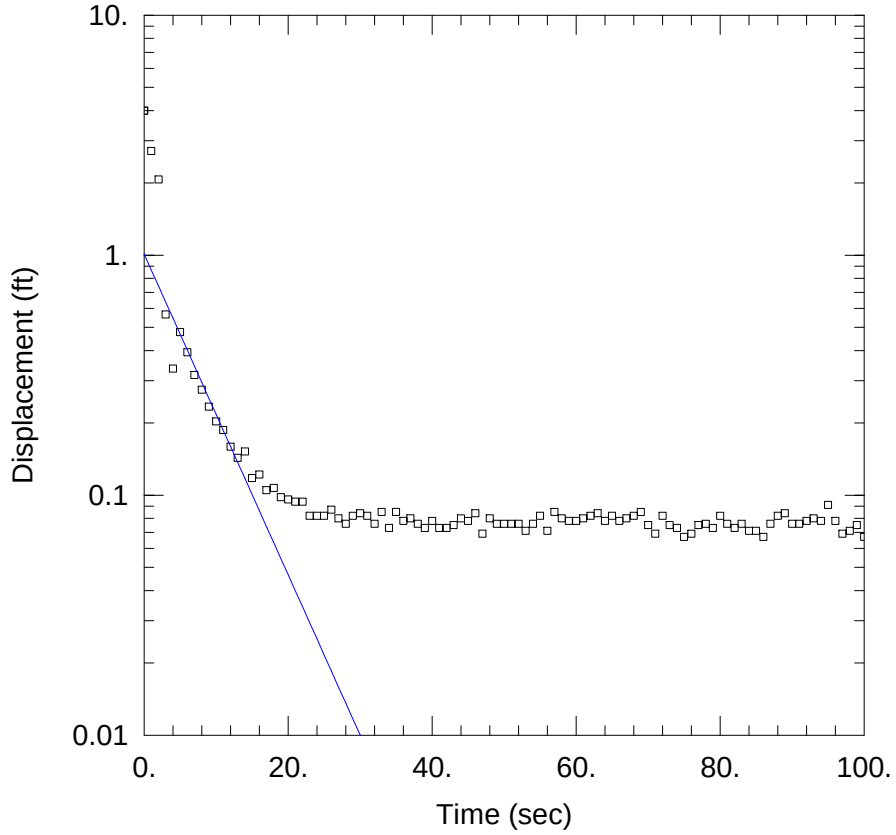
Saturated Thickness: 79.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-220B_OUT3)

Initial Displacement: 2.071 ft
Total Well Penetration Depth: 124.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 124.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221A_IN1.aqt
Date: 01/17/19 Time: 13:33:17

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 8.047 ft/day
y0 = 1.012 ft

AQUIFER DATA

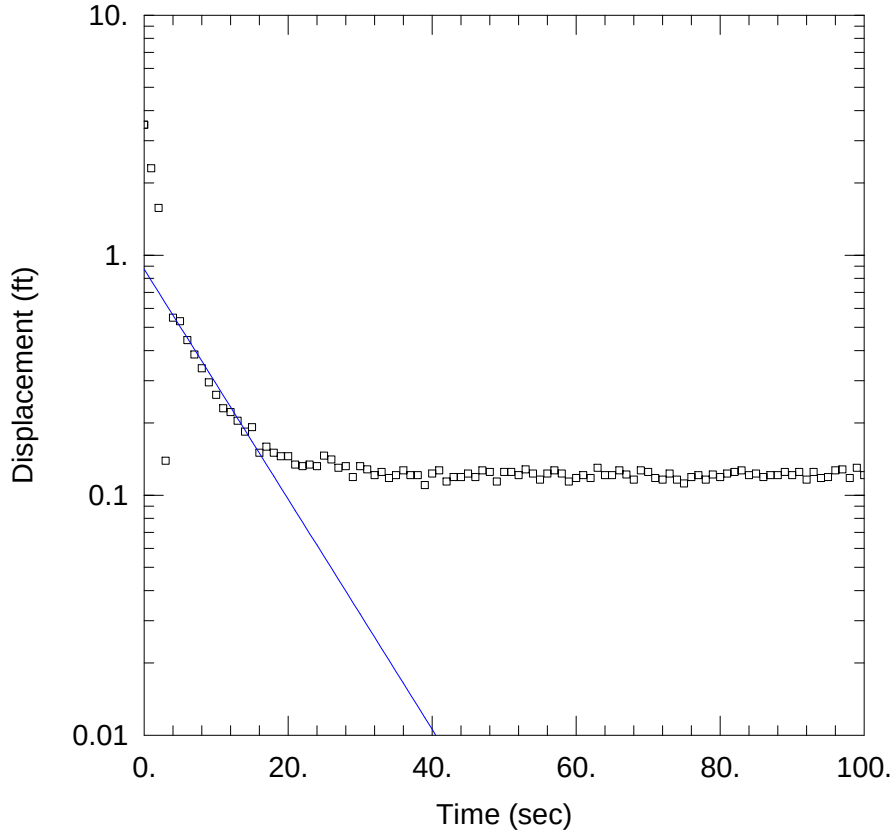
Saturated Thickness: 45.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221A_IN1)

Initial Displacement: 3.998 ft
Total Well Penetration Depth: 39.64 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.64 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221A_IN2.aqt
Date: 01/17/19 Time: 13:33:33

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 5.771 ft/day
y0 = 0.8755 ft

AQUIFER DATA

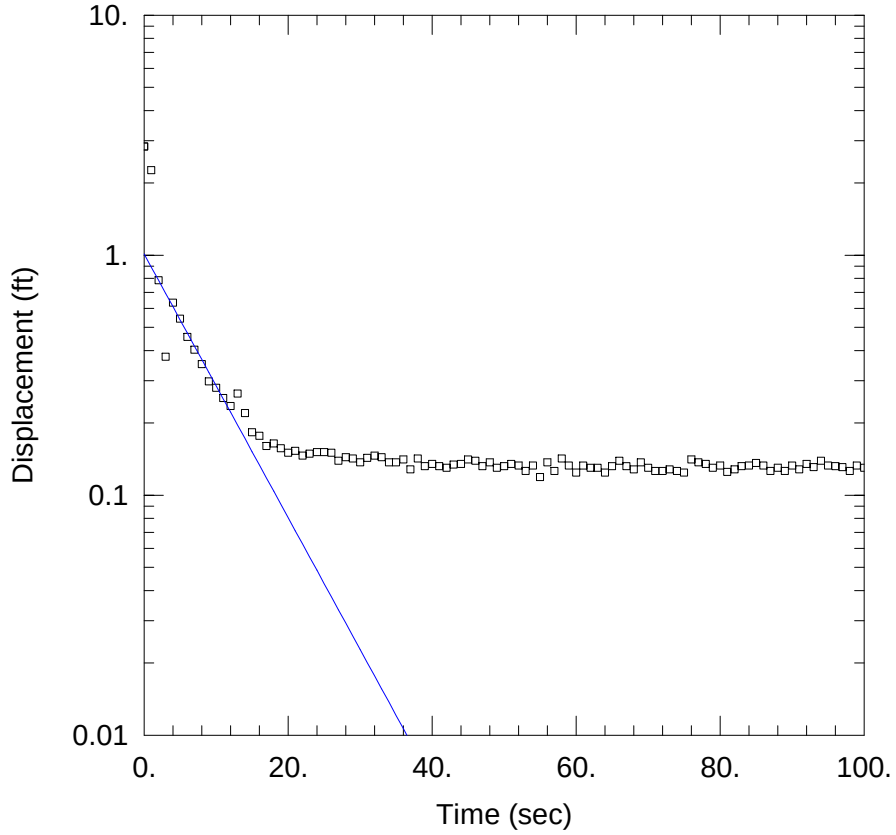
Saturated Thickness: 45.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221A_IN2)

Initial Displacement: 3.491 ft
Total Well Penetration Depth: 39.64 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.64 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221A_IN3.aqt
Date: 01/17/19 Time: 13:33:49

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 6.615 ft/day
y0 = 1.012 ft

AQUIFER DATA

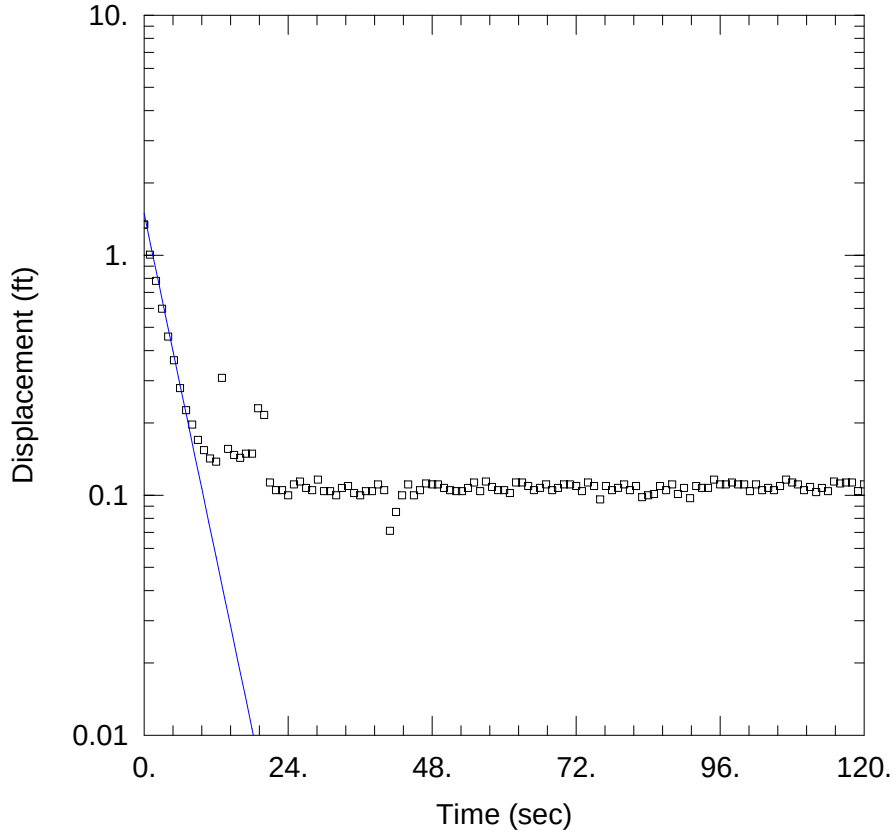
Saturated Thickness: 45.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221A_IN3)

Initial Displacement: 2.838 ft
Total Well Penetration Depth: 39.64 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.64 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221A_OUT1.aqt
Date: 01/17/19 Time: 13:34:06

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 14.37 ft/day
y0 = 1.492 ft

AQUIFER DATA

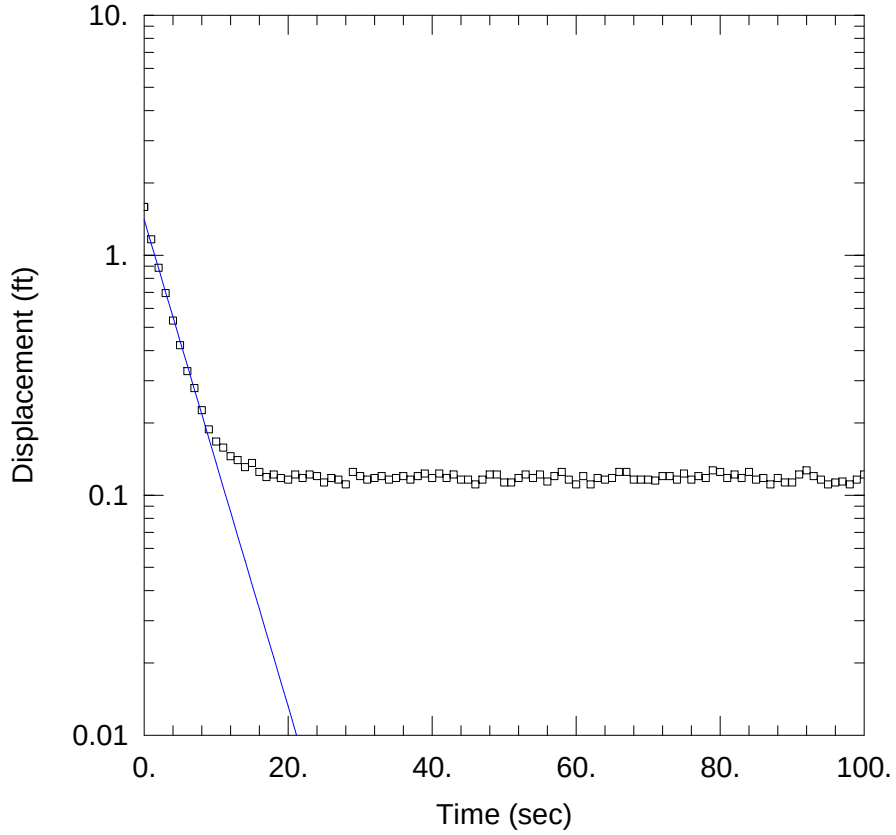
Saturated Thickness: 45.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221A_OUT1)

Initial Displacement: 1.34 ft
Total Well Penetration Depth: 39.64 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.64 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221A_OUT2.aqt
Date: 01/17/19 Time: 13:34:24

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 12.21 ft/day
y0 = 1.409 ft

AQUIFER DATA

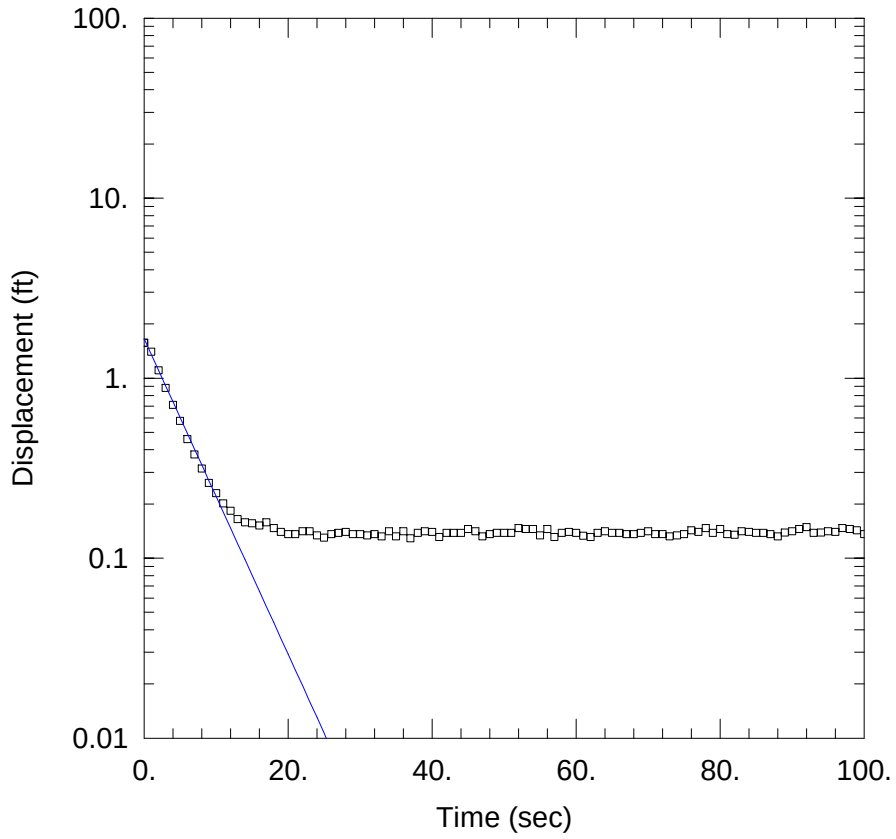
Saturated Thickness: 45.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221A_OUT2)

Initial Displacement: 1.585 ft
Total Well Penetration Depth: 39.64 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.64 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221A_OUT3.aqt
Date: 01/17/19 Time: 13:34:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 10.55 ft/day
y0 = 1.658 ft

AQUIFER DATA

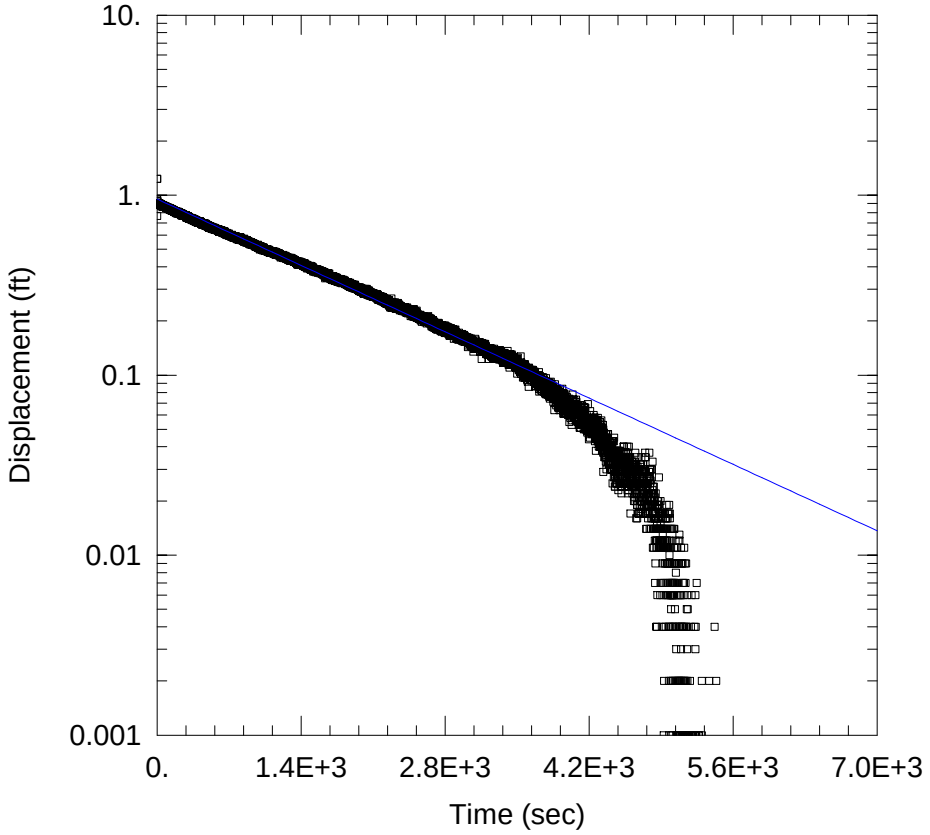
Saturated Thickness: 45.21 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221A_OUT3)

Initial Displacement: 1.571 ft
Total Well Penetration Depth: 39.64 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.64 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221B_IN1.aqt
Date: 01/17/19 Time: 13:36:05

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.1468 ft/day
y0 = 0.9509 ft

AQUIFER DATA

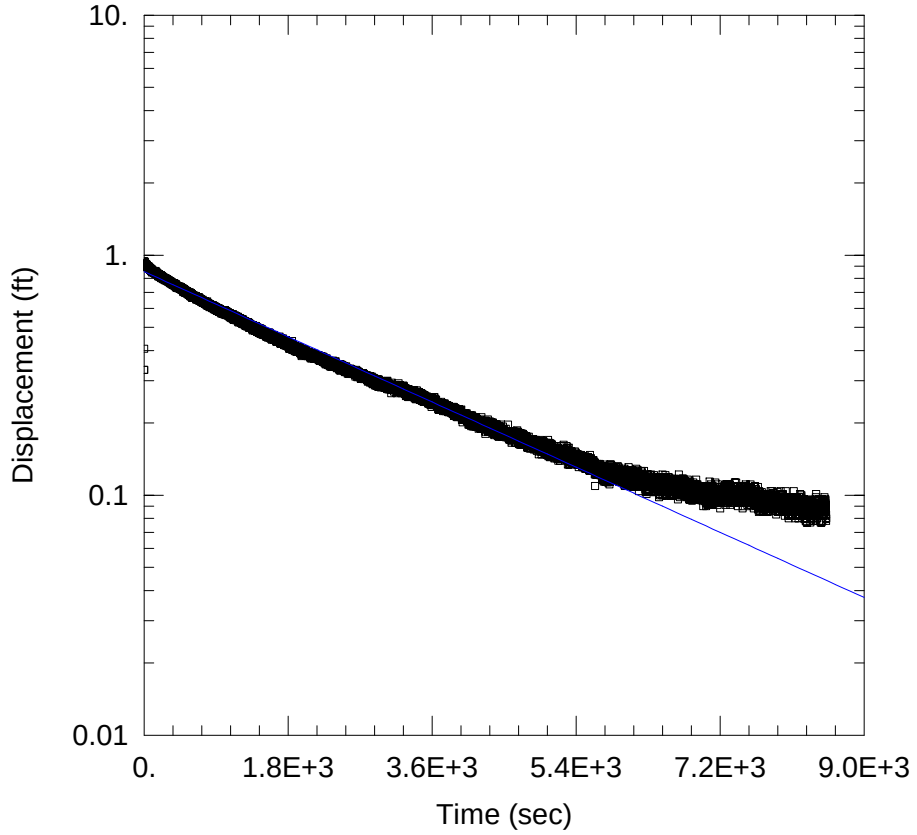
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221B_IN1)

Initial Displacement: 1.232 ft
Total Well Penetration Depth: 73.43 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 73.43 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW221B_OUT1.aqt
Date: 01/17/19 Time: 13:36:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW221B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.08413 ft/day
y0 = 0.8538 ft

AQUIFER DATA

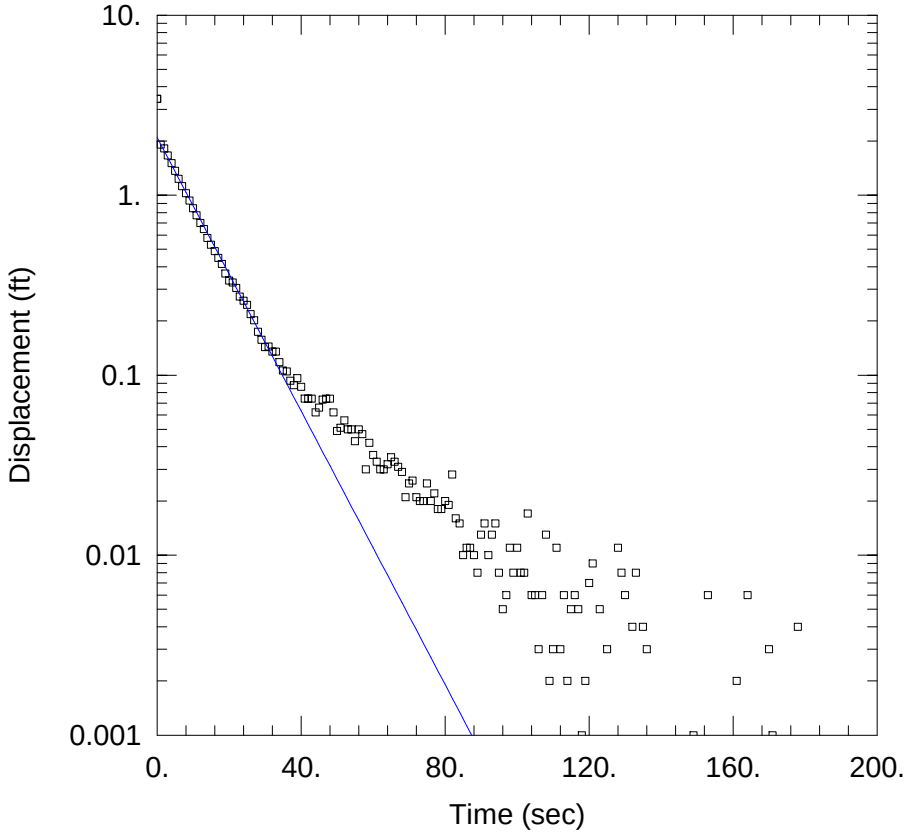
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-221B_OUT1)

Initial Displacement: 0.333 ft
Total Well Penetration Depth: 73.43 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 73.43 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222A_IN1.aqt
Date: 01/17/19 Time: 13:37:38

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 5.507 ft/day
y0 = 2.093 ft

AQUIFER DATA

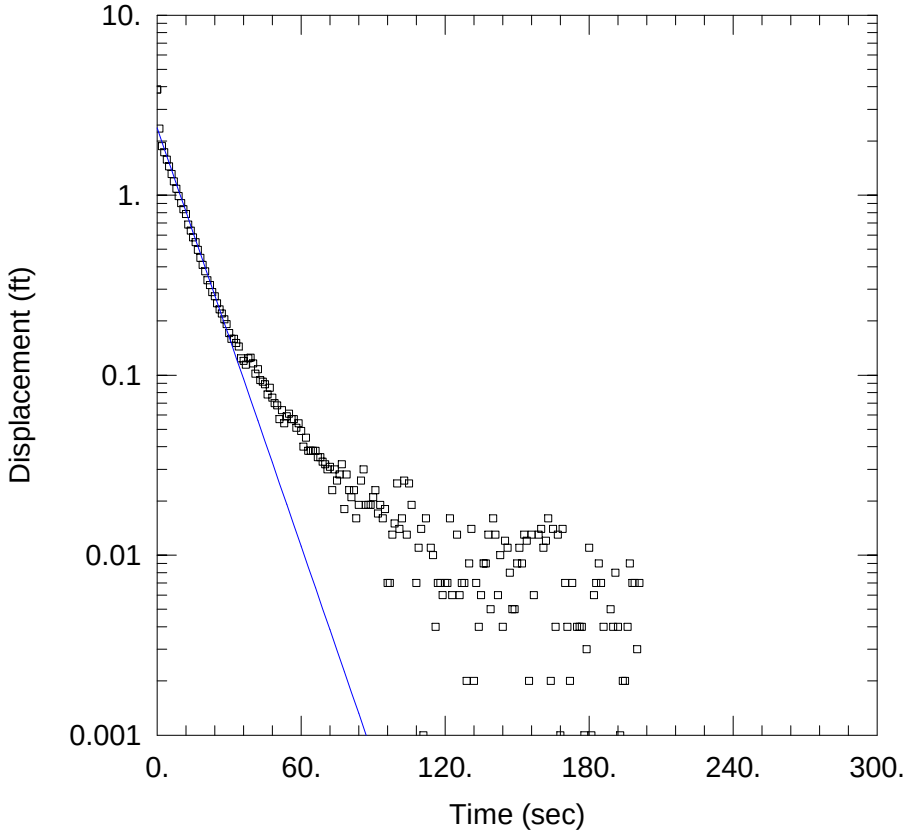
Saturated Thickness: 22.1 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222A_IN1)

Initial Displacement: 3.43 ft
Total Well Penetration Depth: 68.86 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 68.86 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222A_IN2.aqt
Date: 01/17/19 Time: 13:37:55

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

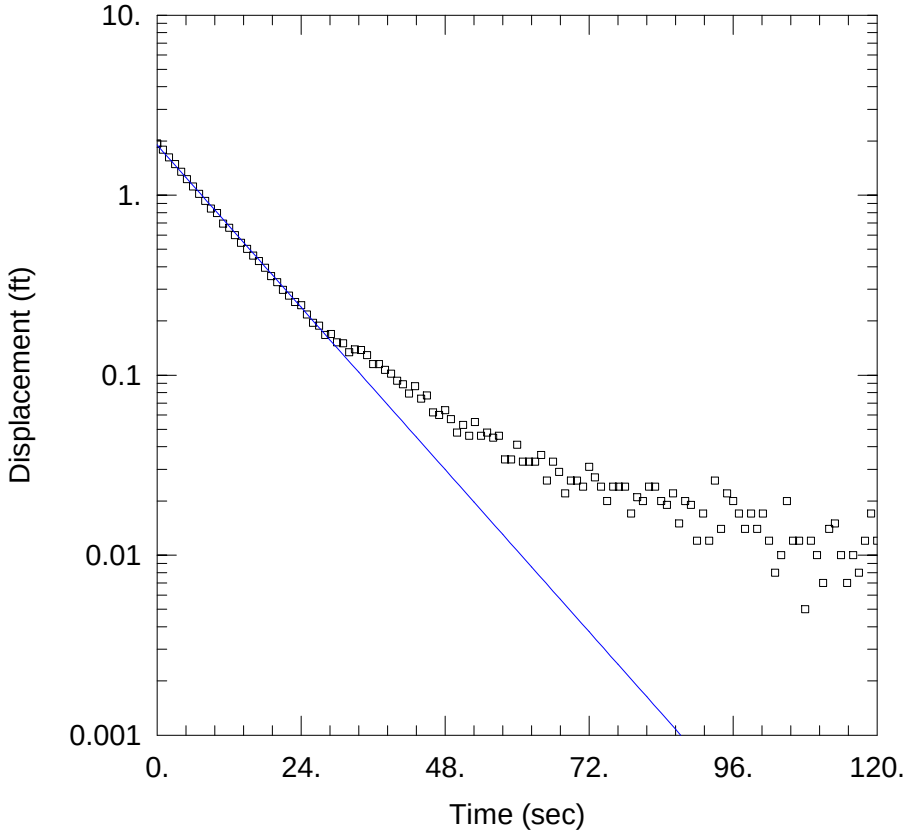
K = 5.611 ft/day
y0 = 2.364 ft

AQUIFER DATA

Saturated Thickness: 22.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222A_IN2)

Initial Displacement: 3.866 ft
Total Well Penetration Depth: 68.86 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 68.86 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222A_IN3.aqt
Date: 01/17/19 Time: 13:38:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 5.444 ft/day
y0 = 1.899 ft

AQUIFER DATA

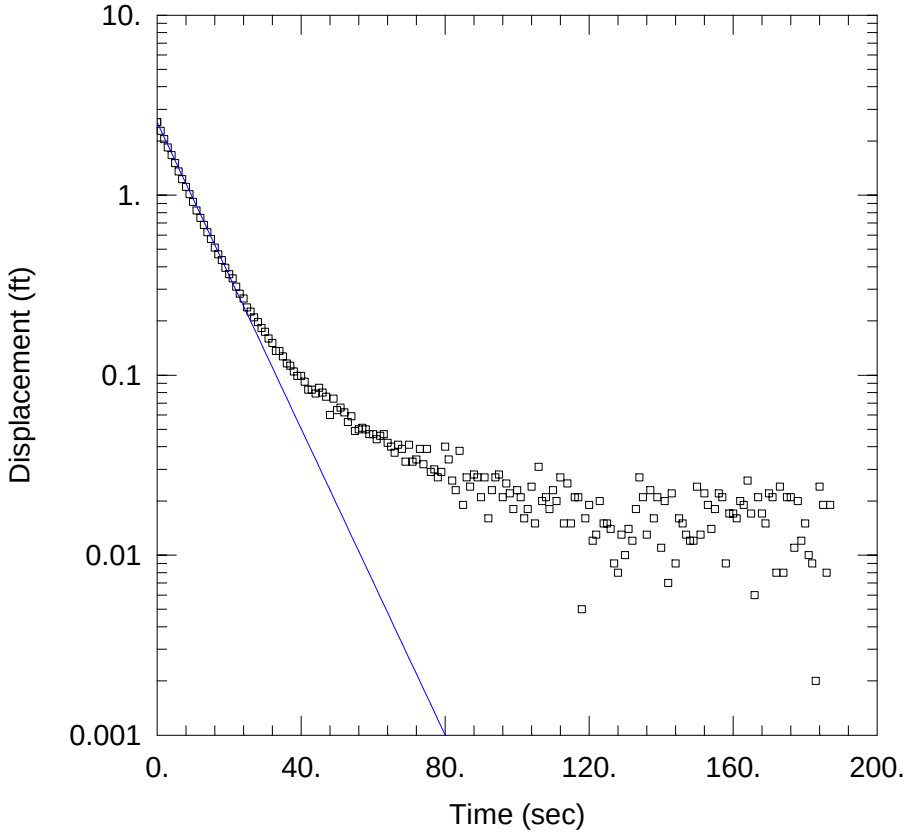
Saturated Thickness: 22.1 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222A_IN3)

Initial Displacement: 1.935 ft
Total Well Penetration Depth: 68.86 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 68.86 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222A_OUT1.aqt
Date: 01/17/19 Time: 13:38:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 6.167 ft/day
y0 = 2.542 ft

AQUIFER DATA

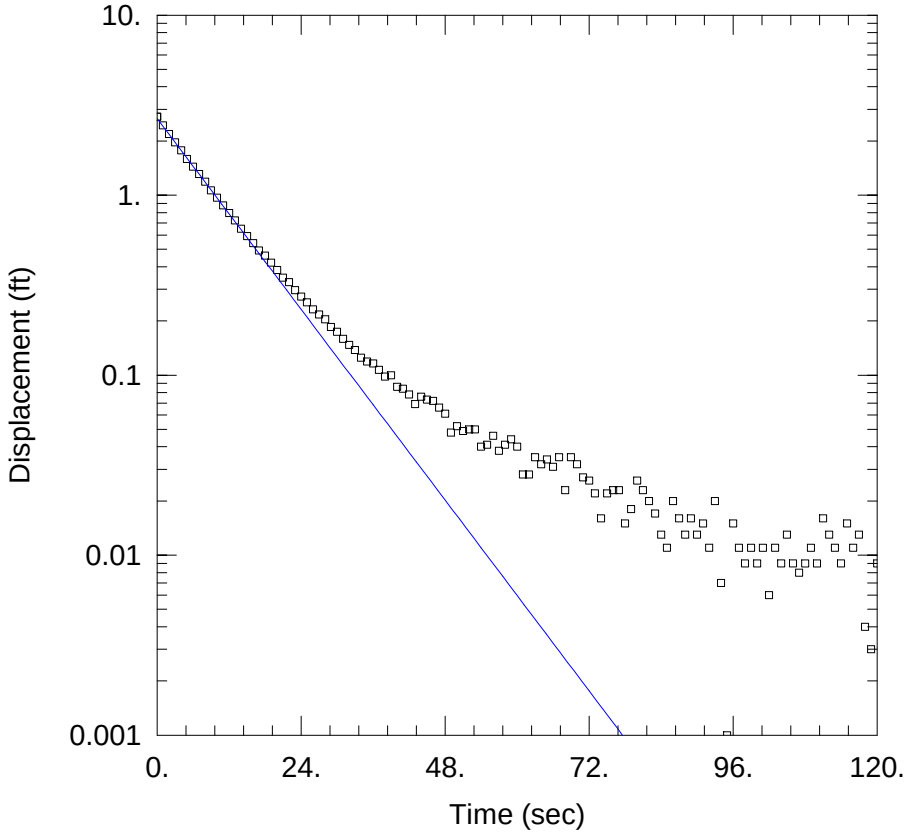
Saturated Thickness: 22.1 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222A_OUT1)

Initial Displacement: 2.544 ft
Total Well Penetration Depth: 68.86 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 68.86 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222A_OUT2.aqt
Date: 01/17/19 Time: 13:38:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 6.4 ft/day
y0 = 2.665 ft

AQUIFER DATA

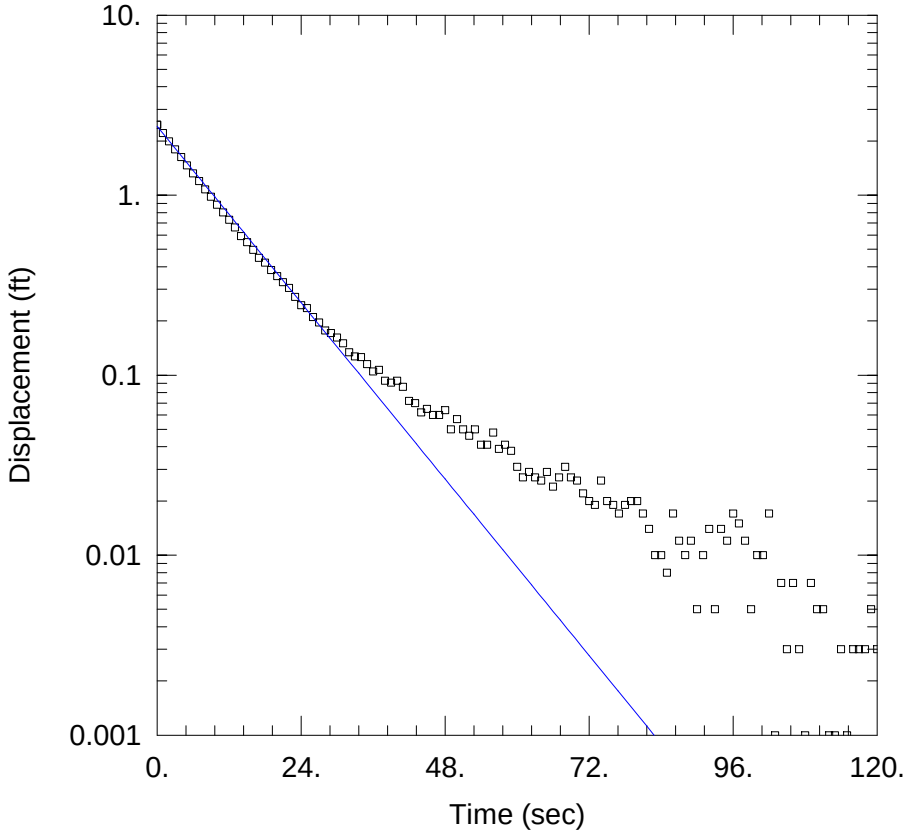
Saturated Thickness: 22.1 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222A_OUT2)

Initial Displacement: 2.727 ft
Total Well Penetration Depth: 68.86 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 68.86 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222A_OUT3.aqt
Date: 01/17/19 Time: 13:39:05

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 5.918 ft/day
y0 = 2.414 ft

AQUIFER DATA

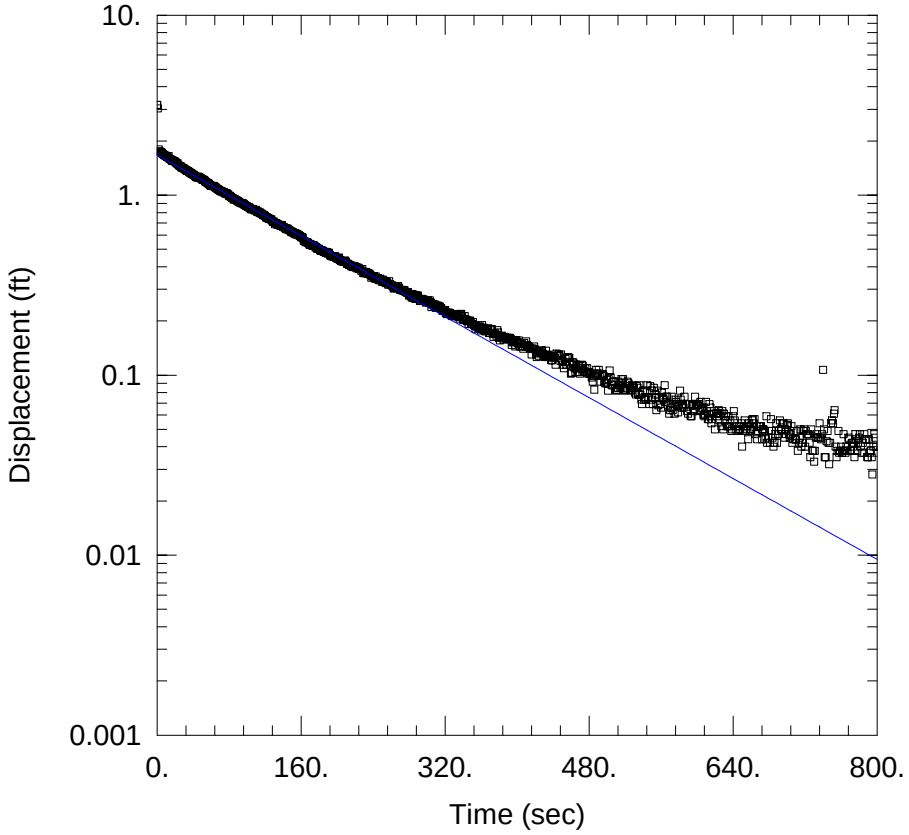
Saturated Thickness: 22.1 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222A_OUT3)

Initial Displacement: 2.464 ft
Total Well Penetration Depth: 68.86 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 68.86 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222B_IN1.aqt
Date: 01/17/19 Time: 13:41:55

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.4442 ft/day
y0 = 1.671 ft

AQUIFER DATA

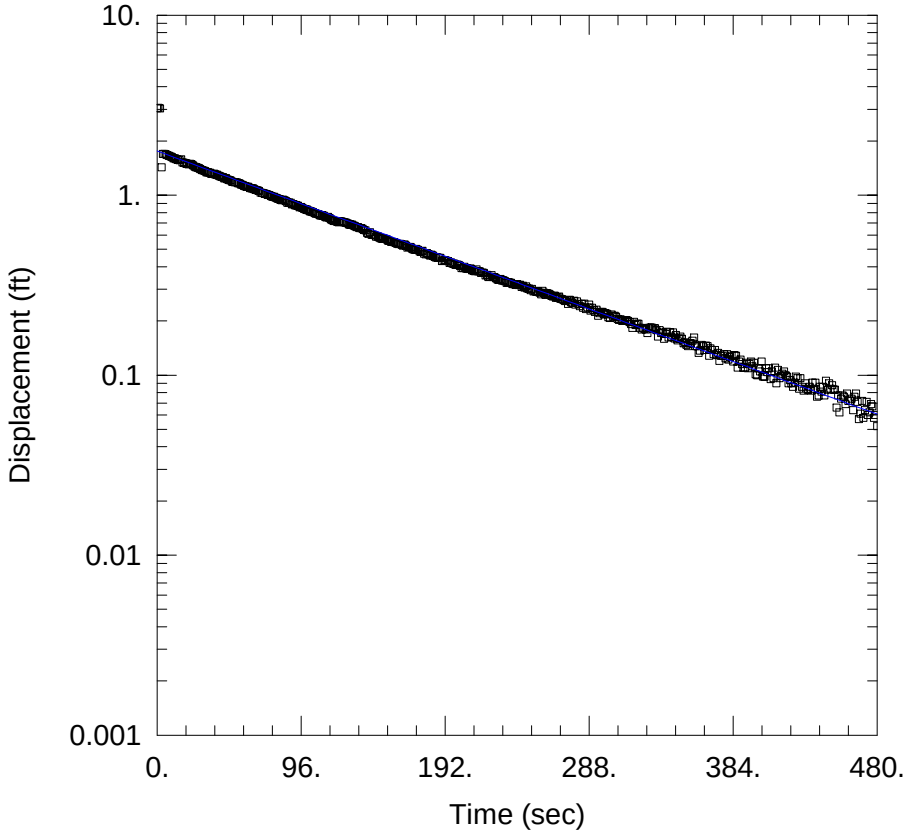
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222B_IN1)

Initial Displacement: 3.167 ft
Total Well Penetration Depth: 131.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 131.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222B_IN2.aqt
Date: 01/17/19 Time: 13:42:17

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.4817 ft/day
y0 = 1.758 ft

AQUIFER DATA

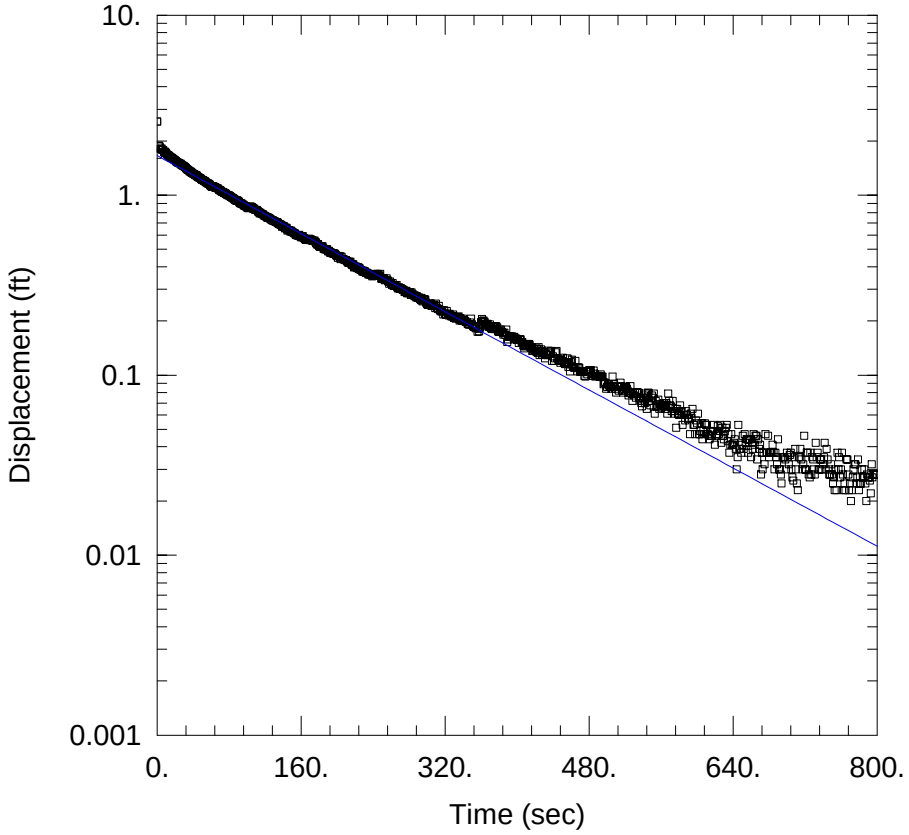
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222B_IN2)

Initial Displacement: 3.05 ft
Total Well Penetration Depth: 131.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 131.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222B_OUT1.aqt
Date: 01/17/19 Time: 13:42:35

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.429 ft/day
y0 = 1.658 ft

AQUIFER DATA

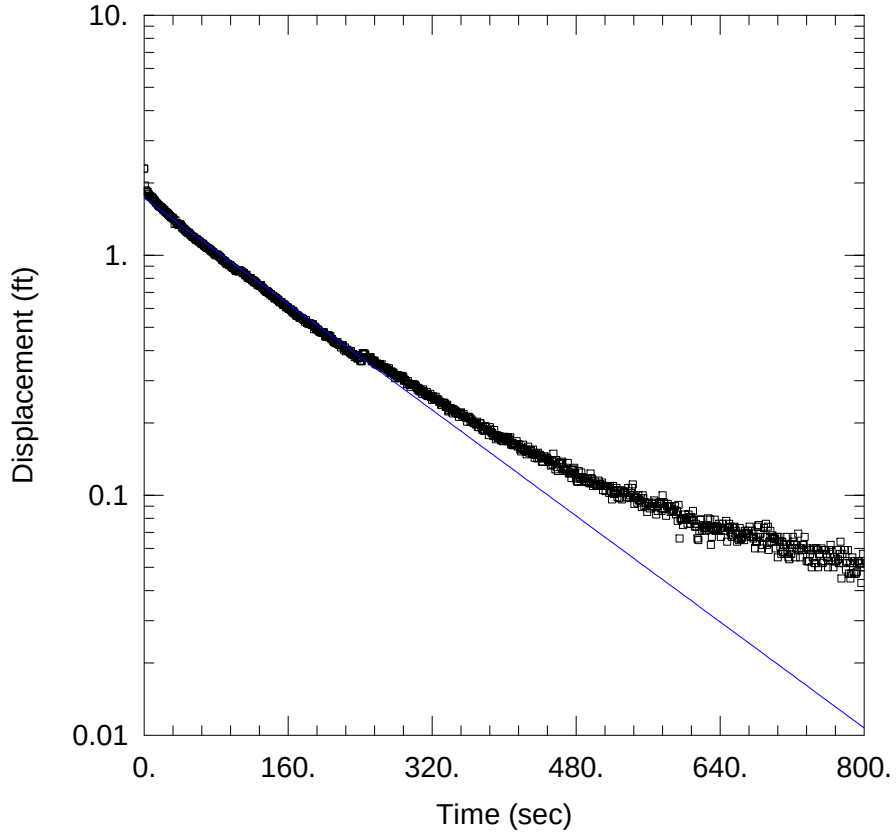
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222B_OUT1)

Initial Displacement: 2.565 ft
Total Well Penetration Depth: 131.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 131.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222B_OUT2.aqt
Date: 01/17/19 Time: 13:42:53

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.4366 ft/day
y0 = 1.731 ft

AQUIFER DATA

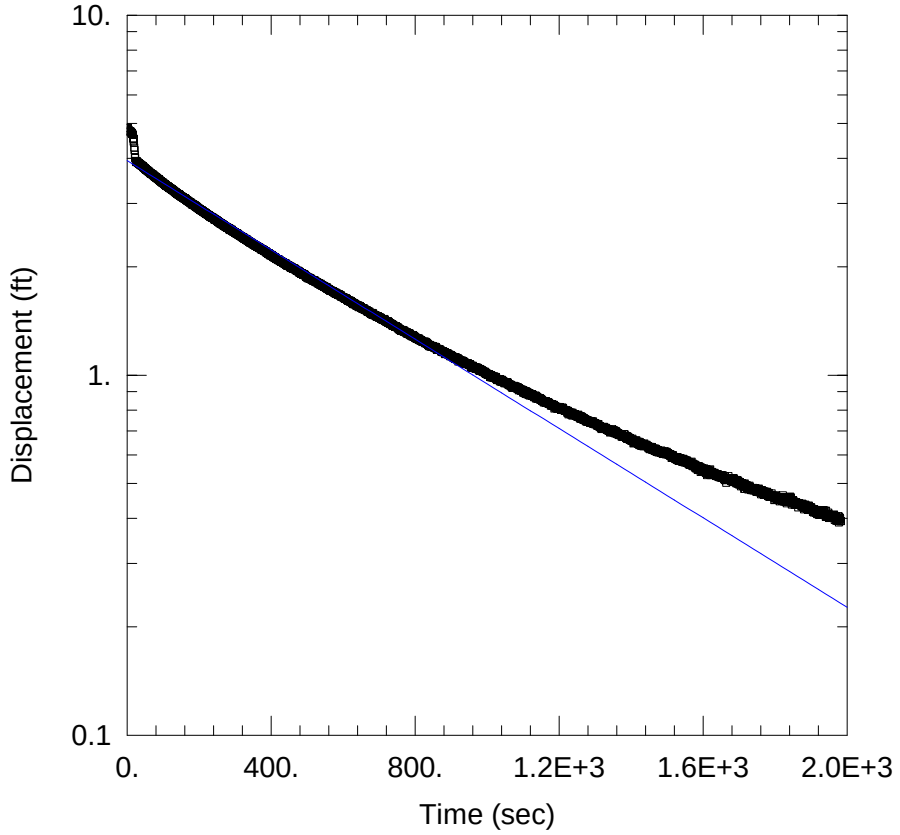
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222B_OUT2)

Initial Displacement: 2.291 ft
Total Well Penetration Depth: 131.7 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 131.7 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222C_IN1.aqt
Date: 01/17/19 Time: 08:13:13

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3973 ft/day
y0 = 3.944 ft

AQUIFER DATA

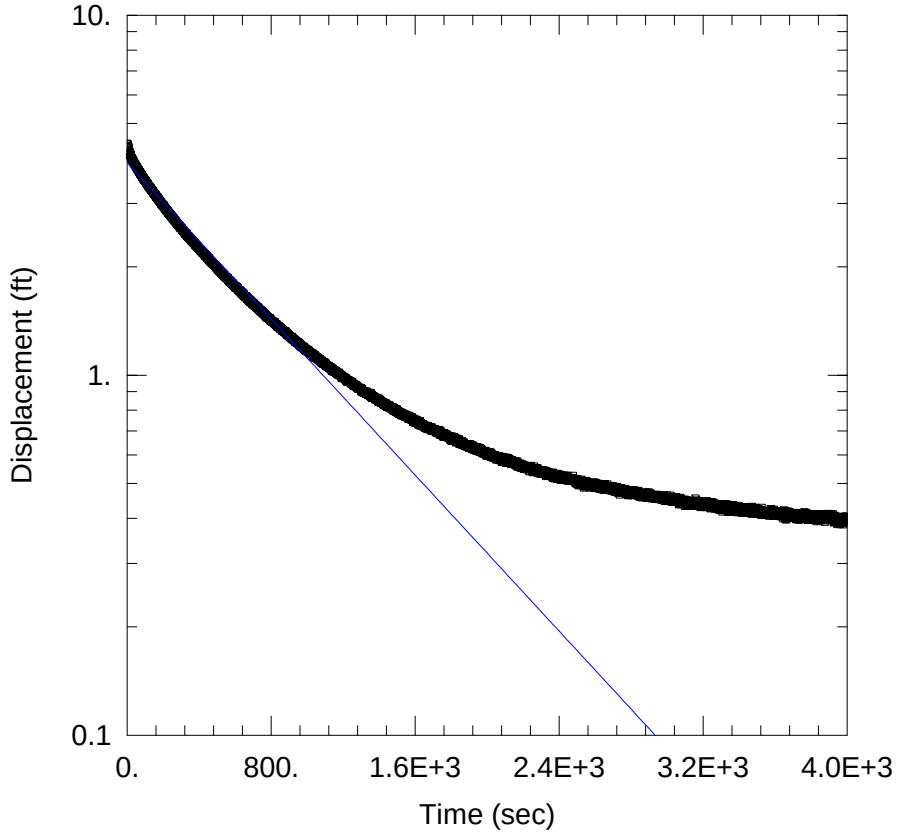
Saturated Thickness: 21.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222C_IN1)

Initial Displacement: 4.859 ft
Total Well Penetration Depth: 207.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 207.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW222C_OUT1.aqt
Date: 01/17/19 Time: 08:14:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW222C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3472 ft/day
y0 = 3.888 ft

AQUIFER DATA

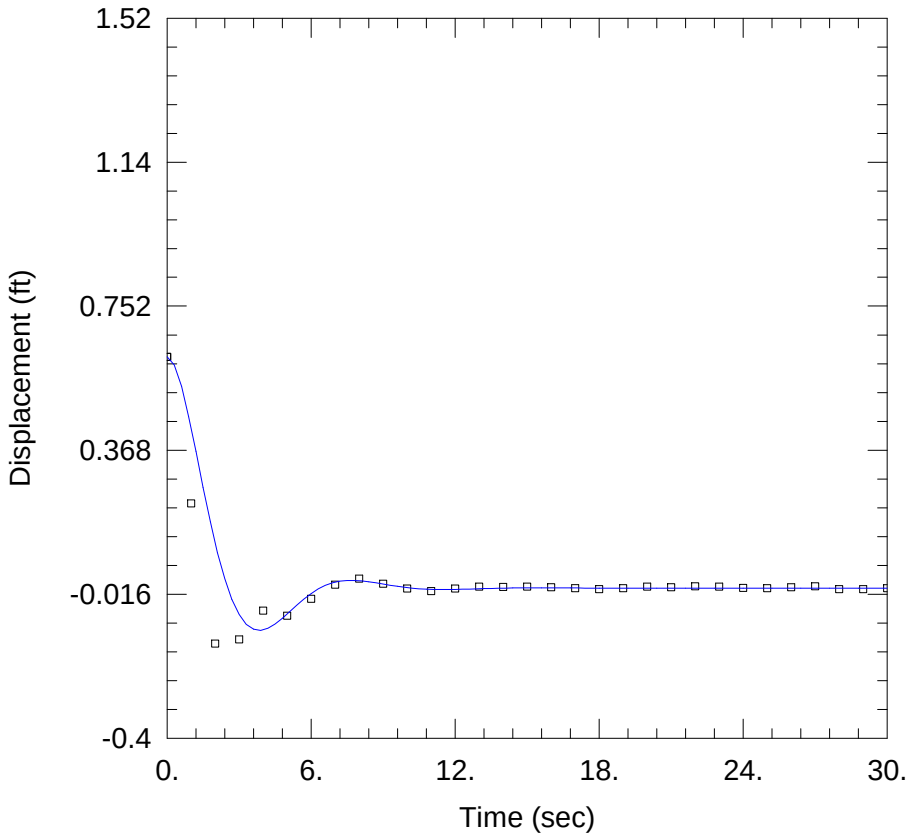
Saturated Thickness: 21.5 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-222C_OUT1)

Initial Displacement: 4.326 ft
Total Well Penetration Depth: 207.4 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 207.4 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223A_IN1.aqt
Date: 01/17/19 Time: 13:44:08

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 48.34 ft/day
Le = 37.18 ft

AQUIFER DATA

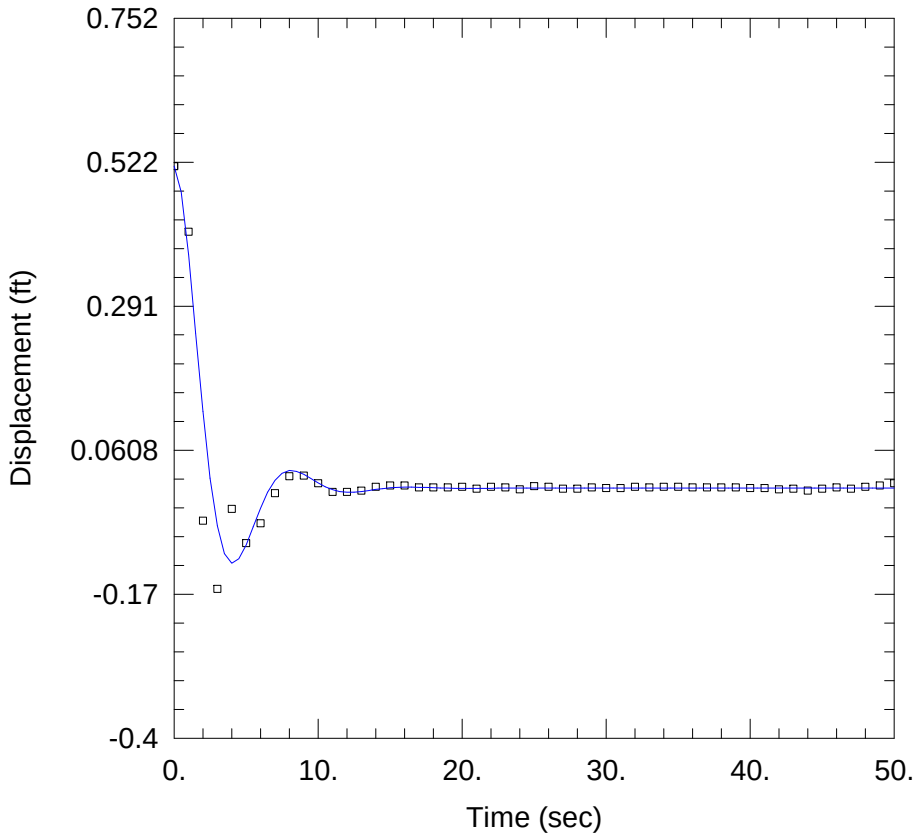
Saturated Thickness: 65.17 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223A_IN1)

Initial Displacement: 0.617 ft
Total Well Penetration Depth: 34.99 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.99 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223A_IN2.aqt
Date: 01/17/19 Time: 13:44:29

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 50.24 ft/day
Le = 44.3 ft

AQUIFER DATA

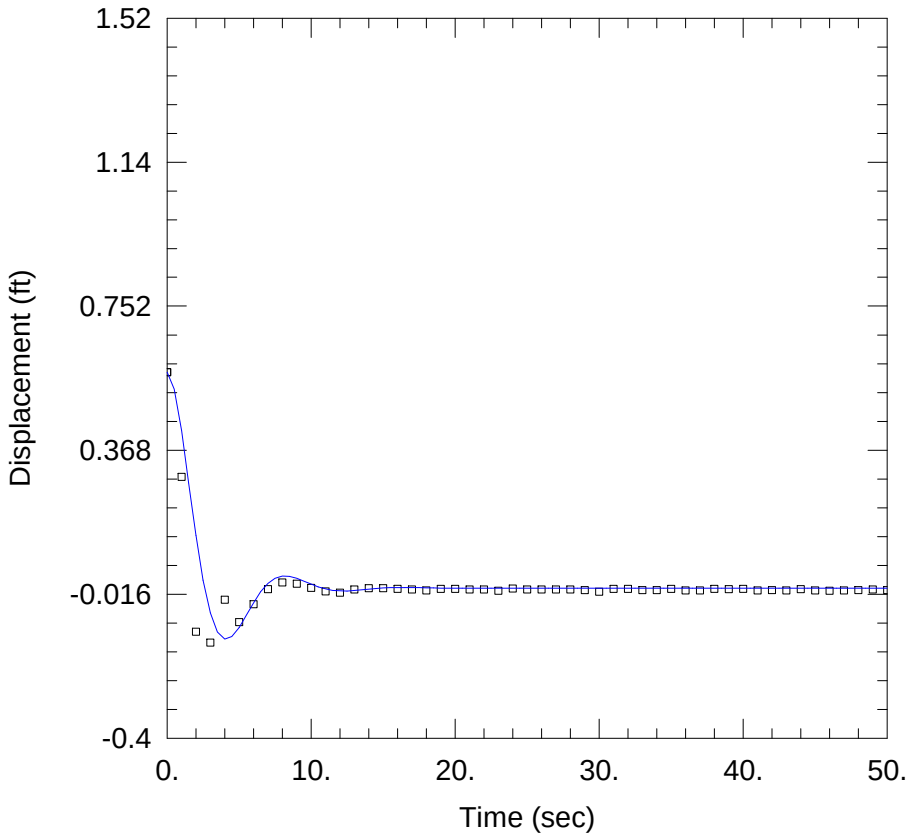
Saturated Thickness: 65.17 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223A_IN2)

Initial Displacement: 0.515 ft
Total Well Penetration Depth: 34.99 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.99 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223A_IN3.aqt
Date: 01/17/19 Time: 13:44:49

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 50.16 ft/day
Le = 45.09 ft

AQUIFER DATA

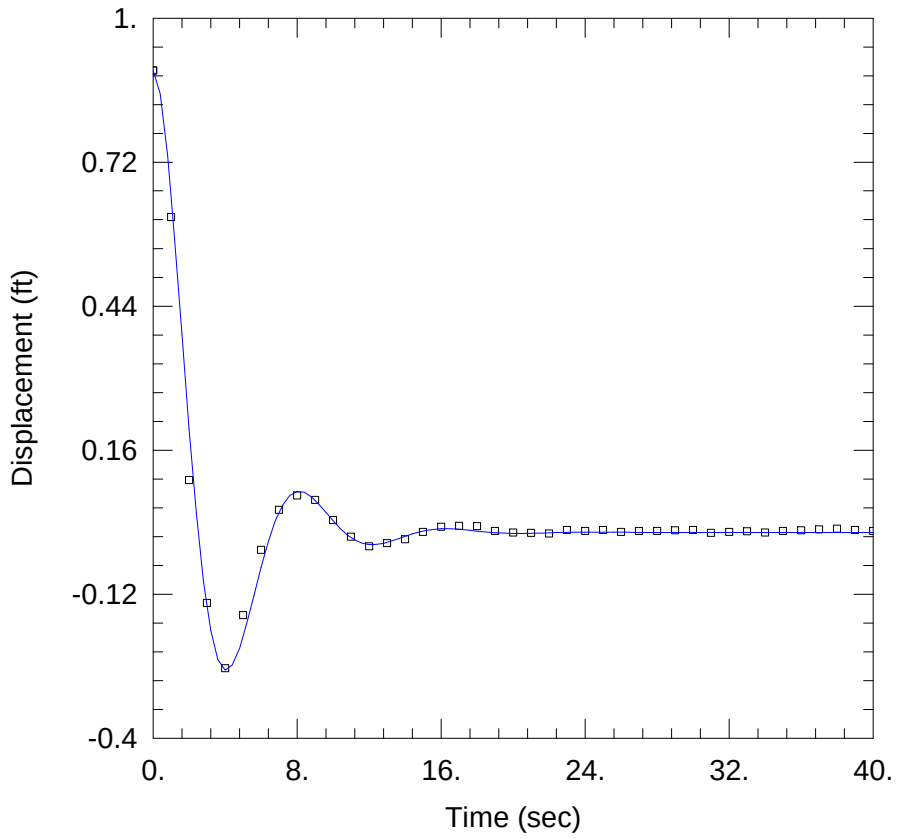
Saturated Thickness: 65.17 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223A_IN3)

Initial Displacement: 0.576 ft
Total Well Penetration Depth: 34.99 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 34.99 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223B_IN1.aqt
Date: 01/17/19 Time: 13:46:45

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 65.7 ft/day
Le = 46.77 ft

AQUIFER DATA

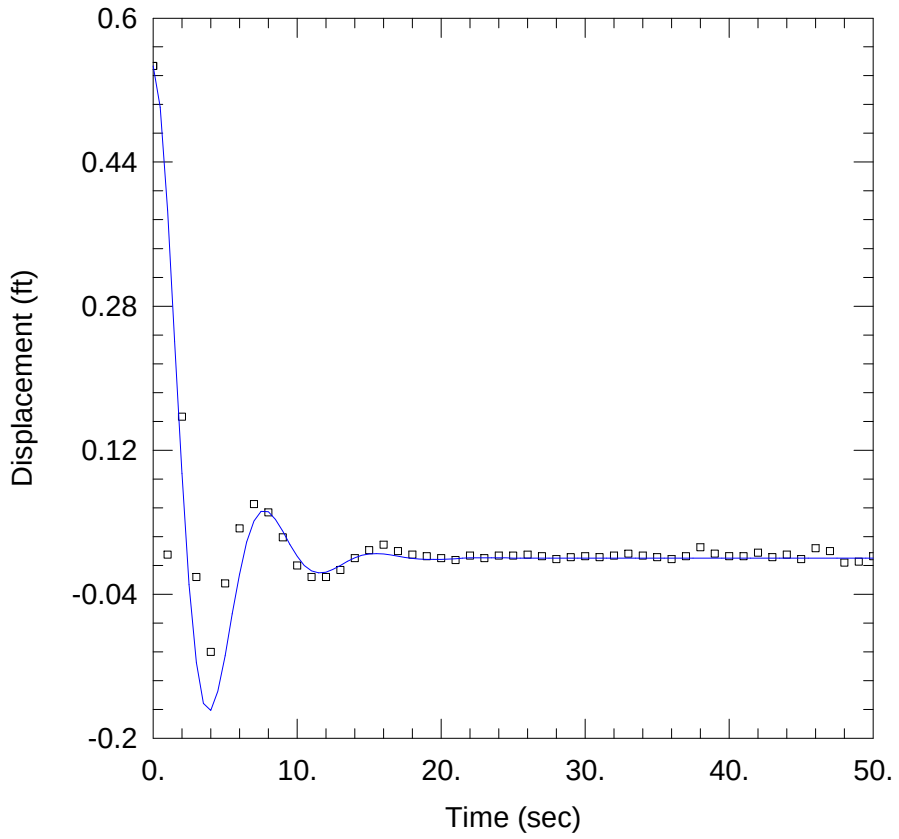
Saturated Thickness: 65.01 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223B_IN1)

Initial Displacement: 0.898 ft
Total Well Penetration Depth: 60.17 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 60.17 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223B_IN2.aqt
Date: 01/17/19 Time: 13:47:01

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 71.05 ft/day
Le = 42.71 ft

AQUIFER DATA

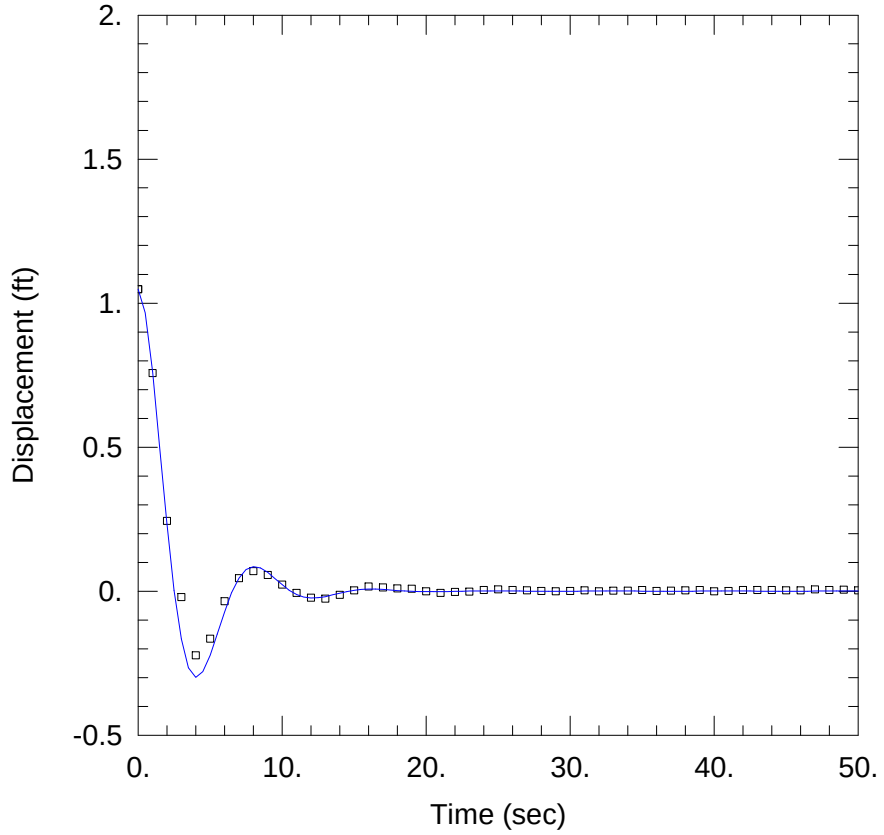
Saturated Thickness: 65.01 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223B_IN2)

Initial Displacement: 0.547 ft
Total Well Penetration Depth: 60.17 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 60.17 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223B_IN3.aqt
Date: 01/17/19 Time: 13:47:17

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 64.3 ft/day
Le = 45.88 ft

AQUIFER DATA

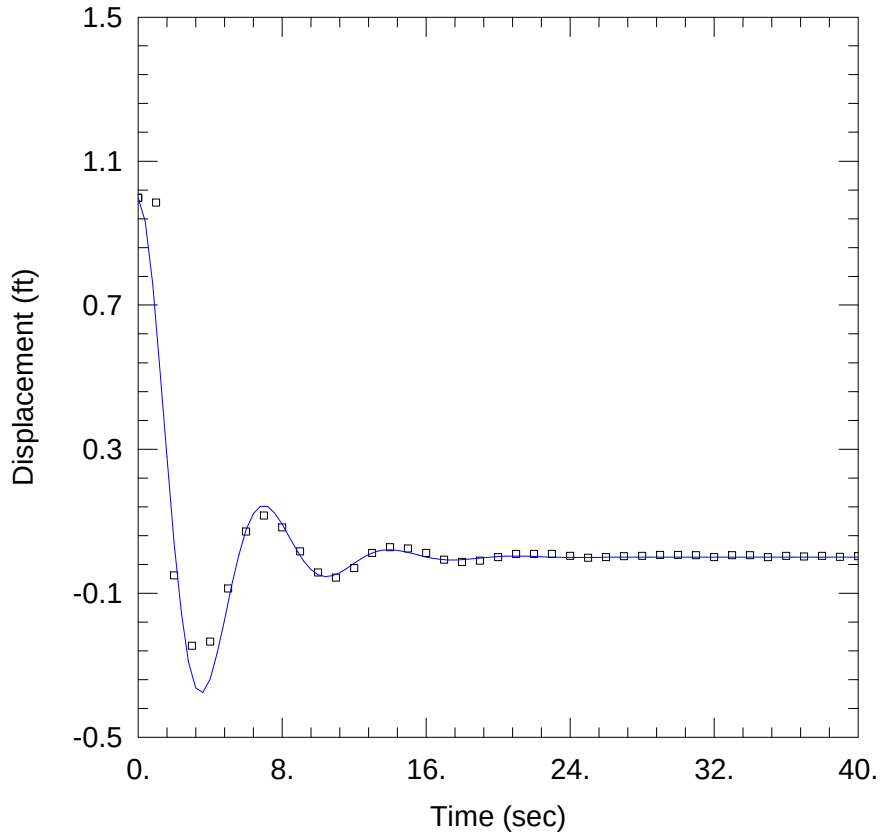
Saturated Thickness: 65.01 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223B_IN3)

Initial Displacement: 1.048 ft
Total Well Penetration Depth: 60.17 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 60.17 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223B_OUT1.aqt
Date: 01/17/19 Time: 13:47:36

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 91.67 ft/day
Le = 36.17 ft

AQUIFER DATA

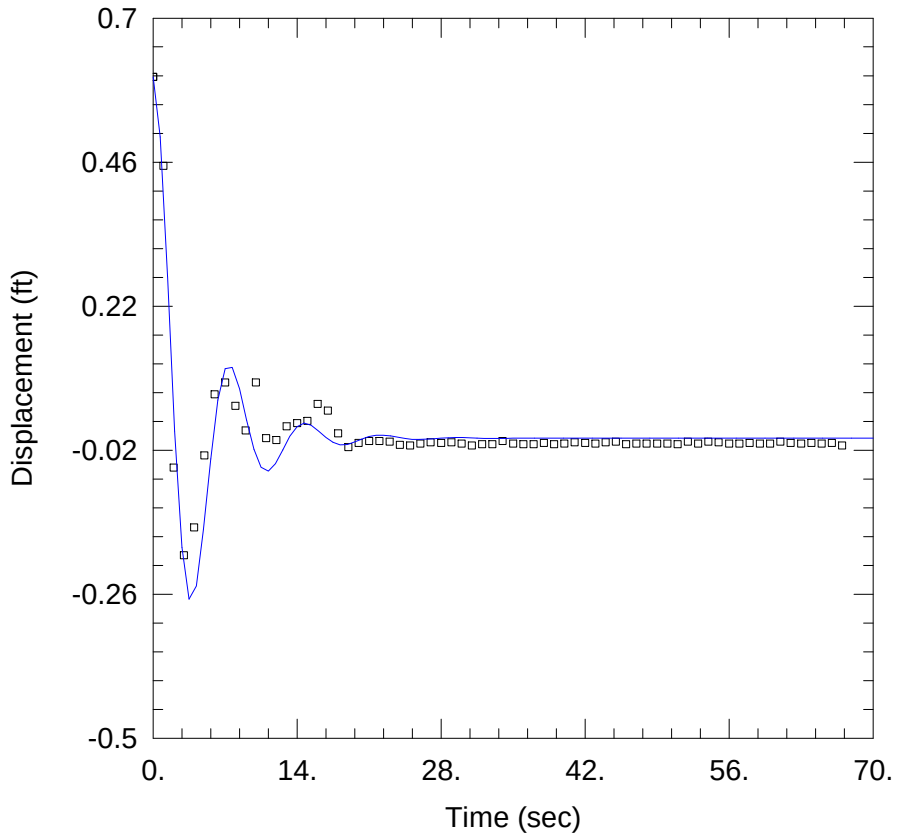
Saturated Thickness: 65.01 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223B_OUT1)

Initial Displacement: 0.998 ft
Total Well Penetration Depth: 60.17 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 60.17 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223B_OUT3.aqt
Date: 01/17/19 Time: 13:47:52

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 103.3 ft/day
Le = 41.64 ft

AQUIFER DATA

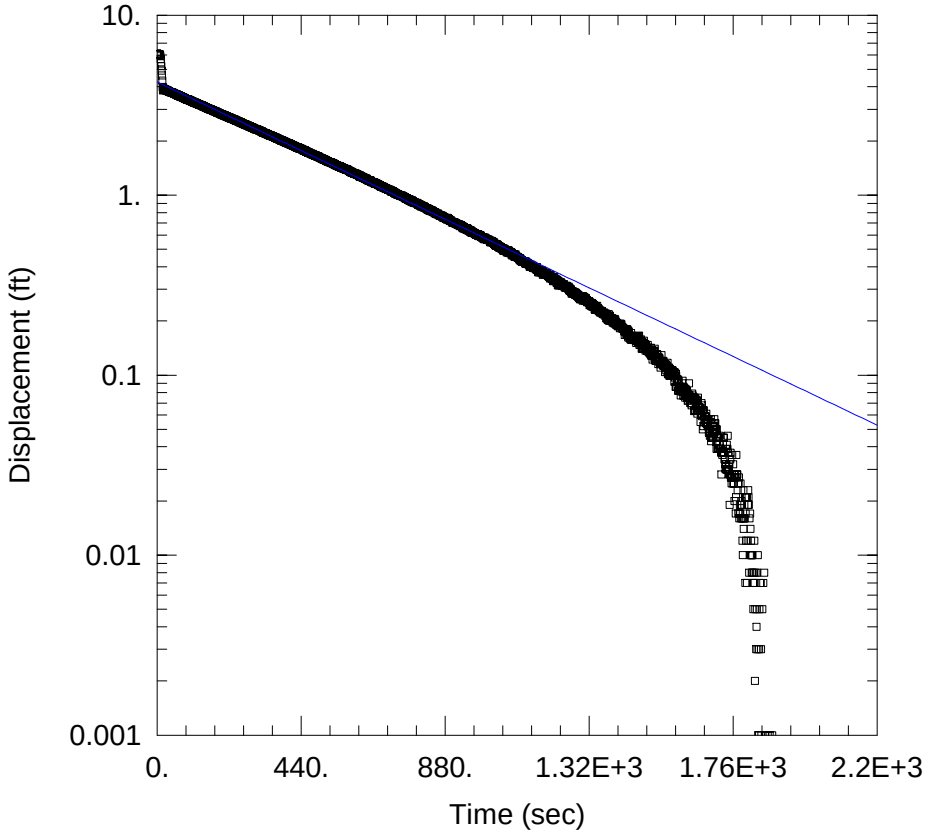
Saturated Thickness: 65.01 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223B_OUT3)

Initial Displacement: 0.602 ft
Total Well Penetration Depth: 60.27 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 60.27 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223C_IN1.aqt
Date: 01/17/19 Time: 13:48:57

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.6445 ft/day
y0 = 4.254 ft

AQUIFER DATA

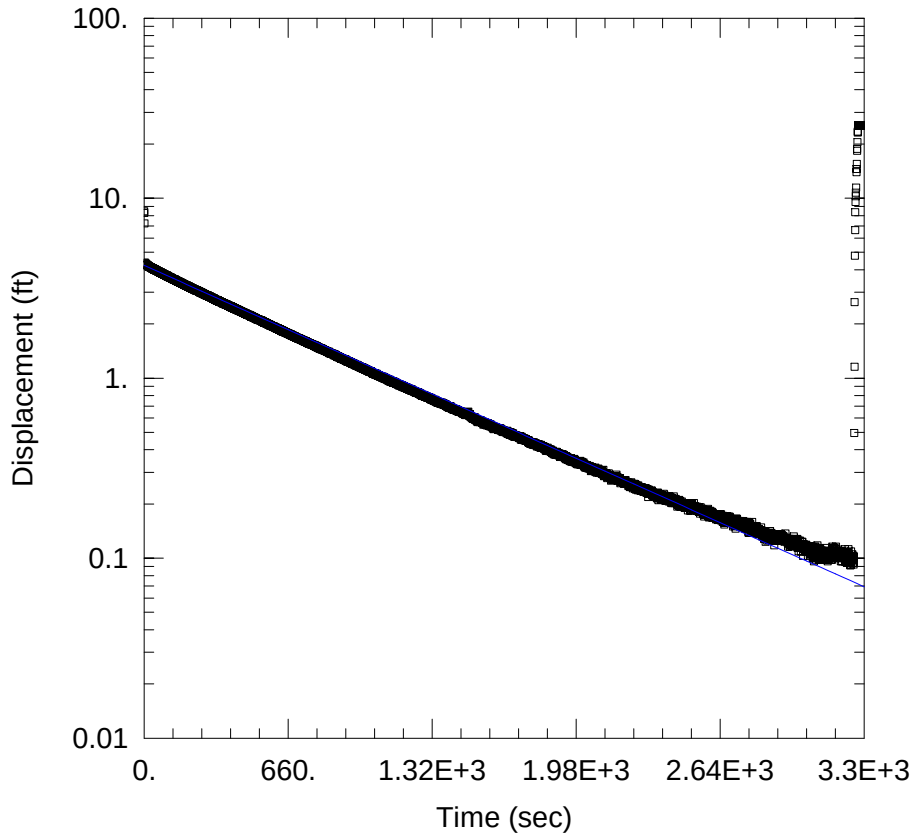
Saturated Thickness: 17. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223C_IN1)

Initial Displacement: 6.107 ft
Total Well Penetration Depth: 80. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 80. ft
Screen Length: 14.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW223C_OUT1.aqt
Date: 01/17/19 Time: 13:49:14

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW223C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.4023 ft/day
y0 = 4.229 ft

AQUIFER DATA

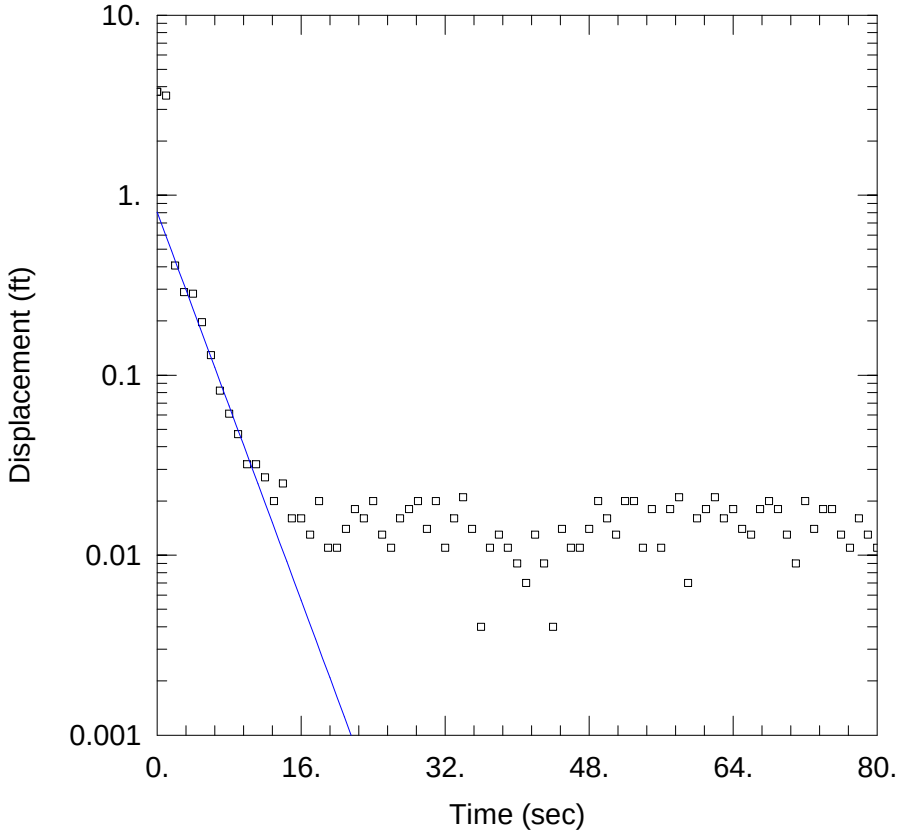
Saturated Thickness: 17. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-223C_OUT1)

Initial Displacement: 8.278 ft
Total Well Penetration Depth: 80. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 80. ft
Screen Length: 14.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224A_IN2.aqt
Date: 01/17/19 Time: 17:10:27

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 15.59 ft/day
y0 = 0.8059 ft

AQUIFER DATA

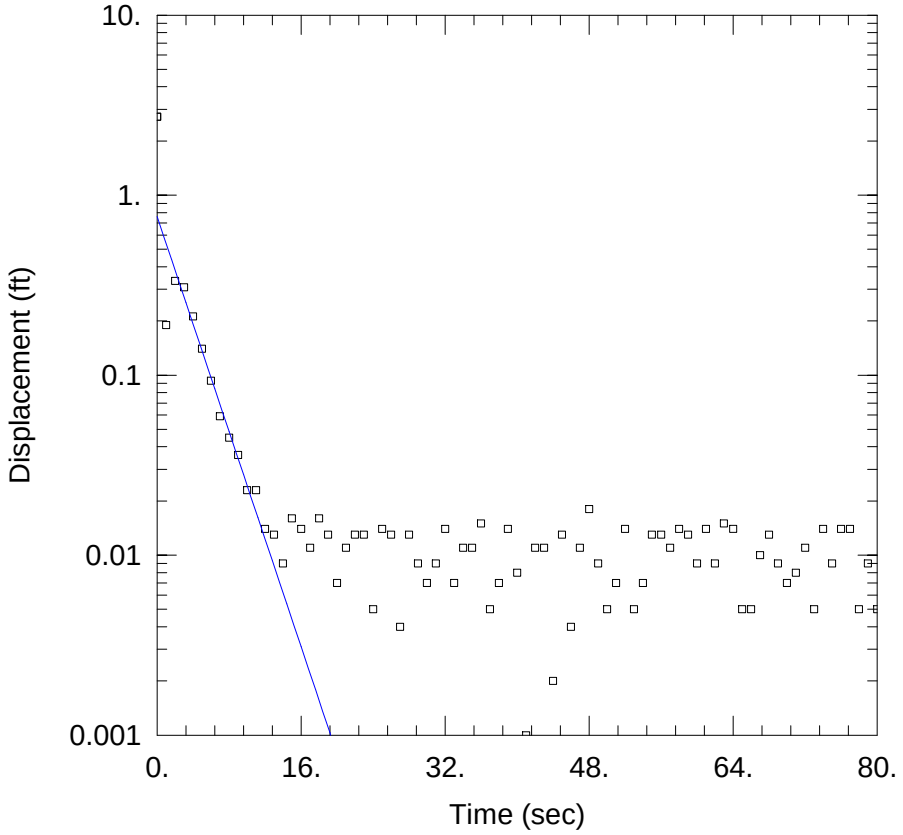
Saturated Thickness: 65.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224A_IN2)

Initial Displacement: 3.756 ft
Total Well Penetration Depth: 39.85 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.85 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224A_IN3.aqt
Date: 01/17/19 Time: 17:10:55

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 17.28 ft/day
y0 = 0.7606 ft

AQUIFER DATA

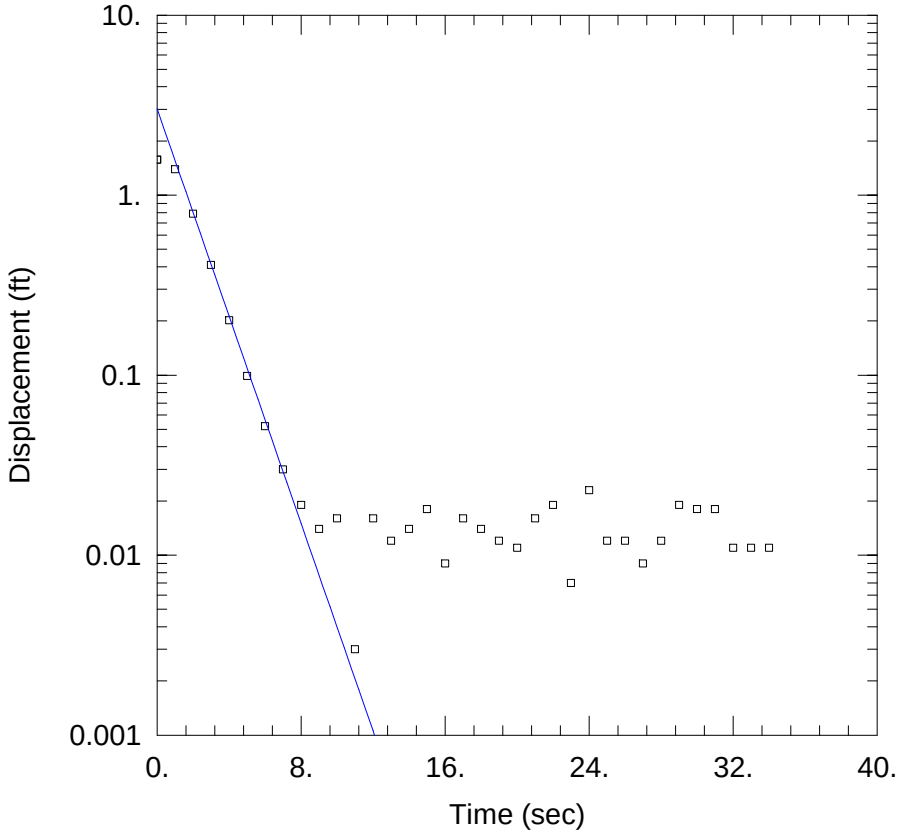
Saturated Thickness: 65.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224A_IN3)

Initial Displacement: 2.724 ft
Total Well Penetration Depth: 39.85 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.85 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224A_OUT1.aqt
Date: 01/17/19 Time: 17:11:22

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 33.32 ft/day
y0 = 3.018 ft

AQUIFER DATA

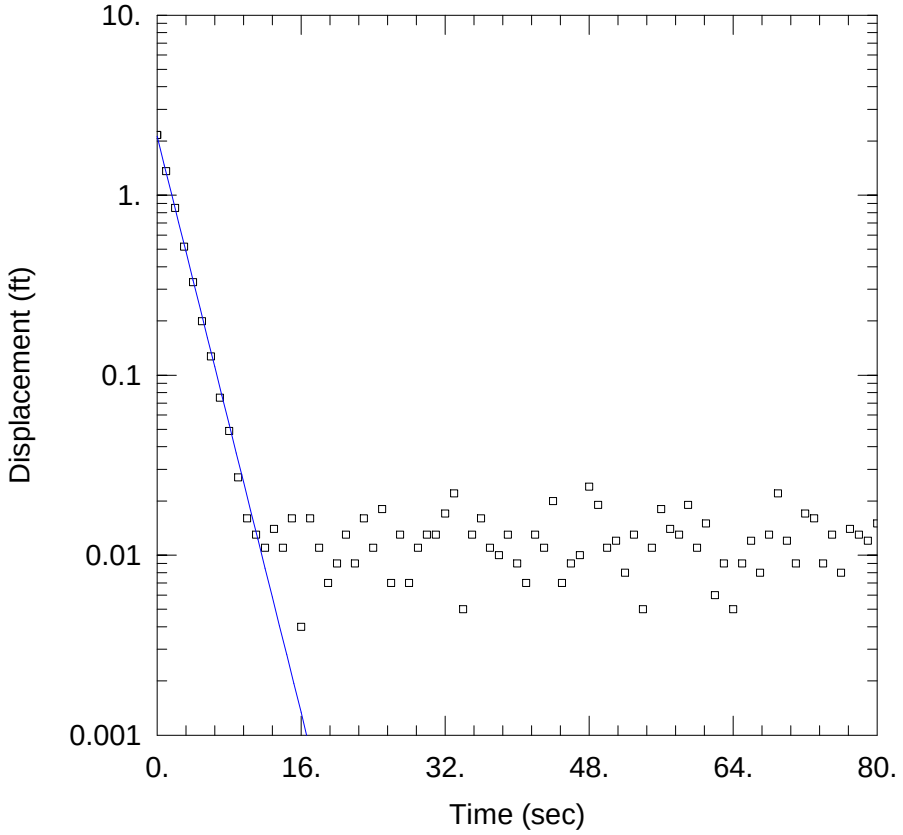
Saturated Thickness: 65.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224A_OUT1)

Initial Displacement: 1.575 ft
Total Well Penetration Depth: 39.85 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.85 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224A_OUT2.aqt
Date: 01/17/19 Time: 17:11:42

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 23.14 ft/day
y0 = 2.124 ft

AQUIFER DATA

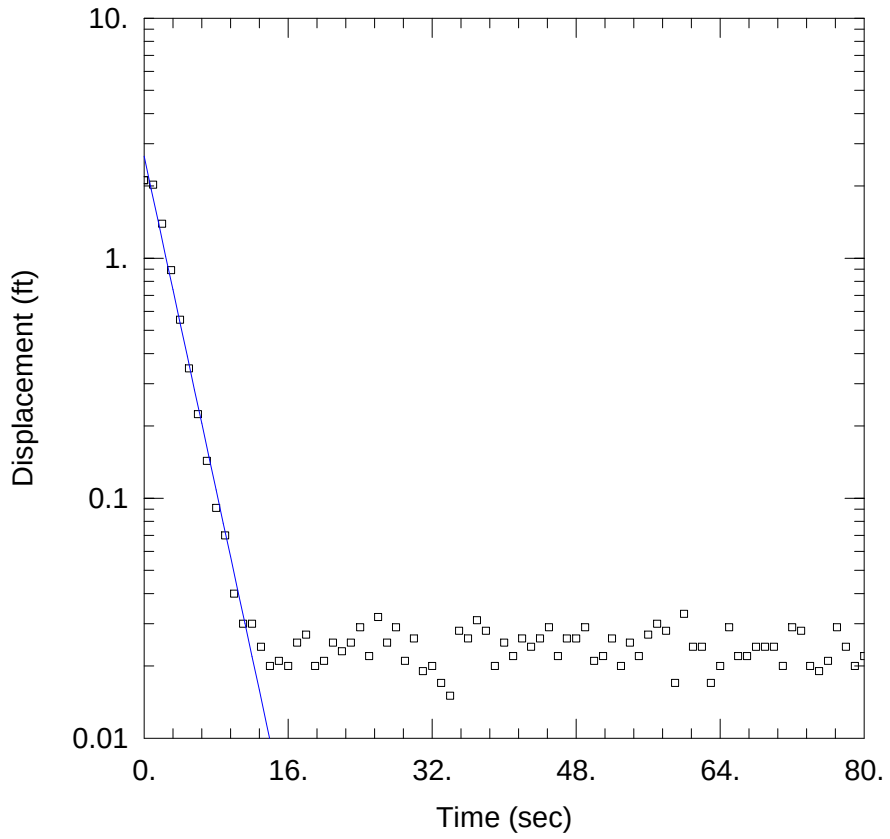
Saturated Thickness: 65.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224A_OUT2)

Initial Displacement: 2.163 ft
Total Well Penetration Depth: 39.85 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 39.85 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224A_OUT3.aqt
Date: 01/17/19 Time: 17:12:06

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 20.18 ft/day
y0 = 2.661 ft

AQUIFER DATA

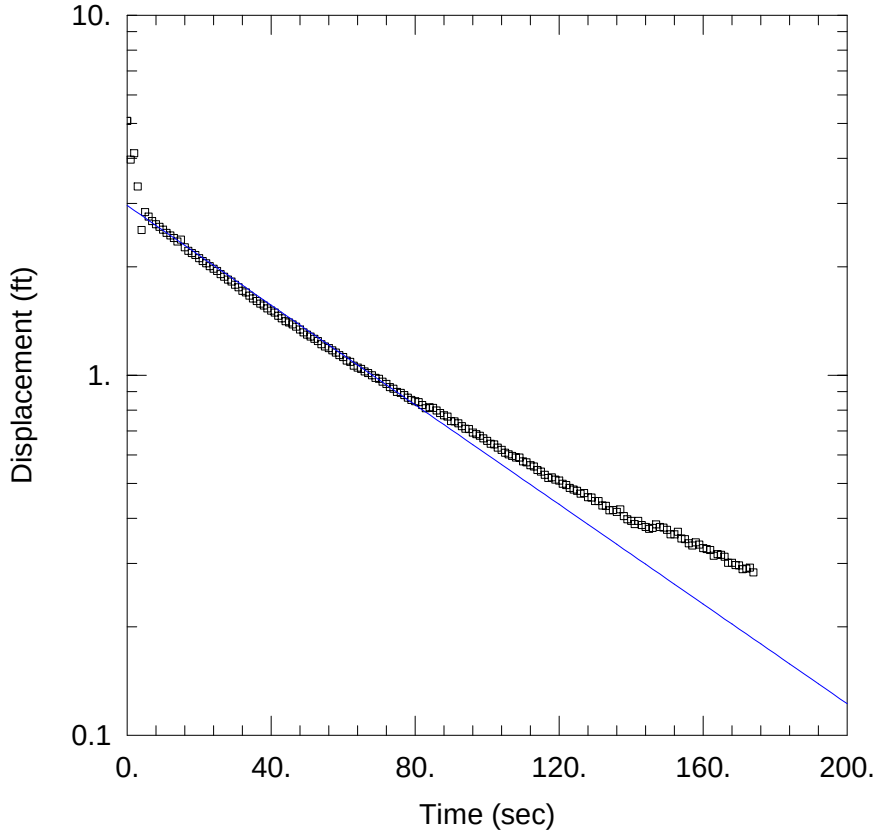
Saturated Thickness: 65.79 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224A_OUT1)

Initial Displacement: 2.115 ft
Total Well Penetration Depth: 40.67 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 40.67 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224B_IN1.aqt
Date: 01/17/19 Time: 13:54:07

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.045 ft/day
y0 = 2.96 ft

AQUIFER DATA

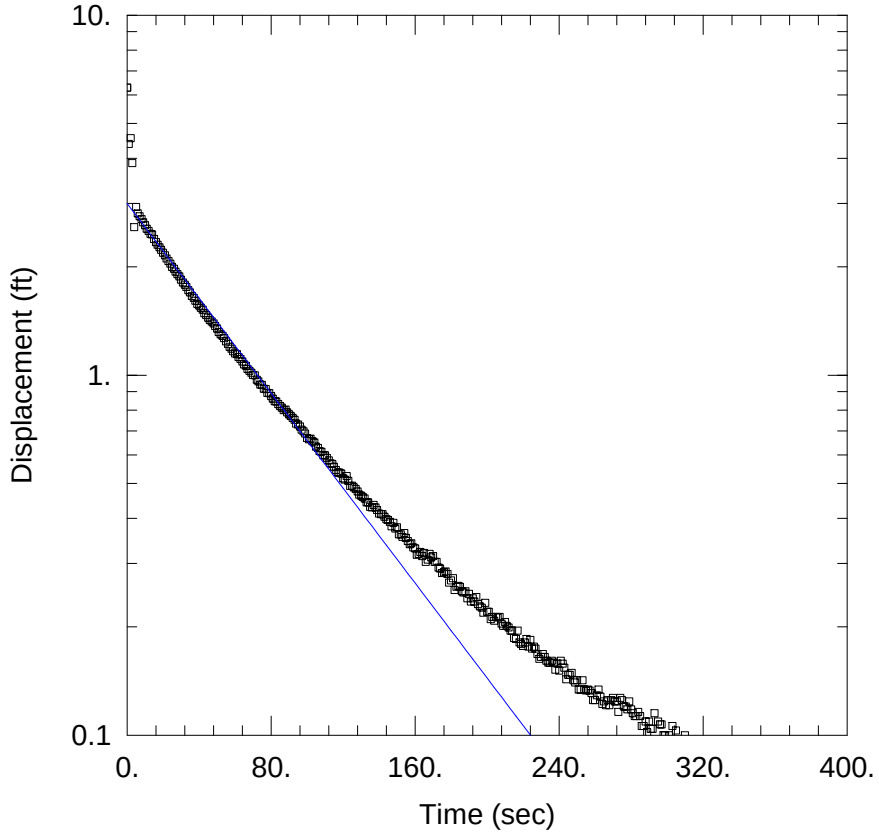
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224B_IN1)

Initial Displacement: 5.085 ft
Total Well Penetration Depth: 92.33 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 92.33 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224B_IN2.aqt
Date: 01/17/19 Time: 13:54:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.9952 ft/day
y0 = 2.999 ft

AQUIFER DATA

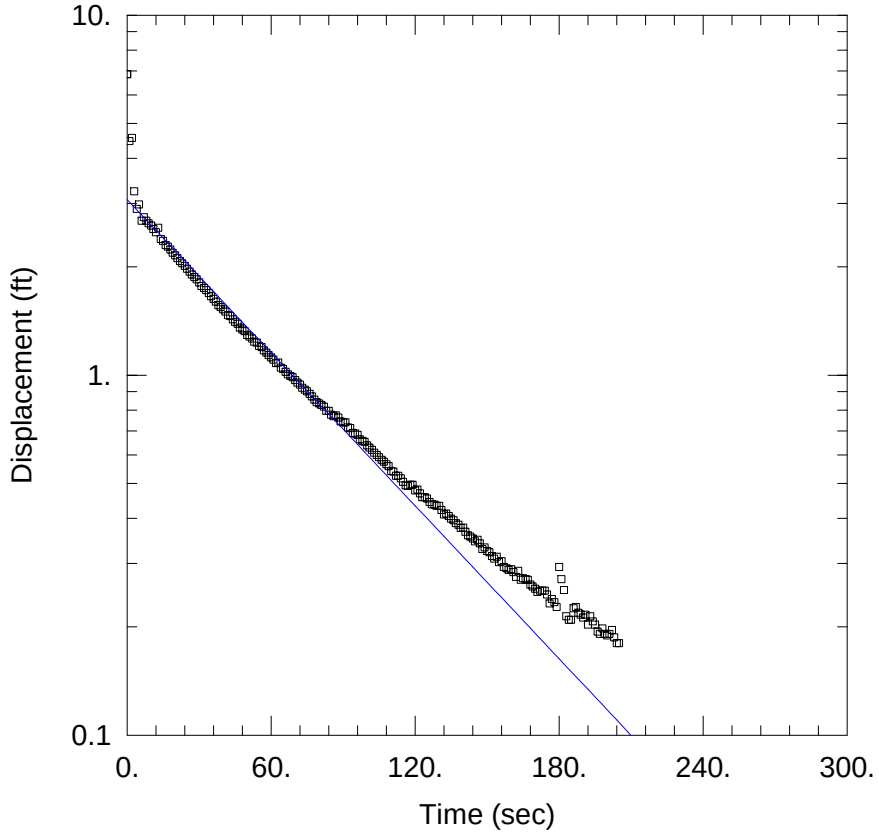
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224B_IN2)

Initial Displacement: 6.285 ft
Total Well Penetration Depth: 92.33 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 92.33 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224B_IN3.aqt
Date: 01/17/19 Time: 13:54:43

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.07 ft/day
y0 = 3.072 ft

AQUIFER DATA

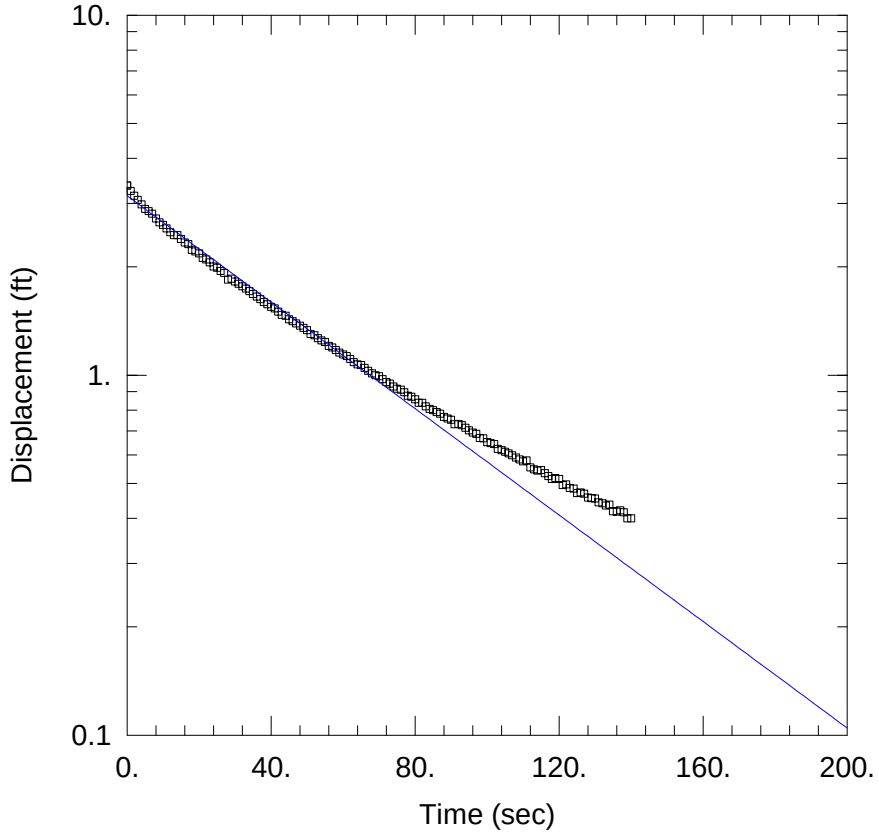
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224B_IN3)

Initial Displacement: 6.853 ft
Total Well Penetration Depth: 92.33 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 92.33 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224B_OUT1.aqt
Date: 01/17/19 Time: 13:55:10

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.116 ft/day
y0 = 3.151 ft

AQUIFER DATA

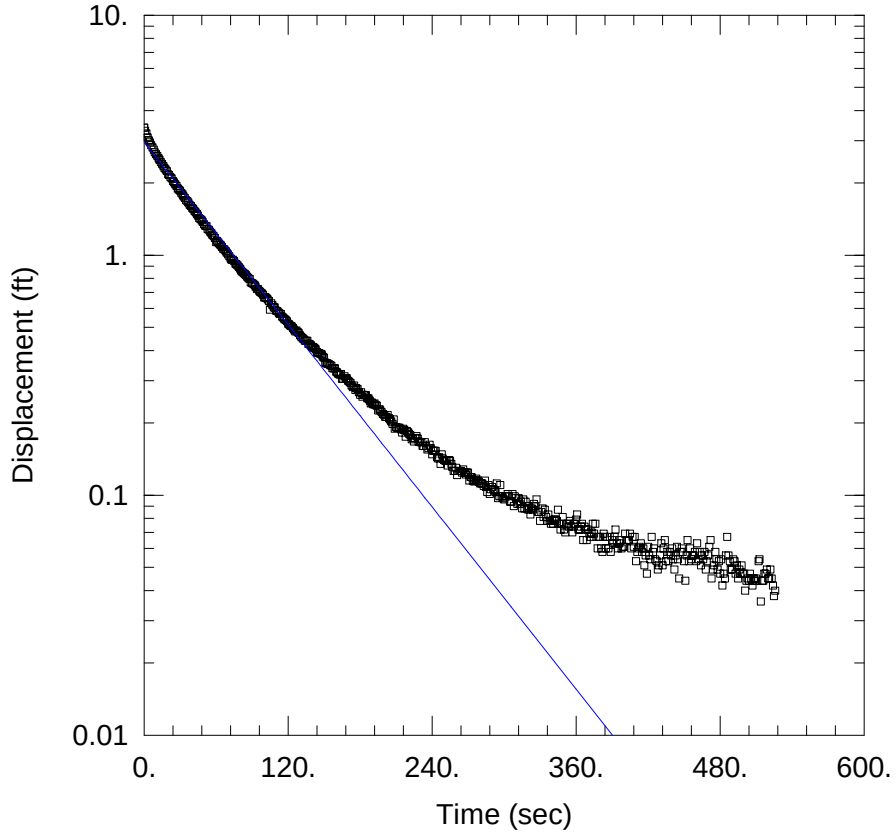
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224B_OUT1)

Initial Displacement: 3.365 ft
Total Well Penetration Depth: 92.33 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 92.33 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224B_OUT2.aqt
Date: 01/17/19 Time: 13:55:28

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.9559 ft/day
y0 = 2.956 ft

AQUIFER DATA

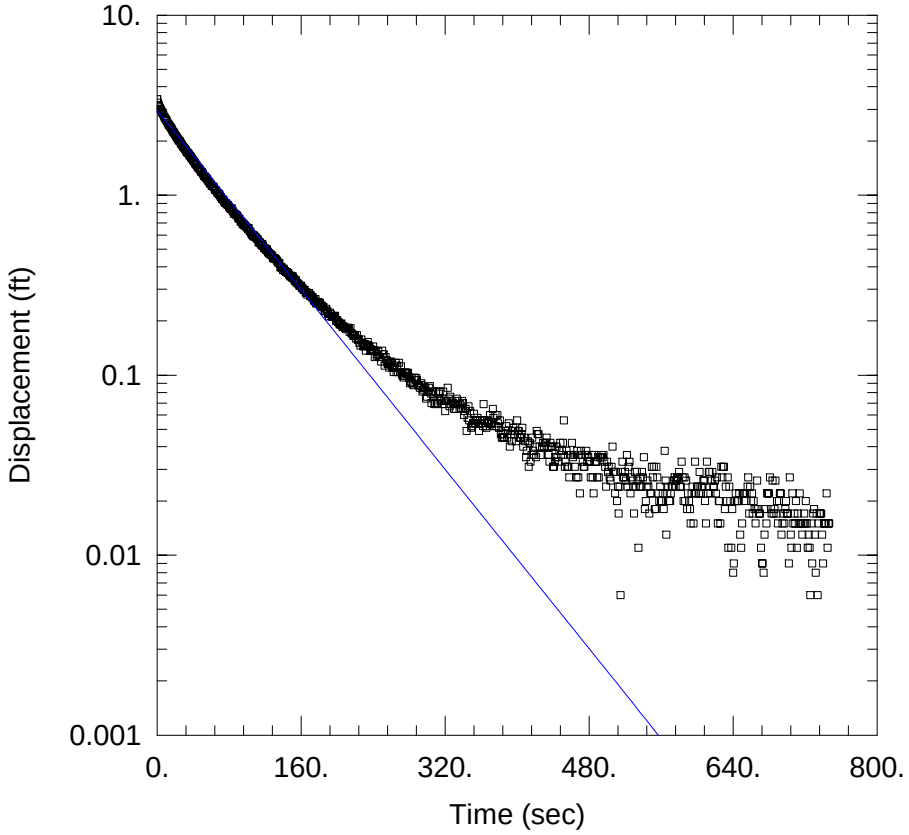
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224B_OUT2)

Initial Displacement: 3.404 ft
Total Well Penetration Depth: 92.33 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 92.33 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224B_OUT3.aqt
Date: 01/17/19 Time: 13:55:42

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.9412 ft/day
y0 = 2.956 ft

AQUIFER DATA

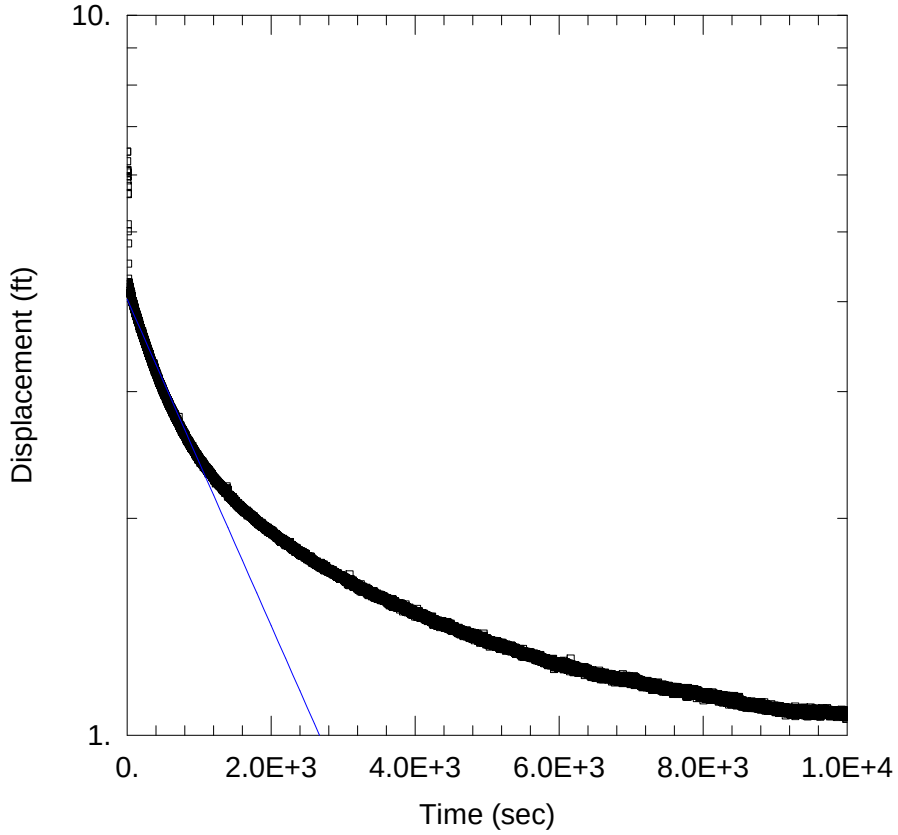
Saturated Thickness: 22.2 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224B_OUT3)

Initial Displacement: 3.419 ft
Total Well Penetration Depth: 92.76 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 92.76 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224C_IN1.aqt
Date: 01/17/19 Time: 13:57:31

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.1404 ft/day
y0 = 4.03 ft

AQUIFER DATA

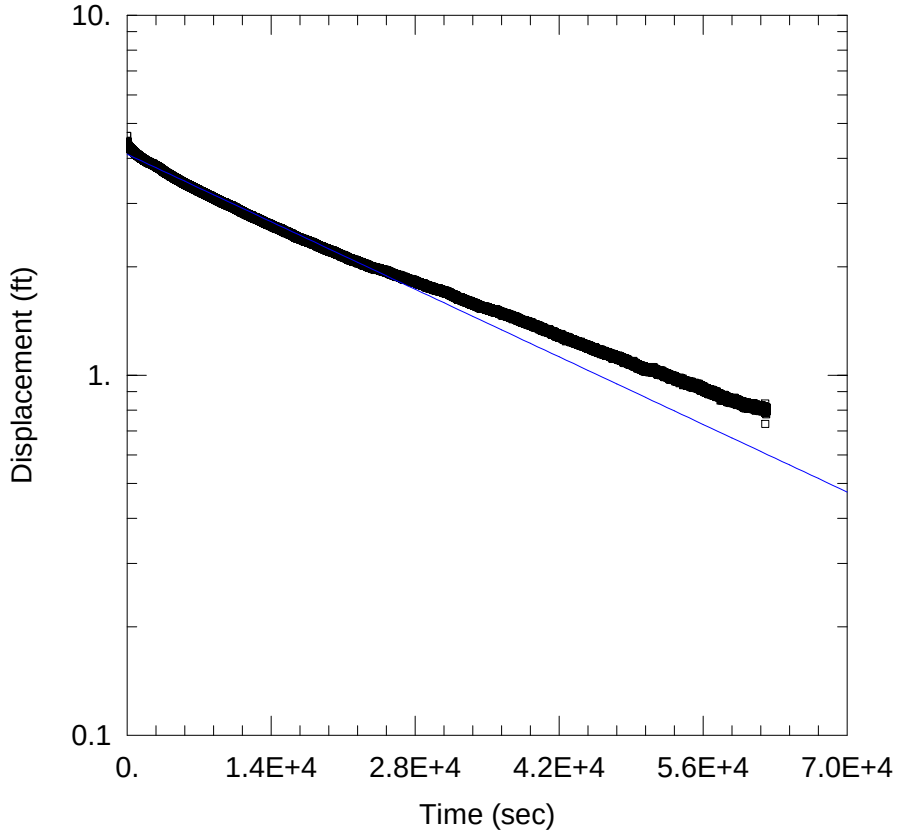
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224C_IN1)

Initial Displacement: 6.463 ft
Total Well Penetration Depth: 159. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 159. ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW224C_OUT1.aqt
Date: 01/17/19 Time: 13:58:15

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW224C
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.008311 ft/day
y0 = 4.11 ft

AQUIFER DATA

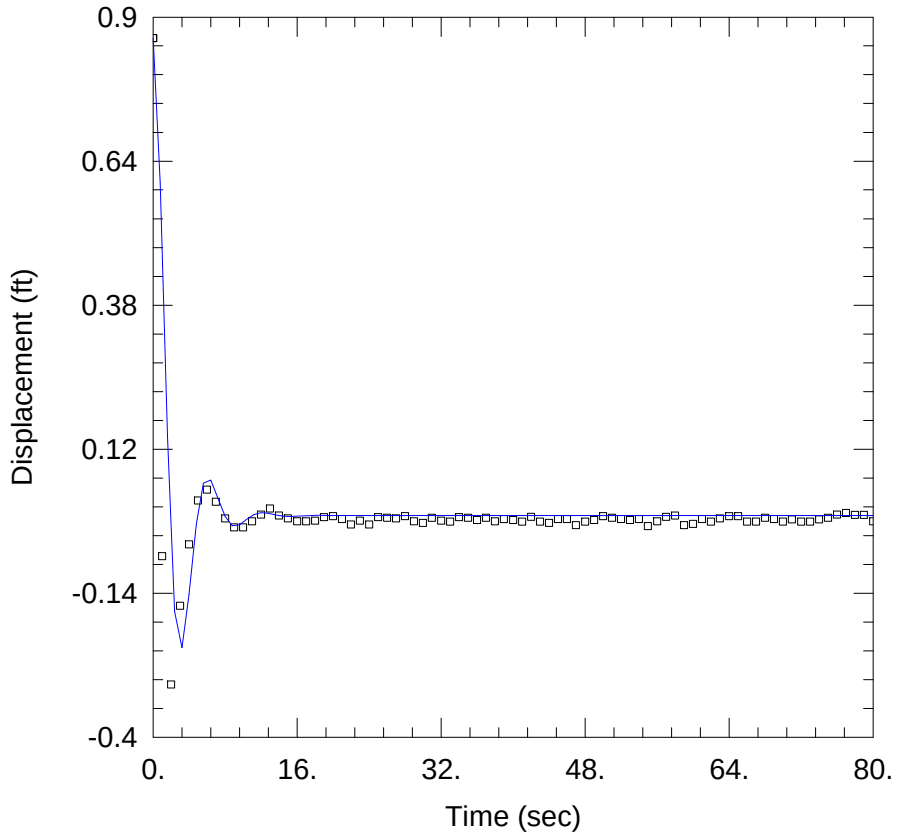
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-224C_OUT1)

Initial Displacement: 4.619 ft
Total Well Penetration Depth: 159. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 159. ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225A_IN1.aqt
Date: 01/17/19 Time: 14:20:00

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 81.83 ft/day
Le = 25.76 ft

AQUIFER DATA

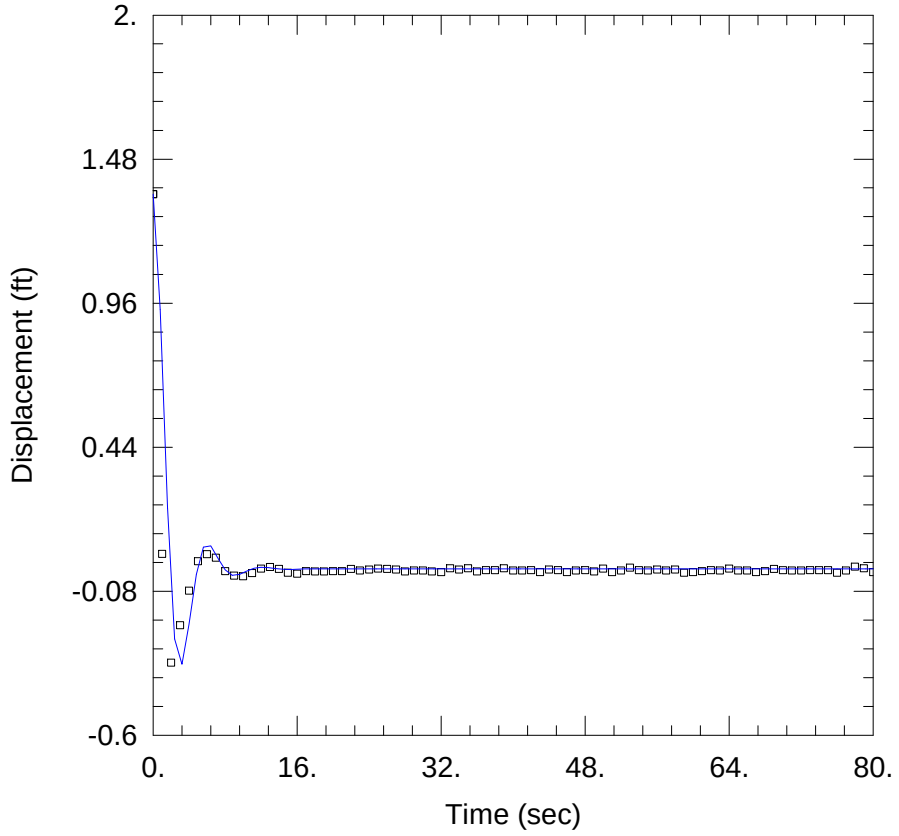
Saturated Thickness: 36.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225A_IN1)

Initial Displacement: 0.862 ft
Total Well Penetration Depth: 35.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 35.55 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225A_IN2.aqt
Date: 01/17/19 Time: 14:20:15

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 78.72 ft/day
Le = 24.98 ft

AQUIFER DATA

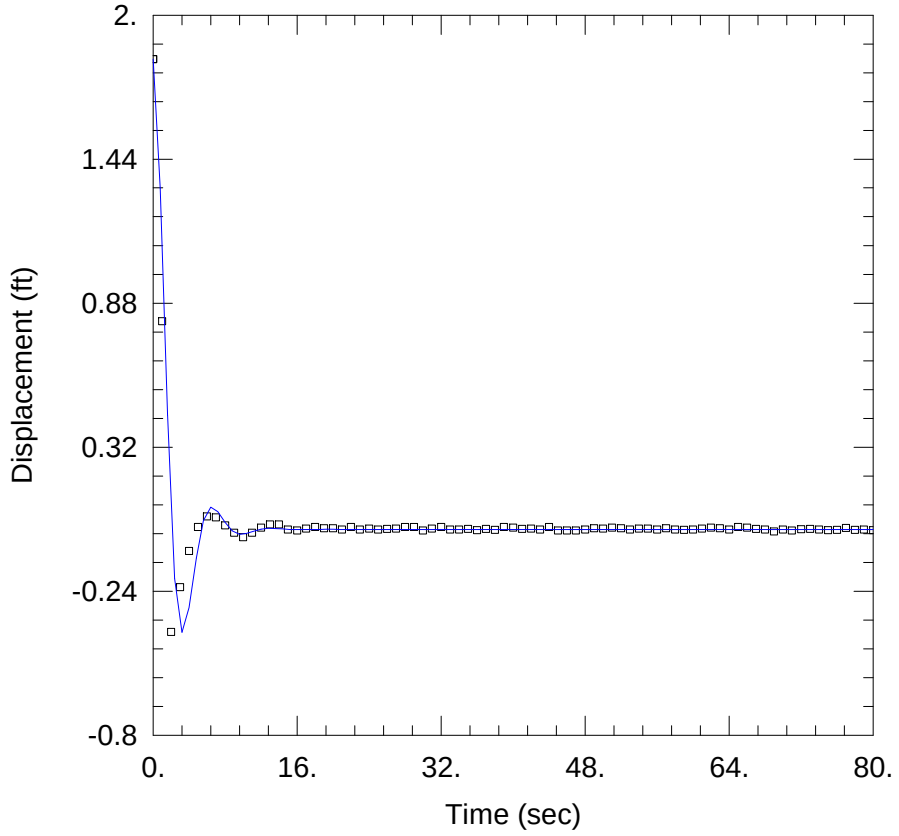
Saturated Thickness: 36.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225A_IN2)

Initial Displacement: 1.354 ft
Total Well Penetration Depth: 35.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 35.55 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225A_IN3.aqt
Date: 01/17/19 Time: 14:20:31

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 67.21 ft/day
Le = 28.06 ft

AQUIFER DATA

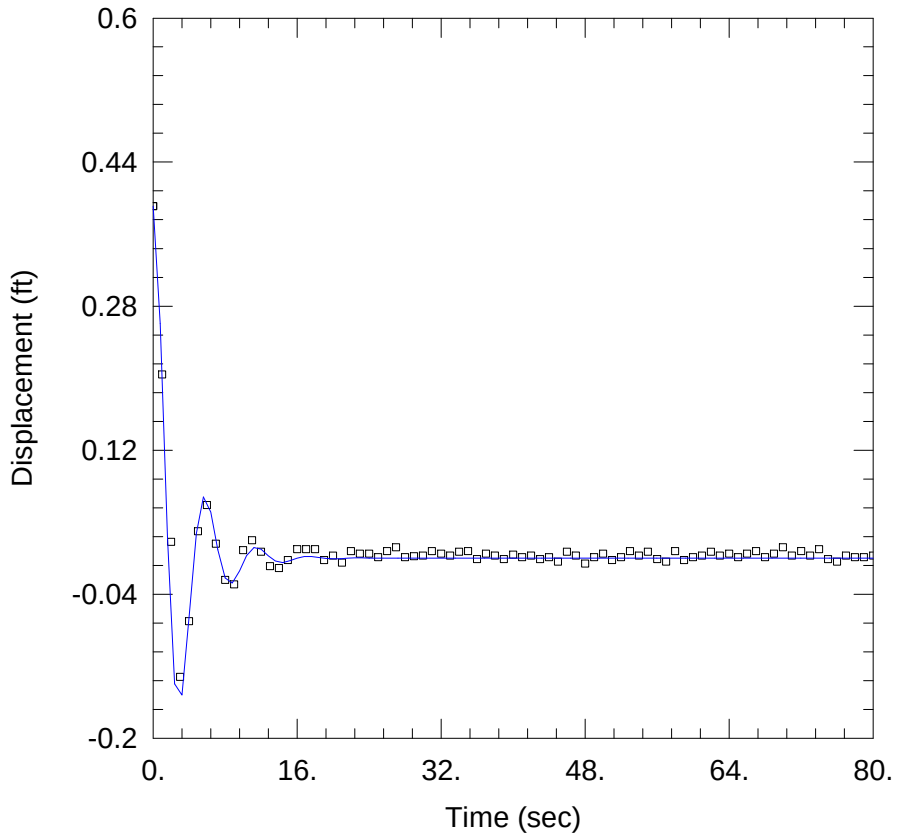
Saturated Thickness: 36.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225A_IN3)

Initial Displacement: 1.829 ft
Total Well Penetration Depth: 35.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 35.55 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225A_OUT1.aqt
Date: 01/17/19 Time: 14:20:47

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 117.5 ft/day
Le = 24.7 ft

AQUIFER DATA

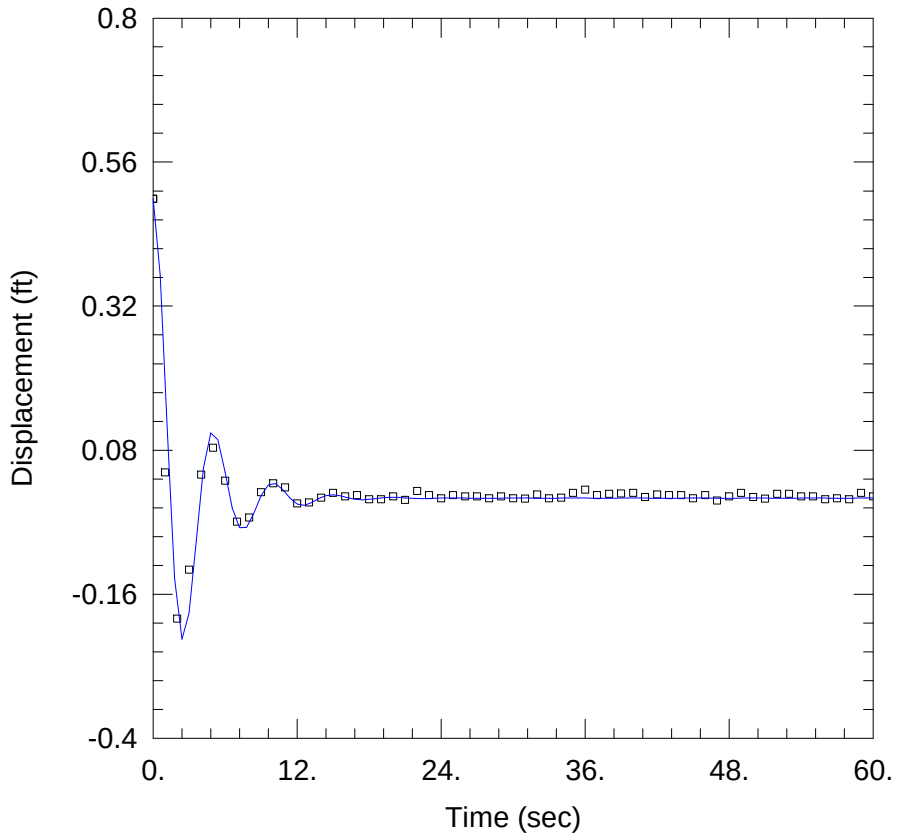
Saturated Thickness: 36.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225A_OUT1)

Initial Displacement: 0.391 ft
Total Well Penetration Depth: 35.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 35.55 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225A_OUT2.aqt
Date: 01/17/19 Time: 14:21:05

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 154.9 ft/day
Le = 19.18 ft

AQUIFER DATA

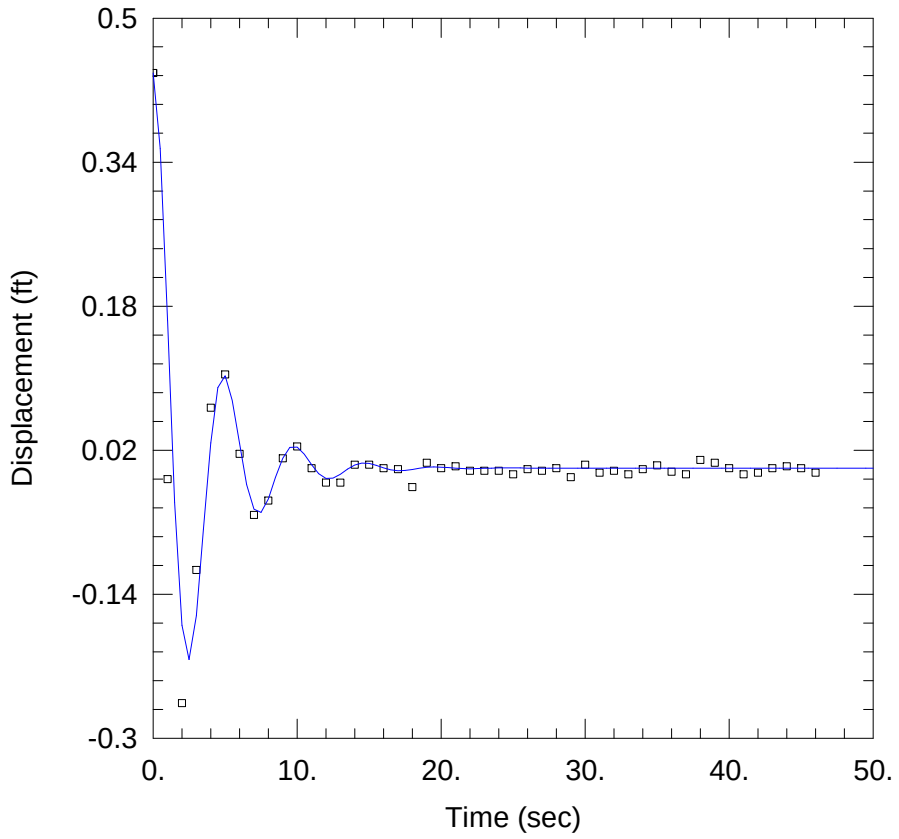
Saturated Thickness: 36.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225A_OUT2)

Initial Displacement: 0.499 ft
Total Well Penetration Depth: 35.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 35.55 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225A_OUT3.aqt
Date: 01/17/19 Time: 14:21:20

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 163.2 ft/day
Le = 18.49 ft

AQUIFER DATA

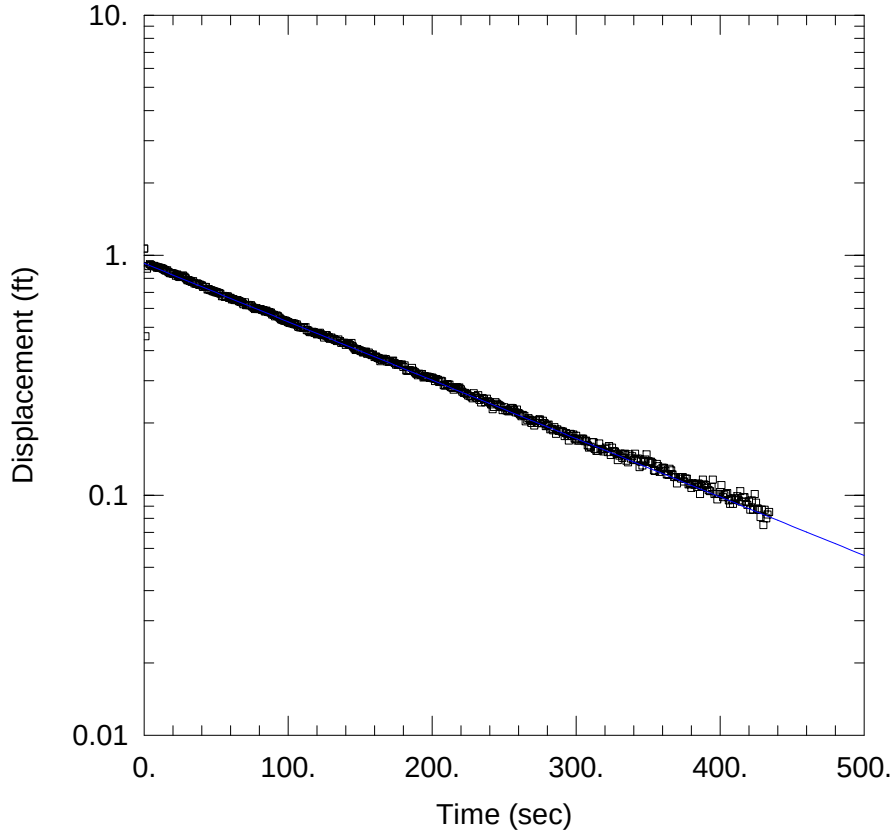
Saturated Thickness: 36.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225A_OUT3)

Initial Displacement: 0.439 ft
Total Well Penetration Depth: 35.55 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 35.55 ft
Screen Length: 19.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225B_IN1.aqt
Date: 01/17/19 Time: 14:22:26

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.368 ft/day
y0 = 0.9244 ft

AQUIFER DATA

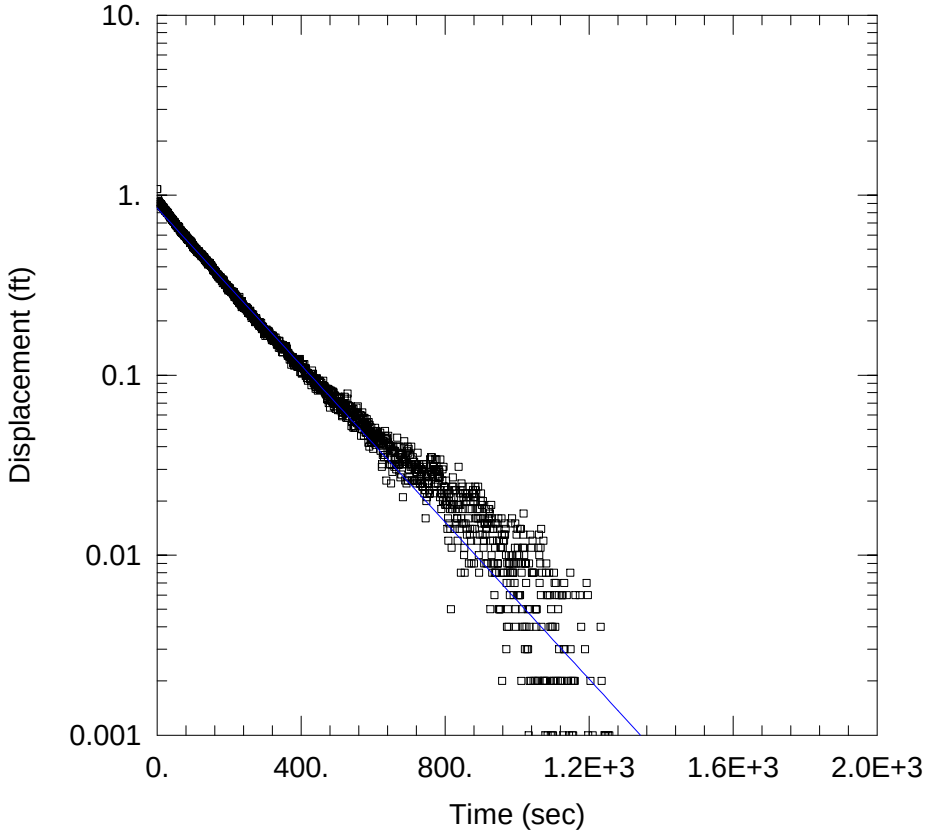
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225B_IN1)

Initial Displacement: 1.064 ft
Total Well Penetration Depth: 77.66 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 77.66 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225B_IN2.aqt
Date: 01/17/19 Time: 14:22:41

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.226 ft/day
y0 = 0.8476 ft

AQUIFER DATA

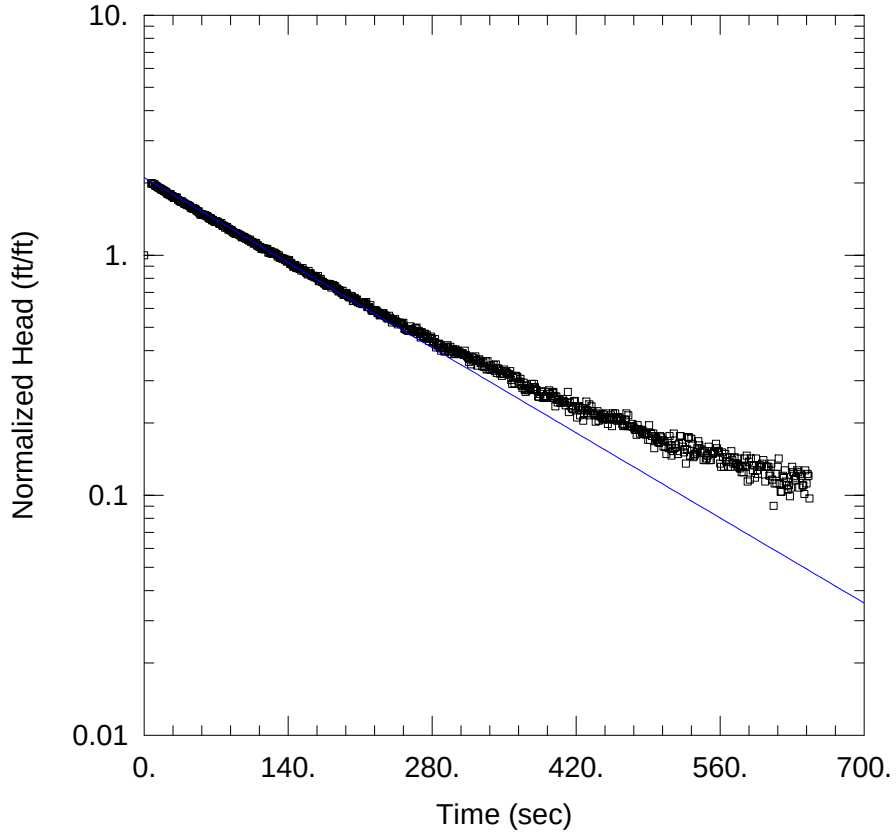
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225B_IN2)

Initial Displacement: 1.083 ft
Total Well Penetration Depth: 77.66 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 77.66 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225B_OUT1.aqt
Date: 01/17/19 Time: 14:23:01

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.424 ft/day
y0 = 0.9804 ft

AQUIFER DATA

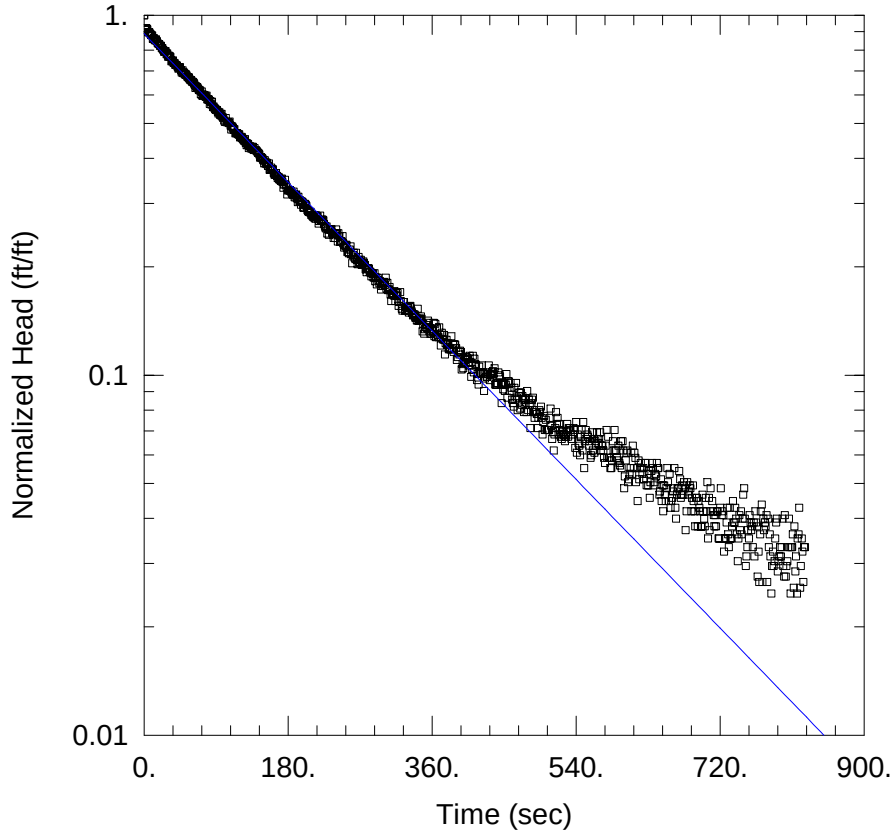
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225B_OUT1)

Initial Displacement: 0.465 ft
Total Well Penetration Depth: 77.31 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 77.31 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW225B_OUT2.aqt
Date: 01/17/19 Time: 14:23:19

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW225B
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.289 ft/day
y0 = 0.9345 ft

AQUIFER DATA

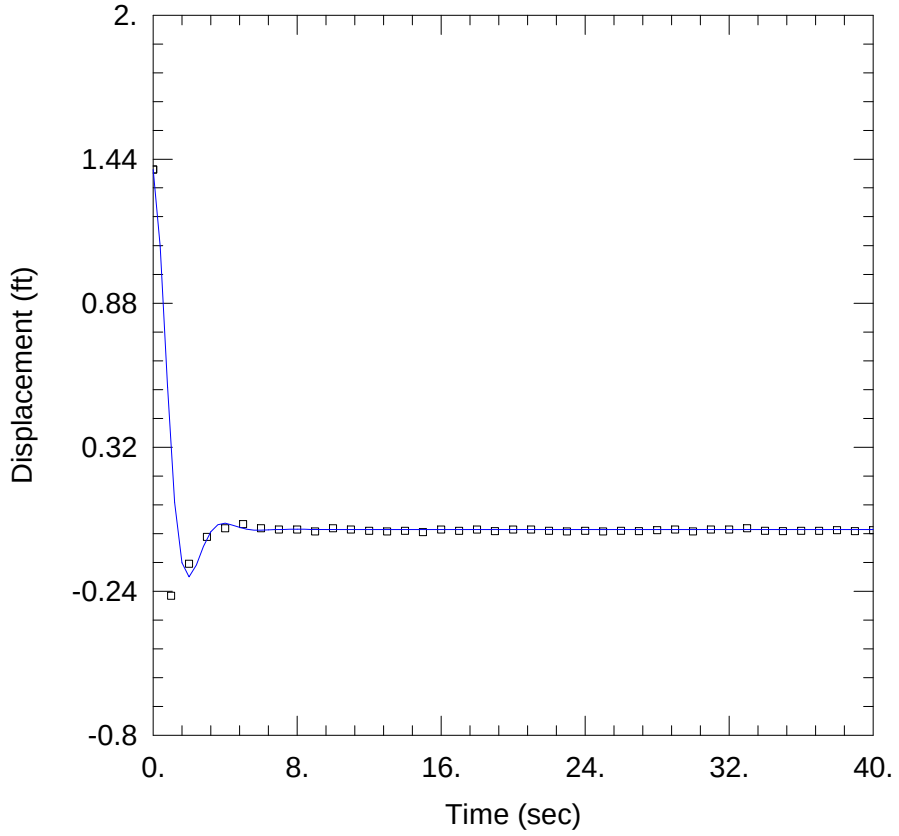
Saturated Thickness: 22. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-225B_OUT2)

Initial Displacement: 1.052 ft
Total Well Penetration Depth: 77.66 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 77.66 ft
Screen Length: 19.5 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW226A_IN2.aqt
Date: 01/17/19 Time: 14:24:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW226A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 111.3 ft/day
Le = 8.856 ft

AQUIFER DATA

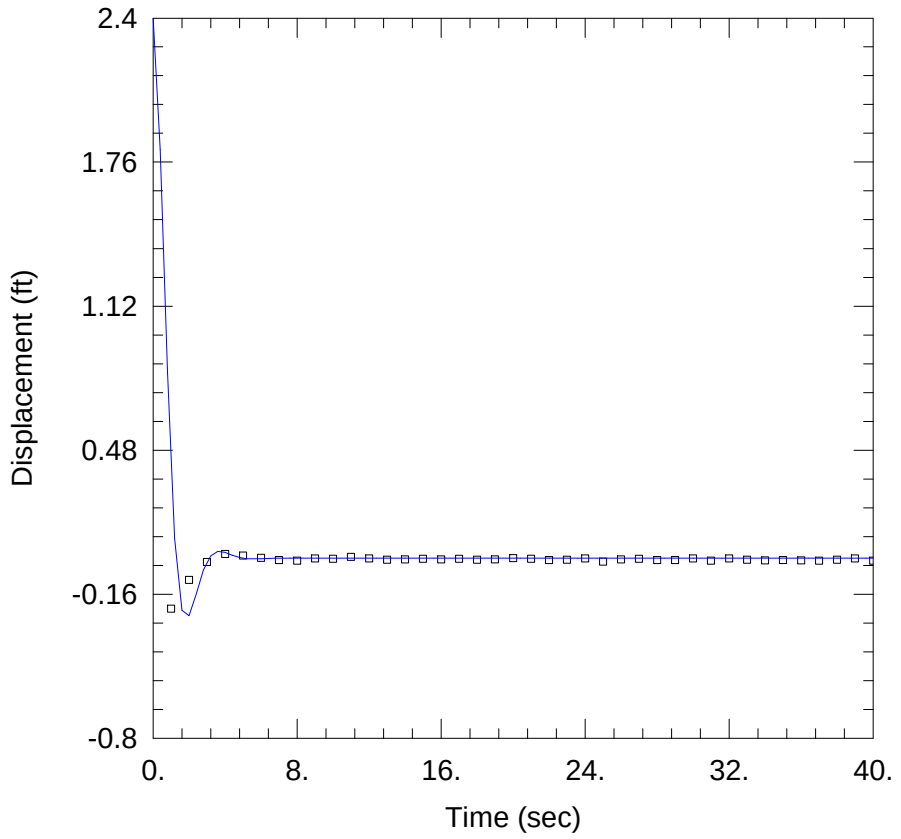
Saturated Thickness: 16.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-226A_IN2)

Initial Displacement: 1.4 ft
Total Well Penetration Depth: 16.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 16.44 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW226A_IN3.aqt
Date: 01/17/19 Time: 14:25:01

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW226A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 115.5 ft/day
Le = 7.402 ft

AQUIFER DATA

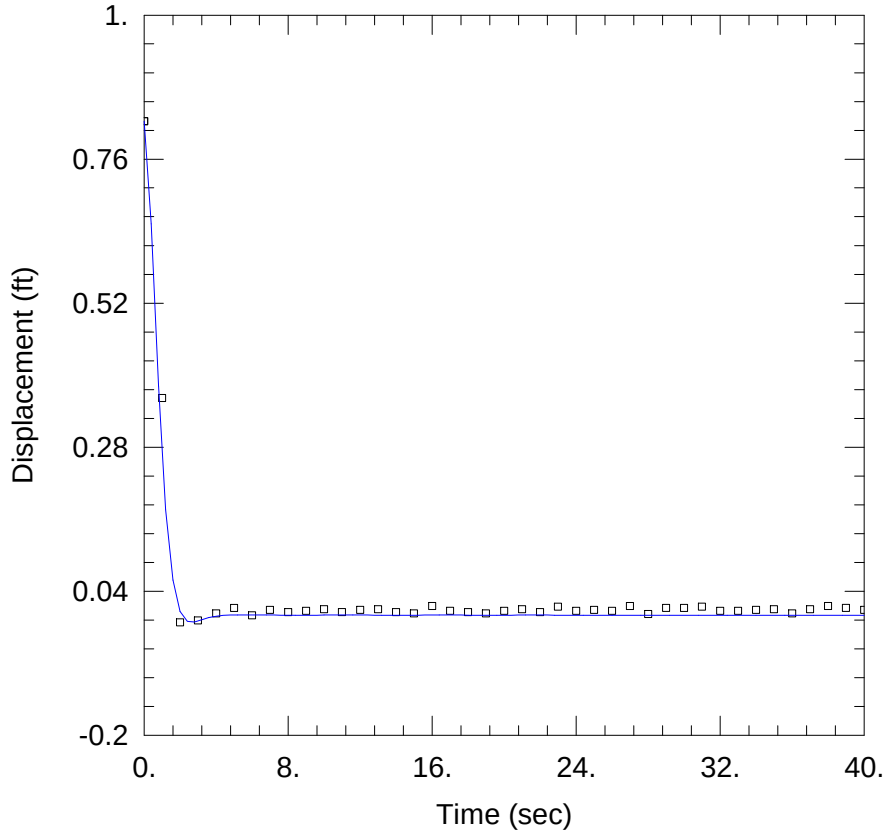
Saturated Thickness: 16.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-226A_IN3)

Initial Displacement: 2.406 ft
Total Well Penetration Depth: 16.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 16.44 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW226A_OUT1.aqt
Date: 01/17/19 Time: 14:25:15

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW226A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 78.95 ft/day
Le = 8.009 ft

AQUIFER DATA

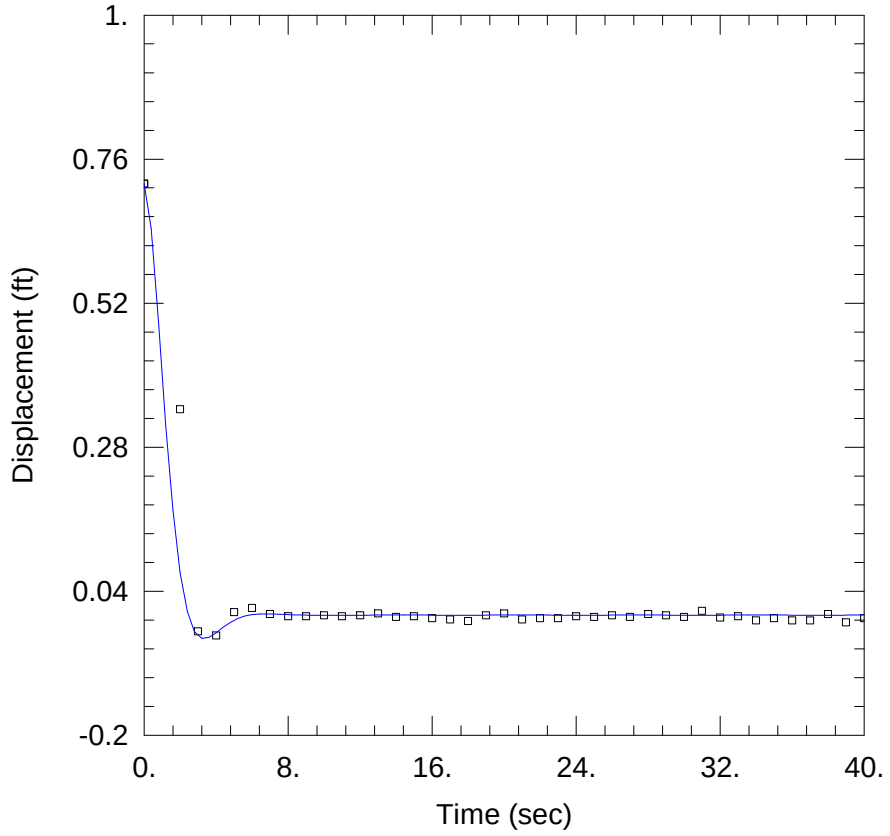
Saturated Thickness: 16.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-226A_OUT1)

Initial Displacement: 0.823 ft
Total Well Penetration Depth: 16.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 16.44 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW226A_OUT2.aqt
Date: 01/17/19 Time: 14:25:32

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW226A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 59.9 ft/day
Le = 19.45 ft

AQUIFER DATA

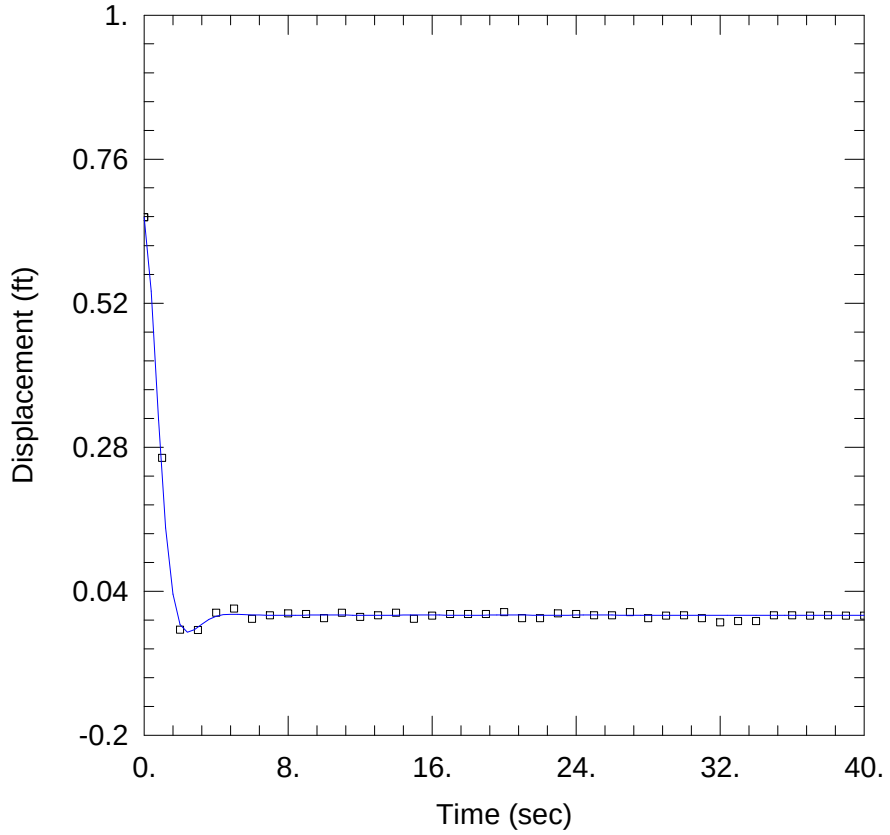
Saturated Thickness: 16.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-226A_OUT2)

Initial Displacement: 0.719 ft
Total Well Penetration Depth: 16.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 16.44 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\LVWPS-MW226A_OUT3.aqt
Date: 01/17/19 Time: 14:25:46

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-MW226A
Test Date: 11/27/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 81.47 ft/day
Le = 9.725 ft

AQUIFER DATA

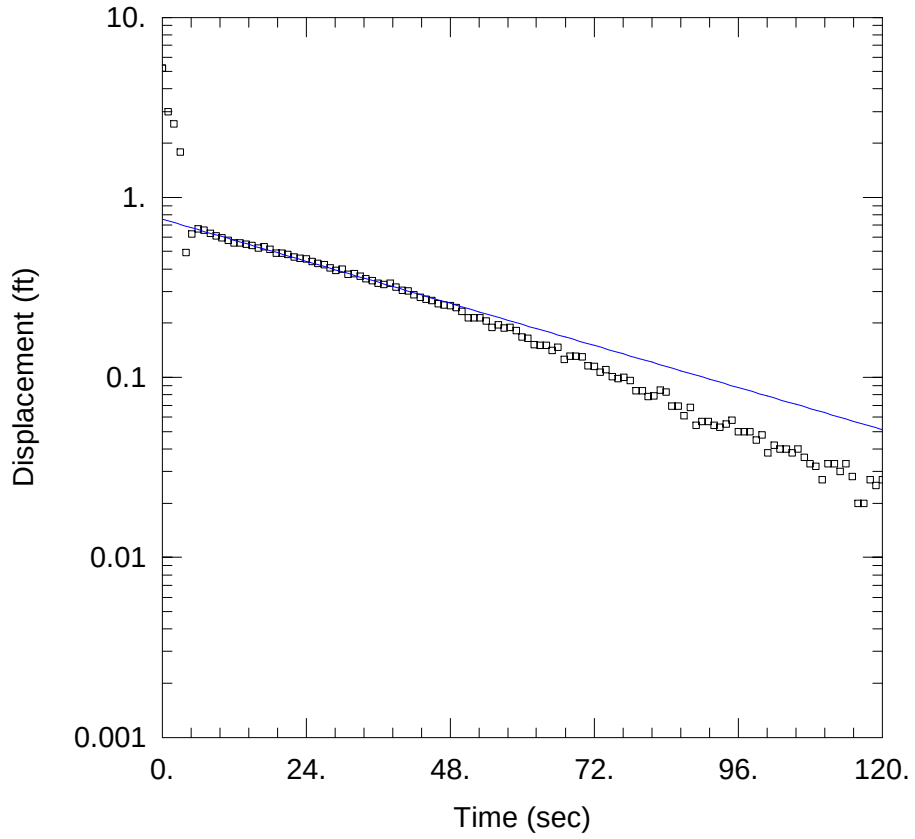
Saturated Thickness: 16.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-226A_OUT1)

Initial Displacement: 0.663 ft
Total Well Penetration Depth: 16.44 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 16.44 ft
Screen Length: 14.7 ft
Well Radius: 0.25 ft



WELL TEST ANALYSIS

Data Set: \...\WMW4.9S_IN1.aqt
Date: 01/28/19 Time: 09:18:44

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: WMW-4.9S
Test Date: 12/3/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.185 ft/day
y0 = 0.7563 ft

AQUIFER DATA

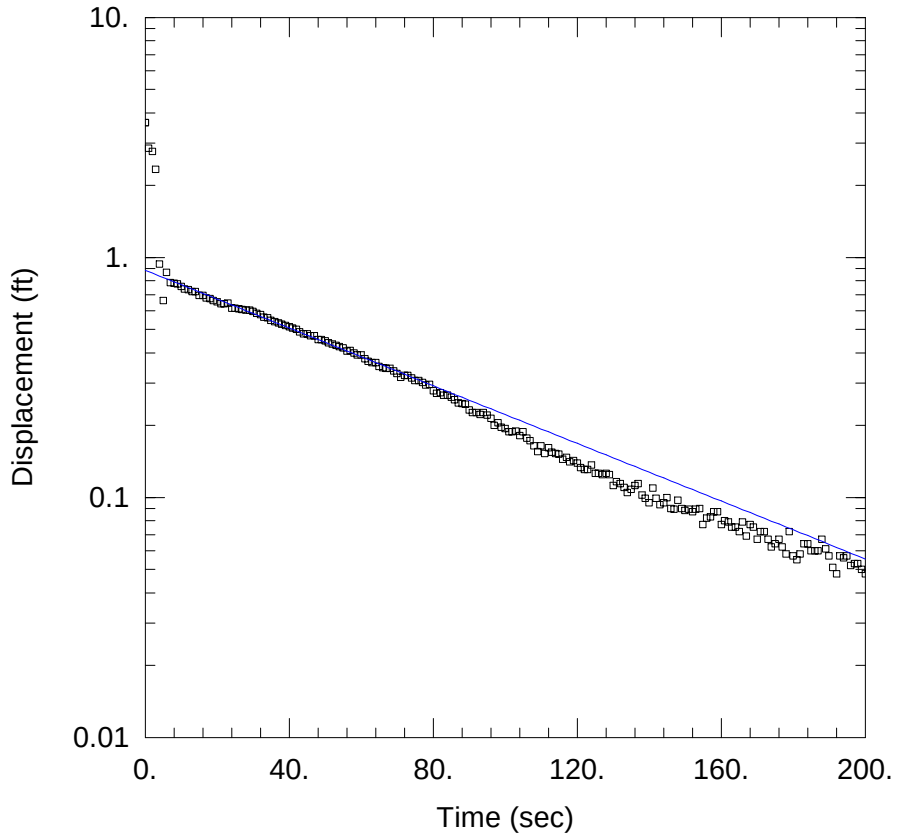
Saturated Thickness: 32. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WMW4.9S_IN1)

Initial Displacement: 5.214 ft
Total Well Penetration Depth: 23.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 20.45 ft
Screen Length: 23.6 ft
Well Radius: 0.4167 ft



WELL TEST ANALYSIS

Data Set: \...\WMW4.9S_IN2.aqt
Date: 01/28/19 Time: 09:19:26

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: WMW-4.9S
Test Date: 12/3/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.965 ft/day
y0 = 0.8834 ft

AQUIFER DATA

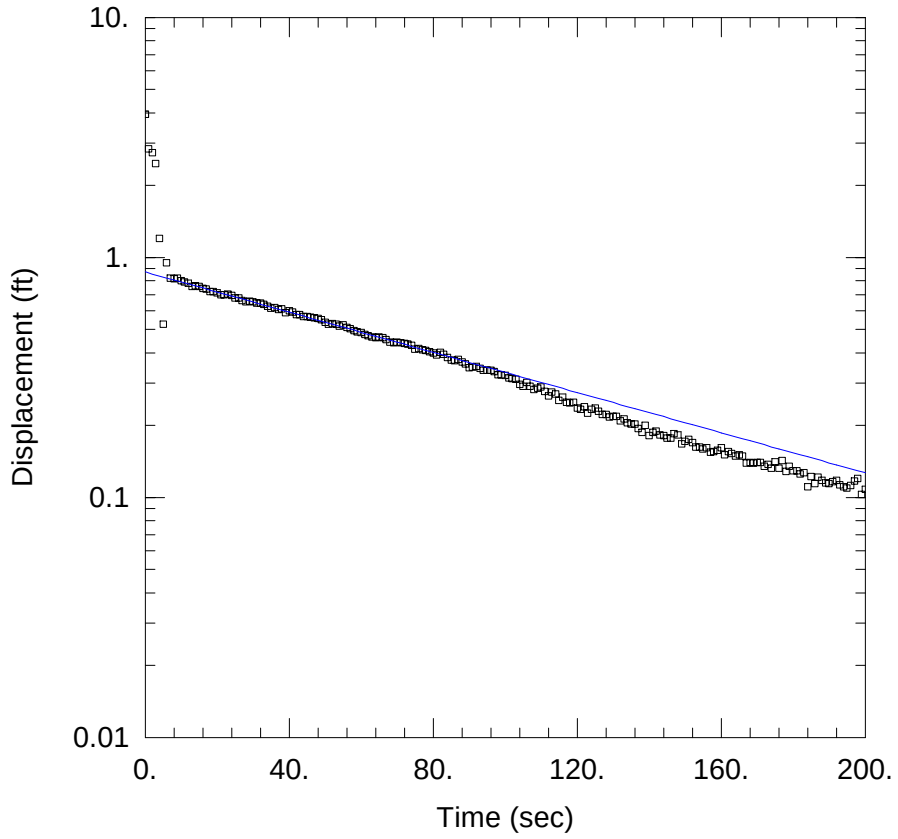
Saturated Thickness: 32. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WMW4.9S_IN2)

Initial Displacement: 3.652 ft
Total Well Penetration Depth: 23.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 20.45 ft
Screen Length: 23.6 ft
Well Radius: 0.4167 ft



WELL TEST ANALYSIS

Data Set: \...\WMW4.9S_IN3.aqt
Date: 01/28/19 Time: 09:19:51

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: WMW-4.9S
Test Date: 12/3/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.368 ft/day
y0 = 0.869 ft

AQUIFER DATA

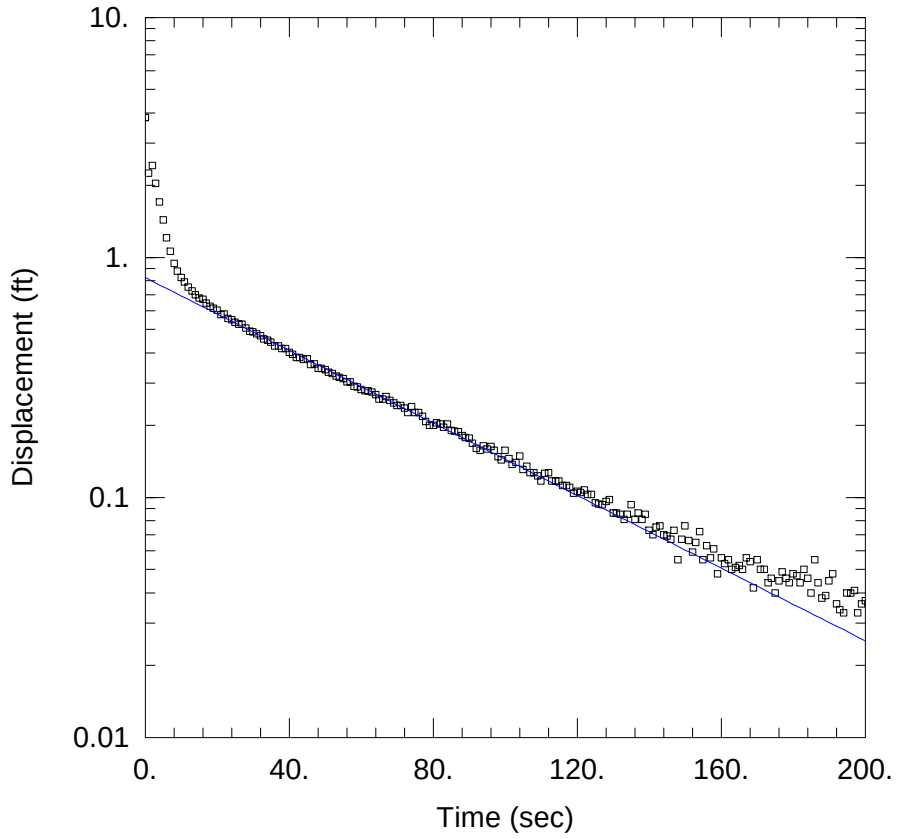
Saturated Thickness: 32. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WMW4.9S_IN3)

Initial Displacement: 3.942 ft
Total Well Penetration Depth: 23.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 20.45 ft
Screen Length: 23.6 ft
Well Radius: 0.4167 ft



WELL TEST ANALYSIS

Data Set: \...\WMW4.9S_OUT1.aqt
Date: 01/28/19 Time: 09:20:11

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: WMW-4.9S
Test Date: 12/3/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.472 ft/day
y0 = 0.822 ft

AQUIFER DATA

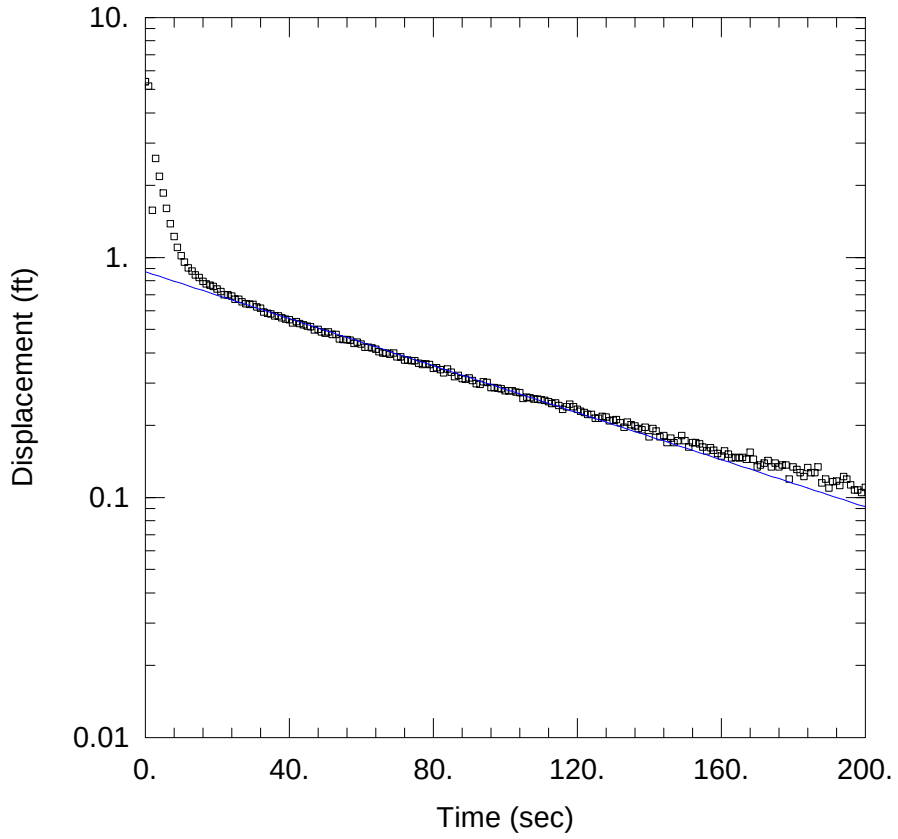
Saturated Thickness: 32. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WMW4.9S_OUT1)

Initial Displacement: 3.815 ft
Total Well Penetration Depth: 23.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 20.45 ft
Screen Length: 23.6 ft
Well Radius: 0.4167 ft



WELL TEST ANALYSIS

Data Set: \...\WMW4.9S_OUT2.aqt
Date: 01/28/19 Time: 09:20:37

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: WMW-4.9S
Test Date: 12/3/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.601 ft/day
y0 = 0.8712 ft

AQUIFER DATA

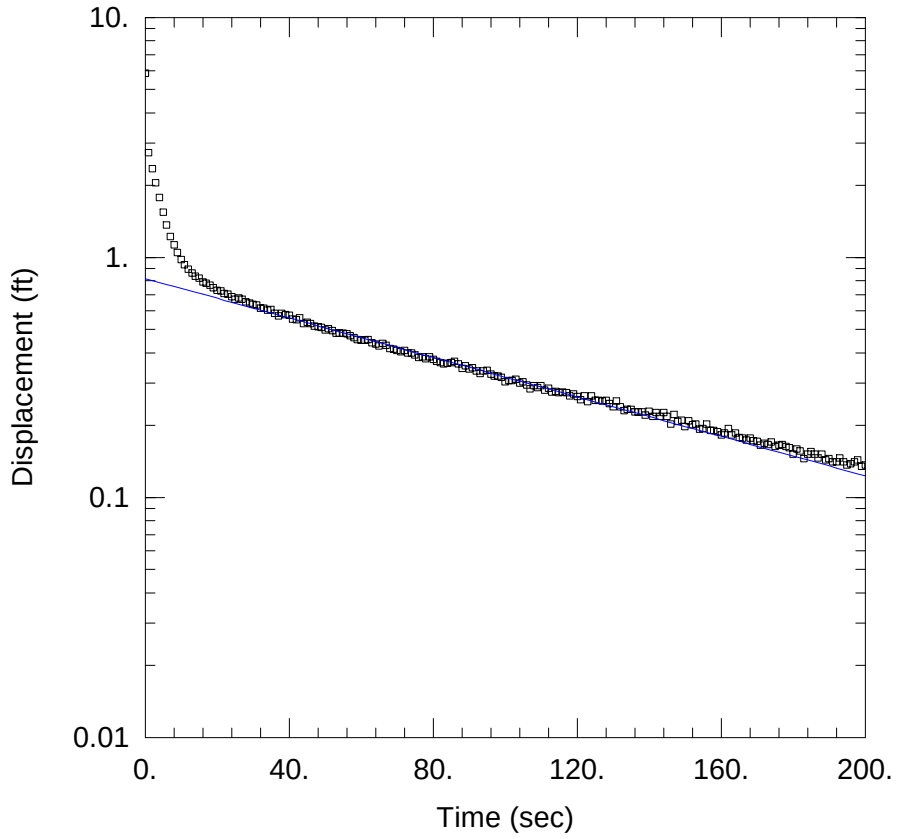
Saturated Thickness: 32. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WMW4.9S_OUT2)

Initial Displacement: 5.397 ft
Total Well Penetration Depth: 23.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 20.45 ft
Screen Length: 23.6 ft
Well Radius: 0.4167 ft



WELL TEST ANALYSIS

Data Set: \...\WMW4.9S_OUT3.aqt
Date: 01/28/19 Time: 09:21:02

PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: WMW-4.9S
Test Date: 12/3/2018

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.344 ft/day
y0 = 0.8161 ft

AQUIFER DATA

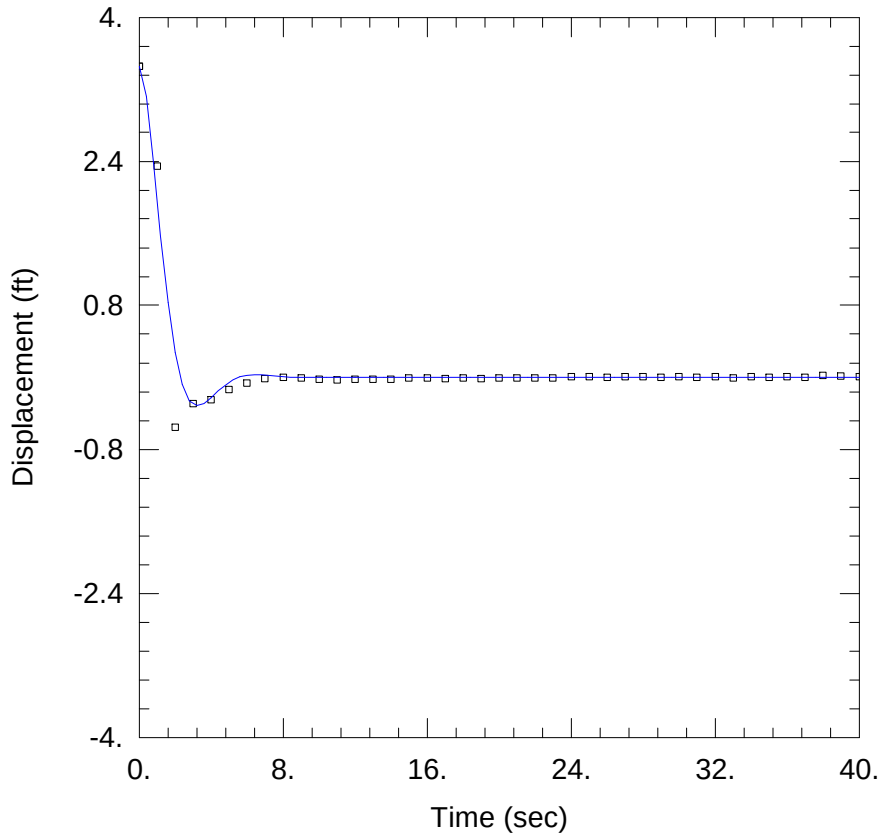
Saturated Thickness: 32. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (WMW4.9S_OUT3)

Initial Displacement: 5.852 ft
Total Well Penetration Depth: 23.6 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 20.45 ft
Screen Length: 23.6 ft
Well Radius: 0.4167 ft



WELL TEST ANALYSIS

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PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-NERT-MW4.93S1
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 143.7 ft/day
Le = 21.74 ft

AQUIFER DATA

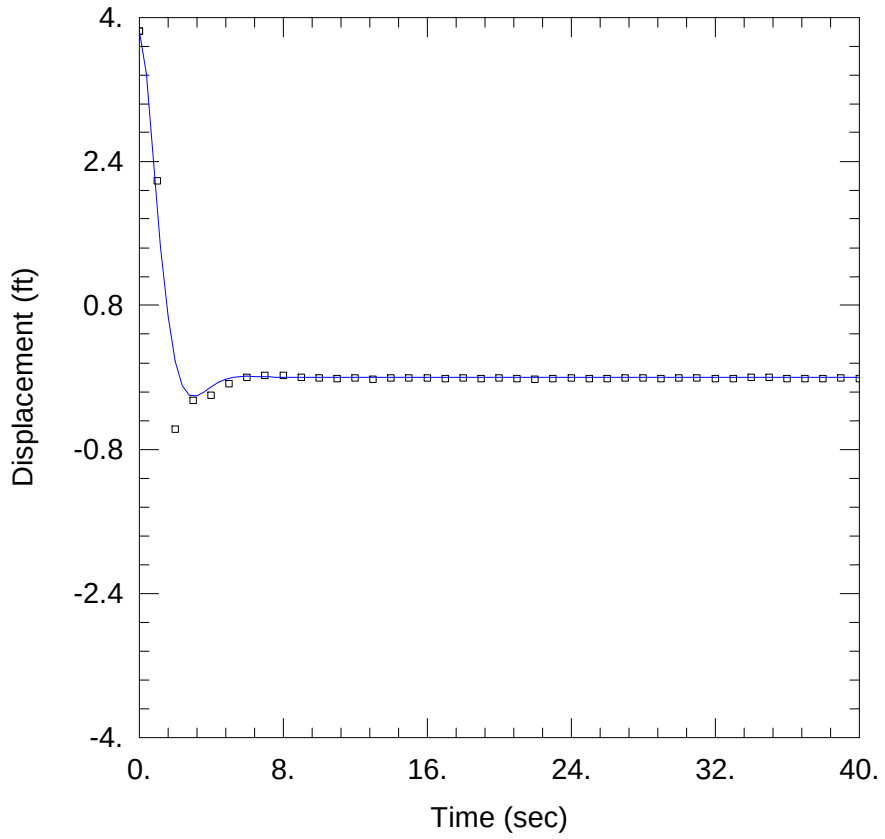
Saturated Thickness: 92.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-NERT-M4.93S1)

Initial Displacement: 3.458 ft
Total Well Penetration Depth: 23.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 27.06 ft
Screen Length: 23.7 ft
Well Radius: 0.3333 ft



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PROJECT INFORMATION

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Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-NERT-MW4.93S1
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 149.5 ft/day
Le = 15.96 ft

AQUIFER DATA

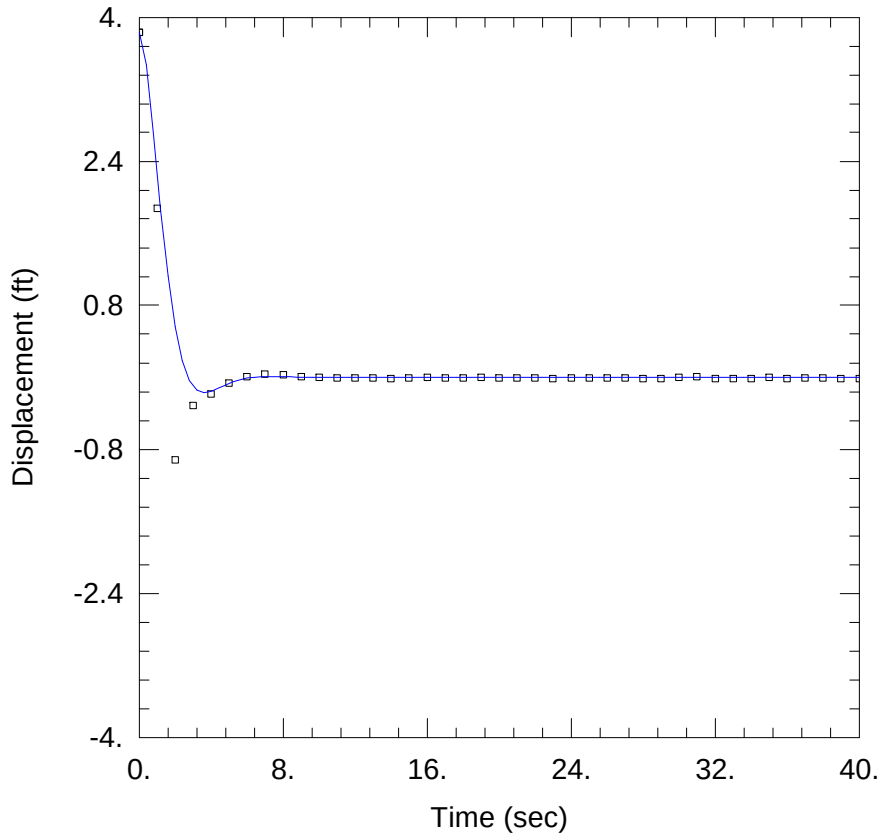
Saturated Thickness: 92.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-NERT-M4.93S1)

Initial Displacement: 3.846 ft
Total Well Penetration Depth: 23.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 27.06 ft
Screen Length: 23.7 ft
Well Radius: 0.3333 ft



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PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-NERT-MW4.93S1
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 124.1 ft/day
Le = 21.67 ft

AQUIFER DATA

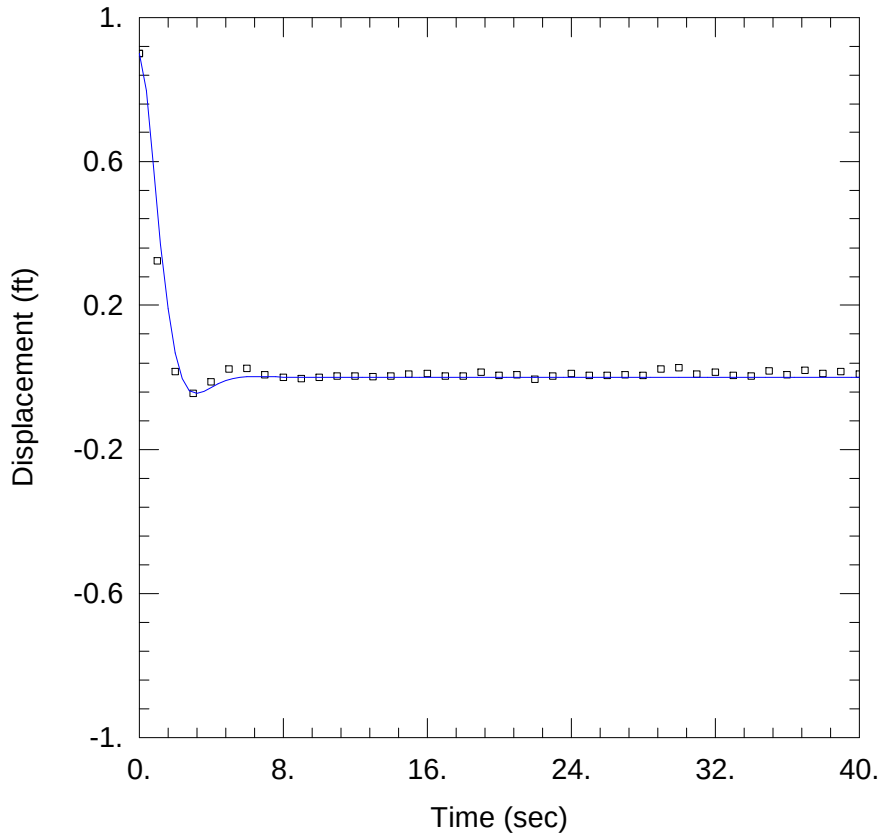
Saturated Thickness: 92.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-NERT-M4.93S1)

Initial Displacement: 3.833 ft
Total Well Penetration Depth: 23.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 27.06 ft
Screen Length: 23.7 ft
Well Radius: 0.3333 ft



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PROJECT INFORMATION

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Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-NERT-MW4.93S1
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 140.9 ft/day
Le = 17.42 ft

AQUIFER DATA

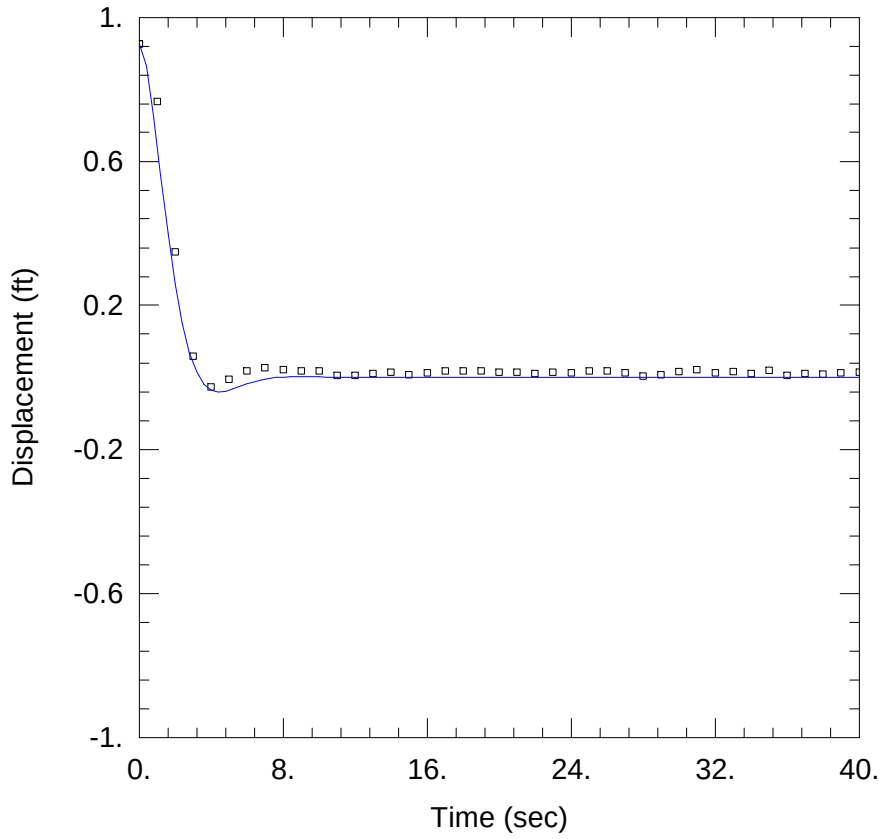
Saturated Thickness: 92.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-NERT-M4.93S1_OUT1)

Initial Displacement: 0.899 ft
Total Well Penetration Depth: 23.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 27.06 ft
Screen Length: 23.7 ft
Well Radius: 0.3333 ft



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PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-NERT-MW4.93S1
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 100.9 ft/day
Le = 32.44 ft

AQUIFER DATA

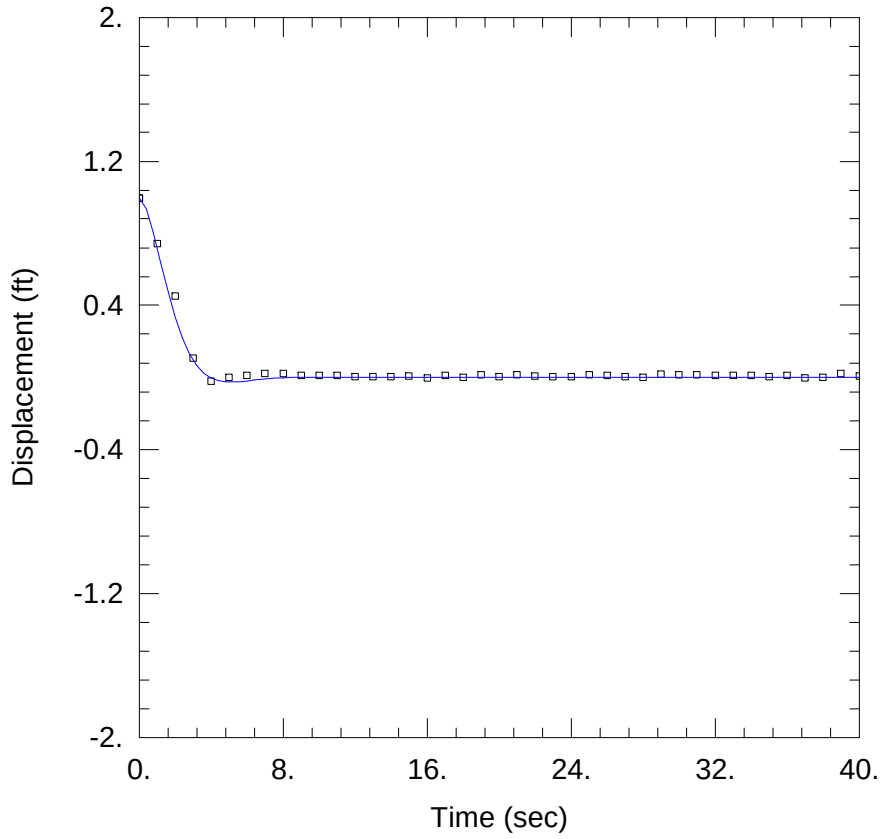
Saturated Thickness: 92.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-NERT-M4.93S1)

Initial Displacement: 0.927 ft
Total Well Penetration Depth: 23.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 27.06 ft
Screen Length: 23.7 ft
Well Radius: 0.3333 ft



WELL TEST ANALYSIS

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PROJECT INFORMATION

Company: Tetra Tech
Client: NERT
Project: 117-7502018-M19
Location: Henderson, NV
Test Well: LVWPS-NERT-MW4.93S1
Test Date: 7/12/2018

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 89.66 ft/day
Le = 35.74 ft

AQUIFER DATA

Saturated Thickness: 92.76 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (LVWPS-NERT-M4.93S1)

Initial Displacement: 0.995 ft
Total Well Penetration Depth: 23.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 27.06 ft
Screen Length: 23.7 ft
Well Radius: 0.3333 ft

Appendix D
Single Borehole Dilution Testing Technical Memorandum

TETRA TECH

TECHNICAL MEMORANDUM

To:	**Dana Grady and Ronnie Britto, Tetra Tech**
From:	Sonya Cadle, Audrey Crockett, and Jenny Dabbs, Tetra Tech
Date:	May 17, 2019
Subject:	Single-Borehole Dilution Testing – Las Vegas Wash Bioremediation Pilot Study

1.0 INTRODUCTION

This technical memorandum presents the results of the single-borehole dilution tests performed as part of the hydrogeological evaluation for the Las Vegas Wash Bioremediation Pilot Study conducted by Tetra Tech, Inc. on behalf of the Nevada Environmental Response Trust.

The locations of the wells tested in the Transect 1a and Transect 1b pilot study areas are shown in ***Figure 1*** and ***Figure 2***, respectively. The objective of the single-borehole dilution tests was to estimate groundwater flow velocity in the pilot study areas.

2.0 SINGLE-BOREHOLE DILUTION TESTS

A single-borehole (or point) dilution test uses the change in concentration with time of a tracer compound emplaced in a well to estimate groundwater flow velocity. The theoretical basis for the single-borehole dilution method has been summarized by Halevy et al. (1967) and Drost et al. (1968). Pitrak et al. (2007) elaborated on the use of these analytical techniques and restated the equations in somewhat simpler form. The apparent flow velocity equation from Pitrak et al. (2007) is:

$$\ln C = -\frac{2v_a}{\pi r}t + ln\ C_0$$

where:

C is the tracer concentration at time t
v_a is the apparent flow velocity
r is the borehole radius
t is time
C_0 is the initial tracer concentration

The apparent flow velocity estimated from the above equation must be adjusted by a distortion factor α to obtain actual flow velocity (Halevy et al., 1967). The distortion factor accounts for perturbations in the flow field caused

by the contrast between the hydraulic properties of the well and the surrounding undisturbed aquifer. The following equation (Halevy et al., 1967) is used to estimate α:

$$\alpha = \frac{4}{1 + \left(\frac{r_1}{r_2}\right)^2 + \left(\frac{k_2}{k_1}\right)\left[1 - \left(\frac{r_1}{r_2}\right)^2\right]}$$

where

r_1 is the inner well casing radius
r_2 is the combined radius of the well casing and filter pack
k_1 is the permeability of the combined well casing and filter pack
k_2 is the permeability of the undisturbed formation

For this analysis, the filter pack and well casing were assumed to have similar permeability, since both are at least one order of magnitude greater than the formation and neither is known exactly. Furthermore, the dynamic viscosity, fluid density, and gravitational acceleration components of the hydraulic conductivity cancel in this equation, so the permeability ratio is identical to the hydraulic conductivity ratio (i.e., $K_2/K_1 = k_2/k_1$). The filter pack of each well was estimated to have a hydraulic conductivity of either 100 or 300 ft/day, depending on the grain size; the hydraulic conductivity (K) of the undisturbed formation was estimated from slug tests performed at each of the wells, as described in *Slug Testing – Las Vegas Wash Bioremediation Pilot Study* (Appendix C, *Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum*). Using the appropriate radii and the estimated hydraulic conductivity ratios, α was estimated for each well.

Groundwater in monitoring wells proposed for single-borehole dilution testing in the pilot study areas has a specific conductance of approximately 3,000 to 9,000 microsiemens per centimeter (µS/cm). It is therefore possible to use either distilled water or stabilized Lake Mead water (SLMW), which have specific conductances of near zero and approximately 1000 µS/cm, respectively, as a tracer for the purpose of the test. Assuming that specific conductance is directly proportional to the fraction of groundwater in the groundwater-SLMW mixture in a well, the tracer concentration can be calculated from:

$$F_{dw} = \frac{SC_0 - SC_t}{SC_0}$$

where

F_{dw} is the fraction of SLMW in the groundwater-SLMW mixture
SC_0 is the specific conductance of the groundwater
SC_t is the specific conductance of the mixture at time t

Field Procedure

The single-borehole dilution tests were performed between June 20-July 19, 2018, in wells LVWPS-MW107A/B, LVWPS-MW201A, LVWPS-MW203B, LVWPS-MW206B, and LVWPS-MW208A. Additional tests were performed between January 9-20, 2019, in wells LVWPS-MW210A/B/C/D/E, LVWPS-MW214, LVWPS-MW217A/B/C, LVWPS-MW220A/B, LVWPS-MW222A, and LVWPS-MW223A/B/C. ***Table 1*** shows well construction and geologic unit of screened intervals.

Table 1 Well Construction and Associated Parameters

Well	UMCf Contact	Top of Screen*	Bottom of Screen*	Borehole Diameter	Well Diameter	Geologic Unit
	feet bgs	feet bgs	feet bgs	inches	inches	
LVWPS-MW107A	36.1	25	35	8.0	4.0	Qal
LVWPS-MW107B	36.1	46	66	8.0	4.0	UMCf
LVWPS-MW201A	55.0	28	48	8.0	4.0	Qal
LVWPS-MW203B	62.0	75	95	8.0	4.0	UMCf
LVWPS-MW206B	95.5	70	89	8.0	4.0	Qal
LVWPS-MW208A	86.0	40	60	8.0	4.0	Qal
LVWPS-MW210A	95.0	35	55	6.0	2.0	Qal
LVWPS-MW210B	95.0	70	90	6.0	2.0	Qal
LVWPS-MW210C	95.0	100	120	6.0	2.0	UMCf-cg
LVWPS-MW210D	84.0	130	140	6.0	2.0	UMCf-cg
LVWPS-MW210E	84.0	146	165	8.0	4.0	UMCf-cg
LVWPS-MW214	45.0	34	44	6.0	2.0	Qal
LVWPS-MW217A	95.0	51	71	6.0	2.0	Qal
LVWPS-MW217B	95.0	100	120	6.0	2.0	UMCf
LVWPS-MW217C	95.0	156	175	8.0	4.0	UMCf
LVWPS-MW220A	107.0	60	80	6.0	2.0	Qal
LVWPS-MW220B	107.0	135	154	8.0	4.0	UMCf-cg
LVWPS-MW222A	55.0	80	100	6.0	2.0	UMCf/UMCf-cg
LVWPS-MW223A	95.0	45	65	6.0	2.0	Qal
LVWPS-MW223B	95.0	70	90	6.0	2.0	Qal
LVWPS-MW223C	95.0	96	110	8.0	4.0	UMCf

Notes
bgs - below ground surface
Qal – Quaternary alluvium
UMCf - Upper Muddy Creek formation
UMCf-cg - Upper Muddy Creek formation – coarse grained facies
* Top and Bottom of Screen values have been rounded to the nearest whole number.

Specific conductance was monitored during the test using a water quality and pressure transducer (In-Situ Aqua TROLL 200) placed in the well at the center of the screened interval. The sensor calibration was checked immediately prior to performing the test in accordance with manufacturer's specifications, using a standard calibration solution.

The tracer was delivered to the well by simultaneously pumping water from the well and replacing it with distilled water or SLMW. The pump was placed near the bottom of the well, and the discharge hose was connected to a container at the top of the well. The distilled water was emplaced in the well at a rate designed to equal the pump's discharge rate to minimize hydraulic head changes in the well. The water exchange continued until approximately one casing volume was removed and replaced with low-specific conductance water.

The transducer was monitored during water emplacement to ensure that the specific conductance decreased quickly and stabilized at a significantly lower value. The transducer was then allowed to remain in the well to measure recovery of specific conductance. The data were downloaded periodically until the specific conductance

values stabilized at or near the original pre-test values or until significant recovery had occurred (in cases of recovery times exceeding 24 hours).

Data Interpretation

The apparent flow velocity equation can be solved graphically by plotting the natural logarithm of the tracer concentration against time, and then fitting a straight line to the data. Plots of the natural logarithm of F_{dw} vs. time for each of the wells tested (except LVWPS-MW217A, as described below) are shown on ***Figures 3*** through ***23***.

Review of the plots of the natural logarithm of F_{dw} vs. time reveals the following:

- Early-time data for some wells show a very shallow slope, interpreted as a result of mixing within the borehole.
- The middle data for most tested wells are relatively linear.
- The late data, which represent relatively large dilutions, are characterized by shallower slopes than the middle data and are typically concave-upward. Concave-upward late data can be seen for most wells.
- In alluvial wells LVWPS-MW201A, LVWPS-MW210A, LVWPS-MW214 and LVWPS-MW220A, the straight-line portion of the test representing the formation response encompasses only a few measurements because of the high velocity of groundwater in these areas.

Where very shallow-slope early-time data are present, they are interpreted to be a result of vertical mixing within the well casing, caused by rapid removal of the pump and tubing immediately after the test was initiated. The relatively linear middle portion of the curve (present in most tests) is considered representative of the period when most of the tracer dilution occurred and was therefore used for analysis. The least-squares straight lines and the equations of the lines are shown on the plots.

At LVWPS-MW217A, the response to the borehole dilution test was anomalous (***Figure 15***). Although the initial specific conductance was high (approximately 3800 µS/cm), the addition of low-specific conductance water was not detected by the transducer. Instead, the specific conductance increased after initiation of the test. This is interpreted as evidence that the local flow system was perturbed by the small change in head in the well associated with the setup and operation of the water exchange system. In a high-transmissivity well with a high groundwater velocity, even a small change in hydraulic head could bring higher-conductance water from the most transmissive part of the formation into the well.

The results at LVWPS-MW217B (***Figure 16***) and LVWPS-MW222A (***Figure 20***) show an unusual scalloped pattern during the middle portion of the test, rather than a straight line. Examination of discharge data from nearby gauging stations for the Las Vegas Wash indicates that each scallop coincides with a peak or trough in the discharge at the wash. The scallops therefore likely represent slight changes in flow direction and velocity caused by the interaction of the wash with the groundwater. The equation of the least-squares straight line was calculated using data across several scallops to incorporate both the steeper portions of the curve, associated with inflection points in the Las Vegas Wash discharge data; and the shallow portions of the curve, associated with straight-line portions of the Las Vegas Wash discharge data. The slope of the line, and thus the flow velocity, therefore represents an average value for the area.

Distortion factors were calculated as described above using the radii of the wells and the hydraulic conductivity of the sand pack around the well screen and the formation. Formation hydraulic conductivity was estimated from slug testing (as described in Appendix C, *Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum*). Calculated distortion factors, apparent velocities estimated from the slopes of the least-squares lines, and calculated flow velocities are summarized in ***Table 2***.

Comparison of ***Table 1*** and ***Table 2*** indicates that the highest velocities are found in the alluvium. Very high (greater than about 90 ft/day) flow velocities are seen in wells screened in the alluvium near the Las Vegas Wash,

namely LVWPS-201A, LVWPS-MW210A, and LVWPS-MW214. These high velocities are interpreted to be associated with proximity to the paleochannel underlying the Las Vegas Wash.

Lower velocities ranging from 0.01 to 1.2 ft/day are present in the UMCf. Some wells are screened in a coarser-grained portion of the UMCf that might be expected to be more transmissive. However, the velocities were similar between the coarse-grained UMCf (ranging from 0.01 to 1.2 ft/day) and the fine-grained UMCf (ranging from 0.01 to 0.68 ft/day). Slug test results from Transect 1b indicated that the hydraulic conductivities in the coarse-grained, unconsolidated UMCf are somewhat higher (6 ft/day) than those in the fine-grained, unconsolidated UMCf (1 ft/day) (Appendix C, *Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum*).

Table 2 Single-Borehole Dilution Test Results and Relevant Parameters

Well	Hydraulic Conductivity (K)	Initial Time	Initial F_{dw}	Final Time	Final F_{dw}	Slope of Least Squares Line	Apparent Velocity	Distortion Factor (α)	Flow Velocity
	feet/day	minutes		minutes			feet/day		feet/day
LVWPS-MW107A	85	50	0.036	85	0.013	-3.02E-02	11	2.74	4
LVWPS-MW107B	0.02	81	0.901	160	0.862	-3.00E-04	0.11	3.20	0.04
LVWPS-MW201A	20	7	0.956	12	0.026	-7.30E-01	281	3.07	91
LVWPS-MW203B	0.09	1758	0.672	3980	0.522	-1.00E-04	0.04	3.20	0.01
LVWPS-MW206B	191	12	0.118	31	0.040	-5.69E-02	21	2.31	9
LVWPS-MW208A	197	6	0.349	58	0.017	-5.77E-02	22	2.29	9
LVWPS-MW210A	79	2	0.862	4	0.056	-1.37E+00	258	2.97	87
LVWPS-MW210B	88	2	0.251	9	0.054	-2.41E-01	45	2.92	16
LVWPS-MW210C	0.23	8	0.101	73	0.039	-1.29E-02	2.4	3.60	0.7
LVWPS-MW210D	0.31	22	0.690	825	0.371	-8.00E-04	0.15	3.60	0.04
LVWPS-MW210E	0.42	400	0.754	5000	0.494	-9.00E-05	0.03	3.19	0.01
LVWPS-MW214	139	9	0.526	12	4.672E-05	-3.06E+00	577	2.63	220
LVWPS-MW217A	105	N/A	N/A	N/A	N/A	N/A	N/A	2.81	N/A
LVWPS-MW217B	0.92	31	0.433	390	0.006	-1.19E-02	2.2	3.57	0.63
LVWPS-MW217C	0.40	215	0.571	725	0.430	-6.00E-04	0.23	3.19	0.07
LVWPS-MW220A	79	1	0.835	5	0.157	-4.38E-01	83	2.97	28
LVWPS-MW220B	7.2	215	0.716	379	0.140	-1.00E-02	3.8	3.07	1.2
LVWPS-MW222A	5.7	36	0.328	150	0.164	-6.00E-03	1.1	3.44	0.33
LVWPS-MW223A	50	3	0.775	9	0.103	-3.51E-01	66	3.18	21
LVWPS-MW223B	79.2	4	0.426	44	0.100	-3.54E-02	6.7	2.97	2.2
LVWPS-MW223C	0.52	14	0.816	245	0.668	-9.00E-04	0.34	3.19	0.11
								Qal Mean Flow Velocity:	53
								UMCf Mean Flow Velocity:	0.31

Notes:
Fdw - Fraction of distilled water
feet/day - feet per day
N/A - Test not analyzed
Qal – Quaternary alluvium
UMCf - Upper Muddy Creek formation

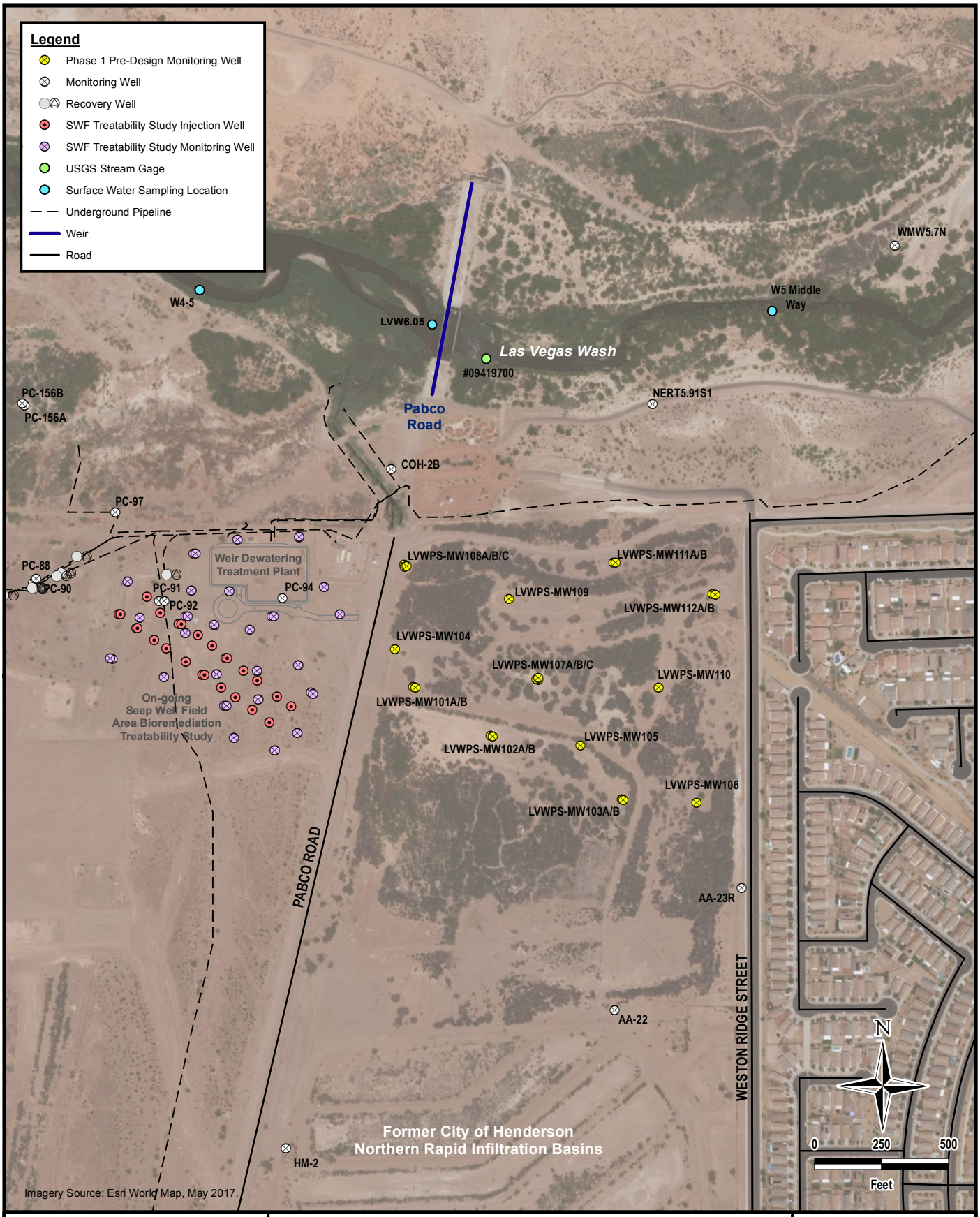
3.0 REFERENCES

Drost, W.; Klotz, D.; Koch, A.; Moser, H.; Neumaier, F.; and Rauert, W. 1968. "Point dilution methods of investigating ground water flow by means of radioisotopes." *Water Resources Research*, Vol. 4 No. 1., pages 125-146. February.

Halevy, E.; Moser, H., Zellhofer, O., and Zuber, A. 1967. "Borehole dilution techniques: A critical review." *Proceedings of the Symposium on Isotopes in Hydrology*, 531-564. Vienna, Austria: I.A.E.A.

Pitrak, M., Mares, S., and Kobr, M. 2007. "A Simple Borehole Dilution Technique in Measuring Horizontal Ground Water Flow." *Ground Water*, Vol. 45 No. 1.

Figures



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NEVADA ENVIRONMENTAL RESPONSE TRUST

SINGLE-BOREHOLE DILUTION TESTING - LAS VEGAS WASH BIOREMEDIATION PILOT STUDY TECHNICAL MEMORANDUM
HENDERSON, NEVADA

TRANSECT 1A STUDY AREA

PROJECT NO.:	117-7502019
DATE:	FEBRUARY 11, 2019
DESIGNED BY:	WG

Figure No.
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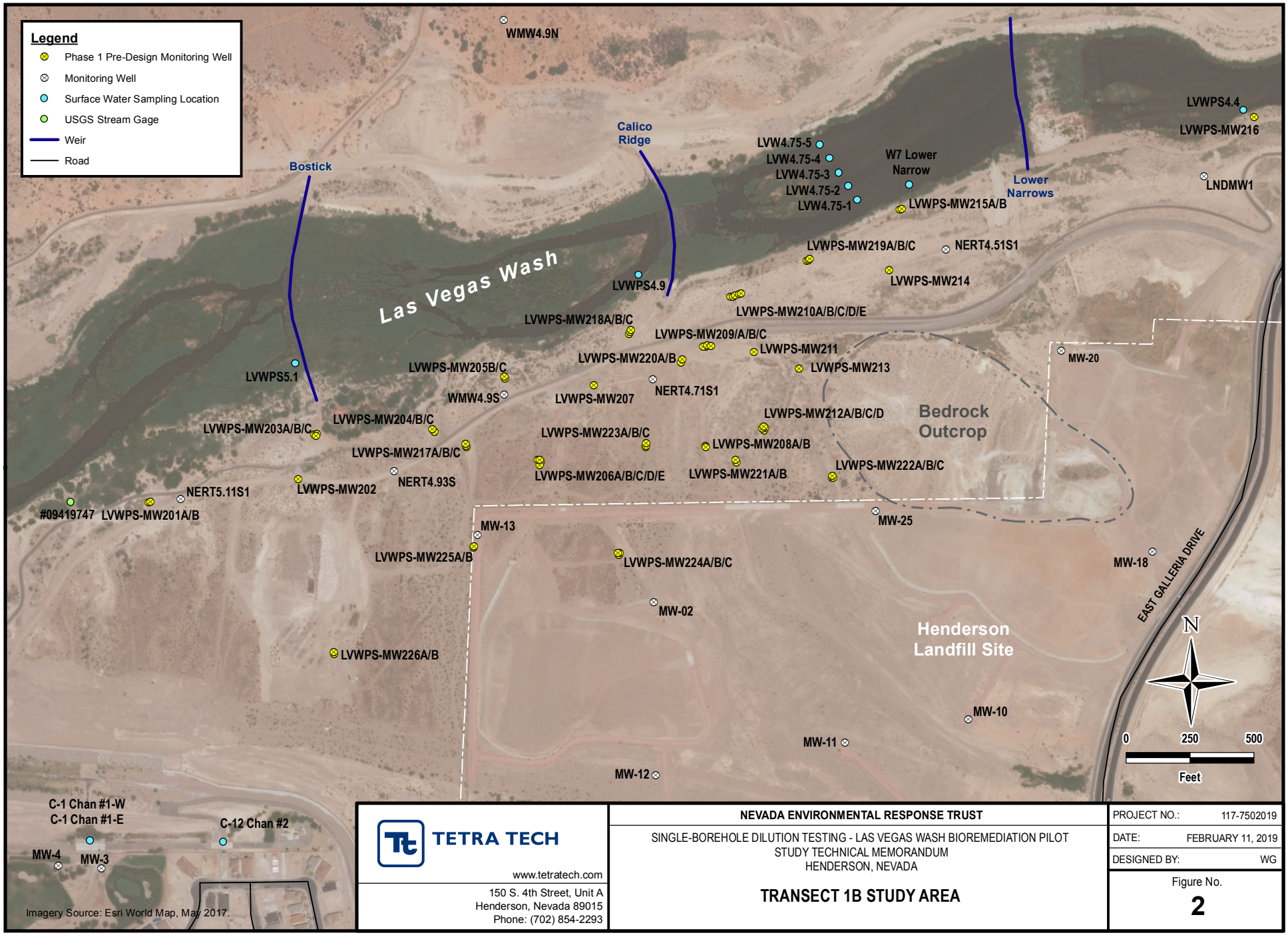

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NEVADA ENVIRONMENTAL RESPONSE TRUST

SINGLE-BOREHOLE DILUTION TESTING - LAS VEGAS WASH BIOREMEDIATION PILOT STUDY TECHNICAL MEMORANDUM
HENDERSON, NEVADA

TRANSECT 1B STUDY AREA

PROJECT NO.:	117-7502019
DATE:	FEBRUARY 11, 2019
DESIGNED BY:	WG

Figure No.
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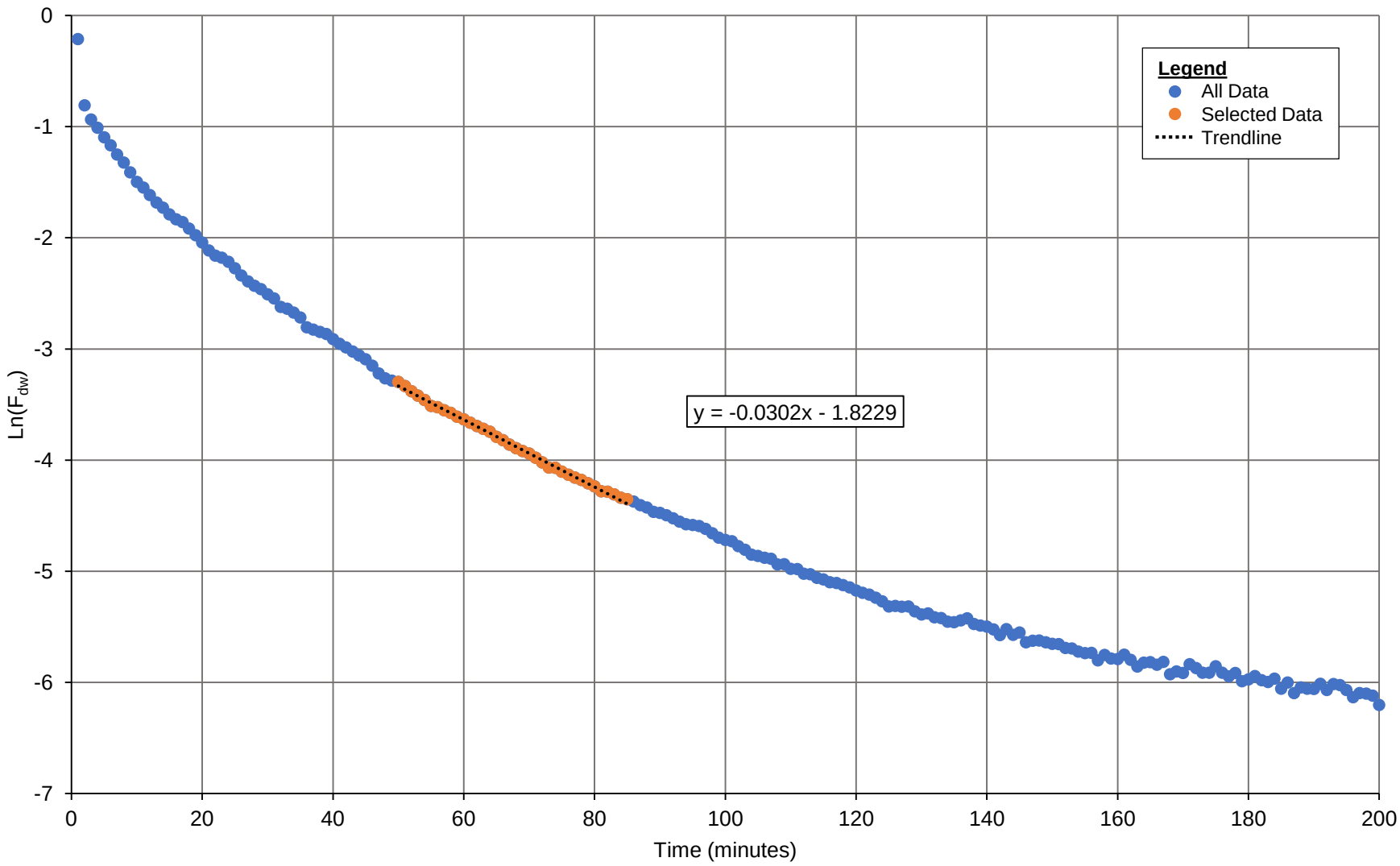

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

SINGLE-BOREHOLE DILUTION TESTING – LAS VEGAS WASH BIOREMEDIATION PILOT STUDY
HENDERSON, NEVADA

ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW107A

Project No.:	117-7502018
Date:	FEBRUARY 11, 2019
Designed By:	ACC

Figure No.
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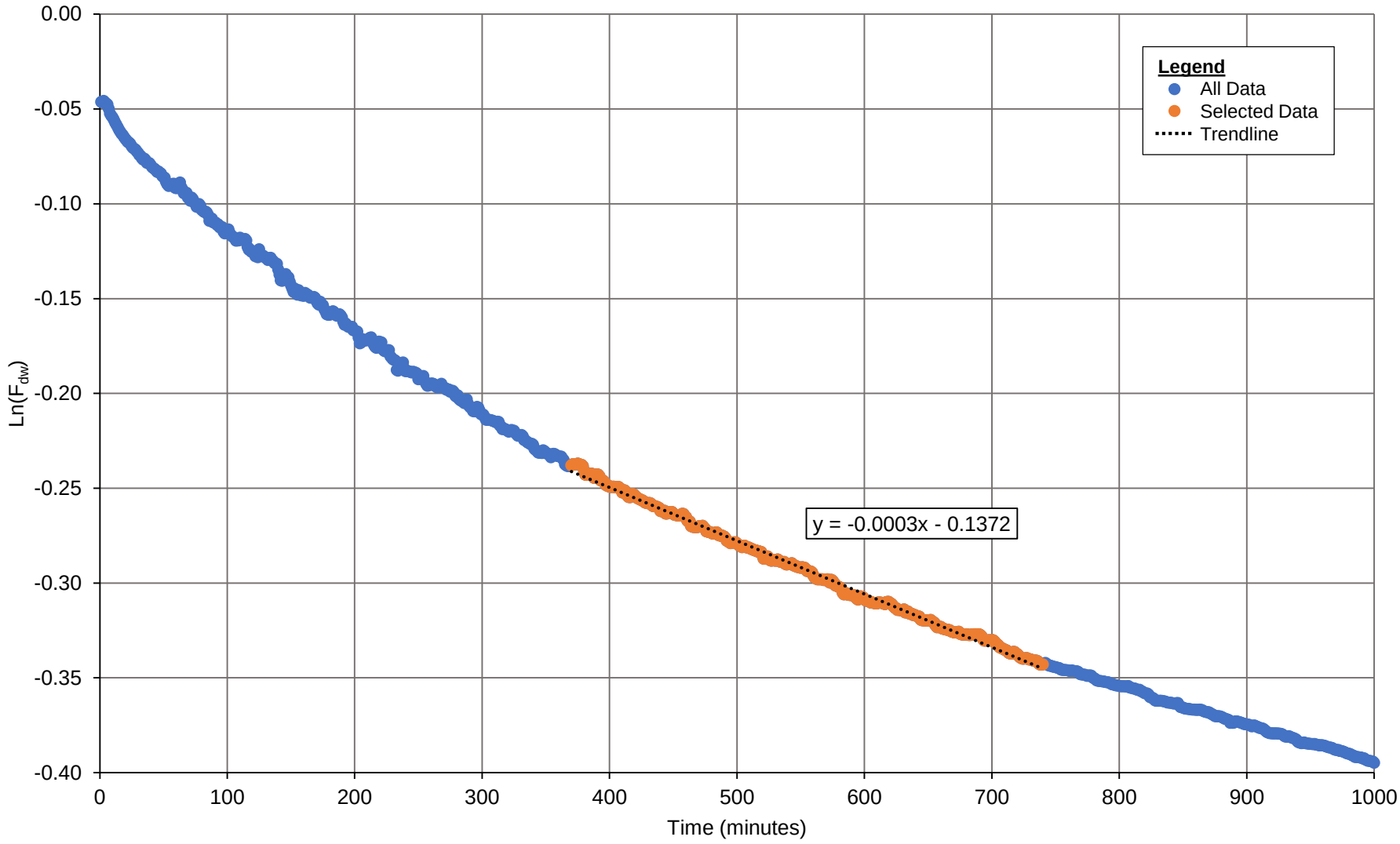

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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW107B

Project No.:	117-7502018
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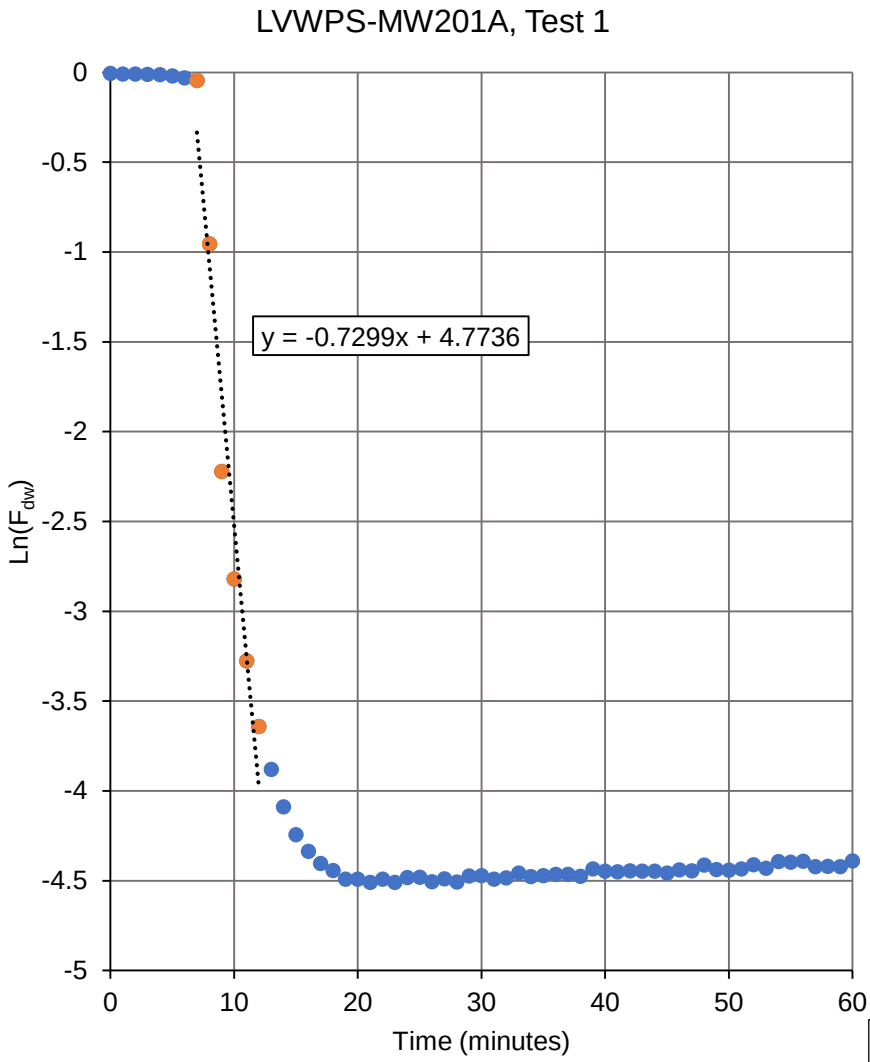
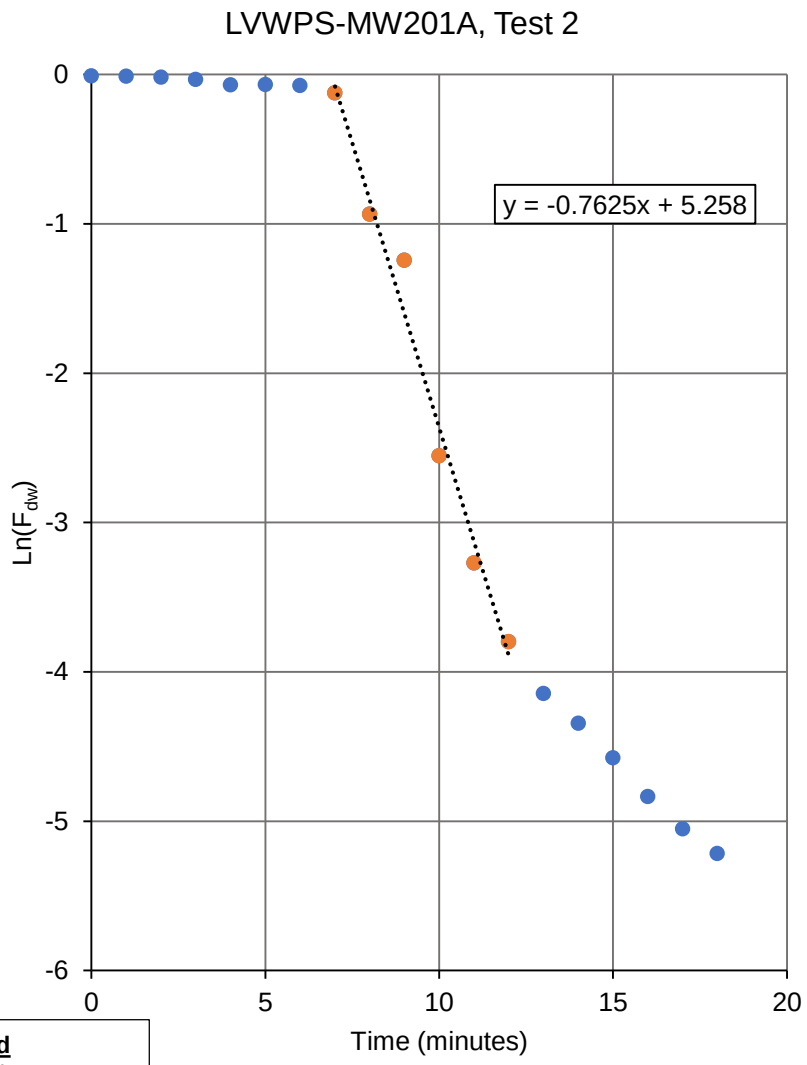
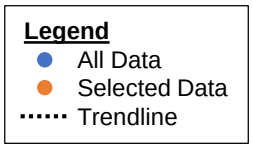
Figure No.
4







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ANALYSIS OF SINGLE-BOREHOLE DILUTION TESTS FOR LVWPS-MW201A

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Figure No.
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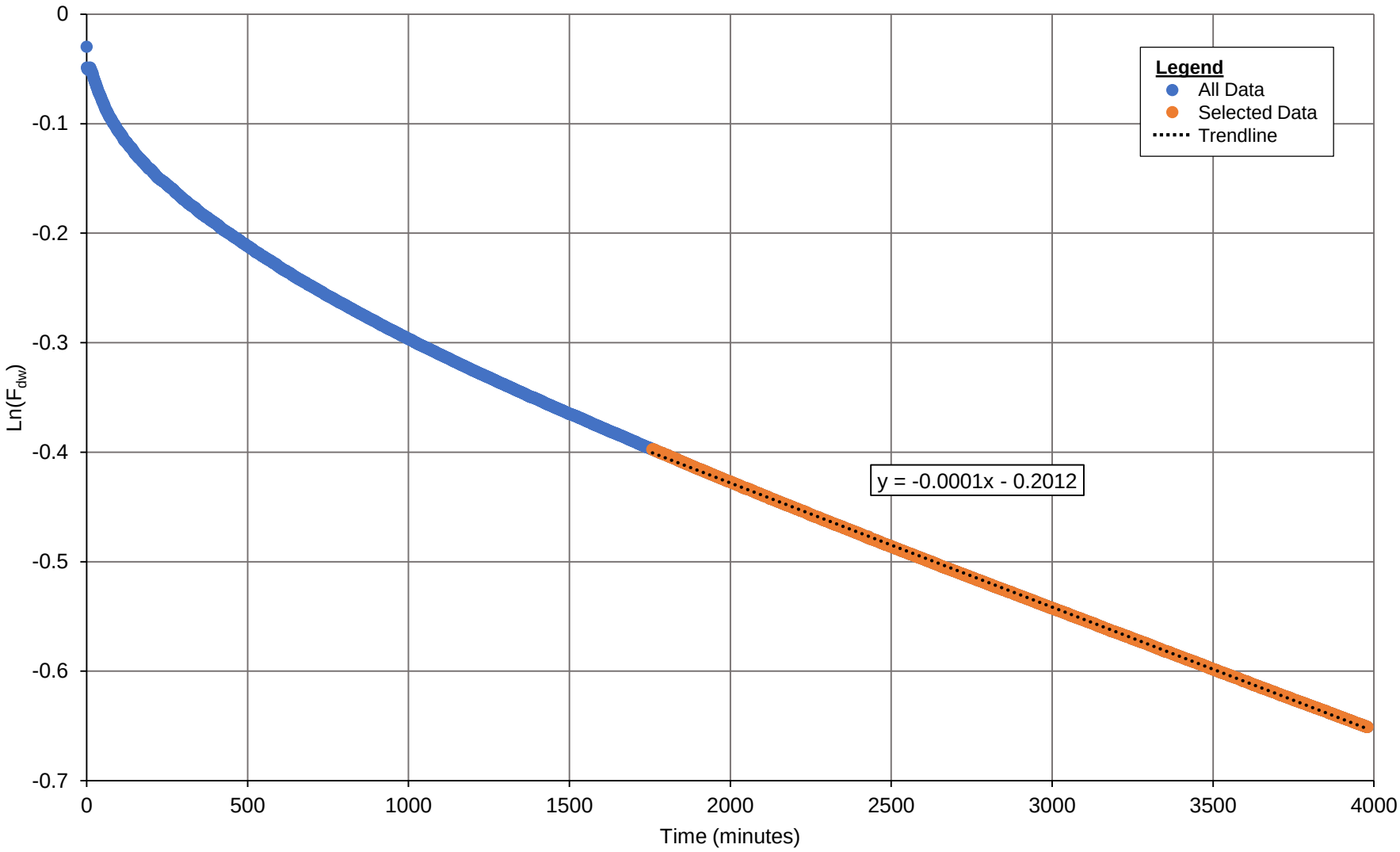

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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW203B

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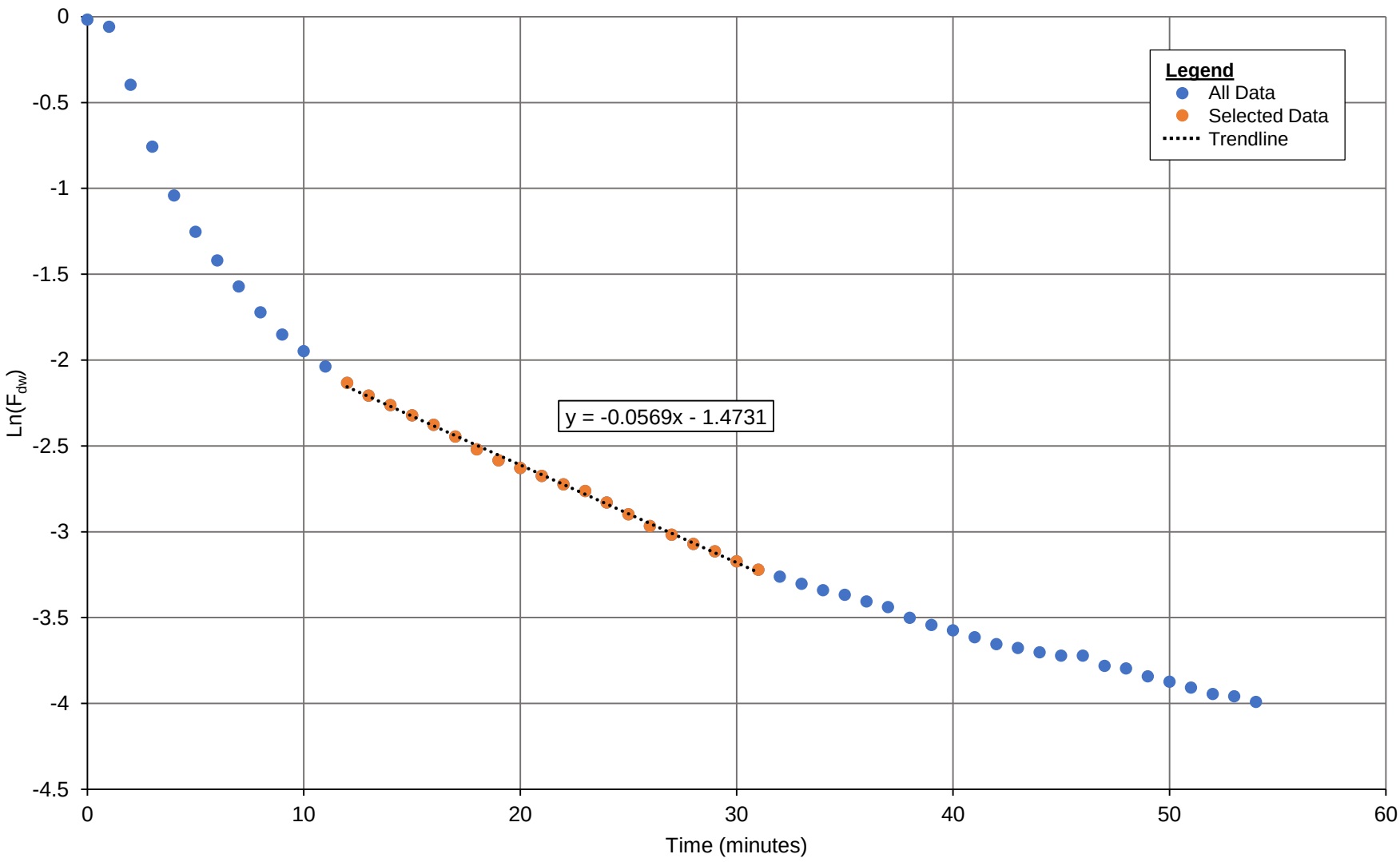
Figure No.
6



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW206B

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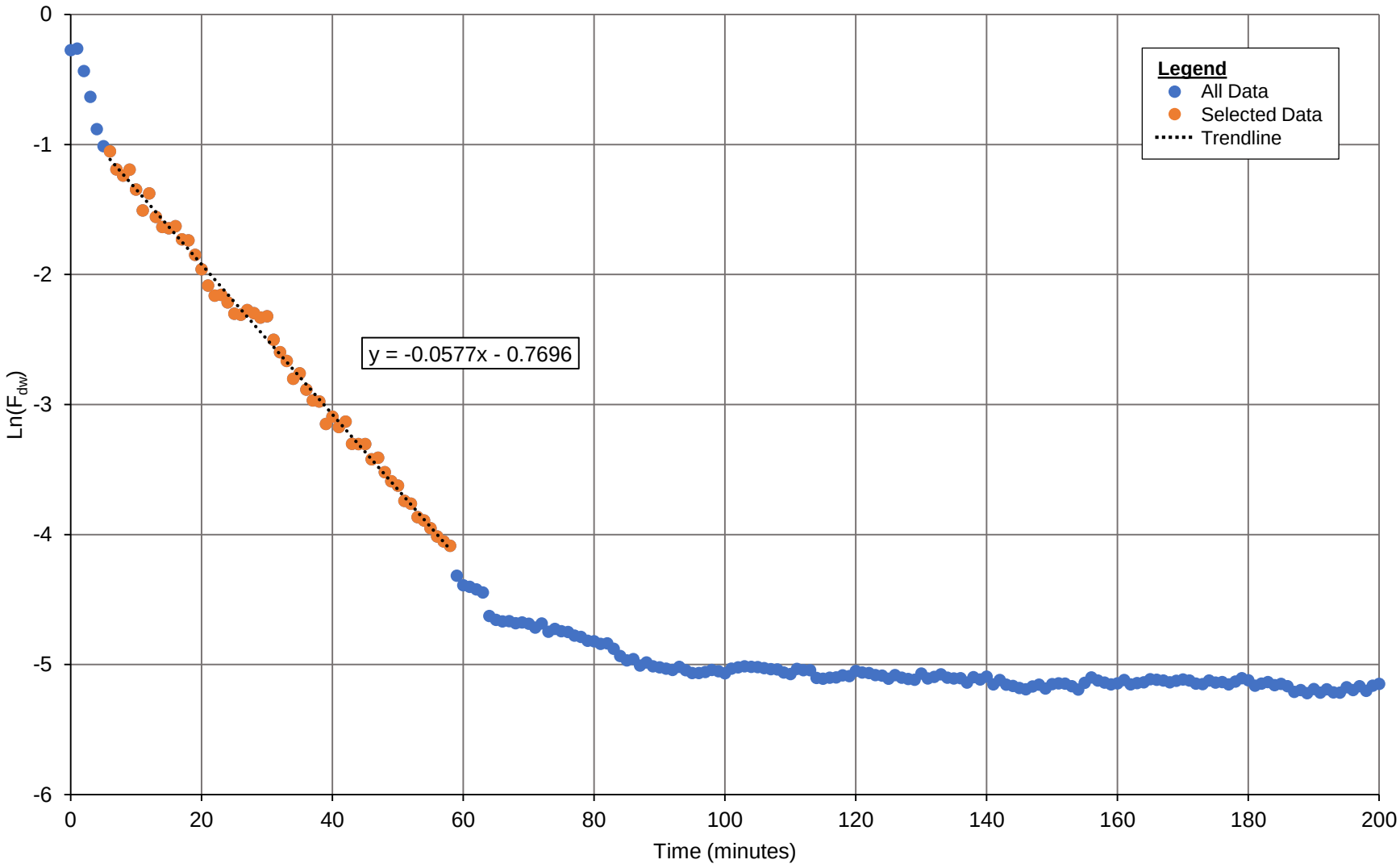
Figure No.
7



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW208A

Project No.:	117-7502018
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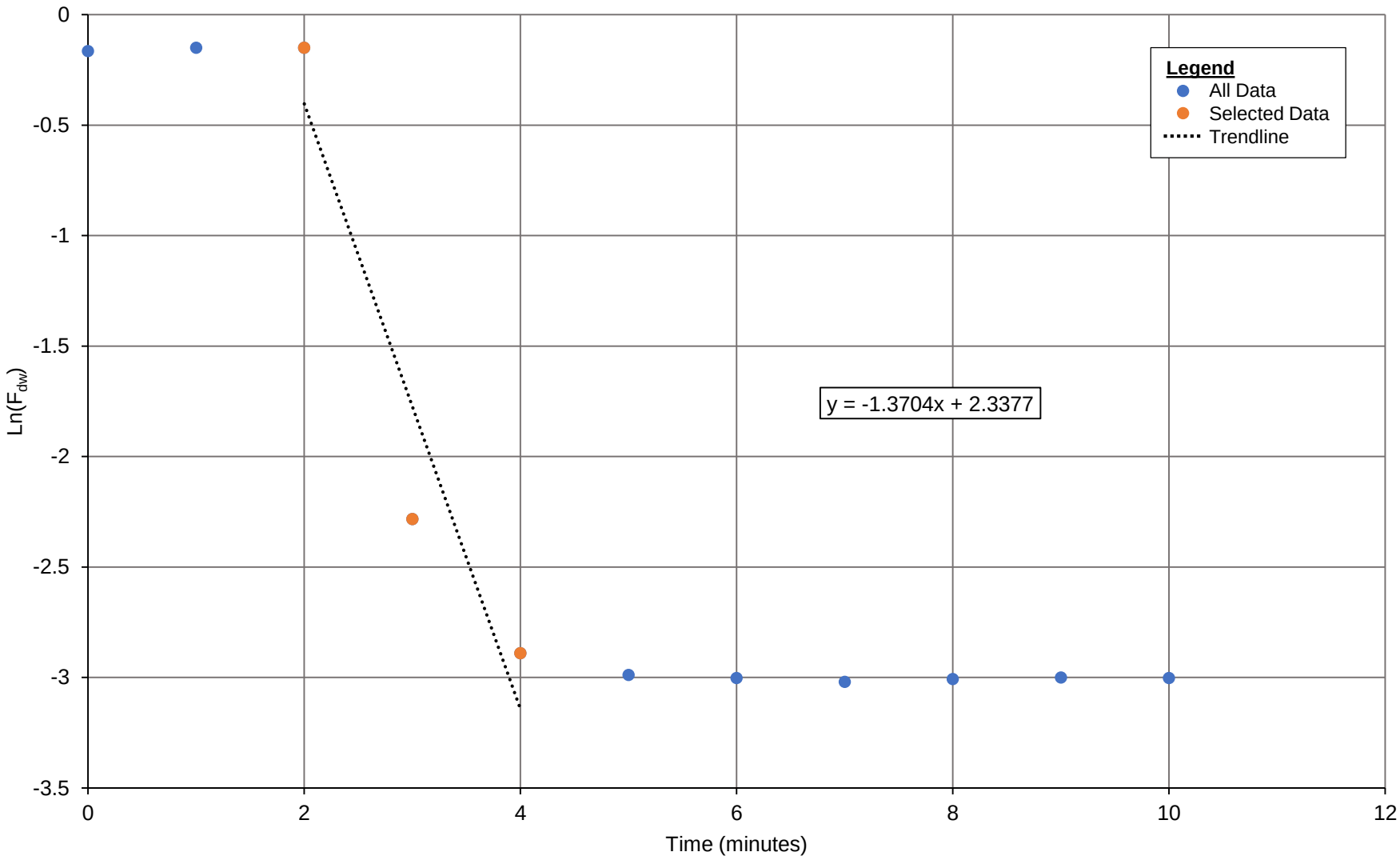
Figure No.
8



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW210A

Project No.:	117-7502018
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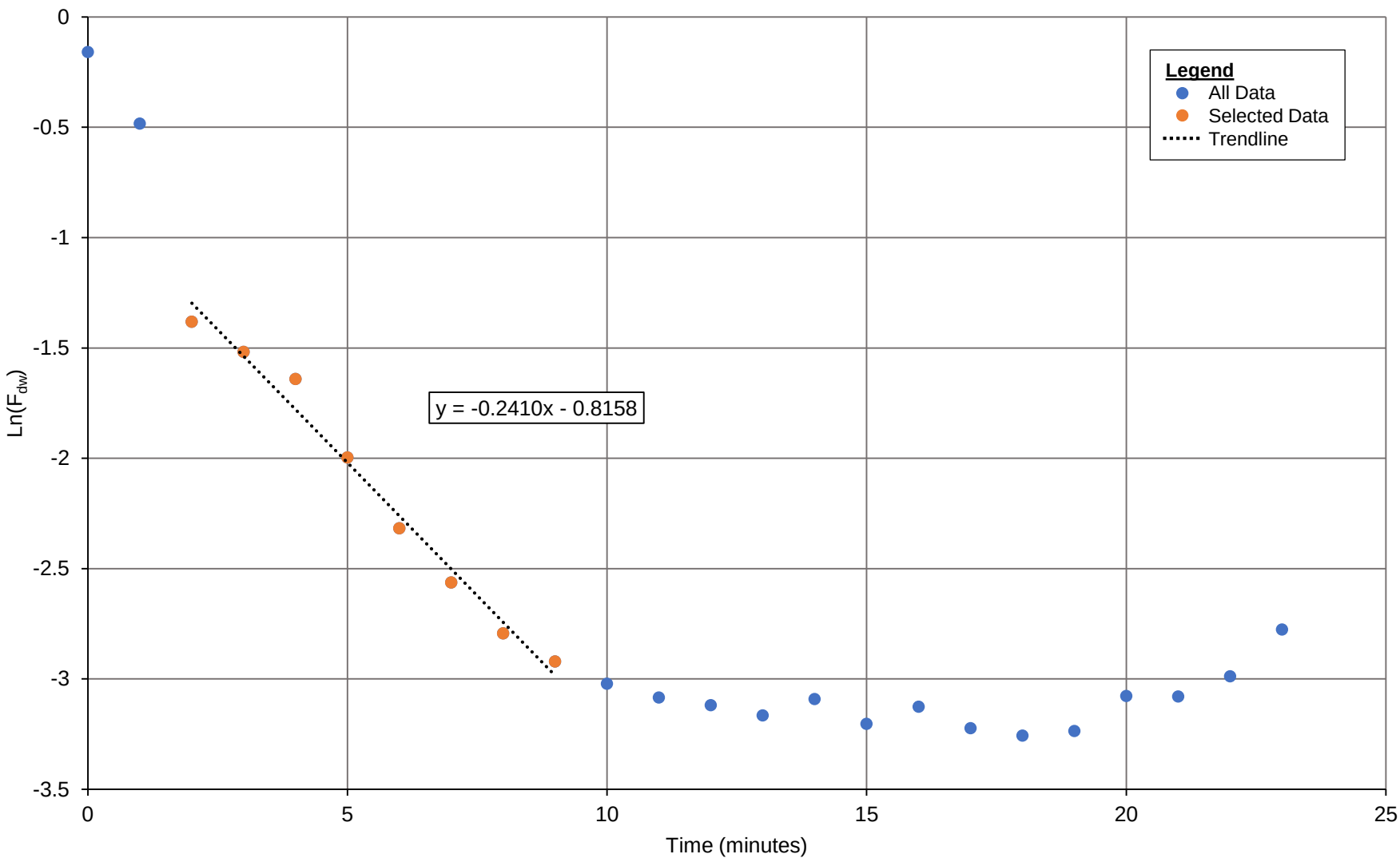
Figure No.
9



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW210B

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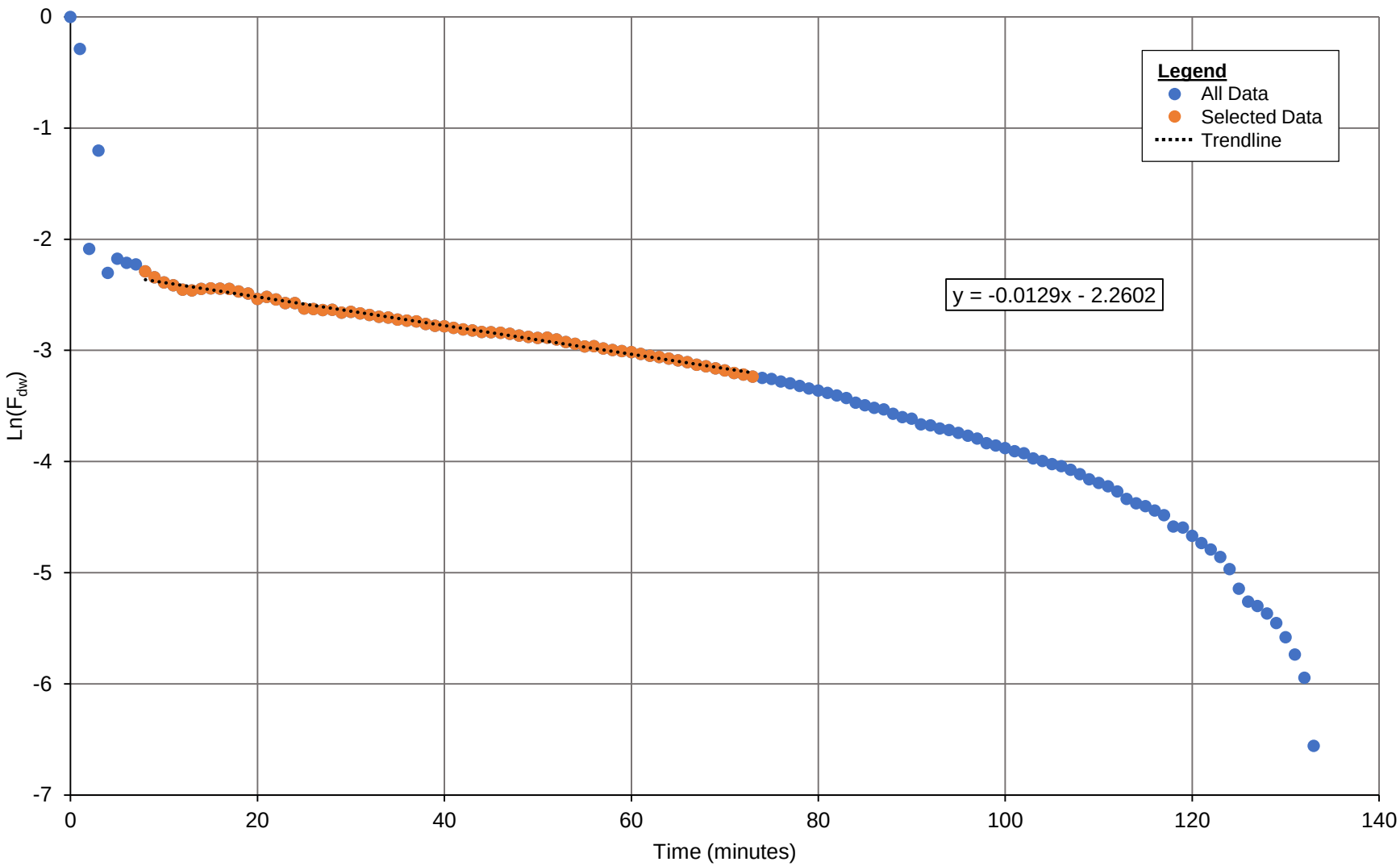
Figure No.
10



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW210C

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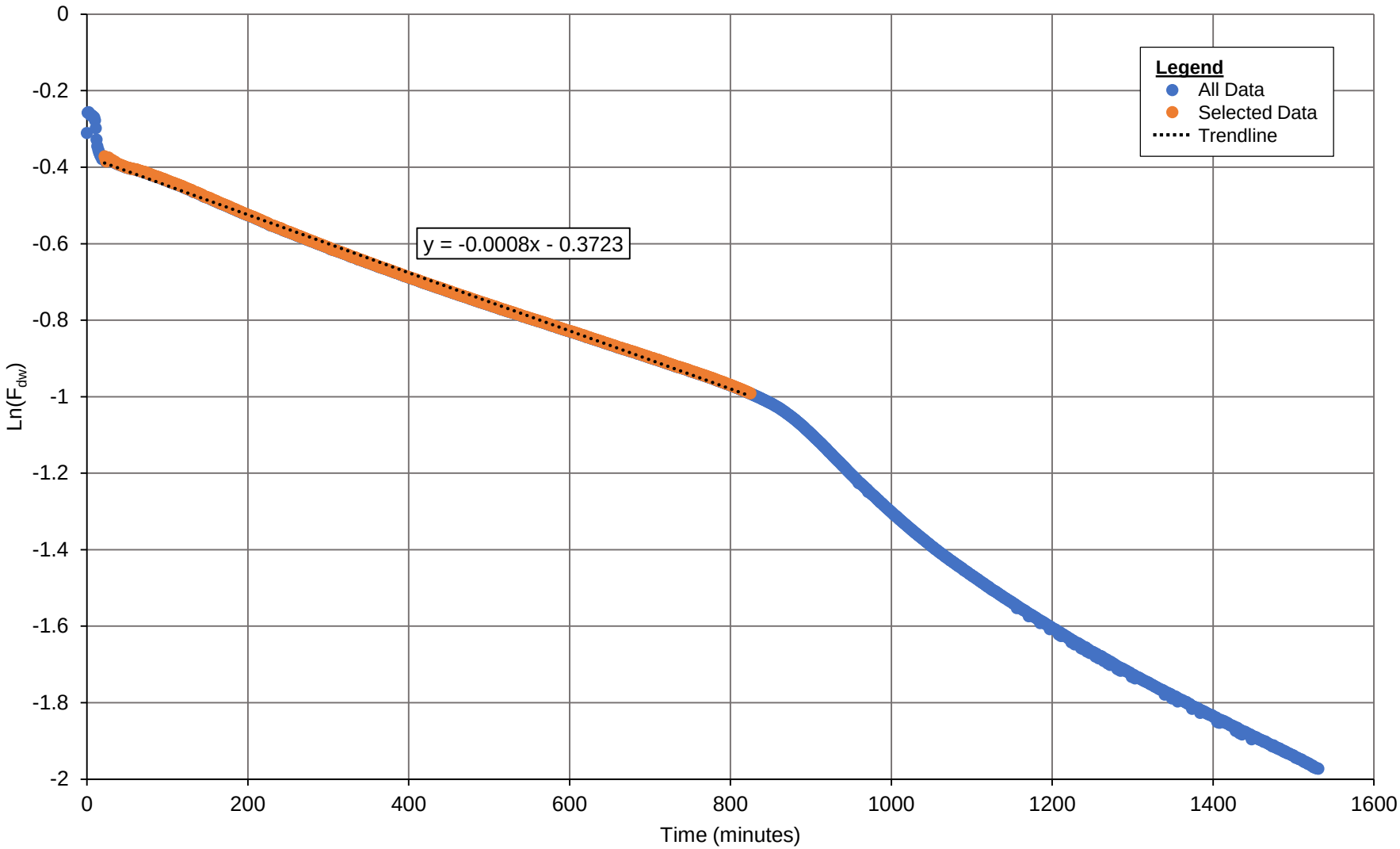
Figure No.
11



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW210D

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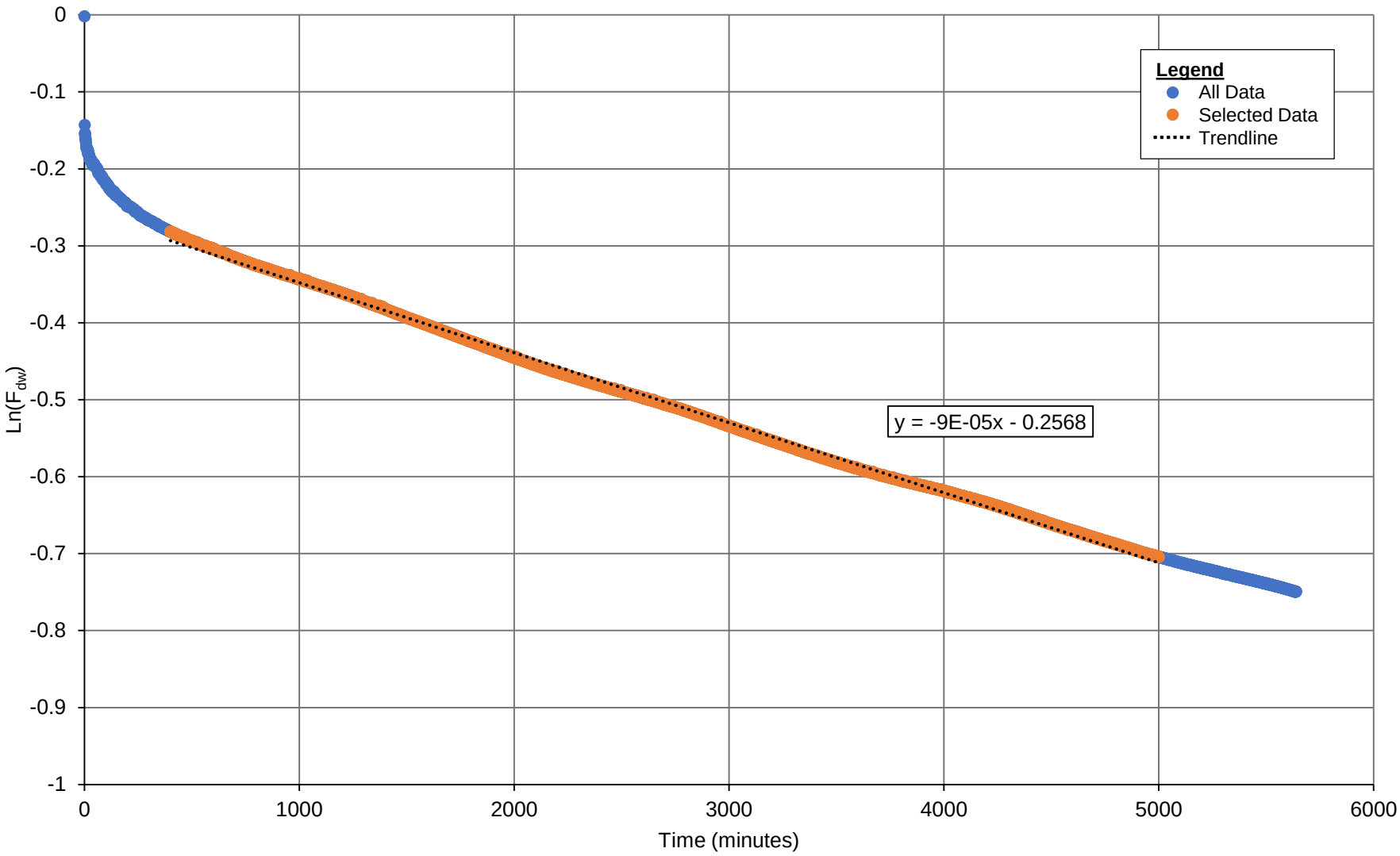
Figure No.
12



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW210E

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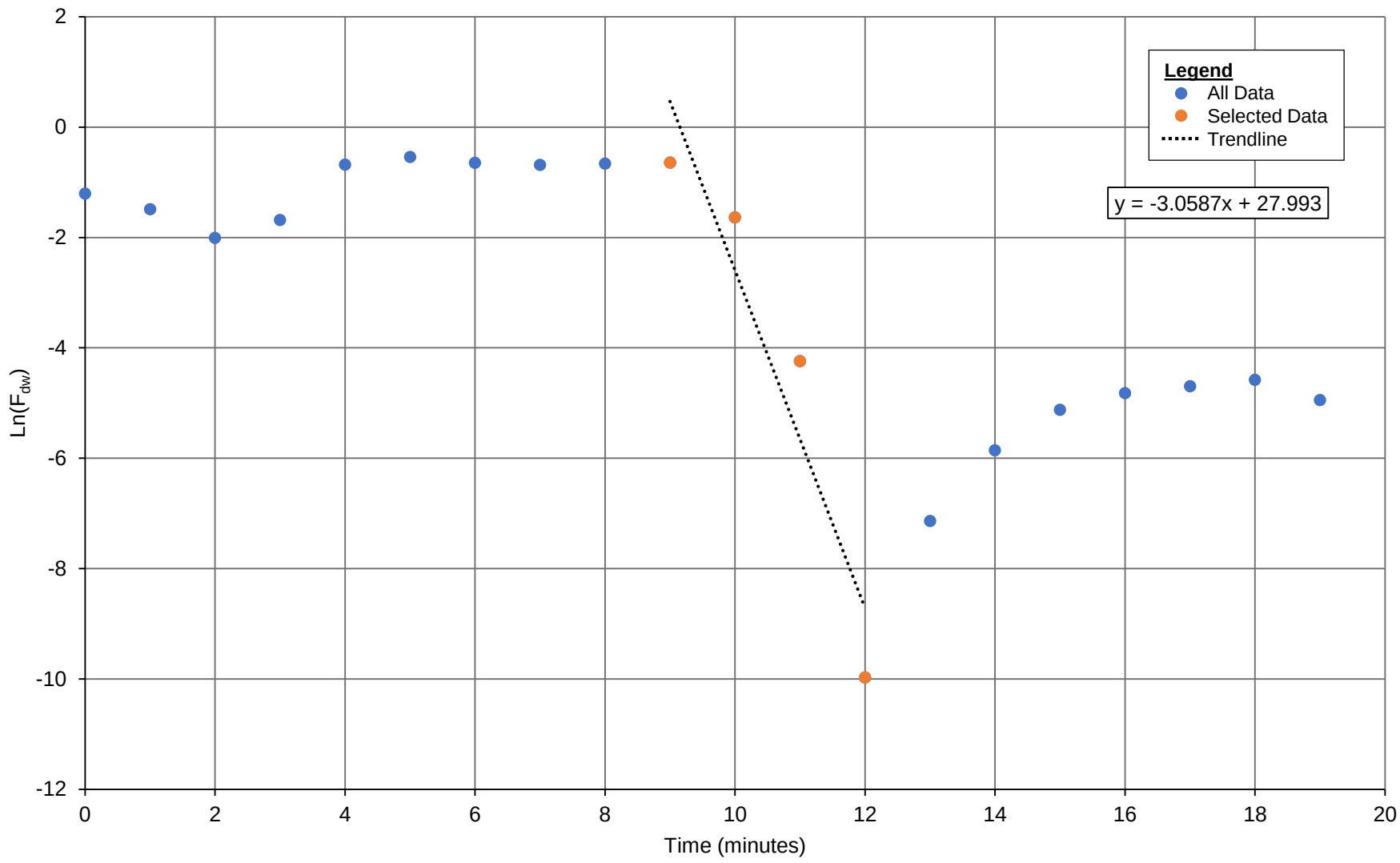
Figure No.
13



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW214

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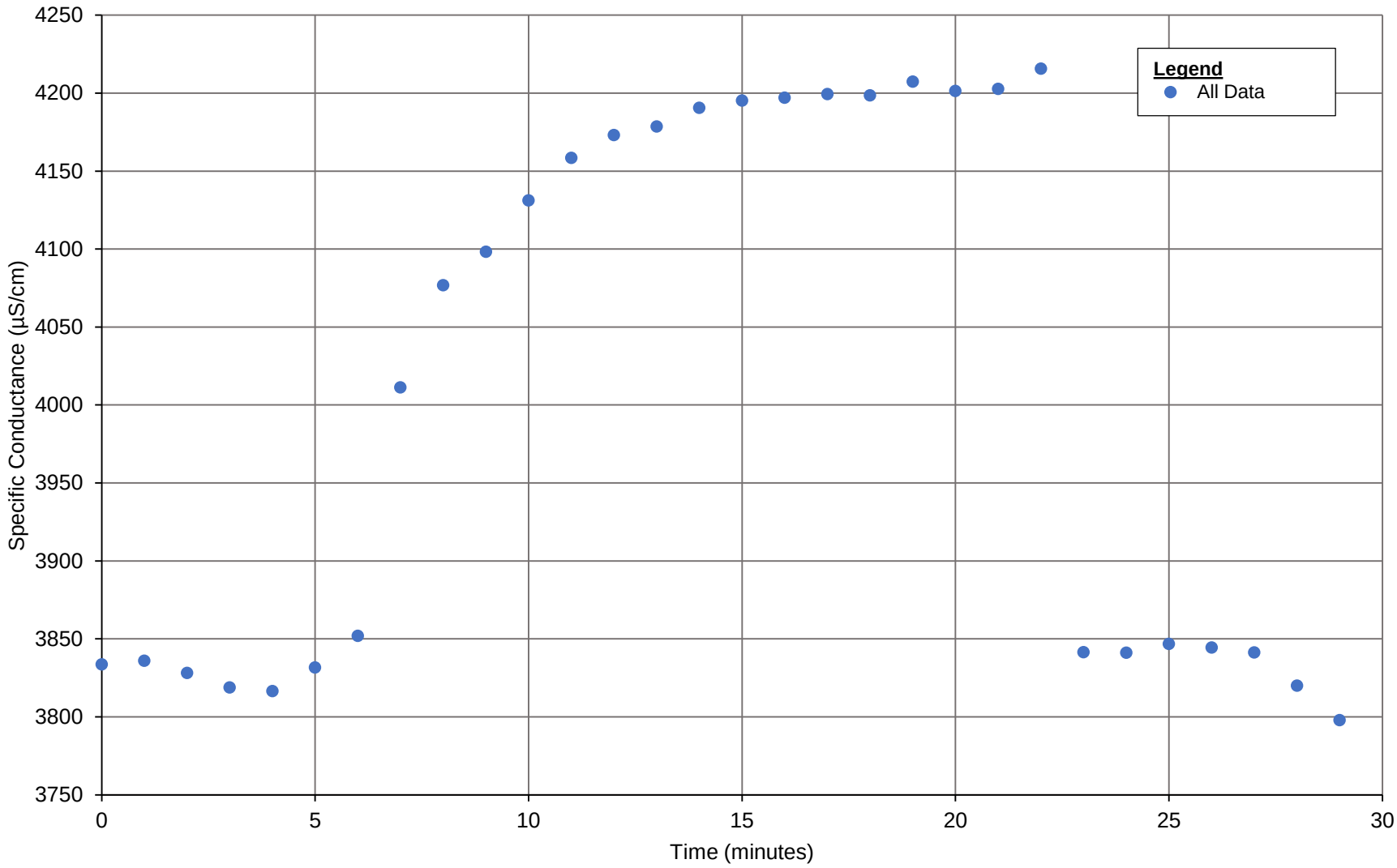
Figure No.
14



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW217A

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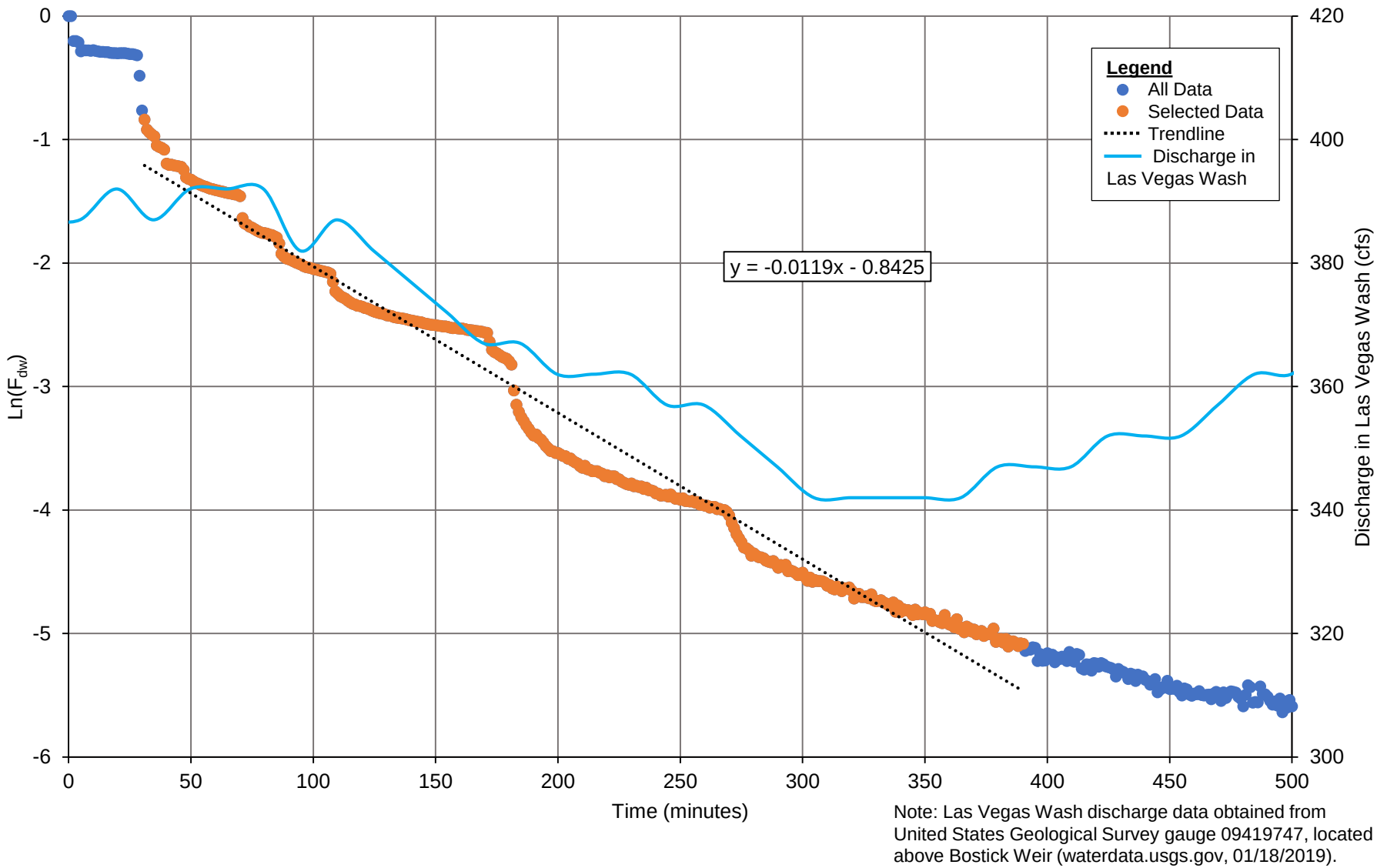
Figure No.
15



Note: Las Vegas Wash discharge data obtained from United States Geological Survey gauge 09419747, located above Bostick Weir (waterdata.usgs.gov, 01/18/2019).

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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW217B

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Figure No.
16

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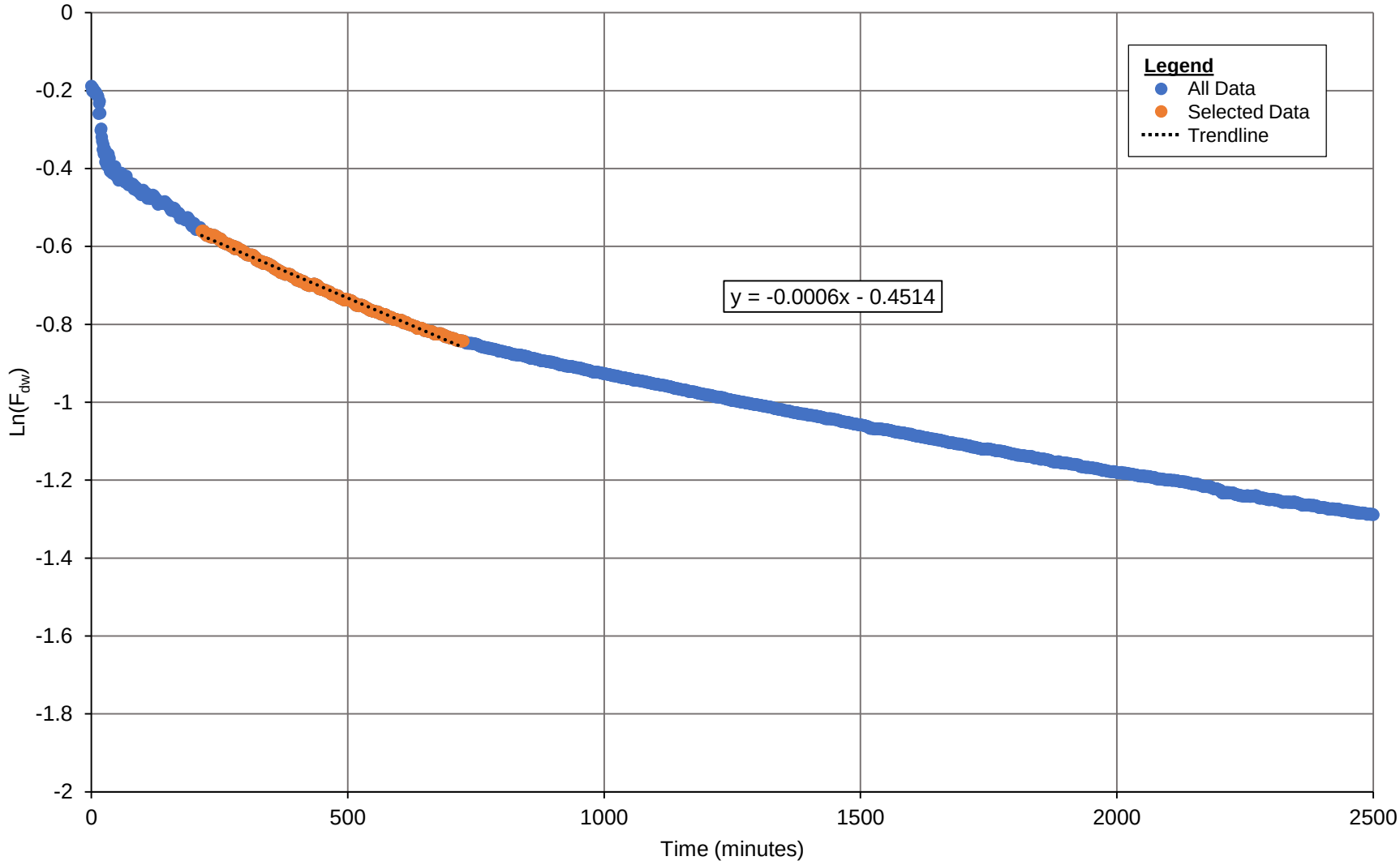

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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW217C

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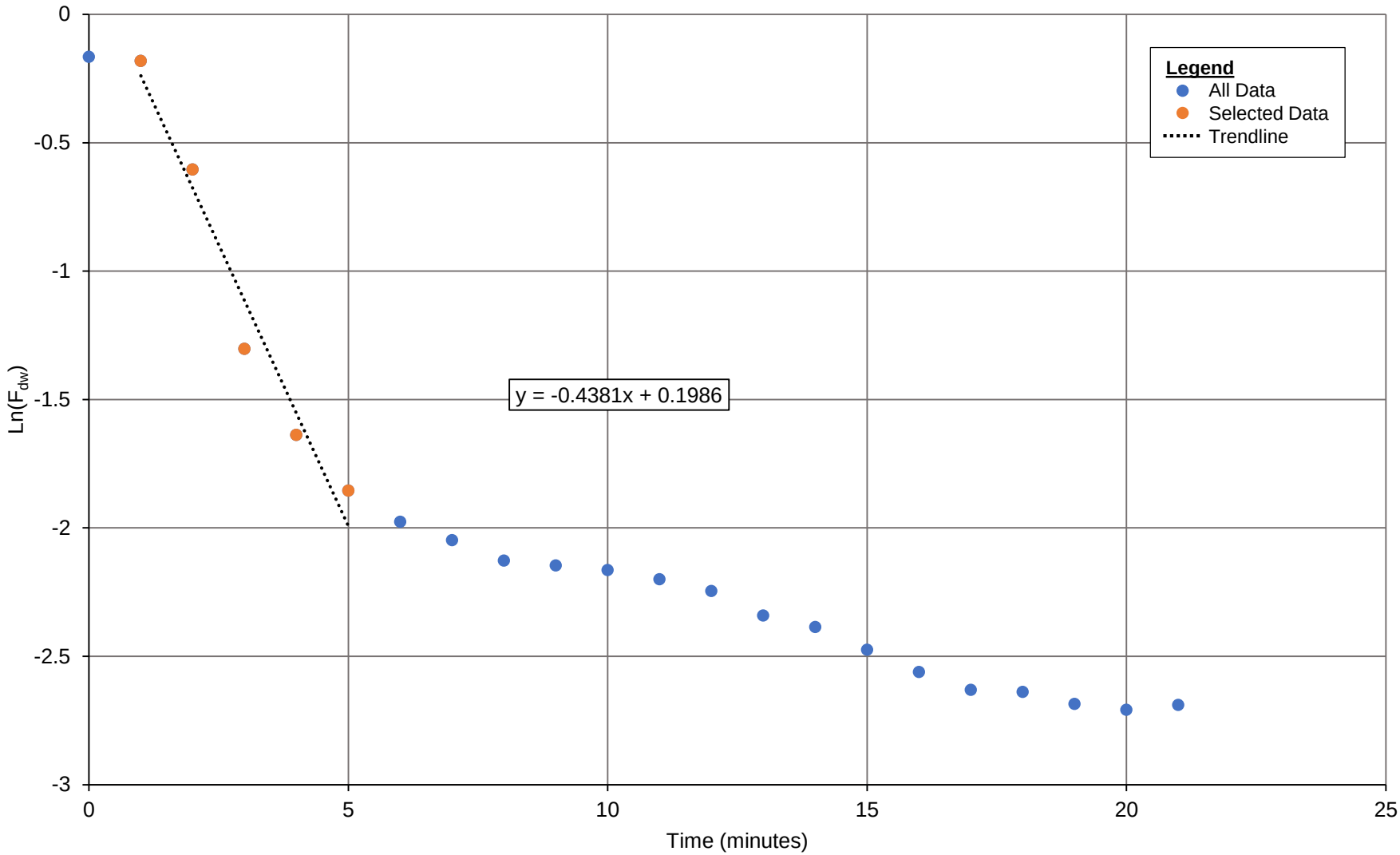
Figure No.
17



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW220A

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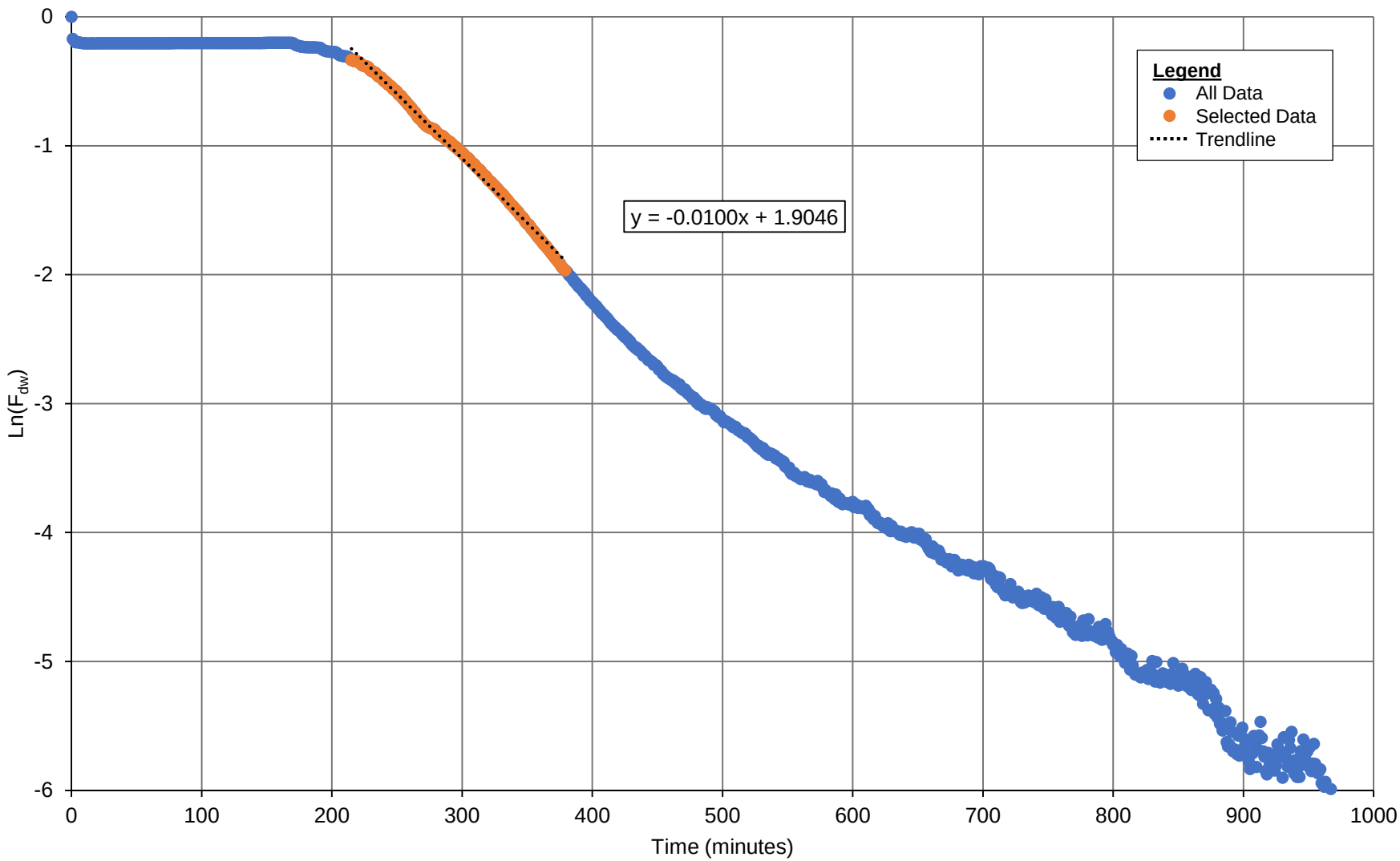
Figure No.
18



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW220B

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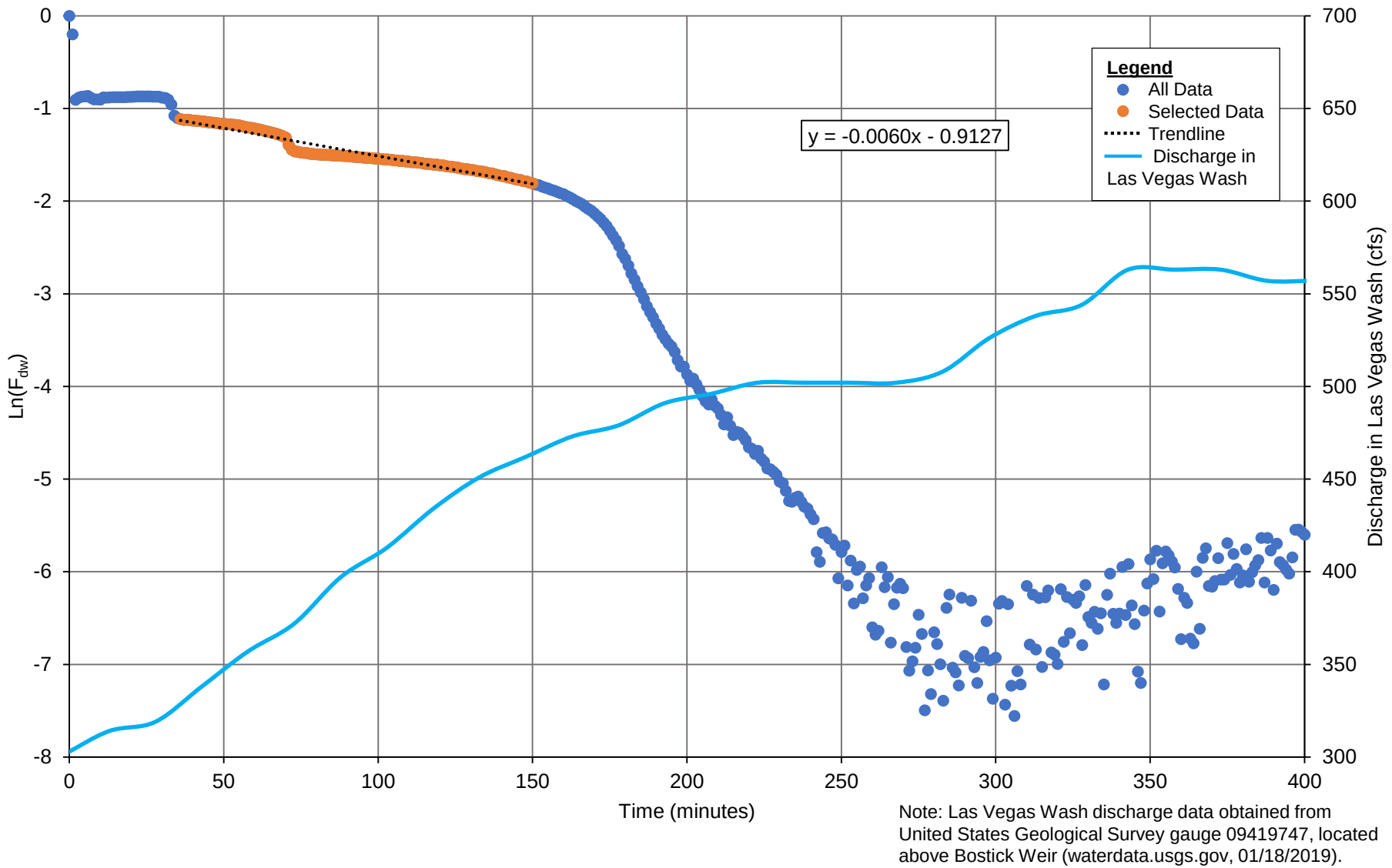
Figure No.
19



Note: Las Vegas Wash discharge data obtained from United States Geological Survey gauge 09419747, located above Bostick Weir (waterdata.usgs.gov, 01/18/2019).

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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW222A

Project No.:	117-7502018
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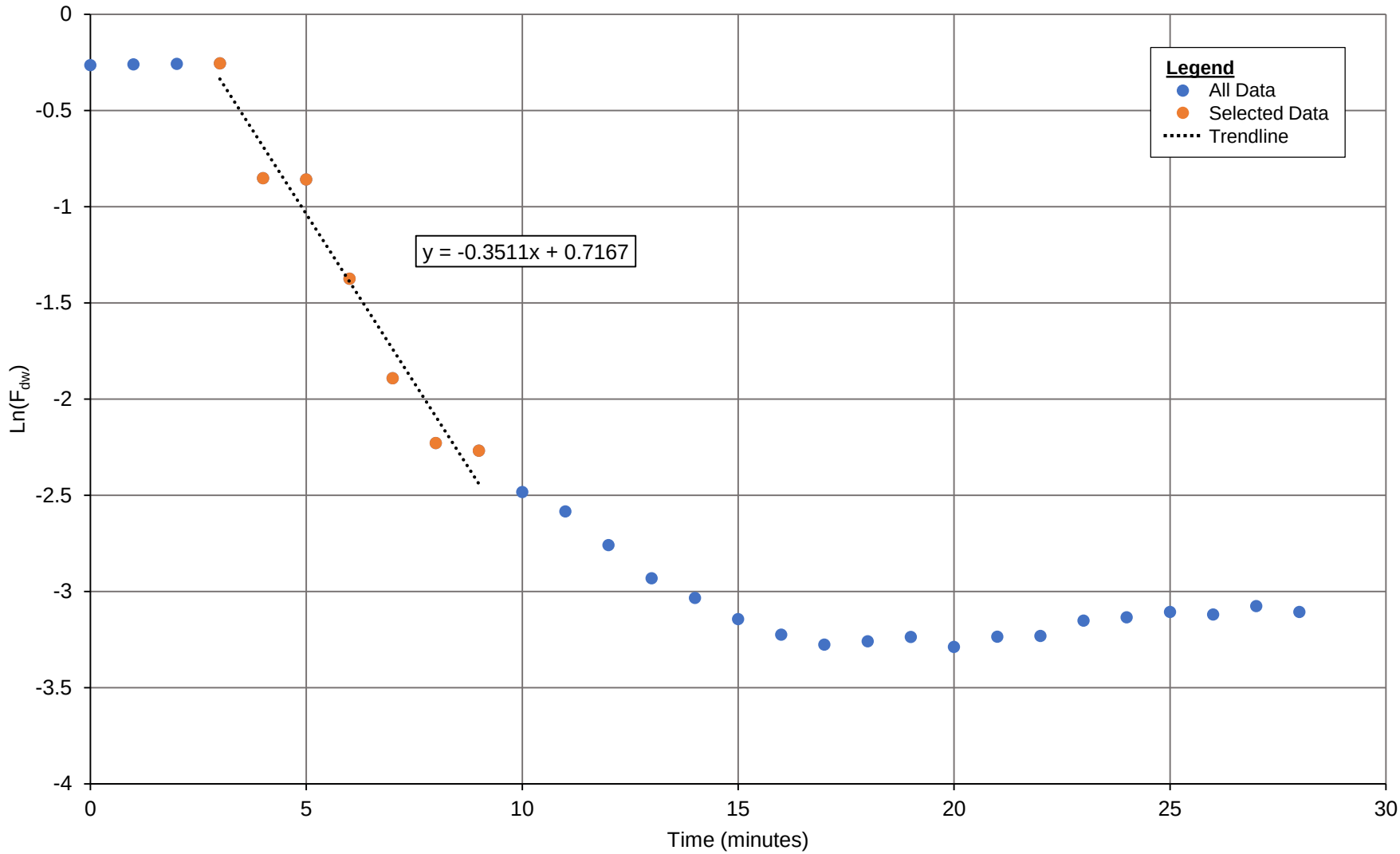
Figure No.
20



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW223A

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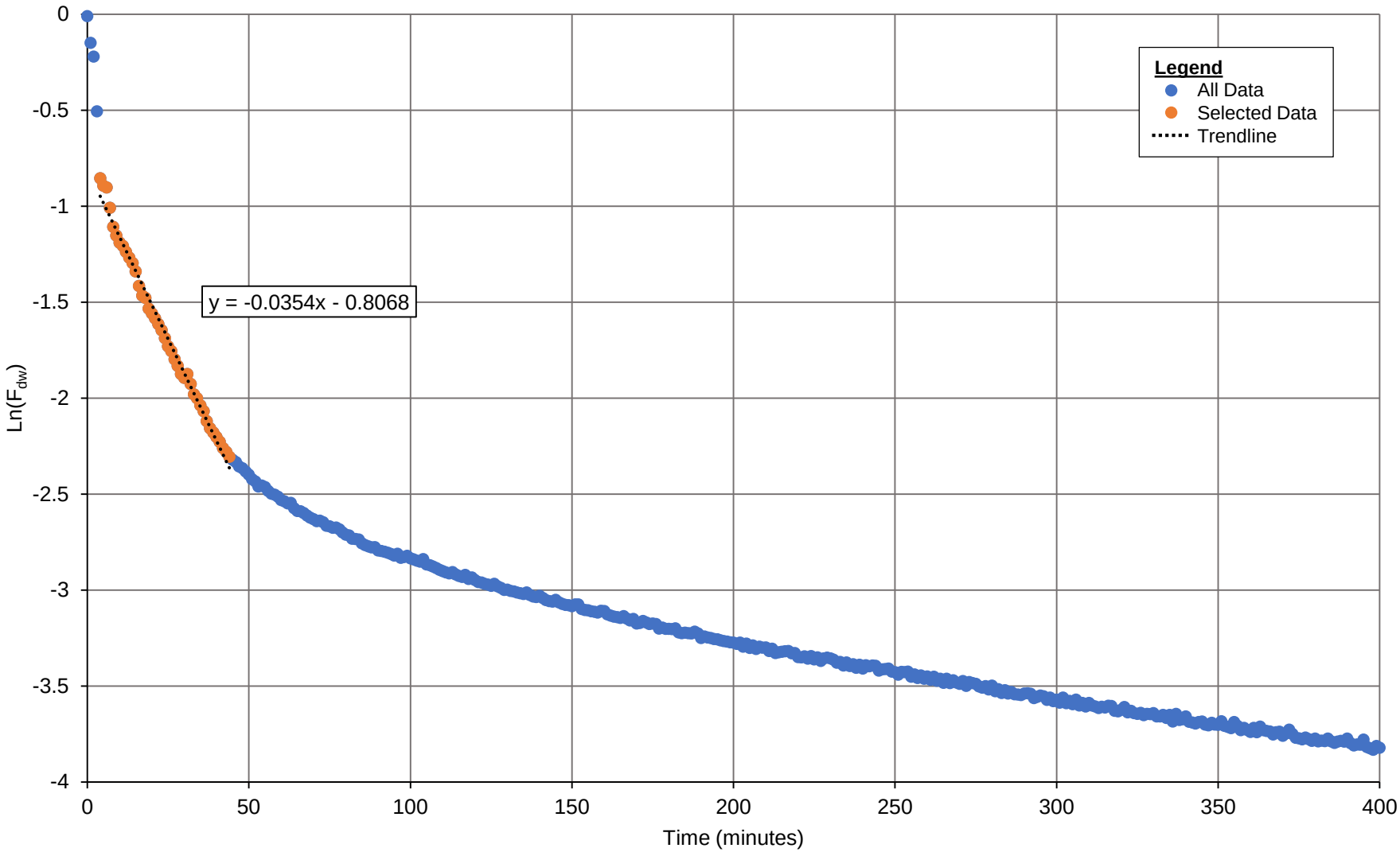
Figure No.
21



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW223B

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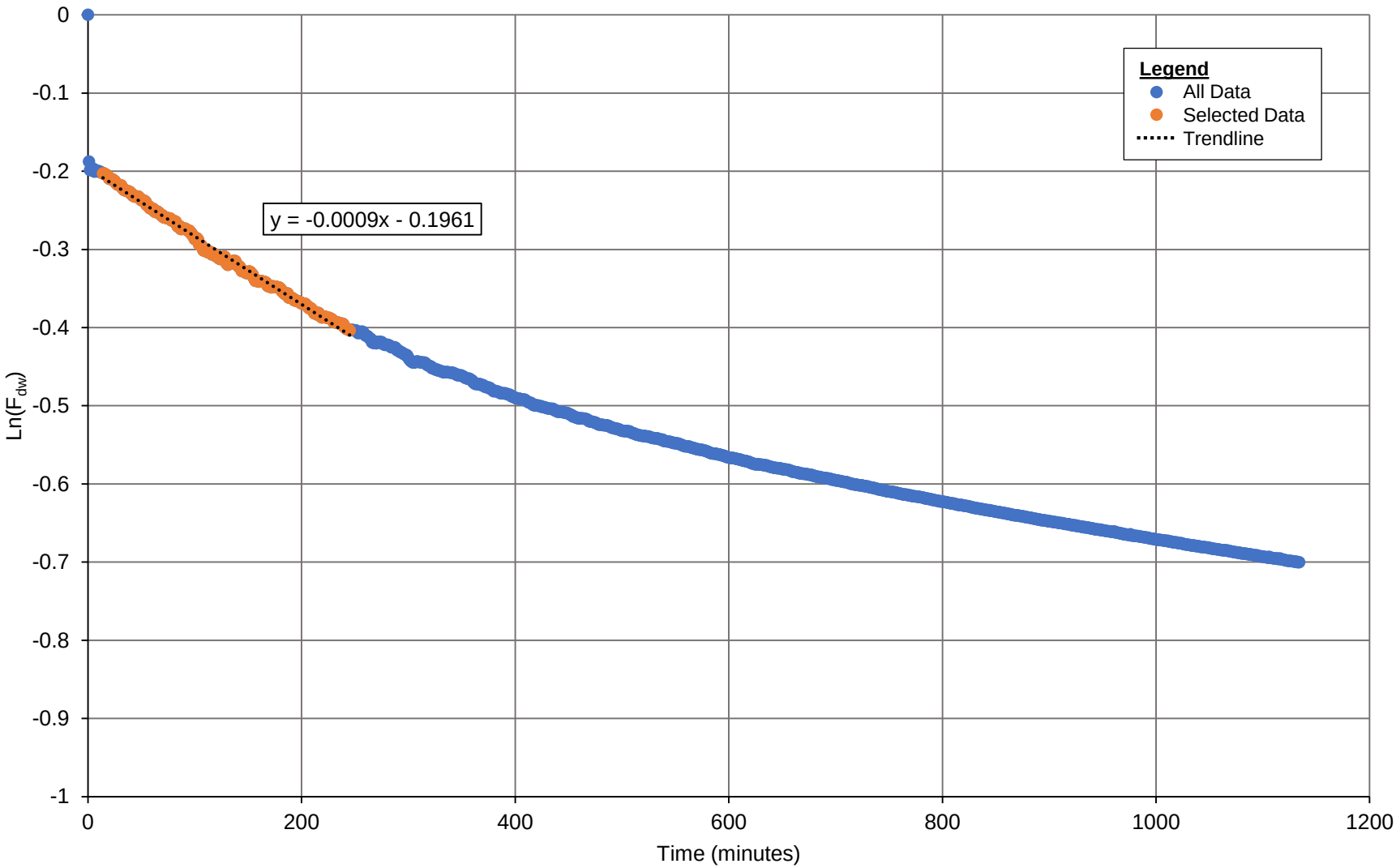
Figure No.
22



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ANALYSIS OF SINGLE-BOREHOLE DILUTION TEST FOR LVWPS-MW223C

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Figure No.
23

Appendix E
Nuclear Magnetic Resonance Logging Technical Memorandum

TETRA TECH

TECHNICAL MEMORANDUM

To:	**Dana Grady and Ronnie Britto, Tetra Tech**
From:	Sonya Cadle, Audrey Crockett, and Jenny Dabbs, Tetra Tech
Date:	May 23, 2019
Subject:	Nuclear Magnetic Resonance Logging – Las Vegas Wash Bioremediation Pilot Study

1.0 INTRODUCTION

This technical memorandum presents the results of the nuclear magnetic resonance logging (NMR) performed as part of the hydrogeological evaluation for the Las Vegas Wash (LVW) Bioremediation Pilot Study conducted by Tetra Tech, Inc. (Tetra Tech) on behalf of the Nevada Environmental Response Trust (NERT or Trust).

The locations of the monitoring and injection wells are shown in Figures 1 and 2. The pilot study involves remediation of groundwater contaminants by injection of carbon substrate solution designed to encourage the development of an environment favorable for in-situ bioremediation (ISB) of perchlorate migrating into the Las Vegas Wash downgradient of the NERT Site. The objectives and methods of the pilot study are described in the Las Vegas Wash Bioremediation Pilot Study Work Plan (Tetra Tech, 2017). The objective of the downhole NMR surveys was to evaluate the hydraulic conductivity, water content, and porosity of the formation outside the cased portion of the wells to further delineate any localized preferential flow pathways within the pilot study area which may affect ISB treatment.

2.0 PROCEDURES

NMR logging can be used in open or PVC-cased wells to provide high-resolution downhole estimates of hydraulic conductivity, total water content, total and mobile porosity, and relative pore-size distributions below the water table (Walsh et al., 2013). Above the water table, NMR provides volumetric water content measurements. The specific logging tool selected depends on the diameter of the well and borehole, because larger diameter wells require a larger radius of investigation to measure hydraulic parameters outside the backfill and drilling disturbance zone. All the NMR probes used for this pilot study, regardless of diameter selected, provide a measurement approximately every 1.5 to 2 feet of depth.

NMR logging was performed in the deepest monitoring well within each paired/clustered monitoring well configuration following each of the drilling efforts. In June 2018, NMR logging was performed in 12 monitoring wells in the Transect 1a study area. In July 2018, NMR logging of 16 monitoring wells was completed following initial monitoring well installation in the Transect 1b study area. Following monitoring well installation associated with Modification No. 2, a total of 15 newly installed monitoring wells in the Transect 1b study area were logged in

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November/December 2018. It should be noted that the five locations to which additional deep borings were added during Modification No. 2 were re-logged to obtain data at the greater depths within the new deepest well in that monitoring well cluster. Furthermore, the deep monitoring wells logged as part of the Modification No. 2 work were all installed as 4-inch diameter monitoring wells as the larger diameter monitoring well allowed for the use of a larger NMR tool to penetrate farther into the formation. Finally, one monitoring well (LVWPS-MW218C) could not be logged below 23 feet bgs because of a bend in the well casing. The high-resolution estimates of hydraulic conductivity were compared to the lithologic logs and aquifer testing results from traditional slug testing methods for each well to assess the possibility of preferential flow. The final processed NMR logging profiles are provided in ***Attachment 1***.

3.0 RESULTS

Because the translation of NMR data to hydraulic conductivity requires the use of an empirical relationship, the correct model for the degree of consolidation of the formation must be selected to yield accurate estimates of hydraulic conductivity. Many of the boreholes examined using NMR transitioned from unconsolidated to semi-consolidated Upper Muddy Creek formation (UMCf). In cases where a well was screened in the semi-consolidated UMCf, the unconsolidated model was used for the upper portion of the borehole, and the semi-consolidated model was used for the lower portion. The transition to the semi-consolidated model was identified by the field geologists based on field observations including the level of cementation (moderately to strongly cemented) and consistency (stiff, very stiff, or hard). The comparison of NMR logs to lithologic logs and to aquifer testing results from traditional slug testing methods confirmed that the standard constants for unconsolidated sediments used during NMR data processing were appropriate for the pilot study area. In semi-consolidated sediments the NMR estimates of hydraulic conductivity (K) were sometimes lower than the estimates made using slug testing; this may be an indication that the degree of consolidation varied. The NMR estimates of porosity, water content, and K of coarser and finer lithologies in the area agreed reasonably well with the aquifer testing and lithologic logs, both qualitatively and quantitatively.

Two separate empirical relationships were used to estimate K based on the NMR data. These are referred to as the Ksdr and Ksoe estimates; each is industry-standard, and the selection of one estimate over the other is dependent on the lithology of the formation. In general, the Ksdr estimate is more sensitive to the presence of clay in the formation and will provide a lower K value than the Ksoe estimate in clay-rich environments.

NMR estimates of K generally agreed with estimates derived using slug testing within an order of magnitude, as shown in ***Attachment 1***. In several wells, the slug test result clearly reflected the influence of a higher-K zone identified on the NMR log which didn't span the entire screened interval of the well. For example, at LVWPS-MW107 (***Figure A.1.7***), the NMR results show lower average Ks than the slug test result; however, NMR log shows a peak in K and mobile porosity at approximately 27 feet below ground surface (bgs), at which the Ksdr value is similar to the estimated K from the slug test.

Compared to traditional aquifer testing methods, the NMR data provided additional detail due to the numerous discrete measurements. In addition, NMR logging provides data throughout the length of the borehole, not just the screened interval, allowing for more thorough characterization of the pilot study area. For example, slug test response tends to be governed by the highest-K interval. Not only did the NMR data generally show that the highest K was the one that corresponded best to the slug test results, but it also showed the depth where that highest K occurred.

NMR profiles are particularly useful for evaluating heterogeneous materials, as the NMR data commonly show small lenses of higher or lower K materials, and allow identification of specific depth zones contributing to K values measured using traditional methods. Variation in NMR data between sandy, gravelly, silty and clayey material often corresponded well to lithologic changes recorded in borehole logs. For example, the NMR profile for LVWPS-MW217 (***Figure A.1.35***) exhibits a sharp increase in both Ksoe and Ksdr at an interval of 158 to 162 feet bgs. This increase in K coincides with a lens of sand located between layers of silty sand and sandy silt.

Siltier sands generally exhibit slightly lower K than poorly graded sand or sand with gravel, as shown in the summary figure for LVWPS-MW109 **(*Figure A.1.9*)**, where a lithologic change of silty sand to gravel at a depth of 25 feet bgs is reflected by increasing values of Ksoe and Ksdr throughout the gravel layer. The contrast in K between fine and coarse materials can also be seen in ***Figure A.1.44***, where data for LVWPS-MW226 show a sudden decrease in Ksoe and Ksdr between 55 and 64 feet bgs, coinciding with a transition from gravel to silty sand at this depth interval. In general, for poorly graded (well sorted) sediments, the Ksoe and Ksdr should be nearly identical, as observed in the upper (alluvial) portions of the profiles for most wells.

As expected, NMR logs indicated that clayey lithologies tended to have lower K values. Decreases in estimated K due to clay were more pronounced in the Ksdr estimate than in the Ksoe estimate, as the Ksdr estimate is more sensitive to clay. In practice, this means that the Ksdr estimate is likely to be more accurate than Ksoe if the proportion of clay in the unit is high. The influence of clayey lithologies can be seen in the NMR log for well LVWPS-MW111 **(*Figure A.1.11*),** where the clay content sharply increases at approximately 55 feet bgs. The well is screened below that, and the Ksoe estimate of K continued to rise from 50 to 60 feet bgs, peaking over 20 ft/day, while the Ksdr estimate was much more similar to the slug test result of 1.9 ft/day.

Also, in both Transect 1a and 1b, the NMR K estimates provided a very useful check on slug test data. When the slug-in and slug-out data differed significantly in high-K wells, the explanation was not immediately obvious. However, the NMR data clearly corresponded more closely to the slug-in tests results, which indicated there was potentially a problem with the slug-out data. The explanation was ultimately found to be related to friction between the slug and the well casing causing slight suction, which in high-K wells caused immediate recovery of a significant portion of the displacement.

Water content data from NMR typically shows the depth of the UMCf contact with the alluvium. The water content often increases sharply at the UMCf contact to approximately 50 percent, reflecting the increased proportion of fine-grained sediments in the UMCf relative to the alluvium. The lithologic, NMR and water content profiles for LVWPS-MW108 **(*Figure A.1.8*)** show good agreement in the transition into the UMCf where clay and capillary water content increase at a depth approximately 40 feet bgs. In the eastern portion of Transect 1b, a number of wells were completed in the coarse-grained facies of the UMCf (UMCF-cg). These wells also exhibit increased water content at the contact between the alluvium and the UMCf-cg, although the increase is not as marked as the distinction between alluvium and UMCf. The water content log for well LVWPS-MW210 **(*Figure A.1.27)*** shows an increase in water content after 84 ft bgs, which was the contact between the alluvium and UMCF-cg at well LVWPS-MW210E.

Generally, mobile porosity was higher in the saturated alluvium than in the UMCf. For example, well LVWPS-MW203A (***Figure A.1.15***) is screened in sand and gravel and has a mobile porosity approaching half the total porosity in some intervals, whereas in the semi-consolidated portion of the LVWPS-MW203 cluster NMR log, mobile porosity represents a tiny fraction of total porosity. The highest overall total porosities are seen in the UMCf. For example, UMCf monitoring wells LVWPS-MW203B (***Figure A.1.15***) and LVWPS-MW206C (***Figure A.1.19***) have total porosities peaking at over 50 percent.

Sometimes NMR data can be used to identify zones where loose material continued to enter the borehole during drilling and/or well installation and was removed, resulting in a cavity surrounding the borehole in which the formation is loosely packed or absent. For example, comparison of the lithologic, NMR, and water content plots for LVWPS-MW202 (***Figure A.1.14***) shows sudden large spikes in Ksoe, Ksdr, and mobile porosity beginning at approximately 55 feet bgs. The large increase in both K values and mobile porosity observed at LVWPS-MW202 may indicate a possible caved zone around the well. Field notes from the well installation of LVWPS-MW202 noted caving, confirming that this interpretation is likely correct. Similar but less severe effects are present in other boreholes.

4.0 SUMMARY OF KEY FINDINGS

This section provides a summary of key observations from the NMR logging effort for the LVW Bioremediation Pilot Study.

- For most wells, K values calculated from NMR data using standard constants for unconsolidated and semi-consolidated materials, as appropriate, agreed with estimates derived using slug testing to within an order of magnitude.
- The larger-diameter NMR tool used in the wells cased with 4-inch PVC produces less noisy results. In the future, the deepest well in each cluster should be cased with 4-inch PVC to facilitate the use of the larger-diameter NMR tool.
- For wells screened in the UMCf, it can be difficult to identify depths of the highest-K zones from lithologic logs because the fine grain size of UMCf sediments increases the likelihood that lithologic changes may not be called out on lithologic logs. NMR can indicate the existence of a higher-K zone of the UMCf that might not have been otherwise identified.
- Water content data from NMR typically show the depth of the UMCf or UMCf-cg contact with the alluvium. The water content increases sharply at the UMCf or UMCF-cg contact to approximately 50 percent or 40 percent, respectively.

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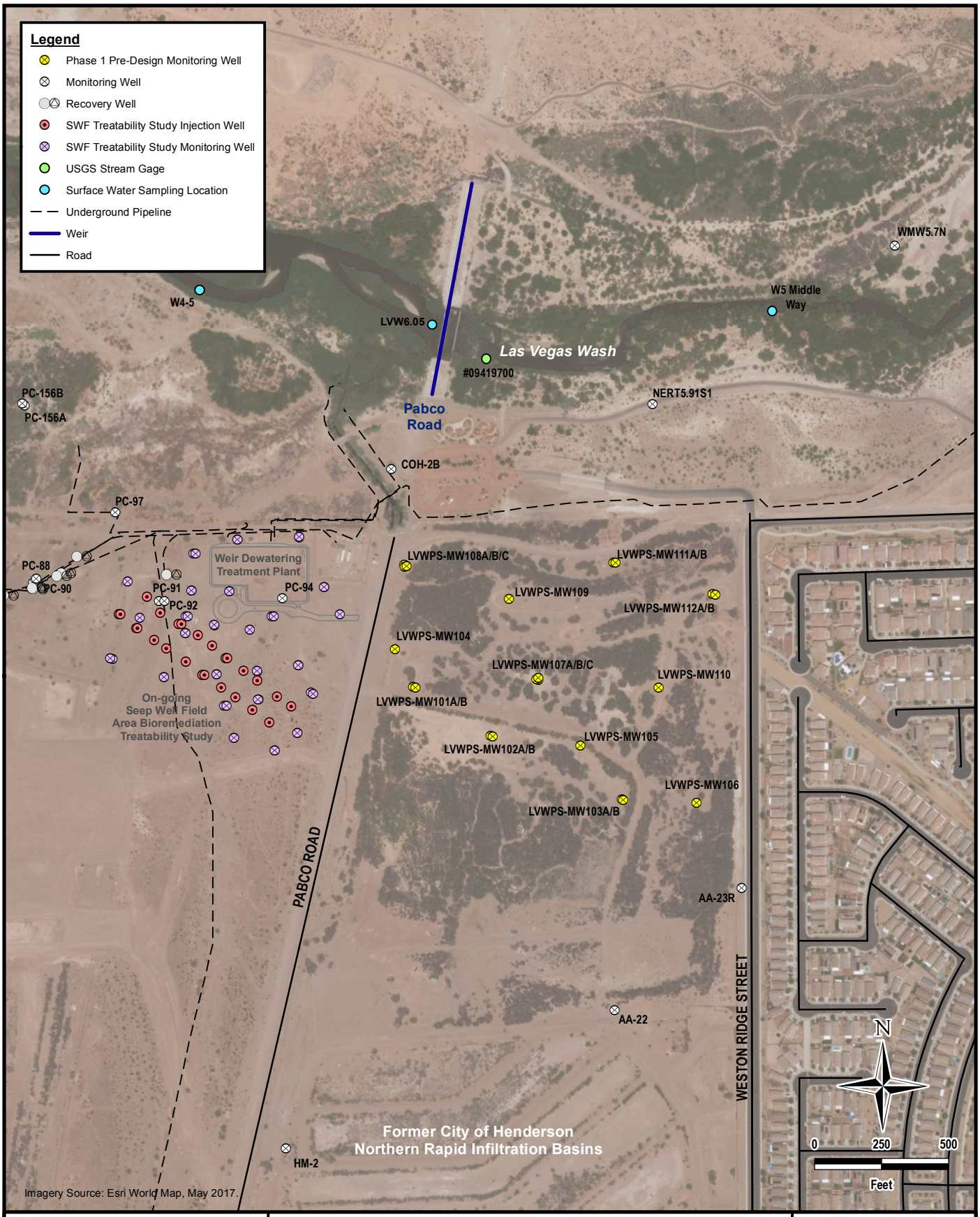
Figures



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TRANSECT 1A STUDY AREA

PROJECT NO.:	117-7502019
DATE:	FEBRUARY 11, 2019
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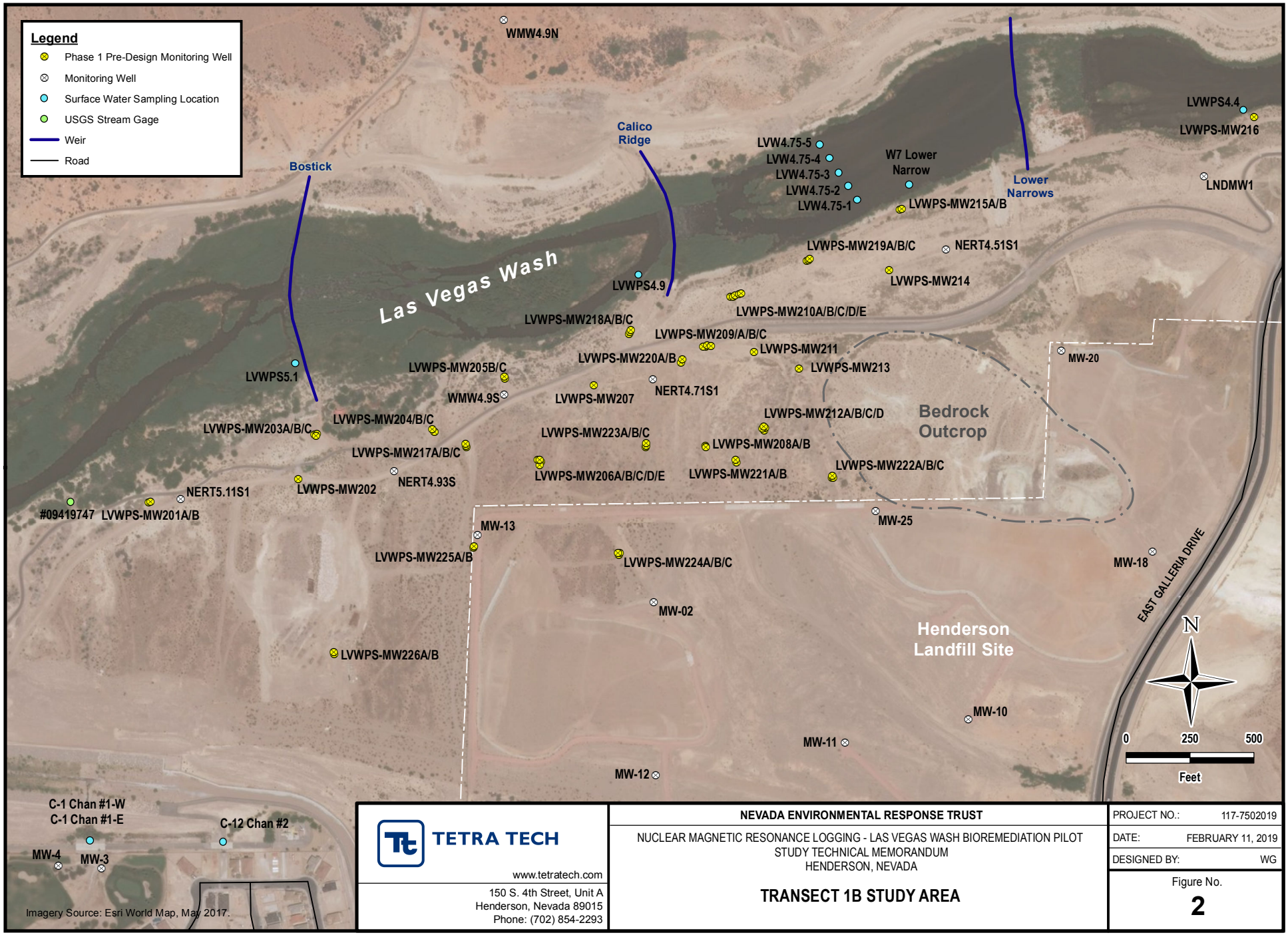
Figure No.
1



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TRANSECT 1B STUDY AREA

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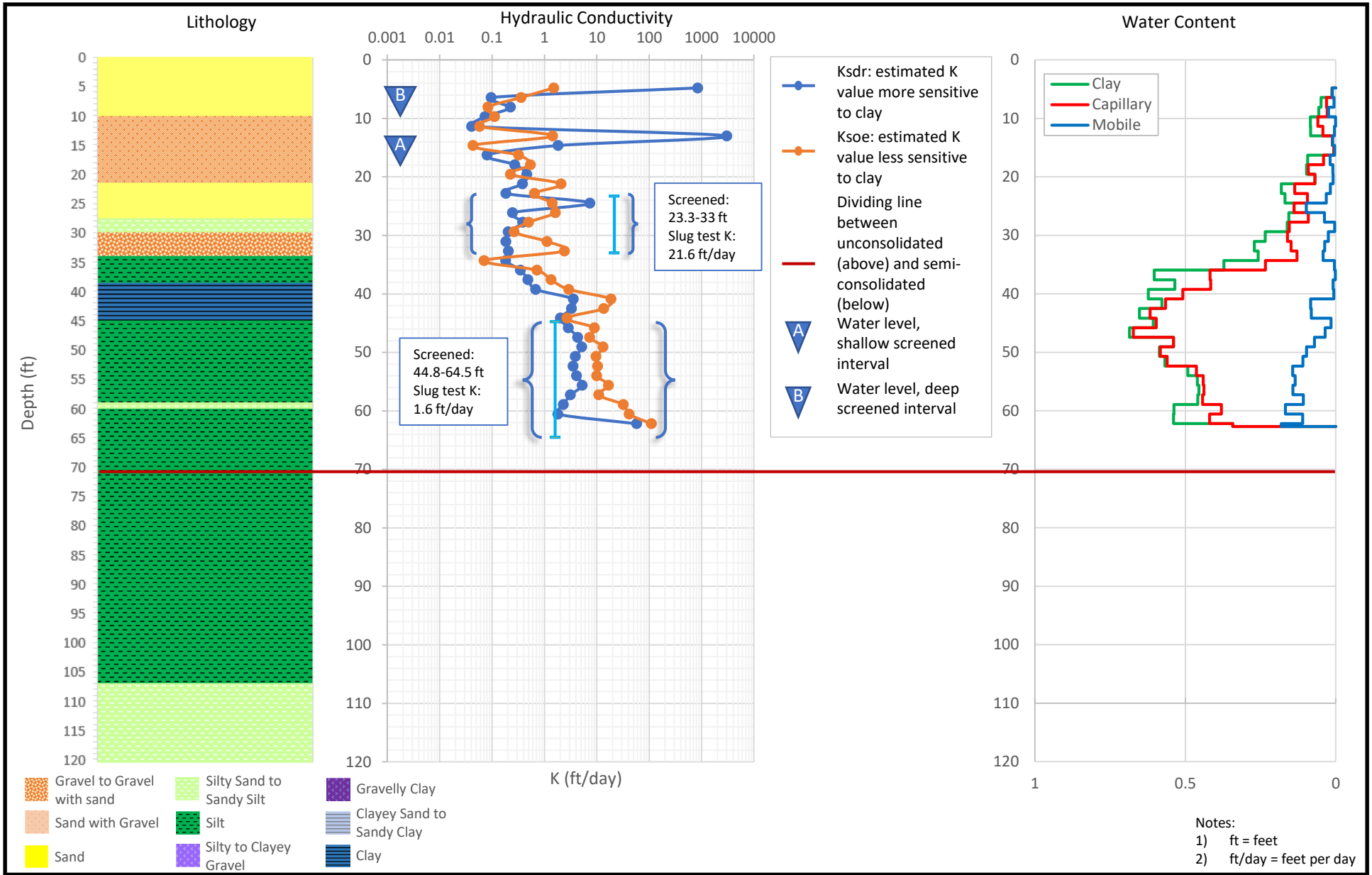
DESIGNED BY:	WG

Figure No.
2

Attachment 1
Nuclear Magnetic Resonance Logging Profiles



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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW101

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Figure No.
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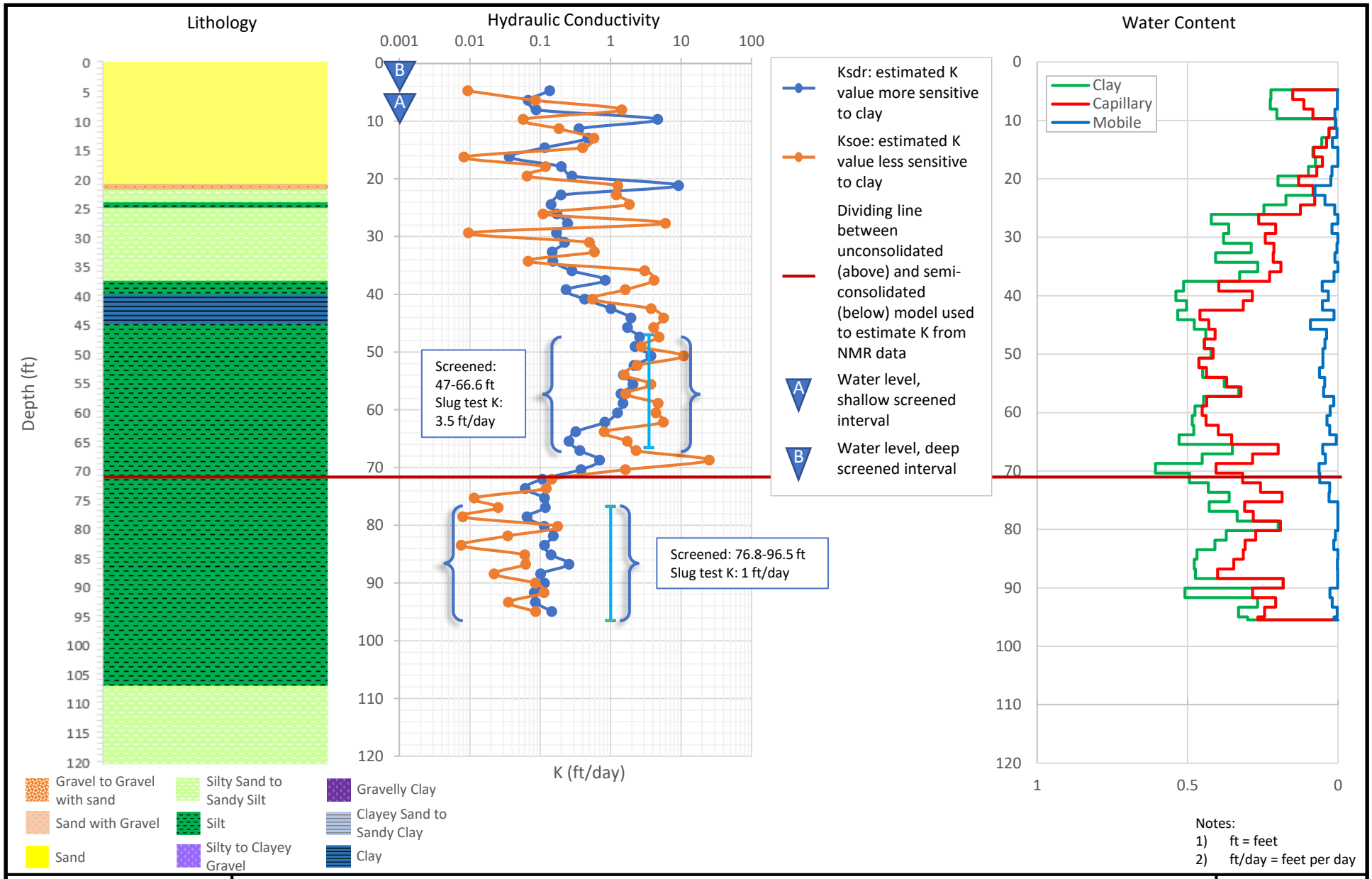

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW102

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
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Figure No.
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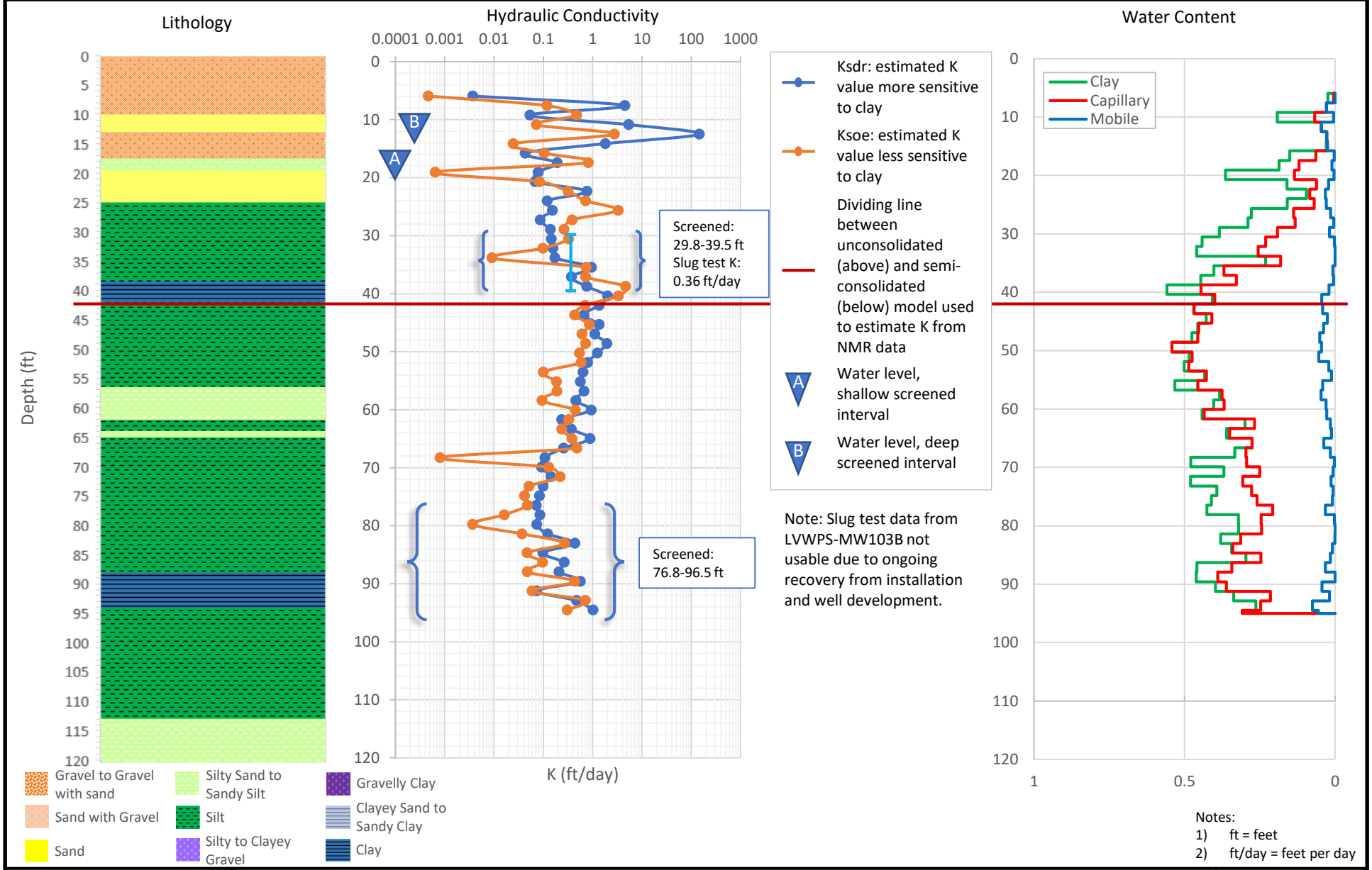

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW103

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Figure No.
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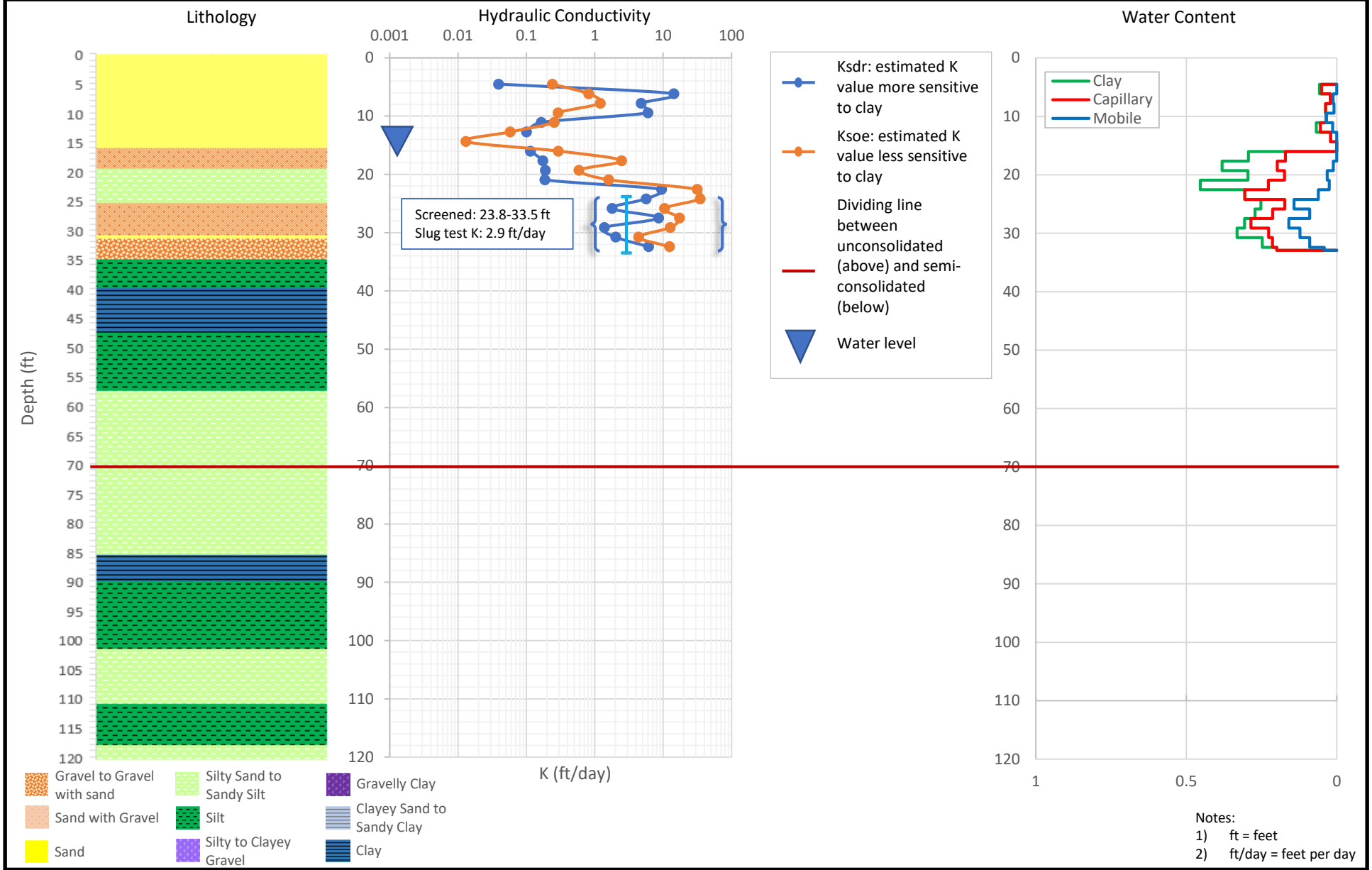

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW104

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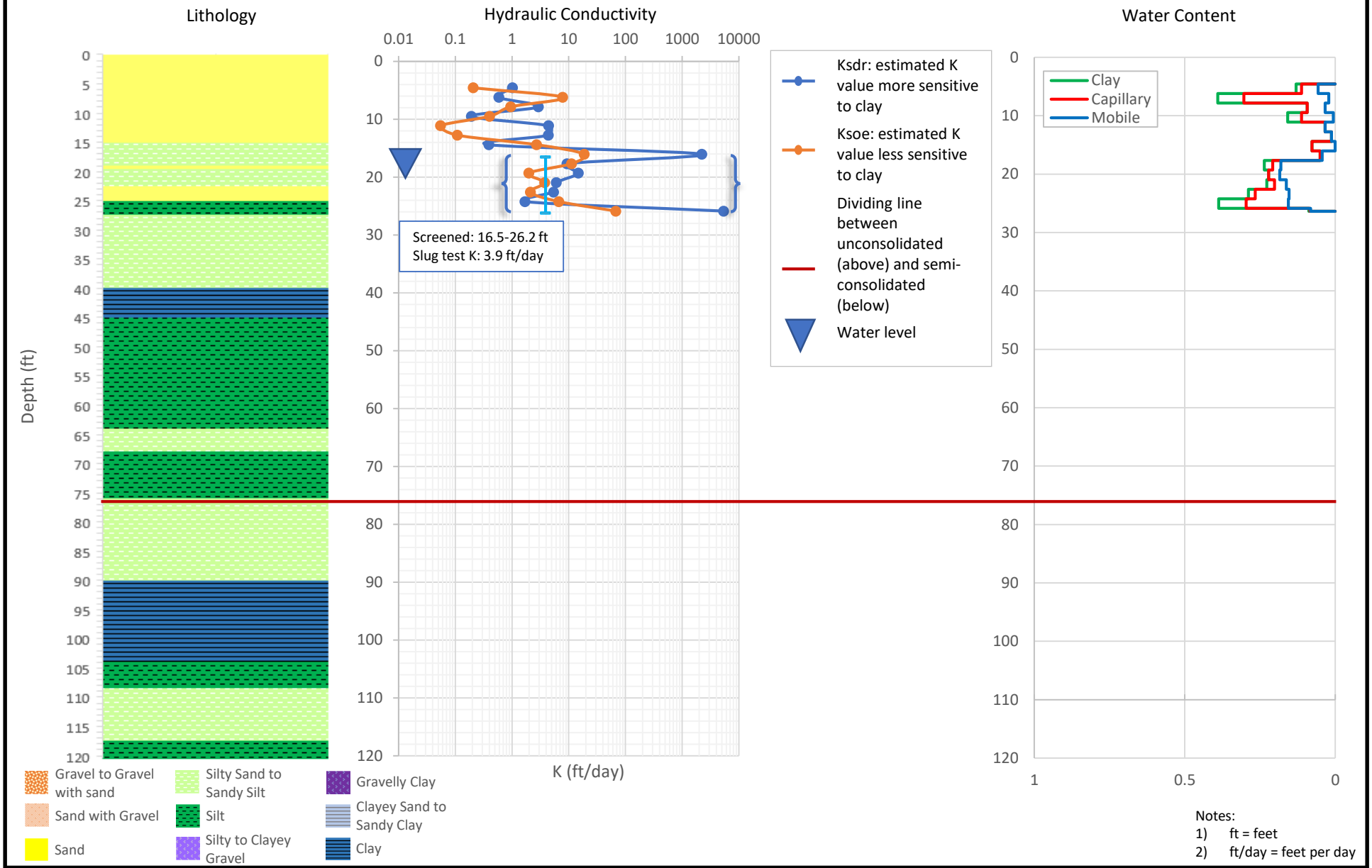

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW105

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Figure No.
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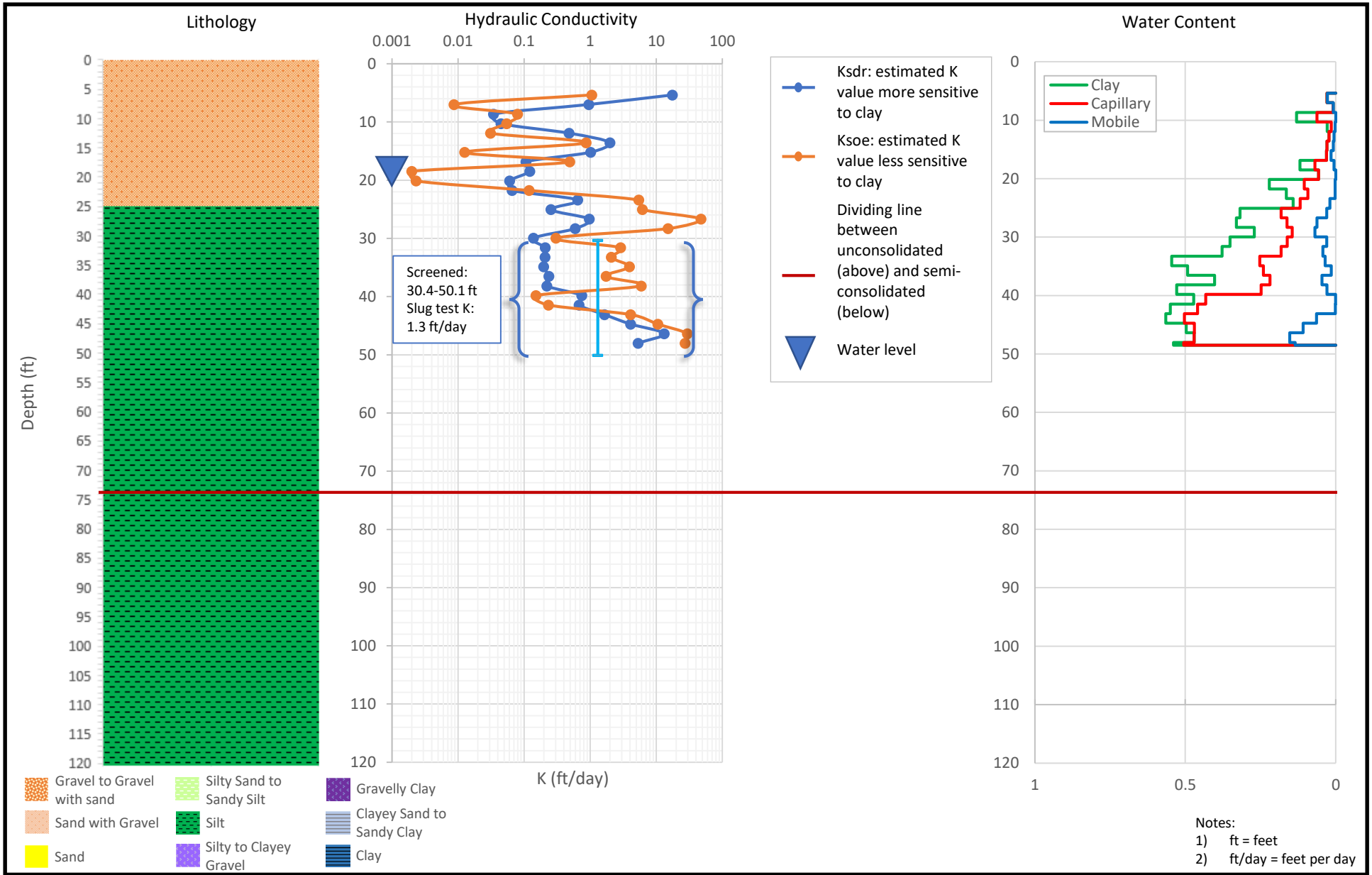

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW106

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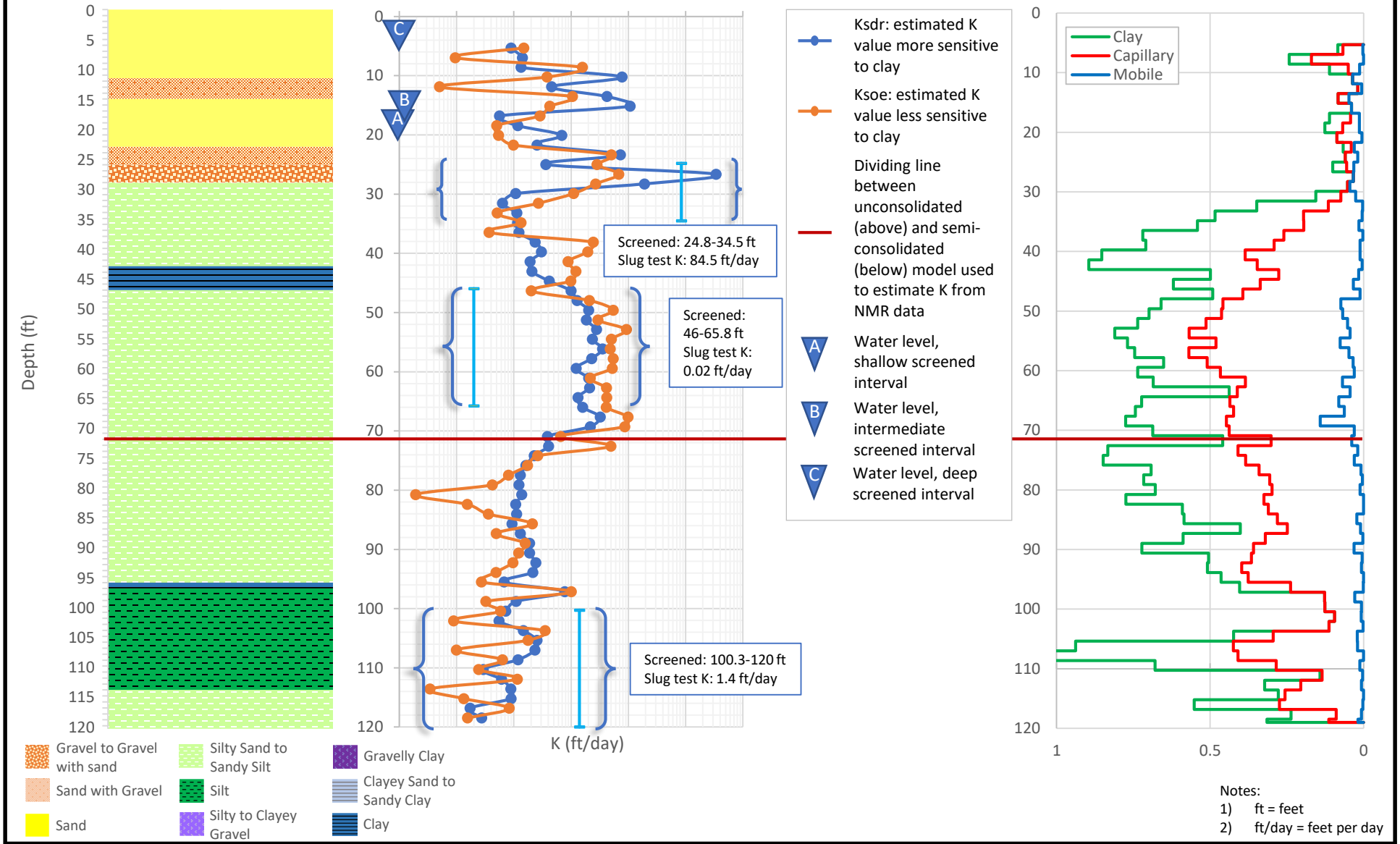

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW107

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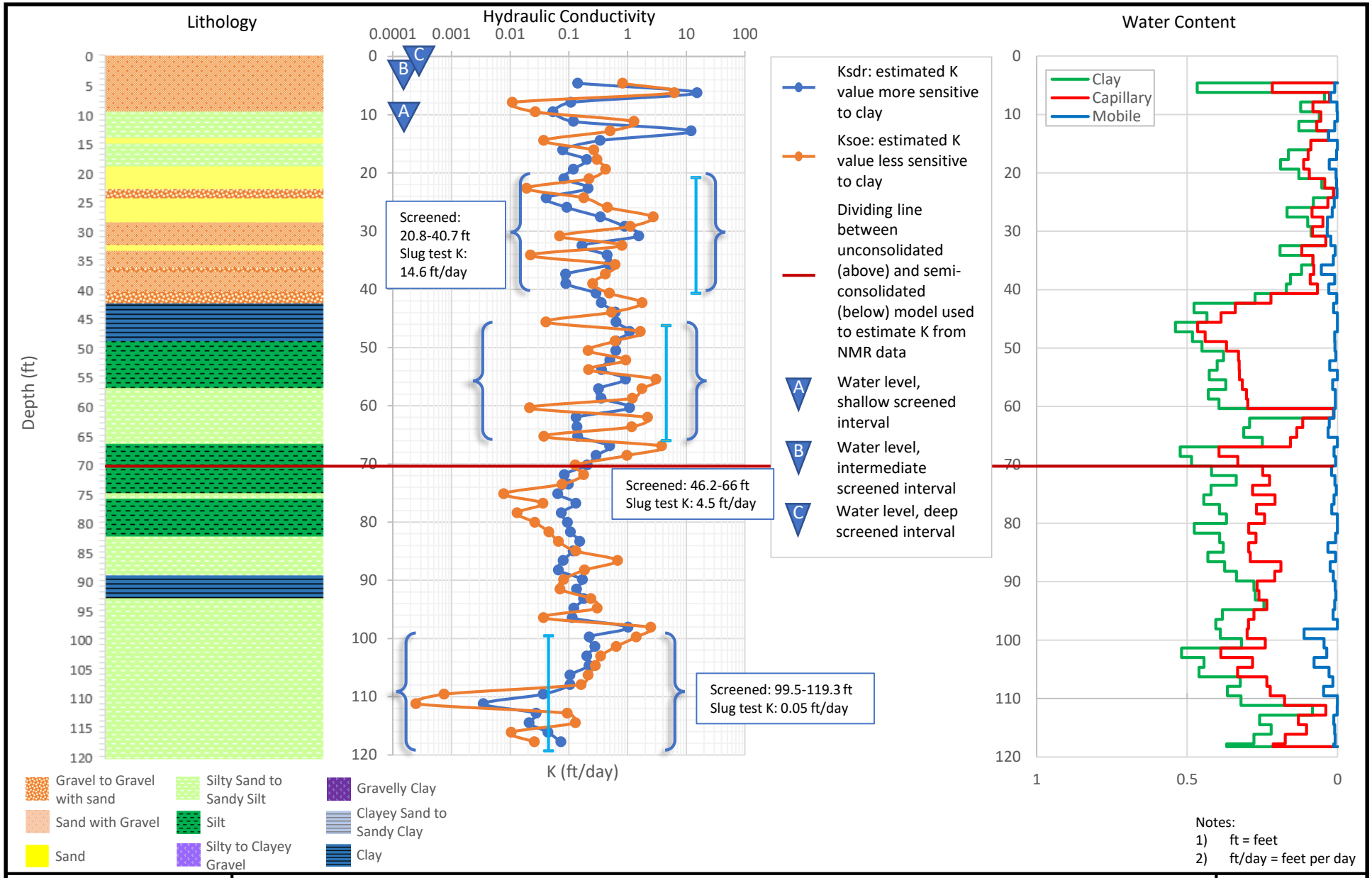

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW108

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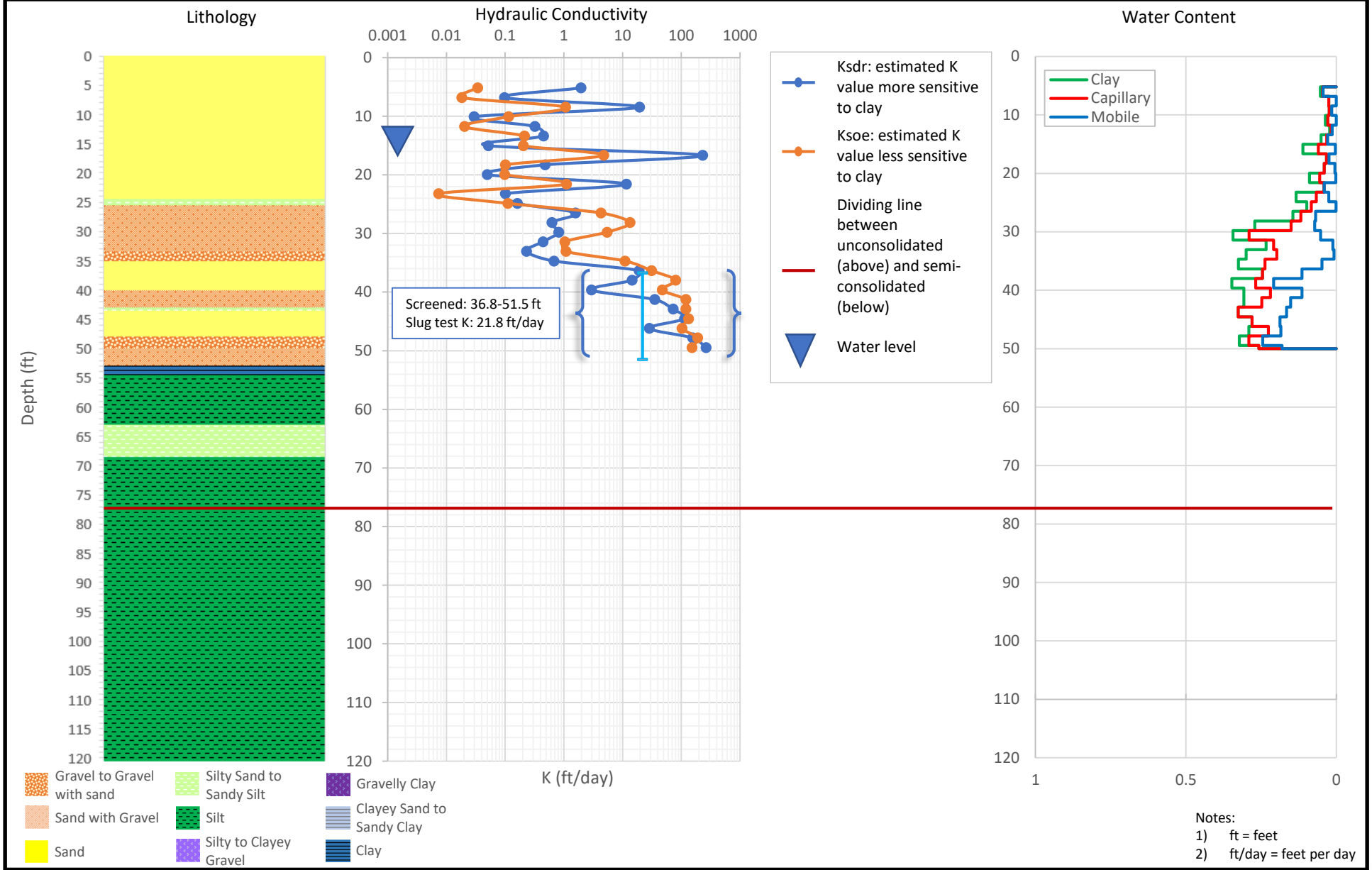

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW109

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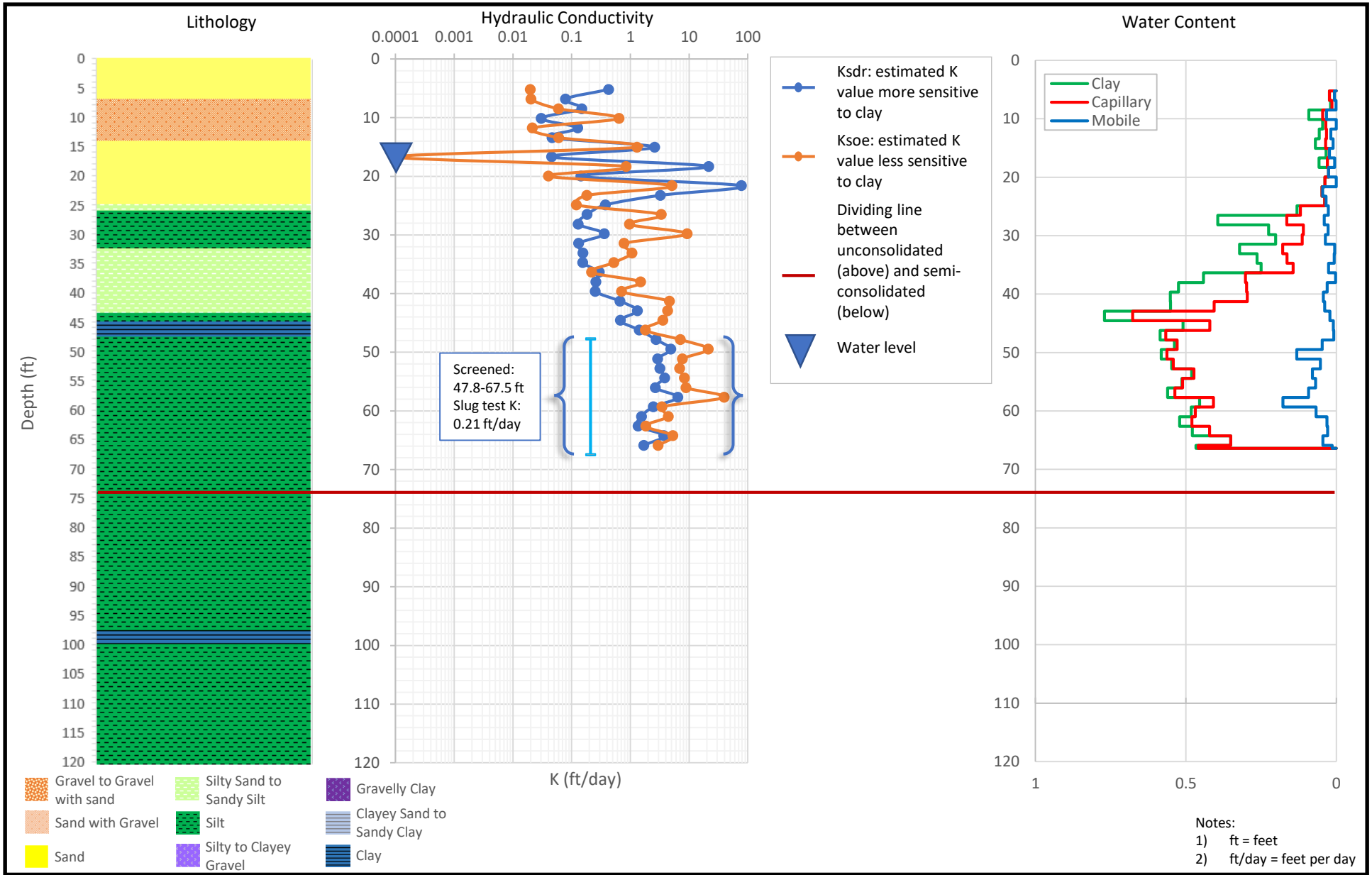

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW110

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
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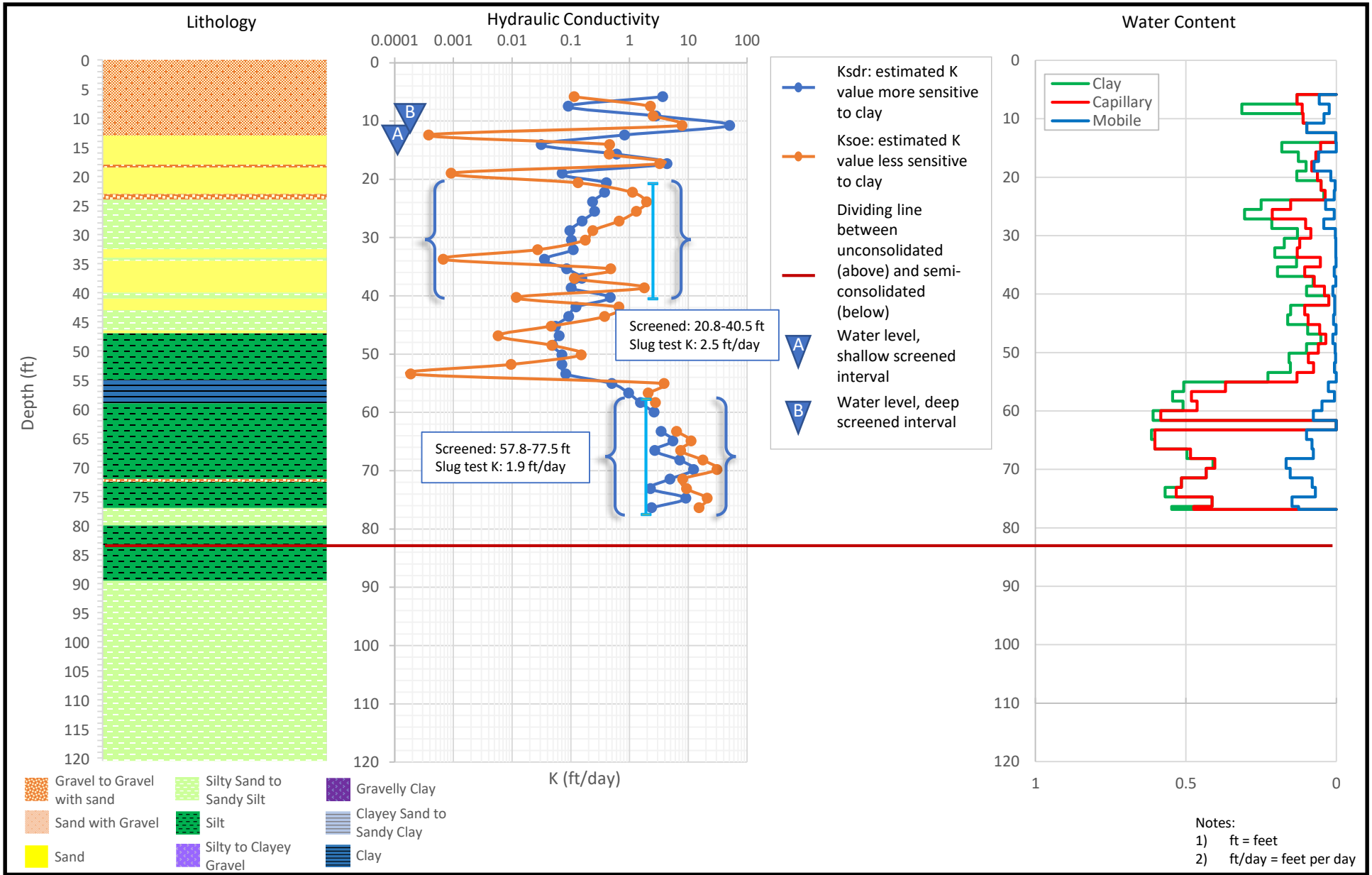

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW111

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

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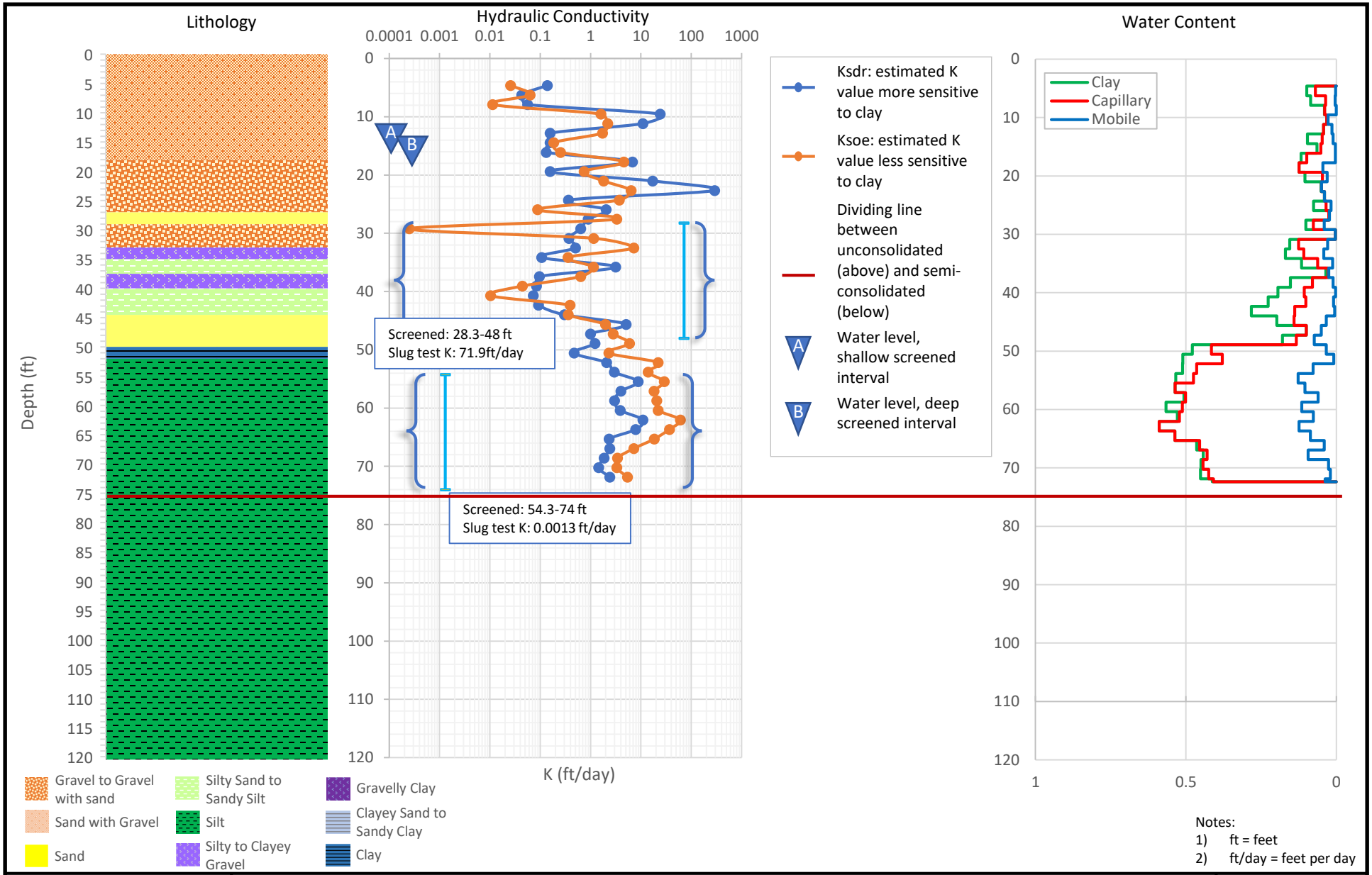

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW112

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
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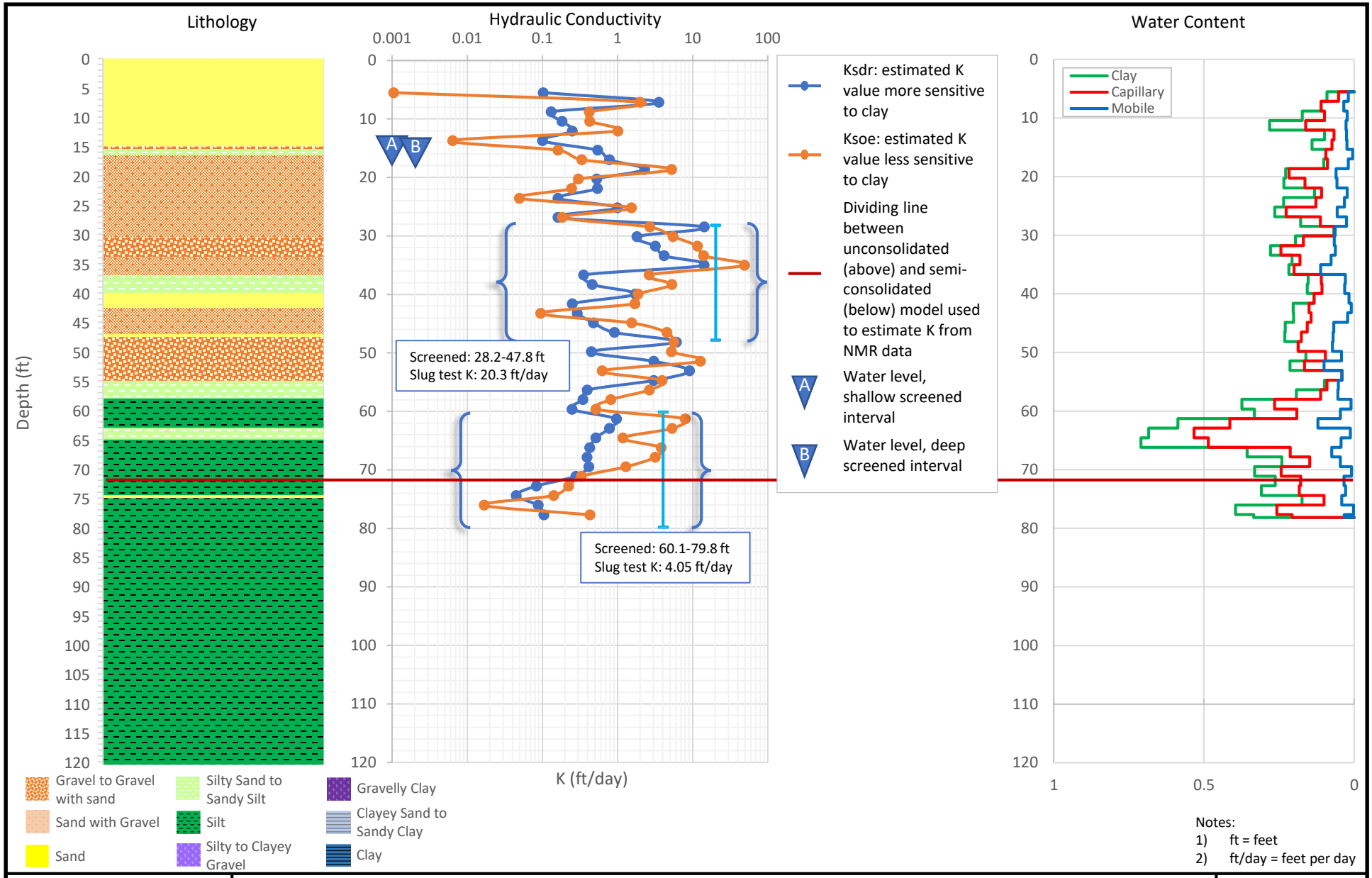

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW201

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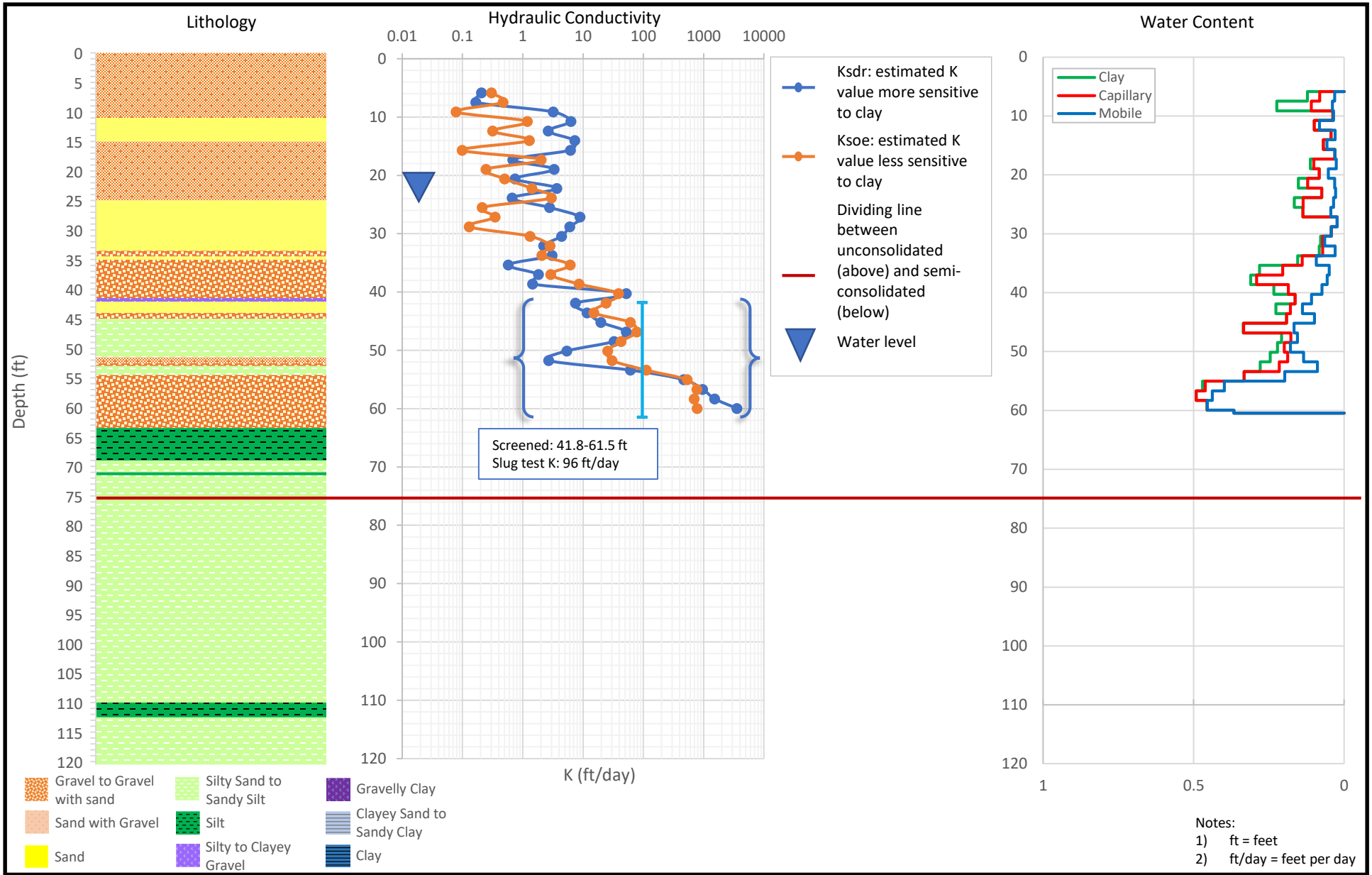

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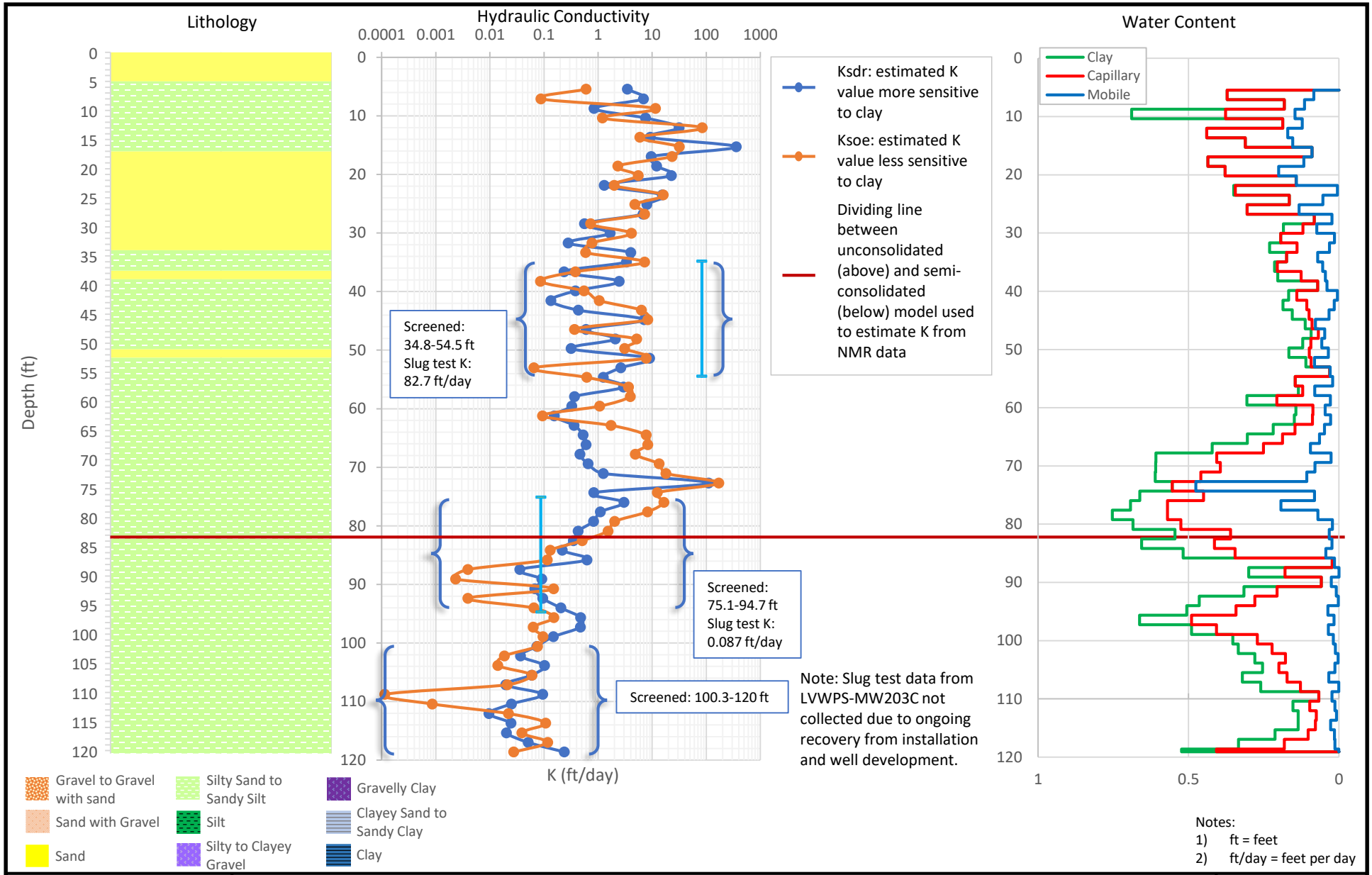
SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW202

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.14

\\ths134fs1\GEOSUPVOL1\PROJECTS\NERT\M17\NMR\NMR_Comparisons_8x11_v2.pptx



Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

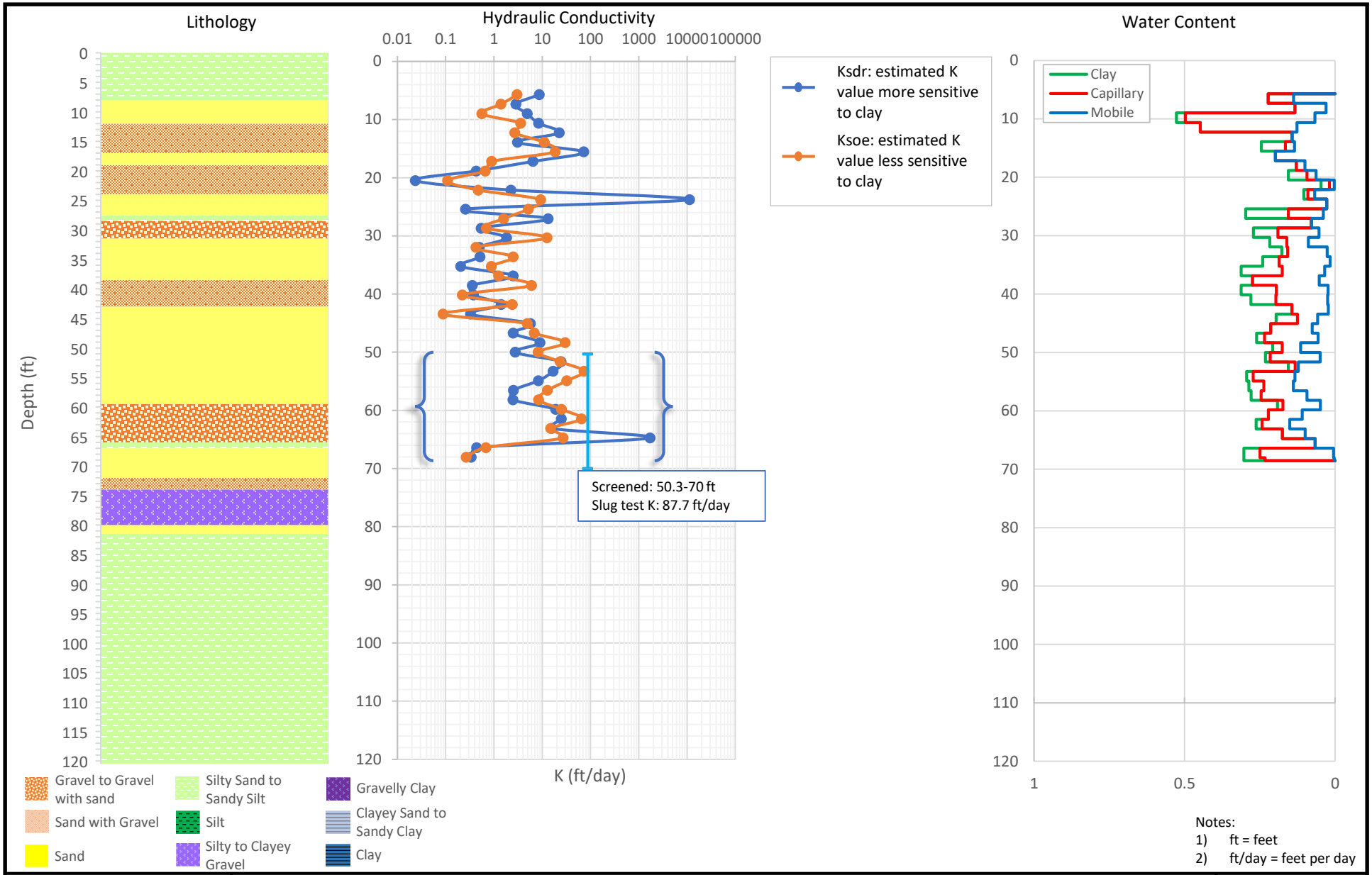
LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW203

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.15

\\ths134fs1\GEOSUPVOL1\PROJECTS\NERT\M17\NMR\NMR_Comparisons_8x11_v2.pptx



Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW204

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.16

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Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and semi-consolidated (below) model used to estimate K from NMR data

Water level, shallow screened interval

Water level, intermediate screened interval

Screened: 50.3-70 ft
Slug test K: 87.7 ft/day

Screened: 101.5-121.2 ft
Slug test K: 0.34 ft/day

Screened: 150.5-170 ft

Clay

Capillary

Mobile

Note: Water level not shown and slug test data from LVWPS-MW204C not usable due to ongoing recovery from installation and well development.

Gravel to Gravel with sand

Sand with Gravel

Sand

Silty Sand to Sandy Silt

Silt

Silty to Clayey Gravel

Gravelly Clay

Clayey Sand to Sandy Clay

Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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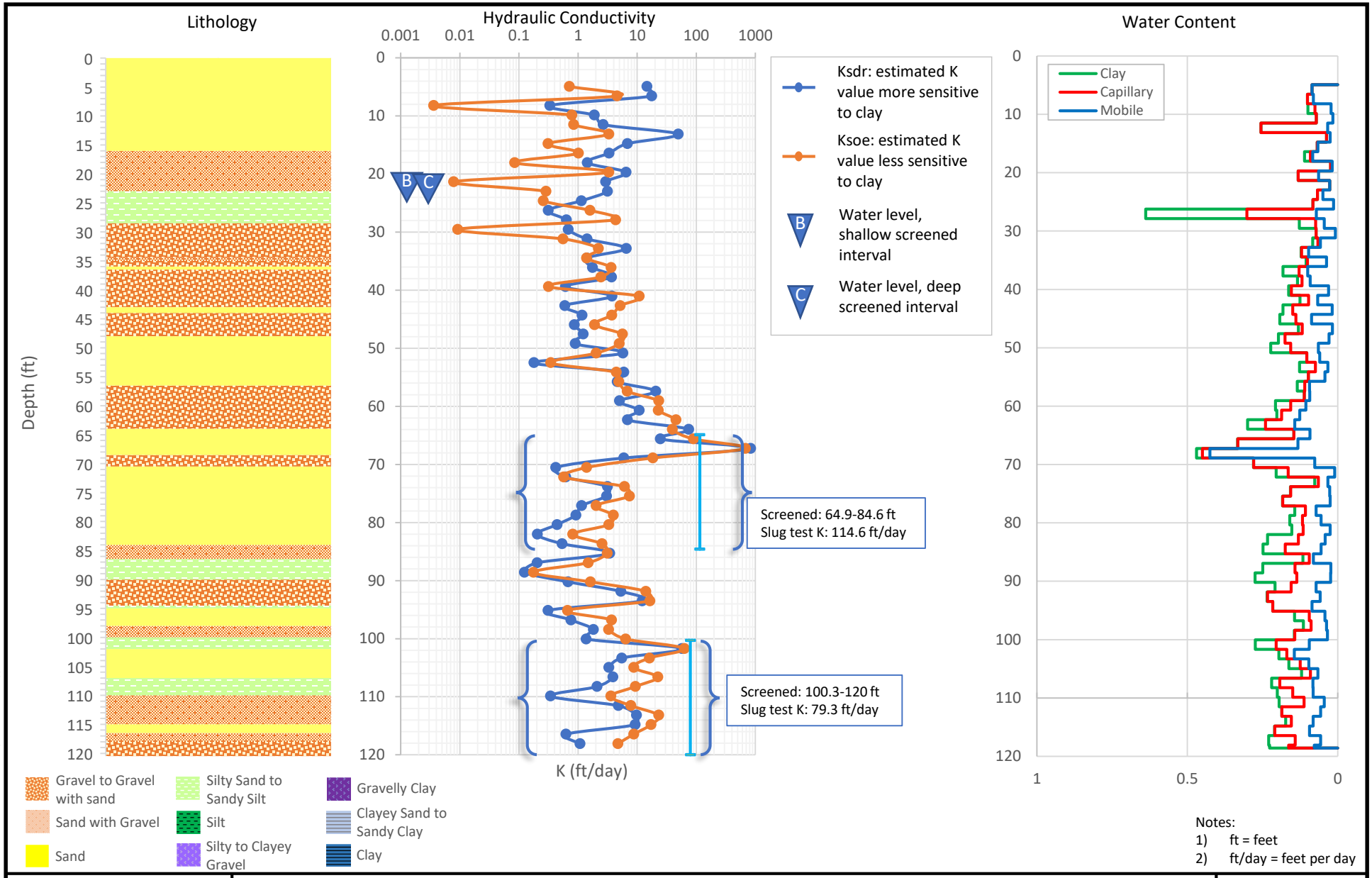
SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW204

Project No.: 117-7502018
Date: FEBRUARY 7, 2019
Designed By: BCS

Figure No.
A.1.17



Notes:
1) ft = feet
2) ft/day = feet per day

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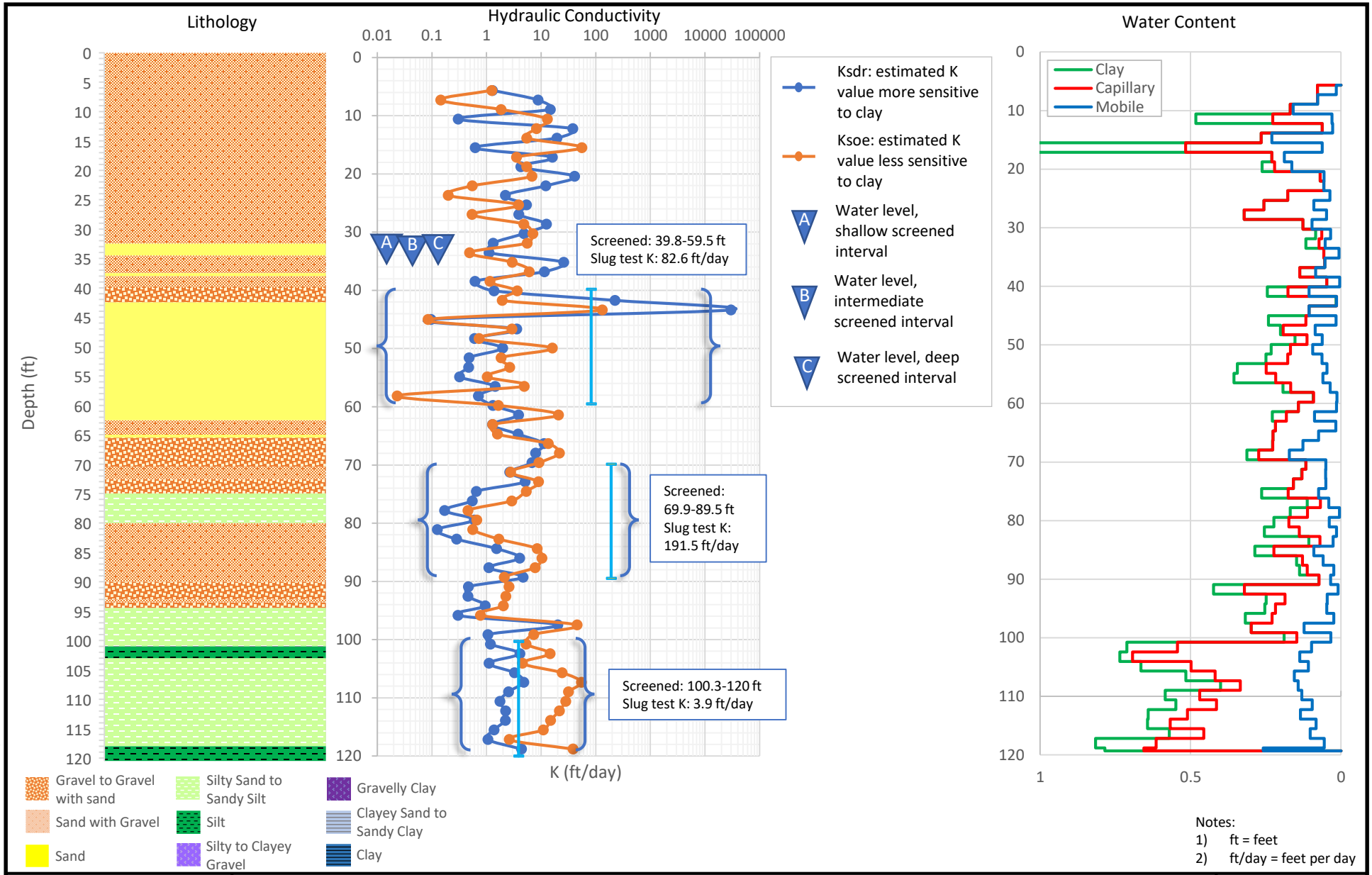
SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW205

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.18



Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW206

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.19

\\ths134fs1\GEOSUPVOL1\PROJECTS\NERT\M17\NMR\NMR_Comparisons_8x11_v2.pptx

Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and semi-consolidated (below) model used to estimate K from NMR data

A Water level, LVWPS-MW206A

B Water level, LVWPS-MW206B

C Water level, LVWPS-MW206C

D Water level, LVWPS-MW206D

E Water level, LVWPS-MW206E

Screened: 39.8 – 59.5 ft
Slug test K: 82.5 ft/day

Screened: 69.9 – 89.5 ft
Slug test K: 191 ft/day

Screened: 100.3 – 120 ft
Slug test K: 3.9 ft/day

Screened: 125.3 – 145 ft
Slug test K: 0.37 ft/day

Screened: 195.5 – 205 ft
Slug test K: 0.31 ft/day

Clay
Capillary
Mobile

Gravel to Gravel with sand
Sand with Gravel
Sand
Silty Sand to Sandy Silt
Silt
Silty to Clayey Gravel
Gravelly Clay
Clayey Sand to Sandy Clay
Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW206

Project No.: 117-7502018
Date: FEBRUARY 7, 2019
Designed By: BCS

Figure No.
A.1.20

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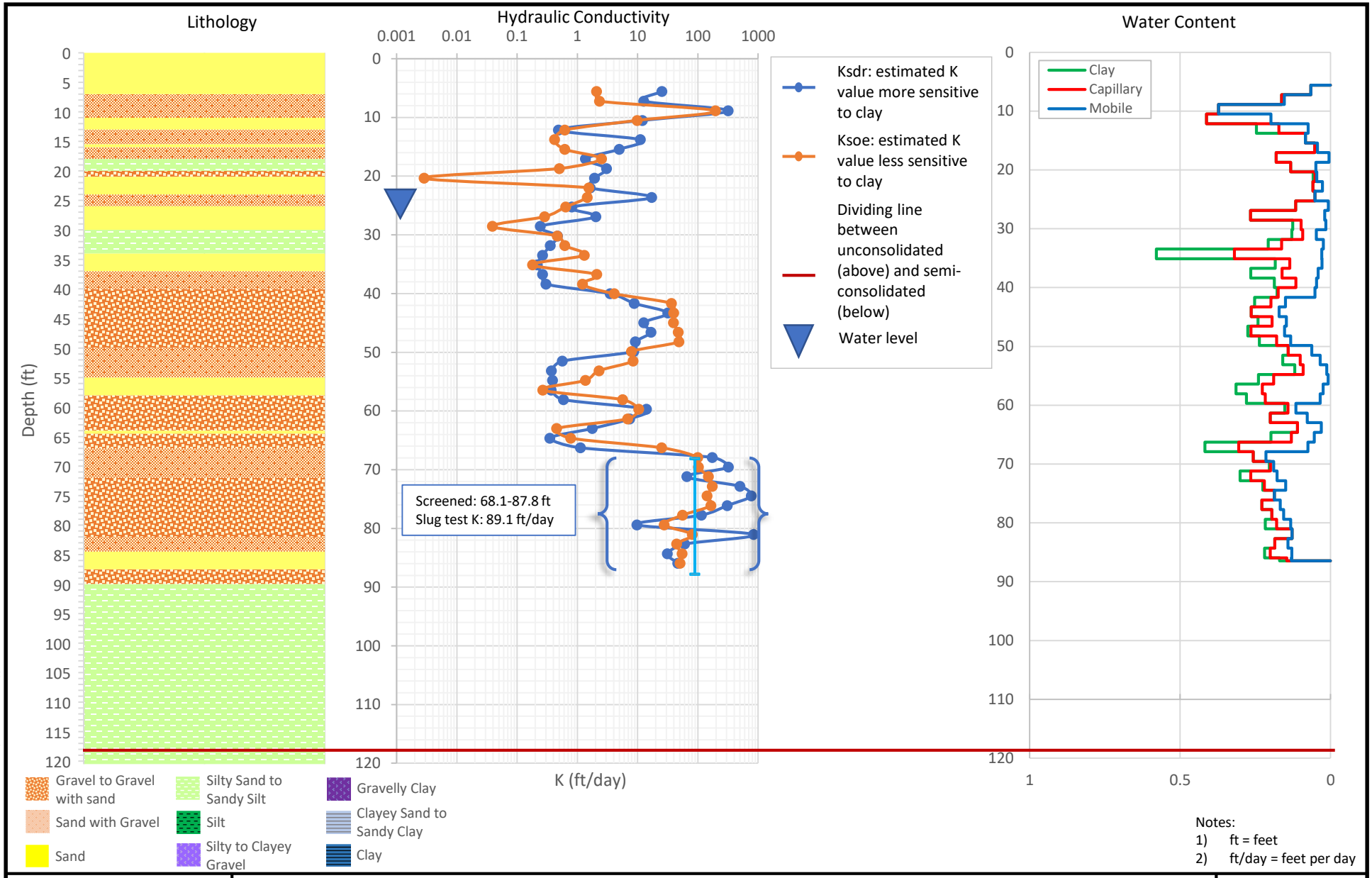

Notes:
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2) ft/day = feet per day

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LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW207

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.21

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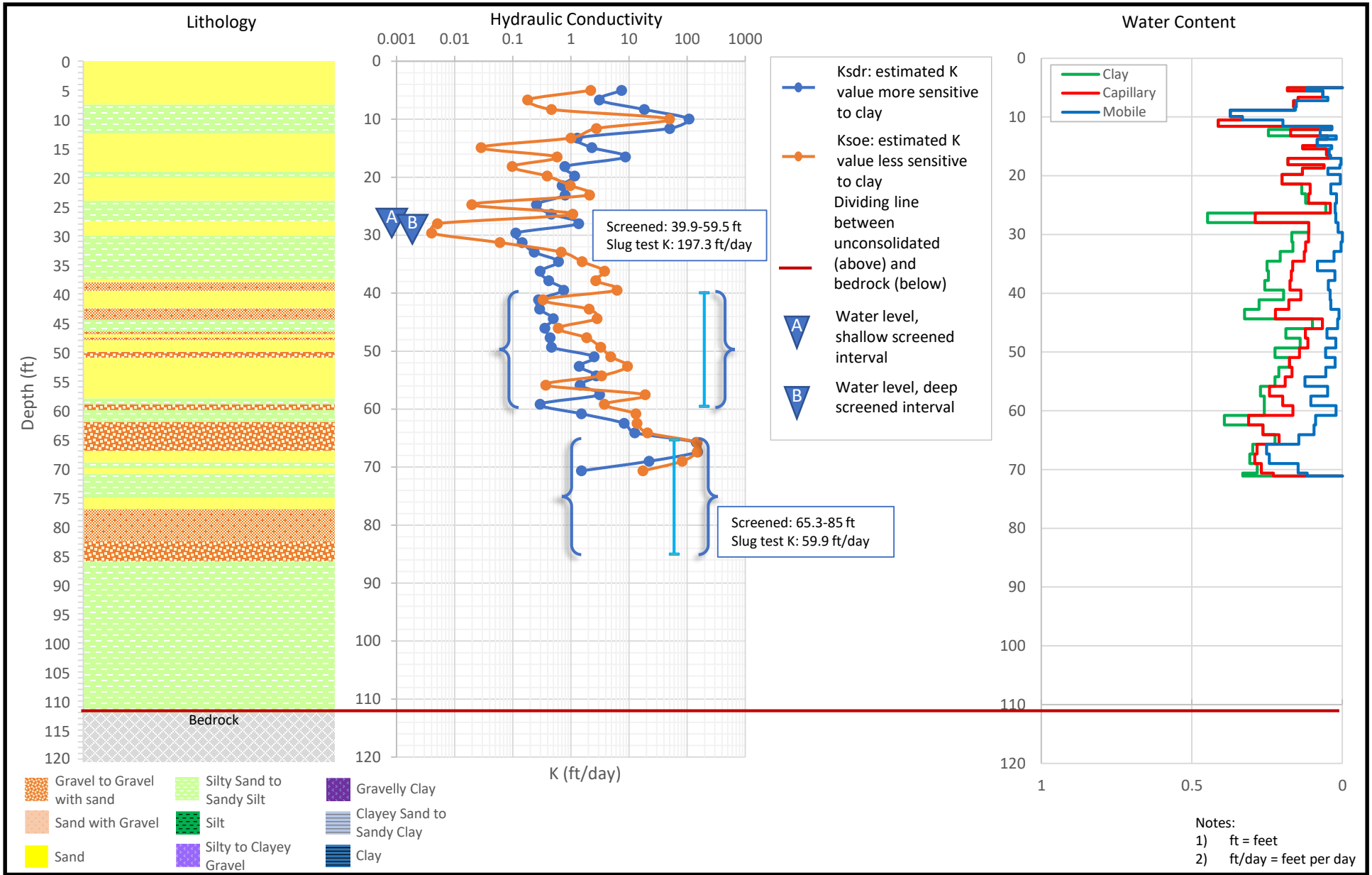

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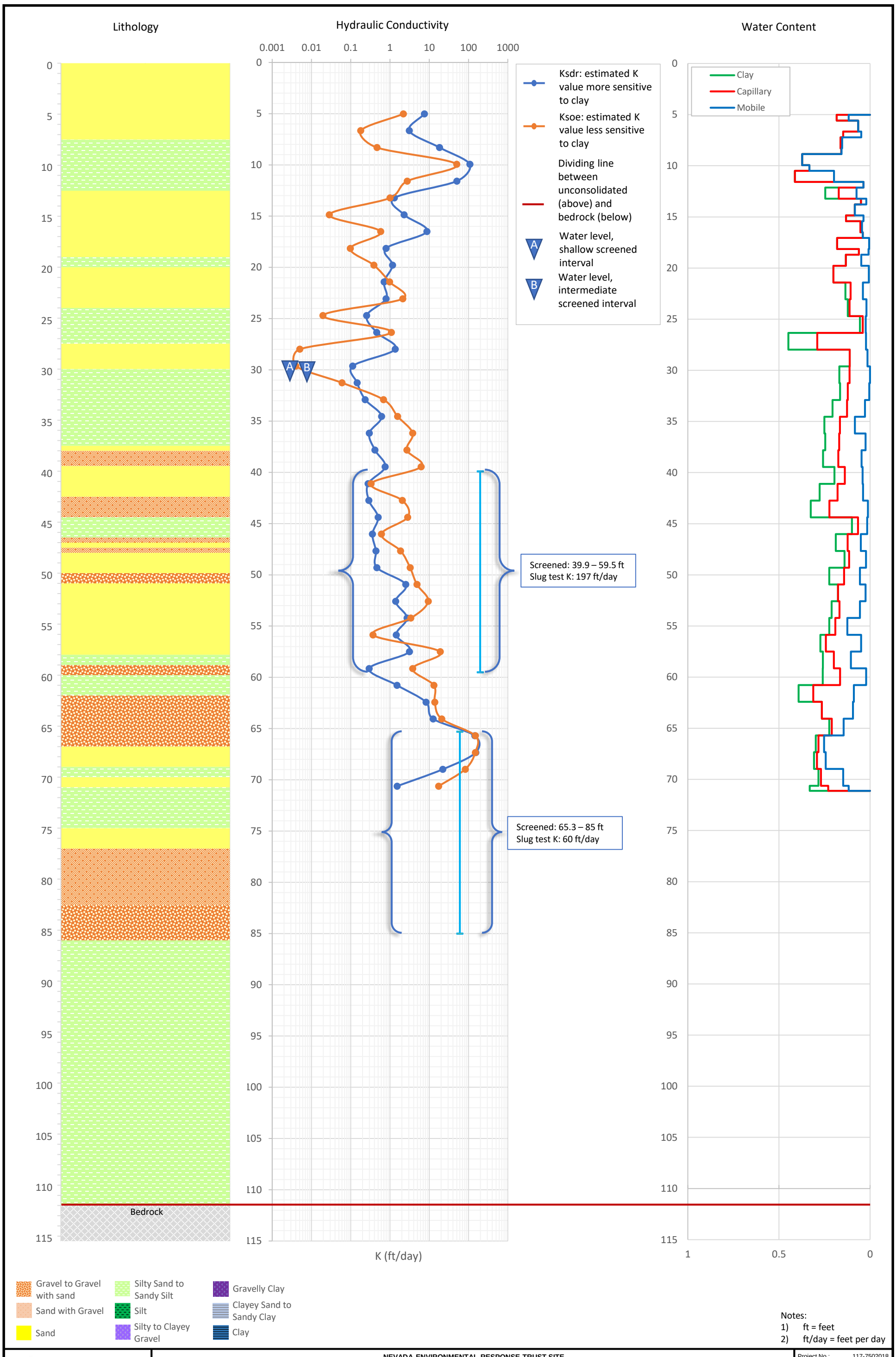
LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW208

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.22

\\ths134fs1\GEOSUPVOL1\PROJECTS\NERT\M17\NMR\NMR_Comparisons_8x11_v2.pptx



Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW208

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	BCS

Figure No.
A.1.23

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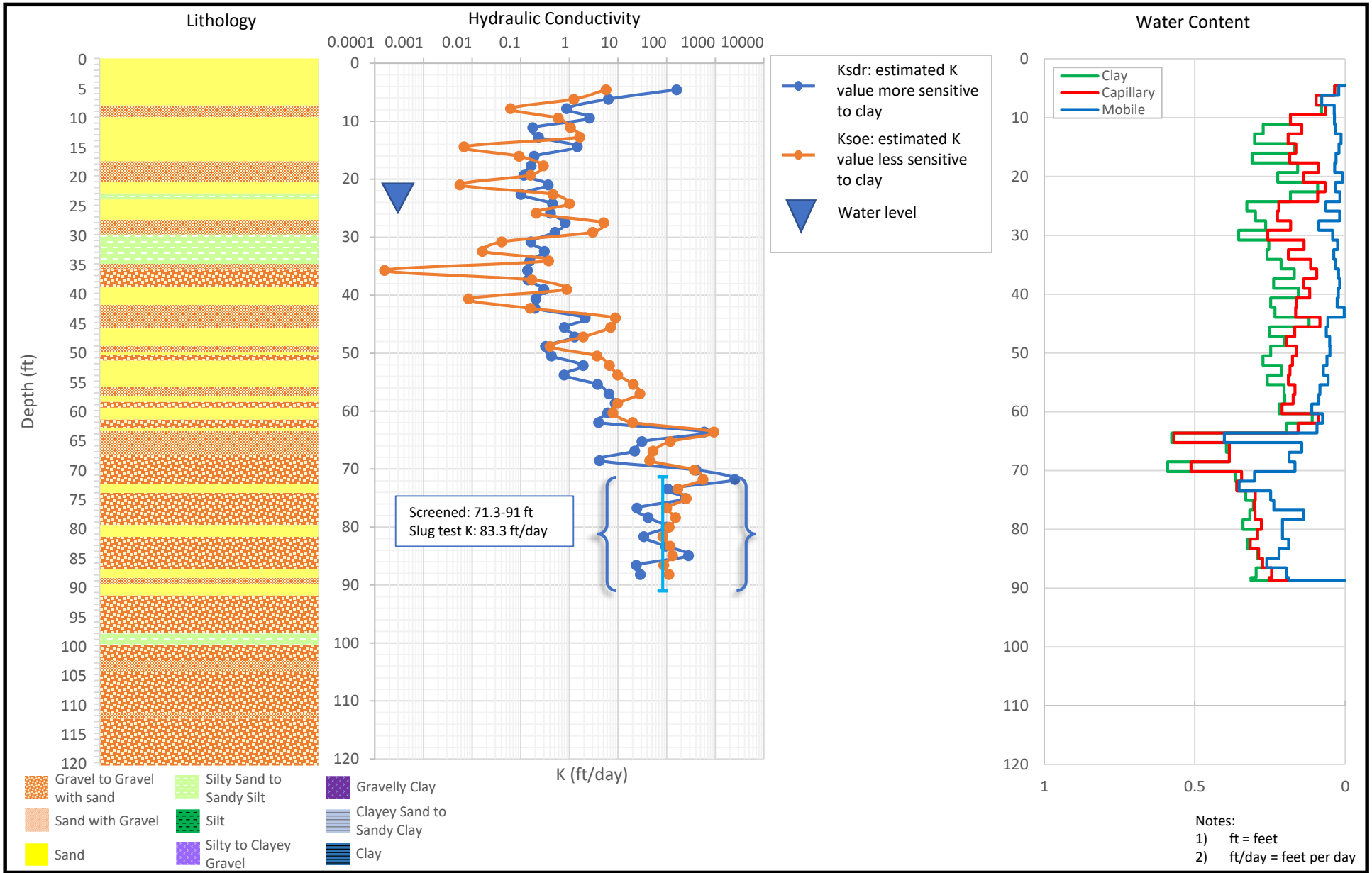

Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW209

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.24

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Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and bedrock (below)

Water level, LVWPS-209A

Water level, LVWPS-209

Water level, LVWPS-209B

Water level, LVWPS-209C

Clay

Capillary

Mobile

Screened: 35.3-55 ft
Slug test K: 417 ft/day

Screened: 71.3-91 ft
Slug test K: 83.3 ft/day

Screened: 110.3-130ft
Slug test K: 38.2 ft/day

Screened: 151-170.5ft
Slug test K: 9.2 ft/day

Bedrock

Gravel to Gravel with sand

Sand with Gravel

Sand

Silty Sand to Sandy Silt

Silt

Silty to Clayey Gravel

Gravelly Clay

Clayey Sand to Sandy Clay

Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW209

Project No.: 117-7502018
Date: FEBRUARY 7, 2019
Designed By: BCS

Figure No.
A.1.25

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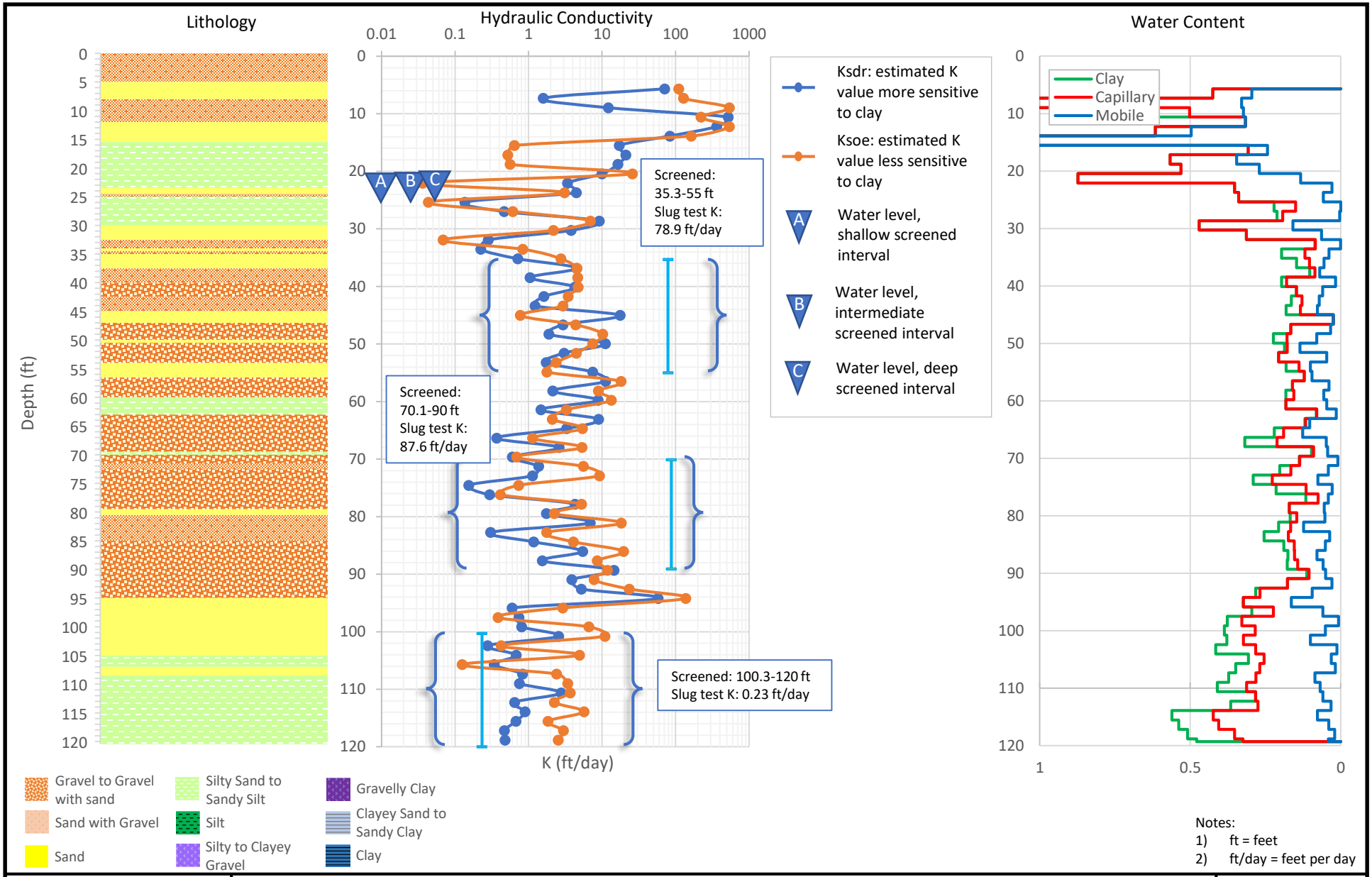

Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW210

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.26

Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and bedrock (below)

A Water level, LVWPS-MW210A

B Water level, LVWPS-MW210B

C Water level, LVWPS-MW210C

D Water level, LVWPS-MW210D

E Water level, LVWPS-MW210E

Clay

Capillary

Mobile

Screened: 35.3-55 ft
Slug test K: 78.9 ft/day

Screened: 70.1-89.8 ft
Slug test K: 87.6 ft/day

Screened: 100.3-120 ft
Slug test K: 0.23 ft/day

Screened: 130.4-140 ft
Slug test K: 0.31 ft/day

Screened: 145.5-165 ft
Slug test K: 0.42 ft/day

Bedrock

Gravel to Gravel with sand

Sand with Gravel

Sand

Silty Sand to Sandy Silt

Silt

Silty to Clayey Gravel

Gravelly Clay

Clayey Sand to Sandy Clay

Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW210

Project No.: 117-7502018
Date: FEBRUARY 7, 2019
Designed By: BCS

Figure No.
A.1.27

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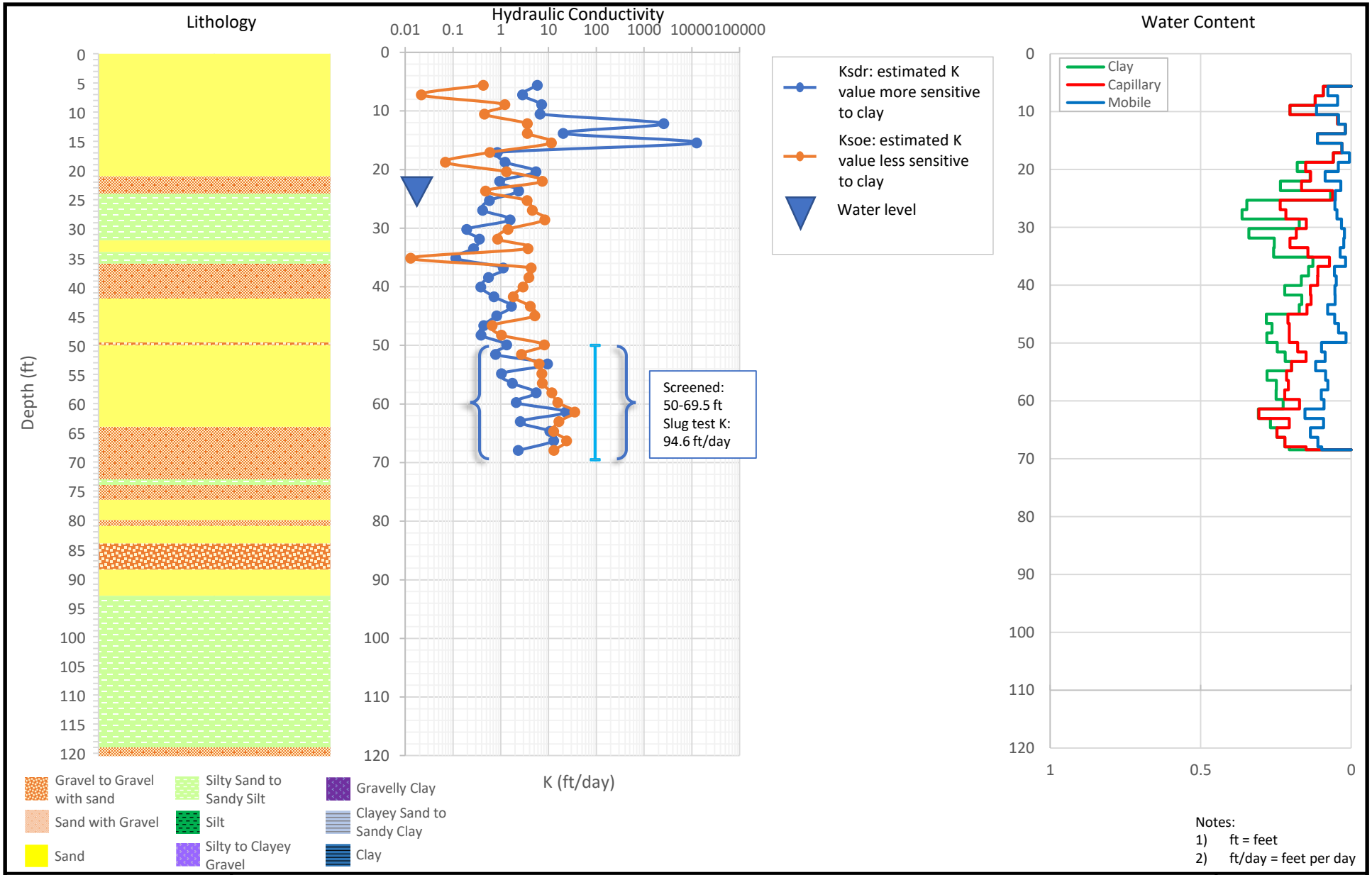

Notes:
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2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW211

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.28

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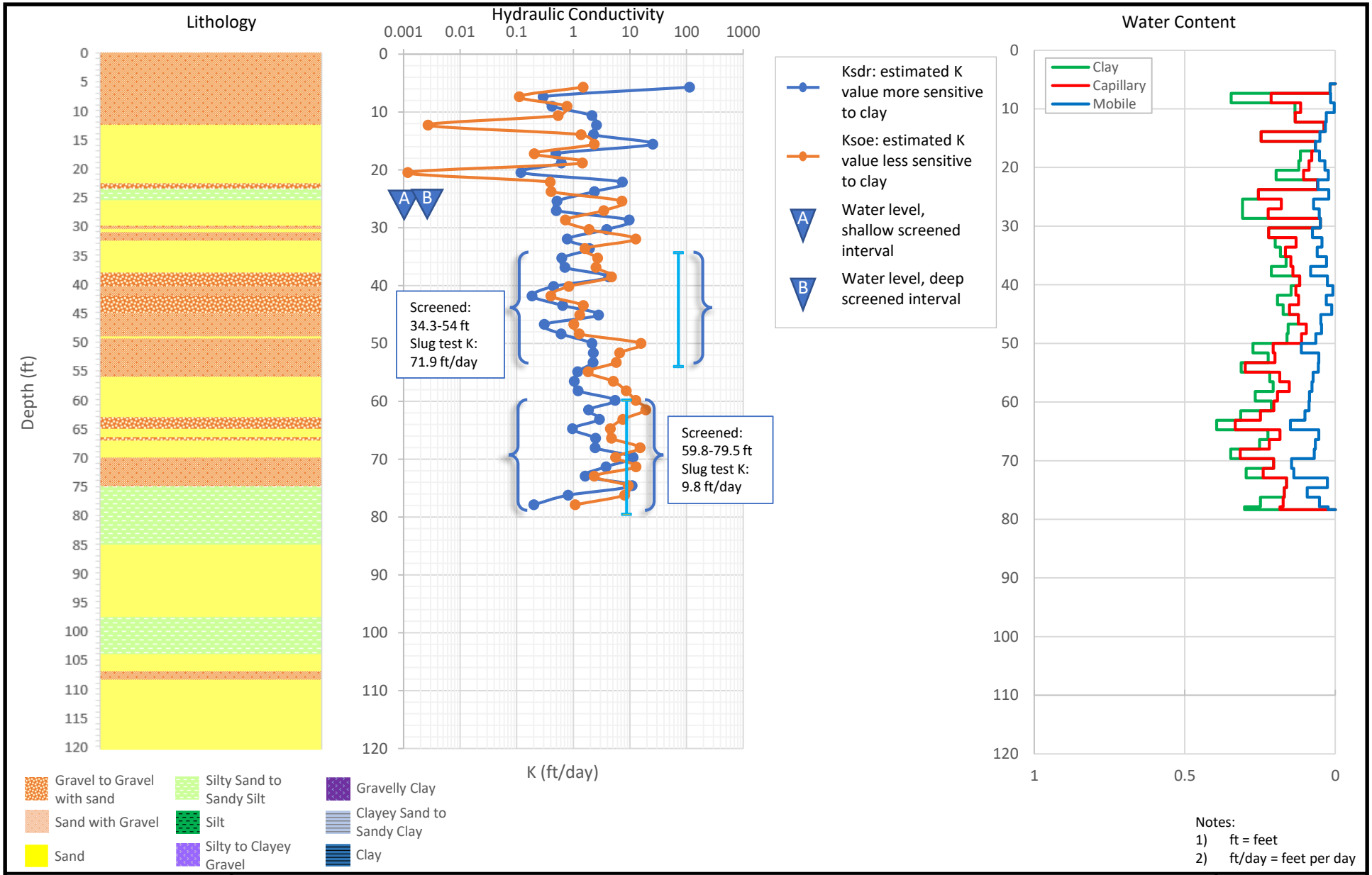

Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW212

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.29

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Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and bedrock (below)

A Water level, LVWPS-212A

B Water level, LVWPS-212B

C Water level, LVWPS-212C

D Water level, LVWPS-212D

Screened: 34.3 – 54 ft
Slug test K: 71.9 ft/day

Screened: 59.8 – 79.5 ft
Slug test K: 9.8 ft/day

Screened: 100.3 - 120 ft
Slug test K: 4.1 ft/day

Screened: 125.5 – 145 ft
Slug test K: 0.73 ft/day

Clay
Capillary
Mobile

Bedrock

Gravel to Gravel with sand
Sand with Gravel
Sand
Silty Sand to Sandy Silt
Silt
Silty to Clayey Gravel
Gravelly Clay
Clayey Sand to Sandy Clay
Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW212

Project No.: 117-7502018
Date: FEBRUARY 7, 2019
Designed By: BCS

Figure No.
A.1.30

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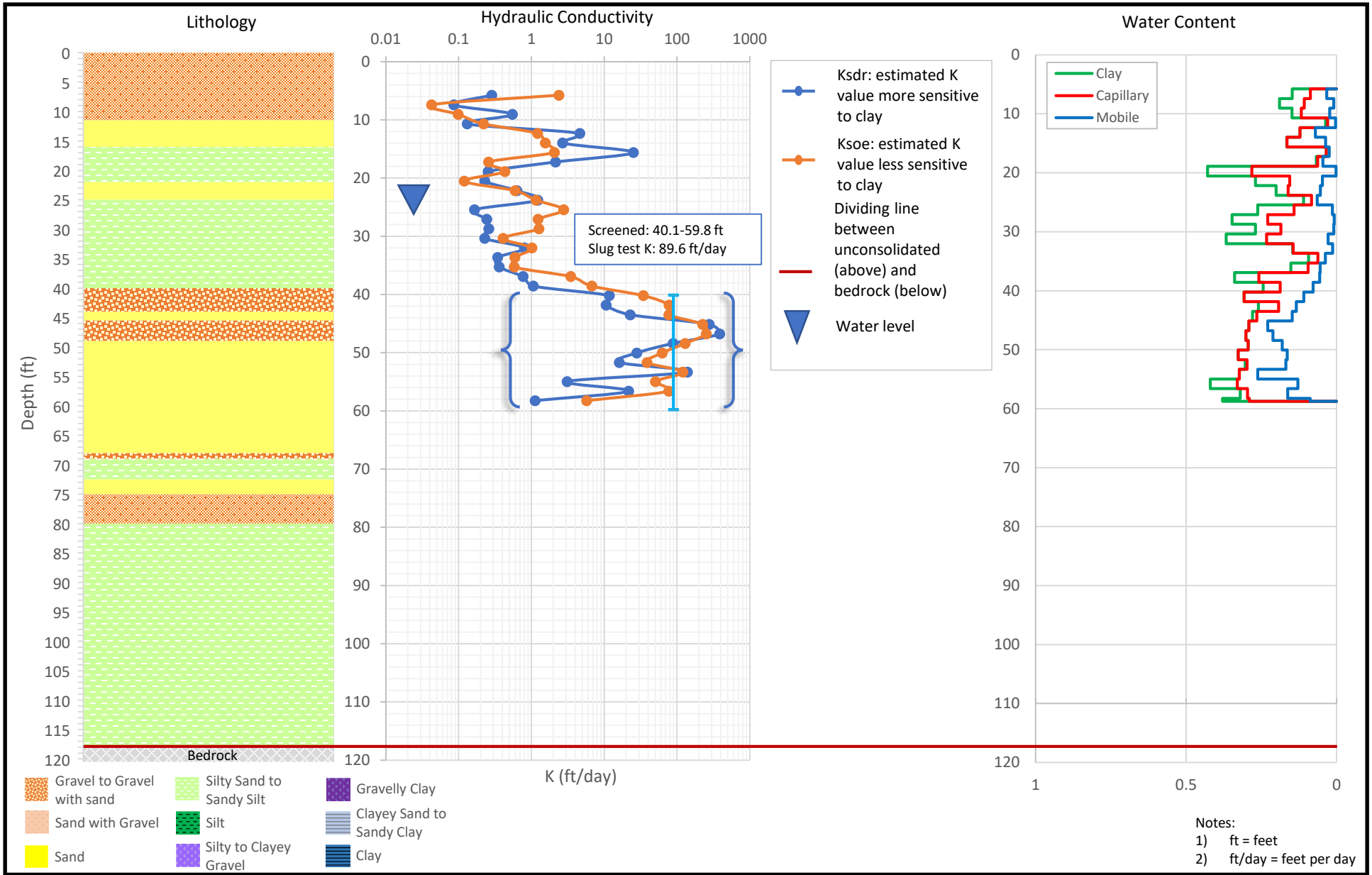

Notes:
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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW213

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.31

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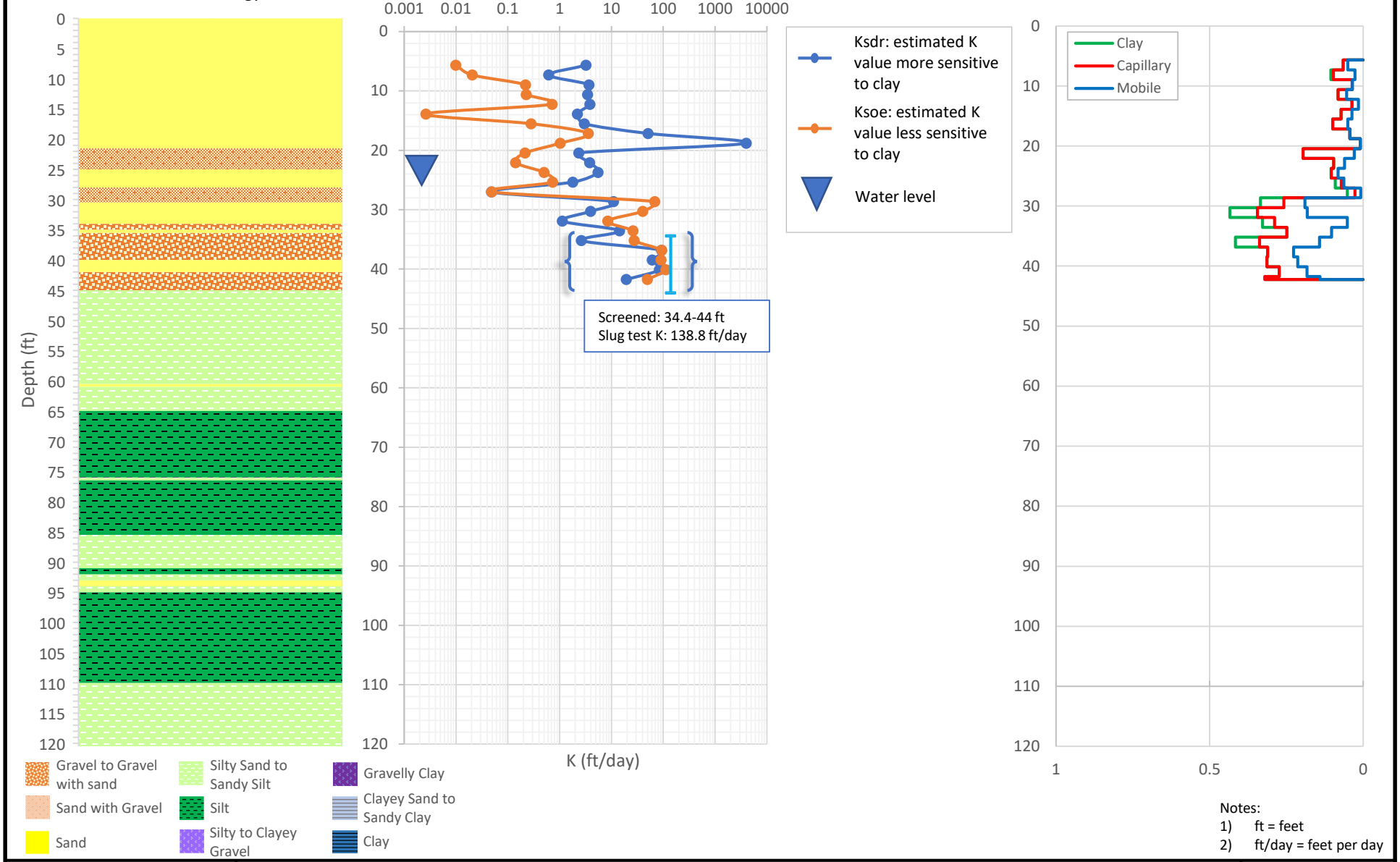

Notes:
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NEVADA ENVIRONMENTAL RESPONSE TRUST SITE

LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW214

Project No.:	117-7502018
Date:	FEBRUARY 11, 2019
Designed By:	ACC

Figure No.
A.1.32

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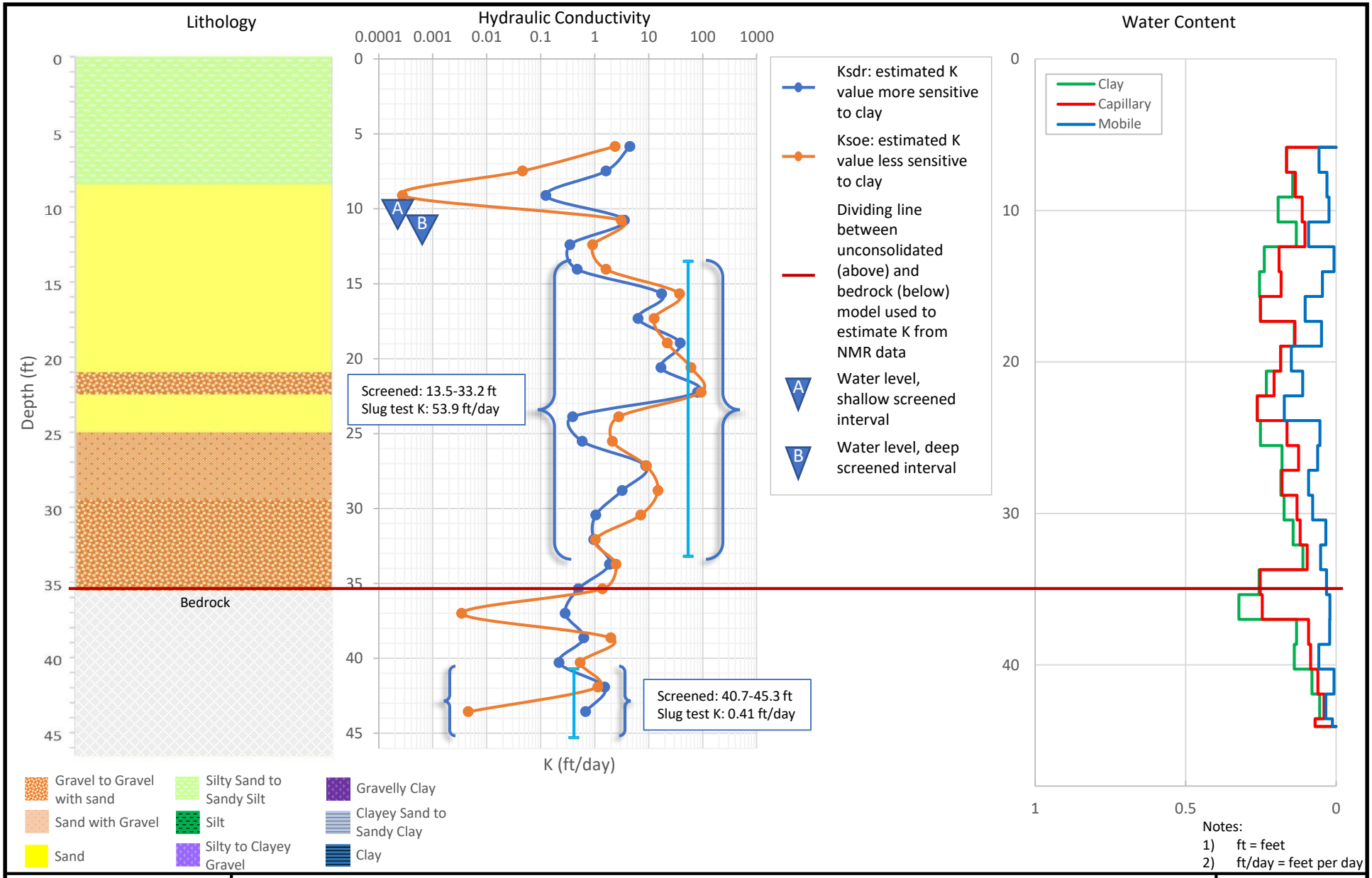

Notes:
1) ft = feet
2) ft/day = feet per day

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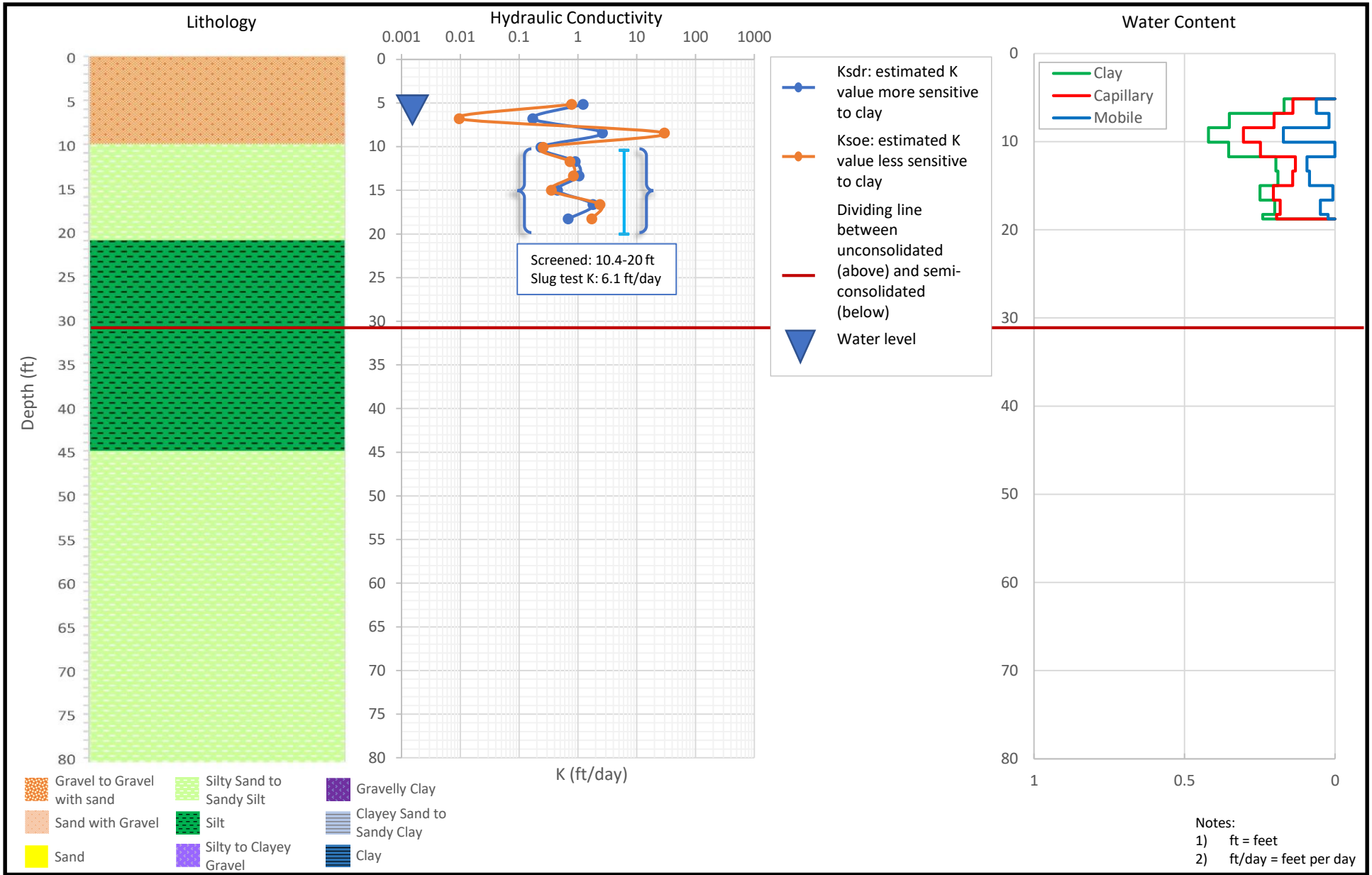
SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW215

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.33



Notes:
1) ft = feet
2) ft/day = feet per day

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LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW216

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	ACC

Figure No.
A.1.34

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Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and semi-consolidated (below)

A Water level, shallow screened interval

B Water level, intermediate screened interval

C Water level, deep screened interval

Screened: 51.3 – 71 ft
Slug test K: 105 ft/day

Screened: 100.3 – 120 ft
Slug test K: 0.92 ft/day

Screened: 155.5 – 175 ft
Slug test K: 0.40 ft/day

Clay
Capillary
Mobile

Gravel to Gravel with sand
Sand with Gravel
Sand
Silty Sand to Sandy Silt
Silt
Silty to Clayey Gravel
Gravelly Clay
Clayey Sand to Sandy Clay
Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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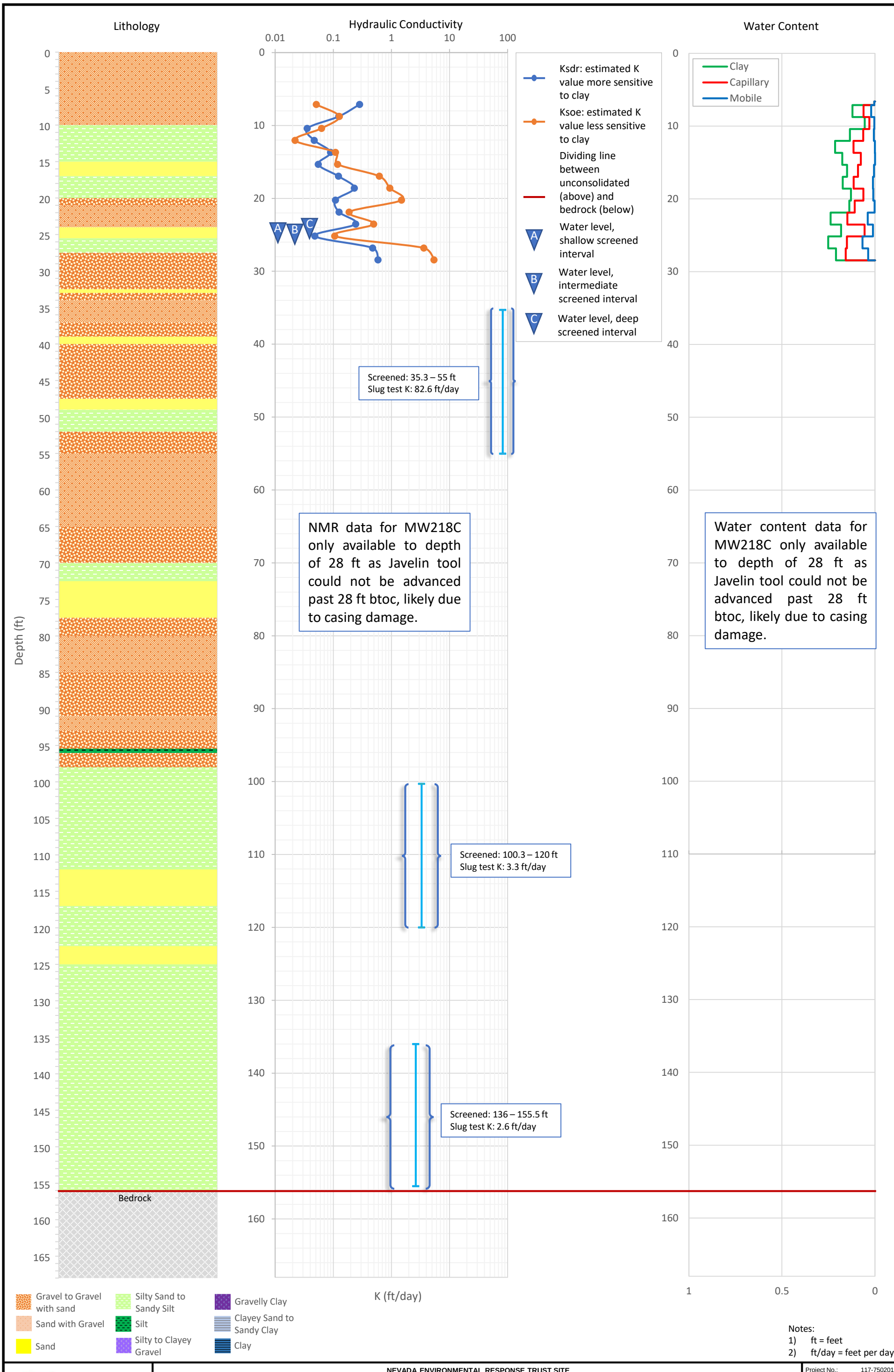
SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW217

Project No.: 117-7502018
Date: FEBRUARY 7, 2019
Designed By: BCS

Figure No.
A.1.35

\\tts134fs1\GEOSUPVOL1\Projects\Data\NERT\M19\NMR\NMR_Comparisons_M19_deepwells_020119_ES.pptx



Notes:
1) ft = feet
2) ft/day = feet per day

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LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW218

Project No.:	117-7502018
Date:	FEBRUARY 7, 2019
Designed By:	BCS

Figure No.
A.1.36

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Lithology

Hydraulic Conductivity

Water Content

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and alternating layers of unconsolidated and consolidated material.

Water level, LVWPS-MW219A

Water level, LVWPS-MW219B

Water level, LVWPS-MW219C

Clay

Capillary

Mobile

Screened: 35.1-49.8 ft
Slug test K: 117 ft/day

Screened: 75.3-95 ft
Slug test K: 1.9 ft/day

Screened: 115.5 - 135 ft
Slug test K: 10 ft/day

Note: Lithology encountered at LVWPS-MW2019 below 53 feet bgs consisted of alternating layers of unconsolidated and consolidated material. Estimates of K will likely be more representative of the unconsolidated material. Therefore, the unconsolidated model was used to estimate K from the NMR data.

Depth (ft)

K (ft/day)

Gravel to Gravel with sand

Sand with Gravel

Sand

Silty Sand to Sandy Silt

Silt

Silty to Clayey Gravel

Gravelly Clay

Clayey Sand to Sandy Clay

Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW219

Project No.: 117-7502018
Date: FEBRUARY 11, 2019
Designed By: BCS

Figure No.
A.1.37

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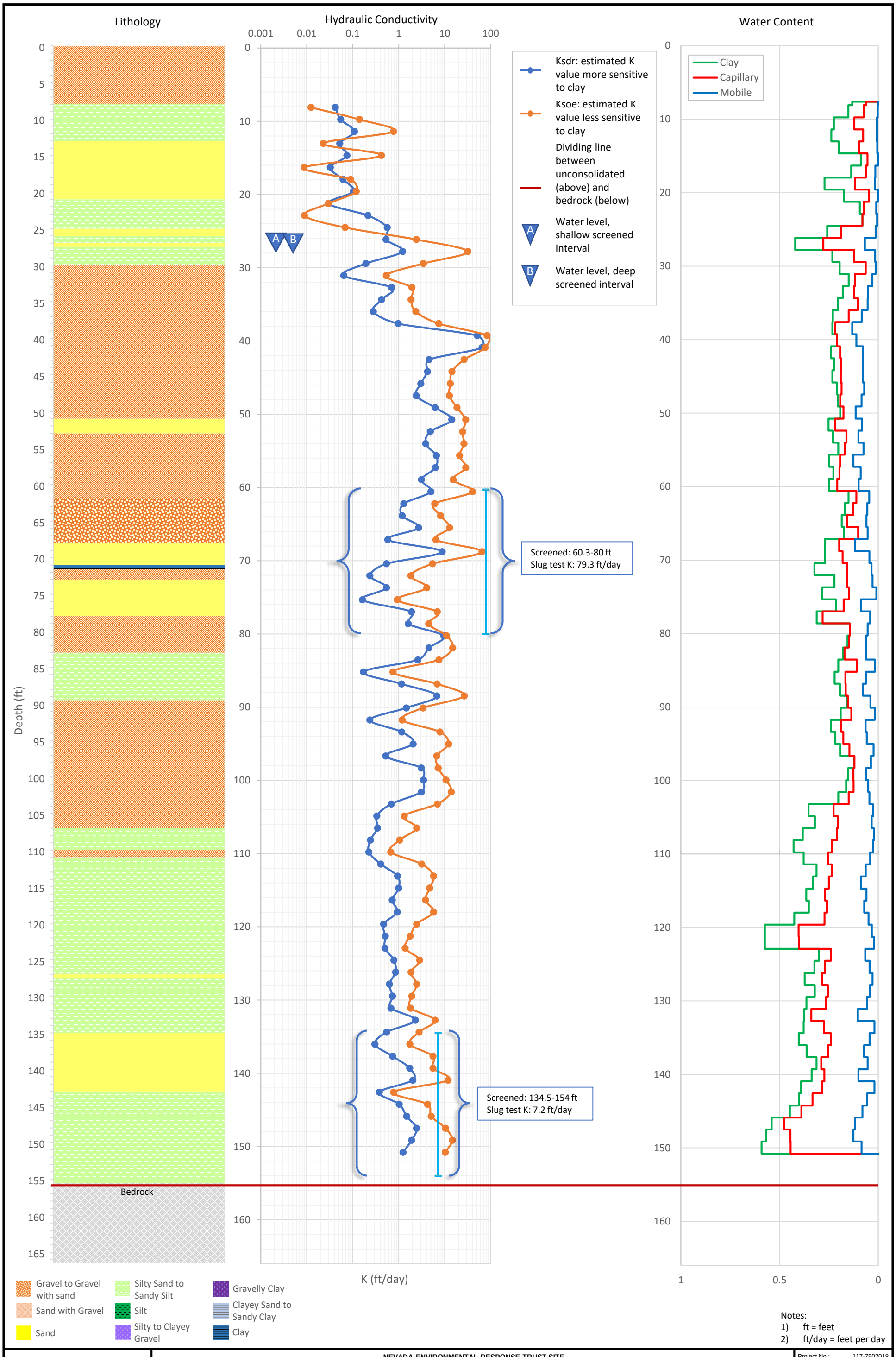

Notes:
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2) ft/day = feet per day

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW220

Project No.:	117-7502018
Date:	FEBRUARY 8, 2019
Designed By:	BCS

Figure No.
A.1.38

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Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and bedrock (below)

Water level, shallow screened interval

Water level, intermediate screened interval

Clay

Capillary

Mobile

Screened: 50.3-70 ft
Slug test K: 9.1 ft/day

Screened: 83.7-103 ft
Slug test K: 0.12 ft/day

Bedrock

Gravel to Gravel with sand

Sand with Gravel

Sand

Silty Sand to Sandy Silt

Silt

Silty to Clayey Gravel

Gravelly Clay

Clayey Sand to Sandy Clay

Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW221

Project No.: 117-7502018
Date: FEBRUARY 8, 2019
Designed By: BCS

Figure No.
A.1.39

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Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and bedrock (below)

A Water level, shallow screened interval

B Water level, intermediate screened interval

C Water level, deep screened interval

Clay
Capillary
Mobile

Screened: 80.3-100 ft
Slug test K: 5.7 ft/day

Screened: 150.3-170 ft
Slug test K: 0.45 ft/day

Screened: 214-233.5 ft
Slug test K: 0.37 ft/day

Bedrock

Gravel to Gravel with sand
Sand with Gravel
Sand
Silty Sand to Sandy Silt
Silt
Silty to Clayey Gravel
Gravelly Clay
Clayey Sand to Sandy Clay
Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW222

Project No.: 117-7502018
Date: FEBRUARY 8, 2019
Designed By: BCS

Figure No.
A.1.40

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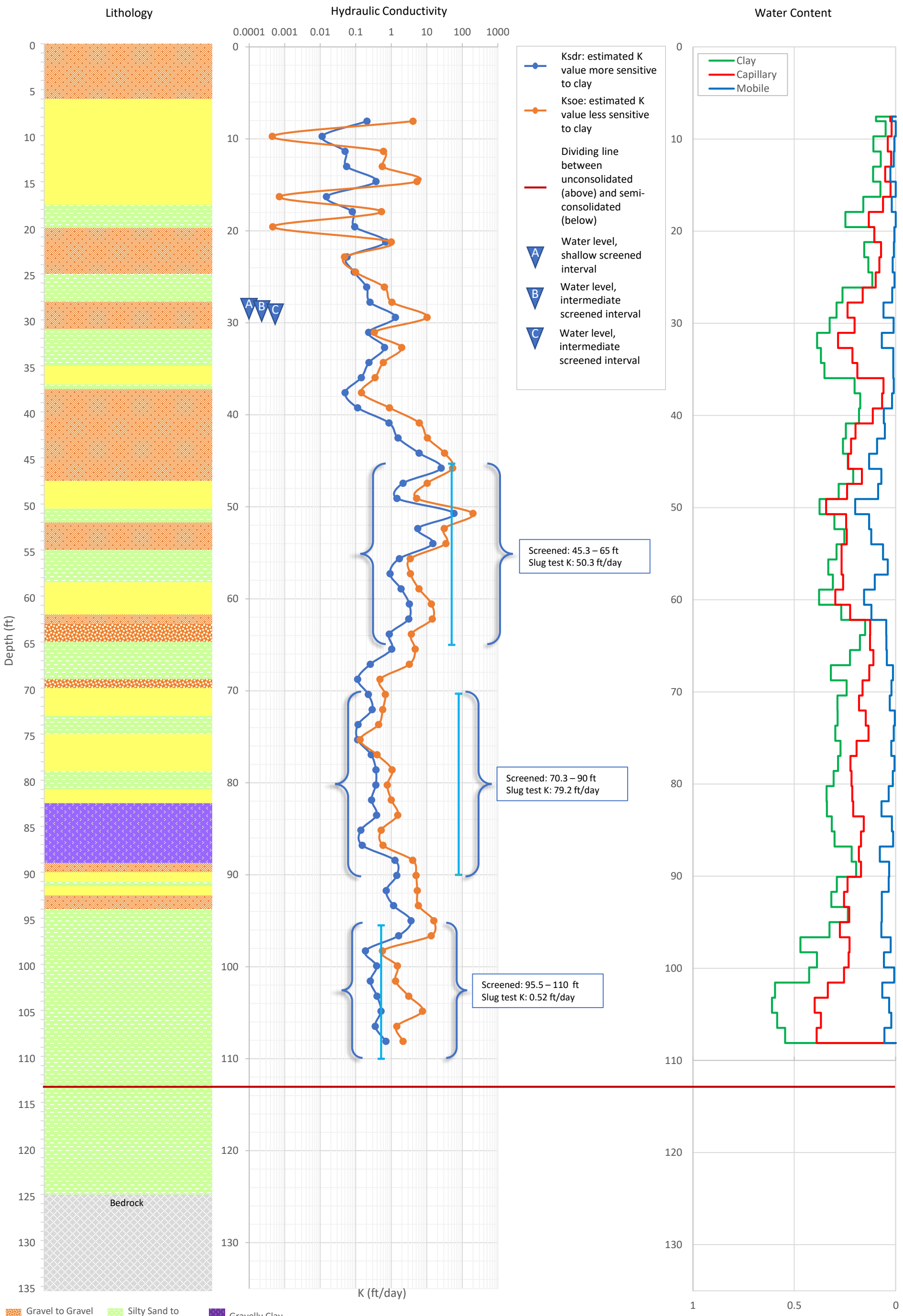

Notes:
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW223

Project No.:	117-7502018
Date:	FEBRUARY 8, 2019
Designed By:	BCS

Figure No.
A.1.41

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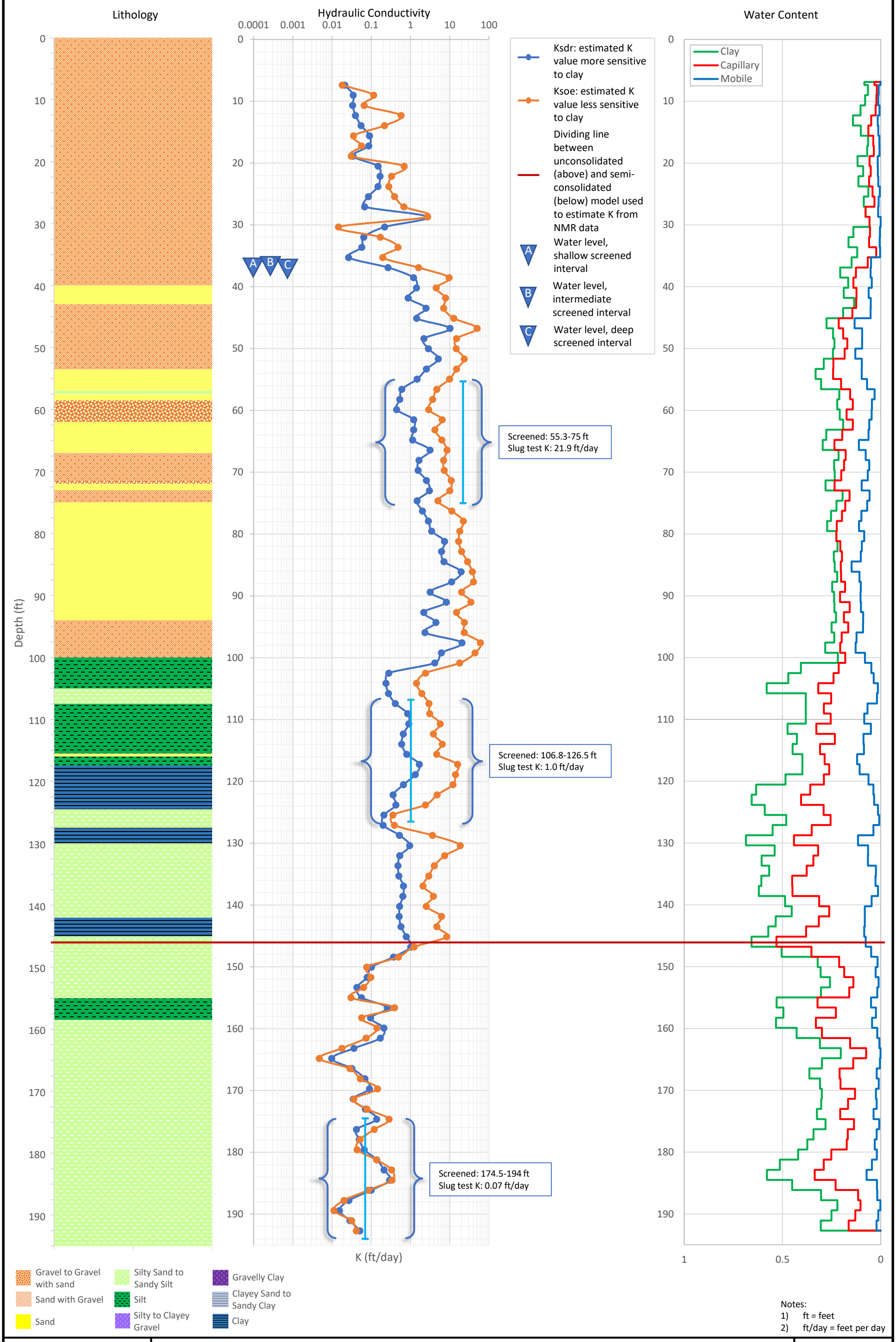

Notes:
1) ft = feet
2) ft/day = feet per day

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LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW224

Project No.:	117-7502018
Date:	FEBRUARY 8, 2019
Designed By:	BCS

Figure No.
A.1.42

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Lithology

Hydraulic Conductivity

Water Content

Depth (ft)

K (ft/day)

Ksdr: estimated K value more sensitive to clay

Ksoe: estimated K value less sensitive to clay

Dividing line between unconsolidated (above) and semi-consolidated (below)

Water level, shallow screened interval

Water level, intermediate screened interval

Screened: 49.3 – 69 ft
Slug test K: 110.6 ft/day

Screened: 90.5 – 110 ft
Slug test K: 1.3 ft/day

Clay
Capillary
Mobile

Gravel to Gravel with sand
Sand with Gravel
Sand
Silty Sand to Sandy Silt
Silt
Silty to Clayey Gravel
Gravelly Clay
Clayey Sand to Sandy Clay
Clay

Notes:
1) ft = feet
2) ft/day = feet per day

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LAS VEGAS WASH PILOT STUDY WORK PLAN ADDENDUM
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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW225

Project No.: 117-7502018
Date: FEBRUARY 8, 2019
Designed By: BCS

Figure No.
A.1.43

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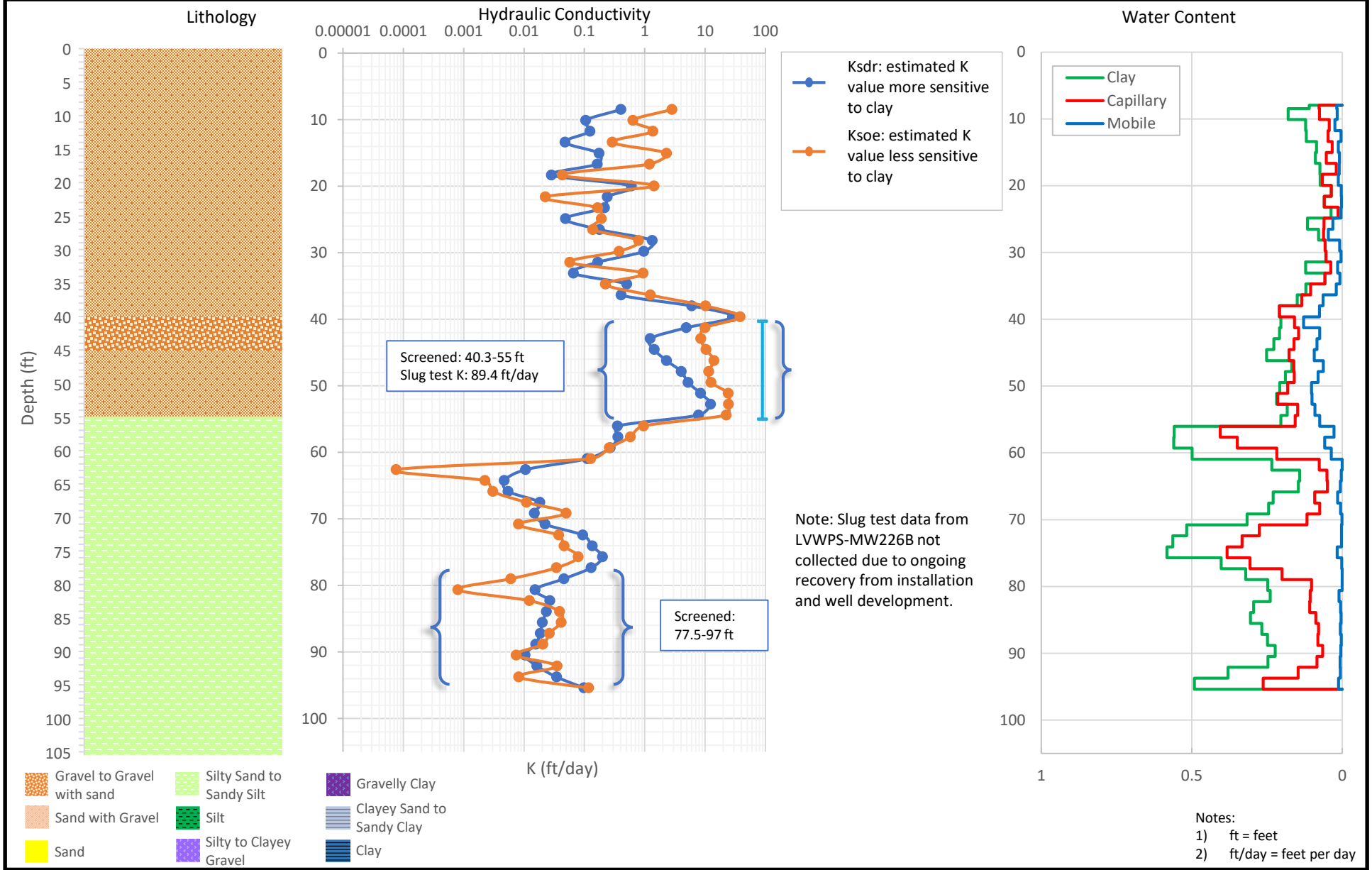

Note: Slug test data from LVWPS-MW226B not collected due to ongoing recovery from installation and well development.

Notes:
1) ft = feet
2) ft/day = feet per day

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SUMMARY OF NUCLEAR MAGNETIC RESONANCE LOGGING AND AQUIFER TEST RESULTS FOR LVWPS-MW226

Project No.:	117-7502018
Date:	FEBRUARY 8, 2019
Designed By:	ACC

Figure No.
A.1.44

Appendix F
Long Term Water Level Monitoring Technical Memorandum

TETRA TECH

TECHNICAL MEMORANDUM

To:	**Dana Grady and Ronnie Britto, Tetra Tech**
From:	Sonya Cadle, Audrey Crockett, and Jenny Dabbs, Tetra Tech
Date:	May 23, 2019
Subject:	Long-Term Water Level Monitoring – Las Vegas Wash Bioremediation Pilot Study

1.0 INTRODUCTION

This technical memorandum describes the implementation of long-term water level monitoring as part of the hydrogeological evaluation for the Las Vegas Wash Bioremediation Pilot Study conducted by Tetra Tech, Inc. on behalf of the Nevada Environmental Response Trust.

The locations of the wells instrumented in the Transect 1a and Transect 1b study areas are shown in ***Figure 1*** and ***Figure 2***, respectively. The objectives of long-term water level monitoring are to characterize seasonal and long-term trends in water levels; improve estimates of groundwater flow rates and directions; and characterize the extent of connection between aquifer units.

2.0 LONG-TERM WATER LEVEL MONITORING

A total of 22 water-level monitoring transducers (In-Situ Rugged TROLL 100) were placed in pilot study monitoring wells. The instrumented locations were chosen to provide coverage across the Transect 1a and Transect 1b pilot study area. In some locations, multiple wells in a cluster were instrumented to provide data for characterization of vertical gradients. Transect 1a transducers were installed in May 2018, and Transect 1b transducers were installed in July 2018, in accordance with the *Las Vegas Wash Bioremediation Pilot Study Work Plan* (Tetra Tech, 2017). Additional monitoring wells were installed in the Transect 1b study area from August to November 2018 as part *Treatability/Pilot Study Modification No. 2 – Las Vegas Wash Bioremediation Pilot Study* (Tetra Tech, 2018) (referred to as Modification No. 2). Thereafter, additional transducers were installed in some of the new wells in the Transect 1b study area in December 2018. One barometric pressure transducer (In-Situ Rugged BaroTROLL) was also deployed in each transect to facilitate the compensation of water-level monitoring data for changes in barometric pressure.

Table 1 summarizes the locations and deployment dates of transducers. Long-term water level monitoring data have been downloaded from some instruments already, and will continue to be downloaded periodically. Downloaded transducer data are imported into a database, corrected for barometric pressure, and converted into groundwater elevations for further analysis.

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Table 1 Locations and Deployment Details of Long-Term Water Level Monitoring Transducers

Well	Screened Unit	Transducer Type	Date Installed	Study Area
LVWPS-MW101A	Alluvium	In-Situ Rugged TROLL	5/23/2018	Transect 1a
LVWPS-MW101B	UMCf	In-Situ Rugged TROLL	5/23/2018	Transect 1a
LVWPS-MW107C	UMCf (Semi-consolidated)	In-Situ Rugged TROLL	5/24/2018	Transect 1a
LVWPS-MW111A	Alluvium	In-Situ Rugged TROLL	5/23/2018	Transect 1a
LVWPS-MW111B	UMCf	In-Situ Rugged TROLL	5/23/2018	Transect 1a
LVWPS-MW112A	Alluvium	In-Situ Rugged TROLL and BaroTROLL	5/23/2018	Transect 1a
LVWPS-MW112B	UMCf	In-Situ Rugged TROLL	5/23/2018	Transect 1a
LVWPS-MW201A	Alluvium	In-Situ Rugged TROLL	7/20/2018	Transect 1b
LVWPS-MW201B	UMCf	In-Situ Rugged TROLL	7/20/2018	Transect 1b
LVWPS-MW206A	Alluvium	In-Situ Rugged TROLL	7/20/2018	Transect 1b
LVWPS-MW206B	Alluvium	In-Situ Rugged TROLL and BaroTROLL	7/20/2018	Transect 1b
LVWPS-MW206C	UMCf	In-Situ Rugged TROLL	7/20/2018	Transect 1b
LVWPS-MW206D	UMCf	In-Situ Rugged TROLL	12/3/2018	Transect 1b
LVWPS-MW206E	UMCf (Semi-consolidated)	In-Situ Rugged TROLL	12/3/2018	Transect 1b
LVWPS-MW210A	Alluvium	In-Situ Rugged TROLL	7/20/2018	Transect 1b
LVWPS-MW210B	Alluvium	In-Situ Rugged TROLL	7/20/2018	Transect 1b
LVWPS-MW210C	UMCf-cg	In-Situ Rugged TROLL	7/20/2018	Transect 1b
LVWPS-MW210D	UMCf-cg	In-Situ Rugged TROLL	12/3/2018	Transect 1b
LVWPS-MW210E	UMCF-cg	In-Situ Rugged TROLL	12/3/2018	Transect 1b
LVWPS-MW222A	UMCf/UMCf-cg	In-Situ Rugged TROLL	12/3/2018	Transect 1b
LVWPS-MW222B	UMCf-cg	In-Situ Rugged TROLL	12/3/2018	Transect 1b
LVWPS-MW222C	UMCf-cg	In-Situ Rugged TROLL	12/3/2018	Transect 1b

Notes
UMCf – Upper Muddy Creek formation
UMCf-cg – Upper Muddy Creek formation, coarse-grained facies

3.0 INITIAL TRANSECT 1A STUDY AREA RESULTS

Data from Transect 1a study area monitoring wells were downloaded in July and December 2018. The Transect 1a study area data were corrected for barometric pressure and compared to the surface water elevation data from the nearby Pabco Road gaging station (United States Geological Survey [USGS] 09419700 Las Vegas Wash at Pabco Rd Nr Henderson, NV) north of the study area. ***Figures 3*** through ***6*** provide hydrographs for the Transect 1a study area monitoring wells.

Analysis of the hydrographs showed that the Transect 1a study area monitoring wells were not visibly influenced by water levels in the Las Vegas Wash. The wells instrumented in the Transect 1a study area are located over 1,000 ft from Las Vegas Wash, so they may be too far away to respond to changes in the surface water elevation and flow in the Las Vegas Wash. The preliminary data also indicate that the vertical gradients between the alluvium and UMCf do not appear to vary significantly or change direction over time.

4.0 INITIAL TRANSECT 1B STUDY AREA RESULTS

Data from the initial set of transducers installed in the Transect 1b monitoring wells were downloaded in December 2018. However, data from the deeper monitoring wells installed as part of Modification No. 2 have not yet been downloaded and analyzed. The December data were corrected for barometric pressure and compared to the surface water elevation data from the nearby Bostick Weir gaging station (USGS 09419747 LV Wash Abv Bostick Weir Nr Henderson, NV). ***Figures 7*** through ***9*** provide hydrographs for the Transect 1b study area monitoring wells.

Analysis of the hydrographs indicated that many of the Transect 1b study area monitoring wells were visibly influenced by water levels in the Las Vegas Wash. For example, monitoring wells LVWPS-MW201A, LVWPS-MW206A/B/C, and LVWPS-MW210A/B/C all show daily groundwater elevation changes that correspond closely to the Las Vegas Wash surface water elevation changes. Monitoring well LVWPS-MW201B does not show daily changes that match the surface water elevations in the Las Vegas Wash. However, when the Las Vegas Wash surface water elevation increases significantly (i.e., by more than 0.5 feet), there is a corresponding increase in groundwater elevation at LVWPS-MW201B approximately a day later. While the material screened by LVPWS-MW201B is not transmissive enough to detect the daily fluctuations in water level, the increased head in the upper portion of the aquifer is eventually transmitted to the lower portion. The response of groundwater elevation to water levels in the Las Vegas Wash is not surprising because the instrumented well clusters are located less than 500 feet from the Las Vegas Wash.

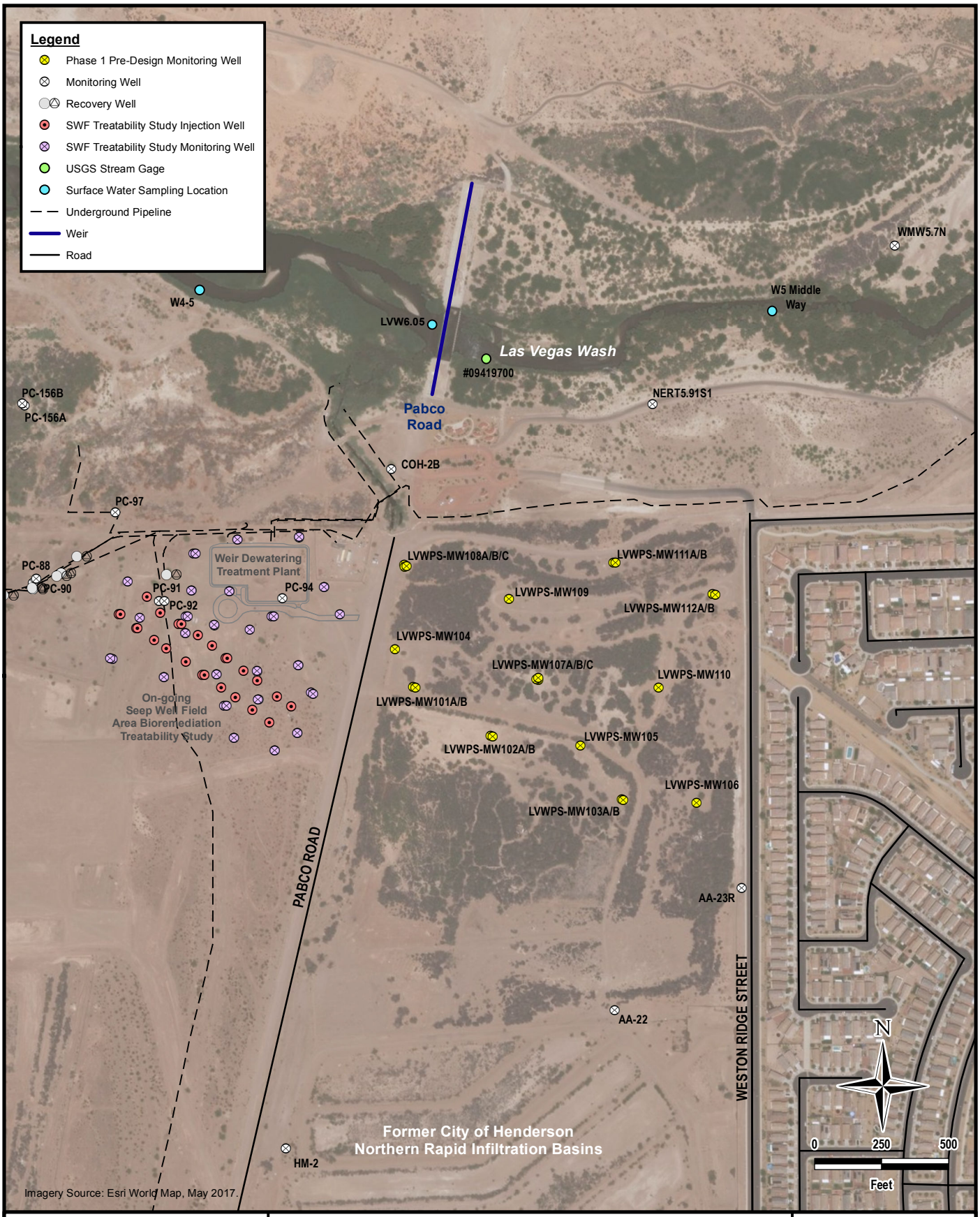
In addition, the preliminary data indicate that the vertical gradients between the alluvium and the UMCf may change direction at some locations over time. For example, the gradient changed from slightly downward to slightly upward between LVWPS-MW206B and LVWPS-MW206C at least once. The gradient also changed from slightly upward to slightly downward between LVWPS-MW210B and LVWPS-MW210C. This phenomenon and its possible causes will be investigated further over the course of long-term monitoring for the pilot study. Also, transducer data from the remaining two wells in each cluster (LVWPS-MW206 and LVWPS-MW210) are expected to contribute to the analysis once the data has been downloaded and analyzed.

5.0 REFERENCES

Tetra Tech. (2017). *Las Vegas Wash Bioremediation Pilot Study Work Plan, Nevada Environmental Response Trust Site, Henderson, Nevada.* September 22.

Tetra Tech. (2018). "Treatability/Pilot Study Modification No. 2 – Las Vegas Wash Bioremediation Pilot Study, Nevada Environmental Response Trust Site, Henderson, Nevada." Technical Memorandum. August 17.

Figures



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LONG-TERM WATER LEVEL MONITORING - LAS VEGAS WASH BIOREMEDIATION PILOT STUDY TECHNICAL MEMORANDUM
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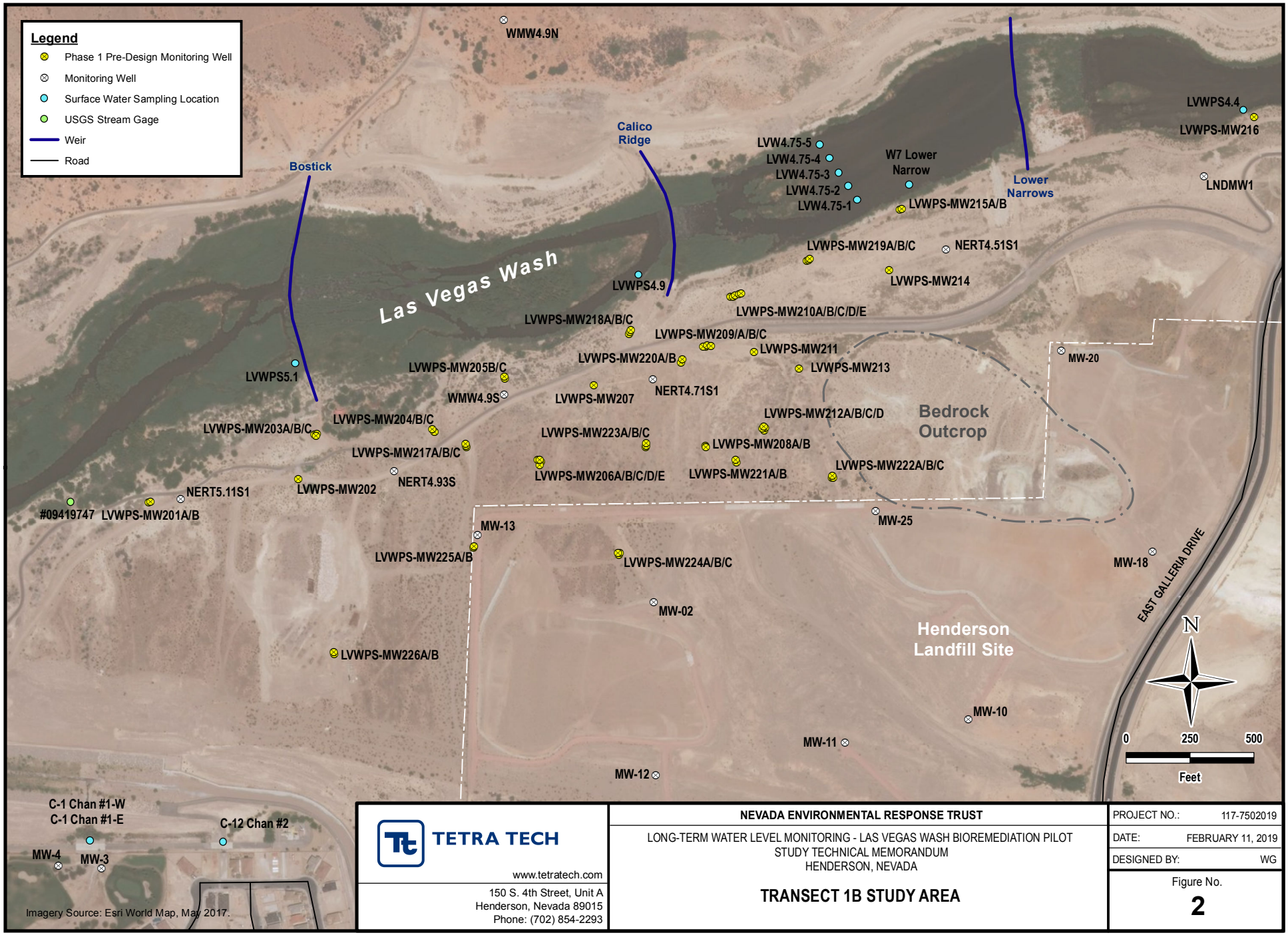
TRANSECT 1A STUDY AREA

PROJECT NO.:	117-7502019
DATE:	FEBRUARY 11, 2019
DESIGNED BY:	WG

Figure No.
1



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TRANSECT 1B STUDY AREA

PROJECT NO.:	117-7502019
DATE:	FEBRUARY 11, 2019
DESIGNED BY:	WG

Figure No.
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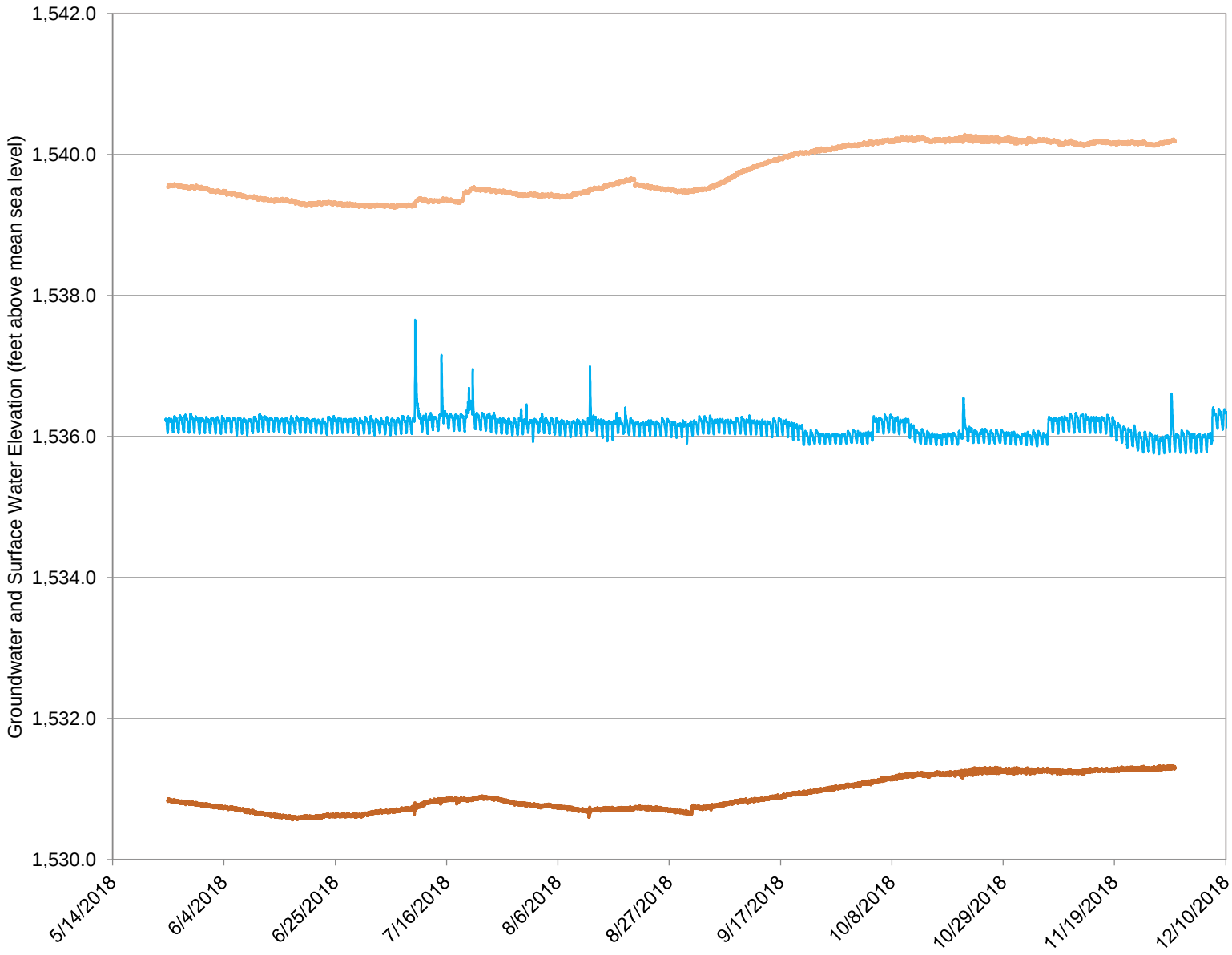

Surface water elevation data obtained 01/29/2019 from waterdata.usgs.gov, United State Geological Survey gauging station 09419700, Las Vegas Wash at Pabco Rd Nr Henderson, NV.

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LONG-TERM WATER LEVEL MONITORING – LAS VEGAS WASH BIOREMEDIATION PILOT STUDY
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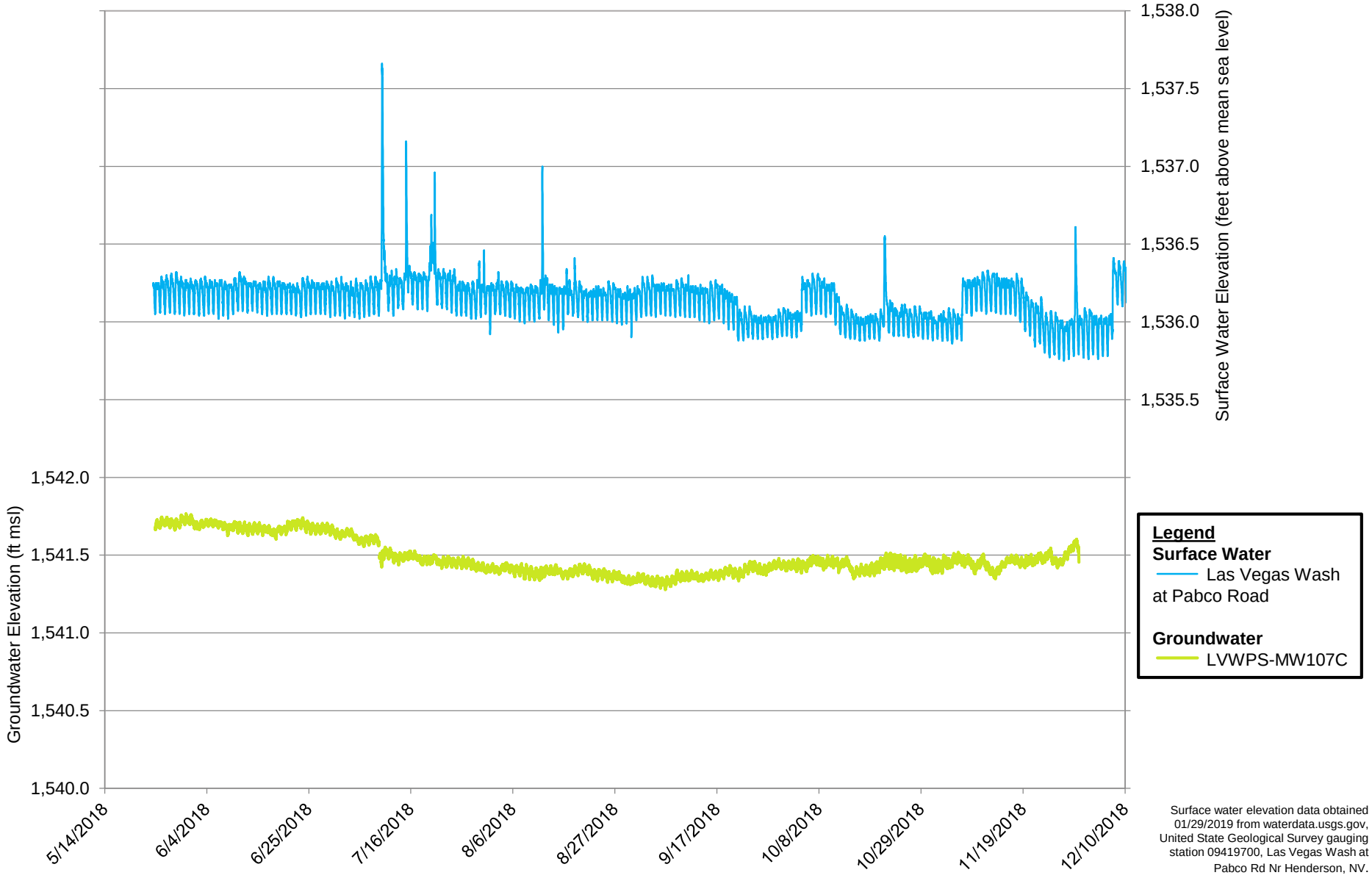
HYDROGRAPH FOR MONITORING WELLS LVWPS-MW101A/B

Project No.:	117-7502018
Date:	MAY 23, 2019
Designed By:	ACC

Figure No.
3



Surface water elevation data obtained 01/29/2019 from waterdata.usgs.gov, United State Geological Survey gauging station 09419700, Las Vegas Wash at Pabco Rd Nr Henderson, NV.

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HYDROGRAPH FOR MONITORING WELLS LVWPS-MW107C

Project No.:	117-7502018
Date:	MAY 23, 2019
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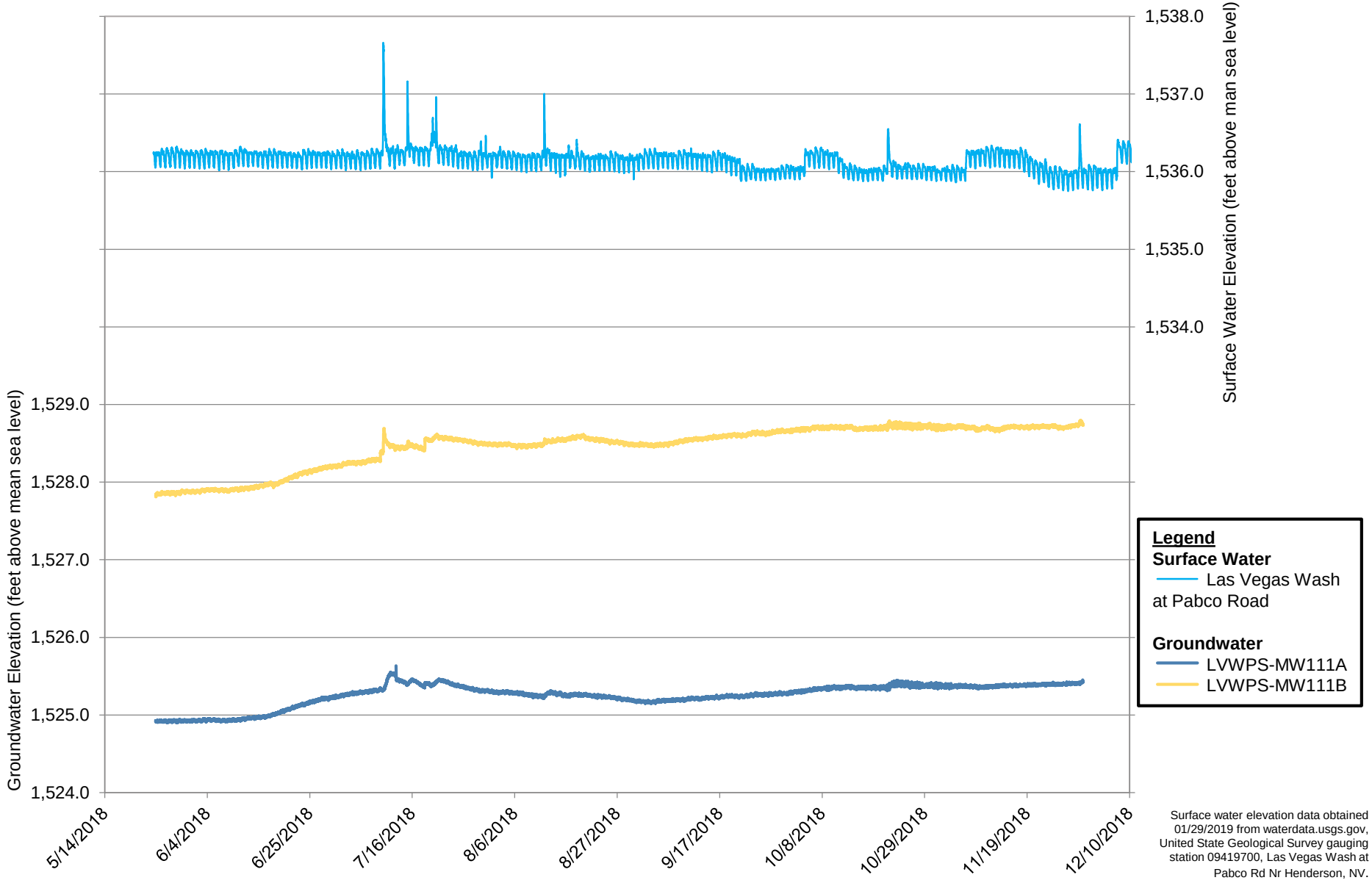
Figure No.
4



Surface water elevation data obtained 01/29/2019 from waterdata.usgs.gov, United State Geological Survey gauging station 09419700, Las Vegas Wash at Pabco Rd Nr Henderson, NV.

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HYDROGRAPH FOR MONITORING WELLS LVWPS-MW111A/B

Project No.:	117-7502018
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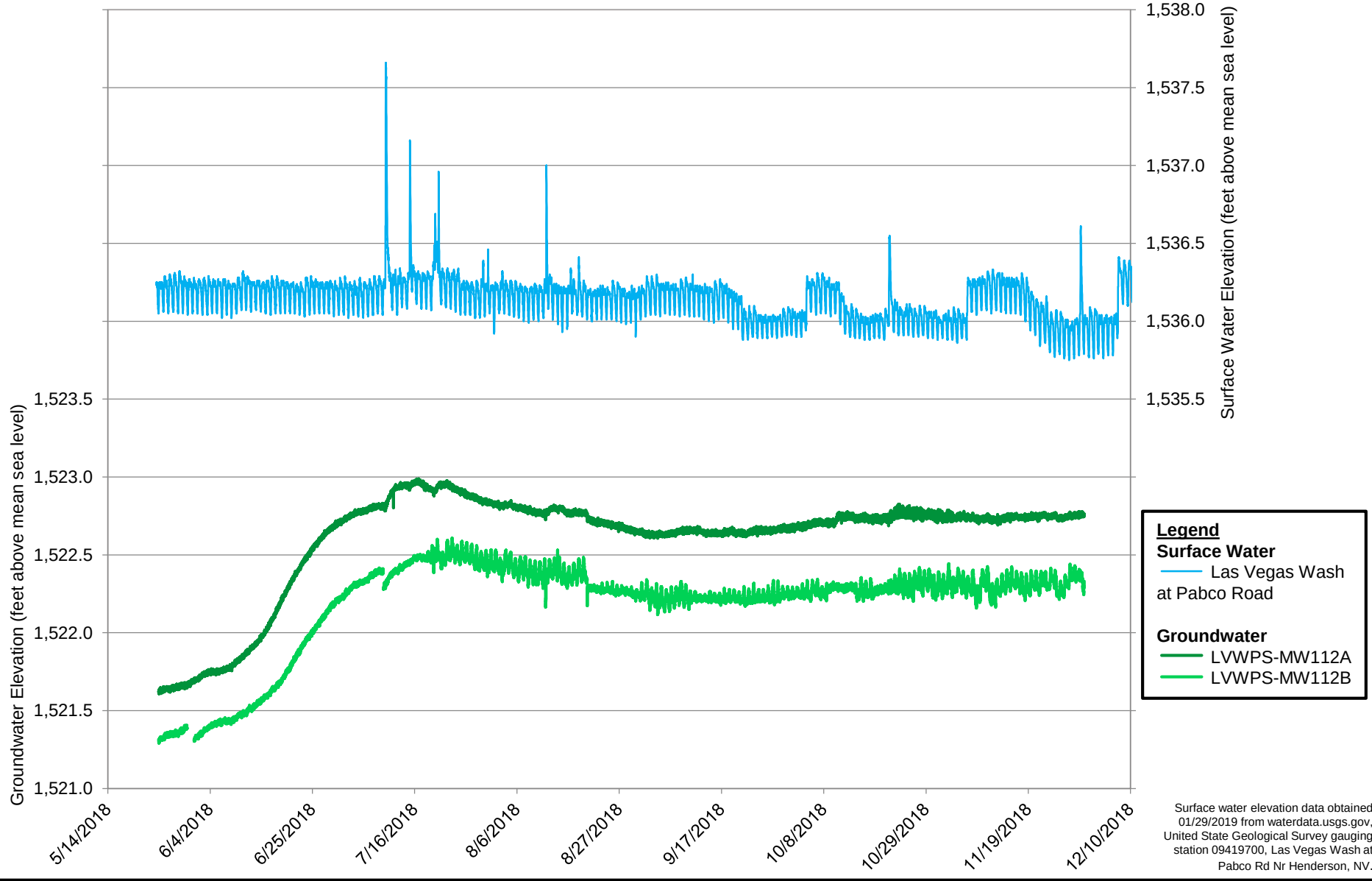
Figure No.
5



Surface water elevation data obtained 01/29/2019 from waterdata.usgs.gov, United State Geological Survey gauging station 09419700, Las Vegas Wash at Pabco Rd Nr Henderson, NV.

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HYDROGRAPH FOR MONITORING WELLS LVWPS-MW112A/B

Project No.:	117-7502018
Date:	MAY 23, 2019
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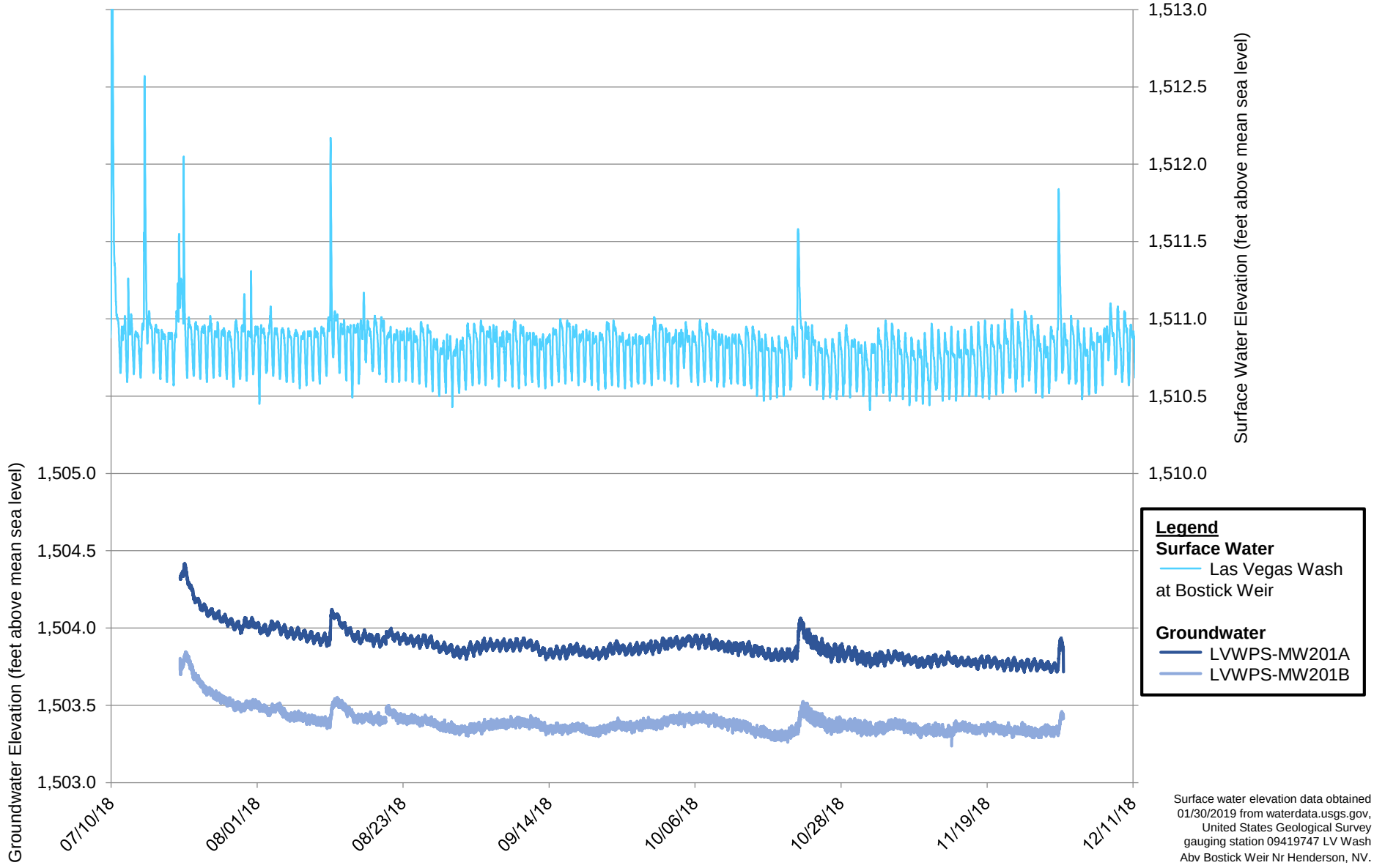
Figure No.
6



Surface water elevation data obtained 01/30/2019 from waterdata.usgs.gov, United States Geological Survey gauging station 09419747 LV Wash Abv Bostick Weir Nr Henderson, NV.

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HYDROGRAPH FOR MONITORING WELLS LVWPS-MW201A/B

Project No.:	117-7502018
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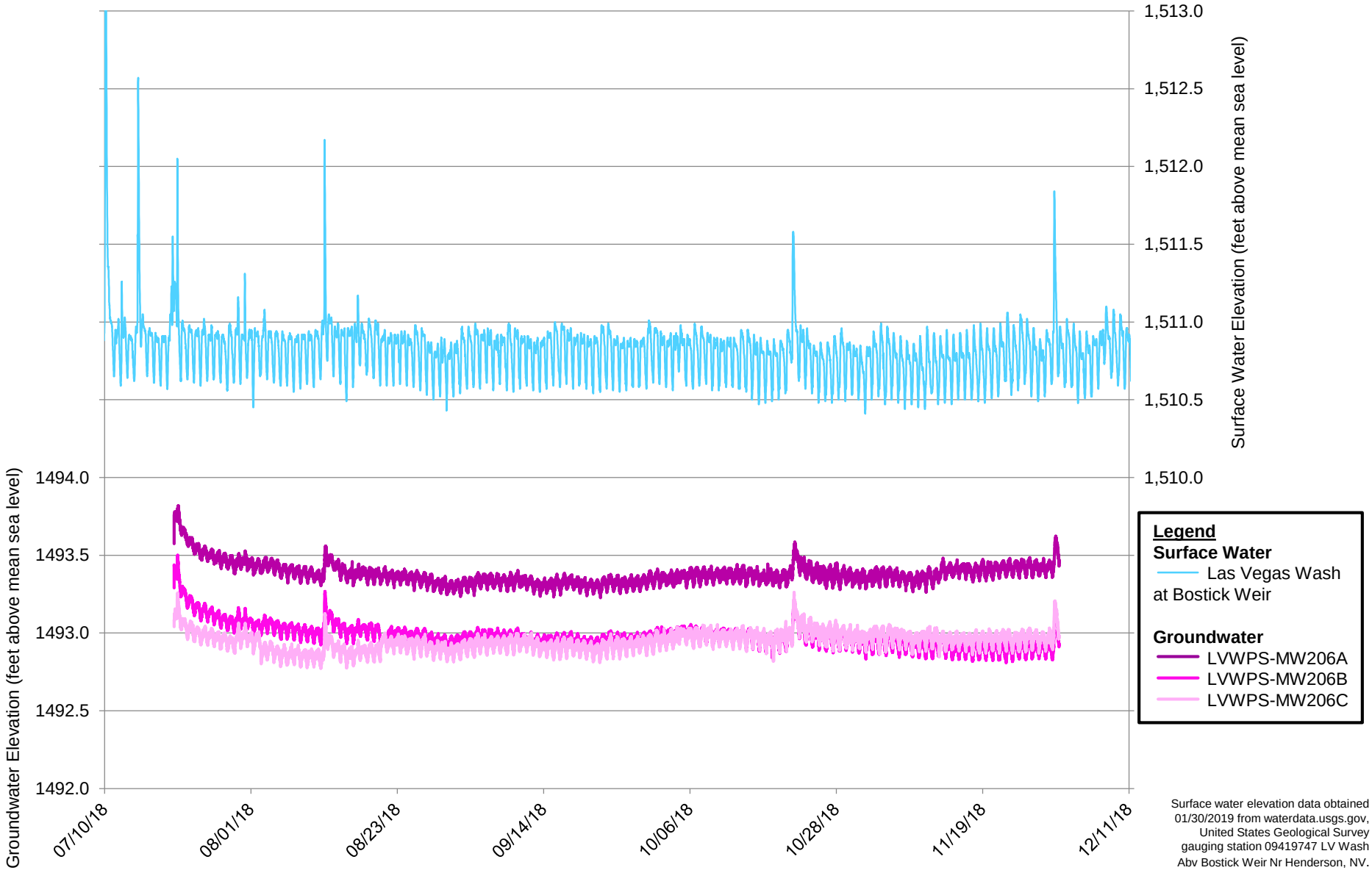
Figure No.
7



Surface water elevation data obtained 01/30/2019 from waterdata.usgs.gov, United States Geological Survey gauging station 09419747 LV Wash Abv Bostick Weir Nr Henderson, NV.

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HYDROGRAPH FOR MONITORING WELLS LVWPS-MW206A/B/C

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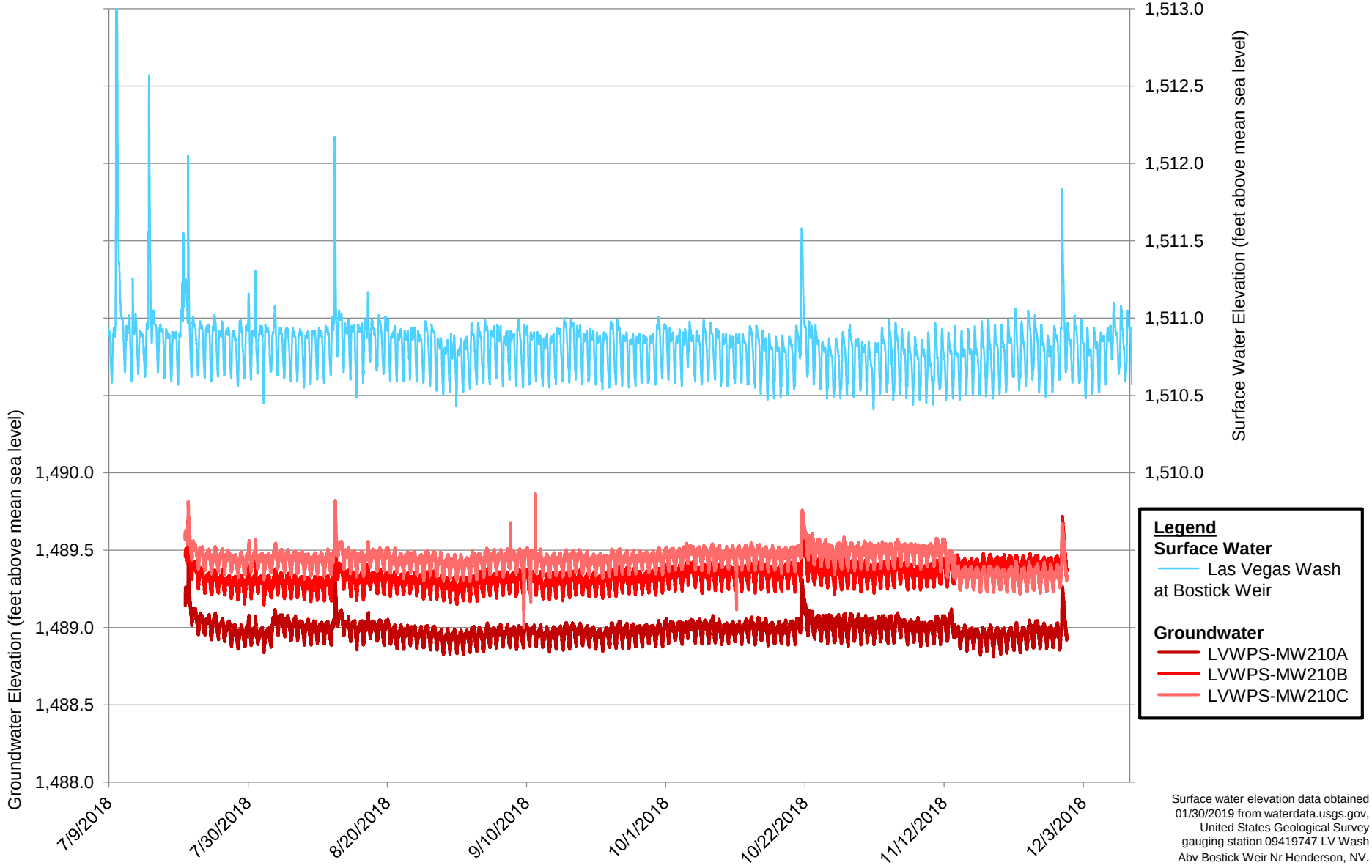
Figure No.
8



Surface water elevation data obtained 01/30/2019 from waterdata.usgs.gov, United States Geological Survey gauging station 09419747 LV Wash Abv Bostick Weir Nr Henderson, NV.

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HYDROGRAPH FOR MONITORING WELLS LVWPS-MW210A/B/C

Project No.:	117-7502018
Date:	MAY 23, 2019
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Figure No.
9

Appendix G
Groundwater and Surface Water Field Logs

Table G.1.
Synoptic Depth to Water - Transect 1a Study Area
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Well Location	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Well Diameter	Well Total Depth	Top of Screen	Bottom of Screen	May 14, 2018		July 9, 2018	
									Depth to Water	Groundwater Elevation	Depth to Water	Groundwater Elevation
									feet bTOC	feet amsl	feet bTOC	feet amsl
LVWPS-MW101A	26732789.49	832678.44	1549.80	1549.34	2	33.5	23.3	33.0	18.40	1530.94	18.61	1530.73
LVWPS-MW101B	26732788.37	832686.18	1549.57	1549.13	2	65	44.8	64.5	9.41	1539.72	9.85	1539.28
LVWPS-MW102A	26732606.35	832965.93	1547.23	1546.82	2	67.1	47.0	66.6	10.45	1536.37	10.75	1536.07
LVWPS-MW102B	26732605.06	832973.68	1547.14	1546.78	2	97	76.8	96.5	5.05	1541.73	5.25	1541.53
LVWPS-MW103A	26732371.53	833455.96	1548.77	1548.39	2	40	29.8	39.5	20.20	1528.19	20.00	1528.39
LVWPS-MW103B	26732368.31	833461.76	1548.93	1548.68	2	97	76.8	96.5	62.81	1485.87	15.45	1533.23
LVWPS-MW104	26732930.15	832609.25	1548.05	1547.69	2	34	23.8	33.5	16.95	1530.74	17.15	1530.54
LVWPS-MW105	26732570.24	833300.91	1547.66	1547.32	2	26.7	16.5	26.2	21.25	1526.07	20.90	1526.42
LVWPS-MW106	26732357.82	833734.57	1549.01	1548.62	2	50.6	30.4	50.1	10.41	1538.21	21.10	1527.52
LVWPS-MW107A	26732823.90	833144.18	1548.14	1547.58	4	35	24.8	34.5	21.08	1526.50	20.75	1526.83
LVWPS-MW107B	26732816.68	833144.44	1548.20	1547.82	4	66.3	46.0	65.8	16.96	1530.86	16.70	1531.12
LVWPS-MW107C	26732819.93	833138.10	1548.33	1547.93	2	120.5	100.3	120.0	6.21	1541.72	6.45	1541.48
LVWPS-MW108A	26733238.09	832645.51	1543.91	1543.56	2	41.4	20.8	40.7	12.44	1531.12	12.59	1530.97
LVWPS-MW108B	26733242.52	832652.04	1543.85	1543.33	2	66.5	46.3	66.0	5.73	1537.60	5.97	1537.36
LVWPS-MW108C	26733245.54	832645.33	1544.05	1543.62	2	119.8	99.6	119.3	3.44	1540.18	3.90	1539.72
LVWPS-MW109	26733119.00	833034.22	1544.91	1544.63	2	52	36.8	51.5	17.00	1527.63	16.90	1527.73
LVWPS-MW110	26732788.02	833593.18	1545.95	1545.68	2	68	47.8	67.5	19.51	1526.17	19.06	1526.62
LVWPS-MW111A	26733253.38	833424.95	1541.06	1540.64	2	41	20.8	40.5	16.65	1523.99	15.30	1525.34
LVWPS-MW111B	26733253.32	833432.86	1540.72	1540.22	2	78	57.8	77.5	12.24	1527.98	11.84	1528.38
LVWPS-MW112A	26733137.42	833795.12	1538.61	1537.99	2	48.5	28.8	48.0	16.40	1521.59	15.18	1522.81
LVWPS-MW112B	26733134.16	833803.81	1538.84	1538.24	2	74.5	54.3	74.0	19.07	1519.17	15.96	1522.28

Notes

amsl	above mean sea level
bgs	below ground surface
bTOC	below top of casing

Table G.2.
Synoptic Depth to Water - Transect 1b Study Area
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Well Location	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Well Diameter	Well Total Depth	Top of Screen	Bottom of Screen	June 29, 2018		November 12, 2018	
									Depth to Water	Groundwater Elevation	Depth to Water	Groundwater Elevation
									feet bTOC	feet amsl	feet bTOC	feet amsl
LVWPS-MW201A	26734867.37	837018.94	1523.10	1522.82	4	48.5	28.2	47.8	18.65	1504.17	19.15	1503.67
LVWPS-MW201B	26734869.47	837026.36	1522.97	1522.81	2	80.4	60.1	79.8	18.15	1504.66	19.61	1503.20
LVWPS-MW202	26734960.16	837604.94	1522.44	1522.04	2	62.0	41.8	61.5	24.80	1497.24	25.03	1497.01
LVWPS-MW203A	26735133.07	837668.33	1519.38	1518.99	2	55.0	34.8	54.5	21.40	1497.59	21.93	1497.06
LVWPS-MW203B	26735134.45	837677.53	1519.31	1519.05	4	95.4	75.1	94.7	22.23	1496.82	22.35	1496.70
LVWPS-MW203C	26735127.54	837675.11	1519.62	1519.23	2	120.6	100.3	120.0	111.15	1408.08	41.65	1477.58
LVWPS-MW204	26735143.94	838137.44	1520.86	1520.68	2	70.6	50.3	70.0	26.74	1493.94	26.85	1493.83
LVWPS-MW204B	26735143.99	838137.39	1520.88	1520.68	2	121.7	101.5	121.2	----	----	26.15	1494.53
LVWPS-MW204C	26735154.11	838130.05	1520.66	1520.33	4	170.6	150.5	170.0	----	----	154.56	1365.77
LVWPS-MW205B	26735351.80	838413.62	1517.41	1517.40	2	85.1	64.9	84.6	25.34	1492.06	25.36	1492.04
LVWPS-MW205C	26735359.77	838411.47	1517.33	1517.36	2	120.6	100.3	120.0	25.64	1491.72	25.64	1491.72
LVWPS-MW206A	26735026.65	838554.30	1528.94	1528.79	2	60.1	39.8	59.5	35.61	1493.18	35.46	1493.33
LVWPS-MW206B	26735020.36	838551.74	1528.85	1528.81	4	90.2	69.9	89.5	36.13	1492.68	35.90	1492.91
LVWPS-MW206C	26735013.64	838549.64	1529.04	1528.68	2	120.6	100.3	120.0	36.00	1492.68	35.88	1492.80
LVWPS-MW206D	26735033.40	838541.37	1528.02	1527.87	2	145.5	125.3	145.0	----	----	33.90	1493.97
LVWPS-MW206E	26735033.41	838550.08	1529.08	1528.81	4	205.6	195.5	205.0	----	----	36.32	1492.49
LVWPS-MW207	26735325.36	838761.63	1519.21	1518.96	2	88.4	68.1	87.8	27.78	1491.18	27.76	1491.20
LVWPS-MW208A	26735088.71	839198.51	1522.78	1522.63	4	60.1	39.9	59.5	31.45	1491.18	31.41	1491.22
LVWPS-MW208B	26735082.39	839200.27	1523.04	1522.84	2	85.6	65.3	85.0	32.00	1490.84	31.99	1490.85
LVWPS-MW209	26735476.50	839198.99	1517.32	1516.79	2	91.6	71.3	91.0	26.96	1489.83	26.86	1489.93
LVWPS-MW209A	26735476.52	839190.21	1517.44	1517.22	2	55.5	35.3	55.0	----	----	27.39	1489.83
LVWPS-MW209B	26735481.45	839205.01	1517.46	1517.29	2	130.5	110.3	130.0	----	----	27.52	1489.77
LVWPS-MW209C	26735477.82	839218.94	1517.46	1517.07	4	171.1	151.0	170.5	----	----	27.42	1489.65
LVWPS-MW210A	26735671.03	839297.06	1515.15	1514.72	2	55.6	35.3	55.0	25.95	1488.77	25.80	1488.92
LVWPS-MW210B	26735673.80	839305.80	1515.09	1514.64	2	90.4	70.1	89.8	25.52	1489.12	25.42	1489.22
LVWPS-MW210C	26735676.65	839314.27	1514.97	1514.66	2	120.6	100.3	120.0	25.42	1489.24	25.30	1489.36
LVWPS-MW210D	26735681.10	839329.86	1514.95	1514.44	2	140.5	130.4	140.0	----	----	25.01	1489.43
LVWPS-MW210E	26735684.19	839338.59	1514.91	1514.48	4	165.6	145.5	165.0	----	----	25.18	1489.30
LVWPS-MW211	26735455.11	839388.41	1516.71	1516.44	2	70.2	50.0	69.7	26.81	1489.63	26.67	1489.77
LVWPS-MW212A	26735150.14	839428.28	1519.62	1519.33	2	54.6	34.3	54.0	28.49	1490.84	27.33	1492.00
LVWPS-MW212B	26735157.37	839430.87	1519.27	1519.30	2	80.1	59.8	79.5	28.76	1490.54	28.61	1490.69
LVWPS-MW212C	26735156.73	839421.91	1519.79	1519.39	2	120.5	100.3	120.0	----	----	29.09	1490.30
LVWPS-MW212D	26735165.66	839425.93	1519.61	1519.29	4	145.6	125.5	145.0	----	----	28.74	1490.55
LVWPS-MW213	26735391.70	839564.27	1516.70	1516.70	2	60.4	40.1	59.8	26.95	1489.75	26.81	1489.89
LVWPS-MW214	26735776.73	839916.30	1508.80	1508.31	2	44.6	34.4	44.0	26.82	1481.49	26.68	1481.63
LVWPS-MW215A	26736013.10	839957.91	1492.39	1492.30	2	33.8	13.5	33.2	11.58	1480.72	11.47	1480.83
LVWPS-MW215B	26736016.55	839966.09	1492.47	1492.06	2	45.9	40.7	45.3	12.31	1479.75	12.15	1479.91
LVWPS-MW216	26736374.70	841345.38	1480.70	1480.45	2	20.6	10.4	20.0	7.97	1472.48	7.84	1472.61
LVWPS-MW217A	26735082.73	838263.42	1529.96	1529.77	2	71.5	51.3	71.0	----	----	36.36	1493.41
LVWPS-MW217B	26735089.76	838261.58	1530.13	1530.00	2	120.5	100.3	120.0	----	----	35.99	1494.01

Table G.2.
Synoptic Depth to Water - Transect 1b Study Area
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Well Location	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Well Diameter	Well Total Depth	Top of Screen	Bottom of Screen	June 29, 2018		November 12, 2018	
									Depth to Water	Groundwater Elevation	Depth to Water	Groundwater Elevation
									feet bTOC	feet amsl	feet bTOC	feet amsl
LVWPS-MW217C	26735096.34	838259.77	1530.04	1529.81	4	175.6	155.5	175.0	----	----	35.76	1494.05
LVWPS-MW218A	26735526.23	838899.57	1516.81	1516.48	2	55.5	35.3	55.0	----	----	26.21	1490.27
LVWPS-MW218B	26735533.82	838903.36	1516.69	1516.52	2	120.5	100.3	120.0	----	----	26.32	1490.20
LVWPS-MW218C	26735541.25	838906.80	1516.22	1515.51	4	156.1	136.0	155.5	----	----	25.71	1489.80
LVWPS-MW219A	26735810.87	839594.90	1512.80	1512.41	2	50.3	35.1	49.8	----	----	27.14	1485.27
LVWPS-MW219B	26735816.52	839600.97	1512.81	1512.43	2	95.5	75.3	95.0	----	----	28.48	1483.95
LVWPS-MW219C	26735821.37	839606.21	1512.78	1512.26	4	135.6	115.5	135.0	----	----	28.37	1483.89
LVWPS-MW220A	26735413.51	839103.70	1517.52	1517.10	2	80.5	60.3	80.0	----	----	27.05	1490.05
LVWPS-MW220B	26735427.15	839107.26	1517.62	1517.26	4	154.6	134.5	154.0	----	----	27.37	1489.89
LVWPS-MW221A	26735024.85	839319.02	1521.16	1520.99	2	70.5	50.3	70.0	----	----	29.89	1491.10
LVWPS-MW221B	26735033.09	839316.10	1521.09	1520.94	4	103.8	83.7	103.2	----	----	30.00	1490.94
LVWPS-MW222A	26734965.16	839692.31	1522.96	1522.65	2	100.5	80.3	100.0	----	----	30.80	1491.85
LVWPS-MW222B	26734964.89	839697.99	1522.90	1522.65	2	170.5	150.3	170.0	----	----	30.39	1492.26
LVWPS-MW222C	26734971.83	839694.48	1522.82	1522.40	4	234.1	214.0	233.5	----	----	27.83	1494.57
LVWPS-MW223A	26735083.82	838965.08	1521.57	1521.48	2	65.5	45.3	65.0	----	----	29.98	1491.50
LVWPS-MW223B	26735090.65	838965.61	1521.52	1521.40	2	90.5	70.3	90.0	----	----	30.11	1491.29
LVWPS-MW223C	26735097.98	838966.20	1521.41	1521.18	4	110.6	95.5	110.0	----	----	30.07	1491.11
LVWPS-MW224A	26734661.76	838859.96	1528.11	1527.95	2	75.5	55.3	75.0	----	----	34.67	1493.28
LVWPS-MW224B	26734667.53	838863.59	1527.68	1527.74	2	127.0	106.8	126.5	----	----	34.30	1493.44
LVWPS-MW224C	26734667.99	838856.30	1527.86	1527.53	4	194.6	174.5	194	----	----	34.85	1492.68
LVWPS-MW225A	26734689.63	838291.93	1528.66	1528.50	2	69.5	49.3	69.0	----	----	33.51	1494.99
LVWPS-MW225B	26734696.00	838292.37	1528.33	1528.05	4	110.6	90.5	110.0	----	----	33.01	1495.04
LVWPS-MW226A	26734272.67	837745.92	1535.90	1535.65	2	55.5	40.3	55.0	----	----	37.54	1498.11
LVWPS-MW226B	26734280.42	837744.66	1535.79	1535.54	4	97.6	77.5	97.0	----	----	86.39	1449.15
MW-02(HEND)	26734478.09	838994.20	1531.33	1533.17	2	45.0	32	42	NM	NM	39.54	1493.63
MW-04(HEND)	26733551.66	838288.65	1527.85	1530.64	2	39.0	29	39	NM	NM	21.99	1508.65
MW-05(HEND)	26733563.04	840501.38	1567.75	1569.13	2	66.7	44	64	NM	NM	42.95	1526.18
MW-06(HEND)	26733596.54	841529.86	1608.67	1610.80	4	49.0	39	49	NM	NM	31.69	1579.11
MW-10(HEND)	26734019.86	840223.23	1543.40	1546.44	4	55.0	45	55	NM	NM	35.84	1510.60
MW-11(HEND)	26733930.02	839738.37	1539.53	1543.35	4	65.0	55	65	NM	NM	47.35	1496.00
MW-12(HEND)	26733800.45	838999.96	1546.09	1547.28	4	61.0	51	61	NM	NM	51.08	1496.20
MW-13(HEND)	26734740.36	838306.94	1528.41	1529.86	4	48.0	38	48	NM	NM	35.11	1494.75
MW-18(HEND)	26734673.96	840945.90	1581.77	1582.56	2	105.6	91	106	NM	NM	67.81	1514.75
MW-20(HEND)	26735460.67	840590.44	1511.14	1512.57	2	65.0	50	65	NM	NM	33.40	1479.17
MW-25(HEND)	26734833.85	839862.89	1528.84	1531.72	4	53.0	38	53	NM	NM	39.35	1492.37
NERT4.51S1	26735857.15	840138.03	1506.79	1506.24	4	50.4	40	50	NM	NM	26.21	1480.03
NERT4.71S1	26735349.66	838991.63	1519.64	1519.29	4	50.4	40	50	NM	NM	28.90	1490.39
NERT4.93S1	26734990.31	837979.18	1523.83	1523.33	4	55.4	45	55	NM	NM	27.62	1495.71
NERT5.11S1	26734881.04	837144.38	1523.18	1522.88	4	45.4	35	45	NM	NM	20.91	1501.97
WMW4.9S	26735290.13	838412.00	1518.01	1518.93	4	46.75	20	50	NM	NM	26.45	1492.48

Table G.2.
Synoptic Depth to Water - Transect 1b Study Area
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Well Location	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Well Diameter	Well Total Depth	Top of Screen	Bottom of Screen	June 29, 2018		November 12, 2018	
									Depth to Water	Groundwater Elevation	Depth to Water	Groundwater Elevation
									feet bTOC	feet amsl	feet bTOC	feet amsl

Notes

amsl	above mean sea level
bgs	below ground surface
bTOC	below top of casing
NM	not measured
----	not installed

1. Existing monitoring wells WMW4.9S and MW-13 were resurveyed during pre-design activities. Survey data shown for all other existing monitoring wells were downloaded from Ramboll Cloud Database All Wells Table on January 16, 2019.

Transect 1a Study Area
Groundwater Field Logs
May 2018 Sampling Event BL01

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Task Name: Las Vegas Wash Pilot Study	Task No: M19	Date: 5/14/18
Task Manager: D. Grady	Field Sampler(s): CASTELLANOS SHAMS	Recorded by: CASTELLANOS & SHAMS
Equipment Model/Type: SOLINST Solinst Water Level Meter	*Serial Number:*	

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Condition of Well and Well Seal
9:20	LVWPS-MW101A	TOC	18.40'	Good
9:21	LVWPS-MW101B	TOC	9.41'	Good
10:27	LVWPS-MW102A	TOC	10.45'	Good
10:28	LVWPS-MW102B	TOC	5.05'	Good
9:12	LVWPS-MW103A	TOC	20.20'	Good
9:13	LVWPS-MW103B	TOC	62.81'	Good
9:15	LVWPS-MW104	TOC	16.95'	Good
9:05	LVWPS-MW105	TOC	21.25'	Good
10:35	LVWPS-MW106	TOC	10.41'	Good
10:16	LVWPS-MW107A	TOC	21.06'	Good
10:15	LVWPS-MW107B	TOC	16.96'	Good
10:17	LVWPS-MW107C	TOC	6.21'	Good
9:52	LVWPS-MW108A	TOC	12.44'	Good
9:53	LVWPS-MW108B	TOC	5.73'	Good
9:54	LVWPS-MW108C	TOC	3.44'	Good
9:34	LVWPS-MW109	TOC	17.00'	Good
10:45	LVWPS-MW110	TOC	19.51'	Good
10:00	LVWPS-MW111A	TOC	15.65'	Good
10:01	LVWPS-MW111B	TOC	12.24'	Good
9:40	LVWPS-MW112A	TOC	16.40'	Good
9:41	LVWPS-MW112B	TOC	19.07'	Good
5/9 8:00	AA-23R	TOC	33.91'	Good
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		

BMP = Below Measuring Point TOC = Top of Casing (Well Riser)

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

NERT, Henderson, NV Project

Task Name: Seep Well Field Treatability Study	Task No: M11	Date: 7/9/18
Task Manager : D Grady	Field Sampler(s): JM, BS, CC	Recorded by: SP Masters
Equipment Model/Type:	*Serial Number:*	*Last Calibration Date:*

Well Identification	Describe Measuring Point	Time (hrs)	Depth to Static Water Level (ft BMP)	Well TD (ft BMP)	Condition of Well and Well Seal
SWFTS-MW01	bTOC	1138	14.79	39.1	Good
SWFTS-MW02	bTOC	1225	12.83	33.2	Good
SWFTS-MW03	bTOC	1154	13.65	42.0	Good
SWFTS-MW04	bTOC	1233	10.42	40.6	Good
SWFTS-MW05A	bTOC	1200	17.89	28.9	Good
SWFTS-MW05B	bTOC	1158	17.84	41.9	Good
SWFTS-MW06A	bTOC	1241	6.15	21.3	Good
SWFTS-MW06A	bTOC				
SWFTS-MW06B	bTOC	1244	6.37	35.7	Good
SWFTS-MW07A	bTOC	1258	13.39	29.6	Good
SWFTS-MW07B	bTOC	1254	13.09	38.5	Good
SWFTS-MW08A	bTOC	1311	16.34	34.8	Good
SWFTS-MW08C	bTOC	1314	14.69	69.6	Good
SWFTS-MW09A	bTOC	~~11:45~~	~~14.03~~	29.0	Good
SWFTS-MW09B	bTOC	11:48	14.19	39.0	missing bolt
SWFTS-MW10A	bTOC	1400	11.28	35.2	Good
SWFTS-MW10C	bTOC	1402	9.40	63.4	Good
SWFTS-MW11	bTOC	1217	17.39	39.4	Good
SWFTS-MW11	bTOC				
SWFTS-MW12	bTOC	1420	18.76	40.7	Good
SWFTS-MW13	bTOC	1427	23.85	47.6	Good
SWFTS-MW14	bTOC	1418	11.49	36.7	Good
SWFTS-MW15	bTOC	1456	14.26	34.7	Good
SWFTS-MW16	bTOC	1440	22.28	41.6	Good
SWFTS-MW17	bTOC	1434	26.77	52.7	Good
SWFTS-MW17	bTOC				
SWFTS-MW17	bTOC				
SWFTS-MW18	bTOC	1448	16.06	36.4	Good
SWFTS-MW19	bTOC	1504	10.85	31.3	Good
SWFTS-MW19	bTOC				
SWFTS-MW20	bTOC	1518	13.24	37.6	Good
SWFTS-MW21	bTOC	1545	16.16	39.7	Good
SWFTS-MW22	bTOC	1506	11.60	31.6	Good
SWFTS-MW23	bTOC	1523	12.92	36.6	Good
SWFTS-MW24	bTOC	1538	13.34	37.7	Good
SWFTS-MW25	bTOC	1530	10.75	42.6	Good

BGS = Below Ground Surface BMP = Below Measuring Point MP = Measuring Point TOC = Top of Casing (Well Riser)

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

NERT, Henderson, NV Project

Task Name: Seep Well Field Treatability Study | Task No: M11 | Date: 7-9-18

Task Manager : D Grady | Field Sampler(s): BS, JM, CC | Recorded by: BS / CC

Equipment Model/Type: | *Serial Number:* | *Last Calibration Date:*

Well Identification	Describe Measuring Point	Time (hrs)	Depth to Static Water Level (ft BMP)	Well TD (ft BMP)	Condition of Well and Well Seal
LVWPS-MW101A	bTOC	1142	18.61	32.35	Good
LVWPS-MW101B	bTOC	1145	9.85	63.85	Good
LVWPS-MW102A	bTOC	1315	10.75	66.40	Good
LVWPS-MW102B	bTOC	1318	5.25	66.40	Good
LVWPS-MW103A	bTOC	1214	20.00	3900	Good
LVWPS-MW103B	bTOC	1335	15.45	95.90	Good
LVWPS-MW104	bTOC	1137	17.15	34.00	Good
LVWPS-MW105	bTOC	1330	~~29.78~~ 29.90	2755	Good
LVWPS-MW106	bTOC	1304	21.10	50.00	Good
LVWPS-MW107A	bTOC	1159	20.75	34.00	Good
LVWPS-MW107B	bTOC	1251	16.70	66.50	Good
LVWPS-MW107C	bTOC	1254	6.45	120.0	Good
LVWPS-MW108A	bTOC	1109	12.59	40.00	Good
LVWPS-MW108B	bTOC	1115	5.97	64.72	Good
LVWPS-MW108C	bTOC	1242	3.90	119.20	Good
LVWPS-MW109	bTOC	1150	16.90	51.00	Good
LVWPS-MW110	bTOC	1232	19.06	67.50	Good
LVWPS-MW111A	bTOC	1126	15.30	38.85	Good
LVWPS-MW111B	bTOC	1124	11.84	75.0	Good
LVWPS-MW112A	bTOC	1225	~~15.0~~ 15.18	41.0	Good
LVWPS-MW112B	bTOC	1345	15.96	78.40	Good
PC-91	bTOC	1432	11.54	19.80	Good
PC-92	bTOC	1438	11.15	36.95	~~Good~~ Poor
PC-94	bTOC	1445	13.44	21.30	~~Poor~~ Good
PC-58	bTOC	1526	21.71	38.85	Good
PC-88	bTOC	1409	7.31	46.40	Poor
PC-97	bTOC	1419	5.90	31.10	Poor, flooded
COH-2B1	bTOC				Couldn't access on 7/9
	bTOC				
	bTOC				
	bTOC				
	bTOC				
	bTOC				
	bTOC				
	bTOC				
	bTOC				

BGS = Below Ground Surface | BMP = Below Measuring Point | MP = Measuring Point | TOC = Top of Casing (Well Riser)

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: Silversonde | Task Manager: D. Grady

Type: YSI 556 | Serial Number: 11E101026

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
~~———~~		~~21.45~~	~~4.01~~	~~7.05~~	~~9.68~~												
5-15-18	0615	23.25	4.00	7.00	10.00	231.3	1.413	8.35	0.0	22.71	4.08	7.03	10.00	231.1	1.413	8.35	0.0
5-16-18	0540	20.82	4.00	7.00	10.02	231.2	1.413	8.35	0.0	21.35	3.98	7.02	10.01	230.09	1.411	8.35	0.0
5-17-18	0610	20.81	4.00	7.00	10.01	231.3	1.414	8.31	0.0	21.58	4.00	7.00	10.01	231.0	1.413	8.35	0.0
5-18-18	0525	20.97	4.00	7.00	10.00	231.2	1.413	8.35	0.0	22.09	4.01	7.00	10.00	231.0	1.412	8.32	0.0

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: SILVER STATE | Task Manager: D. Grady

Type: HORIBA U-52 | Serial Number: #D1MT04FE/

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
4/14/18	12:30 / 16:30	17.36	3.99	/	/	/	4.50	7.92	0.0								
4/15/18	6:15 / 16:00	17.50	3.92	/ 6.83	/ 9.85	/	2.25	6.87	0.0	23.08	4.32	/ 7.15	/ 10.50	/	4.37	8.80	0.0
4/16/18	5:30 / 16:00	17.15	3.97	/	/	/ 473	4.49	7.86	0.0	29.55	4.02	/ 6.99	/ 9.68	/	4.51	5.61	0.0
4/17/18	6:00 / 16:00	16.68	3.99	/ 7.01	/	/	4.50	7.91	0.4	25.67		/ 6.83	/ 9.90	/	4.98	5.76	0.0
4/18/18	6:00	17.	4.02	/	/	/	4.86	16.95	0.0	NA							

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5-16-18 | Well ID: LVWPS - MW101A

Field Sampler(s): B. Ohams

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 18.45 | Screened Interval Top (ft): 23.3 | Pump Intake Depth (ft): 28

Well Depth (ft): 33.5 | Screened/Open Interval Bottom (ft): 33 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1030

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1035	25.67		7.49		6.70		3.11		49.5		479		260	18.45		Brown
1041	25.59		7.46		6.68		2.86		52.7		374		260	18.45		light brown
1046	25.70		7.45		6.69		2.66		51.0		101		260	18.45		light brown
1051	25.76		7.44		6.70		2.75		49.0		68.5		260	18.45		light brown
1057	25.58		7.49		6.66		2.86		41.3		53.7		260	18.45		light brown
1102	25.76		7.46		6.69		2.62		39.8		5.2		260	18.45		clear
1107	25.86		7.45		6.71		2.62		37.5		49.3		260	18.45	8.32	clear

Stop Purge Time: ~~1035~~ 1135 | Sample Time: 1115 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW101A-BL01 | QA/QC Sample ID(s): —

Observations/Comments: very turbid

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	500 mL Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5/16	Well ID: LVWPS- MW101B
Field Sampler(s): CASTELLANOS AND SHANS				
Transducer Removal Time: N/A	Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 9.42'	Screened Interval Top (ft): 44.75		Pump Intake Depth (ft): 54.6	
Well Depth (ft): 65	Screened/Open Interval Bottom (ft): 64.5		Well Diameter (in): 2"	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 10:20				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
10:25	24.31		7.49		7.77		3.85		329		1000+		300 ml/min	9.75'		cloudy
10:30	22.03		7.40		7.89		2.87		316		937		300 ml/min	9.76'		cloudy
10:35	21.89		7.38		7.89		2.85		311		693		300 ml/min	9.75'		cloudy
10:40	22.15		7.37		7.88		2.19		307		671		250 ml/min	9.70'		cloudy
10:45	22.15		7.37		7.86		2.07		301		654		250 ml/min	9.71'		cloudy
10:50	22.29		7.36		7.36		2.01		290		569		250 ml/m	9.70'		cloudy
10:55	22.33		7.36		7.92		0.62		294		537		250 ml/min	9.70'		cloudy
11:00	22.28		7.36		7.89		1.82		291		456		250 ml/min	9.70'		cloudy
11:05	22.24		7.36		7.88		1.91		289		405		250 ml/min	9.70'		cloudy
11:10	22.22		7.36		7.88		1.91		286		355		250 ml/m	9.70'		cloudy
11:15	22.28		7.35		7.88		1.91		285		290		275 ml/m	9.75'		cloudy
11:20	22.28		7.35		7.87		1.90		283		260		25 ml/m	9.75'		cloudy
~~11:25~~	~~22.41~~		~~7.34~~		~~7~~											
															4-gallons	

Stop Purge Time: 11:25	Sample Time: 11:40	QA/QC Sample Time(s): —
	Sample ID: LVWPS - MW101-BLO(	QA/QC Sample ID(s): —

Observations/Comments:
HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	0	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4 HCl	3	~~500 mL~~ Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5/16/18 | Well ID: LVWPS-MW02A

Field Sampler(s): CASTELLANOS AND SHARP

Transducer Removal Time:	N/A	Transducer Redeployment time:	N/A	General Well Condition:	Good
Depth to Water (ft):	10.48'	Screened Interval Top (ft):	46.99'	Pump Intake Depth (ft):	56'
Well Depth (ft):	67'	Screened/Open Interval Bottom (ft):	66.55'	Well Diameter (in):	2"
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE		GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	

Purge Start Time: 12:40

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
12:50	22.12		7.42		7.69		5.11		291		800		225 ml/m	10.65'		clear
12:55	21.95		7.40		7.68		3.15		284		755		250 ml/m	10.62'		clear
13:00	21.58		7.39		7.73		2.75		280		700		250 ml/m	10.62'		clear
13:05	21.59		7.39		7.77		2.53		278		1000+		250 ml/m	10.62'		cloudy
13:10	21.85		7.39		7.78		2.40		276		792		250 ml/m	10.62'		cloudy
13:15	21.75		7.39		7.78		2.35		275		655		250 ml/m	10.59'		cloudy
13:20	21.75		7.39		7.73		2.27		273		496		250 ml/m	10.65'		cloudy
13:25	21.85		7.40		7.73		2.23		272		377		250 ml/m	10.61'		cloudy
13:30	21.40		7.40		7.72		2.23		271		334		250 ml/m	10.60'		cloudy
13:35	21.77		7.39		7.67		2.19		269		275		250 ml/m	10.61'		cloudy
13:40	21.33		7.39		7.67		2.19		268		234		250 ml/m	10.60'		cloudy
13:45	21.17		7.40		7.67		2.20		268		197		250 ml/m	10.60'		cloudy

Stop Purge Time: 13:50 | Sample Time: 13:50 | Sample ID: LVWPS-MW02A-BL01 | QA/QC Sample Time(s): — | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	0	250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	3	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/HCl	3	500 mL Amber Glass 3 x VOA	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5-16-18 | Well ID: LVWPS-MW102B

Field Sampler(s): B. Shams

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 5.16 | Screened Interval Top (ft): 76.75 | Pump Intake Depth (ft): 86.5

Well Depth (ft): 97 | Screened/Open Interval Bottom (ft): 96.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1259

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1246	26.77		7.93		66.70		1.82		-268.8		98.9		200	5.31		clear
1251	28.35		7.92		70.54		0.14		-260.5		107		200	5.25		clear
1256	28.64		7.94		71.37		0.12		-260.4		98.2		200	5.25		clear
1302	28.29		7.96		71.32		0.10		-270.5		105		200	5.25		clear
1307	28.77		7.90		72.00		0.08		-256.3		97.3		200	5.25		clear
1313	28.96		7.86		72.51		0.09		-262.3		97.2		200	5.25		clear
1318	28.76		7.92		72.23		0.07		-277.5		93.1		200	5.25		clear
1324	28.75		7.93		72.35		0.06		-283.5		88.5		200	5.25		clear
1329	28.72		7.95		72.26		0.05		-284.5		89.3		200	5.25	8.6	clear

Stop Purge Time: 1358 | Sample Time: 1335 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW102B-BL01 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.4 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500 mL~~ Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5-18-18 | Well ID: LVWPS-MW103A

Field Sampler(s): B-Shams

Transducer Removal Time: N/A | Transducer Redeployment time: N/A | General Well Condition: Good

Depth to Water (ft): 19.91 | Screened Interval Top (ft): 29.8 | Pump Intake Depth (ft): 34.5

Well Depth (ft): 40 | Screened/Open Interval Bottom (ft): 39.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0707

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0714	21.51		7.80		8.01		1.76		39.9		114		130	20.60		cloudy
0719	21.70		7.81		8.17		1.13		39.0		65.1		130	20.80		cloudy
0740	22.20		7.81		8.40		0.81		30.0		35.8		130	20.85		clear
0745	22.37		7.80		8.53		0.94		28.8		15.7		130	20.85		clear
0750	22.58		7.80		8.29		0.85		27.9		14.29		130	20.85		clear
0755	22.82		7.79		8.29		0.88		28.8		13.85		130	20.85		Clear
0800	23.06		7.78		8.30		0.81		30.6		13.86		130	20.85	7.6	clear

Stop Purge Time: 0814 | Sample Time: 0810 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW103A-KL01 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	1	250 mL Amber Glass w/H2SO4 HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	0	250 mL Amber Glass w/H3PO4	3	500 mL Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5/18	Well ID: LVWPS-103B
Field Sampler(s): CASTELLANOS				
Transducer Removal Time: N/A	Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 62.10'	Screened Interval Top (ft): 76'		Pump Intake Depth (ft): 86'	
Well Depth (ft): 97'	Screened/Open Interval Bottom (ft): 96'		Well Diameter (in): 2"	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 8:20				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
8:30	20.58		7.83		89.7		3.86		360		35		100 m/m	60.7'		CLEAR
8:35	20.53		7.80		94.7		3.01		327		31		100 m/m	60.7'		CLEAR
8:40	20.55		7.80		94.7		2.91		317		28.5		100 m/m	62.10'		CLEAR
8:45	20.67		7.81		94.2		2.85		309		24.2		100 m/m	62.10'		CLEAR
8:50	20.91		7.83		93.2		2.89		301		25.2		100 m/m	62.10'		CLEAR
8:55	21.17		7.83		93.9		2.66		284		23		100 m/m	62.61'		CLEAR
9:00	21.22		7.84		92.0		3.03		294		22		100 m/m	62.61'		CLEAR
9:05	21.15		7.84		91.6		3.18		294		20		100 m/m	62.61'		CLEAR
9:10	21.04		7.85		90.1		3.22		292		21.2		100 m/m	62.60'		CLEAR
9:15	21.05		7.85		89.6		3.25		291		20.4		100 m/m	62.60'		CLEAR
9:20	21.04		7.86		88.9		3.24		290		19		100 m/m	62.60'		CLEAR

Stop Purge Time: 9:20	Sample Time: 9:25		QA/QC Sample Time(s): —		
	Sample ID: LVWPS-103B-BL01		QA/QC Sample ID(s):		

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	0	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/HNO_3~~ HCL	3	500 mL Amber Glass 3 x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5/16/18	Well ID: LVWPS-MW104
Field Sampler(s): CASTELLANOS AND SEANS				
Transducer Removal Time: N/A	Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 17.05'	Screened Interval Top (ft): 23.8		Pump Intake Depth (ft): 28.7'	
Well Depth (ft): 34'	Screened/Open Interval Bottom (ft): 33.5		Well Diameter (in): 2'	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 7:45				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
7:50	18.62		6.68		6.69		5.73		270		253		275 mL/min	17.10'		cloudy
7:55	18.80		6.99		6.63		5.22		294		678		300 mL/min	17.10'		cloudy
8:00	18.88		7.04		6.62		5.22		304		570		275 mL/min	17.10'		cloudy
8:05	18.89		7.07		6.61		5.13		306		332		275 mL/min	17.10'		cloudy
8:10	18.96		7.09		6.61		5.08		310		187		275 mL/min	17.05'		cloudy
8:15	18.98		7.09		6.60		5.00		315		169		275 mL/m	17.05'		cloudy
8:20	18.99		7.10		6.69		7.00		314		132		275 mL/m	17.05'		cloudy
8:25	19.06		7.12		6.60		5.08		324		96		275 mL/m	17.05'		cloudy
8:35	19.13		7.14		6.59		4.94		331		76		275 mL/m	17.05'		cloudy
8:40	19.19		7.13		6.58		4.89		336		63		275 mL/m	17.05'		cloudy
8:45	19.22		7.14		6.58		4.85		341		57		275 mL/m	17.05'		clear
8:50	19.31		7.14		6.56		4.81		350		50		275 mL/m	17.05'		clear
															4 gallons	

Stop Purge Time: 8:50	Sample Time: 8:50	QA/QC Sample Time(s): 9:00	
	Sample ID: LVWPS-MW104-BL01	QA/QC Sample ID(s): LVWPS-MW104-BL01-MS/MSD	

Observations/Comments: LVWPS-MW104-BL01/MS/MSD

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3/3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	0	250 mL Amber Glass ~~w/H2SO4~~ ~~HCL~~
1	125 mL w/EDA	2/2	250 mL Plastic	1/1	250 mL w/H2SO4	/2	250 mL poly w/HNO3	1/1	250 mL Amber Glass ~~w/H2SO4~~ HCL	3/3	~~500 mL~~ Amber Glass 3x WA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, N

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5-17-18 | Well ID: LVWPS-MW105

Field Sampler(s): B. Shams

Transducer Removal Time: N/A | Transducer Redeployment time: N/A | General Well Condition: Good

Depth to Water (ft): 21.25 | Screened Interval Top (ft): 16.5 | Pump Intake Depth (ft): 25

Well Depth (ft): 26.7 | Screened/Open Interval Bottom (ft): 26.2 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1401

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1406	24.52		7.35		7.82		1.82		2.5		38.5		200	21.35		clear
1411	23.87		7.34		7.67		0.72		9.1		24.4		200	21.30		clear
1416	23.82		7.34		7.66		0.46		33.3		17.6		200	21.30		clear
1421	23.61		7.33		7.64		0.38		39.4		7.87		200	21.30		clear
1426	23.64		7.32		7.63		0.36		50.9		8.05		200	21.30		clear
1431	23.69		7.32		7.64		0.41		52.9		8.13		200	21.30		clear
1436	23.61		7.31		7.62		0.28		58.0		8.27		200	21.30	6.0	clear

Stop Purge Time: 1501 | Sample Time: 1440 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW105-BL01 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H2SO4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	500 mL Amber Glass 3 x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5/17/18	Well ID: LVWPS-MW06	
Field Sampler(s): CASTELLANOS AND SHAMS					
Transducer Removal Time: N/A		Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 21.30'		Screened Interval Top (ft): 30		Pump Intake Depth (ft): 40'	
Well Depth (ft): 50'		Screened/Open Interval Bottom (ft): 50		Well Diameter (in): 2"	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE		GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 12:15					

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
12:20	25.11		7.51		8.87		8.13		223		600		250ml/m	21.51'		Cloudy
12:25	22.34		7.49		9.00		3.77		247		1000+		250ml/m	21.58		Cloudy
12:30	20.81		7.48		8.01		4.68		286		584		300 ml/m	21.65'		Cloudy
12:35	20.58		7.52		7.70		4.90		296		970		300 ml/m	21.65'		Cloudy
12:40	20.93		7.55		7.49		4.99		303		606		300 ml/m	21.65'		cloudy
12:45	20.44		7.57		7.35		5.14		308		457		300 ml/m	21.65'		cloudy
12:50	20.48		7.57		7.29		5.13		312		292		300 ml/m	21.65'		cloudy
12:55	20.83		7.56		7.26		5.00		315		225		300 ml/m	21.65'		cloudy
13:00	20.76		7.56		7.23		5.26		319		176		300 ml/m	21.65'		cloudy
13:05	20.82		7.56		7.20		5.19		320		149		300 ml/m	21.61'		cloudy
13:10	20.63		7.54		7.34		5.68		316		121		300 ml/m	21.61'		Cloudy
13:15	20.94		7.56		7.19		5.33		325		96		300 ml/m	21.61'		cloudy
13:20	20.71		7.56		7.19		5.36		325		89		300 ml/m	21.61'		Cloudy
															5-Gallon	

Stop Purge Time: 13:25	Sample Time: 13:35	QA/QC Sample Time(s): —	
	Sample ID: LVWPS-MW06-QC01	QA/QC Sample ID(s): —	

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2SO_4~~ HCL	3	~~500 mL~~ Amber Glass 3 x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Galleria Road Treatability Study | Task Manager: D. Grady | Task No: M17 | Date: 5/3/18 | Well ID: LVWPS-MW107A

Field Sampler(s): CASTELLANO

Transducer Removal Time: N/A | Transducer Redeployment time: N/A | General Well Condition: Good

Depth to Water (ft): 21.16' | Screened Interval Top (ft): 24.8 | Pump Intake Depth (ft): 29'

Well Depth (ft): 35' | Screened/Open Interval Bottom (ft): 34.8 | Well Diameter (in): 4"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1215

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
12:10	22.95		7.51		6.66		4.77		310		77		125ml/min	21.10'		CLEAR
12:15	20.67		7.50		6.69		4.54		309		53		250ml/min	21.10'		CLEAR
12:20	20.25		7.52		6.70		4.56		311		36		250ml/min	21.10'		CLEAR
12:25	20.19		7.55		6.70		4.67		314		24		250ml/min	21.15'		CLEAR
12:30	20.17		7.55		6.70		4.73		315		20		250ml/min	21.15'		CLEAR
12:35	20.00		7.55		6.70		4.60		314		15		250ml/min	21.15'		CLEAR
12:40	20.14		7.57		6.79		4.70		312		15		250ml/min	21.15'		CLEAR
12:45	20.20		7.57		6.73		4.79		315		11		250ml/min	21.11'		CLEAR
12:50	20.10		7.53		6.72		4.24		316		4		250ml/min	21.11'		CLEAR
12:55	20.05		7.53		6.72		4.18		316		2		250ml/min	21.11'		CLEAR
															4 gallons	

Stop Purge Time: 12:55 | Sample Time: 13:00 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW107A-BL01 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500~~ mL Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5-15-18 | Well ID: LVWPS-MW107B

Field Sampler(s): B. Shams

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 16.55 | Screened Interval Top (ft): 65.75 | Pump Intake Depth (ft): 55

Well Depth (ft): 66.29 | Screened/Open Interval Bottom (ft): 45.96 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1335

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1340	26.40		7.68		8.71		0.91		-233.5		25.4		170	16.90		clear
1345	25.69		7.72		8.68		0.28		-239.9		18.80		170	17.51		clear
1350	25.51		7.73		8.68		0.20		-231.9		19.40		170	17.75		clear
1356	26.09		7.74		8.76		0.21		-221.8		14.95		170	17.90		clear
1401	25.90		7.84		8.77		0.19		-223.1		13.21		170	18.35		clear
1407	25.82		7.84		8.76		0.17		-224.5		11.60		170	18.51		clear
1412	25.78		7.83		8.73		0.15		-226.0		10.98		170	18.62	↓	clear
1419	25.97		7.83		8.75		0.14		-230.0		8.04		170	18.69	~~7.75~~ 6.63	clear

Stop Purge Time: 1445 | Sample Time: 1425 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW107B | QA/QC Sample ID(s):

Observations/Comments: Water level did not stabilize. Sampled after 2 tubing + pump volumes.

HACH Kit Sulfide: ~2 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	1	250 mL Amber Glass w/~~H2SO4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	0	250 mL Amber Glass w/H3PO4	3	~~500~~ mL Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5-16-18	Well ID: LVWPS-MW107C
Field Sampler(s): B. Shams				
Transducer Removal Time:	Transducer Redeployment time:		General Well Condition: Good	
Depth to Water (ft): 6.19	Screened Interval Top (ft): 100-25		Pump Intake Depth (ft): 110	
Well Depth (ft): 120.5	Screened/Open Interval Bottom (ft): 120		Well Diameter (in): 2	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 0740				

Time	Temp (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0746	22.95		7.95		67.55		1.25		-140.6		670		200	6.40		cloudy
0752	22.96		7.57		71.29		0.67		-188.6		374		200	6.40		cloudy
0758	23.07		8.11		71.74		0.46		209.2		151		200	6.40		cloudy
0804	23.14		8.07		72.08		0.36		-218.4		86.6		200	6.40		slightly cloudy
0809	23.19		8.05		71.99		0.33		-223.9		73.7		200	6.40		slightly cloudy
0815	23.21		8.06		71.58		0.36		-231.0		80.5		200	6.40		"
0820	23.26		8.01		71.85		0.33		-232.1		23.8		200	6.40		"
0825	23.47		7.99		72.10		0.22		-233.4		25.1		200	6.40		clear
0830	23.49		8.00		72.24		0.20		-235.8		24.5		200	6.40	8.8	clear

Stop Purge Time: 0900	Sample Time: 0835	QA/QC Sample Time(s):
	Sample ID: LVWPS-MW107C-BL01	QA/QC Sample ID(s):

Observations/Comments: Hydrogen sulfide odor in gw

HACH Kit Sulfide: 1.9 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	1	250 mL Amber Glass ~~w/H2SO4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	0	250 mL Amber Glass w/H3PO4	3	500 mL Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5-15-18 | Well ID: LVWPS-MW108A

Field Sampler(s): B. Shams

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 12.44 | Screened Interval Top (ft): 20.81 | Pump Intake Depth (ft): 30

Well Depth (ft): 41.41 | Screened/Open Interval Bottom (ft): 40.69 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1139

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1142	26.25		7.21		7.74		27.8		-20.7		40.9		260	12.45		clear
1147	25.66		~~7.63~~ 7.17		7.63		0.86		-16.6		29.7		260	12.45		clear
1152	25.67		7.17		7.62		0.68		-8.3		11.31		260	12.45		clear
1157	25.62		7.19		7.60		0.54		6.8		5.81		260	12.45		clear
1202	25.60		7.17		7.58		0.54		12.3		4.56		260	12.45		clear
1208	25.72		7.16		7.58		0.53		16.7		3.28		260	12.45		clear
1213	25.69		7.16		7.59		0.50		18.9		2.54		260	12.45	8.06	clear

Stop Purge Time: 1235 | Sample Time: 1215 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW108A | QA/QC Sample ID(s): —

Observations/Comments: Well stabilized quickly

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2SO_4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500~~ mL Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5/15/18 | Well ID: LVWPS - MW108B

Field Sampler(s): SHAMS & CASTELLANOS

Transducer Removal Time: N/A | Transducer Redeployment time: N/A | General Well Condition: Good

Depth to Water (ft): 5.75' | Screened Interval Top (ft): 46' | Pump Intake Depth (ft): 61'

Well Depth (ft): 66' | Screened/Open Interval Bottom (ft): 66' | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 9100

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
9:05	20.42		7.32		8.09		6.29		359		93.7		300 ml/min	6.50'		clear
9:10	19.41		8.32		8.55		4.21		320		602		260 ml/min	5.65'		clear
9:15	19.49		8.38		8.55		4.03		311		315		250 ml/min	5.89'		clear
9:20	19.38		8.37		8.56		3.83		306		210		300 ml/min	5.89'		clear
9:25	19.36		8.33		8.55		3.78		304		141		300 ml/min	5.89'		clear
9:30	19.38		8.31		8.54		3.77		303		115		300 ml/min	5.85'		clear
9:40	19.42		8.25		8.75		10.83		295		87		300 ml/min	5.89'		clear
9:45	19.50		8.30		8.56		3.43		301		92.8		300 ml/min	5.89'		clear
9:50	19.52		8.30		8.55		3.66		300		85.6		300 ml/min	5.89'		clear
9:55	19.52		8.30		8.54		3.52		300		80.8		300 ml/min	5.85'		clear
															4-Gallons	

Stop Purge Time: 9:55 | Sample Time: 10:00 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW108B-BL01 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	4	250 mL Amber Glass w/~~H2SO4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500 mL~~ Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5-15-18	Well ID: LVWPS-MW108C
Field Sampler(s): B. Shams				
Transducer Removal Time:	Transducer Redeployment time:		General Well Condition: Good	
Depth to Water (ft): 3.43	Screened Interval Top (ft): 99.55		Pump Intake Depth (ft): 109	
Well Depth (ft): 119.8	Screened/Open Interval Bottom (ft): 119.3		Well Diameter (in): 2	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 0880				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0900	24.47		7.90		56.58		0.30		-180.1		236		250	4.51		cloudy
0905	24.70		7.86		56.50		0.31		-182.7		81.2		225	5.01		cloudy
0910	25.46		5.33		57.27		0.24		-44.5		43.7		180	5.56		cloudy
0920	25.35		5.02		57.05		0.26		-29.8		30.8		180	6.81		cloudy
0930	24.65		5.38		56.41		0.19		-58.1		8.75		180	6.59		clear ~~cloudy~~
0935	24.72		5.34		56.44		0.17		-63.1		8.30		180	7.11		clear
0945	24.62		5.98		56.39		0.09		-76.5		8.21		180	7.35		clear
0955	24.65		6.05		56.37		0.18		-105.9		7.51		180	8.15	10.5	clear

Stop Purge Time: 1035	Sample Time: 1000	QA/QC Sample Time(s):	
	Sample ID: LVWPS-MW108C	QA/QC Sample ID(s):	

Observations/Comments: Water level didn't stabilize. Sampled after 2 tubing & pump volumes

HACH Kit Sulfide: 0.15 mg/L HACH Kit Ferrous Iron: 0.25 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500~~ mL Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5-17-18	Well ID: LVWPS-MW109
Field Sampler(s): B. Shams				
Transducer Removal Time: N/A	Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 17.06	Screened Interval Top (ft): 36'		Pump Intake Depth (ft): 44	
Well Depth (ft): 52	Screened/Open Interval Bottom (ft): 51'		Well Diameter (in): 2	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 1152				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1158	25.16		6.20		759		1.09		71.2		45.8		200	17.10		cloudy
1205	25.07		6.81		7.53		0.48		63.8		28.7		200	17.10		clear
1210	24.89		7.00		7.46		0.46		75.9		13.1		200	17.10		clear
1215	25.05		6.28		7.48		0.33		114.3		10.2		200	17.10		clear
1220	25.01		6.63		7.47		0.31		101.4		8.3		200	17.10		clear
1225	24.86		6.83		7.44		0.32		89.1		8.5		200	17.10		clear
1230	24.89		6.86		7.45		0.30		91.4		8.9		200	17.10		clear
1235	24.97		6.84		7.44		0.30		92.6		8.2		200	17.10	7.4	clear

Stop Purge Time: 1315 Sample Time: 1240 QA/QC Sample Time(s): 1240

Sample ID: LVWPS-MW109-BL01 QA/QC Sample ID(s): LVWPS-MW109-BL01-FD

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	1	250 mL Amber Glass ~~w/H2SO4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	0	250 mL Amber Glass w/H3PO4	3	~~500 mL~~ Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5/14/18	Well ID: LVWPS - MW110
Field Sampler(s): CRYSTAL CASTELLANOS & BRIAN SUMMS				
Transducer Removal Time: N/A	Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 19.51	Screened Interval Top (ft): 47.75		Pump Intake Depth (ft): 63'	
Well Depth (ft): 68'	Screened/Open Interval Bottom (ft): 67.5		Well Diameter (in): 2"	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 13:04 STARTED				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
13:08	19.69		4.22		0.611		7.17		521		585		200ml/min	20.29'		CLOUDY
13:14	20.02		4.31		0.012		7.40		526		605		200ml/min	20.30'		CLOUDY
13:19	20.81		4.22		0.010		3.80		480		631		200ml/min	20.32'		CLOUDY
13:24	21.30		4.02		0.011		3.49		375		645		200ml/min	20.25'		CLOUDY
13:33	21.37		3.97		0.011		3.68		367		645		150ml/min	19.90'		CLOUDY
13:36	21.37		3.97		0.011		3.68		367		645		150ml/min	19.94'		CLOUDY
13:43	22.07		4.13		0.010		6.22		346		654		150ml/min	20.16'		CLOUDY
13:47	23.22		4.19		0.009		6.03		347		654		150ml/min	20.23'		CLOUDY
13:51	23.42		4.18		0.009		5.44		348		649		150ml/min	20.30'		CLOUDY
14:05	23.51		4.30		0.009		3.71		337		648		150ml/min	20.49'		CLOUDY
14:12	23.51		4.31		0.008		3.52		331		651		150ml/min	20.71'		CLOUDY
14:17	23.52		4.28		0.008		3.20		329		653		150ml/min	20.80'		CLOUDY
14:20	23.56		4.36		0.008		3.02		326		654		150ml/min	20.90'		CLOUDY
14:26	23.56		4.40		0.008		3.01		327		656		250ml/min	20.98'		CLOUDY
14:30	23.52		4.35		0.008		2.85		326		656		250ml/min	20.99'	4 gallons	CLOUDY

Stop Purge Time: 14:30	Sample Time: 14:45	QA/QC Sample Time(s):	
	Sample ID: LVWPS - MW110	QA/QC Sample ID(s):	

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500 mL~~ Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5/17/18 | Well ID: LVWPS-MW111A

Field Sampler(s): CASTELLANOS AND SHAMS

Transducer Removal Time: N/A | Transducer Redeployment time: N/A | General Well Condition: Good

Depth to Water (ft): 16.72' | Screened Interval Top (ft): 20' | Pump Intake Depth (ft): 30'

Well Depth (ft): 41' | Screened/Open Interval Bottom (ft): 40' | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 7:35

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
7:45	19.58		7.10		6.54		6.22		340		1000+		275 mL/min	15.70'		cloudy/tan
7:50	19.45		7.07		6.56		3.39		344		1000+		275 mL/min	15.70		cloudy/RED
7:55	19.49		7.06		6.57		3.14		344		626		300 mL/min	15.81'		cloudy
8:00	19.54		7.03		6.58		2.89		344		418		300 mL/min	15.81'		cloudy
8:05	19.59		7.02		6.59		2.73		344		231		300 mL/min	15.76'		cloudy
8:10	19.53		7.02		6.60		2.66		344		134		300 mL/min	15.75'		cloudy
8:15	19.55		7.02		6.61		2.59		344		100		300 mL/min	15.75		cloudy
8:20	19.67		7.02		6.63		2.35		351		78		325 mL/min	15.82		cloudy
8:25	19.68		7.03		6.62		2.51		354		64		325 mL/m	15.8		cloudy
8:30	19.77		7.03		6.61		2.48		356		57		325 mL/m	15.8		clear
8:35	19.91		7.02		6.62		2.44		360		40		325 mL/m	15.8		clear
															4-gallon	

Stop Purge Time: 8:35 | Sample Time: 8:40 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW111A-BL01 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	0	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/HCl	3	250 mL Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 5-17-17 | Well ID: LVWPS-MW1116

Field Sampler(s): B. Shams

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 12.20 | Screened Interval Top (ft): 57.75 | Pump Intake Depth (ft): 67.5

Well Depth (ft): 78 | Screened/Open Interval Bottom (ft): 72.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0734

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0740	22.68		7.38		9.623		3.53		98.0		42.0		210	12.35		clear
0745	22.70		7.40		9.54		0.99		86.4		24.3		210	12.35		clear
0750	22.72		7.40		9.52		0.62		82.5		10.3		210	12.35		clear
0755	22.73		7.40		9.68		0.47		81.0		9.6		210	12.35		clear
0800	22.73		7.40		10.55		0.39		81.1		8.5		210	12.35		clear
0805	22.75		7.39		10.94		0.34		81.0		8.9		210	12.35		clear
0810	22.75		7.40		10.98		0.36		80.1		7.3		210	12.35		clear
0815	22.79		7.39		11.04		0.29		78.8		9.1		210	12.35	7.3	clear

Stop Purge Time: 0825 | Sample Time: 0820 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW1116-SL01 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	1	250 mL Amber Glass w/H2SO4, HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	0	250 mL Amber Glass w/H3PO4	0	~~500 mL~~ Amber Glass 3 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5/17/18	Well ID: LVWPS-MW112A
Field Sampler(s): CASTELLANOS AND SHAMS				
Transducer Removal Time: N/A	Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 16.45'	Screened Interval Top (ft): 28'		Pump Intake Depth (ft): 38'	
Well Depth (ft): 48'	Screened/Open Interval Bottom (ft): 48		Well Diameter (in): 2"	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 10:05				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
10:10	23.29		7.38		6.18		8.70		280		1000+		250 m/n	16.11'		cloudy
10:15	20.88		7.25		6.34		4.72		272		1000+		350 m/n	16.10'		cloudy
10:20	20.72		7.22		6.34		4.50		278		1000+		300 m/n	16.10'		cloudy
10:25	20.67		7.18		6.34		4.27		299		920		300 m/n	16.10'		cloudy
10:30	20.70		7.17		6.34		4.12		305		442		300 m/n	16.15'		clear
10:35	20.68		7.16		6.34		4.02		314		363		300 m/n	16.15'		cloudy
10:40	20.72		7.16		6.33		3.92		319		400		300 m/n	16.15'		cloudy
10:45	20.68		7.15		6.54		3.99		337		306		300/m	16.00'		cloudy
11:00	20.77		7.13		6.35		3.93		385		204		300/m	16.00'		cloudy
11:05	20.82		7.14		6.35		3.91		364		250		300/m	16.00'		cloudy
11:10	20.72		7.14		6.34		3.90		369		230		300/m	16.00'		cloudy
															4.5-gallon	

Stop Purge Time: 11:10	Sample Time: 11:15	QA/QC Sample Time(s): —	
	Sample ID: LVWPS-MW112A-GL01	QA/QC Sample ID(s): —	

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	0	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/HCl	3	500 mL Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 5-17-18	Well ID: LVWPS-MW112B
Field Sampler(s): B. Shams				
Transducer Removal Time:	Transducer Redeployment time:		General Well Condition: Good	
Depth to Water (ft): 15.95	Screened Interval Top (ft): 54.25		Pump Intake Depth (ft): 64	
Well Depth (ft): 74.5	Screened/Open Interval Bottom (ft): 74		Well Diameter (in): 2	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 0929				

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0935	24.21		6.91		40.02		4.55		-52.4		119		110	17.75		cloudy
0940	24.51		7.50		~~0.8~~	41.03	0.83		-75.4		126		110	18.45		cloudy
0948	24.67		7.27		40.16		0.48		-14.5		75.2		110	19.39		cloudy
0953	24.84		7.11		39.42		0.33		12.2		78.8		110	20.23		clear
0958	25.25		7.57		39.15		0.26		43.6		70.2		110	20.75	2.5	clear

Stop Purge Time: 1020	Sample Time: 1005	QA/QC Sample Time(s):
	Sample ID: LVWPS-MW112B-BL01	QA/QC Sample ID(s):

Observations/Comments: Water level not stabilizing. Sampled after 2 tubing/pump volumes were purged

HACH Kit Sulfide: 0.05 mg/L HACH Kit Ferrous Iron: 0.25 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2SO_4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500 mL~~ Amber Glass 5 x VOAs

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

Transect 1b Study Area
Groundwater Field Logs
June 2018 Sampling Event BL01

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Task Name: Las Vegas Wash Pilot Study | Task No: M19 | Date: 6/29/18

Task Manager: D. Grady | Field Sampler(s): | Recorded by: Crystal

Equipment Model/Type: Solinst Water Level Meter | *Serial Number:*

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Condition of Well and Well Seal
8:00	LVWPS-MW201A	TOC	18.65'	Good
8:05	LVWPS-MW201B	TOC	18.15'	Good
8:15	LVWPS-MW202	TOC	24.88	Good
8:20	LVWPS-MW203A	TOC	21.40'	Good
8:25	LVWPS-MW203B	TOC	22.23'	Good
8:30	LVWPS-MW203C	TOC	111.15'	Good
8:35	LVWPS-MW204	TOC	26.74'	Good
9:25	WMW4.9S	TOC	26.35'	Good
8:50	LVWPS-MW205B	TOC	25.34'	Good
8:55	LVWPS-MW205C	TOC	25.64'	Good
8:40	LVWPS-MW206A	TOC	35.61'	Good
8:45	LVWPS-MW206B	TOC	36.13'	Good
8:48	LVWPS-MW206C	TOC	36.00'	Good
9:20	LVWPS-MW207	TOC	27.78'	Good
9:10	LVWPS-MW208A	TOC	31.45'	Good
9:15	LVWPS-MW208B	TOC	32.00'	Good
9:05	LVWPS-MW209	TOC	26.96'	Good
9:30	LVWPS-MW210A	TOC	25.95'	Good
9:33	LVWPS-MW210B	TOC	25.52'	Good
9:35	LVWPS-MW210C	TOC	25.42'	Good
9:40	LVWPS-MW211	TOC	26.81'	Good
10:00	LVWPS-MW212A	TOC	28.49'	Good
10:05	LVWPS-MW212B	TOC	28.76	Good
9:45	LVWPS-MW213	TOC	26.95'	Good
10:10	LVWPS-MW214	TOC	26.82'	Good
10:15	LVWPS-MW215A	TOC	11.58'	Good
10:18	LVWPS-MW215B	TOC	12.31'	Good
10:25	LVWPS-MW216	TOC	7.97'	Good
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		
		TOC		

BMP = Below Measuring Point | TOC = Top of Casing (Well Riser)

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: SILVER STATE | Task Manager: D. Grady

Type: YSI 556 | Serial Number: # 11J102430

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
6/25/18	14:00	24.16	NA	7.0	10.0	100	1.413	933	N/A	24.13	4.41	6.94	9.72	44.8	3.215	6.84	N/A
6/26/18	14:00	24.80	4.39	7.16	/	135	4.8	7.29	NA	23.53	4.36	6.87	9.61	21.9	3.119	6.26	N/A
6/27/18	13:30	302	/	7.12	/	53.5	0.37	7.70	N/A	24.22	4.16	6.93	9.70	44.2	3.08	6.51	N/A
6/28/18	14:30	31.30	/	7.17	/	54.1	0.317	8.14	N/A	24.60	4.61	6.92	9.75	33.1	6.416	6.54	N/A

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: SILVER STATE | Task Manager: D. Grady

Type: HORIBA U52 | Serial Number: SJ4J

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
6/25/18	1600	34.79	4.01	6.99	10.00	276	4.49	7.30	0.0	35.13	4.01	7.00	10.0	276	4.50	7.29	0.0
6/26/18	07:20	30.27	4.00	7.01	10.0	276	4.49	7.99	0.0	36.01	4.00	7.01	10.0	276	4.49	7.30	0.0
6/27/18	07:00	29.97	3.99	7.00	10.0	278	4.50	7.59	0.0	37.72	3.99	7.00	10.0	277	4.49	7.61	0.0
6/28/18	07:15	30.68	4.00	7.00	10.0	280	4.50	8.10	0.0	36.02	4.00	7.00	10.0	279	4.49	7.31	0.0

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: Silverstate | Task Manager: D. Grady

Type: Hydrolab U-52 | Serial Number: Dijm

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
6/25/18	1600	25.5	4.06	6.95	10.08	330	4.20	8.37	0	25.5	4.0	7.0	10.01	330	4.5	8.51	0
6/26/18	1342	26.40	4.04	6.98	10.05	331	4.13	8.4	0	26.40	3.98	7.0	10.0	331	4.53	8.47	0
6/27/18	1253	27.38	4.37	6.40	10.09	240 ~~232~~	1.10	7.43	0	27.38	4.00	7.00	10.0	235	1.0	7.40	0

not natural solution

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 6/26/18	Well ID: LVWPS-MW201A
Field Sampler(s): Castellanos				
Transducer Removal Time: N/A	Transducer Redeployment time: N/A		General Well Condition: Good	
Depth to Water (ft): 18.68'	Screened Interval Top (ft): 28'		Pump Intake Depth (ft): 37'	
Well Depth (ft): 48.5'	Screened/Open Interval Bottom (ft): 42'		Well Diameter (in): 2"	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 8:00				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
8:20	25.04		7.09		5.608		1.26		61.8		40.2		210 ml/min	18.68		Clear
8:25	24.91		7.09		5.591		0.86		61.7		24.3		210 ml/min	18.67		Clear
8:30	24.94		7.09		5.596		0.72		60.5		9.03		210 ml/min	18.66		Clear
8:35	25.13		7.08		5.610		0.75		58.4		4.59		210 ml/m	18.66		Clear
8:40	25.14		7.09		5.616		0.74		57.6		2.67		210 ml/m	18.67		Clear
8:45	25.15		7.09		5.607		0.70		57.5		2.04		210	18.67		Clear
															8 L	

Stop Purge Time: 8:45

Sample Time: 8:50

Sample ID: LVWPS-MW201A-BL01

QA/QC ~~Sample~~ FD Sample Time(s): 8:55

QA/QC FD Sample ID(s): LVWPS-MW201A-BL01-FD

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	0	250 mL Amber Glass w/H2SO4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	1	250 mL Amber Glass w/H2SO4 HCL	1	~~500 mL~~ Amber Glass 3 x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 6/26/18	Well ID: LVWPS-MW 201B
Field Sampler(s): Crystal Castellanos				
Transducer Removal Time: N/A		Transducer Redeployment time: N/A		General Well Condition:
Depth to Water (ft): 19.10'		Screened Interval Top (ft): 59.25'		Pump Intake Depth (ft): 69'
Well Depth (ft): 80'		Screened/Open Interval Bottom (ft): 79.5		Well Diameter (in): 2"
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE		GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP
Purge Start Time: 10:25				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
10:30	27.01		8.98		14.70		1.92		50.8		1000+		~~1000~~ 170	19.78		cloudy
10:35	26.20		8.57		14.58		1.73		49.2		679		~~679~~ 170	20.94		cloudy
10:40	26.33		8.67		13.84		0.65		57.0		466		170	22.08		cloudy
10:50	26.43		8.73		11.49		0.50		51.0		235		200	~~22~~ 22.85		cloudy
10:55	26.26		8.82		11.12		0.51		52.1		147		200	22.36		CLEAR
11:00	25.92		8.85		10.90		0.57		52.5		101		200	22.65		CLEAR
11:05	26.22		8.76		10.80		0.70		52.7		65.4		200	22.89		CLEAR
11:10	26.45		8.64		10.74		0.79		52.7		44.0		200	23.05		CLEAR
11:15	26.44		8.55		10.69		0.85		52.4		36.2		200	23.16		CLEAR
11:20	26.49		8.50		10.67		0.87		52.6		30.2		200	23.20		CLEAR

Stop Purge Time: 11:20	Sample Time: 11:30	QA/QC Sample Time(s): NA	
	Sample ID: LVWPS-MW 201B-B101	QA/QC Sample ID(s): NA	

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	6	500 mL poly w/HNO3	0	250 mL Amber Glass w/H2SO4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	1	250 mL Amber Glass ~~w/HNO3~~ HCL	1	~~250~~ mL Amber Glass 3 x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/25/18 | Well ID: LVWPS-MW-202

Field Sampler(s): Cmowery

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: good

Depth to Water (ft): 24.77 | Screened Interval Top (ft): 41.9 | Pump Intake Depth (ft): 52

Well Depth (ft): 62.15 | Screened/Open Interval Bottom (ft): 61.6 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 850

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
858	26.19		6.92		3.72		00		205		0		400	24.5		clear/no
904	27.07		6.94		3.6		.46		174		0		160	24.54		
909	27.68		6.94		3.58		0		159		0		160	24.54		
913	27.85		6.95		3.59		0		149		0		160	24.54		
920	28.16		6.95		3.58		0		142		0		160	24.54		
923	28.23		6.96		3.58		0		139		0		160	24.54		
															5L	

Stop Purge Time: 924 | Sample Time: 927 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW202-BL01 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3 2x	3x VOA w/HCl amber	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2SO_4~~ HCl	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/25/18 | Well ID: LVWPS-MW 203A

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: OK

Depth to Water (ft): 21.62 | Screened Interval Top (ft): 34.69 | Pump Intake Depth (ft): 45

Well Depth (ft): 54.98 | Screened/Open Interval Bottom (ft): 54.38 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: ~~10:54~~ 11:00

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
11:18	31.50		7.51		2.41		7.4		178		47.1		150	21.64		NEUTRAL
11:23	30.54		7.44		2.40		6.9		182		40.1		150	21.64		
11:28	30.60		7.40		2.40		6.2		188		24.4		150	21.64		
11:33	30.43		7.41		2.40		6.1		193		22.8		150	21.64	4 L	

Stop Purge Time: 11:34 | Sample Time: 11:40 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/25/18 | Well ID: LVWPS-MW 203B

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: OK

Depth to Water (ft): 22.23 | Screened Interval Top (ft): 75.2 | Pump Intake Depth (ft): 85

Well Depth (ft): 95.5 | Screened/Open Interval Bottom (ft): 94.9 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: ~~12:55~~ JK 12:45

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
13:10	32.66		7.50		6.19		1.52		208		39.1		160	22.24		NEUTRAL
13:15	32.27		7.49		6.13		0.97		207		33.3		160	22.25		
13:20	32.32		7.43		6.17		0.71		201		33.0		160	22.25		
13:25	32.40		7.43		6.15		0.61		196		31.9		160	22.26		
13:30	32.38		7.42		6.15		0.60		195		31.0		160	22.26		
															6 L	

Stop Purge Time: 13:32 | Sample Time: 13:45 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_3PO_4~~ HCl		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 6/25/18	Well ID: LVWPS-MW-203C

Field Sampler(s): CMaloney J Aitken

Transducer Removal Time: —	Transducer Redeployment time: —	General Well Condition: good
Depth to Water (ft): 112.2	Screened Interval Top (ft): 100.15	Pump Intake Depth (ft): Bailing
Well Depth (ft): 120.44	Screened/Open Interval Bottom (ft): 119.84	Well Diameter (in): 2
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11	Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: ~~1540~~ 1540

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
	33.75		7.59		25.9		1.81		98		>1000		Bailer		2L	cloudy/no

Stop Purge Time: 1557 Sample Time: — QA/QC Sample Time(s):

Sample ID: QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L

Bottle Set Summary

2	3x VOA w/HCl Amber	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2SO_4~~ HCl		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/25/18 | Well ID: LVWPS-MW 204

Field Sampler(s): CASTELLANOS

Transducer Removal Time: N/A	Transducer Redeployment time: N/A	General Well Condition: Good
Depth to Water (ft): 26.77'	Screened Interval Top (ft): 46.6'	Pump Intake Depth (ft): 58'
Well Depth (ft): 69.89	Screened/Open Interval Bottom (ft): 69.29'	Well Diameter (in): 2"
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11	Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 12:45 pm

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
12:50	26.00		7.06		5.16		3.72		10.2		>100+		400 ml/m	26.00'		Cloudy
13:00	25.30		7.11		3.605		0.81		9.3		21.3		400 ml/m	26.30		clear
13:05	25.31		7.10		3.624		1.00		9.2		29.9		300 ml/m	26.29		clear
13:10	24.82		7.21		3.378		0.59		8.6		7.12		400 ml/m	26.31		clear
13:15	24.56		7.21		3.310		0.53		7.9		10.02		400 ml/m	26.29		clear
13:20	24.69		7.21		3.279		0.49		0.5		12.72		400 ml/m	26.35		clear
13:20	24.55		7.22		3.325		1.11		-10.5		9.56		400 ml/m	26.35		clear
															14 LITERS	

Stop Purge Time: 13:25 | Sample Time: 13:40 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-MW204-B101 | QA/QC Sample ID(s): NA

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	~~500~~ 250 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	3	~~500 mL~~ Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 6/26	Well ID: LVWPS-MW 205B
Field Sampler(s): C Mowery				
Transducer Removal Time: —	Transducer Redeployment time: —		General Well Condition: good	
Depth to Water (ft): 25.31	Screened Interval Top (ft): 64.9		Pump Intake Depth (ft): 75	
Well Depth (ft): 85.19	Screened/Open Interval Bottom (ft): 84.59		Well Diameter (in):	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 909				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
915	28.68		7.06		3.74		7.11		134		0		240	25.33		clear/no
919	26.58		6.96		3.82		0		135		0		240	25.33		
923	26.46		6.91		3.84		0		135		0		240	25.33		
927	26.11		6.88		3.85		0		134		0		240	25.33		
930	26.08		6.85		3.85		0		135		0		240	25.33		
933	26.16		6.83		3.85		0		135		0		240	25.33		
															5.5L	

Stop Purge Time: 934 Sample Time: 939 QA/QC Sample Time(s): 945 MS/MSD

Sample ID: LVWPS-MW 205B-BL01 QA/QC Sample ID(s): LVWPS-MW #205B-BL01 – MS/MSD

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl 3 Amber	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H2SO4~~ HCl		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/26 | Well ID: LVWPS-MW 205C

Field Sampler(s): CMawbray

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: good

Depth to Water (ft): 25.60 | Screened Interval Top (ft): 99.69 | Pump Intake Depth (ft): 110

Well Depth (ft): 119.98 | Screened/Open Interval Bottom (ft): 119.38 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1036

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1041	38.67		6.57		3.23		2.6		133		26.6		120	25.6		clear no
1046	33.84		7.07		3.28		0		118		11.3		120	25.6		
1049	32.56		7.04		3.30		0		116		1.9		120	25.6		
1053	32.05		7.01		3.30		0		115		0		120	25.6		
1056	31.35		6.99		3.32		0		115		0		120	25.6		
1102	30.70		6.94		3.33		0		115		0		120	25.6		
1107	31.08		6.90		3.35		0		116		0		120	25.6		
															4L	

Stop Purge Time: 1108 | Sample Time: 1113 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW205C-BL01 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl 3 smears	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO3	250 mL Amber Glass w/H2SO4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	1	250 mL Amber Glass w/~~H2SO4~~ HCl	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/26/18 | Well ID: LVWPS-MW 206A

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: ok

Depth to Water (ft): 35.44 | Screened Interval Top (ft): 39.81 | Pump Intake Depth (ft): 50

Well Depth (ft): 60.1 | Screened/Open Interval Bottom (ft): 59.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 07:57

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
08:15	29.43		7.33		5.96		2.69		189		320		160	35.44		TURBID
08:20	28.66		7.30		5.94		2.36		180		165		160	35.44		
08:25	28.83		7.31		5.96		2.23		178		125		160	35.44		
08:30	28.66		7.30		5.94		1.99		172		102		160	35.44		NEUTRAL
08:35	28.74		7.30		5.97		1.93		167		99.5		160	35.44		
08:40	28.75		7.30		5.96		1.92		166		100		160	35.44		
															5 L	

Stop Purge Time: 08:42 | Sample Time: 09:00 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO3		250 mL Amber Glass w/H2SO4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	1	250 mL Amber Glass w/~~H3PO4~~ HCl		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/26/18 | Well ID: LVWPS-MW 206 B

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: OK

Depth to Water (ft): 36.00 | Screened Interval Top (ft): 69.78 | Pump Intake Depth (ft): 80

Well Depth (ft): 90.2 | Screened/Open Interval Bottom (ft): 89.47 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 09:40

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
09:55	31.26		7.24		5.91		2.31		172		12.1		140	36.01		NEUTRAL
10:00	30.89		7.22		5.93		1.42		167		2.6		140	36.01		
10:05	30.95		7.21		5.93		1.14		163		2.5		140	36.01		
10:10	30.98		7.23		5.93		0.96		160		2.5		140	36.02		
10:15	31.02		7.23		5.93		0.94		158		2.3		140	36.02	4L	

Stop Purge Time: 10:16 | Sample Time: 10:30 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_3PO_4~~		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 6/26/18	Well ID: LVWPS-MW 206 C
Field Sampler(s): J. AITKEN				
Transducer Removal Time:	Transducer Redeployment time:		General Well Condition: OK	
Depth to Water (ft): 34.86	Screened Interval Top (ft): 100.5		Pump Intake Depth (ft): 110	
Well Depth (ft): 120.75	Screened/Open Interval Bottom (ft): 120.25		Well Diameter (in): 2	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 1140				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
11:55	43.67		7.59		4.96		2.07		151		128		140	34.86		NEUTRAL
12:00	43.40		7.69		4.95		1.94		157		42.6		140	34.86		
12:05	43.35		7.59		4.90		1.53		152		31.7		140	34.86		
12:10	44.76		7.58		4.86		1.21		146		23.7		140	34.87		
12:15	44.94		7.58		4.85		1.13		145		19.7		140	34.87		
12:20	44.97		7.58		4.84		1.14		144		19.3		140	34.87		
															SL	

Stop Purge Time:	Sample Time: 12:45	QA/QC Sample Time(s):
	Sample ID:	QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO3		250 mL Amber Glass w/H2SO4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	1	250 mL Amber Glass ~~w/H2SO4~~ HCL		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/25/18 | Well ID: LVWPS-MW 207

Field Sampler(s): CMowbray

Transducer Removal Time: – | Transducer Redeployment time: – | General Well Condition: good

Depth to Water (ft): 27.75 | Screened Interval Top (ft): ~~87~~ 67.75 | Pump Intake Depth (ft): 78

Well Depth (ft): 88.04 | Screened/Open Interval Bottom (ft): 87.44 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1251

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1255	29.78		7.00		5.20		4.60		8		47.7		320	~~27.20~~ 27.71		
1257	30.28		6.84		5.21		3.80		33		31.5		160	27.75		clear/no
1302	31.68		6.78		5.30		4.12		47		5.0		160	27.75		
1305	31.56		6.78		5.32		4.22		51		0		160	27.78		
1308	31.54		6.81		5.32		4.35		55		0		160	27.78		
1311	31.50		6.85		5.37		4.56		59		0		160	27.78		
															4L	

Stop Purge Time: 1312 | Sample Time: 1315 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW207-BL01 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2L amber	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO3		250 mL Amber Glass w/H2SO4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	1	250 mL Amber Glass ~~w/H2PO4~~ HCl		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 6/28/10	Well ID: LVWPS-MW 208A
Field Sampler(s): CASTELLANOS				
Transducer Removal Time: NA	Transducer Redeployment time: NA		General Well Condition: Good	
Depth to Water (ft): ~~32~~ 50'	Screened Interval Top (ft): 39'		Pump Intake Depth (ft): 50'	
Well Depth (ft): 60'	Screened/Open Interval Bottom (ft): 59'		Well Diameter (in): 4"	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 7:50				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
8:00	26.07		7.35		5.746		5.95		56.6		19.9		250 mL/m	~~32~~ 48'		Clear
8:05	26.13		7.33		5.744		5.47		55.6		11.80		250 mL/m	31.45'		Clear
8:10	26.52		7.31		5.765		5.35		56.9		8.60		250 mL/m	31.95'		clear
8:15	26.31		7.30		5.766		5.13		56.4		7.49		250 mL/m	31.44'		CLEAR
8:20	26.29		7.30		5.764		5.00		55.0				250 mL/m	31.44'		clear
															~2 gal	

Stop Purge Time: 8:25	Sample Time: 8:30	QA/QC Sample Time(s): 8:45	
	Sample ID: LVWPS-MW208A-BL01	QA/QC Sample ID(s): LVWPS-MW208A-BL01-FD	

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 00 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	1	250 mL Amber Glass ~~w/H2SO4~~ HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	0	250 mL Amber Glass w/H3PO4	1	~~500 mL~~ Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/28/18 | Well ID: LVWPS-MW208B

Field Sampler(s): OSTECH Aug

Transducer Removal Time:	N/A	Transducer Redeployment time:	NA	General Well Condition:	Good
Depth to Water (ft):	32.01'	Screened Interval Top (ft):	64'	Pump Intake Depth (ft):	75'
Well Depth (ft):	85'	Screened/Open Interval Bottom (ft):	84'	Well Diameter (in):	2"
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE		GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	

Purge Start Time: 9:55

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
10:00	29.60		7.48		6.071		5.30		59.4		326		250 m/m	31.9'		Cloudy
10:05	29.00		7.43		6.158		5.27		41.2		217		250 m/m	31.85'		Cloudy
10:10	29.14		7.42		6.265		6.29		41.4		151		250 m/m	31.89'		Clear
10:15	29.05		7.41		6.303		6.52		42.1		105		250 m/m	31.85'		Clear
10:20	29.22		7.40		6.378		6.73		43.1		67		250 m/m	31.66'		clear
10:25	29.35		7.39		6.438		6.98		42.6		87.3		250 m/m	31.77		Clear
10:30	29.25		7.37		6.440		6.34		42.0		217		250 m/m	31.85		Clear
10:35	29.16		7.36		6.476		5.70		41.6		367		200 m/m	31.81		Clear
— stopped purging after, pulled pump because gw became very turbid													300			
1127	32.89		7.35		6.94		10.18		27.0		359		300	31.72		
1130	28.82		7.34		6.501		8.88		31.9		182		300	31.72		
1133	28.59		7.34		6.45		7.74		31.0		180		300	31.72		
1136	28.50		7.33		6.39		7.60		32.0		175		300	31.72		
															≈15 L	

Stop Purge Time: ~~10:15~~ 1137 | Sample Time: ~~10:50~~ 1145 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-MW208-B101 | QA/QC Sample ID(s): NA

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4 HCl
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass 3 x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/28/18 | Well ID: LVWPS-MW 209

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: OK

Depth to Water (ft): 26.87 | Screened Interval Top (ft): 71.3 | Pump Intake Depth (ft): 81

Well Depth (ft): 91.55 | Screened/Open Interval Bottom (ft): 91 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0750

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
08:10	27.48		7.13		6.12		2.55		143		90.1		150	26.87		NEUTRAL
08:15	27.48		7.09		6.11		2.02		145		33.6		150	26.87		
08:20	27.96		7.09		6.12		2.06		146		17.5		150	26.87		
08:25	28.56		7.09		6.13		1.76		146		8.0		150	26.87		
08:30	28.53		7.09		6.11		1.75		146		8.9		150	26.87		
															4 L	

Stop Purge Time: 08:31 | Sample Time: 08:50 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | Well ID: LVWPS-MW 210A

Field Sampler(s): CMowbray

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: good

Depth to Water (ft): 25.85 | Screened Interval Top (ft): 35.4 | Pump Intake Depth (ft): 45

Well Depth (ft): 55.65 | Screened/Open Interval Bottom (ft): 55.1 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 740

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
743	25.3		6.91		5.63		0.13		210		23.2		200	25.9		clear/no
747	25.08		6.87		5.57		0		202		2.2		200	25.9		
752	24.79		6.82		5.59		0		196		0		200	25.9		
755	24.73		6.79		5.60		0		194		0		200	25.9		
759	24.70		6.80		5.61		0		189		0		200	25.9		
802	24.72		6.82		5.61		0		185		0		200	25.9		
															4L	

Stop Purge Time: 803 | Sample Time: 807 | QA/QC Sample Time(s): 810

Sample ID: LVWPS-MW210A-BL01 | QA/QC Sample ID(s): LVWPS-MW210A-BL01-FD

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl (Barnaby)	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO3		250 mL Amber Glass w/H2SO4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	4&2	250 mL poly w/HNO3	1	250 mL Amber Glass ~~w/H3PO4~~ HCl		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | Well ID: LVWPS-MW 210B

Field Sampler(s): CMontroy

Transducer Removal Time:

Transducer Redeployment time:

General Well Condition: good

Depth to Water (ft): 25.48

Screened Interval Top (ft): 70.1

Pump Intake Depth (ft): 80

Well Depth (ft): 90.35

Screened/Open Interval Bottom (ft): 89.8

Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE

GW Disposal: GW-11

Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 849

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
854	35.39		7.59		0.004		9.64		102		102		100	25.55	Horiba wasn't full	
857	29.52		7.11		6.08		1.63		133		29.2		220	25.55		clear/no
901	26.48		6.96		6.25		0.83		138		5.1		220	25.55		
905	25.93		6.91		6.28		0.67		139		0.1		220	25.85		clear/no
909	25.48		6.85		6.31		0.55		141		0		220	25.55		
913	25.30		6.84		6.31		0.48		141		0		220	25.55		
918	25.27		6.87		6.32		0.32		137		0		220	25.55		
															6L	

Stop Purge Time: 919

Sample Time: 925

Sample ID: LVWPS-MW210B-BL01

QA/QC Sample Time(s):

QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl 3 Ambers	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	~~2~~ 1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | Well ID: LVWPS-MW 210C

Field Sampler(s): CMowbray

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: good

Depth to Water (ft): 25.36 | Screened Interval Top (ft): 100.3 | Pump Intake Depth (ft): 110

Well Depth (ft): 120.55 | Screened/Open Interval Bottom (ft): 120 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 958

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1001	29.73		7.03		6.26		0		134		117		200	26		
1013	28.33		6.97		6.34		0		126		210		60	26.15		cloudy/no
1016	27.99		6.95		6.45		0		123		195		80	26.15		
1020	28.80		6.93		6.42		0		120		179		80	26.15		
1024	28.00		6.92		6.48		0		118		157		80	26.15		
1027	28.08		6.92		6.47		0		117		155		80	26.15		
1031	28.48		6.91		6.46		0		115		150		80	26.15		
1034	29.0		6.89		6.51		0		113		148		80	26.15		
1037	29.09		6.91		6.45		0		111		145		80	26.15		
															4L	

Stop Purge Time: 1038 | Sample Time: 1042 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW210C-8L01 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl Amber 3	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2PO_4~~ HCl		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | Well ID: LVWPS-MW 211

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: OK

Depth to Water (ft): 26.71 | Screened Interval Top (ft): 49.69 | Pump Intake Depth (ft): 60

Well Depth (ft): 69.96 | Screened/Open Interval Bottom (ft): 69.36 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 11:15

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
11:30	29.87		7.18		5.37		3.66		159		0.5		160	26.71		NEUTRAL
11:35	29.41		7.17		5.37		2.99		159		0.0		160	26.71		
11:40	29.53		7.18		5.38		3.06		159		0.0		160	26.71		
11:45	29.84		7.19		5.37		3.04		159		0.0		160	26.71		
															4 L	

Stop Purge Time: 11:46 | Sample Time: 12:00 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H2SO4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | **Well ID: LVWPS-MW 212A**

Field Sampler(s): S. AITKEN

Transducer Removal Time:	Transducer Redeployment time:	General Well Condition: OK
Depth to Water (ft): 28.87	Screened Interval Top (ft): 34.3	Pump Intake Depth (ft): 44
Well Depth (ft): 54.55	Screened/Open Interval Bottom (ft): 54	Well Diameter (in): 2
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11	Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 09:20

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
09:35	27.27		7.44		2.76		5.71		180		42.6		140	28.87		NEUTRAL
09:40	27.04		7.38		2.76		5.22		188		20.3		140	28.87		
09:45	27.01		7.39		2.76		5.10		190		10.7		140	28.87		
09:50	27.03		7.42		2.76		4.92		191		9.9		140	28.87		
09:55	26.97		7.43		2.76		4.89		191		9.7		140	28.88		
															4 L	

Stop Purge Time: 09:56 | **Sample Time:** 10:15 | **QA/QC Sample Time(s):** 10:45

Sample ID: | **QA/QC Sample ID(s):** LVWPS-20180627-EB

Observations/Comments:

HACH Kit Sulfide: 0 mg/L **HACH Kit Ferrous Iron:** 0 mg/L

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | Well ID: LVWPS-MW 212B

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: OK

Depth to Water (ft): 28.61 | Screened Interval Top (ft): 59.8 | Pump Intake Depth (ft): 70

Well Depth (ft): 80.05 | Screened/Open Interval Bottom (ft): 79.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 07:50

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
08:00	27.72		7.57		2.36		4.71		216		300		160	28.61		NEUTRAL
08:05	27.77		7.69		2.35		4.60		192		412		160	28.62		TURBID
08:10	27.70		7.66		2.38		5.10		193		337		160	28.62		TURBID
08:15	29.36		7.64		2.40		6.63		188		138		160	28.62		NEUTRAL
08:20	29.57		7.65		2.39		6.54		186		97.0		160	28.63		
08:25	29.90		7.66		2.40		6.46		185		86.1		160	28.63		
08:30	30.03		7.66		2.39		6.41		184		70.1		160	28.63		
08:35	30.12		7.67		2.39		6.39		183		69.7		160	28.63		NEUTRAL
															5L	

Stop Purge Time: 08:36 | Sample Time: 08:50 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/28/18 | Well ID: LVWPS-MW 213

Field Sampler(s): J. AITKEN

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: ok

Depth to Water (ft): 26.85 | Screened Interval Top (ft): 39.96 | Pump Intake Depth (ft): 50

Well Depth (ft): 59.85 | Screened/Open Interval Bottom (ft): 59.65 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 09:40

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
09:55	27.38		7.37		3.78		4.47		162		105		140	26.85		NEUTRAL
10:00	27.42		7.34		3.77		4.26		165		51.4		140	26.85		
10:05	27.38		7.35		3.76		3.93		167		27.0		140	26.85		
10:10	27.19		7.35		3.76		3.78		168		22.2		140	26.85		
10:15	27.20		7.36		3.76		3.90		169		18.9		140	26.85		
10:20	27.23		7.36		3.76		3.92		169		18.3		140	26.85		

Stop Purge Time: | Sample Time: 10:40 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/28/18 | Well ID: LVWPS-MW 214

Field Sampler(s): Mowery

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: good

Depth to Water (ft): 26.76 | Screened Interval Top (ft): 34.35 | Pump Intake Depth (ft): 39

Well Depth (ft): 44.5 | Screened/Open Interval Bottom (ft): 43.95 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 744

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
752	25.25		7.25		5.44		3.04		153		3.9		160	26.76		clear/no
759	24.70		7.23		5.46		2.81		153		0.5		160	26.76		
804	24.71		7.21		5.46		2.79		153		0.2		160	26.76		
807	24.88		7.17		5.32		2.75		160		1.2		160	26.76		
810	24.97		7.19		5.47		2.68		154		1.6		160	26.76		
813	24.97		7.10		5.46		2.66		155		0.2		160	26.76		
															6L	

Stop Purge Time: 814 | Sample Time: 817 | QA/QC Sample Time(s): 830

Sample ID: LVWPS-MW214-20180628-01 | QA/QC Sample ID(s): FB LVWPS-20180628-FB

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl (3 Amber)	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_3PO_4~~ ND		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | Well ID: LVWPS-MW 215A

Field Sampler(s): CASTELLANOS

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 11.55 | Screened Interval Top (ft): 14.1 | Pump Intake Depth (ft): 24

Well Depth (ft): 34.35 | Screened/Open Interval Bottom (ft): 33.8 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 7:50

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
7:55	27.43		7.17		5.651		1.82		76.5		625		100 ml/min	11.51'		CLEAR
8:00	26.68		7.16		5.629		0.87		75.7		35.5		140 ml/min	11.56'		CLEAR
8:05	26.29		7.16		5.593		0.66		74.1		14.03		140 ml/min	11.57'		CLEAR
8:10	26.33		7.16		5.602		0.60		71.6		10.3		140 ml/min	11.59'		CLEAR
8:15	26.30		7.18		5.606		0.58		71.0		8.68		140 ml/min	11.59'		CLEAR
8:20	26.33		7.15		5.612		0.55		69.3		4.3		140 ml/min	11.59'		CLEAR
8:25															= 8L	

Stop Purge Time: 8:25 | Sample Time: 8:30 | QA/QC Sample Time(s): N/A 8:45

Sample ID: LVWPS-MW215A-BL01 | QA/QC Sample ID(s): N/A LVWPS-MW215A-BL01-MS/MSD

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H2SO4	0	500 mL poly w/HNO3	1	250 mL Amber Glass w/H2SO4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H2SO4	2	250 mL poly w/HNO3	0	250 mL Amber Glass w/H3PO4	1	500 mL Amber Glass 3x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/27/18 | Well ID: LVWPS-MW 215B

Field Sampler(s): CASTELLANOS

Transducer Removal Time: NA	Transducer Redeployment time: NA	General Well Condition: Good
Depth to Water (ft): 12.32'	Screened Interval Top (ft): 40'	Pump Intake Depth (ft): 43'
Well Depth (ft): 45.55'	Screened/Open Interval Bottom (ft): 45'	Well Diameter (in): 2"
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11	Equipment Decon. Method: Alconox/DI Rinse SOP
Purge Start Time: 9:50		

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
10:00	26.63		7.48		5.191		4.40		37.0		74.1		300ml/min	14.10'		Clear
10:05	25.67		7.48		5.068		2.16		42.0		62.7		210ml/min	15.60'		Clear
10:10	25.98		7.47		5.092		2.82		45.1		14.94		210ml/min	16.58'		Clear
10:15	26.97		7.45		5.177		2.82		47.8		62.0		300ml/min	15.36'		Clear
10:20	29.77		7.42		5.474		2.60		46.8		54.1		75ml/min	15.15'		Clear
10:25	29.56		7.40		5.510		2.58		40.9		30.2		75ml/min	15.16'		Clear
10:30	29.41		7.38		5.460		1.76		28.3		16.95		75ml/min	15.25'		Clear
															=8L	

Stop Purge Time: 10:30 | Sample Time: 10:30 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-MW215B-B001 | QA/QC Sample ID(s): NA

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	0	500 mL Plastic	0	500 mL w/H_2SO_4	0	500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	0	250 mL Amber Glass w/H_3PO_4	1	500mL Amber Glass 3 x VOA

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 6/28/18 | Well ID: LVWPS-MW 216

Field Sampler(s): CMowbray

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 7.86 | Screened Interval Top (ft): 10.03 | Pump Intake Depth (ft): 15

Well Depth (ft): 20.25 | Screened/Open Interval Bottom (ft): 19.65 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 851

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
854	25.6		7.24		5.93		0		52		>800		320	8'		brown/no
857	26.07		7.22		5.94		0		33		>800		120	7.96		
904	27.54		7.21		5.95		0		20		7800		120	7.90		brown
910	27.65		7.22		5.94		0		21		>800		120	7.90		
916	27.69		7.22		5.93		0		25		>800		120	7.90		
932	28.90		6.55		5.43		0		163		>800		120	7.90		
941	27.75		7.21		5.90		2.94		63		915		120	7.90		
947	27.77		7.24		5.91		0		59		690		120	7.90		
952	27.98		7.22		5.90		0		42		554		120	7.90		
959	28.05		7.21		5.89		0		39		463		120	7.90		
1010	28.23		7.20		5.89		0		37		345		120	7.90		
1017	28.65		7.20		5.87		0		36		340		120	7.90		
1020	28.35		7.19		5.89		0		36		335		120	7.90		
															15L	

Stop Purge Time: 1021 | Sample Time: 1026 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW216-BL01 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl (3 Arsenic)	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_3PO_4~~ HCl		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

Dampen Horiba U-10 optical sensors

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study	Task Manager: D. Grady	Task No: M19	Date: 6/26	Well ID: LVWPS-MW ~~MW~~ -4.95
Field Sampler(s): Choubray				
Transducer Removal Time: 751	Transducer Redeployment time: 844		General Well Condition: Good	
Depth to Water (ft): 26.31	Screened Interval Top (ft): 20		Pump Intake Depth (ft): 35	
Well Depth (ft): 46.75	Screened/Open Interval Bottom (ft): 50 ?		Well Diameter (in): 4	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 756				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
801	25.7		6.91		2.85		0		129		0		200	26.38		clear/no
804	25.59		6.90		2.80		0		130		0		200	26.39		
808	24.59		6.89		2.84		0		131		0		200	26.39		
813	24.21		6.88		2.85		0		131		0		200	26.39		
816	24.55		6.88		2.84		0		131		0		200	26.39		
															4.5L	

Stop Purge Time: 817 Sample Time: 823 QA/QC Sample Time(s): 900

Sample ID: LVWPS-~~MW~~MW-4.95-B101 QA/QC Sample ID(s): LVWPS-20180626-FB

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

2	3x VOA w/HCl 3 Amber	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	2	250 mL Plastic	1	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2SO_4~~ HG	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

Transect 1b Study Area
Groundwater Field Logs
November 2018 Sampling Event BL02

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Task Name: Las Vegas Wash Pilot Study	Task No: M19	Date: 11/12/18
Task Manager: D. Grady	Field Sampler(s):	Recorded by: Mike Paravini
Equipment Model/Type: Solinst Water Level Meter	*Serial Number:*	Note Locked wells transducer? tubing?

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Condition of Well and Well Seal
0805	LVWPS-MW201A	TOC	19.15	4" well, sealed well, not locked, tr and tubing
0807	LVWPS-MW201B	TOC	19.61	2", sealed, NL, Tu, Tr
0824	LVWPS-MW202	TOC	25.03	2", Sealed ~~Nott~~, Tubing
0832	LVWPS-MW203A	TOC	21.93	2", Sealed, NL, tubing
0834	LVWPS-MW203B ~~GT~~ no	TOC	22.35	4", sealed, NL, tubing all locked
0837	LVWPS-MW203C GT	TOC	41.65	2" one bolt left out, NO Tubing, NL
0913	LVWPS-MW204	TOC	26.85	2", sealed, w/ tubing
0915	LVWPS-MW204B GT	TOC	26.15	2", vented, no tubing in well, large tubing in well
0917	LVWPS-MW204C	TOC	159.56	4" vented, no tubing, has thick
0954	WMW4.9S see note	TOC	26.45	4", vault, Locked, transducer, but thicker tubing, lot of tubing
0945	LVWPS-MW205B	TOC	25.36	2", Sealed, NL, w/ tubing (205B & 205C)
0947	LVWPS-MW205C	TOC	25.64	
941	LVWPS-MW206A	TOC	35.46	
943	LVWPS-MW206B	TOC	35.9	
~~[illegible]~~ 947	LVWPS-MW206C	TOC	35.88	
850	LVWPS-MW206D	TOC	33.9	
745	LVWPS-MW206E	TOC	36.32	
1010	LVWPS-MW207	TOC	27.76 fluctuating w/ wind	good, 2", sealed, NL; w/ tubing
1115	LVWPS-MW208A GT	TOC	31.41	4" NL, No tubing
1114	LVWPS-MW208B	TOC	31.99	2" NL, w/ tubing
	LVWPS-MW209	TOC		
	LVWPS-MW209A	TOC		
	LVWPS-MW209B	TOC		
	LVWPS-MW209C	TOC		
	LVWPS-MW210A	TOC		
	LVWPS-MW210B	TOC		
	LVWPS-MW210C	TOC		
	LVWPS-MW210D	TOC		
	LVWPS-MW210E	TOC		
	LVWPS-MW211	TOC		
	LVWPS-MW212A	TOC		
	LVWPS-MW212B	TOC		
	LVWPS-MW212C	TOC		
	LVWPS-MW212D	TOC		
	LVWPS-MW213	TOC		
	LVWPS-MW214	TOC		

BMP = Below Measuring Point   TOC = Top of Casing (Well Riser)

GT = GET Tubing   NL = Not Locked

WMW4.9S vault doesn't actually lock. Lock only holds bar in place. Bolts are stripped and don't secure the well, missing one bolt

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Task Name: Las Vegas Wash Pilot Study | Task No: M19 | Date: 11/12/18

Task Manager: D. Grady | Field Sampler(s): | Recorded by: Mike Pavarini

Equipment Model/Type: Solinst Water Level Meter | *Serial Number:*

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Total Depth (ft BMP)	Condition of Well and Well Seal
	LVWPS-MW215A	TOC			
	LVWPS-MW215B	TOC			
	LVWPS-MW216	TOC			
0928	LVWPS-MW217A	TOC	36.36		} new, sealed, NL no tubing
0929	LVWPS-MW217B	TOC	35.99		
0931	LVWPS-MW217C	TOC	35.76		
1018	LVWPS-MW218A	TOC	26.21		} new, sealed, NL, no tubing 218C tightly sealed
1020	LVWPS-MW218B	TOC	26.32		
1021	LVWPS-MW218C	TOC	25.71		
828 X	LVWPS-MW219A	TOC	27.14		
1045 X	LVWPS-MW219B	TOC	28.48		
1230 X	LVWPS-MW219C	TOC	28.37		
1036	LVWPS-MW220A	TOC	27.05		} new, sealed, NL, no tubing
1038	LVWPS-MW220B	TOC	27.37		
1106	LVWPS-MW221A	TOC	~~30.07~~ TOP 29.89		} new -- --
1105	LVWPS-MW221B	TOC	30.06		
	LVWPS-MW222A	TOC			
	LVWPS-MW222B	TOC			
	LVWPS-MW222C	TOC			
1045	LVWPS-MW223A	TOC	29.98		} new, sealed, NL, no tubing
1047	LVWPS-MW223B	TOC	30.11		
1048	LVWPS-MW223C	TOC	30.07		
0816	NERT5.11S1	TOC	20.91	44.80	not locked, sealed transducer? no tubing
0900	NERT4.93S	TOC	27.62	54.20	not locked, sealed transducer?, no tubing
1055	NERT4.71S1	TOC	28.90	46.80	not locked, sealed transducer, no tubing
	NERT 4.51S	TOC			
		TOC			
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		TOC			
		TOC			
		TOC			

BMP = Below Measuring Point | TOC = Top of Casing (Well R

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Task Name: Las Vegas Wash Pilot Study | Task No: M19 | Date: 11/12/18

Task Manager: D. Grady | Field Sampler(s): | Recorded by: mike Pavarini

Equipment Model/Type: Solinst Water Level Meter | *Serial Number:*

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Total Depth (ft BMP)	Condition of Well and Well Seal
	LVWPS-MW224A	TOC			
	LVWPS-MW224B	TOC			
	LVWPS-MW224C	TOC			
	MW-13	TOC			
	LVWPS-MW225A	TOC			
	LVWPS-MW225B	TOC			
0848	LVWPS-MW226A	TOC	37.54		2" NL, new protubing
0852	LVWPS-MW226B	TOC	86.39		4" NL, new protubing
	MW-02	TOC			
	MW-04	TOC			
	MW-05	TOC			
	MW-06	TOC			
	MW-10	TOC			
	MW-11	TOC			
	MW-12	TOC			
	MW-25	TOC			
	MW-18	TOC			
	MW-20	TOC			
		TOC			
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BMP = Below Measuring Point

TOC = Top of Casing (We

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Task Name: Las Vegas Wash Pilot Study	Task No: M19	Date: 11/12/18
Task Manager: D. Grady	Field Sampler(s): C. Larkins	Recorded by: CJL
Equipment Model/Type: Solinst Water Level Meter	*Serial Number:*	

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Condition of Well and Well Seal
	LVWPS-MW201A	TOC		
	LVWPS-MW201B	TOC		
	LVWPS-MW202	TOC		
	LVWPS-MW203A	TOC		
	LVWPS-MW203B	TOC		
	LVWPS-MW203C	TOC		
	LVWPS-MW204	TOC		
	LVWPS-MW204B	TOC		
	LVWPS-MW204C	TOC		
	WMW4 9S	TOC		
	LVWPS-MW205B	TOC		
	LVWPS-MW205C	TOC		
	LVWPS-MW206A	TOC		
	LVWPS-MW206B	TOC		
	LVWPS-MW206C	TOC		
	LVWPS-MW206D	TOC		
	LVWPS-MW206E	TOC		
	LVWPS-MW207	TOC		
	LVWPS-MW208A	TOC		
	LVWPS-MW208B	TOC		
10.32	LVWPS-MW209	TOC	25.86	Good; dedicated tubing
10.27	LVWPS-MW209A	TOC	27.39	Good
10:33	LVWPS-MW209B	TOC	27.52	Good
10:35	LVWPS-MW209C	TOC	27.42	Good
10:10	LVWPS-MW210A	TOC	25.80	Good
10:11	LVWPS-MW210B	TOC	25.42	Good
10:12	LVWPS-MW210C	TOC	25.30	Good
10:13	LVWPS-MW210D	TOC	25.01	Good
10:14	LVWPS-MW210E	TOC	25.18	Good
10 44	LVWPS-MW211	TOC	26.69	Good
11 06	LVWPS-MW212A	TOC	27.33	Good; dedicated tube
11 09	LVWPS-MW212B	TOC	28.61	; dedtube ~5' down
11:11	LVWPS-MW212C	TOC	29.09	↓
11:12	LVWPS-MW212D	TOC	28.74	↓
10:52	LVWPS-MW213	TOC	26.81	Good; dedicated tubing
954	LVWPS-MW214	TOC	26.68	Good; dedicated tubing

BMP = Below Measuring Point

TOC = Top of Casing (Well Riser)

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Page ___ of ___

Task Name: Las Vegas Wash Pilot Study | Task No: M19 | Date: 11/12/18

Task Manager: D. Grady | Field Sampler(s): C. Larkins | Recorded by: CJL

Equipment Model/Type: Solinst Water Level Meter | *Serial Number:*

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Total Depth (ft BMP)	Condition of Well and Well Seal
11:51	LVWPS-MW215A	TOC	11.47		Good; ant infested, ded tube.
11:53	LVWPS-MW215B	TOC	12.15		Good; ded Tube
9 24	LVWPS-MW216	TOC	7.84		Bolts Rusted, Good
	LVWPS-MW217A	TOC			
	LVWPS-MW217B	TOC			
	LVWPS-MW217C	TOC			
	LVWPS-MW218A	TOC			
	LVWPS-MW218B	TOC			
	LVWPS-MW218C	TOC			
	LVWPS-MW219A	TOC			
	LVWPS-MW219B	TOC			
	LVWPS-MW219C	TOC			
	LVWPS-MW220A	TOC			
	LVWPS-MW220B	TOC			
	LVWPS-MW221A	TOC			
	LVWPS-MW221B	TOC			
11:32	LVWPS-MW222A	TOC	30.80		Good
11:33	LVWPS-MW222B	TOC	30.39		↓
11:35	LVWPS-MW222C	TOC	27.83		
	LVWPS-MW223A	TOC			
	LVWPS-MW223B	TOC			
	LVWPS-MW223C	TOC			
	NERT5.11S1	TOC			
	NERT4.93S	TOC			
	NERT4.71S1	TOC			
9:36	NERT 4.51S	TOC	26.21	49.94	Good
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BMP = Below Measuring Point | TOC = Top of Casing (Well F

TETRA TECH

WELL WATER LEVEL MEASUREMENT LOG

Page ___ of ___

Task Name: Las Vegas Wash Pilot Study | Task No: M19 | Date: 11/12/18

Task Manager: D. Grady | Field Sampler(s): C. Larkins | Recorded by: CJL

Equipment Model/Type: Solinst Water Level Meter | *Serial Number:*

Time	Well ID	Measuring Point	Depth to Static Water Level (ft BMP)	Total Depth (ft BMP)	Condition of Well and Well Seal
8:33	LVWPS-MW224A	TOC	34.67		Good
8:35	LVWPS-MW224B	TOC	34.30		Good
8:37	LVWPS-MW224C	TOC	34.85		Good
845	MW-13	TOC	35.11	49.40	Good; Trans, dummy locked
851	LVWPS-MW225A	TOC	33.51		
853	LVWPS-MW225B	TOC	33.01		
	LVWPS-MW226A	TOC			
	LVWPS-MW226B	TOC			
8:26	MW-02	TOC	39.54	44.76	Plant Gobs on sounder; Good
~~815~~ 15:17	MW-04	TOC	21.99	40.91	locked landfill key, lid Hinge broken
1540	MW-05	TOC	42.95	66.44	locked, hidden on slope
1602	MW-06	TOC	31.69	49.70	locked-LF key - Good
15:48	MW-10	TOC	35.84	56.67	locked-LF key
1530	MW-11	TOC	47.35	66.05	locked; Hinge broken, Orange algae
1512	MW-12	TOC	51.08	61.71	locked; LF key, good
~~0900~~ ~~0818~~	MW-25	TOC	39.35	54.45	locked landfill key, good ~~New Master Pad~~
~~8905~~ ~~0900~~	MW-18	TOC	67.81	10747	locked landfill key-good
0806	MW-20	TOC	53.4	67.43	locked but lid broken, Trans dry
		TOC			
		TOC			
		TOC			
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BMP = Below Measuring Point | TOC = Top of Casing (We

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: Silver State | Task Manager: D. Grady

Type: YSI 558 MPS + Oakton T-100 | Sampler: C. Perkins | Serial Number: YSI 115562-4m ; Oakton #664117 ; Horiba P1MTOYFE

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
11/12/18	1745	20.25	3.99	6.96	9.86	134.0	0.820	90.0	98.2 (817)	19.80	4.00	7.00	9.98	235.0	1.001	102.1	800 100 20 0.02
11/13/18	0750	10.01	3.95	7.04 ~~3.59~~							4.00	7.07					
11/13/18	0829					253.0	1.157	19.34						250.5	0.716	11.28	
11/14/18	0600	7.73	4.00	7.18	9.97	256.3	0.718	7.95	826	6.35	4.00	7.07	10.20	254.0	0.649	13.15	800
11/14/18	0748	7.24	3.83	7.19							4.00	7.08					
11/15/18	06:30	5.24	4.55	6.64	11.29	291.5	0.609	14.70 ~~7.81~~	19.40	3.98	3.99	7.10	10.36	257.0	0.617	13.39	20.0
11/15/18	0750		3.88	~~6.~~ 7.21 5.67 TO							4.00	7.00					
11/15/18	0845	12.45	4.59	7.04		193.3					4.00	7.00		250.5			
11/~~16~~ 15/18 cal	1100	16.07	3.82	7.83		232					4.00	7.00		232			
11/~~19~~ 16/18 cal	0640	5.77	3.52	6.90	—	264			20.4	6.02	4.00	7.00	—	257			20.0

Horiba?

25.4

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: ~~EQUIPCO~~ for | Task Manager: D. Grady

Type: YSI PRODSS for 1 | Sampler: ~~M. PAYNE~~ and J. Burkes | Serial Number:

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
11/13/18	0555	10.8	4.0	7.1	9.9	268.3	1.120	99.7	0.1	11.0	4.0	7.0	10.0	251.8	1.118	100	0.0
11/13/18	1500	15.5	4.0	7.0	9.9	235.6	1.112	99.6	0.0	15.5	4.0	7.0	10.0	234.8	1.080	100	0.0
11/14/18	1550	18.3	4.0	7.0	9.9	234.3	1.110	99.7	0.1	18.3	4.0	7.0	10.0	234.8	1.050	100	0.0
11/15/18	1600	19.2	4.0	7.0	9.9	234.2	1.030	98.7	0.1	19.2	4.0	7.0	10.0	234.2	1.010	100	0.0

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task No.: M19 | Rental from: Silverback | Task Manager: D. Grady

Type: YSI 556 | Sampler: CMowery | Serial Number: 11F-101026

		Pre-Calibration								Post-Calibration							
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Turbidity (NTU)
11/12/18	1800	25.2	3.76	6.88	10.22	117.8	9.40	98.1	-	25.2	4.0	7.0	10.0	235.1	1.0	99.9	-
11/14/18	545	8.74	3.76	7.01	10.06	262.9	.709	97.6	-	8.74	3.99	7.01	10.0	250	1.0	98.8	-
11/16/18	718	10.68	4.31	6.75	10.03	242.7	.723	1.03		10.68	3.99	7.0	10.0	250.1	1.0	1.01	

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 1/3/18 | Well ID: 201A

Field Sampler(s): JMaury

Transducer Removal Time: 1513 | Transducer Redeployment time: 1548 | General Well Condition: Good

Depth to Water (ft): 19.08 | Screened Interval Top (ft): | Pump Intake Depth (ft): 10' off Bottom

Well Depth (ft): | Screened/Open Interval Bottom (ft): | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1516

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1522	23.12		6.94		3.764		0.34		117.6		—		300	19.1		cloudy/no
1525	23.09		6.94		3.781		0.36		117.8		44.5		240	19.1		Br/no
1528	22.99		6.93		3.768		0.36		117.6		19.7		240	19.1		white cloudy
1532	23.00		6.93		3.765		0.34		117.2		13.88		240	19.1		clear/no
1535	23.02		6.93		3.767		0.30		116.9		8.25		240	19.1		
1538	22.98		6.93		3.766		0.29		116.7		5.63		240	19.1		
1542	22.94		6.93		3.764		0.27		116.6		2.31		240	19.1		
															72	

Stop Purge Time: 1544 | Sample Time: 1547 | QA/QC Sample Time(s): 1547

Sample ID: LVWPS-mw201A-BL02 | QA/QC Sample ID(s): LVWPS-mw201A-BL02-FD

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: 2018

Field Sampler(s): CMowbray

Transducer Removal Time: 1427 | Transducer Redeployment time: 1505 | General Well Condition: good

Depth to Water (ft): 19.65 | Screened Interval Top (ft): 59.25 | Pump Intake Depth (ft): 70

Well Depth (ft): 80.05 | Screened/Open Interval Bottom (ft): 79.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1432

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1435	22.12		8.34		9.818		2.25		118.0		186		280	20.4		Br/mire
1438	22.20		8.14		10.11		1.34		118.1		162		180	20.55		
1443	21.50		8.12		9.812		1.11		117.2		128		120	20.66		
1446	21.49		8.07		10.02		1.00		117.6		115		60	20.6		
1449	21.04		8.02		10.41		1.00		117.8		101		100	20.62		
1452	21.36		8.02		10.64		0.99		117.6		132		100	20.72		
1455	21.54		7.94		11.22		0.81		118.2				100	20.82		
															2L	

125 pump 10ml/L2

125 + 125 + (80' x 10) = 1050 need to purge

Stop Purge Time: 1457 | Sample Time: 1800 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW2018-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW202

Field Sampler(s): Mike Parrini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, sealed, not locked, w/ tubing

Depth to Water (ft): 25.02 | Screened Interval Top (ft): 41.9 | Pump Intake Depth (ft): 52

Well Depth (ft): 62.15 | Screened/Open Interval Bottom (ft): 61.6 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1653

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1655	20.1		7.25		3.701		2.00		-94.0		4.9		300	24.90	0.5	clear no odor
1700	21.8		7.23		3.495		0.77		-97.9		3.1		300	24.91	2.0	
1705	21.9		7.23		3.490		0.74		-98.6		3.0		300	24.92	3.5	
1710	21.9		7.23		3.484		0.69		-99.5		3.0		300	24.92	5.0	
1715	21.9		7.23		3.486		0.67		-99.4		2.9		300	24.92	6.5	
1720	21.9	0%	7.23	0%	3.487	<1%	0.64	5%	-99.2	±3	3.2	<10	300	24.92	8.0	no odor clear

Stop Purge Time: 1723 | Sample Time: 1720 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW202-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L N/A

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 8/15/18 | Well ID: LVWPS-MW203A

Field Sampler(s): Mike Lavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, sealed, dedicated tubing

Depth to Water (ft): 21.94 | Screened Interval Top (ft): ~~41.9~~ MP 34.69 | Pump Intake Depth (ft): ~~52~~ MP 45'

Well Depth (ft): ~~62.15~~ MP 54.98 | Screened/Open Interval Bottom (ft): ~~51.6~~ MP 54.38 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1509 started pump

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1515	24.9		7.40		2297		1.18		-102.5		82.4		300	21.94	1.5	slightly cloudy grey
1520	25.2		7.38		2.165		0.68		-103.6		18.7		300	21.94	3	
1525	25.2		7.38		2.163		0.59		-105.1		9.8		300	21.94	4.5	no odor
1530	25.3		7.38		2.164		0.57		-105.4		8.8		300	21.94	6	
1535	25.3	<1%	7.38	0%	2.163	<1%	0.55	>7%	-105.3	±0.2	7.3	<10	300	21.94	7.5	clear no odor

Stop Purge Time: 1537 | Sample Time: 1535 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW203A-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW203B

Field Sampler(s): Mike Paravarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, sealed, dedicated tubing

Depth to Water (ft): 22.00' | Screened Interval Top (ft): 75.2 | Pump Intake Depth (ft): 85'

Well Depth (ft): 95.3 | Screened/Open Interval Bottom (ft): 94.9 | Well Diameter (in): 4"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1405 started pump/ 1408 water to surface

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1410	24.3		7.41		8.934		1.61		-100.5		18.1		250	22.59	1.25	clear no odor
1415	24.4		7.32		8.557		1.06		-101.3		10.7		250	23.01	2.5	
1420	24.4		7.32		8.427		0.93		-101.9		7.2		180	23.31	3.4	
1425	24.4		7.32		8.385		0.87		-102.6		6.3		180	23.55	4.3	
1430	24.5	<1%	7.32	0%	8.347	1%	0.86	8%	-102.7 ± 1.5		5.8	<102.7	180	23.79	5.2	clear no odor

Stop Purge Time: 1434 | **Sample Time:** 1430 | **QA/QC Sample Time(s):** None

Sample ID: LVWPS-MW203B-BL02 | **QA/QC Sample ID(s):** None

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: LVWPS-MW203C

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, vented, w dedicated tubing in well

Depth to Water (ft): 40.86 | Screened Interval Top (ft): 94.9 | Pump Intake Depth (ft): 110'

Well Depth (ft): 120.4 | Screened/Open Interval Bottom (ft): 119.8 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1233 started pump 1235 water to surface DTW = 38.87 after pump install

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1240	24.5		7.76		34.79		1.13		-96.7		210.9		180	40.41	1.2	cloudy light brown
1245	24.1		7.75		35.15		0.86		-98.4		220.4		110	42.04	1.75	yellow
1250	23.9		7.76		34.77		0.87		-99.4		242.1		60	42.65	2.0	no odor
1255	23.7		7.78		34.93		0.89		-100		238.7		60	43.30	2.3	
1300	23.5		7.79		34.29		0.93		-100.7		245.4		60	43.70	2.6	
1305	23.5		7.81		34.01		0.90		-101.2		249.3		60	44.20	2.9	
1310	23.4	<1%	7.80	<1%	34.21	<1%	0.89	4%	-101.3	±0.3	247.3	2%	60	44.80	3.2	slightly grey cloudy

Stop Purge Time: 1314 | Sample Time: 1310 | QA/QC Sample Time(s): —

Sample ID: ~~MW~~ LVWPS-MW203C-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW204

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 26.68 | Screened Interval Top (ft): 46.6 | Pump Intake Depth (ft): 58

Well Depth (ft): 69.89 | Screened/Open Interval Bottom (ft): 69.29 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1513

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1516	22.4		7.22		4.619		2.85		206.9		33.1		300	26.68		clear/none
1519	22.5		7.19		4.676		2.18		212.0		23.5		"	"		"
1522	22.5		7.19		4.677		2.05		214.1		9.8		"	"		"
1525	22.5		7.18		4.676		2.02		214.9		8.7		"	"		"
1528	22.5		7.18		4.676		2.00		215.3		6.2		"	"		"

Stop Purge Time: 1529 | **Sample Time:** 1530 | **QA/QC Sample Time(s):** —

Sample ID: LVWPS-MW204-BL02 | **QA/QC Sample ID(s):** —

Observations/Comments:

HACH Kit Sulfide: —mg/L HACH Kit Ferrous Iron: —mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/$H2SO_4$		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: LVWPS-MW204B

Field Sampler(s): Jesse Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 26.16 | Screened Interval Top (ft): 101.5 | Pump Intake Depth (ft): 111.4

Well Depth (ft): 121.7 | Screened/Open Interval Bottom (ft): 121.2 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 10.12

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1018	22.3		7.68		6.018		2.87		136.5		300.2		180	26.60		clear/none
1021	22.5		7.66		6.132		2.85		147.6		384.2		120	26.80		"
1024	21.4		7.66		6.160		2.85		156.6		570.8		"	26.60		"
1027	21.9		7.67		6.166		2.80		161.9		568.2		"	"		"
1030	21.9		7.68		6.166		2.79		163.2		559.8		"	"		"

Stop Purge Time: 1031 | Sample Time: 1035 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW204B-13L02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: GW Monitoring	Task Manager: Jesse Bunkers	Task No: ~~R02~~ M19	Date: 11/16/18	Well ID: MW204C

Field Sampler(s): CMcabey

Transducer Removal Time:	Transducer Redeployment Time:	General Well Condition: good
Depth to Water (ft): 153.7	Screened Interval Top (ft): 150.5	Pump Intake Depth (ft): — Bay
Well Depth (ft): 170.6	Screened/Open Interval Bottom (ft): 170.	Well Diameter (in): 4
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11	Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: ~~1012~~ 1022

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1025	22.49		9.35		25.83		5.08		131.1		51.2			~~8~~	3L	
							1028 stopped purging recharged ~~[illegible]~~ Pu out of road ~~[illegible]~~									
Start purging 1127																
1136	21.95		9.44		25.59		5.15		118.1		74.6			156.5	9L	
1143	22.62		9.30		25.92		5.76		99.6		230			158.4	14.5L	
1207	23.31		9.10		27.11		4.37		90.3		519			161.8	25L	
1233	23.5		9.09		35.622		4.17		109.3		180.9			165.6	37	
1257	23.4		9.09		35.658		4.03		110.1		169.0			170.5	53	

Stop Purge Time: 1258	Sample Time:	QA/QC Sample Time(s):
	Sample ID:	QA/QC Sample ID(s):

Observations/Comments: 12/3/18 GROUNDWATER SAMPLE COLLECTED UPON RECHARGE on ~~12/4/18 To 64.73~~ 12/3/18 TO 143.03 ft bTOC @ TM5 ; SAMPLE TIME 1130 1100 — SAMPLED w/ BAILER BY J. BUNKERS ADDITIONAL FIELD PARAMETERS NOT MEASURED DUE TO VOLUME CONSTRAINTS

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic	500 mL Plastic		500 mL w/H_2SO_4	500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4
	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4		250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW205B

Field Sampler(s):

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 25.23 | Screened Interval Top (ft): ~~64.29~~ 64.9 (Edit 1/14/19) | Pump Intake Depth (ft): 75

Well Depth (ft): 85.19 | Screened/Open Interval Bottom (ft): 84.59 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 12:50

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
12 55	23.06		7.29		2.629		1.26		64.1		4.65		270	24.09	1.35	
12 58	22.94		7.27		2.570		0.76		58.4		2.57		↓	23.20	2.16	
13 01	22.80		7.26		2.546		0.58		52.7		2.43		↓	22.64	2.97	
13 04	22.82		7.26		2.535		0.46		47.8		2.30		↓	↓	3.78	
13 07	22.83		7.26		2.527		0.46		44.5		1.74		↓	↓	4.59	
13 10	22.85		7.26		2.524		0.46		42.1		1.74		↓	↓	5.40	

Stop Purge Time: 13 12 | Sample Time: ~~13:15~~ 13:10 EB 1/2/19 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-MW205B-BL02 | QA/QC Sample ID(s): NA

Observations/Comments: Dtw drops when pumping is stopped; variable and apparently rising while pumping - NMR being conducted on near by well (possibly causing false reading)

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW205C

Field Sampler(s): C. Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 25.45 | Screened Interval Top (ft): 99.69 | Pump Intake Depth (ft): 110

Well Depth (ft): 119.98 | Screened/Open Interval Bottom (ft): 119.38 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1512

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1517	23.06		7.39		2.22		2.10		90.5		70.2		150	25.41	0.75	white-clear
1522	23.11		7.37		2.177		1.42		83.9		67.6			25.41	1.2	" "
1528	23.11		7.36		2.164		1.14		80.8		43.3			25.41	1.65	Clear
1528	23.06		7.36		2.154		0.97		77.8		34.4				2.1	
1531	23.00		7.36		2.150		0.95		76.0		27.9				2.55	
1536	23.06		7.36		2.144		0.88		72.7		20.6				3.3	
1539	23.03		7.36		2.144		0.89		71.7		17.99				3.75	
1542	23.04		7.36		2.144		0.85		70.2		15.12				4.2	
1547	22.81		7.35		2.133		0.87		67.6		11.30				4.95	
1552	22.58		7.36		2.125		0.78		64.4		11.21				5.7	
1555	22.56		7.36		2.123		0.79		63.1		12.18				6.15	

Stop Purge Time: 16:00 | Sample Time: 16:02 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-MW205C-BL22 | QA/QC Sample ID(s): NA

Observations/Comments:

HACH Kit Sulfide: N/ mg/L HACH Kit Ferrous Iron: N/ mg/L

Bottle Set Summary

3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA 1		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: 206A

Field Sampler(s): Chowray

Transducer Removal Time: 1449 | Transducer Redeployment time: 1601 | General Well Condition: good

Depth to Water (ft): [redacted] 35.46 | Screened Interval Top (ft): 39.81 | Pump Intake Depth (ft): 50

Well Depth (ft): 60.1 | Screened/Open Interval Bottom (ft): 59.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1455

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1502	21.61		6.92		5.083		2.60		-26.3		370		320	35.5		
1506	21.80		6.95		5.125		2.29		-26.5		653		240	35.5		
1509	21.66		6.91		5.101		2.23		-26.8		739		240	35.5		
1512	21.40		6.91		5.077		2.37		-26.7		624		240	35.5		Br/none
1515	21.49		6.91		5.090		2.21		-26.7		531		240	35.5		
1520	21.63		6.93		5.103		2.31		-26.6		525		240	35.5		
1525	21.66		6.91		5.111		2.19		-26.5		408		240	35.5		
1528	21.59		6.90		5.093		2.16		-26.8		630		240	35.5		
1532	22.09		6.90		5.127		2.12		-26.8		374		240	35.5		
1535	22.18		6.89		5.156		2.08		-26.9		145		300	35.5		white cloudy
1540	22.17		6.89		5.161		2.02		-26.9		69.6		300	35.5		
1545	22.18		6.89		5.159		2.08		-26.8		44.8		300	35.5		clear/no
1550	22.17		6.89		5.159		2.06		-26.7		48.2		300	35.5		
1555	22.19		6.89		5.164		2.08		-26.6		42.7		300	35.5	12L	

Stop Purge Time: 1556 | Sample Time: 1600 | QA/QC Sample Time(s): 1600

Sample ID: LVWPS-MW206A-RL02 | QA/QC Sample ID(s): LVWPS-MW206A-RL02-FD

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: 2068

Field Sampler(s): CMowday

Transducer Removal Time: 1600 | Transducer Redeployment time: 1653 | General Well Condition: good

Depth to Water (ft): 35.9 | Screened Interval Top (ft): 69.78 | Pump Intake Depth (ft): 80

Well Depth (ft): 90.2 | Screened/Open Interval Bottom (ft): 89.47 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1612

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1616	20.84		6.85		3.948		1.57		-53.6		61.2		200	35.9		
1624	20.86		6.88		4.616		1.28		-36.7		29.1		200	35.9		
1629	20.84		6.86		4.647		0.89		-33.9		9.03		200	35.9		
1633	20.86		6.86		4.659		0.83		-33.0		10.89		200	35.9		clear/none
1636	20.84		6.86		4.650		0.80		-31.6		10.2		200	35.9		
1639	20.82		6.86		4.645		0.82		-31.4		9.89		200	35.9	6L	

Stop Purge Time: 1640 | Sample Time: 1643 | QA/QC Sample Time(s): [redacted] —

Sample ID: LVWPSMW2068-B102 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: 206[illegible]C

Field Sampler(s): CMowery

Transducer Removal Time: 1257 | Transducer Redeployment time: 1435 | General Well Condition: Good

Depth to Water (ft): 35.[illegible]88 | Screened Interval Top (ft): [illegible]100.5 | Pump Intake Depth (ft): [illegible]110

Well Depth (ft): [illegible]120.75 | Screened/Open Interval Bottom (ft): [illegible]120.25 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1305

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1321	22.43		7.24		4.447		1.95		-40.0		422		220	36.0		br / none
1326	22.50		7.23		4.428		1.94		-36.8		191		220	36.0		
1331	22.59		7.23		4.429		1.90		-34.4		152		220	36.0		
1336	22.70		7.20		4.427		1.93		-33.0		97.5		220	36.0		
1341	22.65		7.17		4.408		2.48		-31.7		83.9		220	36.0		
1345	22.50		7.17		4.404		2.57		-30.8		71.9		220	36.0		
1353	22.24		7.09		4.409		3.22		-28.7		102		220	36.0		
1358	22.34		6.99		4.437		2.97		-28.8		62.3		220	36.0		
1401	22.48		6.98		4.466		2.75		-28.5		43.2		220	36.0		
1404	22.52		6.95		4.521		2.70		-28.3		37.3		220	36.0		
1407	22.56		6.97		4.535		2.68		-28.4		35.7		220	36.0		
1410	22.50		7.01		4.559		2.65		-28.2		33.0		220	36.0	14.5L	clear/no

Stop Purge Time: 1411 | Sample Time: 1413 | QA/QC Sample Time(s):

Sample ID: LVWPS-mw206C-B20221 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

	3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
	125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

Page ___ of ___

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: 2060

Field Sampler(s): cMoutry

Transducer Removal Time:

Transducer Redeployment time:

Depth to Water (ft): 33.9 @ 850

Well Depth (ft): 145.5

Screened Interval Top (ft): 125

Screened/Open Interval Bottom (ft): 145

General Well Condition: good

Pump Intake Depth (ft): 135

Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE

GW Disposal: GW-11

Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 900

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
906	18.77		7.55		4.852		2.28		-104.5		1728					
913	19.15		7.47		4.817		1.04		-144.4		911		90	35.45		
918	19.20		7.48		4.815		.80		-148.9		822		90	35.55		rotten egg
923	19.10		7.48		4.796		.70		-152.5		723		90	35.55		
932	18.84		7.49		4.775		0.65		-155.5		377		90	35.55		
937	18.67		7.49		4.776		.61		-156.9		350		90	35.55		
944	18.33		7.49		4.727		.61		-156.5		320		90	35.55		
948	18.55		7.49		4.742		.62		-153.1		253		90	35.55		
951	18.58		7.49		4.753		.60		-152.7		241		90	35.55		
954	18.56		7.48		4.748		.56		-151.1		238		90	35.55	6 L	cloudy/white

Stop Purge Time: 955

Sample Time: 956

Sample ID:

QA/QC Sample Time(s):

QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: _0_ mg/L HACH Kit Ferrous Iron: _.5_ mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: [redacted] 206E

Field Sampler(s):

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 36.32 745 | Screened Interval Top (ft): 195 S [redacted] | Pump Intake Depth (ft): [redacted] 200

Well Depth (ft): [redacted] 205.6 | Screened/Open Interval Bottom (ft): [redacted] [redacted] 205 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time:

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				

pump not strong enough

Stop Purge Time: | Sample Time: | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/16/18 | Well ID: LVWPS-MW206E

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): ~~36.34~~ 36.87 | Screened Interval Top (ft): 195.5 | Pump Intake Depth (ft): 200.3

Well Depth (ft): 205.6 | Screened/Open Interval Bottom (ft): 205 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0953

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0958	21.8		8.27		13.037		3.04		-93.2		9.0		150	36.20		clear/none
1001	22.1		7.85		14.695		1.67		-90.7		9.9		"	36.32		"
1004	22.6		7.66		15.370		1.19		-86.1		9.8		"	36.36		"
1007	22.6		7.63		15.546		0.86		-92.5		12.0		"	36.46		"
1010	22.6		7.63		15.531		0.78		-95.1		12.9		"	36.56		"
1013	22.6		7.63		15.546		0.72		-97.1		12.2		"	36.60		"

Stop Purge Time: 1014 | Sample Time: 1020 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW206E-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

NOTE: SAMPLED W/ NITROGEN TANK

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | **Well ID: 207**

Field Sampler(s): CMowbray

Transducer Removal Time: — | Transducer Redeployment time: | General Well Condition:

Depth to Water (ft): 27.55 | Screened Interval Top (ft): 67.75 | Pump Intake Depth (ft): 78

Well Depth (ft): 88.04 | Screened/Open Interval Bottom (ft): 87.44 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1645

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1650	19.75		6.92		4.102		2.60		123.3		7.96		200	27.55		clear/no
1654	20.77		6.91		4.195		2.36		122.6		4.57		200	27.55		
1700	20.65		6.91		4.187		2.15		121.4		5.27		200	27.55		
1703	20.54		6.91		4.183		2.12		121.1		3.57		200	27.55		
1706	20.47		6.90		4.178		2.02		121.0		1.66		200	27.55		
															5L	

Stop Purge Time: 1708 | **Sample Time:** 1710 | **QA/QC Sample Time(s):** 1710

Sample ID: LVWPS-207-BL02 | **QA/QC Sample ID(s):** LVWPS-207-BL02-FD

Observations/Comments:

HACH Kit Sulfide: _____mg/L **HACH Kit Ferrous Iron:** _____mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2S0_4
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW208A

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 31.25 | Screened Interval Top (ft): 39.86 | Pump Intake Depth (ft): 50

Well Depth (ft): 60.14 | Screened/Open Interval Bottom (ft): 59.54 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1353

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1357	22.0		7.29		5.244		6.17		171.4		21.8		250	31.25		clear/none
1400	22.6		7.27		5.542		5.81		177.5		23.4		"	"		"
1403	22.5		7.27		5.546		5.65		181.2		22.6		"	"		"
1406	22.5		7.27		5.551		5.63		182.7		21.5		"	"		"

Stop Purge Time: 1407 | Sample Time: 1408 | QA/QC Sample Time(s): —

Sample ID: | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: — mg/L HACH Kit Ferrous Iron: — mg/L

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW208B

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: —

Depth to Water (ft): 31.82 | Screened Interval Top (ft): 64.84

Well Depth (ft): 85.26 | Screened/Open Interval Bottom (ft): 84.53

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11

Purge Start Time: 1422

General Well Condition: Good

Pump Intake Depth (ft): 75

Well Diameter (in): 2

Equipment Decon. Method: Alconox/DI Rinse SOP

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1426	22.3		7.39		5.334		5.86		177.2		130.2		270	31.82		clear/none
1429	22.6		7.39		5.379		5.89		180.8		67.3		"	"		"
1432	22.5		7.38		5.478		5.75		185.2		43.4		"	"		"
1435	22.6		7.38		5.508		5.67		187.8		20.0		"	"		"
1438	22.5		7.38		5.530		5.66		190.0		20.2		"	"		"
1441	22.5		7.38		5.538		5.66		190.8		19.8		"	"		"

Stop Purge Time: 1442 | Sample Time: 1445 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW~~04~~20813-13L02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: — mg/L HACH Kit Ferrous Iron: — mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW209

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, sealed, inner cap not locked has tubing

Depth to Water (ft): 26.87 | Screened Interval Top (ft): 71.3 | Pump Intake Depth (ft): 81'

Well Depth (ft): 91.55 | Screened/Open Interval Bottom (ft): 91 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1517

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1520	22.1		7.18		5.931		3.27		-85.9		10.0		300	26.89	1.0	clear no odor
1525	22.2		7.15		5.936		2.93		-85.5		5.5		300	26.88	2.5	
1530	22.1		7.15		5.935		2.83		-83.5		4.3		300	↕	4.0	
1535	22.1	<1%	7.15	<1%	5.941	<1%	2.77	5%	-84.2	±1	4.0	<10	300	↕	5.5	
1540	22.0		7.15		5938		2.73		-82.1		4.0		300	26.88	7.0	clear no odor

Stop Purge Time: 1543 | Sample Time: 1540 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW209-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L N/A

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW209A

Field Sampler(s): Mike Parvin

Transducer Removal Time: None | Transducer Redeployment time: – | General Well Condition: good, new, sealed, not locked

Depth to Water (ft): 27.45' | Screened Interval Top (ft): 35.3 | Pump Intake Depth (ft): ~45'

Well Depth (ft): ~55.05' measured | Screened/Open Interval Bottom (ft): 55.0 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0717 hr 0727 start PP issues getting compressor to work

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0730	18.5		7.00		5.835		6.39		-52.4		117.6		270	27.46	1.0	sl. cloudy, grey, no odor
0735	20.0		7.26		5.897		6.67		-70.7		38.6		300	27.45	2.5	
0740	20.2		7.21		5.914		4.23		-74.9		15.3		300	"	4	
0745	20.7		7.21		5.899		4.21		-74.8		9.6		300	27.45	5.5	
0750	21.0		7.21		5.905		4.25		-76.2		6.7		300	"	7	
0755	20.9		7.21		5.901		4.21		-76.3		6.4		300	"	8.5	
0800	20.8	1%	7.22	<1%	5.901	<1%	4.20	1%	-77.3	±1.1	5.7	<10	300	27.45	10	clear no odor

Stop Purge Time: 0824 | Sample Time: 0800 | QA/QC Sample Time(s): –

Sample ID: LVWPS-MW209A-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary 1 x3 VOA unpreserved

1	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW209B

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, new, secured

Depth to Water (ft): 27.47 | Screened Interval Top (ft): 110.3 | Pump Intake Depth (ft): 120'

Well Depth (ft): ~~130.5~~ 130 | Screened/Open Interval Bottom (ft): 130 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0903

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0905	water to surface, filling flow-through cell												200 ~~300 ml~~	27.60	0.5	cloudy grey
0910	20.6		7.36		5.922		2.89		-84		4513		~~250~~ ~~300 ml~~	27.63	2.0	
0915	cleared cell of sediment, let refill															
0920	20.3		7.24		5.920		2.93		-83.8		650		200	27.62	~~3.0~~	
0925	20.7		7.22		5.965		2.66		-83.7		397.1		200	27.61	4.0	cloudy grey
0930	21.2		7.22		5.966		2.64		-84.6		280.3		200	27.60	5.0	
0935													200	27.60	6.0	
0940	21.5		7.26		5.931		2.59		-83.8		3850		200	27.60	7.0	turbidity spike?
0945	21.5		7.24		5.930		2.60		-83.8		983		250	27.60	8.0	
0950	cleared cell to help lower turbidity, remove sediment										540		250		9.25	
0955	21.7		7.25		5.975		2.61		-83.9		340.2		250		10.5	
1000	22.1		7.25		5.974		2.50		-86.2		334.0		250	27.61	11.75	
1005	22.1		7.27		5.944		2.44		-87.1		248.3		250		13.0	
1010	22.2		7.26		5.946		2.41		-87.4		231.3		250		14.25	
1015	22.3	<1%	7.26	<1%	5.941	<1%	2.38	2.5%	-87.6	±0.5	227	9%	250	27.60	15.5	slightly grey no odor

Stop Purge Time: 1038 | Sample Time: 1015 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW209B-BL02 | QA/QC Sample ID(s): None —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary 1 3x VOA unpreserved

1	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW209C

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, new, well sealed

Depth to Water (ft): 27.54' | Screened Interval Top (ft): 151.0 | Pump Intake Depth (ft): ~161

Well Depth (ft): 171.1' | Screened/Open Interval Bottom (ft): 170.5 | Well Diameter (in): 4"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 11 57

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1200	still getting water to surface														0.0	
1210	22.1		7.62		0.508		2.01		-89.8		20.4		145	27.53	0.25	cloudy clear
1215	22.4		7.25		0.663		1.43		-92.8		46.2		140	27.54	1.00	slight grey
1220	22.2		7.23		0.666		1.31		-92.4		42.8		140	27.54	1.7	No odor
1225	22.3		7.23		0.675		1.24		-93.1		42.9		140	27.54	2.4	
1230	compressor died, cut out, pumping stopped												ΔP 400.0		3.0	
1235													ΔP 400.0		3.0	
1237	pump back on															
1240	22.6		7.31		0.671		1.30		-95.0		34.0		140	27.54	3.7	
1245	22.5		7.23		0.667		1.15		-96.3		37.7		140	27.54	4.4	
1250	22.5		7.24		0.670		0.97		-97.7		35.5		140	27.54	5.1	
1255	22.5		7.24		0.671		0.95		-97.6		31.8		140	27.54	5.8	
1300	22.6		7.24		0.666		0.93		-98.7		30.7		140	27.54	6.5	
1305	22.5	21%	7.24	<1%	0.670	<1%	0.90	6%	-99.3	±1.7	29.8	7%	140	27.54	7.2	clear no odor

Stop Purge Time: 13 40 | Sample Time: 1305 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW209C-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron 0.0 mg/L

Bottle Set Summary 3x VOA unpreserved

1	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: GW Monitoring	Task Manager: Jesse Bunkers	Task No: H02	Date: 11/13/18	Well ID: LVWPS-MW210A
Field Sampler(s): C. Lerkins				
Transducer Removal Time: 1422		Transducer Redeployment Time: 15:12		General Well Condition: Good
Depth to Water (ft): 25.75		Screened Interval Top (ft): 35.4		Pump Intake Depth (ft): ~~45.0~~ 37.0 CJL 11/13/18
Well Depth (ft): 55.65		Screened/Open Interval Bottom (ft): 55.1		Well Diameter (in): 2
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE		GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP
Purge Start Time: 1437				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1442	21.28		7.14		3.943		1.83		127.0		156		270	25.75	1.35	Clear
1447	21.58		7.12		4.015		0.95		82.0		39.4		270	25.75	2.70	
1452	21.44		7.11		4.041		0.84		64.7		19.46		270	25.75	4.05	
1455	21.41		7.11		4.052		0.84		58.3		9.86		270	25.75	4.86	
1458	21.49		7.11		4.080		0.80		52.2		7.16		270	25.75	5.67	
1501	21.46		7.11		4.086		0.89		52.5		6.66		270	25.75	6.48	

Stop Purge Time: 15:05	Sample Time: 15:08	QA/QC Sample Time(s): N/A	
	Sample ID: LVWPS-MW210A-BLD2	QA/QC Sample ID(s): NA	

Observations/Comments: Removed transduce 11/12/18 16:20 to 16:25 to install tubing
Pump hits obstruction ~~Bottom~~ CJL 11/13/18 at ~41 ft; DTB 54.43

Bottle Set Summary

~~1~~	~~3x VOA w/HCl~~ CJL 11/13/18	1	125 mL Plastic	~~1~~	~~500 mL Plastic~~ ~~3 x VOA Vials~~ CJL 11/13/18		500 mL w/H2SO4		500 mL poly w/HNO3	~~1~~ CJL 11/13/18	250 mL Amber Glass ~~w/H2SO4 HCl~~
1	125 mL w/EDA	~~5~~	250 mL Plastic CJL 11/13/18	~~2~~	250 mL w/H_2SO_4	~~2~~	250 mL poly w/HNO_3 CJL 11/13/18		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | **Well ID:** LVWPS-MW210B

Field Sampler(s): C. Larkins

Transducer Removal Time: 15:27 | Transducer Redeployment time: 1604 | General Well Condition: Good

Depth to Water (ft): 25.32 | Screened Interval Top (ft): 59.8 | Pump Intake Depth (ft): 70

Well Depth (ft): 80.05 | Screened/Open Interval Bottom (ft): 79.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1540

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1545	21.57		7.15		4.469		1.74		69.1		11.69		240	25.25	1.2	Clear
1548	21.74		7.13		4.541		1.75		67.9		6.69		240	25.22	1.92	
1551	21.82		7.14	± 0.01	4.575		1.88	≤ 5%	67.7		4.33		↓	25.22	2.64	
1554	21.77		7.13		4.592		2.00		68.1		3.55			25.22	3.36	
1557	21.76		7.13		4.602		2.04		69.4		3.08			25.22	4.08	↓

Stop Purge Time: 1555 | **Sample Time:** 16:00

Sample ID: LVWPS-MW210B-BL02

QA/QC Sample Time(s): ~~LVWPS-MW210~~ COC 11/13/18

QA/QC Sample ID(s): ~~LVWPS-MW210B~~

Observations/Comments:

HACH Kit Sulfide: NA mg/L **HACH Kit Ferrous Iron:** NA mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: GW Monitoring	Task Manager: Jesse Bunkers	Task No: H02	Date: 11/13/18	Well ID: LVWPS-MW210C
Field Sampler(s): C. Larkins				
Transducer Removal Time: 16:21		Transducer Redeployment Time: 17:22		General Well Condition: Good
Depth to Water (ft): 25.21		Screened Interval Top (ft): 100.3		Pump Intake Depth (ft): 110
Well Depth (ft): 120.55		Screened/Open Interval Bottom (ft): 120		Well Diameter (in): 2
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE		GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP
Purge Start Time: 16 35				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1640	20.58		7.05		4.668		1.25		90.2		888		210	25.64	1.05	Clear + white
1645	20.65		7.04		4.805		1.28		87.3		952		120	26.15	1.65	Gray
1650	20.08		7.04		4.739		1.55		86.5		762		120	26.03	2.25	
1655	20.01		7.04		4.733		1.60		87.9		584		120	26.03	2.85	
1700	19.69		7.05		4.688		1.67		89.6		529		60	25.75	3.15	
1703	19.01		7.06		4.602		1.80		90.8		549		60	25.75	3.45	

Stop Purge Time: 17:08	Sample Time: 17 10	QA/QC Sample Time(s): 17 10
	Sample ID: LVWPS-MW210C-BL02	QA/QC Sample ID(s): LVWPS-MW210C-BL02-MS/MSD

Observations/Comments: Drawdown > 0.3' @ < 100 ml/min

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/15 | **Well ID:** LVWPS-MW210D

Field Sampler(s): C. Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 25.11 | Screened Interval Top (ft): ~~140.0~~ 130.4 | Pump Intake Depth (ft): 135.2

Well Depth (ft): 140.5 | Screened/Open Interval Bottom (ft): 140.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0714

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0719	16.52		7.98		6.794		2.93		175.7		542		120	24.49	0.6	White/Grey
0729	18.16		7.01		7.700		10.59		220.9		789		120	24.95	1.8	Chalky Brown
0739	18.64		4.76		7.840		11.32		322.7		665		120	24.85	3.0	
0749	18.75		3.96		7.962		11.81		377.4		594		120	24.85	4.2	
0800	17.66		6.65		7.526		15.43		220.8		542		120	24.85	5.52	
0805	18.30		6.62		7.851		12.87		229.9		632				6.12	
0810	18.93		5.27		7.988		11.53		293.4		819				6.72	
0813	19.00		7.11		8.033		13.77		162.2		884			24.80	7.08	
0816	19.27		7.02		8.089		12.08		190.8		>1000				7.44	
0819	19.67		6.79		8.094		12.65		146.2		>1000			24.80	7.8	
0903	19.36		7.56		5.102		7.50		168.0		>1000		120		~~8.28~~ 13.08	
0906	19.66		7.50		5.156		6.70		205.0		>1000				~~8.64~~ 13.44	
0909	19.97		6.89		5.178		6.65		250.9		>1000				13.80	
0912	20.24		5.69		5.194		7.10		258.9		>1000				14.16	
0915	20.39		7.34		5.191		6.96		152.1		>1000				14.52	

Stop Purge Time: 0935 | **Sample Time:** 0945 | **QA/QC Sample Time(s):** NA

Sample ID: LVWPS-MW210D-BL02 | **QA/QC Sample ID(s):** NA

Observations/Comments: 0750 Recal pH = 7.07 & 4.00; Rinse flow cell; 0828 Full Recal & Flow Cell Rinse

HACH Kit Sulfide: _____mg/L **HACH Kit Ferrous Iron:** _____mg/L

Bottle Set Summary

1	3x VOA w/HCl	5	125 mL Plastic	1	~~500 mL Plastic~~ 3 x Voa unpres		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW210D

Field Sampler(s): C Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 25.11 | Screened Interval Top (ft): 130.9 | Pump Intake Depth (ft): 135.2

Well Depth (ft): 140.5 | Screened/Open Interval Bottom (ft): 140.4 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 07:14

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0918	20.33		7.60		5.177		7.00		128.0		>1000		140	25.48	14.94	Chalky Brown
0921	20.46		7.61		5.177		6.95		119.3		>1000		140	25.48	15.36	
0924	20.58		7.62		5.179		7.29		112.5		>1000		140	25.48	15.78	
0927	20.63		7.66		5.176		7.25		106.8		>1000		140	25.48	16.20	
0930	20.74		7.65		5182		7.46		102.8		>1000		140	25.48	16.62	

Stop Purge Time: 0935 | Sample Time: 0945 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-MW2100-BL02 | QA/QC Sample ID(s): NA

Observations/Comments:

HACH Kit Sulfide: _____ mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	1	~~500 mL Plastic~~ 3 x Voa unpres		500 mL w/H2SO4		500 mL poly w/HNO3	1	250 mL Amber Glass w/~~H2SO4~~ HCl	
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study Task Manager: D. Grady Task No: M19 Date: 11/14/18 Well ID: LVWPS-MW210E

Field Sampler(s): Mike Pavarini

Transducer Removal Time: NA Transducer Redeployment time: — General Well Condition: new, good

Depth to Water (ft): 25.53' Screened Interval Top (ft): 145.5' Pump Intake Depth (ft): ≈155'

Well Depth (ft): 165.6' Screened/Open Interval Bottom (ft): 165' Well Diameter (in): 4"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE GW Disposal: GW-11 Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0733 started pump 0736 started filling cell

Time	Temp. (°C) READ	Temp. CHANGE*	pH (pH Units) READ	pH CHANGE*	Conductivity (mS/cm) READ	Conductivity CHANGE*	DO (mg/L) READ	DO CHANGE*	ORP (mV) READ	ORP CHANGE*	Turbidity (NTU) READ	Turbidity CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0740	19.0		7.55		6.360		5.66		-69.7		15.9		130	25.31	0.1	clear no odor
0745	20.5		7.40		6.827		3.47		-77.7		62.0		135	25.55	0.75	
0750	20.6		7.38		6.945		3.13		-79.9		106.8		135	25.71	1.4	
0755	20.7		7.38		6.927		2.94		-81.9		144.2		135	25.87	2.1	
0800	20.8		7.38		6.908		3.07		-85.2		41.3		135	26.01	2.75	
0805	20.4		7.40		6.883		2.94		-84.1		68.3		135	26.15	3.4	
0810	20.3		7.38		6.909		2.98		-85.0		28.1		135	26.20	4.1	
0815	19.9		7.38		6.930		2.90		-85.8		36.6		135	26.25	4.8	
0820	19.9		7.38		6.951		2.85		-86.1		41.3		135	29.29	5.5	
0825	20.0		7.38		6.932		2.78		-85.3		40.1			29.34	6.1	
0830	20.1	<1%	7.39	<1%	6.911	<1%	2.72	<6%	-87.5	±1	42.8	≈7%	135	29.32	6.8	clear no odor

sample interacted (fizzed) w/ HCl

Stop Purge Time: 0856 Sample Time: 0830 QA/QC Sample Time(s): —

Sample ID: LVWPS-MW210E-BL02 QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L MP-10 settings 3100 psi CPM1 R-30 D-30

Bottle Set Summary (3x VOA no preservatives amber)

1	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H2SO$_4$		500 mL poly w/HNO$_3$	1	250 mL Amber Glass w/H$_2$SO$_4$
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H$_2$SO$_4$	2	250 mL poly w/HNO$_3$		250 mL Amber Glass w/H$_3$PO$_4$		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: LVWPS-MW211

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: Good, sealed, not locked, dedicated tubing

Depth to Water (ft): 26.80' | Screened Interval Top (ft): 49.69' | Pump Intake Depth (ft): ~60'

Well Depth (ft): 69.96' | Screened/Open Interval Bottom (ft): 69.36' | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1247 (pacific)

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1250	22.0		7.16		~~0.53~~ 5.30		5.00		-109		18.5		300	26.81	1.0	very light grey, no odor
1255	22.1		7.19		5.430		5.06		-174		9.1		300	26.80	2.5	
1300	22.0		7.20		5.420		5.03		-192		7.5		300	26.80	4	clear
1305	22.1		7.20		5.416		5.02		-203		6.7		300	26.80	5.5	
1310	22.2		7.20		5.415		5.03		-234		6.0		300	26.80	7	
1315	22.1		7.20		5.413		5.02		-238		5.7		300	26.80	8.5	
1320	22.2	<1%	7.20	0%	5.411	<1%	5.04	<1%	-241	±7	5.4	<10	300	26.80	10	clear no odor

Stop Purge Time: 1329 | Sample Time: 1320 | Sample ID: LVWPS-MW-211-BL02 | QA/QC Sample Time(s): — | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L N/A

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study Task Manager: D. Grady Task No: M19 Date: 11/14/18 Well ID: LVWPS-MW212A

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None Transducer Redeployment time: — General Well Condition: good, sealed, not locked, tubing in well

Depth to Water (ft): 28.41' Screened Interval Top (ft): 34.3 Pump Intake Depth (ft): 44'

Well Depth (ft): 54.55 Screened/Open Interval Bottom (ft): 54 Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE GW Disposal: GW-11 Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1452 Started Pumping 1453 Water to Surface

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1455	23.3		7.58		2.704		7.09		-107.4		262.3		300	28.43	0.5	very murky light brown
1500	23.4		7.57		2.707		7.15		-106.1		171.3		300	28.43	2.0	no odor
1505	23.5		7.57		2.717		7.20		-106.2		81.3		300	28.43	3.5	
1510	23.5		7.57		2.707		7.18		-105.4		44.3		300	28.43	5.0	
1515	23.5		7.57		2.704		7.17		-105.1		32.1		300	28.43	6.5	
1520	23.5		7.58		2.701		7.17		-105.1		18.3		300	28.43	8.0	
1525	23.5		7.57		2.702		7.16		-104.9		19.7		300	28.43	9.5	clear
1530	23.5	0%	7.57	<1%	2.703	<1%	7.16	<1%	-105.0	±0.1	18.0	9%	300	28.43	11	no odor

Stop Purge Time: 1533 Sample Time: ~~1525~~ MS 1530 QA/QC Sample Time(s): ~~1530~~ MS 1535

Sample ID: LVWPS-MW212A-BL02 QA/QC Sample ID(s): LVWPS-MW212A-BL02-MS/MSD

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary X2 for MS/MSD

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA X2 for MS/MSD		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: ~~11/14/18~~ MP 11/15/18 | Well ID: LVWPS-MW212B

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, sealed

Depth to Water (ft): 28.72 | Screened Interval Top (ft): 54.8 | Pump Intake Depth (ft): 70'

Well Depth (ft): 80.05' | Screened/Open Interval Bottom (ft): 79.5 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1025 started pump | tubing stuck 7' down well had to retrieve next day to finish purge

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1030	22.9		7.67		2.414		7.22		-78.4		451.2		300	28.65	1.5	cloudy light brown
1035	23.1		7.67		2.428		9.19		-75.6		175.3		300	28.70	3	no odor
1040	23.1		7.69		2.430		9.93		-76.0		138.4		300	28.69	4.5	
1045	23.1		7.68		2.423		10.53		-72.8		101.0		300	28.70	6	
1050	23.1		7.66		2.425		10.36		-74.4		78.8		300	28.71	7.5	
1055	23.2		7.69		2.42		11.18		-57.8		56.3		300	28.72	9	
1100	23.3		7.68		2.424		10.58		-75.7		62.1		300	28.72	10.5	
1105	23.3		7.67		2.421		9.54		-76.1		43.2		300	28.71	12	
1110	23.3		7.67		2.428		8.50		-73.4		34.0		300	28.72	13.5	
1115	23.3		7.67		2.433		7.92		-64.2		25.3		300	28.72	15	
1120	23.3		7.67		2.430		7.77		-78.2		24.3		300	28.72	16.5	
1125	23.4		7.67		2.432		7.67		-76.7		23.8		300	28.72	18	
1130	23.4	<1%	7.67	0 %	2.431	<1%	7.50	4%	-71.3	±7	22.7	7%	300	28.72	19.5	clear no odor

Stop Purge Time: 1132 | Sample Time: 1130 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW212B-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

	3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW212C

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: new, good, well sealed

Depth to Water (ft): 29.21 | Screened Interval Top (ft): 100.3' | Pump Intake Depth (ft): 2110'

Well Depth (ft): 120.5' | Screened/Open Interval Bottom (ft): 120 | Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1236 started pumping 1237 water to surface

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1240	23.4		7.48		6.735		1.77		-132.8		117.8		200	29.20	0.5	slightly cloudy grey
1245	23.6		7.51		6.647		1.14		-137.9		105.1		200	29.20	1.5	
1250	23.5		7.49		6.948		1.25		-139.1		69.6		200	29.21	2.5	no odor
1255	23.5		7.48		6.905		1.43		-136.4		42.0		200	29.21	3.5	
1300	23.4		7.47		6.470		1.56		-135.3		43.3		200	29.21	4.5	
1305	23.5		7.48		6.504		1.83		-133.5		32.7		200	29.21	5.5	
1310	23.5		7.47		6.526		1.99		-132.7		27.7		200	29.21	6.5	
1315	23.5		7.46		6.544		1.89		-132.0		24.3		200	29.21	7.5	
1320	23.6		7.46		6.548		1.92	4%	-131.7		23.8		200	29.21	8.5	clear
1325	23.6	<1%	7.47	<1%	6.542		2.01	6%	-131.2	±1	22.6	7.5%	200	29.21	9.5	no odor

Stop Purge Time: 1342 | Sample Time: 1325 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW212C-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary 1 3x VOA unpreserved amber

1	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW12D

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: good, new, secure gray cap

Depth to Water (ft): 28.85 | Screened Interval Top (ft): 125.5 | Pump Intake Depth (ft): 2135'

Well Depth (ft): 145.6 | Screened/Open Interval Bottom (ft): 145 | Well Diameter (in): 4"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1048 started pump 1050 water to surface

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1055	23.2		7.47		6.727		2.16		-92.6		8.4		200	29.10	1.0	clear no odor
1100	23.2		7.34		6.956		1.33		-94.3		10.9		200	29.20	2	
1105	23.3		7.32		6.989		1.06		-95.7		4.0		200	29.27	3	
1110	23.4		7.32		6.990		0.96		-97.0		8.9		200	29.30	4	
1115	23.4		7.32		6.993		0.91		-97.9		9.8		200	29.30	5	
1120	23.3		7.32		6.997		0.88		-98.3		8.6		200	29.31	6	
1125	23.4	<1%	7.32	0%	6.991	<1%	0.85	7%	-98.8	±1	8.2	<10	200	29.31	7	

Stop Purge Time: 1142 | Sample Time: 1125 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW12D-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary 1 3x VOA unpreserved

1	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4	
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW~~24~~213

Field Sampler(s): J. Bunkers

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 26.80 | Screened Interval Top (ft): 39.96 | Pump Intake Depth (ft): 49.80

Well Depth (ft): 59.85 | Screened/Open Interval Bottom (ft): 59.65 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1254

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1257	23.2		7.76		3.907		6.27		97.9		81.8		300	26.80		clear/none
1300	23.4		7.53		4.030		5.64		113.8		35.0		"	"		"
1303	23.5		7.50		4.025		5.56		127.2		9.9		"	"		"
1306	23.5		7.49		4.021		5.53		134.2		8.7		"	"		"
1309	23.4		7.48		4.020		5.52		135.0		6.4		"	"		"

Stop Purge Time: 1310 | Sample Time: 1311 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW213-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: — mg/L HACH Kit Ferrous Iron: — mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: LVWPS-MW214

Field Sampler(s): J. Bunkers

Transducer Removal Time: —	Transducer Redeployment time: —	General Well Condition: Good
Depth to Water (ft): 26.69	Screened Interval Top (ft): 34.35	Pump Intake Depth (ft): 39
Well Depth (ft): 44.5	Screened/Open Interval Bottom (ft): 43.95	Well Diameter (in): 2
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11	Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1529

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1533	22.6		7.36		5.473		5.22		219.3		13.2		300	26.69		clear/none
1536	22.8		7.35		5.492		5.00		195.0		5.9		"	"		"
1539	22.6	<1%	7.35	0.01	5.496	<1%	4.92	2.7%	204.8	9.9 mV	4.4	<10	"	"		"
1542	22.7		7.34		5.492		4.87		204.9		4.0		"	"	4.2	"

Stop Purge Time: 1543 | Sample Time: 1545 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW214-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: — mg/L HACH Kit Ferrous Iron: — mg/L

Bottle Set Summary

3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	1	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/1C/18 | **Well ID:** LVWPS-MW215A

Field Sampler(s): C. Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 11.47 | Screened Interval Top (ft): 14.1 | Pump Intake Depth (ft): 24.00

Well Depth (ft): ~~11.47~~ Est 11/2/18 34.35 | Screened/Open Interval Bottom (ft): 33.8 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 12:14

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
12:19	21.50		7.06		3.460		1.30		50.5		12.84		300	11.50	1.5	Gray → Clear
12:24	21.63		7.03		3.710		0.75		40.6		3.84		300	11.50	3.0	Clear
12:27	21.80		7.03		3.597		0.68		34.9		2.01		300	11.49	3.9	
12:30	21.72		7.03		3.667		0.61		30.4		1.54		300	11.49	4.8	
12:33	21.83		7.03		3.728		0.58		26.0		1.22		300	11.49	5.7	
12:36	21.71		~~7.06~~ 6.94		3.811		0.56		29.7		5.29		300	11.50	6.6	
12:39	21.61		6.99		3.826		0.53		21.2		1.37		300	11.50	7.5	
12:42	21.58	±0.3%	7.01	±0.03	3.881	±1.7%	0.51	±6%	16.6	±6.8 mV	0.76	<10 NTU	300	11.50	8.4	
12:45	21.64		7.02		3.892		0.50		14.4		0.74		300	11.50	9.3	

Stop Purge Time: 12:46 | **Sample Time:** 12:50 | **QA/QC Sample Time(s):** NA

Sample ID: LVWPS-MW215A-BL02 | **QA/QC Sample ID(s):** NA

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: LVWPS-MW215B

Field Sampler(s): C. Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 12.15 | Screened Interval Top (ft): 40.5 | Pump Intake Depth (ft): 43.0

Well Depth (ft): 45.55 | Screened/Open Interval Bottom (ft): 45.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 13:21

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
13:26	21.55		7.15		3.968		1.41		16.9		11.14		300	13.35	1.5	Clear
1331	21.25		7.14		3.978		0.95		13.8		6.62		60	14.06	1.8	↓
1336	20.82		7.14		3.966		0.87		9.0		6.04		60	14.25	2.1	

Stop Purge Time: 1338 | Sample Time: 1342 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-215B-GL02 | QA/QC Sample ID(s): NA

Observations/Comments: 1 System Vol = 145 Ft x 10 ml/Ft + 80 ml = 530 ml ; Drawdown continues at <100 ml/min - Sample collected after Purge Vol > 2x System Vol.

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1					
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass
1					

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study Task Manager: D. Grady Task No: M19 Date: 11/12/18 Well ID: LVWPS-MW216

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None Transducer Redeployment time: — General Well Condition:

Depth to Water (ft): 7.86 Screened Interval Top (ft): ~~10.65~~ MP 10.03 Pump Intake Depth (ft): ~15'

Well Depth (ft): 20.25 Screened/Open Interval Bottom (ft): 19.15 Well Diameter (in): 2"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE GW Disposal: GW-11 Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 15:15

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1520	24.0		7.06		5.915		0.07		-437		3845		400	8.00	2.0	very murky brown, no odor
1525	23.8		7.07		5.918		0.07		-440		2877		400	7.98	4.0	
1530	22.2		7.05		5.925		0.05		-448		1943		400	7.98	6	
1535	23.7		7.05		5.911		0.00		-456		901		400	7.95	8	
1540	23.6		7.06		5.905		0.00		-462.7		501		400	7.94	10	
1545	23.6		7.06		5.884		0.00		-463.5		277		400	7.94	12	
1550	23.4		7.05		5.884		0		-465.6		238		400	7.93	14	
1555	23.6		7.05		5.885		0		-468.3		151		400	7.92	16	
1600	23.5		7.05		5.885		0		-472.1		100.3		400	7.93	18	
1605	23.4		7.05		5.883		0		-472.6		MP 95.2		400	7.92	20	
1610	23.5	<1%	7.05	0%	5.881	<1%	0	0	-472.2	~~±10~~ MP ~~±5~~	91.3	±10%	400	7.92	22	nearly clear, slight grey, no odor

Stop Purge Time: 1609 Sample Time: ~~1605~~ MP 1610 QA/QC Sample Time(s): —

Sample ID: LVWPS-MW216-BL02 QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: ______mg/L HACH Kit Ferrous Iron: ______mg/L N/A

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

LOW FLOW GROUNDWATER SAMPLING LOG

TETRA TECH

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/19 | **Well ID:** LVWPS-MW217A

Field Sampler(s): C. Lorkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 36.23 | Screened Interval Top (ft): 51.3 | Pump Intake Depth (ft): 61.2

Well Depth (ft): 71.5 | Screened/Open Interval Bottom (ft): 71.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1019

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1024	21.92		7.26		2.787		2.02		123.5		43.3		225	34.24	0.9	Clear
1029	22.12		7.21		2.932		1.40		118.7		5.21		225	34.10	1.8	↓
1039	22.18		7.21		3.035		1.16		91.1		3.30		↓	33.69	3.6	
1044	22.26		7.21		3.035		1.13		84.7		2.67			↓	4.5	
1049	22.25		7.21		3.049		1.10		78.0		2.40				5.4	
1052	22.18		7.21		3.046		1.13		75.3		2.24				6.3	
1055	22.19		7.21		3.053		1.13		72.1		2.00		↓	33.35	7.2	↓

Stop Purge Time: 11:00 | **Sample Time:** 11:15 | **QA/QC Sample Time(s):** 11:15

Sample ID: LVWPS-MW217A-BL02 | **QA/QC Sample ID(s):** LVWPS-MW217A-BL02-FD

Observations/Comments: Final DTW after sampling & Pump turned off 36.25 ; Water level appears to be fluctuating - Tested w/ JB's Sounder while pumping & got similar results - NMR being

HACH Kit Sulfide: 0.0 mg/L **HACH Kit Ferrous Iron:** 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	1	~~500 mL Plastic~~ 3 x Van vptes		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ $H<1$	
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWFS-MW217B

Field Sampler(s): C. Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 35.83 | Screened Interval Top (ft): 100.3 | Pump Intake Depth (ft): 110.2

Well Depth (ft): 120.5 | Screened/Open Interval Bottom (ft): 120.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 07:14

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0719	19.05		7.17		3.457		2.52		219.9		81.1		180	35.95		Gray Trb
0724	19.65		7.06		3.553		3.19		245.4		107		180	35.97		
0729	20.19		7.45		3.614		4.42		200.8		159		180	36.04		
0734	20.19		6.84		3.628		5.04		232.9		131		150	36.15		
0744	19.53		5.23		3.539		4.85		298.6		102		120	36.04		
0803	18.30		7.36		3.383		4.40		200.3		94.7		120	36.09		
0806	19.01		7.31		3.472		4.10		192.6		397		120	36.07		
0811	19.30		7.19		3.493		3.95		199.3		446		120	36.09		
0814	19.33		6.95		3.455		3.87		206.5		474		120	36.09		
0824	19.66		6.09		3.500		3.26		252.9		282		120	36.11		
0829	20.43		7.14		3.546		3.14		181.0		243		210	36.21		
0832	20.67		6.84		3.578		3.15		199.4		205		210	36.25		
0835	20.77		6.68		3.584		2.97		206.3		142		210	36.29		
0841	20.13		6.24		3.539		2.90		229.8		105		90	36.11		
0844	19.82		5.87		3.496		2.83		247.3		88.5		90	36.12		

Stop Purge Time: | Sample Time: | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments: 0748 Rinse & Recal YSI pH; 0816 Rinse YSI Sensors

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	1	~~500 mL Plastic~~ 3x VOA unpres		500 mL w/H2SO4		500 mL poly w/HNO3	1	250 mL Amber Glass ~~w/H2SO4~~ HCl
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H2SO4	2	250 mL poly w/HNO3		250 mL Amber Glass w/H3PO4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | **Well ID:** LVWPS-MW217B

Field Sampler(s): C. Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 35.83 | Screened Interval Top (ft): 100.3 | Pump Intake Depth (ft): 110.2

Well Depth (ft): | Screened/Open Interval Bottom (ft): 120.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 07:14

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0857	20.04		4.51		3.503		2.66		315.7		94.0		90	36.15	1.3 L	Clear/Grey

Stop Purge Time: 09:00 | **Sample Time:** 0910 | **QA/QC Sample Time(s):** NA

Sample ID: | **QA/QC Sample ID(s):** NA

Observations/Comments: Drawdown >0.3' @ <100 ml/min - Sample. pH & ORP variability suspected result of turbidity & low flow rate

HACH Kit Sulfide: _____mg/L **HACH Kit Ferrous Iron:** _____mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	1	~~500 mL Plastic~~ 3 x VOA vmples		500 mL w/H_2SO_4	500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: LVWPS-MW217C

Field Sampler(s): Mike Pavarini

Transducer Removal Time: None | Transducer Redeployment time: — | General Well Condition: New

Depth to Water (ft): 35.80 | Screened Interval Top (ft): 155.5 | Pump Intake Depth (ft): 165'

Well Depth (ft): 175.6 | Screened/Open Interval Bottom (ft): 175 | Well Diameter (in): 4"

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0752 started pump 0755 water surface DTW = 35.34' water pump install before pump on

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0800	19.6		7.67		5.555		2.30		-94.2		17.1		110	35.83	0.5	clear no odor
0805	20.5		7.52		5.466		1.57		-91.8		73.1		110	36.01	1.0	
0810	20.8		7.48		5.446		1.27		-93.4		70.6		110	36.11	1.6	
0815	20.9		7.48		5.430		1.14		-94.2		63.1		110	36.20	2.1	
0820	21.1		7.48		5.436		1.06		-94.5		60.3		110	36.23	2.7	
0825	20.9		7.48		5.428		1.00		-95.3		57.1		110	36.22	3.3	
0830	21.0		7.48		5.432		0.98		-95.2		51.3		110	36.23	3.8	
0835	21.0		7.48		5.433		0.97		-96.2		44.7		110	36.24	4.4	
0840	20.9		7.48		5.432		0.93		-97.0		45.1		110	36.24	5.0	clear
0845	21.0		7.48		5.431		0.90	7%	-97.2	±1	42.1	7%	110	36.23	5.5	no odor

Stop Purge Time: 0825 | Sample Time: 0845 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW217C-BL02 | QA/QC Sample ID(s): None

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L | HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary 3x unpreserved

1	3x VOA w/HCl	1	125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13 | Well ID: LVWPS-MW218A

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 26.03 | Screened Interval Top (ft): 353 | Pump Intake Depth (ft): 45

Well Depth (ft): 55.5 | Screened/Open Interval Bottom (ft): 55.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0634

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0638	19.1		7.13		5403		3.87		240.8		751.9		300	26.03		clear/none
0641	19.3		7.19		5495		3.18		234.0		232.5		"	"		brown
0644	19.6		7.20		5497		2.92		232.8		83.2		"	"		"
0647	19.7		7.20		5.485		2.80		233.0		63.2		"	"		clear
0650	20.2		7.20		5.467		2.75		233.7		50.6		"	"		"
0653	20.4		7.20		5.477		2.73		233.9		48.1		"	"		"
0656	20.3		7.20		5.477		2.74		234.2		47.5		"	"		"

Stop Purge Time: 0657 | Sample Time: 0700 | QA/QC Sample Time(s): 0710

Sample ID: LVWPS-MW218A-BL02 | QA/QC Sample ID(s): LVWPS-MW218A-BL02-FD

Observations/Comments:

HACH Kit Sulfide: 0.04 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW218B

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 26.18 | Screened Interval Top (ft): 100.3 | Pump Intake Depth (ft): 110

Well Depth (ft): 120.5 | Screened/Open Interval Bottom (ft): 120 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0834

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0838	18.6		7.33		4.833		2.65		222.9		820.9		240	26.30		clear/none
0841	20.0		7.29		4.894		1.75		222.2		1281.3		"	"		brown
0844	20.3		7.30		4.897		1.28		221.0		1576.2		"	"		"
0847	20.5		7.30		4.891		0.97		214.4		1326.4		"	"		"
0850	20.5		7.28		4.898		0.83		219.6		1007.3		"	"		"
0853	20.6		7.28		4.898		0.81		219.6		755.2		"	"		"
0856	20.9		7.27		4.903		0.69		155.9		390.6		"	"		"
0859	20.8		7.26		4.904		0.61		176.7		301.6		"	"		"
0902	20.6		7.26		4.902		0.59		186.1		201.3		"	"		"
0905	20.7		7.27		4.911		0.49		192.5		197.3		"	"		"
0908	20.6		7.26		4.908		0.49		195.5		196.0		"	"		"
0911	20.6		7.26		4.907		0.48		195.7		195.7		"	"		"

Stop Purge Time: 0912 | Sample Time: 0915 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW218B-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: LVWPS-MW218C

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 25.61 | Screened Interval Top (ft): 1360 | Pump Intake Depth (ft): 145.8

Well Depth (ft): 156.1 | Screened/Open Interval Bottom (ft): 155.5 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1024

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1029	20.6		8.07		6.352		1.92		-98.9		50.4		150	25.63		clear/none
1032	20.6		8.02		6.405		1.77		-87.0		50.3		"	"		"
1035	20.7		7.98		6.453		1.48		-69.6		49.5		"	"		"
1038	20.8		7.97		6.468		1.42		-66.4		48.8		"	"		"
1041	20.8		7.97		6.470		1.40		-66.3		46.2		"	"		"

Stop Purge Time: 1042 | Sample Time: 1045 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW218C-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: ~~LVWPS-MW219A~~ LVWPS-MW219A

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 27.14 | Screened Interval Top (ft): 35.1 | Pump Intake Depth (ft): ~~47.45~~

Well Depth (ft): 50.3 | Screened/Open Interval Bottom (ft): 40.8 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0828

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0831	20.0		7.24		6.083		3.94		308.0		87.9		300	27.14		clear/none
0834	20.3		7.25		6.122		3.57		304.6		54.0		"	"		"
0837	20.7		7.26		6.110		3.41		302.7		36.0		"	"		"
0840	20.3		7.26		6.104		3.32		302.1		23.2		"	"		"
0843	20.5		7.26		6.113		3.26		301.5		18.3		"	"		"
0846	20.6		7.26		6.109		3.22		301.5		18.5		"	"		"
0849	20.6		7.26		6.108		3.21		301.4		18.0		"	"	6.5	"

Stop Purge Time: 0850 | **Sample Time:** 0855 | **QA/QC Sample Time(s):** ~~0900~~

Sample ID: LVWPS-MW219A-BL02 | **QA/QC Sample ID(s):** LVWPS-MW219A-BL02-FD

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L **HACH Kit Ferrous Iron:** 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: LVWPS-MW2193

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 28.48 | Screened Interval Top (ft): 75.3 | Pump Intake Depth (ft): 85.15

Well Depth (ft): 95.5 | Screened/Open Interval Bottom (ft): 95.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1043

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1046	21.1		7.37		4648		1.76		47.8		>1000		225	28.65		opaque white
1049	20.5		7.31		4636		0.85		32.9		>1000		150	28.65		no odor
1054	20.9		7.31		4.639		0.73		24.4		>1000		"	"		
1057	21.1		7.30		4642		0.57		12.4		>1000		"	"		
1100	20.5		7.30		4647		0.52		5.0		>1000		"	"		
1106	20.7		7.30		4.649		0.50		-3.9		>1000		"	"		
1109	20.9		7.30		4649		0.42		-9.6		1988		"	"		
1115	20.9		7.30		4.649		0.41		-12.2		1984		"	"		
1118	21.0		7.30		4.648		0.40		-12.5		1965		"	"		

Stop Purge Time: 1119 | Sample Time: 1120 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW2193-3L02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 1.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/12/18 | Well ID: LVWPS-MW219C

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 28.37 | Screened Interval Top (ft): 115.5 | Pump Intake Depth (ft): 125.25

Well Depth (ft): 135.6 | Screened/Open Interval Bottom (ft): 135.0 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1230

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1235	19.9		7.31		5.769		2.00		-0.7		228.0		170	28.42		clear/none
1238	19.9		7.18		5.889		1.53		14.9		155.6		"	"		"
1241	20.1		7.15		5.921		1.21		39.5		89.5		"	"		"
1244	20.2		7.14		5.948		1.00		54.5		47.5		"	"		"
1247	20.2		7.14		5.947		0.87		59.5		36.1		"	"		"
1250	20.2		7.14		5.950		0.77		59.0		36.5		"	"		"
1253	20.1		7.14		5.953		0.75		60.0		36.2		"	"		"

Stop Purge Time: 1254 | Sample Time: 1255 | QA/QC Sample Time(s): —

Sample ID: LVWPS-MW219C-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.5 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW220A

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 26.90 | Screened Interval Top (ft): 60.3 | Pump Intake Depth (ft): 70

Well Depth (ft): 80.5 | Screened/Open Interval Bottom (ft): 80 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0705

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0708	19.4		7.24		6.058		4.20		237.2		122.5		300	26.90		~~clear~~
0711	21.1		7.24		6.106		3.40		233.0		52.1		"	"		brownish
0714	21.4		7.25		6.107		3.22		230.1		27.2		"	"		no odor
0717	21.4		7.26		6.107		3.11		228.8		26.3		"	"		
0720	21.4		7.26		6.107		3.07		228.5		25.9		"	"		

Stop Purge Time: 0721 | Sample Time: 0725 | QA/QC Sample Time(s): ~~0730~~ 0725

Sample ID: LVWPS-MW220A-BL02 | QA/QC Sample ID(s): LVWPS-MW220A-BL02-MS/MSD

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW2203

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 27.24 | Screened Interval Top (ft): 134.5 | Pump Intake Depth (ft): 144

Well Depth (ft): 154.6 | Screened/Open Interval Bottom (ft): 154.1 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0856

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0902	18.9		7.76		5.430		2.54		206.8		20.7		100	27.24		clear/slight
0905	20.1		7.67		5.502		1.69		210.6		18.7		100	27.24		rotten egg odor
0908	20.2		7.66		5.503		1.61		210.7		19.5		100	27.24		"
0911	20.3		7.65		5.524		1.32		210.6		17.2		100	27.24		"
0914	20.3		7.65		5.527		1.28		210.6		16.9		"	"		"
0917	20.3		7.65		5.527		1.27		210.6		16.3		"	"		"

Stop Purge Time: 0918 | **Sample Time:** 0920 | **QA/QC Sample Time(s):** ~~0919~~ 1000

Sample ID: LVWPS-MW2203-BL02 | **QA/QC Sample ID(s):** LVWPS-20181114-FB

Observations/Comments:

HACH Kit Sulfide: 12.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: LVWPS-~~MW~~W221A

Field Sampler(s): C. Larkins

Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good

Depth to Water (ft): 29.72 | Screened Interval Top (ft): 50.3 | Pump Intake Depth (ft): 60.2

Well Depth (ft): 70.5 | Screened/Open Interval Bottom (ft): 70.0 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0737

Time	Temp. (°C) READ	Temp. CHANGE*	pH (pH Units) READ	pH CHANGE*	Conductivity (mS/cm) READ	Conductivity CHANGE*	DO (mg/L) READ	DO CHANGE*	ORP (mV) READ	ORP CHANGE*	Turbidity (NTU) READ	Turbidity CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0742	19.49		6.54		2.269		5.61		246.8		82.6		300	29.82	1.5	Gray
0747	21.33		5.07		2.377		5.79		312.9		11.5		300	29.82		
0805	20.84		6.12		2.342		5.74		232.9		2.65		300	↓		
0810	21.72		7.41		2.385		5.70		150.3		1.30		↓			
0813	21.84		7.27		2.390		5.72		159.7		1.05					
0823	21.67		4.53		2.347		5.35		291.3		1.87					
0833	21.60		3.95		2.317		5.15		311.0		—		60			
0850	—		—		—		—		—		—		300			
0904	22.00		5.49		2.435		5.80		292.1		1.12					
0910	22.74		7.35		2.770		6.75		108.1		1.16					
0913	22.98		7.31		2.781		6.09		110.8		0.75					
0916	22.96		7.30		2.780		6.10		110.9		0.66					
0919	22.97		7.29		2.780		6.07		112.6		0.88		↓	↓	25 L	

Stop Purge Time: 09 20 | Sample Time: 09 30 | QA/QC Sample Time(s): NA

Sample ID: | QA/QC Sample ID(s): NA

Observations/Comments: 0750 Re Cal pH; appears to drift in fresh cal soln; 08:15 contact Silver State about meter; 08:45 Recal pH using new soln + ORP, 09:05 Christine lends her ~~probe~~ YSI meter Pes. unsure

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	1	~~500 mL Plastic~~ 3x Voa unpres		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass w/~~H_2SO_4~~ HCl
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: LVWPS-MW221B

Field Sampler(s): C. Larkins
Transducer Removal Time: NA | Transducer Redeployment time: NA | General Well Condition: Good
Depth to Water (ft): 30.01 | Screened Interval Top (ft): 83.7 | Pump Intake Depth (ft): 93.5
Well Depth (ft): 103.8 | Screened/Open Interval Bottom (ft): 103.2 | Well Diameter (in): 4
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP
Purge Start Time: 1042

Time	Temp. (°C) READ	Temp. CHANGE*	pH (pH Units) READ	pH CHANGE*	Conductivity (mS/cm) READ	Cond. CHANGE*	DO (mg/L) READ	DO CHANGE*	ORP (mV) READ	ORP CHANGE*	Turbidity (NTU) READ	Turb. CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1042	18.90		8.57		4.49		5.62		56		13.0		270	31.05	1.35	Clear
1052	19.05		8.82		4.48		4.80		51		15.5		270	31.05	2.7	↓
1107	~~18.58~~		7.53		4.45		4.48		166		18.7		270	31.05	6.75	↓
1112	19.15		7.87		4.43		3.99		137		20.3		270	31.05	8.1	↓
1117	19.26		7.90		4.42		3.91		125		21.3		270	31.05	9.45	↓
1120	19.36		7.90		4.42		3.70		116		24.0		270	31.05	10.26	↓
1123	19.35		7.90		4.42		3.71		111		27.2		270	31.05	11.07	↓
1126	19.45		7.90		4.41		3.64		99		27.4		↓	↓	11.88	↓
1129	19.47		7.88		4.41		3.62		92		31.3		↓	↓	12.69	↓
1132	19.45		7.87		4.42		3.64		85		31.4		↓	↓	13.5	↓
1135	19.46		7.87		4.41		3.59		76		32.2		↓	↓	14.31	↓
1138	19.47		7.88		4.42		3.54		57		37.1		↓	↓	15.12	↓
1141	19.55		7.88		4.41		3.58		50		36.4		↓	↓	15.93	↓
1144	19.55		7.88		4.41		3.52		39		39.2		↓	↓	16.74	↓

Stop Purge Time: 1147 | Sample Time: 11:55 | QA/QC Sample Time(s): NA
Sample ID: LVWPS-MW221B-BL02 | QA/QC Sample ID(s): NA

Observations/Comments: 1058 Cal pH on Horiba; ORP not Stabilizing - ~~noticed broken pin in probe display connection; possibly affecting probe function~~ (CDL 11/15/18) - Steady decline - Checked Cal, Cal is Good
HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	1	~~500 mL Plastic~~ 3x VOA unpres		500 mL w/H2SO4		500 mL poly w/HNO3	1	250 mL Amber Glass w/~~H2SO4~~ HCl
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H2SO4	2	250 mL poly w/HNO3		250 mL Amber Glass w/H3PO4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: GW Monitoring	Task Manager: Jesse Bunkers	Task No: H02	Date: 11/13/18	Well ID: LVWPS-MW222A
Field Sampler(s): C. Larkins				
Transducer Removal Time: NA		Transducer Redeployment Time: NA		General Well Condition: Good
Depth to Water (ft): 30.82		Screened Interval Top (ft): 80.3		Pump Intake Depth (ft): 90.2
Well Depth (ft): 100.5		Screened/Open Interval Bottom (ft): 100.0		Well Diameter (in): 2
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE		GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP
Purge Start Time: 12:45				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1250	23.08		8.14		3.996		1.17		34.9		186		240	30.95	1.2	~~Gray~~
1255	23.12		8.08		4.000		1.13		28.8		122		240	30.95	2.4	Slight Turb
1300	23.19		8.04		4.005		0.94		24.4		89.4		240	30.95	3.6	clear
1305	23.29		8.02		4.014		0.93		20.7		61.4		240	30.95	4.5	
1310	23.39		8.02		4.030		0.93		21.1		51.9		240	30.95	6.0	
1315	23.29		8.03		4.033		0.91		17.6		47.0		240	30.95	7.2	
1318	23.23		8.03		4.036		0.96		16.7		47.5		240	30.95	7.92	

Stop Purge Time: 1320 | Sample Time: 13:30 | QA/QC Sample Time(s): NA

Sample ID: LVWPS-MW222A-BL02 | QA/QC Sample ID(s): NA

Observations/Comments

Bottle Set Summary

1	3x VOA w/HCl	1	125 mL Plastic	1	~~500 mL Plastic~~ 3x VOA vapres		500 mL w/H_2SO_4		500 mL poly w/HNO_3	1	250 mL Amber Glass ~~w/H_2SO_4~~ HCl	
1	125 mL w/EDA	5	250 mL Plastic	2	250 mL w/H_2SO_4	2	250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: LVWPS-MW222B

Field Sampler(s): J Bankers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 30.36 | Screened Interval Top (ft): 150.3 | Pump Intake Depth (ft): 160

Well Depth (ft): 170.5 | Screened/Open Interval Bottom (ft): 170.6 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1312

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1323	24.5		8.02		3.921		2.17		-214.9		70.6		140	30.82		clear/none
1326	24.4		8.51		3.896		1.54		-252.8		76.9		"	30.95		"
1329	24.4		8.48		3.888		1.10		-297.8		41.0		130	30.90		"
1332	24.5		8.48		3.884		1.08		-300.8		40.2		"	30.85		"
1335	24.5		8.48		3.884		1.03		-302.2		40.0		"	"		"

Stop Purge Time: 1336 | Sample Time: 1340 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW222B-BL02 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0.0 mg/L HACH Kit Ferrous Iron: 0.0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: GW Monitoring	Task Manager: ~~Jesse Bunkers~~ D. Grady	Task No: ~~H02~~ M19	Date: 11/16/18	Well ID: LVWPS-MW222C
Field Sampler(s): J. Bunkers				
Transducer Removal Time:	Transducer Redeployment Time:		General Well Condition: Good	
Depth to Water (ft): 27.77	Screened Interval Top (ft): 214.0		Pump Intake Depth (ft): 223.8	
Well Depth (ft): 234.1	Screened/Open Interval Bottom (ft): 233.5		Well Diameter (in): 4	
Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE	GW Disposal: GW-11		Equipment Decon. Method: Alconox/DI Rinse SOP	
Purge Start Time: 0743				

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0754	20.5		8.10		4.083		1.66		43.9		8.9		300	27.90		clear/none
0757	19.8		8.02		4.053		0.94		58.8		6.4		150	28.25		"
0800	18.6		8.06		4.028		0.81		74.1		5.3		150	28.25		"
0803	18.6		8.06		4.030		0.80		74.3		5.3		"	"		"
0806	18.5		8.06		4.030		0.79		75.6		5.2		"	"		"

Stop Purge Time: 0807	Sample Time: ~~0810~~ 0815	QA/QC Sample Time(s): —
	Sample ID: LVWPS-MW222C-BL02	QA/QC Sample ID(s): —

Observations/Comments: Sulfide: 0.0 mg/L; Iron: 0.0 mg/L

NOTE: SAMPLED W/ NITROGEN TANK

Bottle Set Summary

	3x VOA w/HCl		125 mL Plastic		500 mL Plastic		500 mL w/H_2SO_4		500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4
	125 mL w/EDA		250 mL Plastic		250 mL w/H_2SO_4		250 mL poly w/HNO_3		250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:
± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: 223A

Field Sampler(s): CMowbray

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: good

Depth to Water (ft): 29.84 | Screened Interval Top (ft): 45.8 | Pump Intake Depth (ft): 55

Well Depth (ft): 65.5 | Screened/Open Interval Bottom (ft): 65 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 835

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
843	20.68		7.10		5.402		6.67		152.0		85.1		300	29.65		clear/no
845	20.15		7.00		5.362		5.52		148.0		32.0		140	29.75		
852	19.33		6.99		5.220		6.27		143.6		13.41		140	29.75		
859	19.29		6.98		5.194		6.63		140.8		8.42		140	29.75		
904	19.19		6.97		5.182		6.84		139.3		7.03		140	29.75		
907	19.09		6.97		5.171		6.71		138.7		4.94		140	29.75		
910	19.9		6.97		5.180		6.52		138.1		2.70		140	29.75		clear
															6L	

Stop Purge Time: 911 | Sample Time: 915 | QA/QC Sample Time(s): —

Sample ID: LVWD3-MW223A-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary 18 Bottles

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/19 | **Well ID:** 223B

Field Sampler(s): CMowbray

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: good

Depth to Water (ft): 29.97 628 | Screened Interval Top (ft): 70.3 | Pump Intake Depth (ft): 80

Well Depth (ft): 90.5 | Screened/Open Interval Bottom (ft): 90 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 635

Time	Temp. (°C) READ	Temp. CHANGE*	pH (pH Units) READ	pH CHANGE*	Conductivity (mS/cm) READ	Conductivity CHANGE*	DO (mg/L) READ	DO CHANGE*	ORP (mV) READ	ORP CHANGE*	Turbidity (NTU) READ	Turbidity CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
646	20.06		6.93		5.061		3.47		183.3		245		300	30		Br/none
658	20.12		6.94		5.056		5.89		167.3		107		300	30		
701	19.73		6.94		5.040		6.33		164.2		77.2		200	30		
711	18.68		6.93		4.904		6.05		158.4		52.6		200	30		
717	18.68		6.93		4.911		6.08		156.1		36.9		200	30		
727	18.85		6.93		4.921		5.97		152.5		33.8		200	30		
737	18.91		6.93		4.938		5.97		150.8		24.8		200	30		
747	18.99		6.93		4.933		5.87		149.8		26.3		200	30		
757	1902		6.95		4.945		5.92		149.6		25.8		200	30		
															14 L	

Stop Purge Time: 759 | **Sample Time:** 803 | **QA/QC Sample Time(s):** —

Sample ID: LVWPS-MW223B-BL02 | **QA/QC Sample ID(s):** —

Observations/Comments:

HACH Kit Sulfide: 0 mg/L **HACH Kit Ferrous Iron:** 0 mg/L

Bottle Set Summary 18 Bottles

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

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NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/2118 | Well ID: 223C

Field Sampler(s): Cmackey

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: good

Depth to Water (ft): 30.0 11:10 | Screened Interval Top (ft): 95.3 | Pump Intake Depth (ft): 103

Well Depth (ft): 110.6 | Screened/Open Interval Bottom (ft): 110 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1118

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1121	21.71		7.49		4.848		1.64		-42.1		109		120	30.2		
1125	22.15		7.44		4.898		0.72		-40.5		83.5		100	30.42		
1130	22.22		7.42		4.916		0.46		-39.0		57.8		100	30.51		clear/no
1135	22.27		7.41		4.920		0.39		-38.3		45.3		100	30.51		
1141	22.31		7.41		4.920		0.33		-37.7		13.18		100	30.51		
1145	22.27		7.41		4.919		0.37		-37.5		10.51		100	30.51		
1150	22.17		7.29		4.910		0.30		-36.6		21.2		100	30.51		clear/no
1155	22.21		7.20		4.911		0.33		-36.5		13.41		100	30.51		
1200	22.27		7.08		4.916		0.33		-36.1		11.84		100	30.51		
1205	22.23		7.06		4.898		0.34		-35.8		11.38		100	30.51		
1210	22.20		7.06		4.898		0.35		-35.7		11.25		100	30.51		
															7L	

Stop Purge Time: 1212 | Sample Time: 1215 | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary — 18 Bottles

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H2SO4	500 mL poly w/HNO3	250 mL Amber Glass w/H2SO4
125 mL w/EDA	250 mL Plastic	250 mL w/H2SO4	250 mL poly w/HNO3	250 mL Amber Glass w/H3PO4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH — LOW FLOW GROUNDWATER SAMPLING LOG

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NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: 224 A

Field Sampler(s): CMowrey

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: good

Depth to Water (ft): 34.65 | Screened Interval Top (ft): 55.3 | Pump Intake Depth (ft): 65

Well Depth (ft): 75.5 | Screened/Open Interval Bottom (ft): 75 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1123

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
1129	24.91		7.52		4.565		7.53		91.2		545		180	34.7		Par / none
1136	24.42		7.42		4.488		6.48		84.9		592		180	34.7		
1143	24.34		7.42		4.472		6.24		65.6		587		180	34.70		
1147	24.42		7.42		4.478		6.07		66.5		573		180	34.70		
1152	24.32		7.43		4.478		5.67		67.1		566		180	34.70		
1155	24.34		7.44		4.492		5.66		67.4		547		180	34.70		Br / none
1159	24.40		7.44		4.513		5.47		67.9		462		180	34.70		
1204	24.46		7.45		4.531		5.04		68.4		463		180	34.70		
1207	24.42		7.45		4.533		5.03		68.8		468		180	34.70		
															10L	

Stop Purge Time: 1208 | Sample Time: 1210 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW224A-BL02 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary 18 Bottles

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

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NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: MW 224 B

Field Sampler(s): CMowery

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: good

Depth to Water (ft): 34.3 | Screened Interval Top (ft): 106.8 | Pump Intake Depth (ft): 116.

Well Depth (ft): 127 | Screened/Open Interval Bottom (ft): 126.5 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 927

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
937	22.39		7.96		5.951		2.14		-3.0		283		210	34.68		br/none
943	23.05		7.72		6.471		1.53		-54.8		214		210	34.68		
948	23.24		7.70		6.481		1.39		-58.4		136		210	34.68		
953	23.26		7.69		6.354		1.30		-51.4		83.9		210	34.68		
958	23.19		7.69		6.309		1.18		-37.7		43.7		210	34.68		rotten eggs
1004	23.35		7.68		6.411		1.10		-34.6		37.2		210	34.68		
1008	23.30		7.68		6.467		1.13		-33.6		31.2		210	34.68		
1015	23.45		7.67		6.532		1.40		-28.7		24.8		210	34.68		
1023	23.44		7.67		6.544		1.00		-25.0		24.4		210	34.68		
1028	23.50		7.66		6.551		6.95		-24.5		19.64		210	34.68		
1032	23.59		7.66		6.657		0.93		-24.7		17.85		210	34.68		
1035	23.61		7.66		6.560		0.90		-24.2		15.64		210	34.68		
1038	23.62		7.67		6.515		6.92		-20.1		14.94		210	34.68		
1042	23.68		7.67		6.420		0.92		-18.2		14.73		210	34.68	14L	

Stop Purge Time: 1044 | Sample Time: 1047 | QA/QC Sample Time(s): 845

Sample ID: LVWPS-MW 224B-BL02 | QA/QC Sample ID(s): LVWPS-20181114-ERB

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: .5 mg/L

Bottle Set Summary 18 bottles

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D Grady | Task No: M19 | Date: 1/14/18 | Well ID: 224C

Field Sampler(s): CMowrey

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: good

Depth to Water (ft): 34.8 | Screened Interval Top (ft): 174.5 | Pump Intake Depth (ft): 182

Well Depth (ft): 194.6 | Screened/Open Interval Bottom (ft): 194 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 707 near capacity for MP-50

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
722	14.11		10.12		9.643		4.47		151.4		133		100	34.6		
726	14.17		9.59		10.79		2.81		121.3		22.6		100	34.8		clear/none
		recalibrated					double check		PH 7 reads 7.04		10 reads 9.78		4 reads 3.67			
									7 = 7.01		10. = 10.0		4 = 3.98			
737	15.44		7.05		11.75		2.41		228.3		6.08		100	35.40		
744	15.80		7.98		12.01		91.93		108.2		4.97		75	35.40		
747	15.85		8.04		12.03		2.25		77.2		4.26		75	35.50		
752	16.02		8.05		12.09		2.37		72.9		3.65		75	35.50		
755	15.88		8.06		12.04		2.32		73.2		2.62		75	35.50		
															4L	

Stop Purge Time: 756 | Sample Time: 800 | QA/QC Sample Time(s): 800

Sample ID: LVWPS-224C-R202 | QA/QC Sample ID(s): LVWPS-224C-R202-MS/MSD

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary 18 Bottles + 13

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3		250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4		500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/3/18 | Well ID: mw225A

Field Sampler(s): Chowdary

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: good

Depth to Water (ft): 33.5 | Screened Interval Top (ft): 49.3 | Pump Intake Depth (ft): 60

Well Depth (ft): 69.5 | Screened/Open Interval Bottom (ft): 69 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1135

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1147	21.97		6.98		5.215		3.83		129.4		72.0		400	33.5		Br / NR
1150	21.73		6.95		5.259		3.66		129.5		45.8		200	33.5		
1155	21.38		6.96		5.222		3.54		129.4		31.1		200	33.5		
1201	21.40		6.94		5.220		3.58		129.2		22.4		200	33.5		
1206	21.28		6.94		5.204		3.52		129.2		19.4		200	33.5		
1209	21.33		6.93		5.211		3.55		129.1		20.5		200	33.5		
1213	21.34		6.94		5.220		3.46		129.0		[redacted]8.54		200	33.5		clear/no
1217	21.36		6.93		5.215		3.53		129.0		3.65		200	33.5		
															11L	

Stop Purge Time: [redacted] 1218 | Sample Time: 1220 | QA/QC Sample Time(s): 1220

Sample ID: LVWPS-mw225A-BL02 | QA/QC Sample ID(s): LVWPS-mw225A-BL02-FD

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary 18 Bottles

	3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4	
	125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass	

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/14/18 | Well ID: 2258 B

Field Sampler(s): CMowery

Transducer Removal Time: | Transducer Redeployment time: | General Well Condition: Good

Depth to Water (ft): 32.97 | Screened Interval Top (ft): 90.5 | Pump Intake Depth (ft): 100

Well Depth (ft): 110.6 | Screened/Open Interval Bottom (ft): 110 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1304

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1311	23.23		7.51		5.295		2.40		75.6		339		200	33.15		clear/no
1315	23.34		7.52		5.297		2.80		75.1		35.7		~~200~~ 120	33.15		
1319	23.33		7.52		5.293		2.87		75.0		33.7		120	33.15		
1324	23.32		7.52		5.291		2.82		75.0		27.5		120	33.15		
1328	23.37		7.51		5.296		2.68		75.1		18.57		120	33.15		
1331	23.31		7.50		5.288		2.86		75.2		18.55		120	33.15		
1334	23.27		7.51		5.283		2.92		75.4		16.19		120	33.15		
1337	23.31		7.51		5.287		2.93		75.7		16.33		120	33.15		clear/no
1340	23.32		7.51		5.302		2.94		75.8		15.86		120	33.15		
															10L	

Stop Purge Time: 1341 | Sample Time: 1345 | QA/QC Sample Time(s):

Sample ID: LVWPS-MW2258-20202 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: 226 A

Field Sampler(s): CMowbray

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition:

Depth to Water (ft): 37.4 | Screened Interval Top (ft): @ 40.3 | Pump Intake Depth (ft): 47.0

Well Depth (ft): 55.5 | Screened/Open Interval Bottom (ft): 55 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: ~~736~~ 735 all back SOP

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
742	21.42		7.30		5.100		5.87		202.4		655		200	37.45		Br/none
749	22.17		7.30		5.183		5.76		159.5		278		200	37.45		
753	22.33		7.29		5.198		5.68		145.3		211		200	37.45		
801	22.36		7.27		5.202		5.60		132.3		256		200	37.45		
804	22.39		7.27		5.205		5.55		129.9		270		200	37.45		
807	22.33		7.26		5.199		5.51		127.8		238		200	37.45		
811	22.47		7.25		5.213		5.45		125.8		269		200	37.45		
814	22.50		7.26		5.216		5.46		124.8		158		200	37.45		white/cloudy
817	22.53		7.26		5.219		5.37		123.3		85.1		200	37.45		
820	22.55		7.24		5.221		5.29		122.3		80.3		200	37.45		
823	22.62		7.25		5.231		5.29		121.0		76.7		200	37.45		
826	22.68		7.24		5.245		5.30		119.8		77.2		200	37.45	14L	

Stop Purge Time: 827 | Sample Time: 830 | QA/QC Sample Time(s): 845

Sample ID: LVWPS-MW226A-BL02 | QA/QC Sample ID(s): LVWPS-20181115-FB

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary 18 Bottles

	3x VOA w/HCl	+	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
+	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

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NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: MW-02

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 39.52 | Screened Interval Top (ft): 32 | Pump Intake Depth (ft): ~~37~~ 41

Well Depth (ft): 45 | Screened/Open Interval Bottom (ft): 42 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0749

Time	Temp. (°C) READ	Temp. (°C) CHANGE*	pH (pH Units) READ	pH (pH Units) CHANGE*	Conductivity (mS/cm) READ	Conductivity (mS/cm) CHANGE*	DO (mg/L) READ	DO (mg/L) CHANGE*	ORP (mV) READ	ORP (mV) CHANGE*	Turbidity (NTU) READ	Turbidity (NTU) CHANGE*	Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
0752	21.2		7.34		4.231		6.99		275.9		20.4		300	39.52		clear/none
0755	22.2		7.33		4.272		6.61		266.0		11.2		"	"		"
0758	22.3		7.34		4.288		6.56		261.7		7.7		"	"		"
0801	22.3		7.34		4.280		6.53		261.3		7.5		"	"		"
0804	22.4		7.34		4.284		6.51		260.9		6.6		"	"		"

Stop Purge Time: 0805 | Sample Time: 0806 | Sample ID: MW-02-BL02

QA/QC Sample Time(s): 0808 | 0820

QA/QC Sample ID(s): MW-02-BL02-FD | LVWPS-20181115-FB

Observations/Comments:

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L

Bottle Set Summary

	3x VOA w/HCl	2	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
2	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: MW-04

Field Sampler(s): CMonaray

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 21.9 | Screened Interval Top (ft): 29 | Pump Intake Depth (ft): 34

Well Depth (ft): 39 | Screened/Open Interval Bottom (ft): 39 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1220

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1226	24.76		7.47		13.96		5.19		101.4		96.7		200	22.78		white/cloudy
1233	24.53		7.49		13.98		5.60		107.3		96.3		180	22.75		none
1236	24.49		7.50		13.96		5.67		107.5		72.0		180	[redacted]	23.5	
1240	24.67		7.51		19.12		5.63		106.0		75.6		120	[redacted]	23.08	
1243	24.78		7.50		14.33		5.46		105.9		64.3		120	23.16		
1246	24.74		7.50		14.35		5.47		105.8		57.8		120	23.18		clear/none
1249	24.66		7.50		14.34		5.45		105.8		52.6		120	23.18		
1252	24.68		7.50		14.36		5.43		105.7		55.1		120	23.18		
1255	24.69		7.49		14.41		5.38		105.8		53.4		120	23.18		
															5L	

Stop Purge Time: 1257 | Sample Time: 1300 | QA/QC Sample Time(s):

Sample ID: MW-04-20202 | QA/QC Sample ID(s):

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

	3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/13/18 | Well ID: MW13

Field Sampler(s): CMowbray

Transducer Removal Time: 1008 | Transducer Redeployment time: 1109 | General Well Condition:

Depth to Water (ft): 35.07 | Screened Interval Top (ft): 38 | Pump Intake Depth (ft): 43

Well Depth (ft): 48 | Screened/Open Interval Bottom (ft): 48 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1014

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1018	20.96		7.06		5.031		5.24		134.7		42.8		280	35.10		cloudy/no
1023	21.69		6.99		5.150		4.47		134.3		45.5		280	35.10		
1028	21.69		6.97		5.166		4.25		133.7		48.8		280	35.10		
1033	21.61		6.96		5.168		4.15		133.2		44.6		280	35.10		
1038	21.62		6.95		5.168		4.02		132.6		48.6		280	35.10		
1043	21.74		6.94		5.175		3.95		132.3		44.8		280	35.10	7 L	

Stop Purge Time: 1044 | Sample Time: 1047 | QA/QC Sample Time(s): —

Sample ID: MW-13-121102 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: 0 mg/L HACH Kit Ferrous Iron: 0 mg/L

Bottle Set Summary 18 Bottles

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: MW-20

Field Sampler(s): CMowbray

Transducer Removal Time: 1056 | Transducer Redeployment time: 1156 | General Well Condition: good

Depth to Water (ft): 32.8 | Screened Interval Top (ft): 50 | Pump Intake Depth (ft): 68

Well Depth (ft): 65 | Screened/Open Interval Bottom (ft): 65 | Well Diameter (in): 2

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1101

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1105	23.62		7.27		5.194		2.77		110.8		173		180	32.8		Br/none
1109	23.86		7.27		5.234		2.58		109.4		116		180	32.9		
1114	24.05		7.28		5.251		2.50		108.7		120		160	32.9		cloudy Iron
1118	24.06		7.27		5.248		2.60		108.7		95.5		160	32.9		
1123	24.13		7.27		5.257		2.55		108.3		56.4		160	32.9		
1128	24.24		7.26		5.268		2.54		108.0		46.5		160	32.9		
1132	24.24		7.26		5.269		2.55		107.6		34.2		160	32.9		
1135	24.20		7.26		5.265		2.53		107.5		26.2		160	32.9		
1138	24.19		7.25		5.264		2.56		107.4		20.7		160	32.9		clear/no
1142	24.23		7.25		5.268		2.50		107.2		19.7		160	32.9		
1145	24.27		7.26		5.272		2.51		107.1		18.8		160	32.9		
															7.52	

Stop Purge Time: 1146 | Sample Time: 1148 | QA/QC Sample Time(s): 1148

Sample ID: MW-20-BL02-[redacted] | QA/QC Sample ID(s): MW-20-BL02-MS/MSD

Observations/Comments:

HACH Kit Sulfide: N A mg/L HACH Kit Ferrous Iron: N A mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: MW-25

Field Sampler(s): J. Bunkers

Transducer Removal Time: — | Transducer Redeployment time: — | General Well Condition: Good

Depth to Water (ft): 39.34 | Screened Interval Top (ft): 38 | Pump Intake Depth (ft): 45.5

Well Depth (ft): 53 | Screened/Open Interval Bottom (ft): 53 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 0850

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
0854	22.8		7.37		4.789		4.92		241.9		8.4		300	39.34		clear/none
0857	24.2		7.35		4.871		4.55		253.3		6.7		"	"		"
0900	24.6		7.35		4.895		4.45		260.0		6.4		"	"		"
0903	24.6		7.34		4.897		4.45		260.9		6.6		"	"		"
0906	24.6		7.34		4.894		4.43		261.7		7.0		"	"		"

Stop Purge Time: 0907 | Sample Time: 0908 | QA/QC Sample Time(s): —

Sample ID: MW-25-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: — mg/L HACH Kit Ferrous Iron: — mg/L

Bottle Set Summary

3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: MW226RD

Field Sampler(s): Mowery

Transducer Removal Time: — | Transducer Redeployment time: | General Well Condition:

Depth to Water (ft): 80.95 | Screened Interval Top (ft): | Pump Intake Depth (ft):

Well Depth (ft): | Screened/Open Interval Bottom (ft): | Well Diameter (in):

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1533

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1534	22.06		7.71		32.17		7.28		115.4		32.8		Bail	—		clear/no
1541	22.24		7.66		32.32		4.75		111.5		134			82.65	5L	
1549	20.69		7.67		31.72		5.05		108.9		455			83.95	9.5L	
1600	20.53		7.71		32.15		5.49		103.0		913			85.60	14L	
1626	21.04		7.70		32.17		4.79		101.1		973			89.55	28L	
1639	20.70		7.64		33.76		4.09		105.3		—			92.8	~~36L~~	
														96.25	36L	

Stop Purge Time: 1653 | Sample Time: | QA/QC Sample Time(s):

Sample ID: | QA/QC Sample ID(s):

Observations/Comments: 12/4/18 GROUNDWATER SAMPLE COLLECTED UPON RECHARGE TO 143.03 feet bTOC @ ~~1115~~ on ~~12/3/18~~ 12/4/18; SAMPLE TIME 1150 - SAMPLED W/ BAILER BY J. BUNKERS 64.73 gal

HACH Kit Sulfide: _____mg/L HACH Kit Ferrous Iron: _____mg/L ADDITIONAL FIELD PARAMETERS NOT MEASURED DUE TO VOLUME CONSTRAINTS.

Bottle Set Summary

3x VOA w/HCl	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/16/18 | Well ID: NERT 4.5151

Field Sampler(s): Clay

Transducer Removal Time: 7658 | Transducer Redeployment time: 07:56 | General Well Condition: Good

Depth to Water (ft): 26.17 | Screened Interval Top (ft): 40 | Pump Intake Depth (ft): 45

Well Depth (ft): 50.41 | Screened/Open Interval Bottom (ft): 50 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 07:20

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
07:25	12.34		7.08		5.42		5.30		235		2.2		240	26.19		
07:30	13.17		7.20		5.40		4.81		229		2.2		↓	26.16		
07:33	13.90		7.27		5.37		4.40		222		2.0			26.16		
07:36	13.88		7.29		5.37		4.27		220		1.9			26.16		
07:39	13.93		7.33		5.39		4.24		213		1.7			26.16		

Stop Purge Time: 07 40 | Sample Time: 07:45 | QA/QC Sample Time(s): 7:05

Sample ID: NERT 4.5151-BL02 | QA/QC Sample ID(s): LVWPS-20181116-EB

Observations/Comments:

HACH Kit Sulfide: ____mg/L HACH Kit Ferrous Iron: ____mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: NERT4.715 1

Field Sampler(s): Jesse Bunkers

Transducer Removal Time: 1508 | Transducer Redeployment time: 1544 | General Well Condition: Good

Depth to Water (ft): 28.70 | Screened Interval Top (ft): 40 | Pump Intake Depth (ft): 45

Well Depth (ft): 46.70 | Screened/Open Interval Bottom (ft): 50 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1524

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1526	23.1		7.56		6.258		3.46		184.1		4.4		320	28.70		clear/no
1529	23.1		7.40		6.268		3.34		190.6		4.8		"	"		"
1532	23.0		7.36		6.266		3.40		194.8		5.2		"	"		"
1535	23.0		7.34		6.265		3.42		196.9		5.8		"	"		"
1538	23.0		7.34		6.265		3.40		197.5		5.7		"	"		"

Stop Purge Time: 1539 | Sample Time: 1540 | QA/QC Sample Time(s): —

Sample ID: NERT4.715 1-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: — mg/L HACH Kit Ferrous Iron: — mg/L

Bottle Set Summary

3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	1	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | **Well ID:** NERT4.9351

Field Sampler(s): C Larkins

Transducer Removal Time: 13 12 | Transducer Redeployment time: 13:04 | General Well Condition: Good

Depth to Water (ft): 27.50 | Screened Interval Top (ft): 45 | Pump Intake Depth (ft): 50

Well Depth (ft): 55.4 | Screened/Open Interval Bottom (ft): 55 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 13 22

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1327	18.86		6.62		4.03		3.39		235		2.3		300	27.50	1.5	Clear
1330	18.72		6.63		4.05		3.08		227		1.5		↓	27.50	2.4	↓
1333	18.65		6.64		4.05		2.90		217		1.5			27.50	3.2	
1336	18.67		6.65		4.06		3.12		208		1.3			↓	4.1	
1339	18.66		6.65		4.06		2.88		205		1.3				5.0	
1342	18.63		6.66		4.07		2.86		200		1.3				5.9	
1345	18.61		6.66		4.07		2.87		197		1.2			27.50	6.8	

Stop Purge Time: 1346 | **Sample Time:** 13:48 | **QA/QC Sample Time(s):** ~~NA~~ 12:30

Sample ID: NERT4.9351-BL02 | **QA/QC Sample ID(s):** ~~NA~~ LVWPS-20181115-EB

11/15/18

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	1	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: NERT5.1151

Field Sampler(s): C. Larkins

Transducer Removal Time: 1430 | Transducer Redeployment time: 1527 | General Well Condition: Good

Depth to Water (ft): 20.83 | Screened Interval Top (ft): 35 | Pump Intake Depth (ft): 40

Well Depth (ft): 45.4 | Screened/Open Interval Bottom (ft): 45 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1445

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1450	19.00		6.75		4.26		3.97		164		164		240	20.83	1.2	Gray
1455	18.91		6.67		4.32		2.86		166		70.2		240	20.83	2.4	Gray/Clear
1500	18.86		6.66		4.32		2.55		166		18.66		240	20.83	3.6	Clear
1503	18.84		6.66		4.31		2.42		165		11.86		240	20.83	4.32	Clear
1506	18.83		6.67		4.31		2.37		164		10.82		240	20.83	5.04	↓
1509	18.81		6.66		4.31		2.34		163		9.17		240	20.83	5.76	
1512	18.80		6.66		4.30		2.29		162		8.90		240	20.83	6.48	
1515	18.79		6.66		4.31		2.26		157		8.62		240	20.83	7.20	

Stop Purge Time: 1518 | Sample Time: 1520 | QA/QC Sample Time(s): NA

Sample ID: NERT5.1151 | QA/QC Sample ID(s): NA

Observations/Comments:

HACH Kit Sulfide: NA mg/L HACH Kit Ferrous Iron: NA mg/L

Bottle Set Summary

3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
125 mL w/EDA	1	250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN **3 CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

TETRA TECH

LOW FLOW GROUNDWATER SAMPLING LOG

NERT, Henderson, NV

Task Name: Las Vegas Wash Pilot Study | Task Manager: D. Grady | Task No: M19 | Date: 11/15/18 | Well ID: WMW4.9S

Field Sampler(s): J. Bunkers

Transducer Removal Time: 1220 | Transducer Redeployment time: 1255 | General Well Condition: Good

Depth to Water (ft): 26.31 | Screened Interval Top (ft): 20 | Pump Intake Depth (ft): 35

Well Depth (ft): 46.75 | Screened/Open Interval Bottom (ft): 50 | Well Diameter (in): 4

Pump/Tubing Type: QED Bladder Pump & TLPE/LDPE | GW Disposal: GW-11 | Equipment Decon. Method: Alconox/DI Rinse SOP

Purge Start Time: 1234

Time	Temp. (°C)		pH (pH Units)		Conductivity (mS/cm)		DO (mg/L)		ORP (mV)		Turbidity (NTU)		Purge Rate (ml/min)	Depth to Water (ft)	Cum. Vol. Purged (L)	Color/Odor
	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*	READ	CHANGE*				
1237	23.4		7.31		2.933		3.17		179.4		6.1		300	26.31		clear/none
1240	23.3		7.26		2.909		2.20		191.0		3.8		"	"		"
1243	23.3		7.26		2.912		2.10		197.5		3.4		"	"		"
1246	23.3		7.25		2.911		2.10		198.3		3.5		"	"		"

Stop Purge Time: 1247 | Sample Time: 1248 | QA/QC Sample Time(s): —

Sample ID: WMW4.9S-BL02 | QA/QC Sample ID(s): —

Observations/Comments:

HACH Kit Sulfide: — mg/L HACH Kit Ferrous Iron: — mg/L

Bottle Set Summary

	3x VOA w/HCl	1	125 mL Plastic	500 mL Plastic	500 mL w/H_2SO_4	500 mL poly w/HNO_3	250 mL Amber Glass w/H_2SO_4
1	125 mL w/EDA		250 mL Plastic	250 mL w/H_2SO_4	250 mL poly w/HNO_3	250 mL Amber Glass w/H_3PO_4	500 mL Amber Glass

*INDICATOR PARAMETERS HAVE STABLIZED WHEN 3 **CONSECUTIVE READINGS** ARE WITHIN:

± 0.1 for pH; ± 3% for Cond and Temp; ± 10 mv for ORP; ± 10% or <0.5 mg/L for DO; ± 10% or <10 NTU Turbidity

Surface Water Field Logs

July 2018 Sampling Event

TETRA TECH

CALIBRATION LOG - WATER QUALITY METER

NERT, Henderson, NV

Task Name: LVW Surface Water Sampling | Task No.: M15 | Rental from: EQUIPCO | Task Manager: Bounkheana Chhun

Field Personnel: Jesse Bunkers, Miles Hearn | Serial Number: YSIPRODSS.23 | Type: YSI ProDSS

			Pre-Calibration							Post-Calibration						
Date	Time	Temp (°C)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (%)	Turbidity (NTU)	pH (pH = 4.0)	pH (pH = 7.0)	pH (pH = 10.0)	ORP (mV)	Cond. (mS/cm)	DO (%)	Turbidity (NTU)
7/23/18	1530	22.4	4.3	7.1	9.88	239.2	1150	97.0	0.1	4.0	7.0	10.0	234.3	1000	100	0.0
7/24/18	1430	22.2	4.1	7.1	10.01	240.0	1009	98.5	0.1	4.0	7.0	10.0	234.2	1000	100	0.0

Notes:

EQUIPCO RENTALS

YSI ProDSS RENTAL
CALIBRATION CERTIFICATE

SERVICE TECHNICIAN: MDS DATE: 4/6/2018

RENTAL CUSTOMER: Tetratech

INSTRUMENT INFORMATION

RENTAL I.D. NUMBER: YSI-ProDSS 23

SERIAL NUMBER:

CALIBRATION INFORMATION

PARAMETER:	STANDARD:	PASS ( )	LOT #
1. CONDUCTIVITY	1,000 µMhos	✓	55029
2. pH ZERO	pH 7	✓	3515
pH SLOPE	pH 4	✓	3573
pH SLOPE	pH 10	✓	3515
3. DISSOLVED OXYGEN	Air Calibration Barometric pressure = 760mmHg	✓	N/A
DISSOLVED OXYGEN ZERO TEST	(Sodium Sulfite)	✓	070618
4. TURBIDITY ZERO	0.0 NTU's	✓	N/A
TURBIDITY SPAN	100 NTU's	✓	070618
5. REDOX (ORP)	231mV (YSI Zobell solution)	✓	021617

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TETRA TECH

SURFACE WATER SAMPLING LOG

NERT, Henderson, NV

Task Name: LVW Surface Water Sampling	Task Manager: Bounkheana Chhun	Task No: M15	Date: 7/23/18
Field Samplers:		Sampling Method: Dipper Bottle	Equipment Decon. Method: DI Rinse

Time	Location ID	Depth of Water (ft)	Depth of Sample (ft)	Temp. (°C)	pH (pH Units)	Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Color	Odor
1030	LVW0.55-0.5-20180723	1.0	0.5	31.2	8.04	2005	7.36	179.4	27.0	None	organic
1100	LVW3.5-1-1.0-20180723	2.0	1.0	33.3	7.93	2054	7.58	60.6	15.3	None	None
1100	LVW3.5-2-1.5-20180723	3.0	1.5	32.1	7.97	2044	7.55	70.8	25.9		
1115	LVW3.5-3-1.75-20180723	3.5	1.75	32.2	7.95	2036	7.62	57.9	17.2		
1115	LVW3.5-4-1.75-20180723	3.5	1.75	32.1	7.94	2031	7.56	54.3	19.3		
1130	LVW3.5-5-2.0-20180723	4.0	2.0	32.3	7.94	2028	7.51	54.3	19.9		
1130	LVW3.5-6-20-20180723	4.0	2.0	33.1	7.91	2018	7.37	61.6	15.3		
1200	W8-93 Kids Weir 0.75-20180723	1.5	0.75	35.8	7.98	2049	7.65	29.8	21.0	"	"
1230	LVW4.2-1-1.5-20180723	3.0	1.5	33.1	7.67	2146	6.14	-6.1	18.3		
1230	LVW4.2-2-2.0-20180723	4.0	2.0	33.2	7.74	2112	6.49	3.2	17.8		
1245	LVW4.2-3-2.5-20180723	5.0	2.5	33.3	7.78	2067	6.73	12.2	15.5		
1245	LVW4.2-4-2.0-20180723	4.0	2.0	33.4	7.75	2041	6.59	26.6	14.0		
1330	LVWPS4.4-0.5-20180723	1.0	0.5	35.9	7.75	1091	6.49	73.3	20.2		
1400	W7 Lower Narrow-1.0-20180723	2.0	1.0	35.2	7.84	2088	6.73	31.0	24.6		
1400	" - MS/MSD	"	"	"	"	"	"	"	"		
1400	" - FB	"	"	"	"	"	"	"	"		
1400	" - EB	"	"	"	"	"	"	"			

QA/QC Samples/ID: W7 Lower Narrow-1.0-20180723-MS/MSD

QA/QC Sample Time: 1400

QA/QC Samples/ID: W7 Lower Narrow-1.0-20180723-FB

QA/QC Sample Time: 1400

QA/QC Samples/ID: W7 Lower Narrow-1.0-20180723-EB

QA/QC Sample Time: 1400

Bottle Set Summary:

125 mL Plastic 17

250 mL Plastic 34

500 mL Plastic –

125 mL w/ EDA 17

Observations/Comments:

TETRA TECH

SURFACE WATER SAMPLING LOG

NERT, Henderson, NV

Task Name: LVW Surface Water Sampling	Task Manager: Bounkheana Chhun	Task No: M15	Date: 7/24/18
Field Samplers: JB, MH		Sampling Method: Dipper Bottle	Equipment Decon. Method: DI Rinse

Time	Location ID	Depth of Water (ft)	Depth of Sample (ft)	Temp. (°C)	pH (pH Units)	Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Color	Odor
0645	LVW4.75-1-1.5-20180724	3.0	1.5	28.1	7.78	1911	6.99	169.2	27.1	None	Org.
0645	LVW4.75-2-1.25-20180724	2.5	1.25	28.8	7.81	1953	7.00	165.6	24.7	None	None
0645	LVW4.75-3-1.0-20180724	2.0	1.0	28.8	7.81	1955	6.98	162.3	26.3	"	"
0700	LVW4.75-4-1.0-20180724	2.0	1.0	28.8	7.82	1918	6.92	157.9	27.0	"	"
0700	LVW4.75-5-1.0-20180724	2.0	1.0	28.8	7.83	1920	7.01	153.9	24.2	"	"
0745	LVWPS4.9-1.0-20180724	2.0	1.0	29.3	7.90	1959	7.23	130.9	14.7	"	"
0845	LVWPS5.1-1.0-20180724	2.0	1.0	29.5	7.80	1995	6.33	138.4	65.6	"	Org.
1030	OutFall004-WLVS-20180724	2.0	1.0	33.4	7.78	2069	6.93	93.4	22.7	"	None
1045	WS-Middleway-1.0-20180724	2.0	1.0	32.7	7.80	2062	7.01	52.8	23.5	"	"
	" - FD	"	"	"	"	"	"	"	"	"	"
1100	LVW6.05-0.5-20180724	1.0	0.5	33.9	7.79	2037	6.81	120.4	17.4	"	"
	" - FD	"	"	"	"	"	"	"	"	"	"
	" - FB	"	"	-	-	-	-	-	-	-	-

QA/QC Samples/ID: WS-Middleway-1.0-20180724-FD	QA/QC Samples/ID: LVW6.05-0.5-20180724-FD	QA/QC Samples/ID: LVW6.05-0.5-20180724-FB
QA/QC Sample Time: 1045	QA/QC Sample Time: 1100	QA/QC Sample Time: 1100
Bottle Set Summary:	125 mL Plastic 13	500 mL Plastic -
	250 mL Plastic 24	125 mL w/ EDA 13

Observations/Comments:

TETRA TECH

SURFACE WATER SAMPLING LOG

NERT, Henderson, NV

Task Name: LVW Surface Water Sampling | Task Manager: Bounkheana Chhun | Task No: M15 | Date: 7/25/18

Field Samplers: JB, MH | Sampling Method: Dipper Bottle | Equipment Decon. Method: DI Rinse

Time	Location ID	Depth of Water (ft)	Depth of Sample (ft)	Temp. (°C)	pH (pH Units)	Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Color	Odor
0645	LVW5.3-1-3.0-20180725	6.0	3.0	30.1	7.66	1927	6.64	126.9	19.7	None	None
0700	LVW5.3-2-0.75-20180725	1.5	0.75	28.4	7.66	2019	6.66	127.9	28.6	"	"
0700	LVW5.3-3-0.5-20180725	1.0	0.5	28.8	7.63	1885	6.64	132.8	23.8	"	"
0800	WS-C-1.0-20180725	2.0	1.0	30.0	7.68	1977	7.18	166.3	20.1	"	"
0800	" -FD	"	"	"	"	"	"	"	"	"	"
0830	LVW6.6-1-1.0-20180725	2.0	1.0	33.0	7.58	2268	5.99	119.3	12.2	"	"
0845	LVW6.6-2-1.0-20180725	2.0	1.0	31.2	7.72	1907	6.55	109.8	26.5	"	"
0900	LVW6.6-3-1.25-20180725	2.5	1.25	30.9	7.74	1687	6.20	111.0	17.0	"	"
0930	LVW7.2-1.0-20180725	2.0	1.0	31.9	7.57	2219	6.24	133.6	15.3	"	"
1100	LVW8.85-1.0-20180725	2.0	1.0	35.3	7.59	1776	7.50	141.5	5.9	"	"
1100	" -FD	"	"	"	"	"	"	"	"	"	"
1100	" -FB	—	—	—	—	—	—	—	—	—	—

QA/QC Samples/ID: LVW8.85-1.0-20180725-FD | QA/QC Samples/ID: LVW8.85-1.0-20180725-FB | QA/QC Samples/ID: WS-6-1.0-20180725-FD

QA/QC Sample Time: 1100 | QA/QC Sample Time: 1100 | QA/QC Sample Time: 0800

Bottle Set Summary:

125 mL Plastic 12 | 500 mL Plastic —

250 mL Plastic 22 | 125 mL w/ EDA 2

Observations/Comments:

Appendix H
Analytical Data Summary Tables

Table H.1
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0			Dissolved Metals by SW6010B			
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium	Potassium	Sodium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101B	21.5 - 22	Alluvium	4/3/2018	N	440-207959-14	<0.012	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	37.5 - 38	UMCf	4/3/2018	N	440-207959-15	0.048 J	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	51 - 51.5	UMCf	4/3/2018	N	440-207959-16	<0.018	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	62 - 62.5	UMCf	4/3/2018	N	440-207959-17	1.5	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	62 - 62.5	UMCf	4/3/2018	FD	440-207959-18	1.0	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	90.5 - 91	UMCf (Semi-Consolidated)	4/3/2018	N	440-207959-19	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	102 - 102.5	UMCf (Semi-Consolidated)	4/3/2018	N	440-207959-20	<0.014	----	----	----	----	----	----	----	----	----
LVWPS-MW102B	27.5 - 28	UMCf	4/4/2018	N	440-208225-1	2.0	4,000 J	250	18	0.84	62	12	5.7	9.5	20
LVWPS-MW102B	42.5 - 43	UMCf	4/4/2018	N	440-208225-2	0.30	----	----	----	----	----	----	----	----	----
LVWPS-MW102B	58 - 58.5	UMCf	4/4/2018	N	440-208225-3	<0.013	190 J	<10	18	<0.25	41	8.5	7.1	9.6	19
LVWPS-MW102B	83 - 83.5	UMCf (Semi-Consolidated)	4/4/2018	N	440-208225-4	<0.014	----	----	----	----	----	----	----	----	----
LVWPS-MW102B	99.5 - 100	UMCf (Semi-Consolidated)	4/4/2018	N	440-208225-5	<0.074 UJ	<78 UJ	<10	260	<0.25	1,200	160	110	200	210
LVWPS-MW102B	119 - 119.5	UMCf (Semi-Consolidated)	4/5/2018	N	440-208225-6	<0.062	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	27.5 - 28	UMCf	4/19/2018	N	440-209332-4	5.3	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	41 - 41.5	UMCf	4/19/2018	N	440-209332-5	0.079 J	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	62 - 62.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-6	<0.059 UJ	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	79 - 79.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-7	<0.069	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	79 - 79.5	UMCf (Semi-Consolidated)	4/19/2018	FD	440-209332-8	<0.071	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	92 - 92.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-9	<0.24	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	105.5 - 106	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-10	<0.063	----	----	----	----	----	----	----	----	----
LVWPS-MW104	24.5 - 25	Alluvium	4/2/2018	N	440-207959-1	0.64	----	----	----	----	----	----	----	----	----
LVWPS-MW104	31 - 31.5	Alluvium	4/2/2018	N	440-207959-2	0.56	----	----	----	----	----	----	----	----	----
LVWPS-MW104	40 - 40.5	UMCf	4/2/2018	N	440-207959-3	<0.014	----	----	----	----	----	----	----	----	----
LVWPS-MW104	53.5 - 54	UMCf	4/2/2018	N	440-207959-4	2.0	----	----	----	----	----	----	----	----	----
LVWPS-MW104	53.5 - 54	UMCf	4/2/2018	FD	440-207959-5	1.9	----	----	----	----	----	----	----	----	----
LVWPS-MW104	63 - 63.5	UMCf	4/2/2018	N	440-207959-6	0.047 J	----	----	----	----	----	----	----	----	----
LVWPS-MW104	75 - 75.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-7	<0.012	----	----	----	----	----	----	----	----	----
LVWPS-MW104	86.5 - 87	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-8	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW104	93 - 93.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-9	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW104	103 - 103.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-10	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW104	114 - 114.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-11	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW105	21.5 - 22	Alluvium	4/23/2018	N	440-209756-1	0.65	----	----	----	----	----	----	----	----	----
LVWPS-MW105	31.5 - 32	UMCf	4/23/2018	N	440-209756-2	1.4	----	----	----	----	----	----	----	----	----
LVWPS-MW105	41.5 - 42	UMCf	4/23/2018	N	440-209756-3	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW105	51.5 - 52	UMCf	4/23/2018	N	440-209756-4	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW105	63 - 63.5	UMCf	4/23/2018	N	440-209756-5	<0.014	----	----	----	----	----	----	----	----	----
LVWPS-MW105	71.5 - 72	UMCf	4/23/2018	N	440-209756-6	<0.015	----	----	----	----	----	----	----	----	----
LVWPS-MW105	71.5 - 72	UMCf	4/23/2018	FD	440-209756-7	<0.015	----	----	----	----	----	----	----	----	----
LVWPS-MW105	81.5 - 82	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-8	<0.070	----	----	----	----	----	----	----	----	----
LVWPS-MW105	93 - 93.5	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-9	<0.069	----	----	----	----	----	----	----	----	----
LVWPS-MW105	99.5 - 100	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-10	<0.066	----	----	----	----	----	----	----	----	----
LVWPS-MW105	113 - 113.5	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-11	<0.068	----	----	----	----	----	----	----	----	----
LVWPS-MW106	24 - 24.5	Alluvium	4/24/2018	N	440-209884-1	1.4	----	----	----	----	----	----	----	----	----
LVWPS-MW106	44.5 - 45	UMCf	4/25/2018	N	440-209884-2	<0.071	----	----	----	----	----	----	----	----	----
LVWPS-MW106	67 - 67.5	UMCf	4/25/2018	N	440-209884-3	<0.061	----	----	----	----	----	----	----	----	----
LVWPS-MW106	86 - 86.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-4	<0.071	----	----	----	----	----	----	----	----	----
LVWPS-MW106	100 - 100.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-5	<0.058	----	----	----	----	----	----	----	----	----
LVWPS-MW106	119 - 119.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-6	<0.070	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	29.5 - 30	Alluvium	3/29/2018	N	440-207701-1	1.2	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	37 - 37.5	UMCf	3/29/2018	N	440-207701-2	2.5	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	44.5 - 45	UMCf	3/29/2018	N	440-207701-3	0.059	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	48.5 - 49	UMCf	3/29/2018	N	440-207701-4	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	60 - 60.5	UMCf	3/30/2018	N	440-207701-5	<0.014	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	70 - 70.5	UMCf	3/30/2018	N	440-207701-6	<0.016	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	84.5 - 85	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-7	<0.016	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	96 - 96.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-8	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	96 - 96.5	UMCf (Semi-Consolidated)	3/30/2018	FD	440-207701-9	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	106 - 106.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-10	<0.014	----	----	----	----	----	----	----	----	----

Table H.1
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0			Dissolved Metals by SW6010B			
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium	Potassium	Sodium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW107C	118 - 118.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-11	<0.014	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	33 - 33.5	Alluvium	3/27/2018	N	440-207470-1	1.4	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	47.5 - 48	UMCf	3/27/2018	N	440-207470-2	0.37	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	57 - 57.5	UMCf	3/27/2018	N	440-207470-3	3.8	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	75 - 75.5	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-4	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	82.5 - 83	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-5	<0.014	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	112 - 112.5	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-6	<0.012	----	----	----	----	----	----	----	----	----
LVWPS-MW109	28 - 28.5	Alluvium	4/17/2018	N	440-209165-1	1.2	----	----	----	----	----	----	----	----	----
LVWPS-MW109	53.5 - 54	UMCf	4/17/2018	N	440-209165-2	2.1	----	----	----	----	----	----	----	----	----
LVWPS-MW109	66 - 66.5	UMCf	4/17/2018	N	440-209165-3	<0.090	----	----	----	----	----	----	----	----	----
LVWPS-MW109	75 - 75.5	UMCf	4/17/2018	N	440-209332-1	<0.066	----	----	----	----	----	----	----	----	----
LVWPS-MW109	93 - 93.5	UMCf (Semi-Consolidated)	4/17/2018	N	440-209332-2	<0.072	----	----	----	----	----	----	----	----	----
LVWPS-MW109	110 - 110.5	UMCf (Semi-Consolidated)	4/17/2018	N	440-209332-3	<0.067	----	----	----	----	----	----	----	----	----
LVWPS-MW110	29 - 29.5	UMCf	4/5/2018	N	440-208267-1	2.7	8,000 J	390	31	1.5	130	19	7.4	16	36
LVWPS-MW110	46 - 46.5	UMCf	4/5/2018	N	440-208267-2	0.056 J	----	----	----	----	----	----	----	----	----
LVWPS-MW110	58 - 58.5	UMCf	4/5/2018	N	440-208267-3	<0.014	870 J	<10	24	<0.25	130	22	13	30	23
LVWPS-MW110	58 - 58.5	UMCf	4/5/2018	FD	440-208267-4	<0.015	910 J	<10	24	<0.25	120	23	12	27	21
LVWPS-MW110	66 - 66.5	UMCf	4/5/2018	N	440-208267-5	<0.012	----	----	----	----	----	----	----	----	----
LVWPS-MW110	86 - 86.5	UMCf (Semi-Consolidated)	4/6/2018	N	440-208267-6	<0.065	<340 UJ	<10	140	<1.3	2,300	410	180	310	150
LVWPS-MW110	117 - 117.5	UMCf (Semi-Consolidated)	4/6/2018	N	440-208267-7	<0.065	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	25 - 25.5	Alluvium	4/12/2018	N	440-208888-1	1.8	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	25 - 25.5	Alluvium	4/12/2018	FD	440-208888-2	1.6	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	35 - 35.5	Alluvium	4/12/2018	N	440-208888-3	1.6	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	45 - 45.5	Alluvium	4/12/2018	N	440-208888-4	1.3	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	55 - 55.5	UMCf	4/12/2018	N	440-208888-5	0.93	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	68 - 68.5	UMCf	4/12/2018	N	440-208888-7	<0.079	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	76.5 - 77	UMCf	4/12/2018	N	440-208888-6	1.1	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	89.5 - 90	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-8	<0.077	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	103 - 103.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-9	<0.053	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	111 - 111.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-10	<0.068 UJ	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	120 - 120.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-11	<0.064	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	120 - 120.5	UMCf (Semi-Consolidated)	4/12/2018	FD	440-208888-12	<0.066	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	27.5 - 28	Alluvium	4/11/2018	N	440-208804-1	0.52	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	35.5 - 36	Alluvium	4/11/2018	N	440-208804-2	0.76	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	47 - 47.5	Alluvium	4/11/2018	N	440-208804-3	3.2	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	66 - 66.5	UMCf	4/11/2018	N	440-208804-4	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	86 - 86.5	UMCf (Semi-Consolidated)	4/11/2018	N	440-208804-5	<0.012	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	101 - 101.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208804-6	<0.013	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	118.5 - 119	UMCf (Semi-Consolidated)	4/12/2018	N	440-208804-7	<0.062	----	----	----	----	----	----	----	----	----

Notes:
FD - Field duplicate

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

mg/kg - milligrams per kilogram

µg/kg - micrograms per kilogram

mg/L - milligarms per liter

µg/L - micrograms per liter

N - Normal field sample

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

UMCf - Upper Muddy Creek formation

< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

---- Not tested.

Table H.1
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6020				EPA 351.2	EPA 351.2	EPA 365.3	SM2320B	SM2320B
						Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3
						µg/L	µg/L	µg/L	µg/L	mg/kg	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101B	21.5 - 22	Alluvium	4/3/2018	N	440-207959-14	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	37.5 - 38	UMCf	4/3/2018	N	440-207959-15	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	51 - 51.5	UMCf	4/3/2018	N	440-207959-16	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	62 - 62.5	UMCf	4/3/2018	N	440-207959-17	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	62 - 62.5	UMCf	4/3/2018	FD	440-207959-18	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	90.5 - 91	UMCf (Semi-Consolidated)	4/3/2018	N	440-207959-19	----	----	----	----	----	----	----	----	----
LVWPS-MW101B	102 - 102.5	UMCf (Semi-Consolidated)	4/3/2018	N	440-207959-20	----	----	----	----	----	----	----	----	----
LVWPS-MW102B	27.5 - 28	UMCf	4/4/2018	N	440-208225-1	4.0 J	<2.5	330	4.8 J	83 J	0.12 J	<0.025	11	13
LVWPS-MW102B	42.5 - 43	UMCf	4/4/2018	N	440-208225-2	----	----	----	----	----	----	----	----	----
LVWPS-MW102B	58 - 58.5	UMCf	4/4/2018	N	440-208225-3	820	<2.5	970	33	220 J	0.15 J	0.079	17	21
LVWPS-MW102B	83 - 83.5	UMCf (Semi-Consolidated)	4/4/2018	N	440-208225-4	----	----	----	----	----	----	----	----	----
LVWPS-MW102B	99.5 - 100	UMCf (Semi-Consolidated)	4/4/2018	N	440-208225-5	<2.5	<2.5	<40	14	150 J	0.41	0.33	9.9	12
LVWPS-MW102B	119 - 119.5	UMCf (Semi-Consolidated)	4/5/2018	N	440-208225-6	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	27.5 - 28	UMCf	4/19/2018	N	440-209332-4	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	41 - 41.5	UMCf	4/19/2018	N	440-209332-5	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	62 - 62.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-6	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	79 - 79.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-7	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	79 - 79.5	UMCf (Semi-Consolidated)	4/19/2018	FD	440-209332-8	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	92 - 92.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-9	----	----	----	----	----	----	----	----	----
LVWPS-MW103B	105.5 - 106	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-10	----	----	----	----	----	----	----	----	----
LVWPS-MW104	24.5 - 25	Alluvium	4/2/2018	N	440-207959-1	----	----	----	----	----	----	----	----	----
LVWPS-MW104	31 - 31.5	Alluvium	4/2/2018	N	440-207959-2	----	----	----	----	----	----	----	----	----
LVWPS-MW104	40 - 40.5	UMCf	4/2/2018	N	440-207959-3	----	----	----	----	----	----	----	----	----
LVWPS-MW104	53.5 - 54	UMCf	4/2/2018	N	440-207959-4	----	----	----	----	----	----	----	----	----
LVWPS-MW104	53.5 - 54	UMCf	4/2/2018	FD	440-207959-5	----	----	----	----	----	----	----	----	----
LVWPS-MW104	63 - 63.5	UMCf	4/2/2018	N	440-207959-6	----	----	----	----	----	----	----	----	----
LVWPS-MW104	75 - 75.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-7	----	----	----	----	----	----	----	----	----
LVWPS-MW104	86.5 - 87	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-8	----	----	----	----	----	----	----	----	----
LVWPS-MW104	93 - 93.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-9	----	----	----	----	----	----	----	----	----
LVWPS-MW104	103 - 103.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-10	----	----	----	----	----	----	----	----	----
LVWPS-MW104	114 - 114.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-11	----	----	----	----	----	----	----	----	----
LVWPS-MW105	21.5 - 22	Alluvium	4/23/2018	N	440-209756-1	----	----	----	----	----	----	----	----	----
LVWPS-MW105	31.5 - 32	UMCf	4/23/2018	N	440-209756-2	----	----	----	----	----	----	----	----	----
LVWPS-MW105	41.5 - 42	UMCf	4/23/2018	N	440-209756-3	----	----	----	----	----	----	----	----	----
LVWPS-MW105	51.5 - 52	UMCf	4/23/2018	N	440-209756-4	----	----	----	----	----	----	----	----	----
LVWPS-MW105	63 - 63.5	UMCf	4/23/2018	N	440-209756-5	----	----	----	----	----	----	----	----	----
LVWPS-MW105	71.5 - 72	UMCf	4/23/2018	N	440-209756-6	----	----	----	----	----	----	----	----	----
LVWPS-MW105	71.5 - 72	UMCf	4/23/2018	FD	440-209756-7	----	----	----	----	----	----	----	----	----
LVWPS-MW105	81.5 - 82	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-8	----	----	----	----	----	----	----	----	----
LVWPS-MW105	93 - 93.5	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-9	----	----	----	----	----	----	----	----	----
LVWPS-MW105	99.5 - 100	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-10	----	----	----	----	----	----	----	----	----
LVWPS-MW105	113 - 113.5	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-11	----	----	----	----	----	----	----	----	----
LVWPS-MW106	24 - 24.5	Alluvium	4/24/2018	N	440-209884-1	----	----	----	----	----	----	----	----	----
LVWPS-MW106	44.5 - 45	UMCf	4/25/2018	N	440-209884-2	----	----	----	----	----	----	----	----	----
LVWPS-MW106	67 - 67.5	UMCf	4/25/2018	N	440-209884-3	----	----	----	----	----	----	----	----	----
LVWPS-MW106	86 - 86.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-4	----	----	----	----	----	----	----	----	----
LVWPS-MW106	100 - 100.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-5	----	----	----	----	----	----	----	----	----
LVWPS-MW106	119 - 119.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-6	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	29.5 - 30	Alluvium	3/29/2018	N	440-207701-1	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	37 - 37.5	UMCf	3/29/2018	N	440-207701-2	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	44.5 - 45	UMCf	3/29/2018	N	440-207701-3	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	48.5 - 49	UMCf	3/29/2018	N	440-207701-4	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	60 - 60.5	UMCf	3/30/2018	N	440-207701-5	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	70 - 70.5	UMCf	3/30/2018	N	440-207701-6	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	84.5 - 85	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-7	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	96 - 96.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-8	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	96 - 96.5	UMCf (Semi-Consolidated)	3/30/2018	FD	440-207701-9	----	----	----	----	----	----	----	----	----
LVWPS-MW107C	106 - 106.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-10	----	----	----	----	----	----	----	----	----

Table H.1
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6020				EPA 351.2	EPA 351.2	EPA 365.3	SM2320B	SM2320B
						Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3
						µg/L	µg/L	µg/L	µg/L	mg/kg	mg/L	mg/L	mg/L	mg/L
LVWPS-MW107C	118 - 118.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-11	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	33 - 33.5	Alluvium	3/27/2018	N	440-207470-1	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	47.5 - 48	UMCf	3/27/2018	N	440-207470-2	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	57 - 57.5	UMCf	3/27/2018	N	440-207470-3	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	75 - 75.5	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-4	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	82.5 - 83	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-5	----	----	----	----	----	----	----	----	----
LVWPS-MW108C	112 - 112.5	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-6	----	----	----	----	----	----	----	----	----
LVWPS-MW109	28 - 28.5	Alluvium	4/17/2018	N	440-209165-1	----	----	----	----	----	----	----	----	----
LVWPS-MW109	53.5 - 54	UMCf	4/17/2018	N	440-209165-2	----	----	----	----	----	----	----	----	----
LVWPS-MW109	66 - 66.5	UMCf	4/17/2018	N	440-209165-3	----	----	----	----	----	----	----	----	----
LVWPS-MW109	75 - 75.5	UMCf	4/17/2018	N	440-209332-1	----	----	----	----	----	----	----	----	----
LVWPS-MW109	93 - 93.5	UMCf (Semi-Consolidated)	4/17/2018	N	440-209332-2	----	----	----	----	----	----	----	----	----
LVWPS-MW109	110 - 110.5	UMCf (Semi-Consolidated)	4/17/2018	N	440-209332-3	----	----	----	----	----	----	----	----	----
LVWPS-MW110	29 - 29.5	UMCf	4/5/2018	N	440-208267-1	11	36	190	3.6 J	120 J	0.15 J	<0.025	16	19
LVWPS-MW110	46 - 46.5	UMCf	4/5/2018	N	440-208267-2	----	----	----	----	----	----	----	----	----
LVWPS-MW110	58 - 58.5	UMCf	4/5/2018	N	440-208267-3	<2.5	<2.5	40 J	16	630 J	0.17 J	<0.025	17	21
LVWPS-MW110	58 - 58.5	UMCf	4/5/2018	FD	440-208267-4	<2.5	12	43 J	15	430 J	0.18 J	<0.025	14	17
LVWPS-MW110	66 - 66.5	UMCf	4/5/2018	N	440-208267-5	----	----	----	----	----	----	----	----	----
LVWPS-MW110	86 - 86.5	UMCf (Semi-Consolidated)	4/6/2018	N	440-208267-6	<2.5	<2.5	56 J	11	36 J	0.40	0.030 J	<4.0	<4.8
LVWPS-MW110	117 - 117.5	UMCf (Semi-Consolidated)	4/6/2018	N	440-208267-7	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	25 - 25.5	Alluvium	4/12/2018	N	440-208888-1	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	25 - 25.5	Alluvium	4/12/2018	FD	440-208888-2	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	35 - 35.5	Alluvium	4/12/2018	N	440-208888-3	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	45 - 45.5	Alluvium	4/12/2018	N	440-208888-4	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	55 - 55.5	UMCf	4/12/2018	N	440-208888-5	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	68 - 68.5	UMCf	4/12/2018	N	440-208888-7	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	76.5 - 77	UMCf	4/12/2018	N	440-208888-6	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	89.5 - 90	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-8	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	103 - 103.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-9	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	111 - 111.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-10	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	120 - 120.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-11	----	----	----	----	----	----	----	----	----
LVWPS-MW111B	120 - 120.5	UMCf (Semi-Consolidated)	4/12/2018	FD	440-208888-12	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	27.5 - 28	Alluvium	4/11/2018	N	440-208804-1	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	35.5 - 36	Alluvium	4/11/2018	N	440-208804-2	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	47 - 47.5	Alluvium	4/11/2018	N	440-208804-3	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	66 - 66.5	UMCf	4/11/2018	N	440-208804-4	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	86 - 86.5	UMCf (Semi-Consolidated)	4/11/2018	N	440-208804-5	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	101 - 101.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208804-6	----	----	----	----	----	----	----	----	----
LVWPS-MW112B	118.5 - 119	UMCf (Semi-Consolidated)	4/12/2018	N	440-208804-7	----	----	----	----	----	----	----	----	----

Notes:
FD - Field duplicate

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

mg/kg - milligrams per kilogram

µg/kg - micrograms per kilogram

mg/L - milligarms per liter

µg/L - micrograms per liter

N - Normal field sample

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

UMCf - Upper Muddy Creek formation

< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

---- Not tested.

Table H.1
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM2320B	SM2540C	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Carbonate (as CO3)	Total Dissolved Solids	Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/L	mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW101B	21.5 - 22	Alluvium	4/3/2018	N	440-207959-14	----	----	----	----	----	----	----
LVWPS-MW101B	37.5 - 38	UMCf	4/3/2018	N	440-207959-15	----	----	----	----	----	----	----
LVWPS-MW101B	51 - 51.5	UMCf	4/3/2018	N	440-207959-16	----	----	----	----	----	----	----
LVWPS-MW101B	62 - 62.5	UMCf	4/3/2018	N	440-207959-17	----	----	----	----	----	----	----
LVWPS-MW101B	62 - 62.5	UMCf	4/3/2018	FD	440-207959-18	----	----	----	----	----	----	----
LVWPS-MW101B	90.5 - 91	UMCf (Semi-Consolidated)	4/3/2018	N	440-207959-19	----	----	----	----	----	----	----
LVWPS-MW101B	102 - 102.5	UMCf (Semi-Consolidated)	4/3/2018	N	440-207959-20	----	----	----	----	----	----	----
LVWPS-MW102B	27.5 - 28	UMCf	4/4/2018	N	440-208225-1	<2.4	160	<0.65	<0.21	7.7	15,000 J	690
LVWPS-MW102B	42.5 - 43	UMCf	4/4/2018	N	440-208225-2	----	----	----	----	----	----	----
LVWPS-MW102B	58 - 58.5	UMCf	4/4/2018	N	440-208225-3	<2.4	160	1.0	<0.20	7.3	69,000 J	300
LVWPS-MW102B	83 - 83.5	UMCf (Semi-Consolidated)	4/4/2018	N	440-208225-4	----	----	----	----	----	----	----
LVWPS-MW102B	99.5 - 100	UMCf (Semi-Consolidated)	4/4/2018	N	440-208225-5	<2.4	3,900	0.68 J	<0.23	7.3	11,000 J	790
LVWPS-MW102B	119 - 119.5	UMCf (Semi-Consolidated)	4/5/2018	N	440-208225-6	----	----	----	----	----	----	----
LVWPS-MW103B	27.5 - 28	UMCf	4/19/2018	N	440-209332-4	----	----	----	----	----	----	----
LVWPS-MW103B	41 - 41.5	UMCf	4/19/2018	N	440-209332-5	----	----	----	----	----	----	----
LVWPS-MW103B	62 - 62.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-6	----	----	----	----	----	----	----
LVWPS-MW103B	79 - 79.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-7	----	----	----	----	----	----	----
LVWPS-MW103B	79 - 79.5	UMCf (Semi-Consolidated)	4/19/2018	FD	440-209332-8	----	----	----	----	----	----	----
LVWPS-MW103B	92 - 92.5	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-9	----	----	----	----	----	----	----
LVWPS-MW103B	105.5 - 106	UMCf (Semi-Consolidated)	4/19/2018	N	440-209332-10	----	----	----	----	----	----	----
LVWPS-MW104	24.5 - 25	Alluvium	4/2/2018	N	440-207959-1	----	----	----	----	----	----	----
LVWPS-MW104	31 - 31.5	Alluvium	4/2/2018	N	440-207959-2	----	----	----	----	----	----	----
LVWPS-MW104	40 - 40.5	UMCf	4/2/2018	N	440-207959-3	----	----	----	----	----	----	----
LVWPS-MW104	53.5 - 54	UMCf	4/2/2018	N	440-207959-4	----	----	----	----	----	----	----
LVWPS-MW104	53.5 - 54	UMCf	4/2/2018	FD	440-207959-5	----	----	----	----	----	----	----
LVWPS-MW104	63 - 63.5	UMCf	4/2/2018	N	440-207959-6	----	----	----	----	----	----	----
LVWPS-MW104	75 - 75.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-7	----	----	----	----	----	----	----
LVWPS-MW104	86.5 - 87	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-8	----	----	----	----	----	----	----
LVWPS-MW104	93 - 93.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-9	----	----	----	----	----	----	----
LVWPS-MW104	103 - 103.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-10	----	----	----	----	----	----	----
LVWPS-MW104	114 - 114.5	UMCf (Semi-Consolidated)	4/2/2018	N	440-207959-11	----	----	----	----	----	----	----
LVWPS-MW105	21.5 - 22	Alluvium	4/23/2018	N	440-209756-1	----	----	----	----	----	----	----
LVWPS-MW105	31.5 - 32	UMCf	4/23/2018	N	440-209756-2	----	----	----	----	----	----	----
LVWPS-MW105	41.5 - 42	UMCf	4/23/2018	N	440-209756-3	----	----	----	----	----	----	----
LVWPS-MW105	51.5 - 52	UMCf	4/23/2018	N	440-209756-4	----	----	----	----	----	----	----
LVWPS-MW105	63 - 63.5	UMCf	4/23/2018	N	440-209756-5	----	----	----	----	----	----	----
LVWPS-MW105	71.5 - 72	UMCf	4/23/2018	N	440-209756-6	----	----	----	----	----	----	----
LVWPS-MW105	71.5 - 72	UMCf	4/23/2018	FD	440-209756-7	----	----	----	----	----	----	----
LVWPS-MW105	81.5 - 82	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-8	----	----	----	----	----	----	----
LVWPS-MW105	93 - 93.5	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-9	----	----	----	----	----	----	----
LVWPS-MW105	99.5 - 100	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-10	----	----	----	----	----	----	----
LVWPS-MW105	113 - 113.5	UMCf (Semi-Consolidated)	4/24/2018	N	440-209756-11	----	----	----	----	----	----	----
LVWPS-MW106	24 - 24.5	Alluvium	4/24/2018	N	440-209884-1	----	----	----	----	----	----	----
LVWPS-MW106	44.5 - 45	UMCf	4/25/2018	N	440-209884-2	----	----	----	----	----	----	----
LVWPS-MW106	67 - 67.5	UMCf	4/25/2018	N	440-209884-3	----	----	----	----	----	----	----
LVWPS-MW106	86 - 86.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-4	----	----	----	----	----	----	----
LVWPS-MW106	100 - 100.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-5	----	----	----	----	----	----	----
LVWPS-MW106	119 - 119.5	UMCf (Semi-Consolidated)	4/25/2018	N	440-209884-6	----	----	----	----	----	----	----
LVWPS-MW107C	29.5 - 30	Alluvium	3/29/2018	N	440-207701-1	----	----	----	----	----	----	----
LVWPS-MW107C	37 - 37.5	UMCf	3/29/2018	N	440-207701-2	----	----	----	----	----	----	----
LVWPS-MW107C	44.5 - 45	UMCf	3/29/2018	N	440-207701-3	----	----	----	----	----	----	----
LVWPS-MW107C	48.5 - 49	UMCf	3/29/2018	N	440-207701-4	----	----	----	----	----	----	----
LVWPS-MW107C	60 - 60.5	UMCf	3/30/2018	N	440-207701-5	----	----	----	----	----	----	----
LVWPS-MW107C	70 - 70.5	UMCf	3/30/2018	N	440-207701-6	----	----	----	----	----	----	----
LVWPS-MW107C	84.5 - 85	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-7	----	----	----	----	----	----	----
LVWPS-MW107C	96 - 96.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-8	----	----	----	----	----	----	----
LVWPS-MW107C	96 - 96.5	UMCf (Semi-Consolidated)	3/30/2018	FD	440-207701-9	----	----	----	----	----	----	----
LVWPS-MW107C	106 - 106.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-10	----	----	----	----	----	----	----

Table H.1
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM2320B	SM2540C	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Carbonate (as CO3)	Total Dissolved Solids	Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/L	mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW107C	118 - 118.5	UMCf (Semi-Consolidated)	3/30/2018	N	440-207701-11	----	----	----	----	----	----	----
LVWPS-MW108C	33 - 33.5	Alluvium	3/27/2018	N	440-207470-1	----	----	----	----	----	----	----
LVWPS-MW108C	47.5 - 48	UMCf	3/27/2018	N	440-207470-2	----	----	----	----	----	----	----
LVWPS-MW108C	57 - 57.5	UMCf	3/27/2018	N	440-207470-3	----	----	----	----	----	----	----
LVWPS-MW108C	75 - 75.5	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-4	----	----	----	----	----	----	----
LVWPS-MW108C	82.5 - 83	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-5	----	----	----	----	----	----	----
LVWPS-MW108C	112 - 112.5	UMCf (Semi-Consolidated)	3/27/2018	N	440-207470-6	----	----	----	----	----	----	----
LVWPS-MW109	28 - 28.5	Alluvium	4/17/2018	N	440-209165-1	----	----	----	----	----	----	----
LVWPS-MW109	53.5 - 54	UMCf	4/17/2018	N	440-209165-2	----	----	----	----	----	----	----
LVWPS-MW109	66 - 66.5	UMCf	4/17/2018	N	440-209165-3	----	----	----	----	----	----	----
LVWPS-MW109	75 - 75.5	UMCf	4/17/2018	N	440-209332-1	----	----	----	----	----	----	----
LVWPS-MW109	93 - 93.5	UMCf (Semi-Consolidated)	4/17/2018	N	440-209332-2	----	----	----	----	----	----	----
LVWPS-MW109	110 - 110.5	UMCf (Semi-Consolidated)	4/17/2018	N	440-209332-3	----	----	----	----	----	----	----
LVWPS-MW110	29 - 29.5	UMCf	4/5/2018	N	440-208267-1	<2.4	250	<0.65	<0.27	7.2 J	<600 UJ	1,200
LVWPS-MW110	46 - 46.5	UMCf	4/5/2018	N	440-208267-2	----	----	----	----	----	----	----
LVWPS-MW110	58 - 58.5	UMCf	4/5/2018	N	440-208267-3	<2.4	310	<0.65	<0.23	7.2 J	62,000 J	390
LVWPS-MW110	58 - 58.5	UMCf	4/5/2018	FD	440-208267-4	<2.4	310	<0.65	<0.24	7.2 J	55,000 J	410
LVWPS-MW110	66 - 66.5	UMCf	4/5/2018	N	440-208267-5	----	----	----	----	----	----	----
LVWPS-MW110	86 - 86.5	UMCf (Semi-Consolidated)	4/6/2018	N	440-208267-6	<2.4	3,400	0.82 J	<0.21	7.1 J	<600 UJ	540
LVWPS-MW110	117 - 117.5	UMCf (Semi-Consolidated)	4/6/2018	N	440-208267-7	----	----	----	----	----	----	----
LVWPS-MW111B	25 - 25.5	Alluvium	4/12/2018	N	440-208888-1	----	----	----	----	----	----	----
LVWPS-MW111B	25 - 25.5	Alluvium	4/12/2018	FD	440-208888-2	----	----	----	----	----	----	----
LVWPS-MW111B	35 - 35.5	Alluvium	4/12/2018	N	440-208888-3	----	----	----	----	----	----	----
LVWPS-MW111B	45 - 45.5	Alluvium	4/12/2018	N	440-208888-4	----	----	----	----	----	----	----
LVWPS-MW111B	55 - 55.5	UMCf	4/12/2018	N	440-208888-5	----	----	----	----	----	----	----
LVWPS-MW111B	68 - 68.5	UMCf	4/12/2018	N	440-208888-7	----	----	----	----	----	----	----
LVWPS-MW111B	76.5 - 77	UMCf	4/12/2018	N	440-208888-6	----	----	----	----	----	----	----
LVWPS-MW111B	89.5 - 90	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-8	----	----	----	----	----	----	----
LVWPS-MW111B	103 - 103.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-9	----	----	----	----	----	----	----
LVWPS-MW111B	111 - 111.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-10	----	----	----	----	----	----	----
LVWPS-MW111B	120 - 120.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208888-11	----	----	----	----	----	----	----
LVWPS-MW111B	120 - 120.5	UMCf (Semi-Consolidated)	4/12/2018	FD	440-208888-12	----	----	----	----	----	----	----
LVWPS-MW112B	27.5 - 28	Alluvium	4/11/2018	N	440-208804-1	----	----	----	----	----	----	----
LVWPS-MW112B	35.5 - 36	Alluvium	4/11/2018	N	440-208804-2	----	----	----	----	----	----	----
LVWPS-MW112B	47 - 47.5	Alluvium	4/11/2018	N	440-208804-3	----	----	----	----	----	----	----
LVWPS-MW112B	66 - 66.5	UMCf	4/11/2018	N	440-208804-4	----	----	----	----	----	----	----
LVWPS-MW112B	86 - 86.5	UMCf (Semi-Consolidated)	4/11/2018	N	440-208804-5	----	----	----	----	----	----	----
LVWPS-MW112B	101 - 101.5	UMCf (Semi-Consolidated)	4/12/2018	N	440-208804-6	----	----	----	----	----	----	----
LVWPS-MW112B	118.5 - 119	UMCf (Semi-Consolidated)	4/12/2018	N	440-208804-7	----	----	----	----	----	----	----

Notes:
FD - Field duplicate

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

mg/kg - milligrams per kilogram

µg/kg - micrograms per kilogram

mg/L - milligarms per liter

µg/L - micrograms per liter

N - Normal field sample

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

UMCf - Upper Muddy Creek formation

< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

---- Not tested.

Table H.2
Soil Microbial Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Sample Date	Depth (ft bgs)	Sample Matrix	Soil Lithology	Microbial Census	Microbial Phospholipid Fatty Acid Analysis (PLFA)								
					Perchlorate reductase gene (pcrA)	Total Biomass	Proteobacteria (Monos)	Firmicutes (TerBrSats)	Anaerobic metal reducers (BrMonos)	SRB/Actinomycetes (MidBrSats)	General (Nsats)	Eukaryotes (polyenoics)	Slowed Growth	Decreased Permeability
					cells/gram	cells/gram	%	%	%	%	%	%	ratio cy/cis	ratio trans/cis
LVWPS-MW102B	4/4/2018	22.5-23	Soil	UMCf	<2.50E+04 (I)	8.45E+05	19.42	16.79	0.81	0.00	47.95	15.03	0.00	0.00
LVWPS-MW102B	4/4/2018	58-58.5	Soil	UMCf	<2.50E+04 (I)	7.23E+05	14.27	19.30	2.68	8.01	37.88	17.85	0.68	0.00
LVWPS-MW110	4/5/2018	29-29.5	Soil	UMCf	<2.50E+04 (I)	<9.63E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW110	4/5/2018	46-46.5	Soil	UMCf	<2.50E+04 (I)	<9.73E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:
BrMonos - Branched Monoenoic
MidBrSats - Mid-Chain Branched Saturated
Monos - Monoenoic
Nsats - Normal Saturated
TerBrSats - Terminally Branched Saturated
UMCf- Upper Muddy Creek Formation
< - Not Detected
(I) - Inhibited

Table H.3
Geotechnical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	API RP 40	ASTM D2216	ASTM D2937	ASTM D854				
				Total porosity	Percent Moisture	Dry Density	Dry Soil Weight	Specific Gravity	Volume	Wet Density	Wet Soil Weight
				Volume Percent	Percent	pcf	g	Unitless	ft^3	pcf	g
LVWPS-MW102B	25 - 27.5	UMCf	4/4/2018	65.2	66.5	56.0	242.10	2.583	0.0095	93.238	402.70
LVWPS-MW102B	40 - 42.5	UMCf	4/4/2018	50.6	38.1	83.3	290.40	2.704	0.0217	115.000	1,133.70
LVWPS-MW102B	62 - 64.5	UMCf	4/4/2018	60.1	40.3	66.0	310.80	2.657	0.0148	92.574	621.30
LVWPS-MW109	25 - 27.5	Alluvium	4/16/2018	28.0	22.6	117.0	443.80	2.607	0.0197	143.332	1,283.70
LVWPS-MW109	57 - 59.5	UMCf	6/1/2018	53.9	45.2	77.3	296.50	2.691	0.0202	112.332	1,030.60
LVWPS-MW109	70 - 72.5	UMCf	4/17/2018	61.8	59.0	61.8	232.70	2.597	0.0102	98.169	454.10
LVWPS-MW110	30 - 32.5	UMCf	4/5/2018	61.1	47.5	63.2	324.90	2.606	0.0185	93.203	783.70
LVWPS-MW110	50 - 52.5	UMCf	4/5/2018	54.8	41.8	75.9	214.50	2.695	0.0232	107.690	1,131.30
LVWPS-MW110	60 - 62.5	UMCf	4/5/2018	52.9	42.8	79.8	199.50	2.722	0.0383	113.934	1,979.70

Notes:
ft^3 - cubic foot
g - grams
pcf - Pounds per cubic foot
UMCf - Upper Muddy Creek formation

Table H.4
Discrete Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Sample Date	QCType	Lab SampleID	Depth (ft bgs)	Screened Lithology	EPA 314.0	EPA 300.1	Anions by EPA 300.0
						Perchlorate	Chlorate	Nitrate (as N)
						µg/L	µg/L	mg/L
LVWPS-MW102A	4/9/2018	N	440-208520-1	20 - 20.5	Alluvium	5,700	15,000	10
LVWPS-MW105	4/23/2018	N	440-209762-1	56 - 56.5	UMCf	8.5	----	----
LVWPS-MW109	4/17/2018	N	440-209162-1	57 - 57.5	UMCf	450	----	----
LVWPS-MW110	4/5/2018	N	440-208268-1	40 - 40.5	UMCf	4,300	----	----
LVWPS-MW110	4/6/2018	N	440-208268-2	75 - 75.5	UMCf	710	940	1.7
LVWPS-MW112A	4/26/2018	N	440-209994-1	25 - 25.5	Alluvium	4,900	----	----
LVWPS-MW112A	4/26/2018	FD	440-209994-2	25 - 25.5	Alluvium	5,300	----	----

Notes:
FD - Field duplicate
mg/L - milligarms per liter
µg/L - micrograms per liter
N - Normal field sample
Results acceptable for use without qualification.
UMCf - Upper Muddy Creek formation
---- Not tested.

Table H.5
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	EPA 314.0	EPA 300.1	Anions by EPA 300.0			Anions by EPA 300.0	Dissolved Gases by RSK-175	Dissolved Metals by SW6010B						
							Perchlorate	Chlorate	Chloride	Nitrate (as N)	Nitrite (as N)	Sulfate	Methane	Aluminum	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium
							µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101A	BL01	5/16/2018	N	440-211479-3	Alluvium	23.3 - 33.0	2,500	24,000	700	14	<0.70	2,100	<0.00025	<0.25	<0.025	<0.0050	2.6	<0.013	550	0.033
LVWPS-MW101B	BL01	5/16/2018	N	440-211479-4	UMCf	44.8 - 64.5	7,200	17,000	1,300	6.2	<1.4	2,700	<0.00025	<0.25	<0.025	<0.0050	2.5	<0.013	530	0.027
LVWPS-MW102A	BL01	5/16/2018	N	440-211479-5	UMCf	47.0 - 66.6	1,300	3,600	1,300	1.7 J	<1.4	2,600	<0.00025	<0.25	<0.025	<0.0050	1.5	<0.013	540	0.017 J
LVWPS-MW102B	BL01	5/16/2018	N	440-211479-6	UMCf (Semi-Consolidated)	76.8 - 96.5	<50	<250	11,000	<5.5	<7.0	33,000	0.044	<1.3	<0.13	<0.025	12	<0.063	530	<0.063
LVWPS-MW103A	BL01	5/18/2018	N	440-211687-2	UMCf	29.8 - 39.5	6,000	14,000	820	11	<0.70	3,200	<0.00025	<0.25	<0.025	<0.0050	3.2	<0.013	510	0.061
LVWPS-MW103B	BL01	5/18/2018	N	440-211687-3	UMCf (Semi-Consolidated)	76.8 - 96.5	<50	580 J	15,000	<5.5	<7.0	80,000	0.00094 J	<1.3	<0.13	<0.025	8.7	<0.063	570	<0.063
LVWPS-MW104	BL01	5/16/2018	N	440-211479-1	Alluvium	23.8 - 33.5	3,700 J+	31,000	920	11	<1.4	2,100	<0.00025	<0.25	<0.025	<0.0050	2.8 J+	<0.013	560	0.034
LVWPS-MW105	BL01	5/17/2018	N	440-211577-5	Alluvium	16.5 - 26.2	5,100	18,000	970	9.9	<1.4	2,500	<0.00025	<0.10	0.019 J	<0.0020	1.9	<0.0050	580	0.022
LVWPS-MW106	BL01	5/17/2018	N	440-211576-4	UMCf	30.4 - 50.1	7,200	71,000	1,100	17	<1.4	2,500	<0.00025	<0.25	<0.025	<0.0050	2.3	<0.013	640	0.052
LVWPS-MW107A	BL01	5/15/2018	N	440-211381-4	Alluvium	24.8 - 34.5	4,000	8,400	880	6.4	<0.70	3,000	<0.00025	0.078 J	0.020	<0.0010	3.1	<0.0025	600	0.015
LVWPS-MW107B	BL01	5/15/2018	N	440-211381-5	UMCf	46.0 - 65.8	<2.5	<50	1,100	<1.1	<1.4	2,500	0.0023	0.12	0.024	<0.0010	2.0	<0.0025	250	0.0026 J
LVWPS-MW107C	BL01	5/16/2018	N	440-211479-2	UMCf (Semi-Consolidated)	100.3 - 120.0	<50	<250	13,000	<5.5	<7.0	37,000	0.047	<1.3	<0.13	<0.025	12	<0.063	550	<0.063
LVWPS-MW108A	BL01	5/15/2018	N	440-211381-3	Alluvium	20.8 - 40.7	6,300	19,000	1,200	5.7	<0.70	1,500	<0.00025	0.14	0.025	<0.0010	3.0	<0.0025	350	0.0070
LVWPS-MW108B	BL01	5/15/2018	N	440-211381-2	UMCf	46.3 - 66.0	9,400	30,000	1,500	11	<1.4	3,000	<0.00025	0.33	0.022	<0.0010	3.1	<0.0025	570	0.043
LVWPS-MW108C	BL01	5/15/2018	N	440-211381-1	UMCf (Semi-Consolidated)	99.6 - 119.3	<50	<250	10,000	<5.5	<7.0	26,000	0.037	<0.50	<0.050	<0.010	13	<0.025	550	<0.025
LVWPS-MW109	BL01	5/17/2018	N	440-211577-3	Alluvium	36.8 - 51.5	5,900	25,000	1,000	7.0	<0.70	1,800	0.87	0.053 J	0.019	<0.0010	2.5	<0.0025	340	<0.0025
LVWPS-MW109	BL01	5/17/2018	FD	440-211577-4	Alluvium	36.8 - 51.5	5,900	25,000	1,000	7.1	<0.70	1,700	0.73	<0.050	0.020	<0.0010	2.7	<0.0025	360	0.0043 J
LVWPS-MW110	BL01	5/14/2018	N	440-211274-1	UMCf	47.8 - 67.5	<5.0	<50	1,200	<1.1	<1.4	3,700	0.00057 J	<0.50	<0.050	<0.010	2.1	<0.025	560	<0.025
LVWPS-MW111A	BL01	5/17/2018	N	440-211576-1	Alluvium	20.8 - 40.5	7,700	14,000	1,100	6.9	<1.4	1,800	<0.00025	0.053 J	0.022	<0.0010	2.6	<0.0025	390	0.0066
LVWPS-MW111B	BL01	5/17/2018	N	440-211577-1	UMCf	57.8 - 77.5	3,000	4,600	1,500	2.3	<1.4	3,800	0.00061 J	<0.050	0.015	<0.0010	1.5	<0.0025	420	0.0029 J
LVWPS-MW112A	BL01	5/17/2018	N	440-211576-2	Alluvium	28.8 - 48.0	5,600	24,000	940	9.3	<0.70	1,900	<0.00025	0.18	0.020	<0.0010	2.4	<0.0025	400	0.0093
LVWPS-MW112B	BL01	5/17/2018	N	440-211577-2	UMCf	54.3 - 74.0	3,900	<100	3,400	<5.5	<7.0	22,000	0.0031	<0.50	<0.050	<0.010	3.1	<0.025	440	<0.025

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mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
UMCf - Upper Muddy Creek formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.5
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B												
							Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Silver	Sodium
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101A	BL01	5/16/2018	N	440-211479-3	Alluvium	23.3 - 33.0	<0.025	<0.025	<0.25	<0.019	210	<0.075	0.36	<0.025	<0.50	70	40	<0.025	640
LVWPS-MW101B	BL01	5/16/2018	N	440-211479-4	UMCf	44.8 - 64.5	<0.025	<0.025	<0.25	<0.019	430	<0.075	0.45	<0.025	<0.50	130	35	<0.025	870
LVWPS-MW102A	BL01	5/16/2018	N	440-211479-5	UMCf	47.0 - 66.6	<0.025	<0.025	<0.25	<0.019	460	<0.075	<0.050	<0.025	<0.50	160	34	<0.025	790
LVWPS-MW102B	BL01	5/16/2018	N	440-211479-6	UMCf (Semi-Consolidated)	76.8 - 96.5	<0.13	<0.13	<1.3	<0.095	6,100	<0.38	<0.25	<0.13	<2.5	5,100	5.5	<0.13	7,800
LVWPS-MW103A	BL01	5/18/2018	N	440-211687-2	UMCf	29.8 - 39.5	<0.025	<0.025	<0.25	<0.019	350	<0.075	<0.050	<0.025	<0.50	600	40	<0.025	810
LVWPS-MW103B	BL01	5/18/2018	N	440-211687-3	UMCf (Semi-Consolidated)	76.8 - 96.5	<0.13	0.95 J-	<1.3	<0.095	12,000	0.80	1.4	1.1 J-	<2.5	11,000	5.7	<0.13	14,000
LVWPS-MW104	BL01	5/16/2018	N	440-211479-1	Alluvium	23.8 - 33.5	<0.025	<0.025	<0.25	<0.019	200	<0.075	0.25	<0.025	<0.50	56	36	<0.025	670
LVWPS-MW105	BL01	5/17/2018	N	440-211577-5	Alluvium	16.5 - 26.2	<0.010	<0.010	<0.10	<0.0076	260	0.030 J	0.079	<0.010	<0.20	190	41	<0.010	550
LVWPS-MW106	BL01	5/17/2018	N	440-211576-4	UMCf	30.4 - 50.1	<0.025	<0.025	<0.25	<0.019	250	<0.075	0.070 J	<0.025	<0.50	150	36	<0.025	660
LVWPS-MW107A	BL01	5/15/2018	N	440-211381-4	Alluvium	24.8 - 34.5	<0.0050	<0.0050	<0.050	<0.0038	280	<0.015	0.12	<0.0050	<0.10	89	47	<0.0050	710
LVWPS-MW107B	BL01	5/15/2018	N	440-211381-5	UMCf	46.0 - 65.8	<0.0050	<0.0050	0.089 J	<0.0038	380	<0.015	0.056	<0.0050	<0.10	560	28	<0.0050	780
LVWPS-MW107C	BL01	5/16/2018	N	440-211479-2	UMCf (Semi-Consolidated)	100.3 - 120.0	<0.13	<0.13	<1.3	<0.095	6,600	<0.38	<0.25	<0.13	<2.5	6,100	5.5	<0.13	9,000
LVWPS-MW108A	BL01	5/15/2018	N	440-211381-3	Alluvium	20.8 - 40.7	<0.0050	<0.0050	<0.050	<0.0038	180	<0.015	0.23	<0.0050	<0.10	52	41	<0.0050	880
LVWPS-MW108B	BL01	5/15/2018	N	440-211381-2	UMCf	46.3 - 66.0	<0.0050	<0.0050	0.25	<0.0038	400	<0.015	0.52	<0.0050	<0.10	120	32	<0.0050	980
LVWPS-MW108C	BL01	5/15/2018	N	440-211381-1	UMCf (Semi-Consolidated)	99.6 - 119.3	<0.050	<0.050	<0.50	<0.038	5,300	0.18 J	<0.10	<0.050	<1.0	2,600	5.8	<0.050	7,300
LVWPS-MW109	BL01	5/17/2018	N	440-211577-3	Alluvium	36.8 - 51.5	<0.0050	<0.0050	<0.050	<0.0038	160	<0.015	0.24	<0.0050	<0.10	51	34	<0.0050	710
LVWPS-MW109	BL01	5/17/2018	FD	440-211577-4	Alluvium	36.8 - 51.5	<0.0050	<0.0050	<0.050	<0.0038	170	<0.015	0.26	<0.0050	<0.10	56	37	<0.0050	770
LVWPS-MW110	BL01	5/14/2018	N	440-211274-1	UMCf	47.8 - 67.5	<0.050	<0.050	<0.50	<0.038	410	<0.15	<0.10	<0.050	<1.0	540	29	<0.050	790
LVWPS-MW111A	BL01	5/17/2018	N	440-211576-1	Alluvium	20.8 - 40.5	<0.0050	<0.0050	<0.050	<0.0038	180	0.061	0.17	<0.0050	<0.10	49	32	<0.0050	710
LVWPS-MW111B	BL01	5/17/2018	N	440-211577-1	UMCf	57.8 - 77.5	<0.0050	<0.0050	<0.050	<0.0038	550	<0.015	0.11	<0.0050	<0.10	390	29	<0.0050	890
LVWPS-MW112A	BL01	5/17/2018	N	440-211576-2	Alluvium	28.8 - 48.0	<0.0050	<0.0050	0.17	<0.0038	160	0.19	0.13	<0.0050	<0.10	53	33	<0.0050	660
LVWPS-MW112B	BL01	5/17/2018	N	440-211577-2	UMCf	54.3 - 74.0	<0.050	<0.050	<0.50	<0.038	3,700	0.31	0.56	<0.050	<1.0	1,700	22	<0.050	3,100

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mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
UMCf - Upper Muddy Creek formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.5
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B						Dissolved Metals by SW6020		Dissolved Metals by SW6020		EPA 218.6	EPA 351.2
							Strontium	Tin	Titanium	Tungsten	Vanadium	Zinc	Antimony	Arsenic	Selenium	Thallium	Chromium, Hexavalent	Total Kjeldahl Nitrogen (TKN)
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LVWPS-MW101A	BL01	5/16/2018	N	440-211479-3	Alluvium	23.3 - 33.0	11	<0.25	<0.013	<0.25	<0.025	<0.060	<5.0	48	34	<5.0	25	<0.10
LVWPS-MW101B	BL01	5/16/2018	N	440-211479-4	UMCf	44.8 - 64.5	13	<0.25	<0.013	<0.25	0.027 J	<0.060	<5.0	73	59	<5.0	5.5	<0.10
LVWPS-MW102A	BL01	5/16/2018	N	440-211479-5	UMCf	47.0 - 66.6	13	<0.25	<0.013	<0.25	0.026 J	<0.060	<5.0	74	26	<5.0	3.9	<0.10
LVWPS-MW102B	BL01	5/16/2018	N	440-211479-6	UMCf (Semi-Consolidated)	76.8 - 96.5	10	<1.3	<0.063	<1.3	<0.13	<0.30	<5.0	<5.0	18 J	<5.0	<0.25	3.4
LVWPS-MW103A	BL01	5/18/2018	N	440-211687-2	UMCf	29.8 - 39.5	9.3	<0.25	<0.013	<0.25	<0.025	<0.060	<5.0	35	8.6 J	<5.0	45	<0.10
LVWPS-MW103B	BL01	5/18/2018	N	440-211687-3	UMCf (Semi-Consolidated)	76.8 - 96.5	12	<1.3	<0.063	<1.3	<0.13	1.2 J-	5.9 J	17	11 J	<5.0	<0.25	19
LVWPS-MW104	BL01	5/16/2018	N	440-211479-1	Alluvium	23.8 - 33.5	12	<0.25	<0.013	<0.25	<0.025	<0.060	<5.0	50	28	<5.0	25	<0.10
LVWPS-MW105	BL01	5/17/2018	N	440-211577-5	Alluvium	16.5 - 26.2	12	<0.10	<0.0050	<0.10	<0.010	<0.024	<0.50	58	17	<0.50	19	<0.10
LVWPS-MW106	BL01	5/17/2018	N	440-211576-4	UMCf	30.4 - 50.1	14	<0.25	<0.013	<0.25	<0.025	<0.060	<0.50	35	32	<0.50	46	<0.10
LVWPS-MW107A	BL01	5/15/2018	N	440-211381-4	Alluvium	24.8 - 34.5	16	<0.050	<0.0025	<0.050	0.0090 J	<0.012	<2.5	48	13	<2.5	15	<0.10
LVWPS-MW107B	BL01	5/15/2018	N	440-211381-5	UMCf	46.0 - 65.8	8.5	<0.050	<0.0025	<0.050	<0.0050	<0.012	<2.5	59	9.3 J	<2.5	<0.25	0.30
LVWPS-MW107C	BL01	5/16/2018	N	440-211479-2	UMCf (Semi-Consolidated)	100.3 - 120.0	7.8	<1.3	<0.063	<1.3	<0.13	<0.30	<5.0	<5.0	19 J	<5.0	<0.25	3.8
LVWPS-MW108A	BL01	5/15/2018	N	440-211381-3	Alluvium	20.8 - 40.7	9.4	<0.050	<0.0025	<0.050	0.031	<0.012	<2.5	68	20	<2.5	5.4	<0.10
LVWPS-MW108B	BL01	5/15/2018	N	440-211381-2	UMCf	46.3 - 66.0	14	<0.050	0.014	<0.050	<0.0050	<0.012	<2.5	52	77	<2.5	39	<0.10
LVWPS-MW108C	BL01	5/15/2018	N	440-211381-1	UMCf (Semi-Consolidated)	99.6 - 119.3	12	<0.50	<0.025	<0.50	<0.050	<0.12 UJ	<10	<10	14 J	<10	<0.25	2.6
LVWPS-MW109	BL01	5/17/2018	N	440-211577-3	Alluvium	36.8 - 51.5	8.3	<0.050	<0.0025	<0.050	0.022	<0.012	<0.50	62	24	<0.50	2.7	<0.10
LVWPS-MW109	BL01	5/17/2018	FD	440-211577-4	Alluvium	36.8 - 51.5	9.0	<0.050	<0.0025	<0.050	0.024	<0.012	<0.50	63	24	<0.50	2.7	<0.10
LVWPS-MW110	BL01	5/14/2018	N	440-211274-1	UMCf	47.8 - 67.5	13	<0.50	<0.025	<0.50	<0.050	<0.12	<2.5	3.2 J	3.4 J	<2.5	<0.25	0.21
LVWPS-MW111A	BL01	5/17/2018	N	440-211576-1	Alluvium	20.8 - 40.5	9.3	<0.050	<0.0025	<0.050	0.012	<0.012	0.66 J	37	27	<0.50	7.6	<0.10
LVWPS-MW111B	BL01	5/17/2018	N	440-211577-1	UMCf	57.8 - 77.5	10	<0.050	<0.0025	<0.050	0.016	<0.012	<0.50	76	39	<0.50	3.4	0.31
LVWPS-MW112A	BL01	5/17/2018	N	440-211576-2	Alluvium	28.8 - 48.0	9.0	<0.050	0.0059	<0.050	0.012	<0.012	<0.50	36	28	<0.50	8.4	<0.10
LVWPS-MW112B	BL01	5/17/2018	N	440-211577-2	UMCf	54.3 - 74.0	8.7	<0.50	<0.025	<0.50	<0.050	<0.12	1.7 J	47	2.1	<0.50	<0.25	2.2

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Table H.5
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	EPA 365.3	FIELD TESTS								NTOTAL
							Phosphorus	Conductivity	Dissolved Oxygen	Ferrous Iron	Oxidation-Reduction Potential	pH	Sulfide	Temperature	Turbidity	Nitrogen, Total
							mg/L	mS/cm	mg/L	mg/L	mV	SU	mg/L	C	NTU	mg/L
LVWPS-MW101A	BL01	5/16/2018	N	440-211479-3	Alluvium	23.3 - 33.0	0.11	6.71	2.62	0.0 U	37.5	7.45	0.0 U	25.86	49.3	14
LVWPS-MW101B	BL01	5/16/2018	N	440-211479-4	UMCf	44.8 - 64.5	0.063	7.87	1.90	0.0 U	283	7.35	0.0 U	22.28	260	6.2
LVWPS-MW102A	BL01	5/16/2018	N	440-211479-5	UMCf	47.0 - 66.6	0.11	7.67	2.20	0.0 U	268	7.40	0.0 U	21.17	197	1.7
LVWPS-MW102B	BL01	5/16/2018	N	440-211479-6	UMCf (Semi-Consolidated)	76.8 - 96.5	0.40	72.26	0.05	0.0 U	-284.3	7.95	0.4	28.72	84.3	3.4
LVWPS-MW103A	BL01	5/18/2018	N	440-211687-2	UMCf	29.8 - 39.5	0.050	8.30	0.81	0.0 U	30.6	7.78	0.0 U	23.06	13.86	11
LVWPS-MW103B	BL01	5/18/2018	N	440-211687-3	UMCf (Semi-Consolidated)	76.8 - 96.5	0.42	88.9	3.24	0.0 U	290	7.86	0.0 U	21.04	19	19
LVWPS-MW104	BL01	5/16/2018	N	440-211479-1	Alluvium	23.8 - 33.5	0.045 J	6.56	4.81	0.0 U	350	7.14	0.0 U	19.31	50	11
LVWPS-MW105	BL01	5/17/2018	N	440-211577-5	Alluvium	16.5 - 26.2	<0.025	7.62	0.28	0.0 U	58.0	7.31	0.0 U	23.61	8.27	9.9
LVWPS-MW106	BL01	5/17/2018	N	440-211576-4	UMCf	30.4 - 50.1	0.073	7.19	5.36	0.0 U	325	7.56	0.0 U	20.71	89	17
LVWPS-MW107A	BL01	5/15/2018	N	440-211381-4	Alluvium	24.8 - 34.5	0.043 J	6.72	4.18	0.0 U	316	7.55	0.0 U	20.05	2	6.4
LVWPS-MW107B	BL01	5/15/2018	N	440-211381-5	UMCf	46.0 - 65.8	0.037 J	8.75	0.14	0.0 U	-230.0	7.83	0.2	25.97	8.04	0.30
LVWPS-MW107C	BL01	5/16/2018	N	440-211479-2	UMCf (Semi-Consolidated)	100.3 - 120.0	0.37	72.24	0.20	0.0 U	-235.8	8.00	1.9	23.49	24.5	3.8
LVWPS-MW108A	BL01	5/15/2018	N	440-211381-3	Alluvium	20.8 - 40.7	0.027 J	7.59	0.50	0.0 U	18.9	7.16	0.0 U	25.69	2.54	5.7
LVWPS-MW108B	BL01	5/15/2018	N	440-211381-2	UMCf	46.3 - 66.0	0.080	8.54	3.52	0.0 U	300	8.30	0.0 U	19.52	80.8	11
LVWPS-MW108C	BL01	5/15/2018	N	440-211381-1	UMCf (Semi-Consolidated)	99.6 - 119.3	0.19	56.37	0.18	0.25	-105.9	6.05	0.15	24.65	7.51	2.6
LVWPS-MW109	BL01	5/17/2018	N	440-211577-3	Alluvium	36.8 - 51.5	<0.025	7.44	0.30	0.0 U	92.6	6.84	0.0 U	24.97	8.2	7.0
LVWPS-MW109	BL01	5/17/2018	FD	440-211577-4	Alluvium	36.8 - 51.5	<0.025	----	----	----	----	----	----	----	----	7.1
LVWPS-MW110	BL01	5/14/2018	N	440-211274-1	UMCf	47.8 - 67.5	0.033 J	0.008	2.85	0.0 U	326	4.35	0.0 U	23.52	656	0.21
LVWPS-MW111A	BL01	5/17/2018	N	440-211576-1	Alluvium	20.8 - 40.5	0.085	6.62	2.44	0.0 U	360	7.02	0.0 U	19.91	40	6.9
LVWPS-MW111B	BL01	5/17/2018	N	440-211577-1	UMCf	57.8 - 77.5	0.036 J	11.04	0.29	0.0 U	78.8	7.39	0.0 U	22.79	9.1	2.6
LVWPS-MW112A	BL01	5/17/2018	N	440-211576-2	Alluvium	28.8 - 48.0	0.15	6.34	3.90	0.0 U	3.69	7.14	0.0 U	20.72	230	9.3
LVWPS-MW112B	BL01	5/17/2018	N	440-211577-2	UMCf	54.3 - 74.0	0.23	39.15	0.26	0.25	43.6	7.37	0.05	25.25	70.2	2.2

Notes:

FD - Field duplicate

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- - The result is an estimated quantity, but the result may be biased low.

J+ - The result is an estimated quantity, but the result may be biased high.

mg/L - milligarms per liter

µg/L - micrograms per liter

mS/cm - milliSiemens per centimeter

mV - milliVolts

N - Normal field sample

NTU - Nephelometric Turbidity Unit

SU - Standard Units

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

UMCf - Upper Muddy Creek formation

< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

---- Not tested.

Table H.5
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	SM2320B				SM2540C	SM5310B	Total Metals by SW6010B	Volatile Fatty Acids (IC)					
							Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Dissolved Solids	Total Organic Carbon	Manganese	Acetic Acid	Butyric Acid	Formic Acid	Lactic Acid	Propionic Acid	Pyruvic Acid
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW101A	BL01	5/16/2018	N	440-211479-3	Alluvium	23.3 - 33.0	110	110	<4.0	<4.0	4,600	1.2	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW101B	BL01	5/16/2018	N	440-211479-4	UMCf	44.8 - 64.5	86	86	<4.0	<4.0	7,300	<0.65	0.056	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW102A	BL01	5/16/2018	N	440-211479-5	UMCf	47.0 - 66.6	83	83	<4.0	<4.0	7,000	<0.65	0.035	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW102B	BL01	5/16/2018	N	440-211479-6	UMCf (Semi-Consolidated)	76.8 - 96.5	98	98	<4.0	<4.0	71,000	3.7	<1.5	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW103A	BL01	5/18/2018	N	440-211687-2	UMCf	29.8 - 39.5	79	79	<4.0	<4.0	6,700	<0.65	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW103B	BL01	5/18/2018	N	440-211687-3	UMCf (Semi-Consolidated)	76.8 - 96.5	200	200	<4.0	<4.0	130,000	7.1	1.2 J+	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW104	BL01	5/16/2018	N	440-211479-1	Alluvium	23.8 - 33.5	150	150	<4.0	<4.0	5,600	1.2	0.030	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW105	BL01	5/17/2018	N	440-211577-5	Alluvium	16.5 - 26.2	83	83	<4.0	<4.0	6,200	1.2	0.044	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW106	BL01	5/17/2018	N	440-211576-4	UMCf	30.4 - 50.1	92	92	<4.0	<4.0	6,500	1.3	0.10	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW107A	BL01	5/15/2018	N	440-211381-4	Alluvium	24.8 - 34.5	140	140	<4.0	<4.0	6,200	2.1	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW107B	BL01	5/15/2018	N	440-211381-5	UMCf	46.0 - 65.8	100	100	<4.0	<4.0	6,100	<0.65	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW107C	BL01	5/16/2018	N	440-211479-2	UMCf (Semi-Consolidated)	100.3 - 120.0	93	93	<4.0	<4.0	74,000	4.5	<1.5	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW108A	BL01	5/15/2018	N	440-211381-3	Alluvium	20.8 - 40.7	260	260	<4.0	<4.0	4,900	1.7	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW108B	BL01	5/15/2018	N	440-211381-2	UMCf	46.3 - 66.0	86	86	<4.0	<4.0	7,600	0.75 J	0.028	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW108C	BL01	5/15/2018	N	440-211381-1	UMCf (Semi-Consolidated)	99.6 - 119.3	100	100	<4.0	<4.0	56,000	4.8	0.26	<2.9	<2.6	<2.6	<3.1	<3.5	<190
LVWPS-MW109	BL01	5/17/2018	N	440-211577-3	Alluvium	36.8 - 51.5	230	230	<4.0	<4.0	5,100	1.5	0.020	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW109	BL01	5/17/2018	FD	440-211577-4	Alluvium	36.8 - 51.5	230	230	<4.0	<4.0	5,000	1.5	0.052	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW110	BL01	5/14/2018	N	440-211274-1	UMCf	47.8 - 67.5	99	99	<4.0	<4.0	8,300	0.74 J	<0.075	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW111A	BL01	5/17/2018	N	440-211576-1	Alluvium	20.8 - 40.5	200	200	<4.0	<4.0	5,100	2.0	0.078	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW111B	BL01	5/17/2018	N	440-211577-1	UMCf	57.8 - 77.5	91	91	<4.0	<4.0	9,100	<0.65	<0.030	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW112A	BL01	5/17/2018	N	440-211576-2	Alluvium	28.8 - 48.0	200	200	<4.0	<4.0	4,800	1.4	0.27	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW112B	BL01	5/17/2018	N	440-211577-2	UMCf	54.3 - 74.0	170	170	<4.0	<4.0	39,000	3.7	0.37	<2.9	<2.6	<2.6	<3.1	<3.5	<74

Notes:
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
UMCf - Upper Muddy Creek formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.6
Groundwater Biotrap Microbial Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Screened Lithology	Sample Date	Sample Matrix	Microbial Census	Microbial Phospholipid Fatty Acid Analysis (PLFA)								
				Perchlorate reductase gene (pcrA)	Total Biomass	Proteobacteria (Monos)	Firmicutes (TerBrSats)	Anaerobic metal reducers (BrMonos)	SRB/ Actinomycetes (MidBrSats)	General (Nsats)	Eukaryotes (polyenoics)	Slowed Growth	Decreased Permeability
				cells/bead	cells/bead	%	%	%	%	%	%	ratio cy/cis	ratio trans/cis
LVWPS-MW103B	UMCf (Semi-Consolidated)	6/20/2018	Biotrap	<2.50E+02	3.48E+04	70.37	0.00	0.00	0.00	29.62	0.00	0.23	0.00
LVWPS-MW107A	Alluvium	6/20/2018	Biotrap	<2.50E+02	2.58E+04	70.83	0.00	3.93	0.00	25.24	0.00	0.56	0.00
LVWPS-MW107B	UMCf	6/20/2018	Biotrap	<2.50E+02	1.05E+05	77.19	1.35	2.02	0.00	18.16	1.29	0.10	0.09

Notes:
BrMonos - Branched Monoenoic
MidBrSats - Mid-Chain Branched Saturated
Monos - Monoenoic
Nsats - Normal Saturated
TerBrSats - Terminally Branched Saturated
UMCf - Upper Muddy Creek formation
< - Not detected

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW201B	24 - 24.5	Alluvium	6/6/2018	N	440-213022-12	0.30 J-	1,600	----	9.1	0.77	27	4.9	2.8
LVWPS-MW201B	39 - 39.5	Alluvium	6/6/2018	N	440-213022-13	0.73	----	----	----	----	----	----	----
LVWPS-MW201B	47 - 47.5	Alluvium	6/6/2018	N	440-213022-14	0.75	----	----	----	----	----	----	----
LVWPS-MW201B	59.5 - 60	UMCf	6/6/2018	N	440-213022-15	5.1	7,200	----	44	1.7	97	14	11
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	N	440-213022-16	0.096	----	----	----	----	----	----	----
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	FD	440-213022-17	0.13	----	----	----	----	----	----	----
LVWPS-MW201B	82 - 82.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-1	<0.068	----	----	----	----	----	----	----
LVWPS-MW201B	92 - 92.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-2	<0.062	<66	----	160	<0.50	1,200	190	94
LVWPS-MW201B	106 - 106.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-5	<0.065	----	----	----	----	----	----	----
LVWPS-MW201B	112 - 112.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-6	<0.062	----	----	----	----	----	----	----
LVWPS-MW201B	120 - 120.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-7	<0.064	----	----	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	N	440-212078-11	0.16 J	----	----	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	FD	440-212078-12	0.39 J	----	----	----	----	----	----	----
LVWPS-MW202	41.5 - 42	Alluvium	5/22/2018	N	440-212078-13	0.8	----	----	----	----	----	----	----
LVWPS-MW202	51.5 - 52	Alluvium	5/22/2018	N	440-212078-14	0.31	----	----	----	----	----	----	----
LVWPS-MW202	64 - 64.5	UMCf	5/22/2018	N	440-212078-15	1.6	----	----	----	----	----	----	----
LVWPS-MW202	72.5 - 73	UMCf	5/22/2018	N	440-212078-16	2.5	----	----	----	----	----	----	----
LVWPS-MW202	81.5 - 82	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-17	<0.013	----	----	----	----	----	----	----
LVWPS-MW202	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-18	<0.014	----	----	----	----	----	----	----
LVWPS-MW202	102.5 - 103	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-19	0.89	----	----	----	----	----	----	----
LVWPS-MW202	109.5 - 110	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-20	0.45	----	----	----	----	----	----	----
LVWPS-MW202	119.5 - 120	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-21	<0.063	----	----	----	----	----	----	----
LVWPS-MW203C	30 - 30.5	Alluvium	5/22/2018	N	440-212078-1	0.29	----	----	----	----	----	----	----
LVWPS-MW203C	40 - 40.5	Alluvium	5/22/2018	N	440-212078-2	0.12 J	----	----	----	----	----	----	----
LVWPS-MW203C	51 - 51.5	Alluvium	5/22/2018	N	440-212078-3	0.14 J	----	----	----	----	----	----	----
LVWPS-MW203C	60 - 60.5	Alluvium	5/22/2018	N	440-212078-4	0.079	----	----	----	----	----	----	----
LVWPS-MW203C	70 - 70.5	UMCf	5/22/2018	N	440-212078-5	6.8	----	----	----	----	----	----	----
LVWPS-MW203C	80 - 80.5	UMCf	5/22/2018	N	440-212078-6	0.14	----	----	----	----	----	----	----
LVWPS-MW203C	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-7	<0.064	----	----	----	----	----	----	----
LVWPS-MW203C	100 - 100.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-8	<0.065	----	----	----	----	----	----	----
LVWPS-MW203C	110 - 110.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-9	<0.062	----	----	----	----	----	----	----
LVWPS-MW203C	120 - 120.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-10	<0.060	----	----	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	N	440-212120-1	0.88	----	----	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	FD	440-212120-33	0.81	----	----	----	----	----	----	----
LVWPS-MW204	41 - 41.5	Alluvium	5/23/2018	N	440-212120-2	0.32	----	----	----	----	----	----	----
LVWPS-MW204	50 - 50.5	Alluvium	5/23/2018	N	440-212120-3	0.47	----	----	----	----	----	----	----
LVWPS-MW204	60 - 60.5	Alluvium	5/23/2018	N	440-212120-4	0.18	----	----	----	----	----	----	----
LVWPS-MW204	70 - 70.5	Alluvium	5/23/2018	N	440-212120-5	0.092	----	----	----	----	----	----	----
LVWPS-MW204	80 - 80.5	Alluvium	5/23/2018	N	440-212120-6	0.2	----	----	----	----	----	----	----
LVWPS-MW204	90 - 90.5	UMCf	5/24/2018	N	440-212120-7	5.9	----	----	----	----	----	----	----
LVWPS-MW204	100 - 100.5	UMCf	5/24/2018	N	440-212120-8	8.4	----	----	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	N	440-212120-9	8.5	----	----	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	FD	440-212120-14	8.1	----	----	----	----	----	----	----
LVWPS-MW204	120 - 120.5	UMCf	5/24/2018	N	440-212120-15	10	----	----	----	----	----	----	----
LVWPS-MW204C	130 - 130.5	UMCf	8/29/2018	N	440-219196-1	3.4	----	----	----	----	----	----	----
LVWPS-MW204C	140 - 140.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-2	0.061	----	----	----	----	----	----	----
LVWPS-MW204C	150 - 150.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-3	<0.011	----	----	----	----	----	----	----
LVWPS-MW204C	160 - 160.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-4	<0.013	----	----	----	----	----	----	----
LVWPS-MW204C	168 - 168.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-5	<0.013	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW204C	180 - 180.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-6	<0.012	----	----	----	----	----	----	----
LVWPS-MW205B	28 - 28.5	Alluvium	5/29/2018	N	440-212452-14	0.06	150 J	11 J	4.0	0.68	18	14	6.9
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	N	440-212452-15	0.029 J	----	----	----	----	----	----	----
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	FD	440-212452-16	0.041 J	----	----	----	----	----	----	----
LVWPS-MW205B	50 - 50.5	Alluvium	5/29/2018	N	440-212452-17	0.069	----	----	----	----	----	----	----
LVWPS-MW205B	60 - 60.5	Alluvium	5/29/2018	N	440-212452-18	0.12	83 J	11 J	4.9	0.38 J	13	9.3	2.5
LVWPS-MW205B	70 - 70.5	Alluvium	5/29/2018	N	440-212452-19	0.28	----	----	----	----	----	----	----
LVWPS-MW205B	79 - 79.5	Alluvium	5/29/2018	N	440-212452-20	0.17 J	----	----	----	----	----	----	----
LVWPS-MW205B	90 - 90.5	Alluvium	5/29/2018	N	440-212452-21	0.9	2,400 J-	130	8.2	0.91	41	6.4	3.1
LVWPS-MW205B	100 - 100.5	Alluvium	5/29/2018	N	440-212452-22	0.18 J	----	----	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	N	440-212452-23	0.15 J	----	----	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	FD	440-212452-26	0.31	----	----	----	----	----	----	----
LVWPS-MW205B	120 - 120.5	Alluvium	5/29/2018	N	440-212452-27	0.16 J	----	----	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	N	440-212120-20	0.9	----	----	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	FD	440-212120-21	0.82	----	----	----	----	----	----	----
LVWPS-MW206C	47 - 47.5	Alluvium	5/24/2018	N	440-212120-24	0.85 J-	----	----	----	----	----	----	----
LVWPS-MW206C	57 - 57.5	Alluvium	5/24/2018	N	440-212120-25	1.3	----	----	----	----	----	----	----
LVWPS-MW206C	67 - 67.5	Alluvium	5/24/2018	N	440-212120-26	1.1	----	----	----	----	----	----	----
LVWPS-MW206C	75 - 75.5	Alluvium	5/24/2018	N	440-212120-27	1	----	----	----	----	----	----	----
LVWPS-MW206C	88 - 88.5	Alluvium	5/24/2018	N	440-212120-28	0.56	----	----	----	----	----	----	----
LVWPS-MW206C	96 - 96.5	UMCf	5/24/2018	N	440-212120-29	3	----	----	----	----	----	----	----
LVWPS-MW206C	104 - 104.5	UMCf	5/24/2018	N	440-212120-34	4.2	----	----	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	N	440-212120-30	0.26	----	----	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	FD	440-212120-31	0.21	----	----	----	----	----	----	----
LVWPS-MW206C	119 - 119.5	UMCf	5/24/2018	N	440-212120-32	<0.015	----	----	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	N	440-222642-13	<0.013	----	----	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	FD	440-222642-15	<0.013	----	----	----	----	----	----	----
LVWPS-MW206E	140 - 140.5	UMCf	10/18/2018	N	440-222642-14	<0.014 UJ	----	----	----	----	----	----	----
LVWPS-MW206E	150 - 150.5	UMCf	10/18/2018	N	440-222642-17	<0.015	----	----	----	----	----	----	----
LVWPS-MW206E	160 - 160.5	UMCf	10/18/2018	N	440-222642-16	<0.015	----	----	----	----	----	----	----
LVWPS-MW206E	169.5 - 170	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-18	<0.015	----	----	----	----	----	----	----
LVWPS-MW206E	180 - 180.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-19	<0.013	----	----	----	----	----	----	----
LVWPS-MW206E	190 - 190.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-20	<0.060	----	----	----	----	----	----	----
LVWPS-MW206E	200 - 200.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-1	<0.014 UJ	----	----	----	----	----	----	----
LVWPS-MW206E	210 - 210.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-2	<0.064	----	----	----	----	----	----	----
LVWPS-MW206E	220 - 220.5	UMCf (Semi-Consolidated)	10/19/2018	N	440-222724-3	<0.060	----	----	----	----	----	----	----
LVWPS-MW207	30 - 30.5	Alluvium	5/24/2018	N	440-212188-1	3.2	----	----	----	----	----	----	----
LVWPS-MW207	40 - 40.5	Alluvium	5/24/2018	N	440-212188-2	0.34	----	----	----	----	----	----	----
LVWPS-MW207	50 - 50.5	Alluvium	5/24/2018	N	440-212188-3	0.19	----	----	----	----	----	----	----
LVWPS-MW207	58 - 58.5	Alluvium	5/24/2018	N	440-212188-4	1.2	----	----	----	----	----	----	----
LVWPS-MW207	70 - 70.5	Alluvium	5/24/2018	N	440-212188-5	0.41	----	----	----	----	----	----	----
LVWPS-MW207	80 - 80.5	Alluvium	5/24/2018	N	440-212188-6	0.52	----	----	----	----	----	----	----
LVWPS-MW207	90 - 90.5	UMCf	5/24/2018	N	440-212188-7	0.61	----	----	----	----	----	----	----
LVWPS-MW207	100 - 100.5	UMCf	5/24/2018	N	440-212188-8	1.7	----	----	----	----	----	----	----
LVWPS-MW207	110 - 110.5	UMCf	5/24/2018	N	440-212188-9	0.042 J	----	----	----	----	----	----	----
LVWPS-MW207	120 - 120.5	UMCf (Semi-Consolidated)	5/24/2018	N	440-212188-10	<0.013	----	----	----	----	----	----	----
LVWPS-MW208B	31 - 31.5	Alluvium	6/4/2018	N	440-212875-1	3.3	3,900 J-	----	49	0.59	140	13 J	10 J
LVWPS-MW208B	41 - 41.5	Alluvium	6/4/2018	N	440-212875-2	0.83	----	----	----	----	----	----	----
LVWPS-MW208B	46 - 46.5	Alluvium	6/4/2018	N	440-212875-3	1	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW208B	57 - 57.5	Alluvium	6/4/2018	N	440-212875-4	0.27	510	----	6.6	0.78	43	6.4	2.4
LVWPS-MW208B	70 - 70.5	Alluvium	6/4/2018	N	440-212875-5	0.44	----	----	----	----	----	----	----
LVWPS-MW208B	75 - 75.5	Alluvium	6/4/2018	N	440-212875-6	0.7	----	----	----	----	----	----	----
LVWPS-MW208B	93 - 93.5	UMCf	6/4/2018	N	440-212875-7	1.5	3,000	----	17	1.4	50	10	4.8
LVWPS-MW208B	100 - 100.5	UMCf	6/4/2018	N	440-212875-8	0.73	----	----	----	----	----	----	----
LVWPS-MW208B	110 - 110.5	UMCf	6/4/2018	N	440-212875-9	0.47	----	----	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	N	440-212875-10	0.17 J	----	----	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	FD	440-212875-11	0.24 J	----	----	----	----	----	----	----
LVWPS-MW209	30 - 30.5	Alluvium	6/1/2018	N	440-212631-1	0.93	----	----	----	----	----	----	----
LVWPS-MW209	40 - 40.5	Alluvium	6/1/2018	N	440-212631-2	1.2	----	----	----	----	----	----	----
LVWPS-MW209	50.5 - 51	Alluvium	6/1/2018	N	440-212631-3	0.75	----	----	----	----	----	----	----
LVWPS-MW209	58 - 58.5	Alluvium	6/1/2018	N	440-212631-4	0.96	----	----	----	----	----	----	----
LVWPS-MW209	73 - 73.5	Alluvium	6/1/2018	N	440-212631-5	0.72	----	----	----	----	----	----	----
LVWPS-MW209	81 - 81.5	Alluvium	6/1/2018	N	440-212631-6	0.67	----	----	----	----	----	----	----
LVWPS-MW209	88 - 88.5	Alluvium	6/1/2018	N	440-212631-7	0.64	----	----	----	----	----	----	----
LVWPS-MW209	98 - 98.5	Alluvium	6/1/2018	N	440-212631-8	0.75	----	----	----	----	----	----	----
LVWPS-MW209	113 - 113.5	Alluvium	6/1/2018	N	440-212752-21	0.2	----	----	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	N	440-212752-22	0.27	----	----	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	FD	440-212752-23	0.27	----	----	----	----	----	----	----
LVWPS-MW209C	130 - 130.5	UMCf-cg	9/8/2018	N	440-219803-1	0.7	----	----	----	----	----	----	----
LVWPS-MW209C	140 - 140.5	UMCf-cg	9/9/2018	N	440-219803-2	1.1	----	----	----	----	----	----	----
LVWPS-MW209C	150 - 150.5	UMCf-cg	9/9/2018	N	440-219803-3	2.3	----	----	----	----	----	----	----
LVWPS-MW209C	160 - 160.5	UMCf-cg	9/9/2018	N	440-219803-4	0.71	----	----	----	----	----	----	----
LVWPS-MW209C	170 - 170.5	UMCf-cg	9/9/2018	N	440-219803-5	1.3	----	----	----	----	----	----	----
LVWPS-MW209C	180 - 180.5	Bedrock	9/9/2018	N	440-219803-6	<0.011	----	----	----	----	----	----	----
LVWPS-MW210C	28 - 28.5	Alluvium	5/29/2018	N	440-212452-1	0.82	1,900 J-	140	15	1.7	54	7.9 J	3.6 J
LVWPS-MW210C	34.5 - 35	Alluvium	5/29/2018	N	440-212452-2	0.36	----	----	----	----	----	----	----
LVWPS-MW210C	49.5 - 50	Alluvium	5/29/2018	N	440-212452-3	0.68	----	----	----	----	----	----	----
LVWPS-MW210C	60.5 - 61	Alluvium	5/29/2018	N	440-212452-4	0.66	2,900	240	11	1.0	36	7.2	3.0
LVWPS-MW210C	70 - 70.5	Alluvium	5/29/2018	N	440-212452-5	0.6	----	----	----	----	----	----	----
LVWPS-MW210C	80 - 80.5	Alluvium	5/30/2018	N	440-212452-6	0.72	----	----	----	----	----	----	----
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	N	440-212452-7	1.2	1,600	150	15	1.2	38	10	4.6
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	FD	440-212452-8	1.1	2,000	140	14	1.1	38	8.5	4.7
LVWPS-MW210C	106 - 106.5	UMCf-cg	5/30/2018	N	440-212452-9	0.98	----	----	----	----	----	----	----
LVWPS-MW210C	113 - 113.5	UMCf-cg	5/30/2018	N	440-212452-10	3.4	----	----	----	----	----	----	----
LVWPS-MW210C	120 - 120.5	UMCf-cg	5/30/2018	N	440-212452-11	2.7	----	----	----	----	----	----	----
LVWPS-MW210E	130 - 130.5	UMCf-cg	9/6/2018	N	440-219617-1	0.090 J-	----	----	----	----	----	----	----
LVWPS-MW210E	140 - 140.5	UMCf-cg	9/6/2018	N	440-219617-2	0.37	----	----	----	----	----	----	----
LVWPS-MW210E	150 - 150.5	UMCf-cg	9/6/2018	N	440-219617-3	0.59	----	----	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	N	440-219617-5	0.11	----	----	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	FD	440-219617-4	0.15	----	----	----	----	----	----	----
LVWPS-MW210E	165 - 165.5	UMCf-cg	9/6/2018	N	440-219617-6	<0.012	----	----	----	----	----	----	----
LVWPS-MW210E	175 - 175.5	Bedrock	9/6/2018	N	440-219646-1	<0.011 UJ	----	----	----	----	----	----	----
LVWPS-MW210E	185 - 185.5	Bedrock	9/6/2018	N	440-219646-2	<0.011	----	----	----	----	----	----	----
LVWPS-MW211	30 - 30.5	Alluvium	5/31/2018	N	440-212752-1	3.2	----	----	----	----	----	----	----
LVWPS-MW211	38 - 38.5	Alluvium	5/31/2018	N	440-212752-2	0.11	----	----	----	----	----	----	----
LVWPS-MW211	50 - 50.5	Alluvium	5/31/2018	N	440-212752-3	0.038 J	----	----	----	----	----	----	----
LVWPS-MW211	60 - 60.5	Alluvium	5/31/2018	N	440-212752-4	0.091	----	----	----	----	----	----	----
LVWPS-MW211	70 - 70.5	Alluvium	5/31/2018	N	440-212752-5	0.12	----	----	----	----	----	----	----

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Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW211	80 - 80.5	Alluvium	5/31/2018	N	440-212752-6	0.44	----	----	----	----	----	----	----
LVWPS-MW211	89 - 89.5	Alluvium	5/31/2018	N	440-212752-7	0.38	----	----	----	----	----	----	----
LVWPS-MW211	100 - 100.5	UMCf	5/31/2018	N	440-212752-8	1.1	----	----	----	----	----	----	----
LVWPS-MW211	110 - 110.5	UMCf-cg	5/31/2018	N	440-212752-9	0.4	----	----	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	N	440-212752-10	1.2	----	----	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	FD	440-212752-11	1.6	----	----	----	----	----	----	----
LVWPS-MW212B	30.5 - 31	Alluvium	6/5/2018	N	440-213022-1	0.052 J	----	----	----	----	----	----	----
LVWPS-MW212B	40.5 - 41	Alluvium	6/5/2018	N	440-213022-2	0.053	----	----	----	----	----	----	----
LVWPS-MW212B	49 - 49.5	Alluvium	6/5/2018	N	440-213022-3	0.024 J	----	----	----	----	----	----	----
LVWPS-MW212B	60 - 60.5	Alluvium	6/5/2018	N	440-213022-4	0.025 J	----	----	----	----	----	----	----
LVWPS-MW212B	68 - 68.5	Alluvium	6/5/2018	N	440-213022-6	0.028 J	----	----	----	----	----	----	----
LVWPS-MW212B	80 - 80.5	UMCf-cg	6/5/2018	N	440-213022-5	1.3	----	----	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	N	440-213022-7	3.2	----	----	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	FD	440-213022-8	4.2	----	----	----	----	----	----	----
LVWPS-MW212B	98 - 98.5	UMCf-cg	6/5/2018	N	440-213022-9	0.092	----	----	----	----	----	----	----
LVWPS-MW212B	106 - 106.5	UMCf-cg	6/5/2018	N	440-213022-10	1.4	----	----	----	----	----	----	----
LVWPS-MW212B	114.5 - 115	UMCf-cg	6/5/2018	N	440-213022-11	4.4	----	----	----	----	----	----	----
LVWPS-MW212D	124 - 124.5	UMCf-cg	9/20/2018	N	440-220569-9	5.2	----	----	----	----	----	----	----
LVWPS-MW212D	130 - 130.5	UMCf-cg	9/20/2018	N	440-220569-10	3.9	----	----	----	----	----	----	----
LVWPS-MW212D	139 - 139.5	UMCf-cg	9/20/2018	N	440-220569-11	2.4	----	----	----	----	----	----	----
LVWPS-MW212D	146.5 - 147	UMCf-cg	9/20/2018	N	440-220569-12	2.8	----	----	----	----	----	----	----
LVWPS-MW212D	159 - 159.5	Bedrock	9/20/2018	N	440-220569-13	0.21	----	----	----	----	----	----	----
LVWPS-MW212D	162 - 162.5	Bedrock	9/20/2018	N	440-220569-14	<0.011	----	----	----	----	----	----	----
LVWPS-MW213	29 - 29.5	Alluvium	6/1/2018	N	440-212752-12	0.11	----	----	----	----	----	----	----
LVWPS-MW213	35 - 35.5	Alluvium	6/1/2018	N	440-212752-13	0.096	----	----	----	----	----	----	----
LVWPS-MW213	49 - 49.5	Alluvium	6/1/2018	N	440-212752-14	<0.012	----	----	----	----	----	----	----
LVWPS-MW213	59 - 59.5	Alluvium	6/1/2018	N	440-212752-15	0.014 J	----	----	----	----	----	----	----
LVWPS-MW213	70 - 70.5	Alluvium	6/1/2018	N	440-212752-16	0.076	----	----	----	----	----	----	----
LVWPS-MW213	81 - 81.5	UMCf-cg	6/1/2018	N	440-212752-17	1.2	----	----	----	----	----	----	----
LVWPS-MW213	90 - 90.5	UMCf-cg	6/1/2018	N	440-212752-18	1.6	----	----	----	----	----	----	----
LVWPS-MW213	100 - 100.5	UMCf-cg	6/1/2018	N	440-212752-19	0.029 J	----	----	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	N	440-212752-20	<0.012	----	----	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	FD	440-212752-42	<0.012	----	----	----	----	----	----	----
LVWPS-MW213	120 - 120.5	Bedrock	6/1/2018	N	440-212752-43	<0.011 UJ	----	----	----	----	----	----	----
LVWPS-MW214	30.5 - 31	Alluvium	6/2/2018	N	440-212752-24	0.58	----	----	----	----	----	----	----
LVWPS-MW214	41 - 41.5	Alluvium	6/2/2018	N	440-212752-25	0.45	----	----	----	----	----	----	----
LVWPS-MW214	53 - 53.5	UMCf/Horse Springs	6/2/2018	N	440-212752-26	0.15	----	----	----	----	----	----	----
LVWPS-MW214	61 - 61.5	UMCf/Horse Springs	6/2/2018	N	440-212752-27	<0.012	----	----	----	----	----	----	----
LVWPS-MW214	69.5 - 70	UMCf/Horse Springs	6/2/2018	N	440-212752-28	<0.011	----	----	----	----	----	----	----
LVWPS-MW214	76.5 - 77	UMCf/Horse Springs	6/2/2018	N	440-212752-29	<0.011	----	----	----	----	----	----	----
LVWPS-MW214	93 - 93.5	UMCf/Horse Springs	6/2/2018	N	440-212752-30	<0.011	----	----	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	N	440-212752-31	<0.011	----	----	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	FD	440-212752-32	<0.011	----	----	----	----	----	----	----
LVWPS-MW214	114 - 114.5	UMCf/Horse Springs	6/2/2018	N	440-212752-35	<0.011	----	----	----	----	----	----	----
LVWPS-MW214	119 - 119.5	UMCf/Horse Springs	6/2/2018	N	440-212752-36	<0.011	----	----	----	----	----	----	----
LVWPS-MW215B	10 - 10.5	Alluvium	6/4/2018	N	440-212752-37	<0.013	----	----	----	----	----	----	----
LVWPS-MW215B	21 - 21.5	Alluvium	6/4/2018	N	440-212752-39	0.2	----	----	----	----	----	----	----
LVWPS-MW215B	33 - 33.5	Alluvium	6/4/2018	N	440-212752-38	0.22	----	----	----	----	----	----	----
LVWPS-MW216	13 - 13.5	Alluvium	6/7/2018	N	440-213209-1	<0.013	----	----	----	----	----	----	----

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Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW216	23 - 23.5	UMCf	6/7/2018	N	440-213209-2	0.1	----	----	----	----	----	----	----
LVWPS-MW216	33 - 33.5	UMCf	6/7/2018	N	440-213209-3	<0.011	----	----	----	----	----	----	----
LVWPS-MW216	43 - 43.5	UMCf	6/7/2018	N	440-213209-4	<0.011	----	----	----	----	----	----	----
LVWPS-MW216	53 - 53.5	UMCf	6/7/2018	N	440-213209-5	<0.011	----	----	----	----	----	----	----
LVWPS-MW216	63 - 63.5	UMCf	6/7/2018	N	440-213209-6	<0.011	----	----	----	----	----	----	----
LVWPS-MW216	73 - 73.5	UMCf	6/7/2018	N	440-213209-7	<0.011	----	----	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	N	440-221583-1	0.72	----	----	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	FD	440-221583-2	0.87	----	----	----	----	----	----	----
LVWPS-MW217C	53 - 53.5	Alluvium	10/3/2018	N	440-221583-3	0.75	----	----	----	----	----	----	----
LVWPS-MW217C	62 - 62.5	Alluvium	10/3/2018	N	440-221583-4	0.99	----	----	----	----	----	----	----
LVWPS-MW217C	69 - 69.5	Alluvium	10/3/2018	N	440-221583-5	0.61	----	----	----	----	----	----	----
LVWPS-MW217C	79 - 79.5	Alluvium	10/3/2018	N	440-221583-6	0.24	----	----	----	----	----	----	----
LVWPS-MW217C	92 - 92.5	Alluvium	10/3/2018	N	440-221583-7	0.86	----	----	----	----	----	----	----
LVWPS-MW217C	101 - 101.5	UMCf	10/4/2018	N	440-221583-8	9.5	----	----	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	N	440-221583-9	13	----	----	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	FD	440-221583-12	12	----	----	----	----	----	----	----
LVWPS-MW217C	120 - 120.5	UMCf	10/4/2018	N	440-221583-10	9.1	----	----	----	----	----	----	----
LVWPS-MW217C	130 - 130.5	UMCf	10/4/2018	N	440-221583-11	1.3	----	----	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	N	440-221583-14	4.3	----	----	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	FD	440-221583-13	5.2	----	----	----	----	----	----	----
LVWPS-MW217C	150 - 150.5	UMCf	10/4/2018	N	440-221583-15	6.3	----	----	----	----	----	----	----
LVWPS-MW217C	160 - 160.5	UMCf	10/4/2018	N	440-221583-16	5.4	----	----	----	----	----	----	----
LVWPS-MW217C	170 - 170.5	UMCf	10/4/2018	N	440-221583-17	17	----	----	----	----	----	----	----
LVWPS-MW217C	180 - 180.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-18	<0.012	----	----	----	----	----	----	----
LVWPS-MW217C	190 - 190.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-21	<0.012	----	----	----	----	----	----	----
LVWPS-MW217C	200 - 200.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-22	<0.013	----	----	----	----	----	----	----
LVWPS-MW217C	210 - 210.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-1	<0.062 UJ	----	----	----	----	----	----	----
LVWPS-MW217C	220 - 220.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-2	<0.062	----	----	----	----	----	----	----
LVWPS-MW218B	159 - 159.5	Bedrock	10/4/2018	N	440-221583-19	0.026 J	----	----	----	----	----	----	----
LVWPS-MW218B	164 - 164.5	Bedrock	10/4/2018	N	440-221583-20	<0.011	----	----	----	----	----	----	----
LVWPS-MW218C	25 - 25.5	Alluvium	9/11/2018	N	440-219893-3	0.19	----	----	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	N	440-219893-1	0.69	----	----	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	FD	440-219893-2	0.68	----	----	----	----	----	----	----
LVWPS-MW218C	49 - 49.5	Alluvium	9/11/2018	N	440-219893-4	0.57	----	----	----	----	----	----	----
LVWPS-MW218C	55 - 55.5	Alluvium	9/11/2018	N	440-219893-5	0.21	----	----	----	----	----	----	----
LVWPS-MW218C	65 - 65.5	Alluvium	9/11/2018	N	440-219893-7	1.1	----	----	----	----	----	----	----
LVWPS-MW218C	71 - 71.5	Alluvium	9/11/2018	N	440-219893-8	0.39	----	----	----	----	----	----	----
LVWPS-MW218C	85 - 85.5	Alluvium	9/11/2018	N	440-219893-9	0.25	----	----	----	----	----	----	----
LVWPS-MW218C	96 - 96.5	Alluvium	9/11/2018	N	440-220010-1	1.7	----	----	----	----	----	----	----
LVWPS-MW218C	105 - 105.5	UMCf	9/11/2018	N	440-220010-2	1.1	----	----	----	----	----	----	----
LVWPS-MW218C	110 - 110.5	UMCf	9/11/2018	N	440-220010-3	1.9 J+	----	----	----	----	----	----	----
LVWPS-MW218C	115 - 115.5	UMCf-cg	9/11/2018	N	440-220010-4	0.39	----	----	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf	9/11/2018	N	440-220010-5	0.040 J	----	----	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf-cg	9/11/2018	FD	440-220010-6	<0.012	----	----	----	----	----	----	----
LVWPS-MW218C	135 - 135.5	UMCf-cg	9/12/2018	N	440-220010-7	0.14	----	----	----	----	----	----	----
LVWPS-MW218C	144 - 144.5	UMCf	9/12/2018	N	440-220010-8	0.55	----	----	----	----	----	----	----
LVWPS-MW218C	155 - 155.5	UMCf-cg	9/12/2018	N	440-220010-9	1.6	----	----	----	----	----	----	----
LVWPS-MW218C	164 - 164.5	Bedrock	9/12/2018	N	440-220010-10	1.3	----	----	----	----	----	----	----
LVWPS-MW219C	30 - 30.5	Alluvium	9/26/2018	N	440-220930-2	0.46 J-	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	N	440-220930-3	0.4	----	----	----	----	----	----	----
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	FD	440-220930-4	0.54	----	----	----	----	----	----	----
LVWPS-MW219C	46 - 46.5	Alluvium	9/26/2018	N	440-220930-5	0.8	----	----	----	----	----	----	----
LVWPS-MW219C	55 - 55.5	UMCf/Horse Springs	9/26/2018	N	440-220930-6	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	65 - 65.5	UMCf/Horse Springs	9/26/2018	N	440-220930-7	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	75.5 - 76	UMCf/Horse Springs	9/26/2018	N	440-220930-9	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	85.5 - 86	UMCf/Horse Springs	9/26/2018	N	440-220930-10	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	95.5 - 96	UMCf/Horse Springs	9/26/2018	N	440-220930-11	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	105.5 - 106	UMCf/Horse Springs	9/26/2018	N	440-220930-12	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	115.5 - 116	UMCf/Horse Springs	9/26/2018	N	440-220930-13	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	126 - 126.5	UMCf/Horse Springs	9/26/2018	N	440-221030-1	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	136 - 136.5	UMCf/Horse Springs	9/26/2018	N	440-221030-2	<0.011	----	----	----	----	----	----	----
LVWPS-MW219C	145 - 145.5	UMCf/Horse Springs	9/26/2018	N	440-221030-3	<0.011	----	----	----	----	----	----	----
LVWPS-MW220B	29.5 - 30	Alluvium	9/20/2018	N	440-220569-1	0.39	----	----	----	----	----	----	----
LVWPS-MW220B	36.5 - 37	Alluvium	9/20/2018	N	440-220569-2	0.27	----	----	----	----	----	----	----
LVWPS-MW220B	51.5 - 52	Alluvium	9/20/2018	N	440-220569-3	0.45	----	----	----	----	----	----	----
LVWPS-MW220B	60.5 - 61	Alluvium	9/20/2018	N	440-220569-4	0.38	----	----	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	N	440-220569-5	0.6	----	----	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	FD	440-220569-6	0.59	----	----	----	----	----	----	----
LVWPS-MW220B	77.5 - 78	Alluvium	9/20/2018	N	440-220569-7	0.64 J-	----	----	----	----	----	----	----
LVWPS-MW220B	87.5 - 88	Alluvium	9/21/2018	N	440-220670-1	0.49 J-	----	----	----	----	----	----	----
LVWPS-MW220B	97.5 - 98	Alluvium	9/21/2018	N	440-220670-2	0.39	----	----	----	----	----	----	----
LVWPS-MW220B	110 - 110.5	UMCf-cg	9/21/2018	N	440-220670-3	2.5	----	----	----	----	----	----	----
LVWPS-MW220B	124 - 124.5	UMCf	9/21/2018	N	440-220670-4	0.028 J	----	----	----	----	----	----	----
LVWPS-MW220B	133 - 133.5	UMCf	9/21/2018	N	440-220670-5	<0.012	----	----	----	----	----	----	----
LVWPS-MW220B	143 - 143.5	UMCf-cg	9/21/2018	N	440-220670-6	0.14	----	----	----	----	----	----	----
LVWPS-MW220B	153 - 153.5	UMCf	9/21/2018	N	440-220670-7	2.5	----	----	----	----	----	----	----
LVWPS-MW220B	160 - 160.5	Bedrock	9/21/2018	N	440-220670-8	<0.011	----	----	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	N	440-220767-21	0.14 J	----	----	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	FD	440-220767-22	0.19 J	----	----	----	----	----	----	----
LVWPS-MW221B	43 - 43.5	Alluvium	9/24/2018	N	440-220767-23	0.069	----	----	----	----	----	----	----
LVWPS-MW221B	53 - 53.5	Alluvium	9/24/2018	N	440-220767-24	0.15	----	----	----	----	----	----	----
LVWPS-MW221B	63 - 63.5	Alluvium	9/24/2018	N	440-220767-25	0.049 J	----	----	----	----	----	----	----
LVWPS-MW221B	73 - 73.5	Alluvium	9/24/2018	N	440-220767-26	0.24	----	----	----	----	----	----	----
LVWPS-MW221B	83 - 83.5	UMCf	9/24/2018	N	440-220767-27	0.46	----	----	----	----	----	----	----
LVWPS-MW221B	93 - 93.5	UMCf-cg	9/24/2018	N	440-220767-28	0.77	----	----	----	----	----	----	----
LVWPS-MW221B	103 - 103.5	UMCf-cg	9/24/2018	N	440-220767-29	0.17	----	----	----	----	----	----	----
LVWPS-MW221B	113 - 113.5	Bedrock	9/24/2018	N	440-220930-1	<0.012	----	----	----	----	----	----	----
LVWPS-MW222C	40.5 - 41	Alluvium	9/21/2018	N	440-220670-9	<0.011	----	----	----	----	----	----	----
LVWPS-MW222C	50 - 50.5	Alluvium	9/21/2018	N	440-220670-10	<0.011	----	----	----	----	----	----	----
LVWPS-MW222C	55 - 55.5	UMCf-cg	9/21/2018	N	440-220670-11	0.038 J	----	----	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	N	440-220670-12	0.23	----	----	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	FD	440-220670-13	0.19	----	----	----	----	----	----	----
LVWPS-MW222C	70.5 - 71	UMCf-cg	9/21/2018	N	440-220670-14	0.35	----	----	----	----	----	----	----
LVWPS-MW222C	80 - 80.5	UMCf-cg	9/21/2018	N	440-220767-1	0.33	----	----	----	----	----	----	----
LVWPS-MW222C	91 - 91.5	UMCf-cg	9/21/2018	N	440-220767-2	0.75	----	----	----	----	----	----	----
LVWPS-MW222C	99 - 99.5	UMCf	9/21/2018	N	440-220767-3	3.5	----	----	----	----	----	----	----
LVWPS-MW222C	110 - 110.5	UMCf-cg	9/21/2018	N	440-220767-4	0.030 J	----	----	----	----	----	----	----
LVWPS-MW222C	122 - 122.5	UMCf	9/21/2018	N	440-220767-5	0.11	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW222C	130 - 130.5	UMCf-cg	9/21/2018	N	440-220767-6	0.11	----	----	----	----	----	----	----
LVWPS-MW222C	140 - 140.5	UMCf-cg	9/21/2018	N	440-220767-7	0.2	----	----	----	----	----	----	----
LVWPS-MW222C	150 - 150.5	UMCf-cg	9/22/2018	N	440-220767-8	0.26	----	----	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	N	440-220767-9	0.17	----	----	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	FD	440-220767-10	0.17	----	----	----	----	----	----	----
LVWPS-MW222C	170 - 170.5	UMCf-cg	9/22/2018	N	440-220767-11	0.21	----	----	----	----	----	----	----
LVWPS-MW222C	180 - 180.5	UMCf-cg	9/22/2018	N	440-220767-12	0.13	----	----	----	----	----	----	----
LVWPS-MW222C	190 - 190.5	UMCf-cg	9/22/2018	N	440-220767-13	0.27	----	----	----	----	----	----	----
LVWPS-MW222C	200 - 200.5	UMCf-cg	9/22/2018	N	440-220767-14	0.26	----	----	----	----	----	----	----
LVWPS-MW222C	210 - 210.5	UMCf-cg	9/22/2018	N	440-220767-15	0.32	----	----	----	----	----	----	----
LVWPS-MW222C	220 - 220.5	UMCf-cg	9/22/2018	N	440-220767-16	0.27	----	----	----	----	----	----	----
LVWPS-MW222C	230 - 230.5	UMCf-cg	9/22/2018	N	440-220767-18	0.29	----	----	----	----	----	----	----
LVWPS-MW222C	238.5 - 239	Bedrock	9/22/2018	N	440-220767-19	<0.011	----	----	----	----	----	----	----
LVWPS-MW222C	248.5 - 249	Bedrock	9/22/2018	N	440-220767-20	<0.011	----	----	----	----	----	----	----
LVWPS-MW223C	36.5 - 37	Alluvium	10/17/2018	N	440-222642-1	0.55	----	----	----	----	----	----	----
LVWPS-MW223C	48 - 48.5	Alluvium	10/17/2018	N	440-222642-2	0.71	----	----	----	----	----	----	----
LVWPS-MW223C	57 - 57.5	Alluvium	10/17/2018	N	440-222642-3	0.84	----	----	----	----	----	----	----
LVWPS-MW223C	67 - 67.5	Alluvium	10/17/2018	N	440-222642-4	0.66	----	----	----	----	----	----	----
LVWPS-MW223C	77 - 77.5	Alluvium	10/18/2018	N	440-222642-5	0.73	----	----	----	----	----	----	----
LVWPS-MW223C	87 - 87.5	Alluvium	10/18/2018	N	440-222642-6	0.69	----	----	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	N	440-222642-7	2.4	----	----	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	FD	440-222642-8	2	----	----	----	----	----	----	----
LVWPS-MW223C	107 - 107.5	UMCf	10/18/2018	N	440-222642-10	0.63	----	----	----	----	----	----	----
LVWPS-MW223C	117 - 117.5	UMCf	10/18/2018	N	440-222642-11	<0.060	----	----	----	----	----	----	----
LVWPS-MW223C	128 - 128.5	Bedrock	10/18/2018	N	440-222642-12	<0.059	----	----	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	N	440-221833-1	0.27	----	----	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	FD	440-221833-2	0.28	----	----	----	----	----	----	----
LVWPS-MW224C	53.5 - 54	Alluvium	10/9/2018	N	440-221833-3	0.58 J-	----	----	----	----	----	----	----
LVWPS-MW224C	62 - 62.5	Alluvium	10/9/2018	N	440-221833-4	0.27	----	----	----	----	----	----	----
LVWPS-MW224C	72 - 72.5	Alluvium	10/9/2018	N	440-221833-5	0.37	----	----	----	----	----	----	----
LVWPS-MW224C	80 - 80.5	Alluvium	10/9/2018	N	440-221833-6	0.18	----	----	----	----	----	----	----
LVWPS-MW224C	92 - 92.5	Alluvium	10/9/2018	N	440-221833-7	0.22	----	----	----	----	----	----	----
LVWPS-MW224C	102 - 102.5	UMCf	10/9/2018	N	440-221833-9	2.7	----	----	----	----	----	----	----
LVWPS-MW224C	110 - 110.5	UMCf	10/9/2018	N	440-221833-10	0.39	----	----	----	----	----	----	----
LVWPS-MW224C	117 - 117.5	UMCf	10/9/2018	N	440-221931-11	0.14	----	----	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	N	440-221931-12	<0.018	----	----	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	FD	440-221931-14	<0.017	----	----	----	----	----	----	----
LVWPS-MW224C	137 - 137.5	UMCf	10/9/2018	N	440-221931-13	<0.017	----	----	----	----	----	----	----
LVWPS-MW224C	146 - 146.5	UMCf	10/9/2018	N	440-221931-15	<0.016	----	----	----	----	----	----	----
LVWPS-MW224C	158 - 158.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-16	<0.017	----	----	----	----	----	----	----
LVWPS-MW224C	177 - 177.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-17	<0.016	----	----	----	----	----	----	----
LVWPS-MW224C	187 - 187.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-18	<0.014	----	----	----	----	----	----	----
LVWPS-MW224C	194 - 194.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-19	<0.012	----	----	----	----	----	----	----
LVWPS-MW225B	37 - 37.5	Alluvium	10/9/2018	N	440-221931-1	0.36	----	----	----	----	----	----	----
LVWPS-MW225B	53 - 53.5	Alluvium	10/9/2018	N	440-221931-2	0.51	----	----	----	----	----	----	----
LVWPS-MW225B	57.5 - 58	Alluvium	10/9/2018	N	440-221931-3	0.43	----	----	----	----	----	----	----
LVWPS-MW225B	71 - 71.5	UMCf	10/9/2018	N	440-221931-4	1.7 J-	----	----	----	----	----	----	----
LVWPS-MW225B	77 - 77.5	UMCf	10/9/2018	N	440-221931-5	2.2	----	----	----	----	----	----	----
LVWPS-MW225B	87 - 87.5	UMCf	10/9/2018	N	440-221931-6	2.9	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 314.0	EPA 300.1	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0	Anions by EPA 300.0	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B
						Perchlorate	Chlorate	Chlorate	Chloride	Nitrate (as NO3)	Sulfate	Calcium	Magnesium
						mg/kg	µg/kg	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW225B	97 - 97.5	UMCf	10/10/2018	N	440-221931-7	1.3	----	----	----	----	----	----	----
LVWPS-MW225B	107 - 107.5	UMCf	10/10/2018	N	440-221931-8	0.53	----	----	----	----	----	----	----
LVWPS-MW225B	114 - 114.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-9	<0.013	----	----	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-20	<0.013	----	----	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	FD	440-221931-10	<0.012	----	----	----	----	----	----	----
LVWPS-MW225B	131 - 131.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-1	<0.015 UJ	----	----	----	----	----	----	----
LVWPS-MW225B	141 - 141.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-2	<0.012	----	----	----	----	----	----	----
LVWPS-MW225B	151 - 151.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-3	<0.012	----	----	----	----	----	----	----
LVWPS-MW225B	155 - 155.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-4	<0.012	----	----	----	----	----	----	----
LVWPS-MW226B	45 - 45.5	Alluvium	10/22/2018	N	440-222941-1	0.62	----	----	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-2	0.3	----	----	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	FD	440-222941-9	0.38	----	----	----	----	----	----	----
LVWPS-MW226B	60 - 60.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-3	5.6	----	----	----	----	----	----	----
LVWPS-MW226B	70 - 70.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-4	<0.012	----	----	----	----	----	----	----
LVWPS-MW226B	80 - 80.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-5	<0.012	----	----	----	----	----	----	----
LVWPS-MW226B	90 - 90.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-6	<0.013	----	----	----	----	----	----	----
LVWPS-MW226B	100 - 100.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-7	<0.012	----	----	----	----	----	----	----
LVWPS-MW226B	105 - 105.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-8	<0.013 UJ	----	----	----	----	----	----	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
mg/L - milligarms per liter
µg/L - micrograms per liter
N - Normal field sample
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW201B	24 - 24.5	Alluvium	6/6/2018	N	440-213022-12	4.0	30	4.2 J	5.3 J	2,300	32	60
LVWPS-MW201B	39 - 39.5	Alluvium	6/6/2018	N	440-213022-13	----	----	----	----	----	----	----
LVWPS-MW201B	47 - 47.5	Alluvium	6/6/2018	N	440-213022-14	----	----	----	----	----	----	----
LVWPS-MW201B	59.5 - 60	UMCf	6/6/2018	N	440-213022-15	17	56	3.3 J	3.9 J	73 J	<2.5	79
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	N	440-213022-16	----	----	----	----	----	----	----
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	FD	440-213022-17	----	----	----	----	----	----	----
LVWPS-MW201B	82 - 82.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-1	----	----	----	----	----	----	----
LVWPS-MW201B	92 - 92.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-2	160	230	<2.5	<2.5	41 J	3.0 J	140
LVWPS-MW201B	106 - 106.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-5	----	----	----	----	----	----	----
LVWPS-MW201B	112 - 112.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-6	----	----	----	----	----	----	----
LVWPS-MW201B	120 - 120.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-7	----	----	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	N	440-212078-11	----	----	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	FD	440-212078-12	----	----	----	----	----	----	----
LVWPS-MW202	41.5 - 42	Alluvium	5/22/2018	N	440-212078-13	----	----	----	----	----	----	----
LVWPS-MW202	51.5 - 52	Alluvium	5/22/2018	N	440-212078-14	----	----	----	----	----	----	----
LVWPS-MW202	64 - 64.5	UMCf	5/22/2018	N	440-212078-15	----	----	----	----	----	----	----
LVWPS-MW202	72.5 - 73	UMCf	5/22/2018	N	440-212078-16	----	----	----	----	----	----	----
LVWPS-MW202	81.5 - 82	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-17	----	----	----	----	----	----	----
LVWPS-MW202	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-18	----	----	----	----	----	----	----
LVWPS-MW202	102.5 - 103	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-19	----	----	----	----	----	----	----
LVWPS-MW202	109.5 - 110	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-20	----	----	----	----	----	----	----
LVWPS-MW202	119.5 - 120	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-21	----	----	----	----	----	----	----
LVWPS-MW203C	30 - 30.5	Alluvium	5/22/2018	N	440-212078-1	----	----	----	----	----	----	----
LVWPS-MW203C	40 - 40.5	Alluvium	5/22/2018	N	440-212078-2	----	----	----	----	----	----	----
LVWPS-MW203C	51 - 51.5	Alluvium	5/22/2018	N	440-212078-3	----	----	----	----	----	----	----
LVWPS-MW203C	60 - 60.5	Alluvium	5/22/2018	N	440-212078-4	----	----	----	----	----	----	----
LVWPS-MW203C	70 - 70.5	UMCf	5/22/2018	N	440-212078-5	----	----	----	----	----	----	----
LVWPS-MW203C	80 - 80.5	UMCf	5/22/2018	N	440-212078-6	----	----	----	----	----	----	----
LVWPS-MW203C	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-7	----	----	----	----	----	----	----
LVWPS-MW203C	100 - 100.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-8	----	----	----	----	----	----	----
LVWPS-MW203C	110 - 110.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-9	----	----	----	----	----	----	----
LVWPS-MW203C	120 - 120.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-10	----	----	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	N	440-212120-1	----	----	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	FD	440-212120-33	----	----	----	----	----	----	----
LVWPS-MW204	41 - 41.5	Alluvium	5/23/2018	N	440-212120-2	----	----	----	----	----	----	----
LVWPS-MW204	50 - 50.5	Alluvium	5/23/2018	N	440-212120-3	----	----	----	----	----	----	----
LVWPS-MW204	60 - 60.5	Alluvium	5/23/2018	N	440-212120-4	----	----	----	----	----	----	----
LVWPS-MW204	70 - 70.5	Alluvium	5/23/2018	N	440-212120-5	----	----	----	----	----	----	----
LVWPS-MW204	80 - 80.5	Alluvium	5/23/2018	N	440-212120-6	----	----	----	----	----	----	----
LVWPS-MW204	90 - 90.5	UMCf	5/24/2018	N	440-212120-7	----	----	----	----	----	----	----
LVWPS-MW204	100 - 100.5	UMCf	5/24/2018	N	440-212120-8	----	----	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	N	440-212120-9	----	----	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	FD	440-212120-14	----	----	----	----	----	----	----
LVWPS-MW204	120 - 120.5	UMCf	5/24/2018	N	440-212120-15	----	----	----	----	----	----	----
LVWPS-MW204C	130 - 130.5	UMCf	8/29/2018	N	440-219196-1	----	----	----	----	----	----	----
LVWPS-MW204C	140 - 140.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-2	----	----	----	----	----	----	----
LVWPS-MW204C	150 - 150.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-3	----	----	----	----	----	----	----
LVWPS-MW204C	160 - 160.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-4	----	----	----	----	----	----	----
LVWPS-MW204C	168 - 168.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-5	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW204C	180 - 180.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-6	----	----	----	----	----	----	----
LVWPS-MW205B	28 - 28.5	Alluvium	5/29/2018	N	440-212452-14	3.9	54	7.7	9.6 J	6,400	79	75
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	N	440-212452-15	----	----	----	----	----	----	----
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	FD	440-212452-16	----	----	----	----	----	----	----
LVWPS-MW205B	50 - 50.5	Alluvium	5/29/2018	N	440-212452-17	----	----	----	----	----	----	----
LVWPS-MW205B	60 - 60.5	Alluvium	5/29/2018	N	440-212452-18	4.1	19	<2.5	<2.5	200	3.7 J	35
LVWPS-MW205B	70 - 70.5	Alluvium	5/29/2018	N	440-212452-19	----	----	----	----	----	----	----
LVWPS-MW205B	79 - 79.5	Alluvium	5/29/2018	N	440-212452-20	----	----	----	----	----	----	----
LVWPS-MW205B	90 - 90.5	Alluvium	5/29/2018	N	440-212452-21	6.2	42	9.3	3.0 J	540	4.2 J	100
LVWPS-MW205B	100 - 100.5	Alluvium	5/29/2018	N	440-212452-22	----	----	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	N	440-212452-23	----	----	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	FD	440-212452-26	----	----	----	----	----	----	----
LVWPS-MW205B	120 - 120.5	Alluvium	5/29/2018	N	440-212452-27	----	----	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	N	440-212120-20	----	----	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	FD	440-212120-21	----	----	----	----	----	----	----
LVWPS-MW206C	47 - 47.5	Alluvium	5/24/2018	N	440-212120-24	----	----	----	----	----	----	----
LVWPS-MW206C	57 - 57.5	Alluvium	5/24/2018	N	440-212120-25	----	----	----	----	----	----	----
LVWPS-MW206C	67 - 67.5	Alluvium	5/24/2018	N	440-212120-26	----	----	----	----	----	----	----
LVWPS-MW206C	75 - 75.5	Alluvium	5/24/2018	N	440-212120-27	----	----	----	----	----	----	----
LVWPS-MW206C	88 - 88.5	Alluvium	5/24/2018	N	440-212120-28	----	----	----	----	----	----	----
LVWPS-MW206C	96 - 96.5	UMCf	5/24/2018	N	440-212120-29	----	----	----	----	----	----	----
LVWPS-MW206C	104 - 104.5	UMCf	5/24/2018	N	440-212120-34	----	----	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	N	440-212120-30	----	----	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	FD	440-212120-31	----	----	----	----	----	----	----
LVWPS-MW206C	119 - 119.5	UMCf	5/24/2018	N	440-212120-32	----	----	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	N	440-222642-13	----	----	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	FD	440-222642-15	----	----	----	----	----	----	----
LVWPS-MW206E	140 - 140.5	UMCf	10/18/2018	N	440-222642-14	----	----	----	----	----	----	----
LVWPS-MW206E	150 - 150.5	UMCf	10/18/2018	N	440-222642-17	----	----	----	----	----	----	----
LVWPS-MW206E	160 - 160.5	UMCf	10/18/2018	N	440-222642-16	----	----	----	----	----	----	----
LVWPS-MW206E	169.5 - 170	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-18	----	----	----	----	----	----	----
LVWPS-MW206E	180 - 180.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-19	----	----	----	----	----	----	----
LVWPS-MW206E	190 - 190.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-20	----	----	----	----	----	----	----
LVWPS-MW206E	200 - 200.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-1	----	----	----	----	----	----	----
LVWPS-MW206E	210 - 210.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-2	----	----	----	----	----	----	----
LVWPS-MW206E	220 - 220.5	UMCf (Semi-Consolidated)	10/19/2018	N	440-222724-3	----	----	----	----	----	----	----
LVWPS-MW207	30 - 30.5	Alluvium	5/24/2018	N	440-212188-1	----	----	----	----	----	----	----
LVWPS-MW207	40 - 40.5	Alluvium	5/24/2018	N	440-212188-2	----	----	----	----	----	----	----
LVWPS-MW207	50 - 50.5	Alluvium	5/24/2018	N	440-212188-3	----	----	----	----	----	----	----
LVWPS-MW207	58 - 58.5	Alluvium	5/24/2018	N	440-212188-4	----	----	----	----	----	----	----
LVWPS-MW207	70 - 70.5	Alluvium	5/24/2018	N	440-212188-5	----	----	----	----	----	----	----
LVWPS-MW207	80 - 80.5	Alluvium	5/24/2018	N	440-212188-6	----	----	----	----	----	----	----
LVWPS-MW207	90 - 90.5	UMCf	5/24/2018	N	440-212188-7	----	----	----	----	----	----	----
LVWPS-MW207	100 - 100.5	UMCf	5/24/2018	N	440-212188-8	----	----	----	----	----	----	----
LVWPS-MW207	110 - 110.5	UMCf	5/24/2018	N	440-212188-9	----	----	----	----	----	----	----
LVWPS-MW207	120 - 120.5	UMCf (Semi-Consolidated)	5/24/2018	N	440-212188-10	----	----	----	----	----	----	----
LVWPS-MW208B	31 - 31.5	Alluvium	6/4/2018	N	440-212875-1	11 J+	84	7.3	3.8 J	810 J	6.0	120
LVWPS-MW208B	41 - 41.5	Alluvium	6/4/2018	N	440-212875-2	----	----	----	----	----	----	----
LVWPS-MW208B	46 - 46.5	Alluvium	6/4/2018	N	440-212875-3	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW208B	57 - 57.5	Alluvium	6/4/2018	N	440-212875-4	9.8	34	5.9	2.5 J	490	7.1	89
LVWPS-MW208B	70 - 70.5	Alluvium	6/4/2018	N	440-212875-5	----	----	----	----	----	----	----
LVWPS-MW208B	75 - 75.5	Alluvium	6/4/2018	N	440-212875-6	----	----	----	----	----	----	----
LVWPS-MW208B	93 - 93.5	UMCf	6/4/2018	N	440-212875-7	6.7	35	9.0	2.9 J	270	<2.5	87
LVWPS-MW208B	100 - 100.5	UMCf	6/4/2018	N	440-212875-8	----	----	----	----	----	----	----
LVWPS-MW208B	110 - 110.5	UMCf	6/4/2018	N	440-212875-9	----	----	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	N	440-212875-10	----	----	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	FD	440-212875-11	----	----	----	----	----	----	----
LVWPS-MW209	30 - 30.5	Alluvium	6/1/2018	N	440-212631-1	----	----	----	----	----	----	----
LVWPS-MW209	40 - 40.5	Alluvium	6/1/2018	N	440-212631-2	----	----	----	----	----	----	----
LVWPS-MW209	50.5 - 51	Alluvium	6/1/2018	N	440-212631-3	----	----	----	----	----	----	----
LVWPS-MW209	58 - 58.5	Alluvium	6/1/2018	N	440-212631-4	----	----	----	----	----	----	----
LVWPS-MW209	73 - 73.5	Alluvium	6/1/2018	N	440-212631-5	----	----	----	----	----	----	----
LVWPS-MW209	81 - 81.5	Alluvium	6/1/2018	N	440-212631-6	----	----	----	----	----	----	----
LVWPS-MW209	88 - 88.5	Alluvium	6/1/2018	N	440-212631-7	----	----	----	----	----	----	----
LVWPS-MW209	98 - 98.5	Alluvium	6/1/2018	N	440-212631-8	----	----	----	----	----	----	----
LVWPS-MW209	113 - 113.5	Alluvium	6/1/2018	N	440-212752-21	----	----	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	N	440-212752-22	----	----	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	FD	440-212752-23	----	----	----	----	----	----	----
LVWPS-MW209C	130 - 130.5	UMCf-cg	9/8/2018	N	440-219803-1	----	----	----	----	----	----	----
LVWPS-MW209C	140 - 140.5	UMCf-cg	9/9/2018	N	440-219803-2	----	----	----	----	----	----	----
LVWPS-MW209C	150 - 150.5	UMCf-cg	9/9/2018	N	440-219803-3	----	----	----	----	----	----	----
LVWPS-MW209C	160 - 160.5	UMCf-cg	9/9/2018	N	440-219803-4	----	----	----	----	----	----	----
LVWPS-MW209C	170 - 170.5	UMCf-cg	9/9/2018	N	440-219803-5	----	----	----	----	----	----	----
LVWPS-MW209C	180 - 180.5	Bedrock	9/9/2018	N	440-219803-6	----	----	----	----	----	----	----
LVWPS-MW210C	28 - 28.5	Alluvium	5/29/2018	N	440-212452-1	6.7 J+	32	2.8 J	<2.5	270 J+	<2.5	66
LVWPS-MW210C	34.5 - 35	Alluvium	5/29/2018	N	440-212452-2	----	----	----	----	----	----	----
LVWPS-MW210C	49.5 - 50	Alluvium	5/29/2018	N	440-212452-3	----	----	----	----	----	----	----
LVWPS-MW210C	60.5 - 61	Alluvium	5/29/2018	N	440-212452-4	6.3	27	4.0 J	<2.5	750	8.4	49
LVWPS-MW210C	70 - 70.5	Alluvium	5/29/2018	N	440-212452-5	----	----	----	----	----	----	----
LVWPS-MW210C	80 - 80.5	Alluvium	5/30/2018	N	440-212452-6	----	----	----	----	----	----	----
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	N	440-212452-7	3.3	30	3.1 J	<2.5	130	<2.5	22
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	FD	440-212452-8	3.2	30	3.3 J	<2.5	190	3.3 J	23
LVWPS-MW210C	106 - 106.5	UMCf-cg	5/30/2018	N	440-212452-9	----	----	----	----	----	----	----
LVWPS-MW210C	113 - 113.5	UMCf-cg	5/30/2018	N	440-212452-10	----	----	----	----	----	----	----
LVWPS-MW210C	120 - 120.5	UMCf-cg	5/30/2018	N	440-212452-11	----	----	----	----	----	----	----
LVWPS-MW210E	130 - 130.5	UMCf-cg	9/6/2018	N	440-219617-1	----	----	----	----	----	----	----
LVWPS-MW210E	140 - 140.5	UMCf-cg	9/6/2018	N	440-219617-2	----	----	----	----	----	----	----
LVWPS-MW210E	150 - 150.5	UMCf-cg	9/6/2018	N	440-219617-3	----	----	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	N	440-219617-5	----	----	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	FD	440-219617-4	----	----	----	----	----	----	----
LVWPS-MW210E	165 - 165.5	UMCf-cg	9/6/2018	N	440-219617-6	----	----	----	----	----	----	----
LVWPS-MW210E	175 - 175.5	Bedrock	9/6/2018	N	440-219646-1	----	----	----	----	----	----	----
LVWPS-MW210E	185 - 185.5	Bedrock	9/6/2018	N	440-219646-2	----	----	----	----	----	----	----
LVWPS-MW211	30 - 30.5	Alluvium	5/31/2018	N	440-212752-1	----	----	----	----	----	----	----
LVWPS-MW211	38 - 38.5	Alluvium	5/31/2018	N	440-212752-2	----	----	----	----	----	----	----
LVWPS-MW211	50 - 50.5	Alluvium	5/31/2018	N	440-212752-3	----	----	----	----	----	----	----
LVWPS-MW211	60 - 60.5	Alluvium	5/31/2018	N	440-212752-4	----	----	----	----	----	----	----
LVWPS-MW211	70 - 70.5	Alluvium	5/31/2018	N	440-212752-5	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW211	80 - 80.5	Alluvium	5/31/2018	N	440-212752-6	----	----	----	----	----	----	----
LVWPS-MW211	89 - 89.5	Alluvium	5/31/2018	N	440-212752-7	----	----	----	----	----	----	----
LVWPS-MW211	100 - 100.5	UMCf	5/31/2018	N	440-212752-8	----	----	----	----	----	----	----
LVWPS-MW211	110 - 110.5	UMCf-cg	5/31/2018	N	440-212752-9	----	----	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	N	440-212752-10	----	----	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	FD	440-212752-11	----	----	----	----	----	----	----
LVWPS-MW212B	30.5 - 31	Alluvium	6/5/2018	N	440-213022-1	----	----	----	----	----	----	----
LVWPS-MW212B	40.5 - 41	Alluvium	6/5/2018	N	440-213022-2	----	----	----	----	----	----	----
LVWPS-MW212B	49 - 49.5	Alluvium	6/5/2018	N	440-213022-3	----	----	----	----	----	----	----
LVWPS-MW212B	60 - 60.5	Alluvium	6/5/2018	N	440-213022-4	----	----	----	----	----	----	----
LVWPS-MW212B	68 - 68.5	Alluvium	6/5/2018	N	440-213022-6	----	----	----	----	----	----	----
LVWPS-MW212B	80 - 80.5	UMCf-cg	6/5/2018	N	440-213022-5	----	----	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	N	440-213022-7	----	----	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	FD	440-213022-8	----	----	----	----	----	----	----
LVWPS-MW212B	98 - 98.5	UMCf-cg	6/5/2018	N	440-213022-9	----	----	----	----	----	----	----
LVWPS-MW212B	106 - 106.5	UMCf-cg	6/5/2018	N	440-213022-10	----	----	----	----	----	----	----
LVWPS-MW212B	114.5 - 115	UMCf-cg	6/5/2018	N	440-213022-11	----	----	----	----	----	----	----
LVWPS-MW212D	124 - 124.5	UMCf-cg	9/20/2018	N	440-220569-9	----	----	----	----	----	----	----
LVWPS-MW212D	130 - 130.5	UMCf-cg	9/20/2018	N	440-220569-10	----	----	----	----	----	----	----
LVWPS-MW212D	139 - 139.5	UMCf-cg	9/20/2018	N	440-220569-11	----	----	----	----	----	----	----
LVWPS-MW212D	146.5 - 147	UMCf-cg	9/20/2018	N	440-220569-12	----	----	----	----	----	----	----
LVWPS-MW212D	159 - 159.5	Bedrock	9/20/2018	N	440-220569-13	----	----	----	----	----	----	----
LVWPS-MW212D	162 - 162.5	Bedrock	9/20/2018	N	440-220569-14	----	----	----	----	----	----	----
LVWPS-MW213	29 - 29.5	Alluvium	6/1/2018	N	440-212752-12	----	----	----	----	----	----	----
LVWPS-MW213	35 - 35.5	Alluvium	6/1/2018	N	440-212752-13	----	----	----	----	----	----	----
LVWPS-MW213	49 - 49.5	Alluvium	6/1/2018	N	440-212752-14	----	----	----	----	----	----	----
LVWPS-MW213	59 - 59.5	Alluvium	6/1/2018	N	440-212752-15	----	----	----	----	----	----	----
LVWPS-MW213	70 - 70.5	Alluvium	6/1/2018	N	440-212752-16	----	----	----	----	----	----	----
LVWPS-MW213	81 - 81.5	UMCf-cg	6/1/2018	N	440-212752-17	----	----	----	----	----	----	----
LVWPS-MW213	90 - 90.5	UMCf-cg	6/1/2018	N	440-212752-18	----	----	----	----	----	----	----
LVWPS-MW213	100 - 100.5	UMCf-cg	6/1/2018	N	440-212752-19	----	----	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	N	440-212752-20	----	----	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	FD	440-212752-42	----	----	----	----	----	----	----
LVWPS-MW213	120 - 120.5	Bedrock	6/1/2018	N	440-212752-43	----	----	----	----	----	----	----
LVWPS-MW214	30.5 - 31	Alluvium	6/2/2018	N	440-212752-24	----	----	----	----	----	----	----
LVWPS-MW214	41 - 41.5	Alluvium	6/2/2018	N	440-212752-25	----	----	----	----	----	----	----
LVWPS-MW214	53 - 53.5	UMCf/Horse Springs	6/2/2018	N	440-212752-26	----	----	----	----	----	----	----
LVWPS-MW214	61 - 61.5	UMCf/Horse Springs	6/2/2018	N	440-212752-27	----	----	----	----	----	----	----
LVWPS-MW214	69.5 - 70	UMCf/Horse Springs	6/2/2018	N	440-212752-28	----	----	----	----	----	----	----
LVWPS-MW214	76.5 - 77	UMCf/Horse Springs	6/2/2018	N	440-212752-29	----	----	----	----	----	----	----
LVWPS-MW214	93 - 93.5	UMCf/Horse Springs	6/2/2018	N	440-212752-30	----	----	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	N	440-212752-31	----	----	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	FD	440-212752-32	----	----	----	----	----	----	----
LVWPS-MW214	114 - 114.5	UMCf/Horse Springs	6/2/2018	N	440-212752-35	----	----	----	----	----	----	----
LVWPS-MW214	119 - 119.5	UMCf/Horse Springs	6/2/2018	N	440-212752-36	----	----	----	----	----	----	----
LVWPS-MW215B	10 - 10.5	Alluvium	6/4/2018	N	440-212752-37	----	----	----	----	----	----	----
LVWPS-MW215B	21 - 21.5	Alluvium	6/4/2018	N	440-212752-39	----	----	----	----	----	----	----
LVWPS-MW215B	33 - 33.5	Alluvium	6/4/2018	N	440-212752-38	----	----	----	----	----	----	----
LVWPS-MW216	13 - 13.5	Alluvium	6/7/2018	N	440-213209-1	----	----	----	----	----	----	----

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Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW216	23 - 23.5	UMCf	6/7/2018	N	440-213209-2	----	----	----	----	----	----	----
LVWPS-MW216	33 - 33.5	UMCf	6/7/2018	N	440-213209-3	----	----	----	----	----	----	----
LVWPS-MW216	43 - 43.5	UMCf	6/7/2018	N	440-213209-4	----	----	----	----	----	----	----
LVWPS-MW216	53 - 53.5	UMCf	6/7/2018	N	440-213209-5	----	----	----	----	----	----	----
LVWPS-MW216	63 - 63.5	UMCf	6/7/2018	N	440-213209-6	----	----	----	----	----	----	----
LVWPS-MW216	73 - 73.5	UMCf	6/7/2018	N	440-213209-7	----	----	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	N	440-221583-1	----	----	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	FD	440-221583-2	----	----	----	----	----	----	----
LVWPS-MW217C	53 - 53.5	Alluvium	10/3/2018	N	440-221583-3	----	----	----	----	----	----	----
LVWPS-MW217C	62 - 62.5	Alluvium	10/3/2018	N	440-221583-4	----	----	----	----	----	----	----
LVWPS-MW217C	69 - 69.5	Alluvium	10/3/2018	N	440-221583-5	----	----	----	----	----	----	----
LVWPS-MW217C	79 - 79.5	Alluvium	10/3/2018	N	440-221583-6	----	----	----	----	----	----	----
LVWPS-MW217C	92 - 92.5	Alluvium	10/3/2018	N	440-221583-7	----	----	----	----	----	----	----
LVWPS-MW217C	101 - 101.5	UMCf	10/4/2018	N	440-221583-8	----	----	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	N	440-221583-9	----	----	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	FD	440-221583-12	----	----	----	----	----	----	----
LVWPS-MW217C	120 - 120.5	UMCf	10/4/2018	N	440-221583-10	----	----	----	----	----	----	----
LVWPS-MW217C	130 - 130.5	UMCf	10/4/2018	N	440-221583-11	----	----	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	N	440-221583-14	----	----	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	FD	440-221583-13	----	----	----	----	----	----	----
LVWPS-MW217C	150 - 150.5	UMCf	10/4/2018	N	440-221583-15	----	----	----	----	----	----	----
LVWPS-MW217C	160 - 160.5	UMCf	10/4/2018	N	440-221583-16	----	----	----	----	----	----	----
LVWPS-MW217C	170 - 170.5	UMCf	10/4/2018	N	440-221583-17	----	----	----	----	----	----	----
LVWPS-MW217C	180 - 180.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-18	----	----	----	----	----	----	----
LVWPS-MW217C	190 - 190.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-21	----	----	----	----	----	----	----
LVWPS-MW217C	200 - 200.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-22	----	----	----	----	----	----	----
LVWPS-MW217C	210 - 210.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-1	----	----	----	----	----	----	----
LVWPS-MW217C	220 - 220.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-2	----	----	----	----	----	----	----
LVWPS-MW218B	159 - 159.5	Bedrock	10/4/2018	N	440-221583-19	----	----	----	----	----	----	----
LVWPS-MW218B	164 - 164.5	Bedrock	10/4/2018	N	440-221583-20	----	----	----	----	----	----	----
LVWPS-MW218C	25 - 25.5	Alluvium	9/11/2018	N	440-219893-3	----	----	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	N	440-219893-1	----	----	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	FD	440-219893-2	----	----	----	----	----	----	----
LVWPS-MW218C	49 - 49.5	Alluvium	9/11/2018	N	440-219893-4	----	----	----	----	----	----	----
LVWPS-MW218C	55 - 55.5	Alluvium	9/11/2018	N	440-219893-5	----	----	----	----	----	----	----
LVWPS-MW218C	65 - 65.5	Alluvium	9/11/2018	N	440-219893-7	----	----	----	----	----	----	----
LVWPS-MW218C	71 - 71.5	Alluvium	9/11/2018	N	440-219893-8	----	----	----	----	----	----	----
LVWPS-MW218C	85 - 85.5	Alluvium	9/11/2018	N	440-219893-9	----	----	----	----	----	----	----
LVWPS-MW218C	96 - 96.5	Alluvium	9/11/2018	N	440-220010-1	----	----	----	----	----	----	----
LVWPS-MW218C	105 - 105.5	UMCf	9/11/2018	N	440-220010-2	----	----	----	----	----	----	----
LVWPS-MW218C	110 - 110.5	UMCf	9/11/2018	N	440-220010-3	----	----	----	----	----	----	----
LVWPS-MW218C	115 - 115.5	UMCf-cg	9/11/2018	N	440-220010-4	----	----	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf	9/11/2018	N	440-220010-5	----	----	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf-cg	9/11/2018	FD	440-220010-6	----	----	----	----	----	----	----
LVWPS-MW218C	135 - 135.5	UMCf-cg	9/12/2018	N	440-220010-7	----	----	----	----	----	----	----
LVWPS-MW218C	144 - 144.5	UMCf	9/12/2018	N	440-220010-8	----	----	----	----	----	----	----
LVWPS-MW218C	155 - 155.5	UMCf-cg	9/12/2018	N	440-220010-9	----	----	----	----	----	----	----
LVWPS-MW218C	164 - 164.5	Bedrock	9/12/2018	N	440-220010-10	----	----	----	----	----	----	----
LVWPS-MW219C	30 - 30.5	Alluvium	9/26/2018	N	440-220930-2	----	----	----	----	----	----	----

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Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	N	440-220930-3	----	----	----	----	----	----	----
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	FD	440-220930-4	----	----	----	----	----	----	----
LVWPS-MW219C	46 - 46.5	Alluvium	9/26/2018	N	440-220930-5	----	----	----	----	----	----	----
LVWPS-MW219C	55 - 55.5	UMCf/Horse Springs	9/26/2018	N	440-220930-6	----	----	----	----	----	----	----
LVWPS-MW219C	65 - 65.5	UMCf/Horse Springs	9/26/2018	N	440-220930-7	----	----	----	----	----	----	----
LVWPS-MW219C	75.5 - 76	UMCf/Horse Springs	9/26/2018	N	440-220930-9	----	----	----	----	----	----	----
LVWPS-MW219C	85.5 - 86	UMCf/Horse Springs	9/26/2018	N	440-220930-10	----	----	----	----	----	----	----
LVWPS-MW219C	95.5 - 96	UMCf/Horse Springs	9/26/2018	N	440-220930-11	----	----	----	----	----	----	----
LVWPS-MW219C	105.5 - 106	UMCf/Horse Springs	9/26/2018	N	440-220930-12	----	----	----	----	----	----	----
LVWPS-MW219C	115.5 - 116	UMCf/Horse Springs	9/26/2018	N	440-220930-13	----	----	----	----	----	----	----
LVWPS-MW219C	126 - 126.5	UMCf/Horse Springs	9/26/2018	N	440-221030-1	----	----	----	----	----	----	----
LVWPS-MW219C	136 - 136.5	UMCf/Horse Springs	9/26/2018	N	440-221030-2	----	----	----	----	----	----	----
LVWPS-MW219C	145 - 145.5	UMCf/Horse Springs	9/26/2018	N	440-221030-3	----	----	----	----	----	----	----
LVWPS-MW220B	29.5 - 30	Alluvium	9/20/2018	N	440-220569-1	----	----	----	----	----	----	----
LVWPS-MW220B	36.5 - 37	Alluvium	9/20/2018	N	440-220569-2	----	----	----	----	----	----	----
LVWPS-MW220B	51.5 - 52	Alluvium	9/20/2018	N	440-220569-3	----	----	----	----	----	----	----
LVWPS-MW220B	60.5 - 61	Alluvium	9/20/2018	N	440-220569-4	----	----	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	N	440-220569-5	----	----	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	FD	440-220569-6	----	----	----	----	----	----	----
LVWPS-MW220B	77.5 - 78	Alluvium	9/20/2018	N	440-220569-7	----	----	----	----	----	----	----
LVWPS-MW220B	87.5 - 88	Alluvium	9/21/2018	N	440-220670-1	----	----	----	----	----	----	----
LVWPS-MW220B	97.5 - 98	Alluvium	9/21/2018	N	440-220670-2	----	----	----	----	----	----	----
LVWPS-MW220B	110 - 110.5	UMCf-cg	9/21/2018	N	440-220670-3	----	----	----	----	----	----	----
LVWPS-MW220B	124 - 124.5	UMCf	9/21/2018	N	440-220670-4	----	----	----	----	----	----	----
LVWPS-MW220B	133 - 133.5	UMCf	9/21/2018	N	440-220670-5	----	----	----	----	----	----	----
LVWPS-MW220B	143 - 143.5	UMCf-cg	9/21/2018	N	440-220670-6	----	----	----	----	----	----	----
LVWPS-MW220B	153 - 153.5	UMCf	9/21/2018	N	440-220670-7	----	----	----	----	----	----	----
LVWPS-MW220B	160 - 160.5	Bedrock	9/21/2018	N	440-220670-8	----	----	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	N	440-220767-21	----	----	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	FD	440-220767-22	----	----	----	----	----	----	----
LVWPS-MW221B	43 - 43.5	Alluvium	9/24/2018	N	440-220767-23	----	----	----	----	----	----	----
LVWPS-MW221B	53 - 53.5	Alluvium	9/24/2018	N	440-220767-24	----	----	----	----	----	----	----
LVWPS-MW221B	63 - 63.5	Alluvium	9/24/2018	N	440-220767-25	----	----	----	----	----	----	----
LVWPS-MW221B	73 - 73.5	Alluvium	9/24/2018	N	440-220767-26	----	----	----	----	----	----	----
LVWPS-MW221B	83 - 83.5	UMCf	9/24/2018	N	440-220767-27	----	----	----	----	----	----	----
LVWPS-MW221B	93 - 93.5	UMCf-cg	9/24/2018	N	440-220767-28	----	----	----	----	----	----	----
LVWPS-MW221B	103 - 103.5	UMCf-cg	9/24/2018	N	440-220767-29	----	----	----	----	----	----	----
LVWPS-MW221B	113 - 113.5	Bedrock	9/24/2018	N	440-220930-1	----	----	----	----	----	----	----
LVWPS-MW222C	40.5 - 41	Alluvium	9/21/2018	N	440-220670-9	----	----	----	----	----	----	----
LVWPS-MW222C	50 - 50.5	Alluvium	9/21/2018	N	440-220670-10	----	----	----	----	----	----	----
LVWPS-MW222C	55 - 55.5	UMCf-cg	9/21/2018	N	440-220670-11	----	----	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	N	440-220670-12	----	----	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	FD	440-220670-13	----	----	----	----	----	----	----
LVWPS-MW222C	70.5 - 71	UMCf-cg	9/21/2018	N	440-220670-14	----	----	----	----	----	----	----
LVWPS-MW222C	80 - 80.5	UMCf-cg	9/21/2018	N	440-220767-1	----	----	----	----	----	----	----
LVWPS-MW222C	91 - 91.5	UMCf-cg	9/21/2018	N	440-220767-2	----	----	----	----	----	----	----
LVWPS-MW222C	99 - 99.5	UMCf	9/21/2018	N	440-220767-3	----	----	----	----	----	----	----
LVWPS-MW222C	110 - 110.5	UMCf-cg	9/21/2018	N	440-220767-4	----	----	----	----	----	----	----
LVWPS-MW222C	122 - 122.5	UMCf	9/21/2018	N	440-220767-5	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW222C	130 - 130.5	UMCf-cg	9/21/2018	N	440-220767-6	----	----	----	----	----	----	----
LVWPS-MW222C	140 - 140.5	UMCf-cg	9/21/2018	N	440-220767-7	----	----	----	----	----	----	----
LVWPS-MW222C	150 - 150.5	UMCf-cg	9/22/2018	N	440-220767-8	----	----	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	N	440-220767-9	----	----	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	FD	440-220767-10	----	----	----	----	----	----	----
LVWPS-MW222C	170 - 170.5	UMCf-cg	9/22/2018	N	440-220767-11	----	----	----	----	----	----	----
LVWPS-MW222C	180 - 180.5	UMCf-cg	9/22/2018	N	440-220767-12	----	----	----	----	----	----	----
LVWPS-MW222C	190 - 190.5	UMCf-cg	9/22/2018	N	440-220767-13	----	----	----	----	----	----	----
LVWPS-MW222C	200 - 200.5	UMCf-cg	9/22/2018	N	440-220767-14	----	----	----	----	----	----	----
LVWPS-MW222C	210 - 210.5	UMCf-cg	9/22/2018	N	440-220767-15	----	----	----	----	----	----	----
LVWPS-MW222C	220 - 220.5	UMCf-cg	9/22/2018	N	440-220767-16	----	----	----	----	----	----	----
LVWPS-MW222C	230 - 230.5	UMCf-cg	9/22/2018	N	440-220767-18	----	----	----	----	----	----	----
LVWPS-MW222C	238.5 - 239	Bedrock	9/22/2018	N	440-220767-19	----	----	----	----	----	----	----
LVWPS-MW222C	248.5 - 249	Bedrock	9/22/2018	N	440-220767-20	----	----	----	----	----	----	----
LVWPS-MW223C	36.5 - 37	Alluvium	10/17/2018	N	440-222642-1	----	----	----	----	----	----	----
LVWPS-MW223C	48 - 48.5	Alluvium	10/17/2018	N	440-222642-2	----	----	----	----	----	----	----
LVWPS-MW223C	57 - 57.5	Alluvium	10/17/2018	N	440-222642-3	----	----	----	----	----	----	----
LVWPS-MW223C	67 - 67.5	Alluvium	10/17/2018	N	440-222642-4	----	----	----	----	----	----	----
LVWPS-MW223C	77 - 77.5	Alluvium	10/18/2018	N	440-222642-5	----	----	----	----	----	----	----
LVWPS-MW223C	87 - 87.5	Alluvium	10/18/2018	N	440-222642-6	----	----	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	N	440-222642-7	----	----	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	FD	440-222642-8	----	----	----	----	----	----	----
LVWPS-MW223C	107 - 107.5	UMCf	10/18/2018	N	440-222642-10	----	----	----	----	----	----	----
LVWPS-MW223C	117 - 117.5	UMCf	10/18/2018	N	440-222642-11	----	----	----	----	----	----	----
LVWPS-MW223C	128 - 128.5	Bedrock	10/18/2018	N	440-222642-12	----	----	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	N	440-221833-1	----	----	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	FD	440-221833-2	----	----	----	----	----	----	----
LVWPS-MW224C	53.5 - 54	Alluvium	10/9/2018	N	440-221833-3	----	----	----	----	----	----	----
LVWPS-MW224C	62 - 62.5	Alluvium	10/9/2018	N	440-221833-4	----	----	----	----	----	----	----
LVWPS-MW224C	72 - 72.5	Alluvium	10/9/2018	N	440-221833-5	----	----	----	----	----	----	----
LVWPS-MW224C	80 - 80.5	Alluvium	10/9/2018	N	440-221833-6	----	----	----	----	----	----	----
LVWPS-MW224C	92 - 92.5	Alluvium	10/9/2018	N	440-221833-7	----	----	----	----	----	----	----
LVWPS-MW224C	102 - 102.5	UMCf	10/9/2018	N	440-221833-9	----	----	----	----	----	----	----
LVWPS-MW224C	110 - 110.5	UMCf	10/9/2018	N	440-221833-10	----	----	----	----	----	----	----
LVWPS-MW224C	117 - 117.5	UMCf	10/9/2018	N	440-221931-11	----	----	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	N	440-221931-12	----	----	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	FD	440-221931-14	----	----	----	----	----	----	----
LVWPS-MW224C	137 - 137.5	UMCf	10/9/2018	N	440-221931-13	----	----	----	----	----	----	----
LVWPS-MW224C	146 - 146.5	UMCf	10/9/2018	N	440-221931-15	----	----	----	----	----	----	----
LVWPS-MW224C	158 - 158.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-16	----	----	----	----	----	----	----
LVWPS-MW224C	177 - 177.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-17	----	----	----	----	----	----	----
LVWPS-MW224C	187 - 187.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-18	----	----	----	----	----	----	----
LVWPS-MW224C	194 - 194.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-19	----	----	----	----	----	----	----
LVWPS-MW225B	37 - 37.5	Alluvium	10/9/2018	N	440-221931-1	----	----	----	----	----	----	----
LVWPS-MW225B	53 - 53.5	Alluvium	10/9/2018	N	440-221931-2	----	----	----	----	----	----	----
LVWPS-MW225B	57.5 - 58	Alluvium	10/9/2018	N	440-221931-3	----	----	----	----	----	----	----
LVWPS-MW225B	71 - 71.5	UMCf	10/9/2018	N	440-221931-4	----	----	----	----	----	----	----
LVWPS-MW225B	77 - 77.5	UMCf	10/9/2018	N	440-221931-5	----	----	----	----	----	----	----
LVWPS-MW225B	87 - 87.5	UMCf	10/9/2018	N	440-221931-6	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	Dissolved Metals by SW6010B	Dissolved Metals by SW6010B	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	Dissolved Metals by SW6020	EPA 351.2
						Potassium	Sodium	Arsenic	Chromium	Iron	Manganese	Total Kjeldahl Nitrogen (TKN)
						mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/kg
LVWPS-MW225B	97 - 97.5	UMCf	10/10/2018	N	440-221931-7	----	----	----	----	----	----	----
LVWPS-MW225B	107 - 107.5	UMCf	10/10/2018	N	440-221931-8	----	----	----	----	----	----	----
LVWPS-MW225B	114 - 114.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-9	----	----	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-20	----	----	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	FD	440-221931-10	----	----	----	----	----	----	----
LVWPS-MW225B	131 - 131.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-1	----	----	----	----	----	----	----
LVWPS-MW225B	141 - 141.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-2	----	----	----	----	----	----	----
LVWPS-MW225B	151 - 151.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-3	----	----	----	----	----	----	----
LVWPS-MW225B	155 - 155.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-4	----	----	----	----	----	----	----
LVWPS-MW226B	45 - 45.5	Alluvium	10/22/2018	N	440-222941-1	----	----	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-2	----	----	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	FD	440-222941-9	----	----	----	----	----	----	----
LVWPS-MW226B	60 - 60.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-3	----	----	----	----	----	----	----
LVWPS-MW226B	70 - 70.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-4	----	----	----	----	----	----	----
LVWPS-MW226B	80 - 80.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-5	----	----	----	----	----	----	----
LVWPS-MW226B	90 - 90.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-6	----	----	----	----	----	----	----
LVWPS-MW226B	100 - 100.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-7	----	----	----	----	----	----	----
LVWPS-MW226B	105 - 105.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-8	----	----	----	----	----	----	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte i
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
mg/L - milligarms per liter
µg/L - micrograms per liter
N - Normal field sample
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inac
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 351.2	EPA 365.3	SM2320B	SM2320B	SM2320B	SM2320B	SM2540C
						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW201B	24 - 24.5	Alluvium	6/6/2018	N	440-213022-12	----	----	61	32	21	<1.4	220
LVWPS-MW201B	39 - 39.5	Alluvium	6/6/2018	N	440-213022-13	----	----	----	----	----	----	----
LVWPS-MW201B	47 - 47.5	Alluvium	6/6/2018	N	440-213022-14	----	----	----	----	----	----	----
LVWPS-MW201B	59.5 - 60	UMCf	6/6/2018	N	440-213022-15	----	----	55	32	18	<1.4	270
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	N	440-213022-16	----	----	----	----	----	----	----
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	FD	440-213022-17	----	----	----	----	----	----	----
LVWPS-MW201B	82 - 82.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-1	----	----	----	----	----	----	----
LVWPS-MW201B	92 - 92.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-2	----	----	36	20	12	<1.4	2,000
LVWPS-MW201B	106 - 106.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-5	----	----	----	----	----	----	----
LVWPS-MW201B	112 - 112.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-6	----	----	----	----	----	----	----
LVWPS-MW201B	120 - 120.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-7	----	----	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	N	440-212078-11	----	----	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	FD	440-212078-12	----	----	----	----	----	----	----
LVWPS-MW202	41.5 - 42	Alluvium	5/22/2018	N	440-212078-13	----	----	----	----	----	----	----
LVWPS-MW202	51.5 - 52	Alluvium	5/22/2018	N	440-212078-14	----	----	----	----	----	----	----
LVWPS-MW202	64 - 64.5	UMCf	5/22/2018	N	440-212078-15	----	----	----	----	----	----	----
LVWPS-MW202	72.5 - 73	UMCf	5/22/2018	N	440-212078-16	----	----	----	----	----	----	----
LVWPS-MW202	81.5 - 82	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-17	----	----	----	----	----	----	----
LVWPS-MW202	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-18	----	----	----	----	----	----	----
LVWPS-MW202	102.5 - 103	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-19	----	----	----	----	----	----	----
LVWPS-MW202	109.5 - 110	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-20	----	----	----	----	----	----	----
LVWPS-MW202	119.5 - 120	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-21	----	----	----	----	----	----	----
LVWPS-MW203C	30 - 30.5	Alluvium	5/22/2018	N	440-212078-1	----	----	----	----	----	----	----
LVWPS-MW203C	40 - 40.5	Alluvium	5/22/2018	N	440-212078-2	----	----	----	----	----	----	----
LVWPS-MW203C	51 - 51.5	Alluvium	5/22/2018	N	440-212078-3	----	----	----	----	----	----	----
LVWPS-MW203C	60 - 60.5	Alluvium	5/22/2018	N	440-212078-4	----	----	----	----	----	----	----
LVWPS-MW203C	70 - 70.5	UMCf	5/22/2018	N	440-212078-5	----	----	----	----	----	----	----
LVWPS-MW203C	80 - 80.5	UMCf	5/22/2018	N	440-212078-6	----	----	----	----	----	----	----
LVWPS-MW203C	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-7	----	----	----	----	----	----	----
LVWPS-MW203C	100 - 100.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-8	----	----	----	----	----	----	----
LVWPS-MW203C	110 - 110.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-9	----	----	----	----	----	----	----
LVWPS-MW203C	120 - 120.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-10	----	----	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	N	440-212120-1	----	----	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	FD	440-212120-33	----	----	----	----	----	----	----
LVWPS-MW204	41 - 41.5	Alluvium	5/23/2018	N	440-212120-2	----	----	----	----	----	----	----
LVWPS-MW204	50 - 50.5	Alluvium	5/23/2018	N	440-212120-3	----	----	----	----	----	----	----
LVWPS-MW204	60 - 60.5	Alluvium	5/23/2018	N	440-212120-4	----	----	----	----	----	----	----
LVWPS-MW204	70 - 70.5	Alluvium	5/23/2018	N	440-212120-5	----	----	----	----	----	----	----
LVWPS-MW204	80 - 80.5	Alluvium	5/23/2018	N	440-212120-6	----	----	----	----	----	----	----
LVWPS-MW204	90 - 90.5	UMCf	5/24/2018	N	440-212120-7	----	----	----	----	----	----	----
LVWPS-MW204	100 - 100.5	UMCf	5/24/2018	N	440-212120-8	----	----	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	N	440-212120-9	----	----	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	FD	440-212120-14	----	----	----	----	----	----	----
LVWPS-MW204	120 - 120.5	UMCf	5/24/2018	N	440-212120-15	----	----	----	----	----	----	----
LVWPS-MW204C	130 - 130.5	UMCf	8/29/2018	N	440-219196-1	----	----	----	----	----	----	----
LVWPS-MW204C	140 - 140.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-2	----	----	----	----	----	----	----
LVWPS-MW204C	150 - 150.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-3	----	----	----	----	----	----	----
LVWPS-MW204C	160 - 160.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-4	----	----	----	----	----	----	----
LVWPS-MW204C	168 - 168.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-5	----	----	----	----	----	----	----

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Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 351.2	EPA 365.3	SM2320B	SM2320B	SM2320B	SM2320B	SM2540C
						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW204C	180 - 180.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-6	----	----	----	----	----	----	----
LVWPS-MW205B	28 - 28.5	Alluvium	5/29/2018	N	440-212452-14	0.35	0.12	120	49	46	----	160
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	N	440-212452-15	----	----	----	----	----	----	----
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	FD	440-212452-16	----	----	----	----	----	----	----
LVWPS-MW205B	50 - 50.5	Alluvium	5/29/2018	N	440-212452-17	----	----	----	----	----	----	----
LVWPS-MW205B	60 - 60.5	Alluvium	5/29/2018	N	440-212452-18	<0.10	<0.025	48	27	16	----	89
LVWPS-MW205B	70 - 70.5	Alluvium	5/29/2018	N	440-212452-19	----	----	----	----	----	----	----
LVWPS-MW205B	79 - 79.5	Alluvium	5/29/2018	N	440-212452-20	----	----	----	----	----	----	----
LVWPS-MW205B	90 - 90.5	Alluvium	5/29/2018	N	440-212452-21	<0.10	<0.025	65	42	19	----	150
LVWPS-MW205B	100 - 100.5	Alluvium	5/29/2018	N	440-212452-22	----	----	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	N	440-212452-23	----	----	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	FD	440-212452-26	----	----	----	----	----	----	----
LVWPS-MW205B	120 - 120.5	Alluvium	5/29/2018	N	440-212452-27	----	----	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	N	440-212120-20	----	----	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	FD	440-212120-21	----	----	----	----	----	----	----
LVWPS-MW206C	47 - 47.5	Alluvium	5/24/2018	N	440-212120-24	----	----	----	----	----	----	----
LVWPS-MW206C	57 - 57.5	Alluvium	5/24/2018	N	440-212120-25	----	----	----	----	----	----	----
LVWPS-MW206C	67 - 67.5	Alluvium	5/24/2018	N	440-212120-26	----	----	----	----	----	----	----
LVWPS-MW206C	75 - 75.5	Alluvium	5/24/2018	N	440-212120-27	----	----	----	----	----	----	----
LVWPS-MW206C	88 - 88.5	Alluvium	5/24/2018	N	440-212120-28	----	----	----	----	----	----	----
LVWPS-MW206C	96 - 96.5	UMCf	5/24/2018	N	440-212120-29	----	----	----	----	----	----	----
LVWPS-MW206C	104 - 104.5	UMCf	5/24/2018	N	440-212120-34	----	----	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	N	440-212120-30	----	----	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	FD	440-212120-31	----	----	----	----	----	----	----
LVWPS-MW206C	119 - 119.5	UMCf	5/24/2018	N	440-212120-32	----	----	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	N	440-222642-13	----	----	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	FD	440-222642-15	----	----	----	----	----	----	----
LVWPS-MW206E	140 - 140.5	UMCf	10/18/2018	N	440-222642-14	----	----	----	----	----	----	----
LVWPS-MW206E	150 - 150.5	UMCf	10/18/2018	N	440-222642-17	----	----	----	----	----	----	----
LVWPS-MW206E	160 - 160.5	UMCf	10/18/2018	N	440-222642-16	----	----	----	----	----	----	----
LVWPS-MW206E	169.5 - 170	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-18	----	----	----	----	----	----	----
LVWPS-MW206E	180 - 180.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-19	----	----	----	----	----	----	----
LVWPS-MW206E	190 - 190.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-20	----	----	----	----	----	----	----
LVWPS-MW206E	200 - 200.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-1	----	----	----	----	----	----	----
LVWPS-MW206E	210 - 210.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-2	----	----	----	----	----	----	----
LVWPS-MW206E	220 - 220.5	UMCf (Semi-Consolidated)	10/19/2018	N	440-222724-3	----	----	----	----	----	----	----
LVWPS-MW207	30 - 30.5	Alluvium	5/24/2018	N	440-212188-1	----	----	----	----	----	----	----
LVWPS-MW207	40 - 40.5	Alluvium	5/24/2018	N	440-212188-2	----	----	----	----	----	----	----
LVWPS-MW207	50 - 50.5	Alluvium	5/24/2018	N	440-212188-3	----	----	----	----	----	----	----
LVWPS-MW207	58 - 58.5	Alluvium	5/24/2018	N	440-212188-4	----	----	----	----	----	----	----
LVWPS-MW207	70 - 70.5	Alluvium	5/24/2018	N	440-212188-5	----	----	----	----	----	----	----
LVWPS-MW207	80 - 80.5	Alluvium	5/24/2018	N	440-212188-6	----	----	----	----	----	----	----
LVWPS-MW207	90 - 90.5	UMCf	5/24/2018	N	440-212188-7	----	----	----	----	----	----	----
LVWPS-MW207	100 - 100.5	UMCf	5/24/2018	N	440-212188-8	----	----	----	----	----	----	----
LVWPS-MW207	110 - 110.5	UMCf	5/24/2018	N	440-212188-9	----	----	----	----	----	----	----
LVWPS-MW207	120 - 120.5	UMCf (Semi-Consolidated)	5/24/2018	N	440-212188-10	----	----	----	----	----	----	----
LVWPS-MW208B	31 - 31.5	Alluvium	6/4/2018	N	440-212875-1	----	----	61	29	22	<1.4	350
LVWPS-MW208B	41 - 41.5	Alluvium	6/4/2018	N	440-212875-2	----	----	----	----	----	----	----
LVWPS-MW208B	46 - 46.5	Alluvium	6/4/2018	N	440-212875-3	----	----	----	----	----	----	----

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Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 351.2	EPA 365.3	SM2320B	SM2320B	SM2320B	SM2320B	SM2540C
						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW208B	57 - 57.5	Alluvium	6/4/2018	N	440-212875-4	----	----	55	24	21	<1.4	140
LVWPS-MW208B	70 - 70.5	Alluvium	6/4/2018	N	440-212875-5	----	----	----	----	----	----	----
LVWPS-MW208B	75 - 75.5	Alluvium	6/4/2018	N	440-212875-6	----	----	----	----	----	----	----
LVWPS-MW208B	93 - 93.5	UMCf	6/4/2018	N	440-212875-7	----	----	50	24	18	<1.4	130
LVWPS-MW208B	100 - 100.5	UMCf	6/4/2018	N	440-212875-8	----	----	----	----	----	----	----
LVWPS-MW208B	110 - 110.5	UMCf	6/4/2018	N	440-212875-9	----	----	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	N	440-212875-10	----	----	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	FD	440-212875-11	----	----	----	----	----	----	----
LVWPS-MW209	30 - 30.5	Alluvium	6/1/2018	N	440-212631-1	----	----	----	----	----	----	----
LVWPS-MW209	40 - 40.5	Alluvium	6/1/2018	N	440-212631-2	----	----	----	----	----	----	----
LVWPS-MW209	50.5 - 51	Alluvium	6/1/2018	N	440-212631-3	----	----	----	----	----	----	----
LVWPS-MW209	58 - 58.5	Alluvium	6/1/2018	N	440-212631-4	----	----	----	----	----	----	----
LVWPS-MW209	73 - 73.5	Alluvium	6/1/2018	N	440-212631-5	----	----	----	----	----	----	----
LVWPS-MW209	81 - 81.5	Alluvium	6/1/2018	N	440-212631-6	----	----	----	----	----	----	----
LVWPS-MW209	88 - 88.5	Alluvium	6/1/2018	N	440-212631-7	----	----	----	----	----	----	----
LVWPS-MW209	98 - 98.5	Alluvium	6/1/2018	N	440-212631-8	----	----	----	----	----	----	----
LVWPS-MW209	113 - 113.5	Alluvium	6/1/2018	N	440-212752-21	----	----	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	N	440-212752-22	----	----	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	FD	440-212752-23	----	----	----	----	----	----	----
LVWPS-MW209C	130 - 130.5	UMCf-cg	9/8/2018	N	440-219803-1	----	----	----	----	----	----	----
LVWPS-MW209C	140 - 140.5	UMCf-cg	9/9/2018	N	440-219803-2	----	----	----	----	----	----	----
LVWPS-MW209C	150 - 150.5	UMCf-cg	9/9/2018	N	440-219803-3	----	----	----	----	----	----	----
LVWPS-MW209C	160 - 160.5	UMCf-cg	9/9/2018	N	440-219803-4	----	----	----	----	----	----	----
LVWPS-MW209C	170 - 170.5	UMCf-cg	9/9/2018	N	440-219803-5	----	----	----	----	----	----	----
LVWPS-MW209C	180 - 180.5	Bedrock	9/9/2018	N	440-219803-6	----	----	----	----	----	----	----
LVWPS-MW210C	28 - 28.5	Alluvium	5/29/2018	N	440-212452-1	<0.10	<0.025	51	34	14	----	160
LVWPS-MW210C	34.5 - 35	Alluvium	5/29/2018	N	440-212452-2	----	----	----	----	----	----	----
LVWPS-MW210C	49.5 - 50	Alluvium	5/29/2018	N	440-212452-3	----	----	----	----	----	----	----
LVWPS-MW210C	60.5 - 61	Alluvium	5/29/2018	N	440-212452-4	<0.10	<0.025	48	30	14	----	140
LVWPS-MW210C	70 - 70.5	Alluvium	5/29/2018	N	440-212452-5	----	----	----	----	----	----	----
LVWPS-MW210C	80 - 80.5	Alluvium	5/30/2018	N	440-212452-6	----	----	----	----	----	----	----
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	N	440-212452-7	<0.10	<0.025	51	29	16	----	110
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	FD	440-212452-8	<0.10	<0.025	53	30	17	----	120
LVWPS-MW210C	106 - 106.5	UMCf-cg	5/30/2018	N	440-212452-9	----	----	----	----	----	----	----
LVWPS-MW210C	113 - 113.5	UMCf-cg	5/30/2018	N	440-212452-10	----	----	----	----	----	----	----
LVWPS-MW210C	120 - 120.5	UMCf-cg	5/30/2018	N	440-212452-11	----	----	----	----	----	----	----
LVWPS-MW210E	130 - 130.5	UMCf-cg	9/6/2018	N	440-219617-1	----	----	----	----	----	----	----
LVWPS-MW210E	140 - 140.5	UMCf-cg	9/6/2018	N	440-219617-2	----	----	----	----	----	----	----
LVWPS-MW210E	150 - 150.5	UMCf-cg	9/6/2018	N	440-219617-3	----	----	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	N	440-219617-5	----	----	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	FD	440-219617-4	----	----	----	----	----	----	----
LVWPS-MW210E	165 - 165.5	UMCf-cg	9/6/2018	N	440-219617-6	----	----	----	----	----	----	----
LVWPS-MW210E	175 - 175.5	Bedrock	9/6/2018	N	440-219646-1	----	----	----	----	----	----	----
LVWPS-MW210E	185 - 185.5	Bedrock	9/6/2018	N	440-219646-2	----	----	----	----	----	----	----
LVWPS-MW211	30 - 30.5	Alluvium	5/31/2018	N	440-212752-1	----	----	----	----	----	----	----
LVWPS-MW211	38 - 38.5	Alluvium	5/31/2018	N	440-212752-2	----	----	----	----	----	----	----
LVWPS-MW211	50 - 50.5	Alluvium	5/31/2018	N	440-212752-3	----	----	----	----	----	----	----
LVWPS-MW211	60 - 60.5	Alluvium	5/31/2018	N	440-212752-4	----	----	----	----	----	----	----
LVWPS-MW211	70 - 70.5	Alluvium	5/31/2018	N	440-212752-5	----	----	----	----	----	----	----

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Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 351.2	EPA 365.3	SM2320B	SM2320B	SM2320B	SM2320B	SM2540C
						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW211	80 - 80.5	Alluvium	5/31/2018	N	440-212752-6	----	----	----	----	----	----	----
LVWPS-MW211	89 - 89.5	Alluvium	5/31/2018	N	440-212752-7	----	----	----	----	----	----	----
LVWPS-MW211	100 - 100.5	UMCf	5/31/2018	N	440-212752-8	----	----	----	----	----	----	----
LVWPS-MW211	110 - 110.5	UMCf-cg	5/31/2018	N	440-212752-9	----	----	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	N	440-212752-10	----	----	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	FD	440-212752-11	----	----	----	----	----	----	----
LVWPS-MW212B	30.5 - 31	Alluvium	6/5/2018	N	440-213022-1	----	----	----	----	----	----	----
LVWPS-MW212B	40.5 - 41	Alluvium	6/5/2018	N	440-213022-2	----	----	----	----	----	----	----
LVWPS-MW212B	49 - 49.5	Alluvium	6/5/2018	N	440-213022-3	----	----	----	----	----	----	----
LVWPS-MW212B	60 - 60.5	Alluvium	6/5/2018	N	440-213022-4	----	----	----	----	----	----	----
LVWPS-MW212B	68 - 68.5	Alluvium	6/5/2018	N	440-213022-6	----	----	----	----	----	----	----
LVWPS-MW212B	80 - 80.5	UMCf-cg	6/5/2018	N	440-213022-5	----	----	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	N	440-213022-7	----	----	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	FD	440-213022-8	----	----	----	----	----	----	----
LVWPS-MW212B	98 - 98.5	UMCf-cg	6/5/2018	N	440-213022-9	----	----	----	----	----	----	----
LVWPS-MW212B	106 - 106.5	UMCf-cg	6/5/2018	N	440-213022-10	----	----	----	----	----	----	----
LVWPS-MW212B	114.5 - 115	UMCf-cg	6/5/2018	N	440-213022-11	----	----	----	----	----	----	----
LVWPS-MW212D	124 - 124.5	UMCf-cg	9/20/2018	N	440-220569-9	----	----	----	----	----	----	----
LVWPS-MW212D	130 - 130.5	UMCf-cg	9/20/2018	N	440-220569-10	----	----	----	----	----	----	----
LVWPS-MW212D	139 - 139.5	UMCf-cg	9/20/2018	N	440-220569-11	----	----	----	----	----	----	----
LVWPS-MW212D	146.5 - 147	UMCf-cg	9/20/2018	N	440-220569-12	----	----	----	----	----	----	----
LVWPS-MW212D	159 - 159.5	Bedrock	9/20/2018	N	440-220569-13	----	----	----	----	----	----	----
LVWPS-MW212D	162 - 162.5	Bedrock	9/20/2018	N	440-220569-14	----	----	----	----	----	----	----
LVWPS-MW213	29 - 29.5	Alluvium	6/1/2018	N	440-212752-12	----	----	----	----	----	----	----
LVWPS-MW213	35 - 35.5	Alluvium	6/1/2018	N	440-212752-13	----	----	----	----	----	----	----
LVWPS-MW213	49 - 49.5	Alluvium	6/1/2018	N	440-212752-14	----	----	----	----	----	----	----
LVWPS-MW213	59 - 59.5	Alluvium	6/1/2018	N	440-212752-15	----	----	----	----	----	----	----
LVWPS-MW213	70 - 70.5	Alluvium	6/1/2018	N	440-212752-16	----	----	----	----	----	----	----
LVWPS-MW213	81 - 81.5	UMCf-cg	6/1/2018	N	440-212752-17	----	----	----	----	----	----	----
LVWPS-MW213	90 - 90.5	UMCf-cg	6/1/2018	N	440-212752-18	----	----	----	----	----	----	----
LVWPS-MW213	100 - 100.5	UMCf-cg	6/1/2018	N	440-212752-19	----	----	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	N	440-212752-20	----	----	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	FD	440-212752-42	----	----	----	----	----	----	----
LVWPS-MW213	120 - 120.5	Bedrock	6/1/2018	N	440-212752-43	----	----	----	----	----	----	----
LVWPS-MW214	30.5 - 31	Alluvium	6/2/2018	N	440-212752-24	----	----	----	----	----	----	----
LVWPS-MW214	41 - 41.5	Alluvium	6/2/2018	N	440-212752-25	----	----	----	----	----	----	----
LVWPS-MW214	53 - 53.5	UMCf/Horse Springs	6/2/2018	N	440-212752-26	----	----	----	----	----	----	----
LVWPS-MW214	61 - 61.5	UMCf/Horse Springs	6/2/2018	N	440-212752-27	----	----	----	----	----	----	----
LVWPS-MW214	69.5 - 70	UMCf/Horse Springs	6/2/2018	N	440-212752-28	----	----	----	----	----	----	----
LVWPS-MW214	76.5 - 77	UMCf/Horse Springs	6/2/2018	N	440-212752-29	----	----	----	----	----	----	----
LVWPS-MW214	93 - 93.5	UMCf/Horse Springs	6/2/2018	N	440-212752-30	----	----	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	N	440-212752-31	----	----	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	FD	440-212752-32	----	----	----	----	----	----	----
LVWPS-MW214	114 - 114.5	UMCf/Horse Springs	6/2/2018	N	440-212752-35	----	----	----	----	----	----	----
LVWPS-MW214	119 - 119.5	UMCf/Horse Springs	6/2/2018	N	440-212752-36	----	----	----	----	----	----	----
LVWPS-MW215B	10 - 10.5	Alluvium	6/4/2018	N	440-212752-37	----	----	----	----	----	----	----
LVWPS-MW215B	21 - 21.5	Alluvium	6/4/2018	N	440-212752-39	----	----	----	----	----	----	----
LVWPS-MW215B	33 - 33.5	Alluvium	6/4/2018	N	440-212752-38	----	----	----	----	----	----	----
LVWPS-MW216	13 - 13.5	Alluvium	6/7/2018	N	440-213209-1	----	----	----	----	----	----	----

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						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW216	23 - 23.5	UMCf	6/7/2018	N	440-213209-2	----	----	----	----	----	----	----
LVWPS-MW216	33 - 33.5	UMCf	6/7/2018	N	440-213209-3	----	----	----	----	----	----	----
LVWPS-MW216	43 - 43.5	UMCf	6/7/2018	N	440-213209-4	----	----	----	----	----	----	----
LVWPS-MW216	53 - 53.5	UMCf	6/7/2018	N	440-213209-5	----	----	----	----	----	----	----
LVWPS-MW216	63 - 63.5	UMCf	6/7/2018	N	440-213209-6	----	----	----	----	----	----	----
LVWPS-MW216	73 - 73.5	UMCf	6/7/2018	N	440-213209-7	----	----	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	N	440-221583-1	----	----	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	FD	440-221583-2	----	----	----	----	----	----	----
LVWPS-MW217C	53 - 53.5	Alluvium	10/3/2018	N	440-221583-3	----	----	----	----	----	----	----
LVWPS-MW217C	62 - 62.5	Alluvium	10/3/2018	N	440-221583-4	----	----	----	----	----	----	----
LVWPS-MW217C	69 - 69.5	Alluvium	10/3/2018	N	440-221583-5	----	----	----	----	----	----	----
LVWPS-MW217C	79 - 79.5	Alluvium	10/3/2018	N	440-221583-6	----	----	----	----	----	----	----
LVWPS-MW217C	92 - 92.5	Alluvium	10/3/2018	N	440-221583-7	----	----	----	----	----	----	----
LVWPS-MW217C	101 - 101.5	UMCf	10/4/2018	N	440-221583-8	----	----	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	N	440-221583-9	----	----	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	FD	440-221583-12	----	----	----	----	----	----	----
LVWPS-MW217C	120 - 120.5	UMCf	10/4/2018	N	440-221583-10	----	----	----	----	----	----	----
LVWPS-MW217C	130 - 130.5	UMCf	10/4/2018	N	440-221583-11	----	----	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	N	440-221583-14	----	----	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	FD	440-221583-13	----	----	----	----	----	----	----
LVWPS-MW217C	150 - 150.5	UMCf	10/4/2018	N	440-221583-15	----	----	----	----	----	----	----
LVWPS-MW217C	160 - 160.5	UMCf	10/4/2018	N	440-221583-16	----	----	----	----	----	----	----
LVWPS-MW217C	170 - 170.5	UMCf	10/4/2018	N	440-221583-17	----	----	----	----	----	----	----
LVWPS-MW217C	180 - 180.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-18	----	----	----	----	----	----	----
LVWPS-MW217C	190 - 190.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-21	----	----	----	----	----	----	----
LVWPS-MW217C	200 - 200.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-22	----	----	----	----	----	----	----
LVWPS-MW217C	210 - 210.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-1	----	----	----	----	----	----	----
LVWPS-MW217C	220 - 220.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-2	----	----	----	----	----	----	----
LVWPS-MW218B	159 - 159.5	Bedrock	10/4/2018	N	440-221583-19	----	----	----	----	----	----	----
LVWPS-MW218B	164 - 164.5	Bedrock	10/4/2018	N	440-221583-20	----	----	----	----	----	----	----
LVWPS-MW218C	25 - 25.5	Alluvium	9/11/2018	N	440-219893-3	----	----	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	N	440-219893-1	----	----	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	FD	440-219893-2	----	----	----	----	----	----	----
LVWPS-MW218C	49 - 49.5	Alluvium	9/11/2018	N	440-219893-4	----	----	----	----	----	----	----
LVWPS-MW218C	55 - 55.5	Alluvium	9/11/2018	N	440-219893-5	----	----	----	----	----	----	----
LVWPS-MW218C	65 - 65.5	Alluvium	9/11/2018	N	440-219893-7	----	----	----	----	----	----	----
LVWPS-MW218C	71 - 71.5	Alluvium	9/11/2018	N	440-219893-8	----	----	----	----	----	----	----
LVWPS-MW218C	85 - 85.5	Alluvium	9/11/2018	N	440-219893-9	----	----	----	----	----	----	----
LVWPS-MW218C	96 - 96.5	Alluvium	9/11/2018	N	440-220010-1	----	----	----	----	----	----	----
LVWPS-MW218C	105 - 105.5	UMCf	9/11/2018	N	440-220010-2	----	----	----	----	----	----	----
LVWPS-MW218C	110 - 110.5	UMCf	9/11/2018	N	440-220010-3	----	----	----	----	----	----	----
LVWPS-MW218C	115 - 115.5	UMCf-cg	9/11/2018	N	440-220010-4	----	----	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf	9/11/2018	N	440-220010-5	----	----	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf-cg	9/11/2018	FD	440-220010-6	----	----	----	----	----	----	----
LVWPS-MW218C	135 - 135.5	UMCf-cg	9/12/2018	N	440-220010-7	----	----	----	----	----	----	----
LVWPS-MW218C	144 - 144.5	UMCf	9/12/2018	N	440-220010-8	----	----	----	----	----	----	----
LVWPS-MW218C	155 - 155.5	UMCf-cg	9/12/2018	N	440-220010-9	----	----	----	----	----	----	----
LVWPS-MW218C	164 - 164.5	Bedrock	9/12/2018	N	440-220010-10	----	----	----	----	----	----	----
LVWPS-MW219C	30 - 30.5	Alluvium	9/26/2018	N	440-220930-2	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 351.2	EPA 365.3	SM2320B	SM2320B	SM2320B	SM2320B	SM2540C
						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	N	440-220930-3	----	----	----	----	----	----	----
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	FD	440-220930-4	----	----	----	----	----	----	----
LVWPS-MW219C	46 - 46.5	Alluvium	9/26/2018	N	440-220930-5	----	----	----	----	----	----	----
LVWPS-MW219C	55 - 55.5	UMCf/Horse Springs	9/26/2018	N	440-220930-6	----	----	----	----	----	----	----
LVWPS-MW219C	65 - 65.5	UMCf/Horse Springs	9/26/2018	N	440-220930-7	----	----	----	----	----	----	----
LVWPS-MW219C	75.5 - 76	UMCf/Horse Springs	9/26/2018	N	440-220930-9	----	----	----	----	----	----	----
LVWPS-MW219C	85.5 - 86	UMCf/Horse Springs	9/26/2018	N	440-220930-10	----	----	----	----	----	----	----
LVWPS-MW219C	95.5 - 96	UMCf/Horse Springs	9/26/2018	N	440-220930-11	----	----	----	----	----	----	----
LVWPS-MW219C	105.5 - 106	UMCf/Horse Springs	9/26/2018	N	440-220930-12	----	----	----	----	----	----	----
LVWPS-MW219C	115.5 - 116	UMCf/Horse Springs	9/26/2018	N	440-220930-13	----	----	----	----	----	----	----
LVWPS-MW219C	126 - 126.5	UMCf/Horse Springs	9/26/2018	N	440-221030-1	----	----	----	----	----	----	----
LVWPS-MW219C	136 - 136.5	UMCf/Horse Springs	9/26/2018	N	440-221030-2	----	----	----	----	----	----	----
LVWPS-MW219C	145 - 145.5	UMCf/Horse Springs	9/26/2018	N	440-221030-3	----	----	----	----	----	----	----
LVWPS-MW220B	29.5 - 30	Alluvium	9/20/2018	N	440-220569-1	----	----	----	----	----	----	----
LVWPS-MW220B	36.5 - 37	Alluvium	9/20/2018	N	440-220569-2	----	----	----	----	----	----	----
LVWPS-MW220B	51.5 - 52	Alluvium	9/20/2018	N	440-220569-3	----	----	----	----	----	----	----
LVWPS-MW220B	60.5 - 61	Alluvium	9/20/2018	N	440-220569-4	----	----	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	N	440-220569-5	----	----	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	FD	440-220569-6	----	----	----	----	----	----	----
LVWPS-MW220B	77.5 - 78	Alluvium	9/20/2018	N	440-220569-7	----	----	----	----	----	----	----
LVWPS-MW220B	87.5 - 88	Alluvium	9/21/2018	N	440-220670-1	----	----	----	----	----	----	----
LVWPS-MW220B	97.5 - 98	Alluvium	9/21/2018	N	440-220670-2	----	----	----	----	----	----	----
LVWPS-MW220B	110 - 110.5	UMCf-cg	9/21/2018	N	440-220670-3	----	----	----	----	----	----	----
LVWPS-MW220B	124 - 124.5	UMCf	9/21/2018	N	440-220670-4	----	----	----	----	----	----	----
LVWPS-MW220B	133 - 133.5	UMCf	9/21/2018	N	440-220670-5	----	----	----	----	----	----	----
LVWPS-MW220B	143 - 143.5	UMCf-cg	9/21/2018	N	440-220670-6	----	----	----	----	----	----	----
LVWPS-MW220B	153 - 153.5	UMCf	9/21/2018	N	440-220670-7	----	----	----	----	----	----	----
LVWPS-MW220B	160 - 160.5	Bedrock	9/21/2018	N	440-220670-8	----	----	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	N	440-220767-21	----	----	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	FD	440-220767-22	----	----	----	----	----	----	----
LVWPS-MW221B	43 - 43.5	Alluvium	9/24/2018	N	440-220767-23	----	----	----	----	----	----	----
LVWPS-MW221B	53 - 53.5	Alluvium	9/24/2018	N	440-220767-24	----	----	----	----	----	----	----
LVWPS-MW221B	63 - 63.5	Alluvium	9/24/2018	N	440-220767-25	----	----	----	----	----	----	----
LVWPS-MW221B	73 - 73.5	Alluvium	9/24/2018	N	440-220767-26	----	----	----	----	----	----	----
LVWPS-MW221B	83 - 83.5	UMCf	9/24/2018	N	440-220767-27	----	----	----	----	----	----	----
LVWPS-MW221B	93 - 93.5	UMCf-cg	9/24/2018	N	440-220767-28	----	----	----	----	----	----	----
LVWPS-MW221B	103 - 103.5	UMCf-cg	9/24/2018	N	440-220767-29	----	----	----	----	----	----	----
LVWPS-MW221B	113 - 113.5	Bedrock	9/24/2018	N	440-220930-1	----	----	----	----	----	----	----
LVWPS-MW222C	40.5 - 41	Alluvium	9/21/2018	N	440-220670-9	----	----	----	----	----	----	----
LVWPS-MW222C	50 - 50.5	Alluvium	9/21/2018	N	440-220670-10	----	----	----	----	----	----	----
LVWPS-MW222C	55 - 55.5	UMCf-cg	9/21/2018	N	440-220670-11	----	----	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	N	440-220670-12	----	----	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	FD	440-220670-13	----	----	----	----	----	----	----
LVWPS-MW222C	70.5 - 71	UMCf-cg	9/21/2018	N	440-220670-14	----	----	----	----	----	----	----
LVWPS-MW222C	80 - 80.5	UMCf-cg	9/21/2018	N	440-220767-1	----	----	----	----	----	----	----
LVWPS-MW222C	91 - 91.5	UMCf-cg	9/21/2018	N	440-220767-2	----	----	----	----	----	----	----
LVWPS-MW222C	99 - 99.5	UMCf	9/21/2018	N	440-220767-3	----	----	----	----	----	----	----
LVWPS-MW222C	110 - 110.5	UMCf-cg	9/21/2018	N	440-220767-4	----	----	----	----	----	----	----
LVWPS-MW222C	122 - 122.5	UMCf	9/21/2018	N	440-220767-5	----	----	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 351.2	EPA 365.3	SM2320B	SM2320B	SM2320B	SM2320B	SM2540C
						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW222C	130 - 130.5	UMCf-cg	9/21/2018	N	440-220767-6	----	----	----	----	----	----	----
LVWPS-MW222C	140 - 140.5	UMCf-cg	9/21/2018	N	440-220767-7	----	----	----	----	----	----	----
LVWPS-MW222C	150 - 150.5	UMCf-cg	9/22/2018	N	440-220767-8	----	----	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	N	440-220767-9	----	----	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	FD	440-220767-10	----	----	----	----	----	----	----
LVWPS-MW222C	170 - 170.5	UMCf-cg	9/22/2018	N	440-220767-11	----	----	----	----	----	----	----
LVWPS-MW222C	180 - 180.5	UMCf-cg	9/22/2018	N	440-220767-12	----	----	----	----	----	----	----
LVWPS-MW222C	190 - 190.5	UMCf-cg	9/22/2018	N	440-220767-13	----	----	----	----	----	----	----
LVWPS-MW222C	200 - 200.5	UMCf-cg	9/22/2018	N	440-220767-14	----	----	----	----	----	----	----
LVWPS-MW222C	210 - 210.5	UMCf-cg	9/22/2018	N	440-220767-15	----	----	----	----	----	----	----
LVWPS-MW222C	220 - 220.5	UMCf-cg	9/22/2018	N	440-220767-16	----	----	----	----	----	----	----
LVWPS-MW222C	230 - 230.5	UMCf-cg	9/22/2018	N	440-220767-18	----	----	----	----	----	----	----
LVWPS-MW222C	238.5 - 239	Bedrock	9/22/2018	N	440-220767-19	----	----	----	----	----	----	----
LVWPS-MW222C	248.5 - 249	Bedrock	9/22/2018	N	440-220767-20	----	----	----	----	----	----	----
LVWPS-MW223C	36.5 - 37	Alluvium	10/17/2018	N	440-222642-1	----	----	----	----	----	----	----
LVWPS-MW223C	48 - 48.5	Alluvium	10/17/2018	N	440-222642-2	----	----	----	----	----	----	----
LVWPS-MW223C	57 - 57.5	Alluvium	10/17/2018	N	440-222642-3	----	----	----	----	----	----	----
LVWPS-MW223C	67 - 67.5	Alluvium	10/17/2018	N	440-222642-4	----	----	----	----	----	----	----
LVWPS-MW223C	77 - 77.5	Alluvium	10/18/2018	N	440-222642-5	----	----	----	----	----	----	----
LVWPS-MW223C	87 - 87.5	Alluvium	10/18/2018	N	440-222642-6	----	----	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	N	440-222642-7	----	----	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	FD	440-222642-8	----	----	----	----	----	----	----
LVWPS-MW223C	107 - 107.5	UMCf	10/18/2018	N	440-222642-10	----	----	----	----	----	----	----
LVWPS-MW223C	117 - 117.5	UMCf	10/18/2018	N	440-222642-11	----	----	----	----	----	----	----
LVWPS-MW223C	128 - 128.5	Bedrock	10/18/2018	N	440-222642-12	----	----	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	N	440-221833-1	----	----	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	FD	440-221833-2	----	----	----	----	----	----	----
LVWPS-MW224C	53.5 - 54	Alluvium	10/9/2018	N	440-221833-3	----	----	----	----	----	----	----
LVWPS-MW224C	62 - 62.5	Alluvium	10/9/2018	N	440-221833-4	----	----	----	----	----	----	----
LVWPS-MW224C	72 - 72.5	Alluvium	10/9/2018	N	440-221833-5	----	----	----	----	----	----	----
LVWPS-MW224C	80 - 80.5	Alluvium	10/9/2018	N	440-221833-6	----	----	----	----	----	----	----
LVWPS-MW224C	92 - 92.5	Alluvium	10/9/2018	N	440-221833-7	----	----	----	----	----	----	----
LVWPS-MW224C	102 - 102.5	UMCf	10/9/2018	N	440-221833-9	----	----	----	----	----	----	----
LVWPS-MW224C	110 - 110.5	UMCf	10/9/2018	N	440-221833-10	----	----	----	----	----	----	----
LVWPS-MW224C	117 - 117.5	UMCf	10/9/2018	N	440-221931-11	----	----	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	N	440-221931-12	----	----	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	FD	440-221931-14	----	----	----	----	----	----	----
LVWPS-MW224C	137 - 137.5	UMCf	10/9/2018	N	440-221931-13	----	----	----	----	----	----	----
LVWPS-MW224C	146 - 146.5	UMCf	10/9/2018	N	440-221931-15	----	----	----	----	----	----	----
LVWPS-MW224C	158 - 158.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-16	----	----	----	----	----	----	----
LVWPS-MW224C	177 - 177.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-17	----	----	----	----	----	----	----
LVWPS-MW224C	187 - 187.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-18	----	----	----	----	----	----	----
LVWPS-MW224C	194 - 194.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-19	----	----	----	----	----	----	----
LVWPS-MW225B	37 - 37.5	Alluvium	10/9/2018	N	440-221931-1	----	----	----	----	----	----	----
LVWPS-MW225B	53 - 53.5	Alluvium	10/9/2018	N	440-221931-2	----	----	----	----	----	----	----
LVWPS-MW225B	57.5 - 58	Alluvium	10/9/2018	N	440-221931-3	----	----	----	----	----	----	----
LVWPS-MW225B	71 - 71.5	UMCf	10/9/2018	N	440-221931-4	----	----	----	----	----	----	----
LVWPS-MW225B	77 - 77.5	UMCf	10/9/2018	N	440-221931-5	----	----	----	----	----	----	----
LVWPS-MW225B	87 - 87.5	UMCf	10/9/2018	N	440-221931-6	----	----	----	----	----	----	----

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Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	EPA 351.2	EPA 365.3	SM2320B	SM2320B	SM2320B	SM2320B	SM2540C
						Total Kjeldahl Nitrogen (TKN)	Phosphorus	Alkalinity as CaCO3	Bicarbonate ion as HCO3	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW225B	97 - 97.5	UMCf	10/10/2018	N	440-221931-7	----	----	----	----	----	----	----
LVWPS-MW225B	107 - 107.5	UMCf	10/10/2018	N	440-221931-8	----	----	----	----	----	----	----
LVWPS-MW225B	114 - 114.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-9	----	----	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-20	----	----	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	FD	440-221931-10	----	----	----	----	----	----	----
LVWPS-MW225B	131 - 131.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-1	----	----	----	----	----	----	----
LVWPS-MW225B	141 - 141.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-2	----	----	----	----	----	----	----
LVWPS-MW225B	151 - 151.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-3	----	----	----	----	----	----	----
LVWPS-MW225B	155 - 155.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-4	----	----	----	----	----	----	----
LVWPS-MW226B	45 - 45.5	Alluvium	10/22/2018	N	440-222941-1	----	----	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-2	----	----	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	FD	440-222941-9	----	----	----	----	----	----	----
LVWPS-MW226B	60 - 60.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-3	----	----	----	----	----	----	----
LVWPS-MW226B	70 - 70.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-4	----	----	----	----	----	----	----
LVWPS-MW226B	80 - 80.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-5	----	----	----	----	----	----	----
LVWPS-MW226B	90 - 90.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-6	----	----	----	----	----	----	----
LVWPS-MW226B	100 - 100.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-7	----	----	----	----	----	----	----
LVWPS-MW226B	105 - 105.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-8	----	----	----	----	----	----	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte i
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
mg/L - milligarms per liter
µg/L - micrograms per liter
N - Normal field sample
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inac
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW201B	24 - 24.5	Alluvium	6/6/2018	N	440-213022-12	----	<0.18	8.3 J	11,000	760
LVWPS-MW201B	39 - 39.5	Alluvium	6/6/2018	N	440-213022-13	----	----	----	----	----
LVWPS-MW201B	47 - 47.5	Alluvium	6/6/2018	N	440-213022-14	----	----	----	----	----
LVWPS-MW201B	59.5 - 60	UMCf	6/6/2018	N	440-213022-15	----	<0.24	8.0 J	39,000	490
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	N	440-213022-16	----	----	----	----	----
LVWPS-MW201B	69 - 69.5	UMCf	6/6/2018	FD	440-213022-17	----	----	----	----	----
LVWPS-MW201B	82 - 82.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-1	----	----	----	----	----
LVWPS-MW201B	92 - 92.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-2	----	<0.20	7.8 J	2,300	1,600
LVWPS-MW201B	106 - 106.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-5	----	----	----	----	----
LVWPS-MW201B	112 - 112.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-6	----	----	----	----	----
LVWPS-MW201B	120 - 120.5	UMCf (Semi-Consolidated)	6/6/2018	N	440-213143-7	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	N	440-212078-11	----	----	----	----	----
LVWPS-MW202	29.5 - 30	Alluvium	5/22/2018	FD	440-212078-12	----	----	----	----	----
LVWPS-MW202	41.5 - 42	Alluvium	5/22/2018	N	440-212078-13	----	----	----	----	----
LVWPS-MW202	51.5 - 52	Alluvium	5/22/2018	N	440-212078-14	----	----	----	----	----
LVWPS-MW202	64 - 64.5	UMCf	5/22/2018	N	440-212078-15	----	----	----	----	----
LVWPS-MW202	72.5 - 73	UMCf	5/22/2018	N	440-212078-16	----	----	----	----	----
LVWPS-MW202	81.5 - 82	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-17	----	----	----	----	----
LVWPS-MW202	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-18	----	----	----	----	----
LVWPS-MW202	102.5 - 103	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-19	----	----	----	----	----
LVWPS-MW202	109.5 - 110	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-20	----	----	----	----	----
LVWPS-MW202	119.5 - 120	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-21	----	----	----	----	----
LVWPS-MW203C	30 - 30.5	Alluvium	5/22/2018	N	440-212078-1	----	----	----	----	----
LVWPS-MW203C	40 - 40.5	Alluvium	5/22/2018	N	440-212078-2	----	----	----	----	----
LVWPS-MW203C	51 - 51.5	Alluvium	5/22/2018	N	440-212078-3	----	----	----	----	----
LVWPS-MW203C	60 - 60.5	Alluvium	5/22/2018	N	440-212078-4	----	----	----	----	----
LVWPS-MW203C	70 - 70.5	UMCf	5/22/2018	N	440-212078-5	----	----	----	----	----
LVWPS-MW203C	80 - 80.5	UMCf	5/22/2018	N	440-212078-6	----	----	----	----	----
LVWPS-MW203C	90 - 90.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-7	----	----	----	----	----
LVWPS-MW203C	100 - 100.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-8	----	----	----	----	----
LVWPS-MW203C	110 - 110.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-9	----	----	----	----	----
LVWPS-MW203C	120 - 120.5	UMCf (Semi-Consolidated)	5/22/2018	N	440-212078-10	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	N	440-212120-1	----	----	----	----	----
LVWPS-MW204	32 - 32.5	Alluvium	5/23/2018	FD	440-212120-33	----	----	----	----	----
LVWPS-MW204	41 - 41.5	Alluvium	5/23/2018	N	440-212120-2	----	----	----	----	----
LVWPS-MW204	50 - 50.5	Alluvium	5/23/2018	N	440-212120-3	----	----	----	----	----
LVWPS-MW204	60 - 60.5	Alluvium	5/23/2018	N	440-212120-4	----	----	----	----	----
LVWPS-MW204	70 - 70.5	Alluvium	5/23/2018	N	440-212120-5	----	----	----	----	----
LVWPS-MW204	80 - 80.5	Alluvium	5/23/2018	N	440-212120-6	----	----	----	----	----
LVWPS-MW204	90 - 90.5	UMCf	5/24/2018	N	440-212120-7	----	----	----	----	----
LVWPS-MW204	100 - 100.5	UMCf	5/24/2018	N	440-212120-8	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	N	440-212120-9	----	----	----	----	----
LVWPS-MW204	110 - 110.5	UMCf	5/24/2018	FD	440-212120-14	----	----	----	----	----
LVWPS-MW204	120 - 120.5	UMCf	5/24/2018	N	440-212120-15	----	----	----	----	----
LVWPS-MW204C	130 - 130.5	UMCf	8/29/2018	N	440-219196-1	----	----	----	----	----
LVWPS-MW204C	140 - 140.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-2	----	----	----	----	----
LVWPS-MW204C	150 - 150.5	UMCf (Semi-Consolidated)	8/29/2018	N	440-219196-3	----	----	----	----	----
LVWPS-MW204C	160 - 160.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-4	----	----	----	----	----
LVWPS-MW204C	168 - 168.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-5	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW204C	180 - 180.5	UMCf (Semi-Consolidated)	8/30/2018	N	440-219196-6	----	----	----	----	----
LVWPS-MW205B	28 - 28.5	Alluvium	5/29/2018	N	440-212452-14	<0.65	<0.19	8.3 J	13,000	780
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	N	440-212452-15	----	----	----	----	----
LVWPS-MW205B	38 - 38.5	Alluvium	5/29/2018	FD	440-212452-16	----	----	----	----	----
LVWPS-MW205B	50 - 50.5	Alluvium	5/29/2018	N	440-212452-17	----	----	----	----	----
LVWPS-MW205B	60 - 60.5	Alluvium	5/29/2018	N	440-212452-18	<0.65	<0.17	8.6 J	31,000	690
LVWPS-MW205B	70 - 70.5	Alluvium	5/29/2018	N	440-212452-19	----	----	----	----	----
LVWPS-MW205B	79 - 79.5	Alluvium	5/29/2018	N	440-212452-20	----	----	----	----	----
LVWPS-MW205B	90 - 90.5	Alluvium	5/29/2018	N	440-212452-21	<0.65	<0.20	8.1 J	17,000	1,300
LVWPS-MW205B	100 - 100.5	Alluvium	5/29/2018	N	440-212452-22	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	N	440-212452-23	----	----	----	----	----
LVWPS-MW205B	110 - 110.5	Alluvium	5/29/2018	FD	440-212452-26	----	----	----	----	----
LVWPS-MW205B	120 - 120.5	Alluvium	5/29/2018	N	440-212452-27	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	N	440-212120-20	----	----	----	----	----
LVWPS-MW206C	38 - 38.5	Alluvium	5/24/2018	FD	440-212120-21	----	----	----	----	----
LVWPS-MW206C	47 - 47.5	Alluvium	5/24/2018	N	440-212120-24	----	----	----	----	----
LVWPS-MW206C	57 - 57.5	Alluvium	5/24/2018	N	440-212120-25	----	----	----	----	----
LVWPS-MW206C	67 - 67.5	Alluvium	5/24/2018	N	440-212120-26	----	----	----	----	----
LVWPS-MW206C	75 - 75.5	Alluvium	5/24/2018	N	440-212120-27	----	----	----	----	----
LVWPS-MW206C	88 - 88.5	Alluvium	5/24/2018	N	440-212120-28	----	----	----	----	----
LVWPS-MW206C	96 - 96.5	UMCf	5/24/2018	N	440-212120-29	----	----	----	----	----
LVWPS-MW206C	104 - 104.5	UMCf	5/24/2018	N	440-212120-34	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	N	440-212120-30	----	----	----	----	----
LVWPS-MW206C	109 - 109.5	UMCf	5/24/2018	FD	440-212120-31	----	----	----	----	----
LVWPS-MW206C	119 - 119.5	UMCf	5/24/2018	N	440-212120-32	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	N	440-222642-13	----	----	----	----	----
LVWPS-MW206E	130 - 130.5	UMCf	10/18/2018	FD	440-222642-15	----	----	----	----	----
LVWPS-MW206E	140 - 140.5	UMCf	10/18/2018	N	440-222642-14	----	----	----	----	----
LVWPS-MW206E	150 - 150.5	UMCf	10/18/2018	N	440-222642-17	----	----	----	----	----
LVWPS-MW206E	160 - 160.5	UMCf	10/18/2018	N	440-222642-16	----	----	----	----	----
LVWPS-MW206E	169.5 - 170	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-18	----	----	----	----	----
LVWPS-MW206E	180 - 180.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-19	----	----	----	----	----
LVWPS-MW206E	190 - 190.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222642-20	----	----	----	----	----
LVWPS-MW206E	200 - 200.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-1	----	----	----	----	----
LVWPS-MW206E	210 - 210.5	UMCf (Semi-Consolidated)	10/18/2018	N	440-222724-2	----	----	----	----	----
LVWPS-MW206E	220 - 220.5	UMCf (Semi-Consolidated)	10/19/2018	N	440-222724-3	----	----	----	----	----
LVWPS-MW207	30 - 30.5	Alluvium	5/24/2018	N	440-212188-1	----	----	----	----	----
LVWPS-MW207	40 - 40.5	Alluvium	5/24/2018	N	440-212188-2	----	----	----	----	----
LVWPS-MW207	50 - 50.5	Alluvium	5/24/2018	N	440-212188-3	----	----	----	----	----
LVWPS-MW207	58 - 58.5	Alluvium	5/24/2018	N	440-212188-4	----	----	----	----	----
LVWPS-MW207	70 - 70.5	Alluvium	5/24/2018	N	440-212188-5	----	----	----	----	----
LVWPS-MW207	80 - 80.5	Alluvium	5/24/2018	N	440-212188-6	----	----	----	----	----
LVWPS-MW207	90 - 90.5	UMCf	5/24/2018	N	440-212188-7	----	----	----	----	----
LVWPS-MW207	100 - 100.5	UMCf	5/24/2018	N	440-212188-8	----	----	----	----	----
LVWPS-MW207	110 - 110.5	UMCf	5/24/2018	N	440-212188-9	----	----	----	----	----
LVWPS-MW207	120 - 120.5	UMCf (Semi-Consolidated)	5/24/2018	N	440-212188-10	----	----	----	----	----
LVWPS-MW208B	31 - 31.5	Alluvium	6/4/2018	N	440-212875-1	----	<0.21	8.1 J	5,000	950 J
LVWPS-MW208B	41 - 41.5	Alluvium	6/4/2018	N	440-212875-2	----	----	----	----	----
LVWPS-MW208B	46 - 46.5	Alluvium	6/4/2018	N	440-212875-3	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW208B	57 - 57.5	Alluvium	6/4/2018	N	440-212875-4	----	<0.22	8.2 J	22,000	720
LVWPS-MW208B	70 - 70.5	Alluvium	6/4/2018	N	440-212875-5	----	----	----	----	----
LVWPS-MW208B	75 - 75.5	Alluvium	6/4/2018	N	440-212875-6	----	----	----	----	----
LVWPS-MW208B	93 - 93.5	UMCf	6/4/2018	N	440-212875-7	----	<0.24	8.0 J	39,000	470
LVWPS-MW208B	100 - 100.5	UMCf	6/4/2018	N	440-212875-8	----	----	----	----	----
LVWPS-MW208B	110 - 110.5	UMCf	6/4/2018	N	440-212875-9	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	N	440-212875-10	----	----	----	----	----
LVWPS-MW208B	112 - 112.5	UMCf	6/4/2018	FD	440-212875-11	----	----	----	----	----
LVWPS-MW209	30 - 30.5	Alluvium	6/1/2018	N	440-212631-1	----	----	----	----	----
LVWPS-MW209	40 - 40.5	Alluvium	6/1/2018	N	440-212631-2	----	----	----	----	----
LVWPS-MW209	50.5 - 51	Alluvium	6/1/2018	N	440-212631-3	----	----	----	----	----
LVWPS-MW209	58 - 58.5	Alluvium	6/1/2018	N	440-212631-4	----	----	----	----	----
LVWPS-MW209	73 - 73.5	Alluvium	6/1/2018	N	440-212631-5	----	----	----	----	----
LVWPS-MW209	81 - 81.5	Alluvium	6/1/2018	N	440-212631-6	----	----	----	----	----
LVWPS-MW209	88 - 88.5	Alluvium	6/1/2018	N	440-212631-7	----	----	----	----	----
LVWPS-MW209	98 - 98.5	Alluvium	6/1/2018	N	440-212631-8	----	----	----	----	----
LVWPS-MW209	113 - 113.5	Alluvium	6/1/2018	N	440-212752-21	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	N	440-212752-22	----	----	----	----	----
LVWPS-MW209	120 - 120.5	Alluvium	6/1/2018	FD	440-212752-23	----	----	----	----	----
LVWPS-MW209C	130 - 130.5	UMCf-cg	9/8/2018	N	440-219803-1	----	----	----	----	----
LVWPS-MW209C	140 - 140.5	UMCf-cg	9/9/2018	N	440-219803-2	----	----	----	----	----
LVWPS-MW209C	150 - 150.5	UMCf-cg	9/9/2018	N	440-219803-3	----	----	----	----	----
LVWPS-MW209C	160 - 160.5	UMCf-cg	9/9/2018	N	440-219803-4	----	----	----	----	----
LVWPS-MW209C	170 - 170.5	UMCf-cg	9/9/2018	N	440-219803-5	----	----	----	----	----
LVWPS-MW209C	180 - 180.5	Bedrock	9/9/2018	N	440-219803-6	----	----	----	----	----
LVWPS-MW210C	28 - 28.5	Alluvium	5/29/2018	N	440-212452-1	<0.65	0.18 J	8.0 J	12,000	680 J
LVWPS-MW210C	34.5 - 35	Alluvium	5/29/2018	N	440-212452-2	----	----	----	----	----
LVWPS-MW210C	49.5 - 50	Alluvium	5/29/2018	N	440-212452-3	----	----	----	----	----
LVWPS-MW210C	60.5 - 61	Alluvium	5/29/2018	N	440-212452-4	<0.65	<0.17	8.2 J	30,000	510
LVWPS-MW210C	70 - 70.5	Alluvium	5/29/2018	N	440-212452-5	----	----	----	----	----
LVWPS-MW210C	80 - 80.5	Alluvium	5/30/2018	N	440-212452-6	----	----	----	----	----
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	N	440-212452-7	<0.65	<0.18	8.0 J	27,000	620
LVWPS-MW210C	95.5 - 96	UMCf-cg	5/30/2018	FD	440-212452-8	<0.65	<0.18	8.0 J	27,000	570
LVWPS-MW210C	106 - 106.5	UMCf-cg	5/30/2018	N	440-212452-9	----	----	----	----	----
LVWPS-MW210C	113 - 113.5	UMCf-cg	5/30/2018	N	440-212452-10	----	----	----	----	----
LVWPS-MW210C	120 - 120.5	UMCf-cg	5/30/2018	N	440-212452-11	----	----	----	----	----
LVWPS-MW210E	130 - 130.5	UMCf-cg	9/6/2018	N	440-219617-1	----	----	----	----	----
LVWPS-MW210E	140 - 140.5	UMCf-cg	9/6/2018	N	440-219617-2	----	----	----	----	----
LVWPS-MW210E	150 - 150.5	UMCf-cg	9/6/2018	N	440-219617-3	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	N	440-219617-5	----	----	----	----	----
LVWPS-MW210E	160 - 160.5	UMCf-cg	9/6/2018	FD	440-219617-4	----	----	----	----	----
LVWPS-MW210E	165 - 165.5	UMCf-cg	9/6/2018	N	440-219617-6	----	----	----	----	----
LVWPS-MW210E	175 - 175.5	Bedrock	9/6/2018	N	440-219646-1	----	----	----	----	----
LVWPS-MW210E	185 - 185.5	Bedrock	9/6/2018	N	440-219646-2	----	----	----	----	----
LVWPS-MW211	30 - 30.5	Alluvium	5/31/2018	N	440-212752-1	----	----	----	----	----
LVWPS-MW211	38 - 38.5	Alluvium	5/31/2018	N	440-212752-2	----	----	----	----	----
LVWPS-MW211	50 - 50.5	Alluvium	5/31/2018	N	440-212752-3	----	----	----	----	----
LVWPS-MW211	60 - 60.5	Alluvium	5/31/2018	N	440-212752-4	----	----	----	----	----
LVWPS-MW211	70 - 70.5	Alluvium	5/31/2018	N	440-212752-5	----	----	----	----	----

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Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW211	80 - 80.5	Alluvium	5/31/2018	N	440-212752-6	----	----	----	----	----
LVWPS-MW211	89 - 89.5	Alluvium	5/31/2018	N	440-212752-7	----	----	----	----	----
LVWPS-MW211	100 - 100.5	UMCf	5/31/2018	N	440-212752-8	----	----	----	----	----
LVWPS-MW211	110 - 110.5	UMCf-cg	5/31/2018	N	440-212752-9	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	N	440-212752-10	----	----	----	----	----
LVWPS-MW211	120 - 120.5	UMCf-cg	5/31/2018	FD	440-212752-11	----	----	----	----	----
LVWPS-MW212B	30.5 - 31	Alluvium	6/5/2018	N	440-213022-1	----	----	----	----	----
LVWPS-MW212B	40.5 - 41	Alluvium	6/5/2018	N	440-213022-2	----	----	----	----	----
LVWPS-MW212B	49 - 49.5	Alluvium	6/5/2018	N	440-213022-3	----	----	----	----	----
LVWPS-MW212B	60 - 60.5	Alluvium	6/5/2018	N	440-213022-4	----	----	----	----	----
LVWPS-MW212B	68 - 68.5	Alluvium	6/5/2018	N	440-213022-6	----	----	----	----	----
LVWPS-MW212B	80 - 80.5	UMCf-cg	6/5/2018	N	440-213022-5	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	N	440-213022-7	----	----	----	----	----
LVWPS-MW212B	88 - 88.5	UMCf-cg	6/5/2018	FD	440-213022-8	----	----	----	----	----
LVWPS-MW212B	98 - 98.5	UMCf-cg	6/5/2018	N	440-213022-9	----	----	----	----	----
LVWPS-MW212B	106 - 106.5	UMCf-cg	6/5/2018	N	440-213022-10	----	----	----	----	----
LVWPS-MW212B	114.5 - 115	UMCf-cg	6/5/2018	N	440-213022-11	----	----	----	----	----
LVWPS-MW212D	124 - 124.5	UMCf-cg	9/20/2018	N	440-220569-9	----	----	----	----	----
LVWPS-MW212D	130 - 130.5	UMCf-cg	9/20/2018	N	440-220569-10	----	----	----	----	----
LVWPS-MW212D	139 - 139.5	UMCf-cg	9/20/2018	N	440-220569-11	----	----	----	----	----
LVWPS-MW212D	146.5 - 147	UMCf-cg	9/20/2018	N	440-220569-12	----	----	----	----	----
LVWPS-MW212D	159 - 159.5	Bedrock	9/20/2018	N	440-220569-13	----	----	----	----	----
LVWPS-MW212D	162 - 162.5	Bedrock	9/20/2018	N	440-220569-14	----	----	----	----	----
LVWPS-MW213	29 - 29.5	Alluvium	6/1/2018	N	440-212752-12	----	----	----	----	----
LVWPS-MW213	35 - 35.5	Alluvium	6/1/2018	N	440-212752-13	----	----	----	----	----
LVWPS-MW213	49 - 49.5	Alluvium	6/1/2018	N	440-212752-14	----	----	----	----	----
LVWPS-MW213	59 - 59.5	Alluvium	6/1/2018	N	440-212752-15	----	----	----	----	----
LVWPS-MW213	70 - 70.5	Alluvium	6/1/2018	N	440-212752-16	----	----	----	----	----
LVWPS-MW213	81 - 81.5	UMCf-cg	6/1/2018	N	440-212752-17	----	----	----	----	----
LVWPS-MW213	90 - 90.5	UMCf-cg	6/1/2018	N	440-212752-18	----	----	----	----	----
LVWPS-MW213	100 - 100.5	UMCf-cg	6/1/2018	N	440-212752-19	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	N	440-212752-20	----	----	----	----	----
LVWPS-MW213	110 - 110.5	UMCf-cg	6/1/2018	FD	440-212752-42	----	----	----	----	----
LVWPS-MW213	120 - 120.5	Bedrock	6/1/2018	N	440-212752-43	----	----	----	----	----
LVWPS-MW214	30.5 - 31	Alluvium	6/2/2018	N	440-212752-24	----	----	----	----	----
LVWPS-MW214	41 - 41.5	Alluvium	6/2/2018	N	440-212752-25	----	----	----	----	----
LVWPS-MW214	53 - 53.5	UMCf/Horse Springs	6/2/2018	N	440-212752-26	----	----	----	----	----
LVWPS-MW214	61 - 61.5	UMCf/Horse Springs	6/2/2018	N	440-212752-27	----	----	----	----	----
LVWPS-MW214	69.5 - 70	UMCf/Horse Springs	6/2/2018	N	440-212752-28	----	----	----	----	----
LVWPS-MW214	76.5 - 77	UMCf/Horse Springs	6/2/2018	N	440-212752-29	----	----	----	----	----
LVWPS-MW214	93 - 93.5	UMCf/Horse Springs	6/2/2018	N	440-212752-30	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	N	440-212752-31	----	----	----	----	----
LVWPS-MW214	103 - 103.5	UMCf/Horse Springs	6/2/2018	FD	440-212752-32	----	----	----	----	----
LVWPS-MW214	114 - 114.5	UMCf/Horse Springs	6/2/2018	N	440-212752-35	----	----	----	----	----
LVWPS-MW214	119 - 119.5	UMCf/Horse Springs	6/2/2018	N	440-212752-36	----	----	----	----	----
LVWPS-MW215B	10 - 10.5	Alluvium	6/4/2018	N	440-212752-37	----	----	----	----	----
LVWPS-MW215B	21 - 21.5	Alluvium	6/4/2018	N	440-212752-39	----	----	----	----	----
LVWPS-MW215B	33 - 33.5	Alluvium	6/4/2018	N	440-212752-38	----	----	----	----	----
LVWPS-MW216	13 - 13.5	Alluvium	6/7/2018	N	440-213209-1	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW216	23 - 23.5	UMCf	6/7/2018	N	440-213209-2	----	----	----	----	----
LVWPS-MW216	33 - 33.5	UMCf	6/7/2018	N	440-213209-3	----	----	----	----	----
LVWPS-MW216	43 - 43.5	UMCf	6/7/2018	N	440-213209-4	----	----	----	----	----
LVWPS-MW216	53 - 53.5	UMCf	6/7/2018	N	440-213209-5	----	----	----	----	----
LVWPS-MW216	63 - 63.5	UMCf	6/7/2018	N	440-213209-6	----	----	----	----	----
LVWPS-MW216	73 - 73.5	UMCf	6/7/2018	N	440-213209-7	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	N	440-221583-1	----	----	----	----	----
LVWPS-MW217C	39 - 39.5	Alluvium	10/3/2018	FD	440-221583-2	----	----	----	----	----
LVWPS-MW217C	53 - 53.5	Alluvium	10/3/2018	N	440-221583-3	----	----	----	----	----
LVWPS-MW217C	62 - 62.5	Alluvium	10/3/2018	N	440-221583-4	----	----	----	----	----
LVWPS-MW217C	69 - 69.5	Alluvium	10/3/2018	N	440-221583-5	----	----	----	----	----
LVWPS-MW217C	79 - 79.5	Alluvium	10/3/2018	N	440-221583-6	----	----	----	----	----
LVWPS-MW217C	92 - 92.5	Alluvium	10/3/2018	N	440-221583-7	----	----	----	----	----
LVWPS-MW217C	101 - 101.5	UMCf	10/4/2018	N	440-221583-8	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	N	440-221583-9	----	----	----	----	----
LVWPS-MW217C	110 - 110.5	UMCf	10/4/2018	FD	440-221583-12	----	----	----	----	----
LVWPS-MW217C	120 - 120.5	UMCf	10/4/2018	N	440-221583-10	----	----	----	----	----
LVWPS-MW217C	130 - 130.5	UMCf	10/4/2018	N	440-221583-11	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	N	440-221583-14	----	----	----	----	----
LVWPS-MW217C	140 - 140.5	UMCf	10/4/2018	FD	440-221583-13	----	----	----	----	----
LVWPS-MW217C	150 - 150.5	UMCf	10/4/2018	N	440-221583-15	----	----	----	----	----
LVWPS-MW217C	160 - 160.5	UMCf	10/4/2018	N	440-221583-16	----	----	----	----	----
LVWPS-MW217C	170 - 170.5	UMCf	10/4/2018	N	440-221583-17	----	----	----	----	----
LVWPS-MW217C	180 - 180.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-18	----	----	----	----	----
LVWPS-MW217C	190 - 190.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-21	----	----	----	----	----
LVWPS-MW217C	200 - 200.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221583-22	----	----	----	----	----
LVWPS-MW217C	210 - 210.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-1	----	----	----	----	----
LVWPS-MW217C	220 - 220.5	UMCf (Semi-Consolidated)	10/4/2018	N	440-221635-2	----	----	----	----	----
LVWPS-MW218B	159 - 159.5	Bedrock	10/4/2018	N	440-221583-19	----	----	----	----	----
LVWPS-MW218B	164 - 164.5	Bedrock	10/4/2018	N	440-221583-20	----	----	----	----	----
LVWPS-MW218C	25 - 25.5	Alluvium	9/11/2018	N	440-219893-3	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	N	440-219893-1	----	----	----	----	----
LVWPS-MW218C	35 - 35.5	Alluvium	9/11/2018	FD	440-219893-2	----	----	----	----	----
LVWPS-MW218C	49 - 49.5	Alluvium	9/11/2018	N	440-219893-4	----	----	----	----	----
LVWPS-MW218C	55 - 55.5	Alluvium	9/11/2018	N	440-219893-5	----	----	----	----	----
LVWPS-MW218C	65 - 65.5	Alluvium	9/11/2018	N	440-219893-7	----	----	----	----	----
LVWPS-MW218C	71 - 71.5	Alluvium	9/11/2018	N	440-219893-8	----	----	----	----	----
LVWPS-MW218C	85 - 85.5	Alluvium	9/11/2018	N	440-219893-9	----	----	----	----	----
LVWPS-MW218C	96 - 96.5	Alluvium	9/11/2018	N	440-220010-1	----	----	----	----	----
LVWPS-MW218C	105 - 105.5	UMCf	9/11/2018	N	440-220010-2	----	----	----	----	----
LVWPS-MW218C	110 - 110.5	UMCf	9/11/2018	N	440-220010-3	----	----	----	----	----
LVWPS-MW218C	115 - 115.5	UMCf-cg	9/11/2018	N	440-220010-4	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf	9/11/2018	N	440-220010-5	----	----	----	----	----
LVWPS-MW218C	125 - 125.5	UMCf-cg	9/11/2018	FD	440-220010-6	----	----	----	----	----
LVWPS-MW218C	135 - 135.5	UMCf-cg	9/12/2018	N	440-220010-7	----	----	----	----	----
LVWPS-MW218C	144 - 144.5	UMCf	9/12/2018	N	440-220010-8	----	----	----	----	----
LVWPS-MW218C	155 - 155.5	UMCf-cg	9/12/2018	N	440-220010-9	----	----	----	----	----
LVWPS-MW218C	164 - 164.5	Bedrock	9/12/2018	N	440-220010-10	----	----	----	----	----
LVWPS-MW219C	30 - 30.5	Alluvium	9/26/2018	N	440-220930-2	----	----	----	----	----

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Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	N	440-220930-3	----	----	----	----	----
LVWPS-MW219C	41.5 - 42	Alluvium	9/26/2018	FD	440-220930-4	----	----	----	----	----
LVWPS-MW219C	46 - 46.5	Alluvium	9/26/2018	N	440-220930-5	----	----	----	----	----
LVWPS-MW219C	55 - 55.5	UMCf/Horse Springs	9/26/2018	N	440-220930-6	----	----	----	----	----
LVWPS-MW219C	65 - 65.5	UMCf/Horse Springs	9/26/2018	N	440-220930-7	----	----	----	----	----
LVWPS-MW219C	75.5 - 76	UMCf/Horse Springs	9/26/2018	N	440-220930-9	----	----	----	----	----
LVWPS-MW219C	85.5 - 86	UMCf/Horse Springs	9/26/2018	N	440-220930-10	----	----	----	----	----
LVWPS-MW219C	95.5 - 96	UMCf/Horse Springs	9/26/2018	N	440-220930-11	----	----	----	----	----
LVWPS-MW219C	105.5 - 106	UMCf/Horse Springs	9/26/2018	N	440-220930-12	----	----	----	----	----
LVWPS-MW219C	115.5 - 116	UMCf/Horse Springs	9/26/2018	N	440-220930-13	----	----	----	----	----
LVWPS-MW219C	126 - 126.5	UMCf/Horse Springs	9/26/2018	N	440-221030-1	----	----	----	----	----
LVWPS-MW219C	136 - 136.5	UMCf/Horse Springs	9/26/2018	N	440-221030-2	----	----	----	----	----
LVWPS-MW219C	145 - 145.5	UMCf/Horse Springs	9/26/2018	N	440-221030-3	----	----	----	----	----
LVWPS-MW220B	29.5 - 30	Alluvium	9/20/2018	N	440-220569-1	----	----	----	----	----
LVWPS-MW220B	36.5 - 37	Alluvium	9/20/2018	N	440-220569-2	----	----	----	----	----
LVWPS-MW220B	51.5 - 52	Alluvium	9/20/2018	N	440-220569-3	----	----	----	----	----
LVWPS-MW220B	60.5 - 61	Alluvium	9/20/2018	N	440-220569-4	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	N	440-220569-5	----	----	----	----	----
LVWPS-MW220B	70 - 70.5	Alluvium	9/20/2018	FD	440-220569-6	----	----	----	----	----
LVWPS-MW220B	77.5 - 78	Alluvium	9/20/2018	N	440-220569-7	----	----	----	----	----
LVWPS-MW220B	87.5 - 88	Alluvium	9/21/2018	N	440-220670-1	----	----	----	----	----
LVWPS-MW220B	97.5 - 98	Alluvium	9/21/2018	N	440-220670-2	----	----	----	----	----
LVWPS-MW220B	110 - 110.5	UMCf-cg	9/21/2018	N	440-220670-3	----	----	----	----	----
LVWPS-MW220B	124 - 124.5	UMCf	9/21/2018	N	440-220670-4	----	----	----	----	----
LVWPS-MW220B	133 - 133.5	UMCf	9/21/2018	N	440-220670-5	----	----	----	----	----
LVWPS-MW220B	143 - 143.5	UMCf-cg	9/21/2018	N	440-220670-6	----	----	----	----	----
LVWPS-MW220B	153 - 153.5	UMCf	9/21/2018	N	440-220670-7	----	----	----	----	----
LVWPS-MW220B	160 - 160.5	Bedrock	9/21/2018	N	440-220670-8	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	N	440-220767-21	----	----	----	----	----
LVWPS-MW221B	33 - 33.5	Alluvium	9/24/2018	FD	440-220767-22	----	----	----	----	----
LVWPS-MW221B	43 - 43.5	Alluvium	9/24/2018	N	440-220767-23	----	----	----	----	----
LVWPS-MW221B	53 - 53.5	Alluvium	9/24/2018	N	440-220767-24	----	----	----	----	----
LVWPS-MW221B	63 - 63.5	Alluvium	9/24/2018	N	440-220767-25	----	----	----	----	----
LVWPS-MW221B	73 - 73.5	Alluvium	9/24/2018	N	440-220767-26	----	----	----	----	----
LVWPS-MW221B	83 - 83.5	UMCf	9/24/2018	N	440-220767-27	----	----	----	----	----
LVWPS-MW221B	93 - 93.5	UMCf-cg	9/24/2018	N	440-220767-28	----	----	----	----	----
LVWPS-MW221B	103 - 103.5	UMCf-cg	9/24/2018	N	440-220767-29	----	----	----	----	----
LVWPS-MW221B	113 - 113.5	Bedrock	9/24/2018	N	440-220930-1	----	----	----	----	----
LVWPS-MW222C	40.5 - 41	Alluvium	9/21/2018	N	440-220670-9	----	----	----	----	----
LVWPS-MW222C	50 - 50.5	Alluvium	9/21/2018	N	440-220670-10	----	----	----	----	----
LVWPS-MW222C	55 - 55.5	UMCf-cg	9/21/2018	N	440-220670-11	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	N	440-220670-12	----	----	----	----	----
LVWPS-MW222C	60 - 60.5	UMCf-cg	9/21/2018	FD	440-220670-13	----	----	----	----	----
LVWPS-MW222C	70.5 - 71	UMCf-cg	9/21/2018	N	440-220670-14	----	----	----	----	----
LVWPS-MW222C	80 - 80.5	UMCf-cg	9/21/2018	N	440-220767-1	----	----	----	----	----
LVWPS-MW222C	91 - 91.5	UMCf-cg	9/21/2018	N	440-220767-2	----	----	----	----	----
LVWPS-MW222C	99 - 99.5	UMCf	9/21/2018	N	440-220767-3	----	----	----	----	----
LVWPS-MW222C	110 - 110.5	UMCf-cg	9/21/2018	N	440-220767-4	----	----	----	----	----
LVWPS-MW222C	122 - 122.5	UMCf	9/21/2018	N	440-220767-5	----	----	----	----	----

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Soil Analytical Results Summary
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Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW222C	130 - 130.5	UMCf-cg	9/21/2018	N	440-220767-6	----	----	----	----	----
LVWPS-MW222C	140 - 140.5	UMCf-cg	9/21/2018	N	440-220767-7	----	----	----	----	----
LVWPS-MW222C	150 - 150.5	UMCf-cg	9/22/2018	N	440-220767-8	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	N	440-220767-9	----	----	----	----	----
LVWPS-MW222C	160 - 160.5	UMCf-cg	9/22/2018	FD	440-220767-10	----	----	----	----	----
LVWPS-MW222C	170 - 170.5	UMCf-cg	9/22/2018	N	440-220767-11	----	----	----	----	----
LVWPS-MW222C	180 - 180.5	UMCf-cg	9/22/2018	N	440-220767-12	----	----	----	----	----
LVWPS-MW222C	190 - 190.5	UMCf-cg	9/22/2018	N	440-220767-13	----	----	----	----	----
LVWPS-MW222C	200 - 200.5	UMCf-cg	9/22/2018	N	440-220767-14	----	----	----	----	----
LVWPS-MW222C	210 - 210.5	UMCf-cg	9/22/2018	N	440-220767-15	----	----	----	----	----
LVWPS-MW222C	220 - 220.5	UMCf-cg	9/22/2018	N	440-220767-16	----	----	----	----	----
LVWPS-MW222C	230 - 230.5	UMCf-cg	9/22/2018	N	440-220767-18	----	----	----	----	----
LVWPS-MW222C	238.5 - 239	Bedrock	9/22/2018	N	440-220767-19	----	----	----	----	----
LVWPS-MW222C	248.5 - 249	Bedrock	9/22/2018	N	440-220767-20	----	----	----	----	----
LVWPS-MW223C	36.5 - 37	Alluvium	10/17/2018	N	440-222642-1	----	----	----	----	----
LVWPS-MW223C	48 - 48.5	Alluvium	10/17/2018	N	440-222642-2	----	----	----	----	----
LVWPS-MW223C	57 - 57.5	Alluvium	10/17/2018	N	440-222642-3	----	----	----	----	----
LVWPS-MW223C	67 - 67.5	Alluvium	10/17/2018	N	440-222642-4	----	----	----	----	----
LVWPS-MW223C	77 - 77.5	Alluvium	10/18/2018	N	440-222642-5	----	----	----	----	----
LVWPS-MW223C	87 - 87.5	Alluvium	10/18/2018	N	440-222642-6	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	N	440-222642-7	----	----	----	----	----
LVWPS-MW223C	97 - 97.5	UMCf	10/18/2018	FD	440-222642-8	----	----	----	----	----
LVWPS-MW223C	107 - 107.5	UMCf	10/18/2018	N	440-222642-10	----	----	----	----	----
LVWPS-MW223C	117 - 117.5	UMCf	10/18/2018	N	440-222642-11	----	----	----	----	----
LVWPS-MW223C	128 - 128.5	Bedrock	10/18/2018	N	440-222642-12	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	N	440-221833-1	----	----	----	----	----
LVWPS-MW224C	40 - 40.5	Alluvium	10/8/2018	FD	440-221833-2	----	----	----	----	----
LVWPS-MW224C	53.5 - 54	Alluvium	10/9/2018	N	440-221833-3	----	----	----	----	----
LVWPS-MW224C	62 - 62.5	Alluvium	10/9/2018	N	440-221833-4	----	----	----	----	----
LVWPS-MW224C	72 - 72.5	Alluvium	10/9/2018	N	440-221833-5	----	----	----	----	----
LVWPS-MW224C	80 - 80.5	Alluvium	10/9/2018	N	440-221833-6	----	----	----	----	----
LVWPS-MW224C	92 - 92.5	Alluvium	10/9/2018	N	440-221833-7	----	----	----	----	----
LVWPS-MW224C	102 - 102.5	UMCf	10/9/2018	N	440-221833-9	----	----	----	----	----
LVWPS-MW224C	110 - 110.5	UMCf	10/9/2018	N	440-221833-10	----	----	----	----	----
LVWPS-MW224C	117 - 117.5	UMCf	10/9/2018	N	440-221931-11	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	N	440-221931-12	----	----	----	----	----
LVWPS-MW224C	127 - 127.5	UMCf	10/9/2018	FD	440-221931-14	----	----	----	----	----
LVWPS-MW224C	137 - 137.5	UMCf	10/9/2018	N	440-221931-13	----	----	----	----	----
LVWPS-MW224C	146 - 146.5	UMCf	10/9/2018	N	440-221931-15	----	----	----	----	----
LVWPS-MW224C	158 - 158.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-16	----	----	----	----	----
LVWPS-MW224C	177 - 177.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-17	----	----	----	----	----
LVWPS-MW224C	187 - 187.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-18	----	----	----	----	----
LVWPS-MW224C	194 - 194.5	UMCf (Semi-Consolidated)	10/9/2018	N	440-221931-19	----	----	----	----	----
LVWPS-MW225B	37 - 37.5	Alluvium	10/9/2018	N	440-221931-1	----	----	----	----	----
LVWPS-MW225B	53 - 53.5	Alluvium	10/9/2018	N	440-221931-2	----	----	----	----	----
LVWPS-MW225B	57.5 - 58	Alluvium	10/9/2018	N	440-221931-3	----	----	----	----	----
LVWPS-MW225B	71 - 71.5	UMCf	10/9/2018	N	440-221931-4	----	----	----	----	----
LVWPS-MW225B	77 - 77.5	UMCf	10/9/2018	N	440-221931-5	----	----	----	----	----
LVWPS-MW225B	87 - 87.5	UMCf	10/9/2018	N	440-221931-6	----	----	----	----	----

Table H.7
Soil Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	QCType	Lab SampleID	SM5310B	SW7199	SW9045	SW9060	Total Metals by SW6010B
						Total Organic Carbon	Chromium, Hexavalent	pH	Total Organic Carbon	Phosphorus
						mg/L	mg/kg	SU	mg/kg	mg/kg
LVWPS-MW225B	97 - 97.5	UMCf	10/10/2018	N	440-221931-7	----	----	----	----	----
LVWPS-MW225B	107 - 107.5	UMCf	10/10/2018	N	440-221931-8	----	----	----	----	----
LVWPS-MW225B	114 - 114.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-9	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221931-20	----	----	----	----	----
LVWPS-MW225B	127 - 127.5	UMCf (Semi-Consolidated)	10/10/2018	FD	440-221931-10	----	----	----	----	----
LVWPS-MW225B	131 - 131.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-1	----	----	----	----	----
LVWPS-MW225B	141 - 141.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-2	----	----	----	----	----
LVWPS-MW225B	151 - 151.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-3	----	----	----	----	----
LVWPS-MW225B	155 - 155.5	UMCf (Semi-Consolidated)	10/10/2018	N	440-221965-4	----	----	----	----	----
LVWPS-MW226B	45 - 45.5	Alluvium	10/22/2018	N	440-222941-1	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-2	----	----	----	----	----
LVWPS-MW226B	55 - 55.5	UMCf (Semi-Consolidated)	10/22/2018	FD	440-222941-9	----	----	----	----	----
LVWPS-MW226B	60 - 60.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-3	----	----	----	----	----
LVWPS-MW226B	70 - 70.5	UMCf (Semi-Consolidated)	10/22/2018	N	440-222941-4	----	----	----	----	----
LVWPS-MW226B	80 - 80.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-5	----	----	----	----	----
LVWPS-MW226B	90 - 90.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-6	----	----	----	----	----
LVWPS-MW226B	100 - 100.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-7	----	----	----	----	----
LVWPS-MW226B	105 - 105.5	UMCf (Semi-Consolidated)	10/23/2018	N	440-222941-8	----	----	----	----	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte i
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
mg/L - milligarms per liter
µg/L - micrograms per liter
N - Normal field sample
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inac
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.8
Soil Microbial Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Sample Date	Depth (ft bgs)	Sample Matrix	Soil Lithology	Microbial Census	Microbial Phospholipid Fatty Acid Analysis (PLFA)								
					Perchlorate reductase gene (pcrA)	Total Biomass	Proteobacteria (Monos)	Firmicutes (TerBrSats)	Anaerobic Metal Reducers (BrMonos)	SRB/ Actinomycetes (MidBrSats)	General (Nsats)	Eukaryotes (polyenoics)	Slowed Growth	Decreased Permeability
					cells/gram	cells/gram	%	%	%	%	%	%	ratio cy/cis	ratio trans/cis
LVWPS-MW201B	6/6/2018	24-24.5	Soil	Alluvium	<2.00E+04 (I)	<2.93E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW201B	6/6/2018	59.5-60	Soil	UMCf	<2.00E+04 (I)	1.04E+06	17.12	26.07	2.10	0.00	48.35	6.37	1.95	0.00
LVWPS-MW204	8/29/2018	100-100.5	Soil	UMCf	<2.00E+04 (I)	1.40E+05	27.98	13.28	0.00	0.00	45.08	13.66	3.38	0.00
LVWPS-MW204	8/29/2018	150-150.5	Soil	UMCf (Semi-Consolidated)	<2.00E+04 (I)	1.59E+05	15.15	23.30	0.00	6.39	51.93	3.24	4.81	0.00
LVWPS-MW205B	5/29/2018	28-28.5	Soil	Alluvium	<2.00E+04 (I)	<2.93E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW205B	5/29/2018	60-60.5	Soil	Alluvium	<2.00E+04 (I)	<2.93E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW208B	6/4/2018	31-31.5	Soil	Alluvium	<2.00E+04 (I)	<2.96E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW208B	6/4/2018	57-57.5	Soil	Alluvium	<2.00E+04 (I)	<2.95E+05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW210	9/5/2018	100-100.5	Soil	UMCf-cg	<2.00E+04 (I)	<5.98E+04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW210	9/6/2018	150-150.5	Soil	UMCf-cg	<2.00E+04 (I)	<5.98E+04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LVWPS-MW215B	6/4/2018	10-10.5	Soil	Alluvium	<2.00E+04	2.08E+07	30.14	23.48	2.39	13.42	27.63	2.94	2.61	0.23

Notes
BrMonos - Branched Monoenoic
MidBrSats - Mid-Chained Branched Saturated
Monos - Monoenoic
TerBrSats - Termially Branched Saturated
Nsats - Normal Saturation
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
< - Not detected
(I) - Inhibited

Table H.9
Geotechnical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Depth (ft bgs)	Soil Lithology	Sample Date	API RP 40	ASTM D2216	ASTM D2937	ASTM D854				
				Total porosity	Percent Moisture	Dry Density	Dry Soil Weight	Specific Gravity	Volume	Wet Density	Wet Soil Weight
				Volume Percent	Percent	pcf	g	Unitless	ft^3	pcf	g
LVWPS-MW202	35 - 37.5	Alluvium	5/22/2018	53.6	10.2	75.0	629.60	2.598	0.0219	82.709	819.80
LVWPS-MW202	65 - 67.5	UMCf	5/22/2018	57.4	53.8	69.2	278.10	2.609	0.0233	106.468	1,127.40
LVWPS-MW206C[1]	47 - 49.5	Alluvium	5/24/2018	----	12.3	----	501.70	2.639	----	----	----
LVWPS-MW206C	105 - 107.5	UMCf	5/24/2018	61.9	58.5	62.6	274.60	2.633	0.0218	99.162	980.20
LVWPS-MW209	40 - 42.5	Alluvium	6/1/2018	29.6	17.3	116.8	650.20	2.661	0.0131	137.0	813.50

Notes:
ft^3 - cubic foot
g - grams
pcf - Pounds per cubic foot
UMCf- Upper Muddy Creek Formation
1. Sample matrix not compatible for measuring in situ density.

Table H.10
Discrete Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Sample Date	QCType	Lab SampleID	Depth (ft bgs)	Screened Lithology	EPA 314.0	EPA 300.1	Anions by EPA 300.0
						Perchlorate	Chlorate	Nitrate (as N)
						µg/L	µg/L	mg/L
LVWPS-MW204	5/23/2018	N	440-212120-11	29 - 29.5	Alluvium	3,400	15,000	12
LVWPS-MW205C	5/30/2018	N	440-212452-24	44 - 44.5	Alluvium	840	1,800	8.6
LVWPS-MW205C	5/30/2018	N	440-212452-25	56 - 56.5	Alluvium	720	----	----
LVWPS-MW207	5/24/2018	N	440-212120-18	29 - 29.5	Alluvium	3,900	20,000	17
LVWPS-MW207	5/24/2018	FD	440-212120-19	29 - 29.5	Alluvium	4,000	20,000	17
LVWPS-MW209	6/1/2018	N	440-212632-1	40 - 40.5	Alluvium	3,700	----	----
LVWPS-MW209	6/1/2018	N	440-212632-2	105 - 105.5	Alluvium	4,600	17,000	20
LVWPS-MW210C	5/30/2018	N	440-212561-1	63 - 63.5	Alluvium	4,400	16,000	18
LVWPS-MW211	5/31/2018	N	440-212752-40	40 - 40.5	Alluvium	2,200	----	----
LVWPS-MW213	6/1/2018	N	440-212752-41	35 - 35.5	Alluvium	790	----	----
LVWPS-MW214	6/1/2018	N	440-212752-44	40 - 40.5	Alluvium	3,100	----	----

Notes:
FD - Field duplicate
mg/L - milligarms per liter
µg/L - micrograms per liter
N - Normal field sample
---- Not tested.
Results acceptable for use without qualification.

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	EPA 314.0	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0			Dissolved Gases by RSK-175	Dissolved Metals by SW6010B								
							Perchlorate	Chlorate	Chloride	Nitrate (as N)	Nitrite (as N)	Sulfate	Methane	Aluminum	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper
							µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LNDMW-1	BL01	7/11/2018	N	440-215722-1	Unknown	-	5,200	4,600	----	8.5 J-	----	1,700	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201A	BL01	6/26/2018	N	440-214475-1	Alluvium	28.2 - 47.8	5,000	19,000	750	13	<0.70	1,600	<0.00025	<0.050	0.015	<0.0010	1.4	<0.0025	370	0.013	<0.0050	<0.0050
LVWPS-MW201A	BL01	6/26/2018	FD	440-214475-2	Alluvium	28.2 - 47.8	4,800	19,000	750	13	<0.70	1,600	<0.00025	<0.050	0.016	<0.0010	1.6	<0.0025	400	0.014	<0.0050	<0.0050
LVWPS-MW201A	BL02	11/13/2018	N	440-224424-8	Alluvium	28.2 - 47.8	3,200	14,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201A	BL02	11/13/2018	FD	440-224424-9	Alluvium	28.2 - 47.8	3,100	14,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201B	BL01	6/26/2018	N	440-214475-3	UMCf	60.1 - 79.8	7,400	11,000	1,600	6.6	<1.4	3,100	<0.00025	<0.50	0.026	<0.0010	1.2	<0.0025	500	0.058 J+	<0.0050	0.0064 J
LVWPS-MW201B	BL02	11/13/2018	N	440-224424-7	UMCf	60.1 - 79.8	3,400	4,600	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW202	BL01	6/25/2018	N	440-214375-1	Alluvium	41.8 - 61.5	2,300	7,600	500	10	<0.35	1,100	<0.00025	0.085 J	0.017	<0.0010	1.2	<0.0025	290	0.0073 J+	<0.0050	<0.0050
LVWPS-MW202	BL02	11/13/2018	N	440-224424-11	Alluvium	41.8 - 61.5	2,000	7,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203A	BL01	6/25/2018	N	440-214375-3	Alluvium	34.8 - 54.5	430	330	320	8.2	0.25	640	<0.00025	0.098 J	0.015	<0.0010	0.60	<0.0025	160	0.0028 J	<0.0050	<0.0050
LVWPS-MW203A	BL02	11/15/2018	N	440-224699-2	Alluvium	34.8 - 54.5	120	<10	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203B	BL01	6/25/2018	N	440-214375-4	UMCf	75.1 - 94.7	5,700	7,900	960	4.6	<0.70	2,300	0.00078 J	0.074 J	0.017	<0.0010	1.4	<0.0025	430	0.028 J+	<0.0050	<0.0050
LVWPS-MW203B	BL02	11/15/2018	N	440-224699-1	UMCf	75.1 - 94.7	120	100	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203C	BL01	6/29/2018	N	440-214733-1	UMCf (Semi-Consolidated)	100.3 - 120.0	120	<250	5,500	<5.5	<7.0	13,000	<0.00025	<0.50	<0.050	<0.010	6.0	<0.025	510	<0.025	<0.050	<0.050
LVWPS-MW203C	BL02	11/15/2018	N	440-224537-9	UMCf (Semi-Consolidated)	100.3 - 120.0	<25	<100	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW204	BL01	6/25/2018	N	440-214376-1	Alluvium	50.3 - 70.0	1,300	2,900	440	10	<0.14	890	<0.00025	0.090 J	0.015	<0.0010	0.80	<0.0025	210	0.0033 J	<0.0050	<0.0050
LVWPS-MW204	BL02	11/14/2018	N	440-224537-10	Alluvium	50.3 - 70.0	3,200	13,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW204B	BL02	11/15/2018	N	440-224537-15	UMCf	101.5 - 121.2	16,000	22,000	970	12	0.36 J	1,800	<0.00025	0.086 J	0.017	<0.0010	1.1	<0.0025	380	0.060	<0.0050	<0.0050
LVWPS-MW204C	BL02	12/3/2018	N	440-226018-1	UMCf (Semi-Consolidated)	150.5 - 170.0	1,400	3,500	4,100	<5.5	<2.5	9,500	<0.00025	<0.050	0.14	<0.0010	1.5	<0.0025	440	0.084	<0.0050	<0.0050
LVWPS-MW205B	BL01	6/26/2018	N	440-214476-1	Alluvium	64.9 - 84.6	2,800	11,000	580	11	<0.35	1,200	<0.00025	<0.050	0.021	<0.0010	1.3	<0.0025	330	0.0055	<0.0050	<0.0050
LVWPS-MW205B	BL02	11/14/2018	N	440-224424-23	Alluvium	64.9 - 84.6	1,900	6,100	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW205C	BL01	6/26/2018	N	440-214476-4	Alluvium	100.3 - 120.0	2,200	6,300	490	11	<0.14	1,000	<0.00025	<0.050	0.020	<0.0010	1.0	<0.0025	280	<0.0025	<0.0050	<0.0050
LVWPS-MW205C	BL02	11/14/2018	N	440-224537-1	Alluvium	100.3 - 120.0	1,300	2,900	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206A	BL01	6/26/2018	N	440-214475-4	Alluvium	39.8 - 59.5	4,300	20,000	860	19	<0.70	2,200	<0.00025	<0.50	0.024	<0.0010	1.9	<0.0025	590	0.037 J	<0.0050	0.0062 J
LVWPS-MW206A	BL02	11/12/2018	N	440-224311-1	Alluvium	39.8 - 59.5	3,400	16,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206A	BL02	11/12/2018	FD	440-224311-2	Alluvium	39.8 - 59.5	3,500	16,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206B	BL01	6/26/2018	N	440-214475-5	Alluvium	69.9 - 89.5	4,700	24,000	900	18	<0.70	2,100	<0.00025	<0.50	0.025	<0.0010	2.0	<0.0025	630	0.037 J	<0.0050	0.0064 J
LVWPS-MW206B	BL02	11/12/2018	N	440-224311-3	Alluvium	69.9 - 89.5	3,700	19,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206C	BL01	6/26/2018	N	440-214492-1	UMCf	100.3 - 120.0	4,800	8,900	690	3.8	<0.70	1,700	<0.00025	<0.050	0.016	<0.0010	1.4	<0.0025	330	0.025	<0.0050	<0.0050
LVWPS-MW206C	BL02	11/12/2018	N	440-224187-3	UMCf	100.3 - 120.0	4,200	17,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206D	BL02	11/12/2018	N	440-224187-1	UMCf	125.3 - 145.0	<0.50	<20	720	<0.55	<0.25	2,400	<0.00025	0.053 J	0.016	<0.0010	1.7	<0.0025	360	<0.0025	<0.0050	<0.0050
LVWPS-MW206E	BL02	11/16/2018	N	440-224656-1	UMCf (Semi-Consolidated)	195.5 - 205.0	<0.50	<40	2,700	<2.8	<1.3	5,100	<0.00025	<0.050	0.012	<0.0010	3.1	<0.0025	580	<0.0025	<0.0050	<0.0050
LVWPS-MW207	BL01	6/25/2018	N	440-214375-2	Alluvium	68.1 - 87.8	4,900	22,000	810	15	<0.70	1,800	<0.00025	0.063 J	0.025	<0.0010	1.8	<0.0025	530	0.023 J+	<0.0050	<0.0050
LVWPS-MW207	BL02	11/13/2018	N	440-224424-12	Alluvium	68.1 - 87.8	3,500	17,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW207	BL02	11/13/2018	FD	440-224424-13	Alluvium	68.1 - 87.8	3,700	17,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW208A	BL01	6/28/2018	N	440-214604-1	Alluvium	39.9 - 59.5	2,300	3,400	480	13	<0.70	2,100	<0.00025	<0.050	0.015	<0.0010	1.9	<0.0025	390	0.012	<0.0050	<0.0050
LVWPS-MW208A	BL01	6/28/2018	FD	440-214604-2	Alluvium	39.9 - 59.5	2,400	3,600	470	13	<0.70	2,100	<0.00025	<0.050	0.014	<0.0010	1.9	<0.0025	400	0.012	<0.0050	<0.0050
LVWPS-MW208A	BL02	11/13/2018	N	440-224424-1	Alluvium	39.9 - 59.5	2,700	3,800	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW208B	BL01	6/28/2018	N	440-214604-3	Alluvium	65.3 - 85.0	2,700	4,500	580	15	<0.70	2,200	<0.00025	0.11	0.020	<0.0010	1.9	<0.0025	470	0.016	<0.0050	<0.0050
LVWPS-MW208B	BL02	11/13/2018	N	440-224424-2	Alluvium	65.3 - 85.0	2,900	4,700	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW209	BL01	6/28/2018	N	440-214604-8	Alluvium	71.3 - 91.0	4,100	17,000	790	19	<0.70	2,100	<0.00025	<0.050	0.016	<0.0010	1.6	<0.0025	490	0.026	<0.0050	<0.0050
LVWPS-MW209	BL02	11/13/2018	N	440-224424-10	Alluvium	71.3 - 91.0	3,900	16,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW209A	BL02	11/13/2018	N	440-224292-4	Alluvium	35.3 - 55.0	3,300	8,000	750	18	<0.25	2,400	<0.00025	<0.050	0.018	<0.0010	1.8	<0.0025	540	0.021	<0.0050	<0.0050
LVWPS-MW209B	BL02	11/13/2018	N	440-224292-5	UMCf-cg	110.3 - 130.0	3,700	14,000	780	17	0.43 J	2,100	<0.00025	<0.050	0.020	<0.0010	1.9	<0.0025	530	0.019	<0.0050	<0.0050
LVWPS-MW209C	BL02	11/13/2018	N	440-224292-6	UMCf-cg	151.0 - 170.5	6,400	11,000	1,100	13	<0.50	2,100	<0.00025	<0.050	0.012	<0.0010	1.4	<0.0025	560	0.020	<0.0050	<0.0050
LVWPS-MW210A	BL01	6/27/2018	N	440-214521-1	Alluvium	35.3 - 55.0	4,400	19,000	800	17	<0.70	1,800	<0.00025	<0.050	0.022	<0.0010	1.6 J	<0.0025	500 J	0.023 J	<0.0050	<0.0050
LVWPS-MW210A	BL01	6/27/2018	FD	440-214521-2	Alluvium	35.3 - 55.0	4,300	18,000	810	16	<0.70	1,900	<0.00025	<0.050	0.021	<0.0010	1.6	<0.0025	500	0.023	<0.0050	<0.0050
LVWPS-MW210A	BL02	11/13/2018	N	440-224424-17	Alluvium	35.3 - 55.0	3,700	16,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210B	BL01	6/27/2018	N	440-214521-3	Alluvium	70.1 - 89.8	4,400	17,000	840	19	<0.70	2,100	<0.00025	<0.050	0.016	<0.0010	1.8	<0.0025	530	0.029	<0.0050	<0.0050
LVWPS-MW210B	BL02	11/13/2018	N	440-224424-18	Alluvium	70.1 - 89.8	3,900	16,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210C	BL01	6/27/2018	N	440-214521-4	UMCf-cg	100.3 - 120.0	10,000	14,000	1,100	7.5	<0.70	2,000	<0.00025	<0.050	0.013	<0.0010	1.3	<0.0025	530	0.030	<0.0050	<0.0050
LVWPS-MW210C	BL02	11/13/2018	N	440-224424-19	UMCf-cg	100.3 - 120.0	13,000 J+	18,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210D	BL02	11/13/2018	N	440-224292-1	UMCf-cg	130.4 - 140.0	3,500	4,000	1,100	2.0 J	<0.50	2,400	<0.00025	7.7	0.19	<0.0020	1.2	<0.0050	660	0.015	<0.010	<0.010

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	EPA 314.0	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0			Dissolved Gases by RSK-175	Dissolved Metals by SW6010B								
							Perchlorate	Chlorate	Chloride	Nitrate (as N)	Nitrite (as N)	Sulfate	Methane	Aluminum	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper
							µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW210E	BL02	11/14/2018	N	440-224424-14	UMCf-cg	145.5 - 165.0	440	400	1,000	<0.55	<0.25	2,700	<0.00025	<0.050	0.017	<0.0010	1.3	<0.0025	600	<0.0025	<0.0050	<0.0050
LVWPS-MW211	BL01	6/27/2018	N	440-214521-7	Alluvium	50.0 - 69.7	3,100	5,900	590	15	<0.70	2,100	<0.00025	<0.050	0.019	<0.0010	1.9	<0.0025	440	0.014	<0.0050	0.10
LVWPS-MW211	BL02	11/12/2018	N	440-224186-3	Alluvium	50.0 - 69.7	2,600	5,100	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212A	BL01	6/27/2018	N	440-214521-5	Alluvium	34.3 - 54.0	370	430	200	7	<0.070	1,100	<0.00025	<0.050	0.014	<0.0010	1.5	<0.0025	220	0.018	<0.0050	<0.0050
LVWPS-MW212A	BL02	11/14/2018	N	440-224537-6	Alluvium	34.3 - 54.0	350	410	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212B	BL01	6/27/2018	N	440-214521-6	Alluvium	59.8 - 79.5	190	190	190	6.1	<0.070	860	<0.00025	<0.050	0.021	<0.0010	1.2	<0.0025	170	0.019	<0.0050	<0.0050
LVWPS-MW212B	BL02	11/15/2018	N	440-224537-8	Alluvium	59.8 - 79.5	190	220	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212C	BL02	11/14/2018	N	440-224424-16	UMCf-cg	100.3 - 120.0	7,300	11,000	1,100	6.7	<0.25	2,000	<0.00025	<0.050	0.018	<0.0010	1.6	<0.0025	580	0.025	<0.0050	<0.0050
LVWPS-MW212D	BL02	11/14/2018	N	440-224424-15	UMCf-cg	125.5 - 145.0	7,700	12,000	1,100	8.8	0.63 J	2,500	<0.00025	<0.050	0.014	<0.0010	1.7	<0.0025	580	0.024	<0.0050	<0.0050
LVWPS-MW213	BL01	6/28/2018	N	440-214604-7	Alluvium	40.1 - 59.8	120	330	270	2.6	<0.35	1,500	<0.00025	<0.050	0.014	<0.0010	1.8	<0.0025	300	0.011	<0.0050	<0.0050
LVWPS-MW213	BL02	11/13/2018	N	440-224292-13	Alluvium	40.1 - 59.8	110	300	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW214	BL01	6/28/2018	N	440-214604-4	Alluvium	34.4 - 44.0	2,800	7,000	590	15	<0.70	2,000	<0.00025	<0.050	0.016	<0.0010	1.7	<0.0025	430	0.019	<0.0050	<0.0050
LVWPS-MW214	BL02	11/12/2018	N	440-224292-8	Alluvium	34.4 - 44.0	2,700	130	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW215A	BL01	6/27/2018	N	440-214521-9	Alluvium	13.5 - 33.2	3,700	16,000	710	14	<0.70	1,500	<0.00025	<0.050	0.018	<0.0010	1.4	<0.0025	400	0.016	<0.0050	<0.0050
LVWPS-MW215A	BL02	11/12/2018	N	440-224186-1	Alluvium	13.5 - 33.2	2,700	11,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW215B	BL01	6/27/2018	N	440-214521-10	Bedrock	40.7 - 45.3	950	1,400	590	2.8	<0.70	1,500	<0.00025	<0.050	0.020	<0.0010	1.3	<0.0025	310	<0.0025	<0.0050	<0.0050
LVWPS-MW215B	BL02	11/12/2018	N	440-224186-2	Bedrock	40.7 - 45.3	2,400	5,700	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW216	BL01	6/28/2018	N	440-214604-5	Alluvium	10.4 - 20.0	1,200	1,800	740	4.3	<0.70	2,000	<0.00025	<0.050	0.026	<0.0010	1.8	<0.0025	420	<0.0025	<0.0050	<0.0050
LVWPS-MW216	BL02	11/12/2018	N	440-224292-3	Alluvium	10.4 - 20.0	1,100	1,800	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW217A	BL02	11/14/2018	N	440-224424-21	Alluvium	51.3 - 71.0	3,000	12,000	570	11	<0.13	1,200 J+	<0.00025	<0.050	0.016	<0.0010	1.5	<0.0025	340	0.013	<0.0050	<0.0050
LVWPS-MW217A	BL02	11/14/2018	FD	440-224424-22	Alluvium	51.3 - 71.0	2,800	12,000	550	11	<0.13	1,200 J+	<0.00025	<0.050	0.017	<0.0010	1.5	<0.0025	350	0.013	<0.0050	<0.0050
LVWPS-MW217B	BL02	11/14/2018	N	440-224424-20	UMCf	100.3 - 120.0	9,200	15,000	760	14	<0.25	1,600	<0.00025	0.051 J	0.015	<0.0010	1.2	<0.0025	370	0.061	<0.0050	<0.0050
LVWPS-MW217C	BL02	11/15/2018	N	440-224537-7	UMCf	155.5 - 175.0	7,000	10,000	760	9.1	0.84 J	1,800	<0.00025	<0.050	0.017	<0.0010	1.2	<0.0025	390	0.013	<0.0050	<0.0050
LVWPS-MW218A	BL02	11/13/2018	N	440-224292-9	Alluvium	35.3 - 55.0	3,700	18,000	690	14	<0.25	1,600	<0.00025	0.12	0.027	<0.0010	1.6	<0.0025	480	0.020	<0.0050	<0.0050
LVWPS-MW218A	BL02	11/13/2018	FD	440-224292-10	Alluvium	35.3 - 55.0	3,700	17,000	700	15	<0.25	1,600	<0.00025	0.099 J	0.028	<0.0010	1.6	<0.0025	480	0.020	<0.0050	<0.0050
LVWPS-MW218B	BL02	11/13/2018	N	440-224292-11	UMCf/UMCf-cg	100.3 - 120.0	3,600	15,000	630	12	<0.25	1,400	<0.00025	<0.050	0.015	<0.0010	1.7	<0.0025	390	0.012	<0.0050	<0.0050
LVWPS-MW218C	BL02	11/13/2018	N	440-224292-12	UMCf/UMCf-cg	136.0 - 155.5	160	<10	880	<0.55	<0.25	2,300	0.0037	<0.050	0.026	<0.0010	1.3	<0.0025	560	<0.0025	<0.0050	<0.0050
LVWPS-MW219A	BL02	11/12/2018	N	440-224186-5	Alluvium	35.1 - 49.8	3,800	13,000	750	17	<0.25	2,100	<0.00025	<0.050	0.017	<0.0010	1.9	<0.0025	520	0.025	<0.0050	<0.0050
LVWPS-MW219A	BL02	11/12/2018	FD	440-224186-6	Alluvium	35.1 - 49.8	3,800	13,000	750	17	<0.25	2,100	<0.00025	<0.050	0.016	<0.0010	1.8	<0.0025	510	0.023	<0.0050	<0.0050
LVWPS-MW219B	BL02	11/12/2018	N	440-224186-7	UMCf/Horse Springs	75.3 - 95.0	<0.50	<20	330	<0.28	<0.13	2,200	<0.00025	0.079 J	0.011	<0.0010	1.2	<0.0025	510	<0.0025	<0.0050	<0.0050
LVWPS-MW219C	BL02	11/12/2018	N	440-224186-8	UMCf/Horse Springs	115.5 - 135.0	35	<20	740	<0.55	<0.25	2,000	<0.00025	<0.050	0.013	<0.0010	1.4	<0.0025	480	<0.0025	<0.0050	<0.0050
LVWPS-MW220A	BL02	11/14/2018	N	440-224424-3	Alluvium	60.3 - 80.0	3,800 J+	14,000	780	18	<0.25	2,000	<0.00025	<0.050	0.018	<0.0010	1.8	<0.0025	510	0.024	<0.0050	<0.0050
LVWPS-MW220B	BL02	11/14/2018	N	440-224424-4	UMCf-cg	134.5 - 154.0	2,400	8,200	660	6.4	0.38 J	2,000	0.0017	0.081 J	0.024	<0.0010	1.5	<0.0025	470	<0.0025	<0.0050	<0.0050
LVWPS-MW221A	BL02	11/15/2018	N	440-224537-2	Alluvium	50.3 - 70.0	660	830	230	6.8	<0.050	1,500	<0.00025	<0.050	0.012	<0.0010	1.4	<0.0025	300	0.012	<0.0050	<0.0050
LVWPS-MW221B	BL02	11/15/2018	N	440-224537-3	UMCf/UMCf-cg	83.7 - 103.2	4,300	5,100	750	2.4	<0.050	1,500	<0.00025	<0.050	0.017	<0.0010	1.1	<0.0025	360	0.016	<0.0050	<0.0050
LVWPS-MW222A	BL02	11/13/2018	N	440-224292-2	UMCf/UMCf-cg	80.3 - 100.0	2,000	3,000	550	2.5	<0.25	2,000	<0.00025	<0.050	0.017	<0.0010	1.8	<0.0025	550	0.011	<0.0050	<0.0050
LVWPS-MW222B	BL02	11/14/2018	N	440-224424-6	UMCf-cg	150.3 - 170.0	330	12 J	260	<0.11	<0.050	1,900	0.00044 J	<0.050	0.016	<0.0010	1.1	<0.0025	520	<0.0025	<0.0050	<0.0050
LVWPS-MW222C	BL02	11/16/2018	N	440-224658-5	UMCf-cg	214.0 - 233.5	810	540	270	0.86	<0.050	2,100	<0.00025 UJ	<0.050	0.017	<0.0010	1.1	<0.0025	540	<0.0025	<0.0050	<0.0050
LVWPS-MW223A	BL02	11/13/2018	N	440-224311-5	Alluvium	45.3 - 65.0	3,800	6,800	780	19	<0.25	2,400	<0.00025	<0.050	0.015	<0.0010	1.9	<0.0025	520	0.017	<0.0050	<0.0050
LVWPS-MW223B	BL02	11/13/2018	N	440-224311-4	Alluvium	70.3 - 90.0	3,500	12,000	820	20	<0.25	2,200	<0.00025	0.15	0.018	<0.0010	1.7	<0.0025	520	0.024	<0.0050	<0.0050
LVWPS-MW223C	BL02	11/12/2018	N	440-224187-2	UMCf	95.5 - 110.0	5,100	8,400	730	10	5.1	2,100	0.00054 J	<0.050	0.018	<0.0010	1.6	<0.0025	480	0.011	<0.0050	<0.0050
LVWPS-MW224A	BL02	11/14/2018	N	440-224425-4	Alluvium	55.3 - 75.0	2,500	3,400	490	13	<0.25	2,100	<0.00025	2.7	0.14	<0.0010	2.2	<0.0025	480	0.017	<0.0050	<0.0050
LVWPS-MW224B	BL02	11/14/2018	N	440-224425-3	UMCf	106.8 - 126.5	1,300	2,000	960	7.3	<0.50	2,600	<0.00025	<0.050	0.024	<0.0010	2.2	<0.0025	450	<0.0025	<0.0050	<0.0050
LVWPS-MW224C	BL02	11/14/2018	N	440-224425-1	UMCf (Semi-Consolidated)	174.5 - 194.0	<0.50	<20	3,600	<2.8	<1.3	4,300	<0.00025	<0.050	0.022	<0.0010	2.6	<0.0025	680	<0.0025	<0.0050	<0.0050
LVWPS-MW225A	BL02	11/13/2018	N	440-224311-7	Alluvium	49.3 - 69.0	3,400	10,000	800	21	<0.25	2,300	<0.00025	<0.050	0.017	<0.0010	1.8	<0.0025	530	0.026	<0.0050	<0.0050
LVWPS-MW225A	BL02	11/13/2018	FD	440-224311-8	Alluvium	49.3 - 69.0	3,400	10,000	760	22	<0.25	2,200	<0.00025	<0.050	0.018	<0.0010	1.9	<0.0025	550	0.027	<0.0050	<0.0050
LVWPS-MW225B	BL02	11/14/2018	N	440-224425-5	UMCf	90.5 - 110.0	3,800	3,900	890	2.3	0.74 J	2,000	<0.00025	<0.050	0.019	<0.0010	1.3	<0.0025	450	0.0087	<0.0050	<0.0050
LVWPS-MW226A	BL02	11/15/2018	N	440-224538-1	Alluvium	40.3 - 55.0	3,700	7,100	750	23	<0.25	2,400	<0.00025	<0.050	0.016	<0.0010	2.0	<0.0025	530	0.038	<0.0050	<0.0050
LVWPS-MW226B	BL02	12/4/2018	N	440-226264-1	UMCf (Semi-Consolidated)	77.5 - 97.0	290	1,100 J	8,400	<5.5	<2.5	14,000	<0.00025	<0.50	<0.050	<0.010	6.7	<0.025	580	<0.025	<0.050	<0.050
MW-02(HEND)	BL01	7/12/2018	N	440-215722-5	Unknown	32.0 - 42.0	1,900	2,600	----	7.9	----	2,200	----	----	----	----	----	----	----	----	----	----
MW-02(HEND)	BL02	11/15/2018	N	440-224537-11	Unknown	32.0 - 42.0	1,800	2,400	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-02(HEND)	BL02	11/15/2018	FD	440-224537-12	Unknown	32.0 - 42.0	1,800	2,300	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-04(HEND)	BL01	7/12/2018	N	440-215722-4	Alluvium	29.0 - 39.0	3,100	6,000	----	19	----	1,800	----	----	----	----	----	----	----	----	----	----

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	EPA 314.0	EPA 300.1	Anions by EPA 300.0	Anions by EPA 300.0			Dissolved Gases by RSK-175	Dissolved Metals by SW6010B								
							Perchlorate	Chlorate	Chloride	Nitrate (as N)	Nitrite (as N)	Sulfate	Methane	Aluminum	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper
							µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-04(HEND)	BL02	11/15/2018	N	440-224537-18	Alluvium	29.0 - 39.0	8,600	2,100	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-13(HEND)	BL01	7/12/2018	N	440-215722-3	Alluvium	38.0 - 48.0	3,800	14,000	----	20	----	1,900	----	----	----	----	----	----	----	----	----	----
MW-13(HEND)	BL02	11/13/2018	N	440-224311-6	Alluvium	38.0 - 48.0	3,200	9,400	770	20	<0.25	2,200	<0.00025	<0.050	0.016	<0.0010	1.9	<0.0025	550	0.026	<0.0050	<0.0050
MW-20(HEND)	BL01	7/12/2018	N	440-215722-6	Unknown	50.0 - 65.0	71	82 J	----	<0.55	----	1,800	----	----	----	----	----	----	----	----	----	----
MW-20(HEND)	BL02	11/15/2018	N	440-224537-17	Unknown	50.0 - 65.0	61 J+	60	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-25(HEND)	BL01	7/12/2018	N	440-215722-2	Unknown	38.0 - 53.0	10	65 J	----	2.1	----	2,200	----	----	----	----	----	----	----	----	----	----
MW-25(HEND)	BL02	11/15/2018	N	440-224537-14	Unknown	38.0 - 53.0	12	74 J	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.51S1	BL02	11/16/2018	N	440-224658-4	Alluvium	40.0 - 50.0	3,100	12,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.71S1	BL02	11/15/2018	N	440-224658-2	Alluvium	40.0 - 50.0	3,500	12,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.93S1	BL02	11/15/2018	N	440-224537-5	Alluvium	45.0 - 55.0	2,700	11,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT5.11S1	BL02	11/15/2018	N	440-224658-1	Alluvium	35.0 - 45.0	3,600	16,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----
WMW4.9S	BL01	6/26/2018	N	440-214476-2	Alluvium	20.0 - 50.0	950	2,300	390	9.6	<0.070	800	<0.00025	<0.050	0.021	<0.0010	0.58	<0.0025	210	<0.0025	<0.0050	<0.0050
WMW4.9S	BL02	11/15/2018	N	440-224537-16	Alluvium	20.0 - 50.0	780	14,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B														
							Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Silver	Sodium	Strontium	Tin	Titanium	Tungsten	Vanadium
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LNDMW-1	BL01	7/11/2018	N	440-215722-1	Unknown	-	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201A	BL01	6/26/2018	N	440-214475-1	Alluvium	28.2 - 47.8	<0.050	<0.0038	130	<0.015	0.031	0.0059 J	<0.10	56	17	<0.0050	420	6.8	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW201A	BL01	6/26/2018	FD	440-214475-2	Alluvium	28.2 - 47.8	<0.050	<0.0038	140	<0.015	0.033	0.0058 J	<0.10	59	23	<0.0050	440	7.3	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW201A	BL02	11/13/2018	N	440-224424-8	Alluvium	28.2 - 47.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201A	BL02	11/13/2018	FD	440-224424-9	Alluvium	28.2 - 47.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201B	BL01	6/26/2018	N	440-214475-3	UMCf	60.1 - 79.8	<0.050	<0.0038	420	<0.015	0.018 J	<0.0050	<0.10	300	20	<0.0050	930	9.0	<0.050	<0.0025	<0.050	0.013
LVWPS-MW201B	BL02	11/13/2018	N	440-224424-7	UMCf	60.1 - 79.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW202	BL01	6/25/2018	N	440-214375-1	Alluvium	41.8 - 61.5	<0.050	<0.0038	110	0.64	0.028	0.0098 J	<0.10	48	17	<0.0050	330	4.9	<0.050	<0.0025	<0.050	0.0060 J
LVWPS-MW202	BL02	11/13/2018	N	440-224424-11	Alluvium	41.8 - 61.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203A	BL01	6/25/2018	N	440-214375-3	Alluvium	34.8 - 54.5	<0.050	<0.0038	69	1.6	0.011 J	0.012	<0.10	26	10	<0.0050	200	2.5	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW203A	BL02	11/15/2018	N	440-224699-2	Alluvium	34.8 - 54.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203B	BL01	6/25/2018	N	440-214375-4	UMCf	75.1 - 94.7	<0.050	<0.0038	270	0.32	0.066	<0.0050	<0.10	140	36	<0.0050	550	8.8	<0.050	<0.0025	<0.050	0.0081 J
LVWPS-MW203B	BL02	11/15/2018	N	440-224699-1	UMCf	75.1 - 94.7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203C	BL01	6/29/2018	N	440-214733-1	UMCf (Semi-Consolidated)	100.3 - 120.0	<0.50	<0.038	2,300	1.8	1.3	<0.050	<1.0	1,500	7.4	<0.050	4,400	10	<0.50	<0.025	<0.50	<0.050
LVWPS-MW203C	BL02	11/15/2018	N	440-224537-9	UMCf (Semi-Consolidated)	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW204	BL01	6/25/2018	N	440-214376-1	Alluvium	50.3 - 70.0	<0.050	<0.0038	89	1.0	0.015 J	0.010	<0.10	39	13	<0.0050	250	3.5	<0.050	<0.0025	<0.050	0.0057 J
LVWPS-MW204	BL02	11/14/2018	N	440-224537-10	Alluvium	50.3 - 70.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW204B	BL02	11/15/2018	N	440-224537-15	UMCf	101.5 - 121.2	0.061 J	<0.0038	250	0.041	0.029	<0.0050	<0.10	84	30	<0.0050	470	9.3	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW204C	BL02	12/3/2018	N	440-226018-1	UMCf (Semi-Consolidated)	150.5 - 170.0	<0.050	<0.038	410	<0.015	0.094	<0.0050	<0.10	950	0.17 J	<0.0050	2,200	8.0	<0.050	<0.0025	<0.050	<0.050
LVWPS-MW205B	BL01	6/26/2018	N	440-214476-1	Alluvium	64.9 - 84.6	<0.050	<0.0038	130	0.28	0.025	0.010	<0.10	52	17 J-	<0.0050	360	5.8	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW205B	BL02	11/14/2018	N	440-224424-23	Alluvium	64.9 - 84.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW205C	BL01	6/26/2018	N	440-214476-4	Alluvium	100.3 - 120.0	<0.050	<0.0038	120	0.30	0.023	0.011	<0.10	48	17	<0.0050	320	5.0	<0.050	<0.0025	<0.050	0.0057 J
LVWPS-MW205C	BL02	11/14/2018	N	440-224537-1	Alluvium	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206A	BL01	6/26/2018	N	440-214475-4	Alluvium	39.8 - 59.5	<0.050	<0.0038	230	<0.015	0.081	0.0062 J	<0.10	110	29	<0.0050	570	12	<0.050	<0.0025	<0.050	0.021
LVWPS-MW206A	BL02	11/12/2018	N	440-224311-1	Alluvium	39.8 - 59.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206A	BL02	11/12/2018	FD	440-224311-2	Alluvium	39.8 - 59.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206B	BL01	6/26/2018	N	440-214475-5	Alluvium	69.9 - 89.5	<0.050	<0.0038	210	0.021	0.057	0.0070 J	<0.10	100	28	<0.0050	580	12	<0.050	<0.0025	<0.050	0.019
LVWPS-MW206B	BL02	11/12/2018	N	440-224311-3	Alluvium	69.9 - 89.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206C	BL01	6/26/2018	N	440-214492-1	UMCf	100.3 - 120.0	<0.050	<0.0038	200	0.35	0.055	<0.0050	<0.10	110	35	<0.0050	420	7.7	<0.050	<0.0025	<0.050	0.0091 J
LVWPS-MW206C	BL02	11/12/2018	N	440-224187-3	UMCf	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206D	BL02	11/12/2018	N	440-224187-1	UMCf	125.3 - 145.0	0.13	<0.0038	250	0.37	0.081	<0.0050	<0.10	190	30	<0.0050	510	8.0	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW206E	BL02	11/16/2018	N	440-224656-1	UMCf (Semi-Consolidated)	195.5 - 205.0	<0.050	<0.019	750	0.16	0.13	<0.0050	<0.10	560	29	<0.0050	1,800	10	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW207	BL01	6/25/2018	N	440-214375-2	Alluvium	68.1 - 87.8	<0.050	<0.0038	190	<0.015	0.044	0.014	<0.10	84	26	<0.0050	500	9.4	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW207	BL02	11/13/2018	N	440-224424-12	Alluvium	68.1 - 87.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW207	BL02	11/13/2018	FD	440-224424-13	Alluvium	68.1 - 87.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW208A	BL01	6/28/2018	N	440-214604-1	Alluvium	39.9 - 59.5	<0.050	<0.0038	150	<0.015	0.10	<0.0050	<0.10	160	27	<0.0050	490	7.9	<0.050	<0.0025	<0.050	0.0074 J
LVWPS-MW208A	BL01	6/28/2018	FD	440-214604-2	Alluvium	39.9 - 59.5	<0.050	<0.0038	160	<0.015	0.11	<0.0050	<0.10	160	28	<0.0050	510	8.1	<0.050	<0.0025	<0.050	0.0078 J
LVWPS-MW208A	BL02	11/13/2018	N	440-224424-1	Alluvium	39.9 - 59.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW208B	BL01	6/28/2018	N	440-214604-3	Alluvium	65.3 - 85.0	0.10	<0.0038	190	0.020	0.10	<0.0050	<0.10	140	28	<0.0050	560	9.6	<0.050	0.0050	<0.050	0.0075 J
LVWPS-MW208B	BL02	11/13/2018	N	440-224424-2	Alluvium	65.3 - 85.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW209	BL01	6/28/2018	N	440-214604-8	Alluvium	71.3 - 91.0	<0.050	<0.0038	180	<0.015	0.074	<0.0050	<0.10	100	25	<0.0050	570	9.7	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW209	BL02	11/13/2018	N	440-224424-10	Alluvium	71.3 - 91.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW209A	BL02	11/13/2018	N	440-224292-4	Alluvium	35.3 - 55.0	<0.050	<0.0038	220	<0.015	0.099	<0.0050	<0.10	110	30	<0.0050	530	11	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW209B	BL02	11/13/2018	N	440-224292-5	UMCf-cg	110.3 - 130.0	<0.050	<0.0038	210	0.21	0.090	0.0055 J	<0.10	110	28	<0.0050	530	10	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW209C	BL02	11/13/2018	N	440-224292-6	UMCf-cg	151.0 - 170.5	<0.050	<0.0038	270	0.19	0.046	<0.0050	<0.10	83	33	<0.0050	570	11	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW210A	BL01	6/27/2018	N	440-214521-1	Alluvium	35.3 - 55.0	<0.050	<0.0038	180 J	<0.015	0.054 J	<0.0050	<0.10	86 J	26 J	<0.0050	480 J	9.4 J	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW210A	BL01	6/27/2018	FD	440-214521-2	Alluvium	35.3 - 55.0	<0.050	<0.0038	180	<0.015	0.054	<0.0050	<0.10	86	26	<0.0050	480	9.3	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW210A	BL02	11/13/2018	N	440-224424-17	Alluvium	35.3 - 55.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210B	BL01	6/27/2018	N	440-214521-3	Alluvium	70.1 - 89.8	<0.050	<0.0038	200	<0.015	0.080	<0.0050	<0.10	100	28	<0.0050	510	10	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW210B	BL02	11/13/2018	N	440-224424-18	Alluvium	70.1 - 89.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210C	BL01	6/27/2018	N	440-214521-4	UMCf-cg	100.3 - 120.0	<0.050	<0.0038	290	0.74	0.033	0.0061 J	<0.10	65	28	<0.0050	450	13	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW210C	BL02	11/13/2018	N	440-224424-19	UMCf-cg	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210D	BL02	11/13/2018	N	440-224292-1	UMCf-cg	130.4 - 140.0	8.3	0.0080 J	320	1.4	0.046	0.029	0.36 J	62	43	<0.010	490	13	<0.10	0.29	<0.10	<0.010

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B														
							Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Silver	Sodium	Strontium	Tin	Titanium	Tungsten	Vanadium
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW210E	BL02	11/14/2018	N	440-224424-14	UMCf-cg	145.5 - 165.0	0.22	<0.0038	280	1.5	0.043	0.0065 J	<0.10	78	24	<0.0050	610	12	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW211	BL01	6/27/2018	N	440-214521-7	Alluvium	50.0 - 69.7	<0.050	<0.0038	190	0.076	0.10	<0.0050	<0.10	120	27	<0.0050	460	9.6	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW211	BL02	11/12/2018	N	440-224186-3	Alluvium	50.0 - 69.7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212A	BL01	6/27/2018	N	440-214521-5	Alluvium	34.3 - 54.0	<0.050	<0.0038	73	<0.015	0.032	<0.0050	<0.10	79	30	<0.0050	250	4.7	<0.050	<0.0025	<0.050	0.019
LVWPS-MW212A	BL02	11/14/2018	N	440-224537-6	Alluvium	34.3 - 54.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212B	BL01	6/27/2018	N	440-214521-6	Alluvium	59.8 - 79.5	<0.050	<0.0038	54	0.085	0.028	<0.0050	<0.10	63	28	<0.0050	210	3.3	<0.050	<0.0025	<0.050	0.017
LVWPS-MW212B	BL02	11/15/2018	N	440-224537-8	Alluvium	59.8 - 79.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212C	BL02	11/14/2018	N	440-224424-16	UMCf-cg	100.3 - 120.0	<0.050	<0.0038	230	0.66	0.033	<0.0050	<0.10	100	27	<0.0050	540	11	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW212D	BL02	11/14/2018	N	440-224424-15	UMCf-cg	125.5 - 145.0	<0.050	<0.019	240	0.22	0.046	<0.0050	<0.10	93	29	<0.0050	620	11	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW213	BL01	6/28/2018	N	440-214604-7	Alluvium	40.1 - 59.8	<0.050	<0.0038	92	0.020	0.027	<0.0050	<0.10	58	29	<0.0050	400	5.8	<0.050	<0.0025	<0.050	0.0083 J
LVWPS-MW213	BL02	11/13/2018	N	440-224292-13	Alluvium	40.1 - 59.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW214	BL01	6/28/2018	N	440-214604-4	Alluvium	34.4 - 44.0	<0.050	<0.0038	160	<0.015	0.086	<0.0050	<0.10	110	27	<0.0050	520	9.0	<0.050	<0.0025	<0.050	0.0064 J
LVWPS-MW214	BL02	11/12/2018	N	440-224292-8	Alluvium	34.4 - 44.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW215A	BL01	6/27/2018	N	440-214521-9	Alluvium	13.5 - 33.2	<0.050	<0.0038	150	<0.015	0.044	0.0069 J	<0.10	68	23	<0.0050	410	7.4	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW215A	BL02	11/12/2018	N	440-224186-1	Alluvium	13.5 - 33.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW215B	BL01	6/27/2018	N	440-214521-10	Bedrock	40.7 - 45.3	0.11	<0.0038	180	0.24	0.081	0.0071 J	<0.10	49	24	<0.0050	380	8.3	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW215B	BL02	11/12/2018	N	440-224186-2	Bedrock	40.7 - 45.3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW216	BL01	6/28/2018	N	440-214604-5	Alluvium	10.4 - 20.0	<0.050	<0.0038	160	0.30	0.096	<0.0050	<0.10	76	23	<0.0050	640	9.0	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW216	BL02	11/12/2018	N	440-224292-3	Alluvium	10.4 - 20.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW217A	BL02	11/14/2018	N	440-224424-21	Alluvium	51.3 - 71.0	<0.050	<0.0038	120	<0.015	0.039	0.0063 J	<0.10	65	22	<0.0050	400	5.9	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW217A	BL02	11/14/2018	FD	440-224424-22	Alluvium	51.3 - 71.0	<0.050	<0.0038	120	<0.015	0.040	0.0070 J	<0.10	66	22	<0.0050	400	6.0	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW217B	BL02	11/14/2018	N	440-224424-20	UMCf	100.3 - 120.0	0.077 J	<0.0038	240	0.024	0.027	<0.0050	<0.10	58	35	<0.0050	440	9.6	<0.050	0.0028 J	<0.050	0.012
LVWPS-MW217C	BL02	11/15/2018	N	440-224537-7	UMCf	155.5 - 175.0	<0.050	<0.0038	200	0.096	0.058	0.0052 J	<0.10	78	30	<0.0050	490	8.3	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW218A	BL02	11/13/2018	N	440-224292-9	Alluvium	35.3 - 55.0	0.11	<0.0038	160	<0.015	0.042	0.0056 J	<0.10	70	25	<0.0050	440	8.5	<0.050	0.0037 J	<0.050	<0.0050
LVWPS-MW218A	BL02	11/13/2018	FD	440-224292-10	Alluvium	35.3 - 55.0	0.097 J	<0.0038	170	<0.015	0.043	<0.0050	<0.10	71	25	<0.0050	450	8.6	<0.050	0.0026 J	<0.050	<0.0050
LVWPS-MW218B	BL02	11/13/2018	N	440-224292-11	UMCf/UMCf-cg	100.3 - 120.0	<0.050	<0.0038	140	0.051	0.039	0.0065 J	<0.10	68	24	<0.0050	450	6.7	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW218C	BL02	11/13/2018	N	440-224292-12	UMCf/UMCf-cg	136.0 - 155.5	0.058 J	<0.0038	260	2.6	0.080	0.0089 J	<0.10	80	23	<0.0050	470	11	<0.050	<0.0025	<0.050	<0.010
LVWPS-MW219A	BL02	11/12/2018	N	440-224186-5	Alluvium	35.1 - 49.8	<0.050	<0.0038	210	<0.015	0.086	<0.0050	<0.10	110	29	<0.0050	510	10	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW219A	BL02	11/12/2018	FD	440-224186-6	Alluvium	35.1 - 49.8	<0.050	<0.0038	200	<0.015	0.084	0.0053 J	<0.10	100	28	<0.0050	500	9.9	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW219B	BL02	11/12/2018	N	440-224186-7	UMCf/Horse Springs	75.3 - 95.0	0.99	<0.0038	230	0.079	<0.010	<0.0050	<0.10	48	37	<0.0050	270	11	<0.050	0.0030 J	<0.050	<0.0050
LVWPS-MW219C	BL02	11/12/2018	N	440-224186-8	UMCf/Horse Springs	115.5 - 135.0	0.097 J	<0.0038	270	0.14	0.13	0.0064 J	<0.10	62	36	<0.0050	470	13	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW220A	BL02	11/14/2018	N	440-224424-3	Alluvium	60.3 - 80.0	<0.050	<0.0038	190	<0.015	0.080	0.0052 J	<0.10	95	21	<0.0050	530	9.7	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW220B	BL02	11/14/2018	N	440-224424-4	UMCf-cg	134.5 - 154.0	0.21	<0.0038	210	1.4	0.062	0.015	<0.10	77	27	<0.0050	410	9.6	<0.050	0.012	<0.050	<0.0050
LVWPS-MW221A	BL02	11/15/2018	N	440-224537-2	Alluvium	50.3 - 70.0	<0.050	<0.0038	84	<0.015	0.030	<0.0050	<0.10	82	29	<0.0050	240	4.5	<0.050	<0.0025	<0.050	0.010
LVWPS-MW221B	BL02	11/15/2018	N	440-224537-3	UMCf/UMCf-cg	83.7 - 103.2	<0.050	<0.0038	170	0.22	0.034	<0.0050	<0.10	77	22	<0.0050	310	7.6	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW222A	BL02	11/13/2018	N	440-224292-2	UMCf/UMCf-cg	80.3 - 100.0	<0.050	<0.0038	170	0.077	0.034	<0.0050	<0.10	78	23	<0.0050	420	11	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW222B	BL02	11/14/2018	N	440-224424-6	UMCf-cg	150.3 - 170.0	<0.050	<0.0038	78	0.64	0.058	<0.0050	<0.10	57	12	<0.0050	220	8.9	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW222C	BL02	11/16/2018	N	440-224658-5	UMCf-cg	214.0 - 233.5	<0.050	<0.0038	89	0.93	0.052	<0.0050	<0.10	58	19	<0.0050	220	9.4	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW223A	BL02	11/13/2018	N	440-224311-5	Alluvium	45.3 - 65.0	<0.050	<0.0038	230	<0.015	0.11	<0.0050	<0.10	120	26	<0.0050	530	11	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW223B	BL02	11/13/2018	N	440-224311-4	Alluvium	70.3 - 90.0	<0.050	<0.0038	220	0.019 J	0.086	0.0060 J	<0.10	110	28	<0.0050	500	10	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW223C	BL02	11/12/2018	N	440-224187-2	UMCf	95.5 - 110.0	<0.050	<0.0038	200	0.19	0.080	<0.0050	<0.10	93	22	<0.0050	500	9.8	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW224A	BL02	11/14/2018	N	440-224425-4	Alluvium	55.3 - 75.0	2.4	<0.0038	180	0.11	0.087	0.0088 J	0.14 J	140	37	<0.0050	440	8.7	<0.050	0.14	<0.050	0.0097 J
LVWPS-MW224B	BL02	11/14/2018	N	440-224425-3	UMCf	106.8 - 126.5	0.12	<0.0038	300	0.79	0.13	0.0058 J	<0.10	210	22	<0.0050	670	8.7	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW224C	BL02	11/14/2018	N	440-224425-1	UMCf (Semi-Consolidated)	174.5 - 194.0	<0.050	<0.019	770	0.15	0.23	<0.0050	<0.10	590	23	<0.0050	1,800	13	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW225A	BL02	11/13/2018	N	440-224311-7	Alluvium	49.3 - 69.0	<0.050	<0.0038	220	<0.015	0.086	<0.0050	<0.10	120	29	<0.0050	490	10	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW225A	BL02	11/13/2018	FD	440-224311-8	Alluvium	49.3 - 69.0	<0.050	<0.0038	230	<0.015	0.092	<0.0050	<0.10	120	30	<0.0050	520	11	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW225B	BL02	11/14/2018	N	440-224425-5	UMCf	90.5 - 110.0	<0.050	<0.0038	220	0.20	0.057	<0.0050	<0.10	130	24	<0.0050	560	8.8	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW226A	BL02	11/15/2018	N	440-224538-1	Alluvium	40.3 - 55.0	0.10	<0.0038	210	<0.015	0.11	0.011	<0.10	140	22	<0.0050	490	9.7	<0.050	<0.0025	<0.050	<0.0050
LVWPS-MW226B	BL02	12/4/2018	N	440-226264-1	UMCf (Semi-Consolidated)	77.5 - 97.0	<0.50	<0.038	3,200	<0.15	0.52	<0.050	<1.0	1,200	6.9	<0.050	5,900	12	<0.50	<0.025	<0.50	<0.050
MW-02(HEND)	BL01	7/12/2018	N	440-215722-5	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-02(HEND)	BL02	11/15/2018	N	440-224537-11	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-02(HEND)	BL02	11/15/2018	FD	440-224537-12	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-04(HEND)	BL01	7/12/2018	N	440-215722-4	Alluvium	29.0 - 39.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B															
							Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Silver	Sodium	Strontium	Tin	Titanium	Tungsten	Vanadium
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-04(HEND)	BL02	11/15/2018	N	440-224537-18	Alluvium	29.0 - 39.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-13(HEND)	BL01	7/12/2018	N	440-215722-3	Alluvium	38.0 - 48.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-13(HEND)	BL02	11/13/2018	N	440-224311-6	Alluvium	38.0 - 48.0	<0.050	<0.0038	230	<0.015	0.089	0.0060 J	<0.10	120	31	<0.0050	520	11	<0.050	<0.0025	<0.050	<0.0050
MW-20(HEND)	BL01	7/12/2018	N	440-215722-6	Unknown	50.0 - 65.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-20(HEND)	BL02	11/15/2018	N	440-224537-17	Unknown	50.0 - 65.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-25(HEND)	BL01	7/12/2018	N	440-215722-2	Unknown	38.0 - 53.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-25(HEND)	BL02	11/15/2018	N	440-224537-14	Unknown	38.0 - 53.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.51S1	BL02	11/16/2018	N	440-224658-4	Alluvium	40.0 - 50.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.71S1	BL02	11/15/2018	N	440-224658-2	Alluvium	40.0 - 50.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.93S1	BL02	11/15/2018	N	440-224537-5	Alluvium	45.0 - 55.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT5.11S1	BL02	11/15/2018	N	440-224658-1	Alluvium	35.0 - 45.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
WMW4.9S	BL01	6/26/2018	N	440-214476-2	Alluvium	20.0 - 50.0	<0.050	<0.0038	86	<0.015	0.015 J	0.0056 J	<0.10	38	15	<0.0050	230	3.4	<0.050	<0.0025	<0.050	<0.0050
WMW4.9S	BL02	11/15/2018	N	440-224537-16	Alluvium	20.0 - 50.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or impre
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B					EPA 218.6	EPA 351.2	EPA 365.3	FIELD TESTS				FIELD TESTS				NTOTAL
							Zinc	Antimony	Arsenic	Selenium	Thallium	Chromium, Hexavalent	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Conductivity	Dissolved Oxygen	Ferrous Iron	Oxidation-Reduction Potential	pH	Sulfide	Temperature	Turbidity	Nitrogen, Total
							mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mS/cm	mg/L	mg/L	mV	SU	mg/L	C	NTU	mg/L
LNDMW-1	BL01	7/11/2018	N	440-215722-1	Unknown	-	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201A	BL01	6/26/2018	N	440-214475-1	Alluvium	28.2 - 47.8	<0.012	<5.0	29	18 J	<5.0	14	<0.10	0.074	5.607	0.7	0 U	57.5	7.09	0 U	25.5	2.04	13
LVWPS-MW201A	BL01	6/26/2018	FD	440-214475-2	Alluvium	28.2 - 47.8	<0.012	<5.0	29	18 J	<5.0	14	<0.10	<0.025	----	----	----	----	----	----	----	----	13
LVWPS-MW201A	BL02	11/13/2018	N	440-224424-8	Alluvium	28.2 - 47.8	----	----	----	----	----	----	----	----	3.764	0.27	----	116.6	6.93	----	22.94	2.31	----
LVWPS-MW201A	BL02	11/13/2018	FD	440-224424-9	Alluvium	28.2 - 47.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201B	BL01	6/26/2018	N	440-214475-3	UMCf	60.1 - 79.8	<0.012	<5.0	34	29	<5.0	67	<0.10	0.076	10.67	0.87	0 U	52.6	8.5	0 U	26.49	30.2	6.6
LVWPS-MW201B	BL02	11/13/2018	N	440-224424-7	UMCf	60.1 - 79.8	----	----	----	----	----	----	----	----	11.22	0.81	----	118.2	7.94	----	21.54	132	----
LVWPS-MW202	BL01	6/25/2018	N	440-214375-1	Alluvium	41.8 - 61.5	<0.012	<5.0	26	13 J	<5.0	5.7	<0.10	<0.025	3.58	0	0 U	139	6.96	0 U	28.23	0	10
LVWPS-MW202	BL02	11/13/2018	N	440-224424-11	Alluvium	41.8 - 61.5	----	----	----	----	----	----	----	----	3.487	0.04	----	-99.2	7.23	----	21.9	3.2	----
LVWPS-MW203A	BL01	6/25/2018	N	440-214375-3	Alluvium	34.8 - 54.5	<0.012	<5.0	21	7.4 J	<5.0	<0.25	<0.10	0.086	2.4	6.1	0 U	193	7.41	0 U	30.43	22.8	8.5
LVWPS-MW203A	BL02	11/15/2018	N	440-224699-2	Alluvium	34.8 - 54.5	----	----	----	----	----	----	----	----	2.163	0.55	----	-105.3	7.38	----	25.3	7.3	----
LVWPS-MW203B	BL01	6/25/2018	N	440-214375-4	UMCf	75.1 - 94.7	<0.012	<5.0	48	9.1 J	<5.0	23	<0.10	0.026 J	6.15	0.6	0 U	195	7.42	0 U	32.38	31	4.6
LVWPS-MW203B	BL02	11/15/2018	N	440-224699-1	UMCf	75.1 - 94.7	----	----	----	----	----	----	----	----	8.347	0.86	----	-102.7	7.32	----	24.5	5.8	----
LVWPS-MW203C	BL01	6/29/2018	N	440-214733-1	UMCf (Semi-Consolidated)	100.3 - 120.0	<0.12	<5.0	7.6 J	12 J	<5.0	<0.25	1.6	0.079	25.9	1.81	0 U	18	7.59	0 U	33.75	1000 J	1.6
LVWPS-MW203C	BL02	11/15/2018	N	440-224537-9	UMCf (Semi-Consolidated)	100.3 - 120.0	----	----	----	----	----	----	----	----	34.21	0.89	----	-101.3	7.8	----	23.4	247.3	----
LVWPS-MW204	BL01	6/25/2018	N	440-214376-1	Alluvium	50.3 - 70.0	<0.012	<5.0	46	<5.0	<5.0	1.4	<0.10	0.055	3.325	1.11	0 U	-10.5	7.22	0 U	24.55	9.56	10
LVWPS-MW204	BL02	11/14/2018	N	440-224537-10	Alluvium	50.3 - 70.0	----	----	----	----	----	----	----	----	4.676	2	----	215.3	7.18	----	22.5	6.2	----
LVWPS-MW204B	BL02	11/15/2018	N	440-224537-15	UMCf	101.5 - 121.2	<0.012	<0.50	33	8.4	<0.50	71	<0.10	0.3	6.166	2.79	0 U	163.2	7.68	0 U	21.9	559.8	12
LVWPS-MW204C	BL02	12/3/2018	N	440-226018-1	UMCf (Semi-Consolidated)	150.5 - 170.0	<0.012	0.77 J	0.70 J	5.9	<0.50	71	6.2	0.066	35.658	4.03	----	110.1	9.09	----	23.4	169	6.2
LVWPS-MW205B	BL01	6/26/2018	N	440-214476-1	Alluvium	64.9 - 84.6	<0.012	<5.0	27	12 J	<5.0	4	<0.10 UJ	<0.025	3.85	0	0 U	135	6.83	0 U	26.16	0	11
LVWPS-MW205B	BL02	11/14/2018	N	440-224424-23	Alluvium	64.9 - 84.6	----	----	----	----	----	----	----	----	2.524	0.46	----	42.1	7.26	----	22.85	1.74	----
LVWPS-MW205C	BL01	6/26/2018	N	440-214476-4	Alluvium	100.3 - 120.0	<0.012	<5.0	25	7.7 J	<5.0	0.33 J	<0.10	<0.025	3.35	0	0 U	116	6.9	0 U	31.08	0	11
LVWPS-MW205C	BL02	11/14/2018	N	440-224537-1	Alluvium	100.3 - 120.0	----	----	----	----	----	----	----	----	2.123	0.79	----	63.1	7.36	----	22.56	12.18	----
LVWPS-MW206A	BL01	6/26/2018	N	440-214475-4	Alluvium	39.8 - 59.5	<0.012	<5.0	24	<5.0	<5.0	34	<0.10	0.31	5.96	1.92	0 U	166	7.3	0 U	28.75	100	19
LVWPS-MW206A	BL02	11/12/2018	N	440-224311-1	Alluvium	39.8 - 59.5	----	----	----	----	----	----	----	----	5.164	2.08	----	-26.6	6.89	----	22.19	42.7	----
LVWPS-MW206A	BL02	11/12/2018	FD	440-224311-2	Alluvium	39.8 - 59.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206B	BL01	6/26/2018	N	440-214475-5	Alluvium	69.9 - 89.5	<0.012	<5.0	34	23	<5.0	32	<0.10	<0.025	5.93	0.94	0 U	158	7.23	0 U	31.02	2.3	18
LVWPS-MW206B	BL02	11/12/2018	N	440-224311-3	Alluvium	69.9 - 89.5	----	----	----	----	----	----	----	----	4.645	0.82	----	-31.4	6.86	----	20.82	9.89	----
LVWPS-MW206C	BL01	6/26/2018	N	440-214492-1	UMCf	100.3 - 120.0	0.048	<5.0	51	7.8 J	<5.0	27	<0.10	0.064	4.84	1.14	0 U	144	7.58	0 U	44.97	19.3	3.8
LVWPS-MW206C	BL02	11/12/2018	N	440-224187-3	UMCf	100.3 - 120.0	----	----	----	----	----	----	----	----	4.559	2.65	0 U	-28.2	7.01	0 U	22.5	33	----
LVWPS-MW206D	BL02	11/12/2018	N	440-224187-1	UMCf	125.3 - 145.0	<0.012	1.3 J	48	1.1 J	<0.50	<0.25	<0.10	0.2	4.748	0.56	0.5	-151.1	7.48	0 U	18.56	238	<0.11
LVWPS-MW206E	BL02	11/16/2018	N	440-224656-1	UMCf (Semi-Consolidated)	195.5 - 205.0	<0.012	<0.50	63	1.0 J	1.2	<0.25	0.24	0.049 J	15.546	0.72	0 U	-97.1	7.63	0 U	22.6	12.2	0.24
LVWPS-MW207	BL01	6/25/2018	N	440-214375-2	Alluvium	68.1 - 87.8	<0.012	<5.0	29	24	<5.0	20	<0.10	<0.025	5.37	4.56	0 U	59	6.85	0 U	31.5	0	15
LVWPS-MW207	BL02	11/13/2018	N	440-224424-12	Alluvium	68.1 - 87.8	----	----	----	----	----	----	----	----	4.178	2.02	----	121	6.9	----	20.47	1.66	----
LVWPS-MW207	BL02	11/13/2018	FD	440-224424-13	Alluvium	68.1 - 87.8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW208A	BL01	6/28/2018	N	440-214604-1	Alluvium	39.9 - 59.5	<0.012	<5.0	50	9.0 J	<5.0	13	<0.10 UJ	<0.025	5.764	5	0 U	55	7.3	0 U	26.29	7.49	13
LVWPS-MW208A	BL01	6/28/2018	FD	440-214604-2	Alluvium	39.9 - 59.5	<0.012	<5.0	48	13 J	<5.0	13	<0.10	<0.025	----	----	----	----	----	----	----	----	13
LVWPS-MW208A	BL02	11/13/2018	N	440-224424-1	Alluvium	39.9 - 59.5	----	----	----	----	----	----	----	----	5.551	5.63	----	182.7	7.27	----	22.5	21.5	----
LVWPS-MW208B	BL01	6/28/2018	N	440-214604-3	Alluvium	65.3 - 85.0	<0.012	<5.0	48	5.8 J	<5.0	14	<0.10	0.077	6.39	7.6	0 U	32	7.33	0 U	28.5	175	15
LVWPS-MW208B	BL02	11/13/2018	N	440-224424-2	Alluvium	65.3 - 85.0	----	----	----	----	----	----	----	----	5.538	5.66	----	190.8	7.38	----	22.5	19.8	----
LVWPS-MW209	BL01	6/28/2018	N	440-214604-8	Alluvium	71.3 - 91.0	<0.012	<5.0	34	18 J	<5.0	29	<0.10	<0.025	6.11	1.75	0 U	146	7.09	0 U	28.53	8.9	19
LVWPS-MW209	BL02	11/13/2018	N	440-224424-10	Alluvium	71.3 - 91.0	----	----	----	----	----	----	----	----	5.938	2.73	----	-82.1	7.15	----	22	4	----
LVWPS-MW209A	BL02	11/13/2018	N	440-224292-4	Alluvium	35.3 - 55.0	<0.012	<0.50	36	11	<0.50	19	<0.10	<0.025	5.901	4.2	0 U	-77.3	7.22	0 U	20.8	5.7	18
LVWPS-MW209B	BL02	11/13/2018	N	440-224292-5	UMCf-cg	110.3 - 130.0	0.027	<0.50	28	17	<0.50	17	<0.10	0.13	5.941	2.38	0 U	-87	7.26	0 U	22.3	227	17
LVWPS-MW209C	BL02	11/13/2018	N	440-224292-6	UMCf-cg	151.0 - 170.5	<0.012	<0.50	60	8.4	<0.50	19	<0.10	0.056	6.67	0.9	0 U	-99.3	7.24	0 U	22.5	29.8	13
LVWPS-MW210A	BL01	6/27/2018	N	440-214521-1	Alluvium	35.3 - 55.0	<0.012	<5.0	33	22	<5.0	22	<0.10	<0.025	5.61	0	0 U	185	6.82	0 U	24.72	0	17
LVWPS-MW210A	BL01	6/27/2018	FD	440-214521-2	Alluvium	35.3 - 55.0	<0.012	<5.0	34	21	<5.0	23	<0.10	<0.025	----	----	----	----	----	----	----	----	16
LVWPS-MW210A	BL02	11/13/2018	N	440-224424-17	Alluvium	35.3 - 55.0	----	----	----	----	----	----	----	----	4.086	0.89	----	52.5	7.11	----	21.46	6.66	----
LVWPS-MW210B	BL01	6/27/2018	N	440-214521-3	Alluvium	70.1 - 89.8	<0.012	<5.0	36	23	<5.0	30	<0.10	<0.025	6.32	0.32	0 U	137	6.87	0 U	25.27	0	19
LVWPS-MW210B	BL02	11/13/2018	N	440-224424-18	Alluvium	70.1 - 89.8	----	----	----	----	----	----	----	----	4.602	2.04	----	69.4	7.13	----	21.76	3.08	----
LVWPS-MW210C	BL01	6/27/2018	N	440-214521-4	UMCf-cg	100.3 - 120.0	<0.012	<5.0	30	13 J	<5.0	26	<0.10	0.11	6.45	0	0 U	111	6.91	0 U	29.09	145	7.5
LVWPS-MW210C	BL02	11/13/2018	N	440-224424-19	UMCf-cg	100.3 - 120.0	----	----	----	----	----	----	----	----	4.602	1.8	----	90.8	7.06	----	19.01	549	----
LVWPS-MW210D	BL02	11/13/2018	N	440-224292-1	UMCf-cg	130.4 - 140.0	0.28	0.52 J	27	7.6	0.56 J	0.40 J	0.68	2.4	5.182	7.46	0 U	102.8	7.65	----	20.74	1000 >	2.7

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B					EPA 218.6	EPA 351.2	EPA 365.3	FIELD TESTS				FIELD TESTS				NTOTAL
							Zinc	Antimony	Arsenic	Selenium	Thallium	Chromium, Hexavalent	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Conductivity	Dissolved Oxygen	Ferrous Iron	Oxidation-Reduction Potential	pH	Sulfide	Temperature	Turbidity	Nitrogen, Total
							mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mS/cm	mg/L	mg/L	mV	SU	mg/L	C	NTU	mg/L
LVWPS-MW210E	BL02	11/14/2018	N	440-224424-14	UMCf-cg	145.5 - 165.0	<0.012	<0.50	35	0.89 J	<0.50	<0.25	<0.10	0.06	6.911	2.72	0 U	-87.5	7.39	0 U	20.1	42.8	<0.11
LVWPS-MW211	BL01	6/27/2018	N	440-214521-7	Alluvium	50.0 - 69.7	<0.012	<5.0	40	9.6 J	<5.0	14	<0.10	<0.025	5.37	3.04	0 U	159	7.19	0 U	29.84	0	15
LVWPS-MW211	BL02	11/12/2018	N	440-224186-3	Alluvium	50.0 - 69.7	----	----	----	----	----	----	----	----	5.411	5.04	----	-241	7.2	----	22.2	5.4	----
LVWPS-MW212A	BL01	6/27/2018	N	440-214521-5	Alluvium	34.3 - 54.0	0.030	<5.0	52	6.1 J	<5.0	17	<0.10	<0.025	2.76	4.89	0 U	191	7.43	0 U	26.97	9.7	7.0
LVWPS-MW212A	BL02	11/14/2018	N	440-224537-6	Alluvium	34.3 - 54.0	----	----	----	----	----	----	----	----	2.703	7.16	----	-105	7.57	----	23.5	18	----
LVWPS-MW212B	BL01	6/27/2018	N	440-214521-6	Alluvium	59.8 - 79.5	<0.012	<5.0	46	5.0 J	<5.0	18	0.38	0.037 J	2.3	6.39	0 U	183	7.67	0 U	30.12	69.7	6.5
LVWPS-MW212B	BL02	11/15/2018	N	440-224537-8	Alluvium	59.8 - 79.5	----	----	----	----	----	----	----	----	2.431	7.5	----	-71.3	7.67	----	23.4	22.7	----
LVWPS-MW212C	BL02	11/14/2018	N	440-224424-16	UMCf-cg	100.3 - 120.0	0.021	<0.50	28	8.0	<0.50	27	<0.10	0.067	6.542	2.01	0 U	-131.2	7.47	0 U	23.6	22.6	<0.11
LVWPS-MW212D	BL02	11/14/2018	N	440-224424-15	UMCf-cg	125.5 - 145.0	<0.012	<0.50	34	9.9	<0.50	24	<0.10	0.05	6.991	0.85	0 U	-98.6	7.32	0 U	23.4	8.2	9.4
LVWPS-MW213	BL01	6/28/2018	N	440-214604-7	Alluvium	40.1 - 59.8	<0.012	<5.0	39	6.9 J	<5.0	11	<0.10	<0.025	3.76	3.92	0 U	169	7.36	0 U	27.23	18.3	2.6
LVWPS-MW213	BL02	11/13/2018	N	440-224292-13	Alluvium	40.1 - 59.8	----	----	----	----	----	----	----	----	4.02	5.52	----	135	7.48	----	23.4	6.4	----
LVWPS-MW214	BL01	6/28/2018	N	440-214604-4	Alluvium	34.4 - 44.0	<0.012	<5.0	40	6.2 J	<5.0	20	<0.10	<0.025	5.46	2.66	0 U	155	7.1	0 U	24.97	0.2	15
LVWPS-MW214	BL02	11/12/2018	N	440-224292-8	Alluvium	34.4 - 44.0	----	----	----	----	----	----	----	----	5.492	4.87	----	204.9	7.34	----	22.7	4	----
LVWPS-MW215A	BL01	6/27/2018	N	440-214521-9	Alluvium	13.5 - 33.2	<0.012	0.56 J	34	18	0.52 J	15	<0.10 UJ	<0.025	5.612	0.55	0 U	69.3	7.15	0 U	26.33	4.3	14
LVWPS-MW215A	BL02	11/12/2018	N	440-224186-1	Alluvium	13.5 - 33.2	----	----	----	----	----	----	----	----	3.892	0.5	----	14.4	7.02	----	21.64	0.74	----
LVWPS-MW215B	BL01	6/27/2018	N	440-214521-10	Bedrock	40.7 - 45.3	<0.012	<5.0	30	6.0 J	<5.0	<0.25	<0.10	0.13	5.46	1.7	0 U	28.3	7.38	0 U	29.41	16.95	2.8
LVWPS-MW215B	BL02	11/12/2018	N	440-224186-2	Bedrock	40.7 - 45.3	----	----	----	----	----	----	----	----	3.966	0.87	----	9	7.14	----	20.82	6.04	----
LVWPS-MW216	BL01	6/28/2018	N	440-214604-5	Alluvium	10.4 - 20.0	<0.012	<5.0	50	8.3 J	<5.0	<0.25	<0.10	0.33	5.89	0	0 U	36	7.19	0 U	28.35	335	4.3
LVWPS-MW216	BL02	11/12/2018	N	440-224292-3	Alluvium	10.4 - 20.0	----	----	----	----	----	----	----	----	5.881	0	----	-472.2	7.05	----	23.5	91.3	----
LVWPS-MW217A	BL02	11/14/2018	N	440-224424-21	Alluvium	51.3 - 71.0	<0.012	<0.50	28	15	<0.50	12	<0.10	0.094	3.053	1.13	0 U	72.1	7.21	0 U	22.19	2	11
LVWPS-MW217A	BL02	11/14/2018	FD	440-224424-22	Alluvium	51.3 - 71.0	<0.012	<0.50	29	16	<0.50	12	<0.10	<0.025	----	----	----	----	----	----	----	----	11
LVWPS-MW217B	BL02	11/14/2018	N	440-224424-20	UMCf	100.3 - 120.0	<0.012	<0.50	55	6.9	<0.50	58	<0.10	0.13	3.503	2.66	----	315.7	4.51	----	20.04	94	14
LVWPS-MW217C	BL02	11/15/2018	N	440-224537-7	UMCf	155.5 - 175.0	0.028	<0.50	34	6.2	<0.50	14	<0.10	0.056	5.431	0.9	0 U	-97.2	7.48	0 U	21	42.1	9.9
LVWPS-MW218A	BL02	11/13/2018	N	440-224292-9	Alluvium	35.3 - 55.0	<0.012	<0.50	31	17	<0.50	18	<0.10	0.045 J	5.477	2.74	0 U	234.2	7.2	0.04	20.3	47.5	14
LVWPS-MW218A	BL02	11/13/2018	FD	440-224292-10	Alluvium	35.3 - 55.0	<0.012	<0.50	30	18	<0.50	18	<0.10	0.048 J	----	----	----	----	----	----	----	----	15
LVWPS-MW218B	BL02	11/13/2018	N	440-224292-11	UMCf/UMCf-cg	100.3 - 120.0	<0.012	<0.50	27	16	<0.50	10	<0.10	0.056	4.907	0.48	0 U	195.7	7.26	0 U	20.6	195.7	12
LVWPS-MW218C	BL02	11/13/2018	N	440-224292-12	UMCf/UMCf-cg	136.0 - 155.5	<0.012	<0.50	16	0.71 J	<0.50	<0.25	0.44	0.078	6.47	1.4	0 U	-66.3	7.97	0 U	20.8	46.2	0.44
LVWPS-MW219A	BL02	11/12/2018	N	440-224186-5	Alluvium	35.1 - 49.8	<0.012	<0.50	37	15	<0.50	24	<0.10 UJ	0.029 J	6.108	3.21	0 U	301.4	7.26	0 U	20.6	18	17
LVWPS-MW219A	BL02	11/12/2018	FD	440-224186-6	Alluvium	35.1 - 49.8	<0.012	<0.50	37	16	<0.50	24	<0.10 UJ	<0.025	----	----	----	----	----	----	----	----	17
LVWPS-MW219B	BL02	11/12/2018	N	440-224186-7	UMCf/Horse Springs	75.3 - 95.0	<0.012	<0.50	37	<0.50	<0.50	<0.25	0.31	1.2	4.648	0.4	0 U	-12.5	7.3	0 U	21	196.5	0.31
LVWPS-MW219C	BL02	11/12/2018	N	440-224186-8	UMCf/Horse Springs	115.5 - 135.0	<0.012	<0.50	85	1.8 J	1.5	<0.25	<0.10	0.078	5.953	0.75	0.5	60	7.14	0 U	20.1	36.2	<0.11
LVWPS-MW220A	BL02	11/14/2018	N	440-224424-3	Alluvium	60.3 - 80.0	<0.012	0.55 J	37	18	<0.50	25	<0.10 UJ	0.028 J	6.107	3.07	0 U	228.5	7.26	0 U	21.4	25.9	18
LVWPS-MW220B	BL02	11/14/2018	N	440-224424-4	UMCf-cg	134.5 - 154.0	0.022	<0.50	19	12	0.75 J	<0.25	<0.10	0.033 J	5.527	1.27	0 U	210.6	7.65	0 U	20.3	16.3	6.8
LVWPS-MW221A	BL02	11/15/2018	N	440-224537-2	Alluvium	50.3 - 70.0	<0.012	<0.50	51	4.3	<0.50	13	<0.10 UJ	<0.025	2.78	6.07	0 U	112.6	7.29	0 U	22.97	0.88	6.8
LVWPS-MW221B	BL02	11/15/2018	N	440-224537-3	UMCf/UMCf-cg	83.7 - 103.2	<0.012	<0.50	26	3.9	<0.50	16	<0.10	0.058	4.41	3.52	0 U	39	7.88	0 U	19.55	39.2	2.4
LVWPS-MW222A	BL02	11/13/2018	N	440-224292-2	UMCf/UMCf-cg	80.3 - 100.0	<0.012	1.1 J	21	5.2	0.99 J	9.2	<0.10	0.049 J	4.036	0.96	----	16.7	8.03	----	23.23	47.5	2.5
LVWPS-MW222B	BL02	11/14/2018	N	440-224424-6	UMCf-cg	150.3 - 170.0	<0.012	<0.50	19	1.6 J	<0.50	<0.25	0.21	0.14	3.884	1.03	0 U	-302.2	8.48	0 U	24.5	40	0.21
LVWPS-MW222C	BL02	11/16/2018	N	440-224658-5	UMCf-cg	214.0 - 233.5	<0.012	<0.50	30	2.7	<0.50	<0.25	0.32	0.030 J	4.03	0.79	0 U	75.6	8.06	0 U	18.5	5.2	1.2
LVWPS-MW223A	BL02	11/13/2018	N	440-224311-5	Alluvium	45.3 - 65.0	<0.012	<0.50	43	9.5	<0.50	16	<0.10	0.032 J	5.18	6.52	0 U	138.1	6.97	0 U	19.19	2.7	19
LVWPS-MW223B	BL02	11/13/2018	N	440-224311-4	Alluvium	70.3 - 90.0	0.16	<0.50	38	14	<0.50	24	<0.10	0.027 J	4.945	5.92	0 U	149.6	6.93	0 U	19.02	25.8	20
LVWPS-MW223C	BL02	11/12/2018	N	440-224187-2	UMCf	95.5 - 110.0	0.095	<0.50	23	8.9	<0.50	9	<0.10 UJ	0.031 J	4.898	0.35	0 U	-35.7	7.06	0 U	22.2	11.25	15
LVWPS-MW224A	BL02	11/14/2018	N	440-224425-4	Alluvium	55.3 - 75.0	<0.012	<0.50	61	10	<0.50	12	<0.10	2.0	4.533	5.03	0 U	68.8	7.45	0 U	24.42	468	13
LVWPS-MW224B	BL02	11/14/2018	N	440-224425-3	UMCf	106.8 - 126.5	<0.012	<0.50	35	4.1	<0.50	<0.25	<0.10	0.1	6.42	0.92	0.5	-18.2	7.67	0 U	23.68	14.73	7.3
LVWPS-MW224C	BL02	11/14/2018	N	440-224425-1	UMCf (Semi-Consolidated)	174.5 - 194.0	<0.012	<0.50	59	1.6 J	1.5	1.5 J	0.13 J	<0.025	12.04	2.32	0 U	73.2	8.06	0 U	15.88	2.62	0.13
LVWPS-MW225A	BL02	11/13/2018	N	440-224311-7	Alluvium	49.3 - 69.0	<0.012	<0.50	41	12	<0.50	25	<0.10	<0.025	5.215	3.53	0 U	129	6.93	0 U	21.36	3.65	21
LVWPS-MW225A	BL02	11/13/2018	FD	440-224311-8	Alluvium	49.3 - 69.0	<0.012	<0.50	43	13	<0.50	25	<0.10	<0.025	----	----	----	----	----	----	----	----	22
LVWPS-MW225B	BL02	11/14/2018	N	440-224425-5	UMCf	90.5 - 110.0	0.026	<0.50	48	4.8	<0.50	7.7 J+	<0.10	<0.025	5.302	2.94	0 U	75.8	7.51	0 U	23.32	15.86	3.0
LVWPS-MW226A	BL02	11/15/2018	N	440-224538-1	Alluvium	40.3 - 55.0	<0.012	1.1 J	55	11	0.57 J	17	<0.10	0.15	5.245	5.3	0 U	119.8	7.24	0 U	22.68	77.2	23
LVWPS-MW226B	BL02	12/4/2018	N	440-226264-1	UMCf (Semi-Consolidated)	77.5 - 97.0	<0.12	2.4	8.8	8.0	0.66 J	<0.25	0.94	0.18	33.76	4.09	----	105.3	7.64	----	20.7	1000 >	0.94
MW-02(HEND)	BL01	7/12/2018	N	440-215722-5	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-02(HEND)	BL02	11/15/2018	N	440-224537-11	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	4.284	6.51	----	260.9	7.34	----	22.4	6.6	----
MW-02(HEND)	BL02	11/15/2018	FD	440-224537-12	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-04(HEND)	BL01	7/12/2018	N	440-215722-4	Alluvium	29.0 - 39.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	Dissolved Metals by SW6010B					EPA 218.6	EPA 351.2	EPA 365.3	FIELD TESTS				FIELD TESTS				NTOTAL
							Zinc	Antimony	Arsenic	Selenium	Thallium	Chromium, Hexavalent	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Conductivity	Dissolved Oxygen	Ferrous Iron	Oxidation-Reduction Potential	pH	Sulfide	Temperature	Turbidity	Nitrogen, Total
							mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mS/cm	mg/L	mg/L	mV	SU	mg/L	C	NTU	mg/L
MW-04(HEND)	BL02	11/15/2018	N	440-224537-18	Alluvium	29.0 - 39.0	----	----	----	----	----	----	----	----	14.41	5.38	----	105.8	7.49	----	24.69	53.4	----
MW-13(HEND)	BL01	7/12/2018	N	440-215722-3	Alluvium	38.0 - 48.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-13(HEND)	BL02	11/13/2018	N	440-224311-6	Alluvium	38.0 - 48.0	<0.012	<0.50	41	12	<0.50	24	<0.10	0.038 J	5.175	3.95	0 U	132.3	6.94	0 U	21.74	44.8	20
MW-20(HEND)	BL01	7/12/2018	N	440-215722-6	Unknown	50.0 - 65.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-20(HEND)	BL02	11/15/2018	N	440-224537-17	Unknown	50.0 - 65.0	----	----	----	----	----	----	----	----	5.272	2.51	----	107.1	7.26	----	24.27	18.8	----
MW-25(HEND)	BL01	7/12/2018	N	440-215722-2	Unknown	38.0 - 53.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-25(HEND)	BL02	11/15/2018	N	440-224537-14	Unknown	38.0 - 53.0	----	----	----	----	----	----	----	----	4.894	4.43	----	261.7	7.34	----	24.6	7	----
NERT4.51S1	BL02	11/16/2018	N	440-224658-4	Alluvium	40.0 - 50.0	----	----	----	----	----	----	----	----	5.39	4.24	----	213	7.33	----	13.93	1.7	----
NERT4.71S1	BL02	11/15/2018	N	440-224658-2	Alluvium	40.0 - 50.0	----	----	----	----	----	----	----	----	6.265	3.4	----	197.5	7.34	----	23	5.7	----
NERT4.93S1	BL02	11/15/2018	N	440-224537-5	Alluvium	45.0 - 55.0	----	----	----	----	----	----	----	----	4.07	2.87	----	197	6.66	----	18.61	1.2	----
NERT5.11S1	BL02	11/15/2018	N	440-224658-1	Alluvium	35.0 - 45.0	----	----	----	----	----	----	----	----	4.31	2.26	----	157	6.66	----	18.79	8.62	----
WMW4.9S	BL01	6/26/2018	N	440-214476-2	Alluvium	20.0 - 50.0	<0.012	<5.0	23	<5.0	<5.0	1.6	<0.10	0.054	2.84	0	0 U	131	6.88	0 U	24.55	0	9.6
WMW4.9S	BL02	11/15/2018	N	440-224537-16	Alluvium	20.0 - 50.0	----	----	----	----	----	----	----	----	2.911	2.1	----	198.3	7.25	----	23.3	3.5	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or impre
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	SM2320B				SM2540C	SM5310B	Total Metals by SW6010B	Volatile Fatty Acids (IC)			Volatile Fatty Acids (IC)		
							Alkalinity as CaCO3	Bicarbonate ion (as HCO3)	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids	Total Organic Carbon	Manganese	Acetic Acid	Butyric Acid	Formic Acid	Lactic Acid	Propionic Acid	Pyruvic Acid
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LNDMW-1	BL01	7/11/2018	N	440-215722-1	Unknown	-	----	----	----	----	4,400	----	----	----	----	----	----	----	----
LVWPS-MW201A	BL01	6/26/2018	N	440-214475-1	Alluvium	28.2 - 47.8	150	190	<2.4	<1.4	4,400	2.4	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW201A	BL01	6/26/2018	FD	440-214475-2	Alluvium	28.2 - 47.8	160	190	<2.4	<1.4	4,400	1.8	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW201A	BL02	11/13/2018	N	440-224424-8	Alluvium	28.2 - 47.8	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201A	BL02	11/13/2018	FD	440-224424-9	Alluvium	28.2 - 47.8	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW201B	BL01	6/26/2018	N	440-214475-3	UMCf	60.1 - 79.8	71	85	<2.4	<1.4	8,500	<0.65	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<19
LVWPS-MW201B	BL02	11/13/2018	N	440-224424-7	UMCf	60.1 - 79.8	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW202	BL01	6/25/2018	N	440-214375-1	Alluvium	41.8 - 61.5	160	200	<2.4	<1.4	2,900	2.2	0.57	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW202	BL02	11/13/2018	N	440-224424-11	Alluvium	41.8 - 61.5	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203A	BL01	6/25/2018	N	440-214375-3	Alluvium	34.8 - 54.5	180	220	<2.4	<1.4	1,900	2.4	1.5	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW203A	BL02	11/15/2018	N	440-224699-2	Alluvium	34.8 - 54.5	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203B	BL01	6/25/2018	N	440-214375-4	UMCf	75.1 - 94.7	130	160	<2.4	<1.4	6,000	1.0	0.32	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW203B	BL02	11/15/2018	N	440-224699-1	UMCf	75.1 - 94.7	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW203C	BL01	6/29/2018	N	440-214733-1	UMCf (Semi-Consolidated)	100.3 - 120.0	110	140	<2.4	<1.4	30,000	4.7	2.1	<1.5 UJ	<1.3	<1.3	<1.6 UJ	<1.8 UJ	<37
LVWPS-MW203C	BL02	11/15/2018	N	440-224537-9	UMCf (Semi-Consolidated)	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW204	BL01	6/25/2018	N	440-214376-1	Alluvium	50.3 - 70.0	160	190	<2.4	<1.4	2,500	2.2	0.79	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9 UJ
LVWPS-MW204	BL02	11/14/2018	N	440-224537-10	Alluvium	50.3 - 70.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW204B	BL02	11/15/2018	N	440-224537-15	UMCf	101.5 - 121.2	100	120	<2.4	<1.4	4,600	1.1	0.17	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW204C	BL02	12/3/2018	N	440-226018-1	UMCf (Semi-Consolidated)	150.5 - 170.0	300	86	140	<1.4	22,000	34	<0.030	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW205B	BL01	6/26/2018	N	440-214476-1	Alluvium	64.9 - 84.6	150	190	<2.4	<1.4	3,400	1.7	0.27	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9 UJ
LVWPS-MW205B	BL02	11/14/2018	N	440-224424-23	Alluvium	64.9 - 84.6	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW205C	BL01	6/26/2018	N	440-214476-4	Alluvium	100.3 - 120.0	150	180	<2.4	<1.4	2,900	1.9	0.29	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW205C	BL02	11/14/2018	N	440-224537-1	Alluvium	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206A	BL01	6/26/2018	N	440-214475-4	Alluvium	39.8 - 59.5	130	150	<2.4	<1.4	5,900	1.6	0.21	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW206A	BL02	11/12/2018	N	440-224311-1	Alluvium	39.8 - 59.5	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206A	BL02	11/12/2018	FD	440-224311-2	Alluvium	39.8 - 59.5	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206B	BL01	6/26/2018	N	440-214475-5	Alluvium	69.9 - 89.5	130	160	<2.4	<1.4	5,900	1.5	0.021	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW206B	BL02	11/12/2018	N	440-224311-3	Alluvium	69.9 - 89.5	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206C	BL01	6/26/2018	N	440-214492-1	UMCf	100.3 - 120.0	120	150	<2.4	<1.4	4,500	0.68 J	0.38	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW206C	BL02	11/12/2018	N	440-224187-3	UMCf	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW206D	BL02	11/12/2018	N	440-224187-1	UMCf	125.3 - 145.0	88	110	<2.4	<1.4	4,800	1.6	0.41	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW206E	BL02	11/16/2018	N	440-224656-1	UMCf (Semi-Consolidated)	195.5 - 205.0	100	130	<2.4	<1.4	12,000	1.4	0.16	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW207	BL01	6/25/2018	N	440-214375-2	Alluvium	68.1 - 87.8	140	180	<2.4	<1.4	5,200	1.9	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW207	BL02	11/13/2018	N	440-224424-12	Alluvium	68.1 - 87.8	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW207	BL02	11/13/2018	FD	440-224424-13	Alluvium	68.1 - 87.8	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW208A	BL01	6/28/2018	N	440-214604-1	Alluvium	39.9 - 59.5	110	130	<2.4	<1.4	4,300	0.97 J	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW208A	BL01	6/28/2018	FD	440-214604-2	Alluvium	39.9 - 59.5	110	130	<2.4	<1.4	4,400	0.95 J	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW208A	BL02	11/13/2018	N	440-224424-1	Alluvium	39.9 - 59.5	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW208B	BL01	6/28/2018	N	440-214604-3	Alluvium	65.3 - 85.0	92	110	<2.4	<1.4	4,700	1.3	0.041	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW208B	BL02	11/13/2018	N	440-224424-2	Alluvium	65.3 - 85.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW209	BL01	6/28/2018	N	440-214604-8	Alluvium	71.3 - 91.0	130	160	<2.4	<1.4	5,600	1.6	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW209	BL02	11/13/2018	N	440-224424-10	Alluvium	71.3 - 91.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW209A	BL02	11/13/2018	N	440-224292-4	Alluvium	35.3 - 55.0	120	140	<2.4	<1.4	5,100	2.5	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW209B	BL02	11/13/2018	N	440-224292-5	UMCf-cg	110.3 - 130.0	130	160	<2.4	<1.4	5,000	2.3	0.32	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW209C	BL02	11/13/2018	N	440-224292-6	UMCf-cg	151.0 - 170.5	110	140	<2.4	<1.4	5,600	1.6	0.20	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW210A	BL01	6/27/2018	N	440-214521-1	Alluvium	35.3 - 55.0	140	170	<2.4	<1.4	5,000	1.6	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW210A	BL01	6/27/2018	FD	440-214521-2	Alluvium	35.3 - 55.0	140	170	<2.4	<1.4	4,900	1.6	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW210A	BL02	11/13/2018	N	440-224424-17	Alluvium	35.3 - 55.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210B	BL01	6/27/2018	N	440-214521-3	Alluvium	70.1 - 89.8	150	180	<2.4	<1.4	5,600	1.6	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW210B	BL02	11/13/2018	N	440-224424-18	Alluvium	70.1 - 89.8	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210C	BL01	6/27/2018	N	440-214521-4	UMCf-cg	100.3 - 120.0	140	170	<2.4	<1.4	6,200	0.77 J	0.83	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW210C	BL02	11/13/2018	N	440-224424-19	UMCf-cg	100.3 - 120.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW210D	BL02	11/13/2018	N	440-224292-1	UMCf-cg	130.4 - 140.0	110	130	<2.4	<1.4	5,700	4.2	3.1	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	SM2320B				SM2540C	SM5310B	Total Metals by SW6010B	Volatile Fatty Acids (IC)			Volatile Fatty Acids (IC)		
							Alkalinity as CaCO3	Bicarbonate ion (as HCO3)	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids	Total Organic Carbon	Manganese	Acetic Acid	Butyric Acid	Formic Acid	Lactic Acid	Propionic Acid	Pyruvic Acid
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LVWPS-MW210E	BL02	11/14/2018	N	440-224424-14	UMCf-cg	145.5 - 165.0	160	190	<2.4	<1.4	5,800	19	1.4	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW211	BL01	6/27/2018	N	440-214521-7	Alluvium	50.0 - 69.7	110	130	<2.4	<1.4	5,100	1.2	0.078	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW211	BL02	11/12/2018	N	440-224186-3	Alluvium	50.0 - 69.7	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212A	BL01	6/27/2018	N	440-214521-5	Alluvium	34.3 - 54.0	83	100	<2.4	<1.4	2,200	<0.65	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW212A	BL02	11/14/2018	N	440-224537-6	Alluvium	34.3 - 54.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212B	BL01	6/27/2018	N	440-214521-6	Alluvium	59.8 - 79.5	78	95	<2.4	<1.4	1,900	<0.65	0.11	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW212B	BL02	11/15/2018	N	440-224537-8	Alluvium	59.8 - 79.5	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW212C	BL02	11/14/2018	N	440-224424-16	UMCf-cg	100.3 - 120.0	75	92	<2.4	<1.4	5,400	1.4	0.68	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW212D	BL02	11/14/2018	N	440-224424-15	UMCf-cg	125.5 - 145.0	89	110	<2.4	<1.4	5,900	2.5	0.21	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW213	BL01	6/28/2018	N	440-214604-7	Alluvium	40.1 - 59.8	87	110	<2.4	<1.4	3,200	<0.65	0.034	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW213	BL02	11/13/2018	N	440-224292-13	Alluvium	40.1 - 59.8	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW214	BL01	6/28/2018	N	440-214604-4	Alluvium	34.4 - 44.0	110	130	<2.4	<1.4	4,600	1.2	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9 UJ
LVWPS-MW214	BL02	11/12/2018	N	440-224292-8	Alluvium	34.4 - 44.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW215A	BL01	6/27/2018	N	440-214521-9	Alluvium	13.5 - 33.2	140	170	<2.4	<1.4	4,300	1.6	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9 UJ
LVWPS-MW215A	BL02	11/12/2018	N	440-224186-1	Alluvium	13.5 - 33.2	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW215B	BL01	6/27/2018	N	440-214521-10	Bedrock	40.7 - 45.3	160	190	<2.4	<1.4	3,900	1.4	0.28	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW215B	BL02	11/12/2018	N	440-224186-2	Bedrock	40.7 - 45.3	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW216	BL01	6/28/2018	N	440-214604-5	Alluvium	10.4 - 20.0	170	200	<2.4	<1.4	4,600	0.84 J	0.45	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
LVWPS-MW216	BL02	11/12/2018	N	440-224292-3	Alluvium	10.4 - 20.0	----	----	----	----	----	----	----	----	----	----	----	----	----
LVWPS-MW217A	BL02	11/14/2018	N	440-224424-21	Alluvium	51.3 - 71.0	180	220	<2.4	<1.4	3,300	2.2	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW217A	BL02	11/14/2018	FD	440-224424-22	Alluvium	51.3 - 71.0	180	220	<2.4	<1.4	3,300	2.1	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW217B	BL02	11/14/2018	N	440-224424-20	UMCf	100.3 - 120.0	110	140	<2.4	<1.4	4,200	1.7	0.042	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW217C	BL02	11/15/2018	N	440-224537-7	UMCf	155.5 - 175.0	110	140	<2.4	<1.4	4,400	4.4	0.10	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW218A	BL02	11/13/2018	N	440-224292-9	Alluvium	35.3 - 55.0	150	190	<2.4	<1.4	4,200	2.1	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW218A	BL02	11/13/2018	FD	440-224292-10	Alluvium	35.3 - 55.0	160	200	<2.4	<1.4	4,200	2.1	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW218B	BL02	11/13/2018	N	440-224292-11	UMCf/UMCf-cg	100.3 - 120.0	180	220	<2.4	<1.4	3,600	2.2	0.075	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW218C	BL02	11/13/2018	N	440-224292-12	UMCf/UMCf-cg	136.0 - 155.5	87	110	<2.4	<1.4	5,500	1.8	2.6	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW219A	BL02	11/12/2018	N	440-224186-5	Alluvium	35.1 - 49.8	120	150	<2.4	<1.4	5,000	2.0	0.037	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW219A	BL02	11/12/2018	FD	440-224186-6	Alluvium	35.1 - 49.8	130	160	<2.4	<1.4	5,100	2.1	0.024	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW219B	BL02	11/12/2018	N	440-224186-7	UMCf/Horse Springs	75.3 - 95.0	130	160	<2.4	<1.4	4,200	19	0.92	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW219C	BL02	11/12/2018	N	440-224186-8	UMCf/Horse Springs	115.5 - 135.0	180	220	<2.4	<1.4	4,900	1.5	0.17	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW220A	BL02	11/14/2018	N	440-224424-3	Alluvium	60.3 - 80.0	140	170	<2.4	<1.4	4,900	2.5	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW220B	BL02	11/14/2018	N	440-224424-4	UMCf-cg	134.5 - 154.0	110	140	<2.4	<1.4	4,500	2.1	1.3	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW221A	BL02	11/15/2018	N	440-224537-2	Alluvium	50.3 - 70.0	83	100	<2.4	<1.4	2,500	0.93 J	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW221B	BL02	11/15/2018	N	440-224537-3	UMCf/UMCf-cg	83.7 - 103.2	84	64	19	<1.4	3,400	2.1	0.30	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW222A	BL02	11/13/2018	N	440-224292-2	UMCf/UMCf-cg	80.3 - 100.0	54	66	<2.4	<1.4	4,300	0.96 J	0.095	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW222B	BL02	11/14/2018	N	440-224424-6	UMCf-cg	150.3 - 170.0	28	34	<2.4	<1.4	3,200	2.3	0.81	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW222C	BL02	11/16/2018	N	440-224658-5	UMCf-cg	214.0 - 233.5	42	51	<2.4	<1.4	3,400	0.95 J	0.98	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW223A	BL02	11/13/2018	N	440-224311-5	Alluvium	45.3 - 65.0	130	160	<2.4	<1.4	5,300	2.3	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW223B	BL02	11/13/2018	N	440-224311-4	Alluvium	70.3 - 90.0	130	150	<2.4	<1.4	5,100	2.6	0.024	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW223C	BL02	11/12/2018	N	440-224187-2	UMCf	95.5 - 110.0	91	110	<2.4	<1.4	4,600	3.2	0.19	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW224A	BL02	11/14/2018	N	440-224425-4	Alluvium	55.3 - 75.0	85	100	<2.4	<1.4	4,100	2.1 J+	1.9	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW224B	BL02	11/14/2018	N	440-224425-3	UMCf	106.8 - 126.5	83	100	<2.4	<1.4	5,800	2.1 J+	0.73	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW224C	BL02	11/14/2018	N	440-224425-1	UMCf (Semi-Consolidated)	174.5 - 194.0	76	93	<2.4	<1.4	13,000	3.0 J+	0.14	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7 UJ
LVWPS-MW225A	BL02	11/13/2018	N	440-224311-7	Alluvium	49.3 - 69.0	120	140	<2.4	<1.4	5,100	2.4	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW225A	BL02	11/13/2018	FD	440-224311-8	Alluvium	49.3 - 69.0	120	140	<2.4	<1.4	5,000	2.4	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW225B	BL02	11/14/2018	N	440-224425-5	UMCf	90.5 - 110.0	78	95	<2.4	<1.4	4,800	1.8 J+	0.19	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW226A	BL02	11/15/2018	N	440-224538-1	Alluvium	40.3 - 55.0	100	130	<2.4	<1.4	5,300	2.9	0.027	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
LVWPS-MW226B	BL02	12/4/2018	N	440-226264-1	UMCf (Semi-Consolidated)	77.5 - 97.0	100	120	<2.4	<1.4	36,000	4.2	0.10	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
MW-02(HEND)	BL01	7/12/2018	N	440-215722-5	Unknown	32.0 - 42.0	----	----	----	----	3,600	----	----	----	----	----	----	----	----
MW-02(HEND)	BL02	11/15/2018	N	440-224537-11	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-02(HEND)	BL02	11/15/2018	FD	440-224537-12	Unknown	32.0 - 42.0	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-04(HEND)	BL01	7/12/2018	N	440-215722-4	Alluvium	29.0 - 39.0	----	----	----	----	4,500	----	----	----	----	----	----	----	----

Table H.11
Groundwater Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Event	Sample Date	QCType	Lab SampleID	Screened Lithology	Screened Interval	SM2320B				SM2540C	SM5310B	Total Metals by SW6010B	Volatile Fatty Acids (IC)			Volatile Fatty Acids (IC)		
							Alkalinity as CaCO3	Bicarbonate ion (as HCO3)	Carbonate (as CO3)	Hydroxide as OH	Total Dissolved Solids	Total Organic Carbon	Manganese	Acetic Acid	Butyric Acid	Formic Acid	Lactic Acid	Propionic Acid	Pyruvic Acid
							mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-04(HEND)	BL02	11/15/2018	N	440-224537-18	Alluvium	29.0 - 39.0	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-13(HEND)	BL01	7/12/2018	N	440-215722-3	Alluvium	38.0 - 48.0	----	----	----	----	5,500 J	----	----	----	----	----	----	----	----
MW-13(HEND)	BL02	11/13/2018	N	440-224311-6	Alluvium	38.0 - 48.0	120	140	<2.4	<1.4	4,900	2.5	<0.015	<2.9	<2.6	<2.6	<3.1	<3.5	<3.7
MW-20(HEND)	BL01	7/12/2018	N	440-215722-6	Unknown	50.0 - 65.0	----	----	----	----	4,900	----	----	----	----	----	----	----	----
MW-20(HEND)	BL02	11/15/2018	N	440-224537-17	Unknown	50.0 - 65.0	----	----	----	----	----	----	----	----	----	----	----	----	----
MW-25(HEND)	BL01	7/12/2018	N	440-215722-2	Unknown	38.0 - 53.0	----	----	----	----	3,600 J	----	----	----	----	----	----	----	----
MW-25(HEND)	BL02	11/15/2018	N	440-224537-14	Unknown	38.0 - 53.0	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.51S1	BL02	11/16/2018	N	440-224658-4	Alluvium	40.0 - 50.0	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.71S1	BL02	11/15/2018	N	440-224658-2	Alluvium	40.0 - 50.0	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT4.93S1	BL02	11/15/2018	N	440-224537-5	Alluvium	45.0 - 55.0	----	----	----	----	----	----	----	----	----	----	----	----	----
NERT5.11S1	BL02	11/15/2018	N	440-224658-1	Alluvium	35.0 - 45.0	----	----	----	----	----	----	----	----	----	----	----	----	----
WMW4.9S	BL01	6/26/2018	N	440-214476-2	Alluvium	20.0 - 50.0	190	230	<2.4	<1.4	2,300	1.9	<0.015	<1.5	<1.3	<1.3	<1.6	<1.8	<1.9
WMW4.9S	BL02	11/15/2018	N	440-224537-16	Alluvium	20.0 - 50.0	----	----	----	----	----	----	----	----	----	----	----	----	----

Notes:
Bedrock - Horse Springs Formation
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- - The result is an estimated quantity, but the result may be biased low.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or impre
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
UMCf/Horse Springs - Alternating layers of UMCf and reworked Horse Springs Formation
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Table H.12
Groundwater Biotrap Microbial Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Screened Lithology	Sample Date	Sample Matrix	Microbial Census	Microbial Phospholipid Fatty Acid Analysis (PLFA)								
				Perchlorate reductase gene (pcrA)	Total Biomass	Proteobacteria (Monos)	Firmicutes (TerBrSats)	Anaerobic metal reducers (BrMonos)	SRB/Actinomycetes (MidBrSats)	General (Nsats)	Eukaryotes (polyenoics)	Slowed Growth	Decreased Permeability
				cells/bead	cells/bead	%	%	%	%	%	%	ratio cy/cis	ratio trans/cis
LVWPS-MW203B	UMCf	8/2/2018	Biotrap	<250	1.22E+05	72.96	1.63	2.1	0.00	21.68	1.62	1.81	0.11
LVWPS-MW204B	UMCf	1/23/2019	Biotrap	<250	3.49E+04	72.11	0.00	8.63	0.00	19.26	0.00	1.78	0.00
LVWPS-MW206C	UMCf	8/2/2018	Biotrap	<250	2.63E+05	65.42	3.08	1.83	0.77	25.46	3.44	1.37	0.08
LVWPS-MW210A	Alluvium	8/2/2018	Biotrap	<250	1.50E+05	59.97	2.23	1.51	0.00	36.32	0.00	1.16	0.00
LVWPS-MW210B	Alluvium	8/2/2018	Biotrap	<250	1.88E+05	71.86	0.83	3.37	0.00	22.22	1.72	5.80	0.00
LVWPS-MW210C	UMCf-cg	8/2/2018	Biotrap	2.89E+02	2.05E+05	54.69	6.74	3.43	2.43	25.22	7.51	1.26	0.22
LVWPS-MW212D	UMCf-cg	1/23/2019	Biotrap	<250	3.09E+04	65.27	5.82	5.67	0.00	23.24	0.00	1.87	0.00
LVWPS-MW222C	UMCf-cg	1/23/2019	Biotrap	<250	5.32E+04	66.82	0.00	0.00	0.00	33.17	0.00	1.03	0.00
LVWPS-MW223A	Alluvium	1/23/2019	Biotrap	<250	5.84E+04	73.55	0.00	0.00	0.00	26.45	0.00	2.00	0.00

Notes
BrMonos - Branched Monoenoic
MidBrSats - Mid-Chained Branched Saturated
Monos - Monoenoic
TerBrSats - Termially Branched Saturated
Nsats - Normal Saturation
UMCf- Upper Muddy Creek Formation
UMCf-cg - Upper Muddy Creek Formation - Corase Grained
< - Not detected

Table H.13
Surface Water Analytical Results Summary
Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum

Location	Sample Date	QCType	EPA 314.0	EPA 300.1	Anions by EPA 300.0		Dissolved Metals by SW6010B		Dissolved Metals by SW6020			Field Tests						SM2540C	SM5310B
			Perchlorate	Chlorate	Chloride	Sulfate	Iron	Manganese	Arsenic	Selenium	Thallium	Conductivity	Dissolved Oxygen	Oxidation-Reduction Potential	pH	Temperature	Turbidity	Total Dissolved Solids	Total Organic Carbon
			µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mS/cm	mg/L	mV	SU	C	NTU	mg/l	mg/L
LVW 0.55	7/23/2018	N	38	230	----	----	----	----	----	----	----	2.005	7.36	179.4	8.04	31.2	23.0	1,300	----
LVW 3.5-1	7/23/2018	N	54	290	----	----	----	----	----	----	----	2.054	7.58	60.6	7.93	33.3	15.3	1,300	----
LVW 3.5-2	7/23/2018	N	53	280	----	----	----	----	----	----	----	2.044	7.55	70.8	7.97	32.1	25.9	1,400	----
LVW 3.5-3	7/23/2018	N	53	280	----	----	----	----	----	----	----	2.036	7.62	57.9	7.95	32.2	17.2	1,400	----
LVW 3.5-4	7/23/2018	N	48	260	----	----	----	----	----	----	----	2.031	7.56	54.3	7.94	32.1	19.3	1,400	----
LVW 3.5-5	7/23/2018	N	48	260	----	----	----	----	----	----	----	2.028	7.51	54.3	7.94	32.3	19.9	1,300	----
LVW 3.5-6	7/23/2018	N	43	240	----	----	----	----	----	----	----	2.018	7.37	61.6	7.91	33.1	15.3	1,300	----
LVW 4.2-1	7/23/2018	N	52	320	230	450	<0.050	0.033	6.3 J	<5.0	<5.0	2.146	6.14	6.1	7.67	33.1	18.3	1,400	5.3
LVW 4.2-2	7/23/2018	N	49	300	240	450	<0.050	0.032	6.2 J	<5.0	<5.0	2.112	6.49	3.2	7.74	33.2	17.8	1,400	4.6
LVW 4.2-3	7/23/2018	N	21	220	230	450	<0.050	0.025	6.4 J	<5.0	<5.0	2.067	6.73	12.2	7.78	33.3	15.5	1,300	4.7
LVW 4.2-4	7/23/2018	N	16	150	230	440	<0.050	0.021	6.6 J	<5.0	<5.0	2.041	6.59	26.6	7.75	33.4	14.0	1,300	4.6
LVW 4.75-1	7/24/2018	N	35	340	230	420	<0.050	0.039	6.8 J	7.6 J	<5.0	1.911	6.99	167.2	7.78	28.1	27.1	1,300	5.2
LVW 4.75-2	7/24/2018	N	39	370	230	420	<0.050	0.04	5.0 J	<5.0	<5.0	1.953	7.00	165.6	7.81	28.8	24.7	1,300	5.3
LVW 4.75-3	7/24/2018	N	38	360	230	430	<0.050	0.039	<5.0	<5.0	<5.0	1.955	6.98	162.3	7.81	28.8	26.3	1,300	5.4
LVW 4.75-4	7/24/2018	N	10	200	230	400	<0.050	0.026	5.1 J	<5.0	<5.0	1.918	6.92	157.9	7.82	28.8	27.0	1,300	5.3
LVW 4.75-5	7/24/2018	N	8.1	210	240	410	<0.050	0.023	<5.0	<5.0	<5.0	1.920	7.01	153.9	7.83	28.8	24.2	1,300	5.3
LVW 5.3-1	7/25/2018	N	13	180	210	410	<0.050	<0.015	5.3 J	<5.0	<5.0	1.927	6.64	126.9	7.66	30.1	19.7	1,300	6.3
LVW 5.3-2	7/25/2018	N	1.7 J	160	210	400	<0.050	<0.015	<5.0	<5.0	<5.0	2.019	6.66	127.9	7.66	28.4	28.6	1,300	6.1
LVW 5.3-3	7/25/2018	N	1.6 J	160	210	400	<0.050	<0.015	5.1 J	<5.0	<5.0	1.885	6.64	132.8	7.63	28.8	23.8	1,300	5.8
LVW 6.05	7/24/2018	N	<0.95	430	220	450	<0.050	0.015 J	<5.0	<5.0	<5.0	2.037	6.81	120.4	7.79	33.9	17.4	1,400	5.4
LVW 6.05	7/24/2018	FD	<0.95	450	----	----	----	----	----	----	----	----	----	----	----	----	----	1,400	----
LVW 6.6-1	7/25/2018	N	1.9 J	120	230	570	<0.050	0.022	7.6 J	<5.0	<5.0	2.268	5.99	119.3	7.58	33.0	12.2	1,600	5.4
LVW 6.6-2	7/25/2018	N	<0.95	130	200	410	<0.050	<0.015	<5.0	<5.0	<5.0	1.907	6.55	109.8	7.72	31.2	26.5	1,300	5.5
LVW 6.6-3	7/25/2018	N	<0.95	140	190	320	<0.050	<0.015	<5.0	<5.0	<5.0	1.687	6.20	111.0	7.74	30.9	17.0	1,100	5.8
LVW 7.2	7/25/2018	N	<0.95	130	230	570	<0.050	0.042	7.1 J	<5.0	<5.0	2.219	6.24	133.6	7.57	31.9	15.3	1,600	5.5
LVW 8.85	7/25/2018	N	<0.95	120	----	----	----	----	----	----	----	1.776	7.50	141.5	7.59	35.3	5.9	1,100	----
LVW 8.85	7/25/2018	FD	<0.95	120	----	----	----	----	----	----	----	----	----	----	----	----	----	1,100	----
LVWPS 4.4	7/23/2018	N	72	79	240	470	<0.050	0.027	6.3 J	<5.0	<5.0	1.091	6.45	73.3	7.75	35.9	20.2	1,400	4.5
LVWPS 4.9	7/24/2018	N	7.5	270	230	420	<0.050	0.038	5.3 J	<5.0	<5.0	1.959	7.23	130.9	7.90	29.3	14.7	1,300	5.3
LVWPS 5.1	7/24/2018	N	9.8	340	230	430	<0.050	0.024	<5.0	<5.0	<5.0	1.995	6.33	138.4	7.80	29.5	65.6	1,300	5.4
W5 Middle Way	7/24/2018	N	5	420	240	470	<0.050	0.021	5.2 J	<5.0	<5.0	2.062	7.01	52.8	7.80	32.7	23.5	1,400	5.3
W5 Middle Way	7/24/2018	FD	4.2	430	240	470	<0.050	0.02	5.4 J	<5.0	<5.0	----	----	----	----	----	----	1,400	5.3
W5-6	7/25/2018	N	2.6	150	230	430	<0.050	0.018 J	5.3 J	<5.0	<5.0	1.977	7.18	166.3	7.68	30.0	20.1	1,300	5.5
W5-6	7/25/2018	FD	2.9	160	230	420	<0.050	0.018 J	5.1 J	<5.0	<5.0	----	----	----	----	----	----	1,300	5.5
W7 Lower Narrow	7/23/2018	N	50	290	230	440	<0.050	0.049	6.7 J	<5.0	<5.0	2.088	6.73	31	7.84	35.2	24.6	1,400	4.7
W8-9 3Kids Weir	7/23/2018	N	47	60	230	440	<0.050	0.018 J	6.1 J	<5.0	<5.0	2.049	7.65	29.8	7.98	35.8	21	1,400	5.5

Notes:
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
mg/L - milligarms per liter
µg/L - micrograms per liter
mS/cm - milliSiemens per centimeter
mV - milliVolts
N - Normal field sample
NTU - Nephelometric Turbidity Unit
SU - Standard Units
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
---- Not tested.

Appendix I
Injection Well Spacing and Injection Volume Design Summary

TETRA TECH

TECHNICAL MEMORANDUM

To:	**Project File – Task M19 Las Vegas Wash Bioremediation Pilot Study**
From:	Ronnie Britto, Dana Grady, and Guy Roemer, Tetra Tech, Inc.
Date:	August 9, 2019
Subject:	Injection Well Spacing and Injection Volume Design Summary

1.0 INTRODUCTION

The key pilot study design components of injection well spacing and carbon substrate quantities are critical to properly evaluate in-situ bioremediation (ISB) and collect important data related to effectiveness, implementability, and cost to increase the likelihood of successful pilot study implementation. As a result, this technical memorandum summarizes the details of the process used to determine the appropriate injection well spacing and associated preliminary injectate quantities for the Zones 1, 2, and 3 study areas to be tested in the Las Vegas Wash Bioremediation Pilot Study as specified in the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum. In addition to an overview of the design considerations to be evaluated when estimating injection well spacing and carbon substrate quantities, details on the numerical calculations and screening level model simulations that were performed for each of the three remediation zones are also provided and explained with respect to how the injection well spacing and injection volumes for each remediation zone was selected. It should be noted that final injection quantities will be based on data collected during installation of the injection and monitoring wells and baseline groundwater sampling and aquifer testing activities. At the request of NDEP, Tetra Tech, on behalf of the Trust, will provide final injectate quantity details and justification to NDEP prior to the purchase of the carbon substrate.

2.0 INJECTION WELL SPACING DESIGN CONSIDERATIONS

When designing ISB systems, spacings of injection wells are generally guided by the hydraulic conductivity, groundwater flow velocity, effective porosity, and lithology within the injection area (Air Force Center for Engineering and the Environment [AFCEE], 2007). Each of these relate to injection well spacing as follows:

- ***Hydraulic Conductivity.*** In formations with high hydraulic conductivity (i.e., greater than 100 ft/day), greater volumes of substrate can be introduced into the subsurface more quickly. Therefore, a larger radius of influence (ROI) can be achieved for a single injection well, resulting in fewer injection wells. In groundwater flow environments with lower hydraulic conductivities, closer injection well spacings may be warranted because even under increased pressures, the achievable ROI is smaller due to the lower hydraulic conductivity.

- ***Groundwater Flow Velocity.*** If the high conductivity formation also has a high groundwater flow velocity (greater than 5 ft/day), the ROI would be expected to decrease perpendicular to the direction of groundwater flow. In such cases, proportionally more of the transport of the injected fluid occurs in a downgradient direction as opposed to cross-gradient (AFCEE, 2007; AFCEE, 2004). It should be noted that cross-gradient distribution can be increased by injecting fluids under pressure.
- ***Effective Porosity.*** In formations with low effective porosity, a smaller volume of substrate travels further from the injection well than in formations with high effective porosity. Therefore, a single well can achieve a larger ROI for a given substrate volume in a formation with low effective porosity.
- ***Lithology.*** Lithology of the formation often is related to hydraulic conductivity and effective porosity. However, most geologic environments are inherently heterogeneous, and both small- and large-scale heterogeneities in the subsurface lithology tend to influence dispersion of the injectate downgradient of the injection wells. Dispersion plays a larger role in substrate distribution in conditions with high groundwater flow velocities (greater than 5 ft/day) where heterogeneous layers or lenses of silt and clay are present in the formation. However, dispersion plays a non-negligible role in lower-flow environments as well.

In accordance to AFCEE protocol (AFCEE, 2004; AFCEE, 2007), taking all the above factors into consideration, horizontal injection well spacing generally ranges from 5 feet for passive systems with low permeability formations to greater than 50 feet in high permeability formations. Injection well spacings for previous and on-going ISB treatability studies performed within the OU-1 and OU-3 study areas have ranged from 20 to 60 feet depending on the range of hydraulic conductivities, groundwater flow rates, effective porosities, and lithology targeted at each of the treatability study areas.

For treatability and pilot studies, the injection well spacing is also evaluated with respect to the quantities/type of carbon substrate, quantities of distribution water, and injection rates at different injection well spacings to achieve reasonable subsurface distribution. As for the previous studies in high permeability and high hydraulic conductivity formations, emulsified vegetable oil (EVO) was deemed to be the most appropriate carbon substrate due to its ability to rapidly induce reducing conditions while also providing long-term sustenance of carbon substrate within the aquifer. EVO converts and hydrolyzes gradually in the aquifer resulting in the eventual slow production of short chain fatty acids such as acetic acid and hydrogen that are utilized by perchlorate degrading microorganisms Therefore, an advantage of EVO is that it can be added during separate injection events over time (frequency ranging in the order of months to years) resulting in a semi-passive system that does not require permanent aboveground equipment and continual maintenance. A second advantage is that the EVO has a slow conversion process of fatty acids, which is ideal for aquifers with high hydraulic conductivity and high sulfate concentrations. This slow conversion process assists in limiting the undesirable sulfate reduction. As observed in the previous COH and on-going SWF Area treatability studies, sulfate reduction appeared to be minimal and this is to a degree attributable to the selection of the slow release EVO.

For the selected carbon substrate of EVO, a key design consideration is the injection of adequate quantities of water to distribute the injected EVO to create a biologically active zone for the reduction of perchlorate- and chlorate-contaminated groundwater. Ultimately, a greater injection well spacing will require a greater quantity of distribution water and rate of injection to achieve adequate subsurface distribution within the biologically active zone. Therefore, although a greater injection well spacing results in fewer injection wells and therefore lower drilling costs, it also results in a greater quantity of injectate solution (substrate and distribution water) required to be injected, which increases the duration and costs of each injection event. Counter to this, a closer injection well spacing will increase the capital investment associated with injection well installation, but less injectate solution would be required, decreasing the duration and costs of each injection event. However, an additional variable is that less injectate solution could also result in the need for increased frequency of carbon substrate reinjection events.

For the Las Vegas Wash Bioremediation Pilot Study, higher injection rates are not likely to be feasible in the UMCf due to the lower hydraulic conductivity of this formation when compared to the alluvium. Therefore, a closer injection well spacing in the UMCf is expected to be necessary. In the alluvium, the ROI will depend heavily on the rate of the injection since the hydraulic conductivity is high. Although the formation could accept high injection rates, the achievable injection rate is limited by the capacity of the injection equipment. Therefore, the selected injection well spacing within the alluvium must be balanced with achievable injection rates.

Finally, in practice and, in particular for treatability studies and pilot studies, most remediation designs begin with a uniform injection well spacing for each particular lithology/targeted injection zone to control both initial capital costs (i.e., drilling of injection wells) and operating costs (substrate, water, and injection labor). Once the initial injection well installation is complete and post-injection data is collected and analyzed, the remediation design may be supplemented with select additional injection wells to fill in gaps where field data indicate that the remediation needs to be supplemented. This phased approach has been effective at ISB sites across the country and provides the field data necessary to progressively add supplemental injection wells, if required, in select locations rather than overdesigning the system from the inception of the study. Conversely, there is also the potential that effectiveness monitoring results over time may indicate a reduced injection frequency for select injection wells and/or elimination of select injection wells as part of on-going remedy optimization.

Considering that ISB is still in the evaluation/testing phase, the Las Vegas Wash Bioremediation Pilot Study (as well as other ISB treatability studies) will provide important data and lessons learned with respect to injection well spacings for ISB implementation. To the extent that ISB becomes part of the final remedy, the remedial design will take into account these lessons learned.

3.0 INJECTATE QUANTITY CONSIDERATIONS

Estimation of carbon substrate injection quantities for ISB transects/barriers are based on the following factors and considerations. These factors can range from objective and quantitative to semi-quantitative, while others are more subjective or based on previous experience and empiricism.

(i) Carbon substrate adsorption to saturated soil
(ii) Injection well spacing and expected or attainable ROI
(iii) Chemical stoichiometric requirements
(iv) EVO and ISB protocol documents
(v) Consultation with carbon substrate vendors
(vi) Vendor design protocols
(vii) Previous treatability studies at or near the site
(viii) Practitioner's experience with ISB
(ix) Objectives and purpose of the study
(x) Site geology, hydrogeology, and geochemistry
(xi) Study duration and economics

Among these factors, the first three generally govern decisions on carbon dosages for ISB injection transects and are commonly adopted with due reliance as required on the other considerations listed above. As a result, these three factors are discussed further in this section with respect to the Las Vegas Wash Bioremediation Pilot Study design. It may be noted that data collected from the previous and on-going ISB treatability studies have been and will continue to be used in the design and implementation process for the Las Vegas Wash Bioremediation Pilot Study, specifically with respect to the first three factors. After the first injection event, data collected as part of the effectiveness monitoring program will be evaluated in conjunction with calculations for the substrate quantities in subsequent injection events to ascertain future dosages and periodicity of EVO rejuvenation that is required.

3.1 Carbon Substrate Adsorption to Saturated Soil

In the case of EVO, a key factor in the determination of the applied dosages is the adsorption capacity of the carbon substrate to the soil in the saturated matrix (also referred to herein as oil retention ratio), which is used in calculations of carbon substrate requirements (these calculations are further described in Section 4.0). To begin the process of determining the appropriate oil retention ratio to use, batch sorption tests were performed by UNLV with representative soil collected from the Transect 1b study area during monitoring well installation performed as part of the Phase 1 pre-design activities. The results indicated sorption capacity ranges from 0.015 to 0.093 g/g (grams of oil/gram of soil) for representative alluvium soils and 0.054 to 0.1 g/g for the UMCf soil.

The oil retention ratios determined in the batch tests are much higher in comparison to typical ratios provided in protocol documents, the EVO User's Guide and Design Tool, and literature (Borden, 2007; Clayton and Borden, 2009; ESTCP, 2008; Weispfenning and Borden, 2008), which generally indicate ratios that are one to two orders of magnitude lower and range between 0.0004 to 0.0024 for gravels and sands and 0.0054 to 0.0095 for finer soils with more clays and silts. A major reason for the marked differences between typical values and site-specific values from batch testing is the tendency for oil flocculation and chemical reactions that could occur due to the large presence of calcium in the saturated soil at the NERT site. Therefore, using the laboratory-determined oil retention ratios would not be practical for calculation of carbon substrate (EVO) quantities. However, it should be noted that laboratory batch sorption tests are short-term, simple tests that are still important as they provide relative differences in values determined for different lithologies encountered at the NERT site.

Other key information learned from previous bench-scale studies performed by UNLV with regards to carbon substrate dosing included: (i) the identification of carbon substrate loss due to advective flow from the high groundwater flow velocities and (ii) sulfate biodegradation. Specifically, during the previous laboratory column studies performed by UNLV, higher initial EVO dosages were used in the column studies due to the relatively high "apparent" oil retention ratios estimated from batch sorption tests. During these tests, two types of carbon substrate losses resulted. First, because the actual oil retention ratio was lower than the batch sorption studies implied, the excess carbon substrate passed through the column in the effluent, unused, within a two-month period. Secondly, perchlorate breakthrough occurred concurrent with the loss of carbon substrate in the effluent. In addition to the carbon substrate losses, using the relatively high "apparent" oil retention ratios estimated from batch sorption tests also resulted in substantial sulfate biodegradation and loss of permeability in the columns (Tetra Tech, 2016). Control or minimization of sulfate biodegradation is important in this setting as it results in considerable wastage and expense of EVO, rampant production of hydrogen sulfide, and a higher potential for aquifer clogging and permeability loss.

Based on lessons learned from the bench-scale studies, the heterogeneous nature of the aquifer, the existence of paleochannels with high groundwater flow velocities, and the relatively high sulfate concentrations and presence of calcium, the initial dosage of EVO is limited with periodic follow up of EVO additions during the pilot study. Based on literature, bench-scale results, practitioner's experience with EVO, and vendor consultation, an approximate value of 0.002 and 0.0035 g/g are currently recommended to be used in the Las Vegas Wash Bioremediation Pilot Study for the alluvium and UMCf, respectively.

3.2 Injection Well Spacing and Relationship to Carbon Substrate Dosages

When developing carbon substrate quantities for an injection well transect, the assumption is that if an adequate amount of distribution water follows the carbon substrate injected (along with gradual dispersion), then the ROI obtained would generally match the spacing among the injection wells. Therefore, the volume and quantity of soil that is targeted for each injection well spacing configuration are based on the projected ROI. The quantity of EVO can then be determined for the volume of soil that is targeted using the estimated oil retention ratio. As noted previously, a smaller injection well spacing will result in more injection wells, a smaller ROI, and a smaller quantity of injectate solution (EVO and distribution water). On the other hand, a larger spacing will result in a smaller number of injection wells, a larger ROI, and consequentially a larger amount of EVO that needs to be dosed to

adsorb to the larger radius around each injection well. The amount and source of the distribution water as well as the timeframe for injection of distribution water also needs to be factored into the cost and decision process for a particular injection well spacing. Once a particular spacing is finalized, the effectiveness monitoring results following the injection events can be used to determine if additional injection wells may be needed in select areas due to the influence of heterogeneity and finer-grained soils in certain locations.

3.3 Chemical Stoichiometric Requirements

For ISB injection well transects, the quantity of the selected carbon substrate is generally determined based on the following data and information:

- Measured concentration of the primary contaminant(s) of concern that consume the carbon substrate via microbial respiration;
- Measured concentrations of various other electron acceptors in the groundwater that also consume the carbon substrate via microbial respiration;
- Volumetric groundwater flow through the transect during the study timeframe; and
- Durational timeframe for the study

The concentrations of the primary contaminant(s) of concern and other electron acceptors present in the groundwater is typically averaged across the injection well transect from data that has been collected from either recent or baseline groundwater sampling events after injection well installation is completed. The volumetric groundwater flow during the study timeframe is determined based on groundwater flow velocity, the cross-sectional area of the injection transect, and the effective porosity of the targeted saturated zone. At sites where there is considerable localized lithological heterogeneity, average values within the specific targeted zones are generally employed for groundwater flow velocity and porosity.

Once the groundwater volume passing through the injection transect in a given time has been estimated, the carbon substrate demand can then be estimated from existing literature or developed from chemical stoichiometric equations. Each electron acceptor requires a different quantity of carbon substrate based on its chemical structure. It should be noted that different commercial EVO products have different percentages of actual oil with varying components of water, emulsion, vitamins, nutrients, quick release substrate (such as glycerin, acetate, or lactate), and proprietary materials. Therefore, the total amount of substrate required must be estimated based on the actual amount of EVO in the selected product. Additionally, EVO itself is composed of over twenty long-chain fatty acids, each having a different molecular formula. Among these, oleic and linoleic acids are the main fatty acids and are often used for representative stoichiometric estimations for EVO dosage determinations.

Once the total stoichiometric estimates are made, a factor of safety is applied. This is often recommended in bioremediation protocol documents for a variety of practical reasons including non-specific demands and uptakes and the need to overcompensate to maximize contaminant to substrate contact in the subsurface (AFCEE, 2004). Published values for factors of safety generally range from 2.5 to 10. Upon completion of the Phase 2 injection well installation and baseline groundwater sampling activities, data will be available for concentrations of contaminants and various electron acceptors as well as the final injection transect dimensions. This data will be used to develop a stoichiometrically-based EVO substrate estimate, which can be compared to the substrate quantities estimated based on the selected injection well spacing and oil retention ratios (described previously in Sections 3.1 and 3.2) to confirm appropriate quantities are injected.

4.0 PILOT STUDY INJECTION WELL SPACING AND SUBSTRATE DESIGN

To optimize the injection well spacing and injection volumes, an evaluation was performed for a range of injection well spacings and associated injection volumes for each of the three remediation zones considering the factors described in Sections 2 and 3. This section provides an overview of this evaluation and corresponding screening

level model simulations, while Section 5 provides the recommended design for testing during the pilot study. Results from these calculations and simulations are provided in Attachment 1.

4.1 Numerical Calculations

Estimations of injection well spacings were performed for three scenarios for each of the targeted lithologies in each remediation zone. Site-specific data, including effective porosity and wet soil density, collected from nearby monitoring wells, were used for each of the individual remediation zones to be as representative as possible based on available information. A summary of the input parameters and resulting injection well spacing estimations for the three scenarios for each remediation zone are provided in Attachment 1. The general process that was employed is described in further detail below.

1) **Selection of an appropriate length of the injection well transect.** For the Las Vegas Wash Bioremediation Pilot Study, the injection transect length varies between 200 and 300 feet in length depending on the remediation zone and will be finalized following installation of pilot borings to determine the degree of heterogeneity along the injection well transect. The rationale for transect length selection is detailed in the main text of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum.

2) **Selection of a range of appropriate injection well spacings.** A range of injection well spacings were selected for each remediation zone depending on the targeted lithology and site-specific characteristics. Calculations were performed for a range of spacings from 5 to 50 feet.

3) **Calculation of the total number of injection wells.** The total number of injection wells required for the study were then calculated using the range of injection well spacings selected in Step 2 in conjunction with the targeted injection well transect lengths selected in Step 1.

4) **Selection of the targeted saturated thickness.** The targeted saturated thickness varies depending on the remediation zone based on the targeted media of the study area, data collected during the Phase 1 pre-design, and individual objectives of each remediation zone. Specifically, the targeted saturated thicknesses that were selected for each zone are as follows:

    - Zone 1 – average of 70 feet in the unconsolidated UMCf,
    - Zone 2 – average of 55 feet in the alluvium and average of 25 feet in the unconsolidated UMCf, and
    - Zone 3 – average of 80 feet in the unconsolidated UMCf-cg.

5) **Calculation of the Targeted Treated Soil Mass.** Based on the coverage of the injection wells resulting from the selected injection well spacing, number of injection wells, and targeted saturated thickness, the targeted treated soil mass was calculated as follows:

$$M_s = \left(\pi \cdot \frac{D^2}{4}\right) \cdot N_i \cdot T \cdot \rho_s$$

where

$M_s = mass\ of\ soil\ (pounds)$
$D = diameter\ (well\ spacing)$
$N_i = number\ of\ injection\ wells$
$T = treatment\ thickness$
$\rho_s = density\ of\ wet\ soil$

6) **Estimation of the injection volume per injection location.** The following formula was utilized to estimate the injection volume of water required for substrate distribution per injection location:

$$Vi = \left(\pi \cdot \frac{D^2}{4}\right) \cdot T \cdot \rho_w \cdot n_e$$

where

$Vi = injection\ volume\ (gallons\ of\ water)$
$D = distance\ (feet)$
$T = treatment\ thickness\ (feet)$
$\rho_w = density\ of\ water\ (gallons\ per\ cubic\ foot)$
$n_e = effective\ porosity$

7) **Estimation of the total injection volume required per injection event.** This calculation multiples the estimated injection volume per injection location (result from Step 6) by the total number of injection wells along the desired injection well transect length (Step 3).

8) **Estimation of the substrate requirement.** This is the final step in which the substrate requirement is estimated using the result from the calculations presented in Step 5, the oil retention ratio, and the density of the substrate. The following equation was used to estimate the substrate requirement:

$$V_{sub} = (M_s \cdot R_o) \div \rho_{sub}$$

where

$V_{sub} = substrate\ volume\ (gallons)$
$M_s = mass\ of\ soil\ (pounds)$
$\rho_{sub} = density\ of\ substrate$
$R_o = oil\ retention\ ratio$

In addition to standard estimation, a design factor is sometimes applied to adjust substrate requirements based on experience by the remedial designer. This factor allows for adjustment based on technical experience from other ISB studies, site geochemistry (i.e., goal of minimizing sulfate reduction), hydraulic properties of the targeted lithology (i.e., goal of minimizing permeability loss or accounting for higher or lower groundwater flow rates), and vendor consultation. If a design factor is utilized, the volume of substrate is multiplied by the design factor to arrive at an estimated dosing rate.

4.2 Modeling Simulations

Screening-level one-layer groundwater flow models were constructed in MODFLOW 2000 to assist in the design of the injection wells that will be used for this treatability study. Specifically, this modeling was used as another line of evidence to evaluate the appropriate injection well spacing for this pilot study. A separate model was constructed for each zone and lithology (i.e., four models). Each model grid consisted of 100 rows and 100 columns with a horizontal grid spacing of 5 feet. A hydraulic gradient was imposed in each model to simulate ambient groundwater flow conditions at the pilot study. Each model included a line of injection wells equally spaced over a 200 or 300 ft length as appropriate based on the design for each remediation zone.

Using the estimations summarized in Attachment 1, three modeling simulations were run on the most likely injection well spacings to estimate potential radius of influence in the subsurface within each remediation zone. Specifically, modeling simulations were performed for 15, 25, and 35 feet within the UMCf and UMCf-cg and 25, 35, and 45 feet in the alluvium. These spacings were selected for modeling based on the observed hydraulic conductivities, lithology encountered, and remediation experience in similar formations to provide a range of variations to observe potential injectate distribution.

4.2.1 Modeling Parameters

Site-specific data is required to run the model simulations described herein. Specifically, the model includes site-specific data regarding saturated thickness, hydraulic conductivity, and effective porosity. Each of these are described in more detail below.

4.2.1.1 Saturated Thickness

Saturated thickness for each zone and unit was estimated using the approximate average saturated thickness of the unit, as determined from borehole data from nearby monitoring well clusters. Well boring logs (provided in Appendix B of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum) were used to identify the depth of the contacts between each geologic unit; the thickness of the uppermost unit was assumed to be the distance between the water table and the contact between it and the unit below. ***Table 1*** shows the saturated thickness used for modelling each zone and geologic unit.

In Zone 1, it is anticipated that the injection well depths will range from 135 to 175 feet bgs, with screens targeting the unconsolidated UMCf, which varies in thickness from approximately 55 to 80 feet. Based on the lithology observed at monitoring well clusters LVWPS-MW208, LVWPS-MW221, LVWPS-MW223, and LVWPS-MW224 near Zone 2, it is anticipated that the Zone 2 injection wells installed within the alluvium will have depths ranging from 75 to 100 feet bgs, with screens targeting the saturated alluvium that varies in thickness from 45 to 65 feet. The Zone 2 injection wells installed within the UMCf will likely have depths ranging from 105 to 145 feet bgs, with screen lengths targeting the saturated UMCf that varies from approximately 18 to 30 feet. In general, the saturated thickness of the alluvium and UMCf in Zones 1 and 2 were assumed to be similar across each remediation transect for purposes of modeling within each remediation zone, and therefore, the saturated thickness selected for the Zone 1 and Zone 2 models summarized in ***Table 1*** was selected be the approximate average of the thickness measured in the available boreholes in each unit and zone.

In contrast, the saturated thickness of the UMCf-cg in Zone 3 may vary widely in thickness due to the fault zone in the Zone 3 area. Based on the lithology and perchlorate concentrations observed at nearby monitoring well clusters LVWPS-MW212, LVWPS-MW221 and LVWPS-MW222 and the maximum targeted depth of 175 feet bgs selected for Zone 3, it is anticipated that the injection well depths will range from 105 to 175 feet bgs, with varying screen lengths targeting approximately 30 to 120 feet of UMCf-cg. For modeling purposes, the thickness was assumed to be the average of the thicknesses targeted in the dual- or triple-nested injection well design proposed for Zone 3.

Table 1 Saturated Thickness by Zone and Unit

Zone	Formation	Saturated Thickness (ft)
1	UMCf	70
2	Alluvium	55
2	UMCf	25
3	UMCf-cg	80

Notes:
ft - feet

4.2.1.2 Hydraulic Conductivity

Hydraulic conductivity for each zone and geologic unit was estimated from slug test results (Appendix C of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum). The hydraulic conductivity for each zone and unit was assumed to be the average of the available results for the zone and unit. Wells were assigned to nearby zones. ***Table 2*** summarizes the data used to estimate hydraulic conductivity for each zone and unit.

Table 2 Slug Test Results used to Estimate Hydraulic Conductivity

Zone	Formation	Well	K (ft/day)
1	UMCf	LVWPS-MW204B	0.34
1	UMCf	LVWPS-MW217B	0.92
1	UMCf	LVWPS-MW217C	0.4
2	Alluvium	LVWPS-MW224A	22
2	Alluvium	LVWPS-MW223A	50
2	Alluvium	LVWPS-MW223B	79
2	Alluvium	LVWPS-MW208A	197
2	Alluvium	LVWPS-MW208B	60
2	UMCf	LVWPS-MW224B	1
2	UMCf	LVWPS-MW224C	0.07
2	UMCf	LVWPS-MW223C	0.52
3	UMCf-cg	LVWPS-MW221B	0.12
3	UMCf-cg	LVWPS-MW222A	5.7
3	UMCf-cg	LVWPS-MW222B	0.45
3	UMCf-cg	LVWPS-MW212C	4
3	UMCf-cg	LVWPS-MW212D	0.7

Notes:
ft/day – feet per day

4.2.1.3 Effective Porosity Calculations

Effective porosity for each of the units was estimated from available nuclear magnetic resonance (NMR) data and borehole dilution testing results. Because considerable spatial variation in the lithology of the geologic units is present in the pilot study area, effective porosity was estimated separately for each zone and each geologic unit in the zones.

Well boring logs (Appendix B of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum) were used to identify the depth of the contacts between each geologic unit. The NMR-measured mobile water content was assumed to be representative of the effective porosity. The average effective porosity across the unit was calculated for each unit in each borehole. ***Table 3***, below, summarizes the available NMR data, the units

penetrated by each well at which NMR data is available, and the average effective porosity for each unit at each well. A more complete discussion of NMR data is found in Appendix E of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum.

Table 3 Summary of Effective Porosity Estimates from NMR

Zone	Formation	Well	Mobile porosity in unit, NMR
1	UMCf	LVWPS-MW204B	0.102
1	UMCf	LVWPS-MW217B	0.126
2	Alluvium	LVWPS-MW224A	0.060
2	Alluvium	LVWPS-MW223A	0.045
2	Alluvium	LVWPS-MW208A	0.068
2	UMCf	LVWPS-MW224B	0.057
2	UMCf	LVWPS-MW223C	0.042
3	UMCf-cg	LVWPS-MW221B	0.035
3	UMCf-cg	LVWPS-MW222A	0.080
3	UMCf-cg	LVWPS-MW212C	0.066

Well LVWPS-MW222A is screened in interbedded UMCf/UMCf-cg. For the purposes of the particle tracking, it was assumed to be a UMCf-cg well, since the NMR data regarding total porosity suggested that UMCf-cg material predominates.

Additional estimates of effective porosity were produced using data from aquifer testing. Effective porosity was estimated using Darcy's Law:

$$n\_e = \ (-K * i)/v$$

Where ne is effective porosity, K is the hydraulic conductivity of the formation, v is the groundwater velocity, and i is the hydraulic head gradient. Hydraulic conductivities for each well were estimated using slug test results (Appendix C of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum). Groundwater velocities were estimated from borehole dilution testing (Appendix D of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum). Hydraulic head gradients were estimated for each zone from contours of the potentiometric surface provided as Figure 10 of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum. ***Table 4*** summarizes the effective porosity estimates derived from aquifer testing.

Table 4 Summary of Effective Porosity Estimates from Aquifer Testing

Zone	Formation	Well	Effective Porosity
1	UMCf	LVWPS-MW217B	0.012
1	UMCf	LVWPS-MW217C	0.045

Zone	Formation	Well	Effective Porosity
2	Alluvium	LVWPS-MW223A	0.01
2	Alluvium	LVWPS-MW223B	0.141
2	Alluvium	LVWPS-MW208A	0.083
2	UMCf	LVWPS-MW223C	0.02
3	UMCf-cg	LVWPS-MW222A	0.07

The effective porosities used in the capture zone modeling are averages, for each zone and unit, of the effective porosities described above. ***Table 5*** shows the final estimates for each zone and geologic unit.

Table 5 Estimated Effective Porosities by Zone and Geologic Unit

		Effective Porosity		
Zone	Formation	NMR	Aquifer Testing	Average
1	UMCf	0.11	0.03	0.07
2	Alluvium	0.06	0.08	0.07
2	UMCf	0.05	0.02	0.03
3	UMCf-cg	0.06	0.07	0.07

4.2.1.4 Injection Rates

Injection rates were estimated based on site injection experience during previous and on-going treatability studies, a review of hydraulic properties, and targeted saturated thickness, and therefore, vary at each remediation zone. Specifically, injections rates estimated were as follows:

- Zone 1 Study Area – 10 gpm into the UMCf
- Zone 2 Study Area – 30 gpm into the alluvium; 5 gpm into the UMCf
- Zone 3 Study Area – 15 gpm into the UMCf-cg

It should be noted that actual injection rates may vary during field operations based on individual flow and pressure responses that occur in specific injection wells, primarily due to the varying heterogeneity at this site. Also, because injections will be performed at multiple injection wells at a single time, there could be hydraulic variations that occur with distance resulting in a range of injection rates. Lastly, modifications to the injection rates and pressures will be modified as required based on field observations during injections.

4.2.2 Model Results

Figures were generated from the screening level models to show groundwater level change from injection (i.e., mounding) at the end of injection and particle pathlines after a total of 14 days. Each figure contains a summary table of the model parameters and injection regime. Results for each zone are described below.

4.2.2.1 Zone 1 – UMCf

Figures I.1 through I.3 show the model results from Simulations 1 through 3 for Zone 1 in the UMCf. The magnitude of groundwater mounding is highest in Simulation 1 (15-foot injection well spacings) then reduces in Simulations 2 and 3 (25 and 35-foot injection well spacings, respectively). This is due to the closer spacing of the wells and the effects of superposition. Given the magnitude of the mounding in Simulation 1, it is recommended that a larger well spacing be used. Simulation 3 has lower mounding than Simulation 1. However, the particle pathlines are spread further apart between the injection wells than the other two simulations. These stagnation zones are areas that injectate may not enter during the injection period. Therefore, Simulation 2 (25-foot injection well spacing) provides a good balance with both decreased groundwater mounding and a smaller stagnation zone width.

4.2.2.2 Zone 2 – Alluvium

Figures I.4 through I.6 shows the model results for Simulations 1 (25-foot spacing), 2 (35-foot spacing), and 3 (45-foot spacing) for Zone 2 in the alluvium. Similar to Zone 1, the injection well spacing for Simulation 3 is sufficiently large to cause fairly wide stagnation zones that would be expected to interfere with reasonable distribution of injectate. Groundwater mounding is not a concern in the alluvial deposits due to the higher hydraulic conductivity and so is not an important consideration in evaluation of injection well spacing. Both Simulation 1 and Simulation 2 had adequate ROI. However, since Simulation 1 requires the installation of three additional injection wells compared to Simulation 2, it is recommended that the selected injection well spacing to be tested during this pilot study be 35-foot spacings (Simulation 2).

4.2.2.3 Zone 2 – UMCf

Figures I.7 through I.9 shows the model results for Simulations 1 through 3 for Zone 2 in the UMCf. Even though this zone has lower saturated thickness and effective porosity than the other zones, it shows a similar pattern in mounding and particle pathlines as Zone 1. Simulation 1 (15-foot spacing) has significant mounding and Simulation 3 (35-foot spacing) has the largest stagnation zones. Therefore, the Simulation 2 well spacing of 25 feet is recommended.

4.2.2.4 Zone 3 – UMCf

Figures I.10 through I.12 display model results for Simulations 1, 2, and 3 for Zone 3 (15-, 25-, and 35-foot spacings, respectively) in the UMCf-cg. Groundwater mounding for this zone is less than the other UMCf zones due to an approximate factor of 4 higher hydraulic conductivity. Therefore, despite using a higher injection rate of 15 gpm, the mounding is still not excessive. Simulations 1 and 2 both had adequate ROI, while Simulation 3 had fairly large stagnation zones which would be expected to interfere with injectate distribution. Therefore, since Simulation 1 requires installation of four more wells than Simulation 2 and doesn't provide a significant improvement in ROI, the 25-foot spacing used in Simulation 2 is recommended.

5.0 RECOMMENDED INJECTION SPACINGS AND INJECTATE QUANTITIES

Based on the information provided herein and modeling scenarios simulated, the recommended injection spacing and preliminary injection volumes for the first injection event are provided in ***Table 6***. As previously noted, the injection volumes will be refined based on data collected during pilot boring well installation, final injection well construction information, and data collected during baseline groundwater sampling and aquifer testing. Injection volumes during subsequent injection events will continue to be refined based on on-going effectiveness monitoring results. All collected data and details on the refinement of the injection volumes will be provided in the monthly progress reports.

Table 6 Recommended Injection Well Spacing and Preliminary Injectate Quantities

Study Area	Injection Well Spacing (ft)	Approximate Substrate Quantities (gallons)	Approximate Injection Volumes (gallons)
Zone 1 – UMCf Only	25	6,100	144,000
Zone 2 – Alluvium	35	13,000	249,500
Zone 2 – UMCf	25	3,300	33,000
Zone 3 – UMCf-cg Only	25	7,000	164,500

6.0 REFERENCES

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Attachment 1

Zone 1 Calculations and Modeling Simulations

Table I.1. Input Parameters for Design Calculations
Zone 1 Study Area – UMCf Only

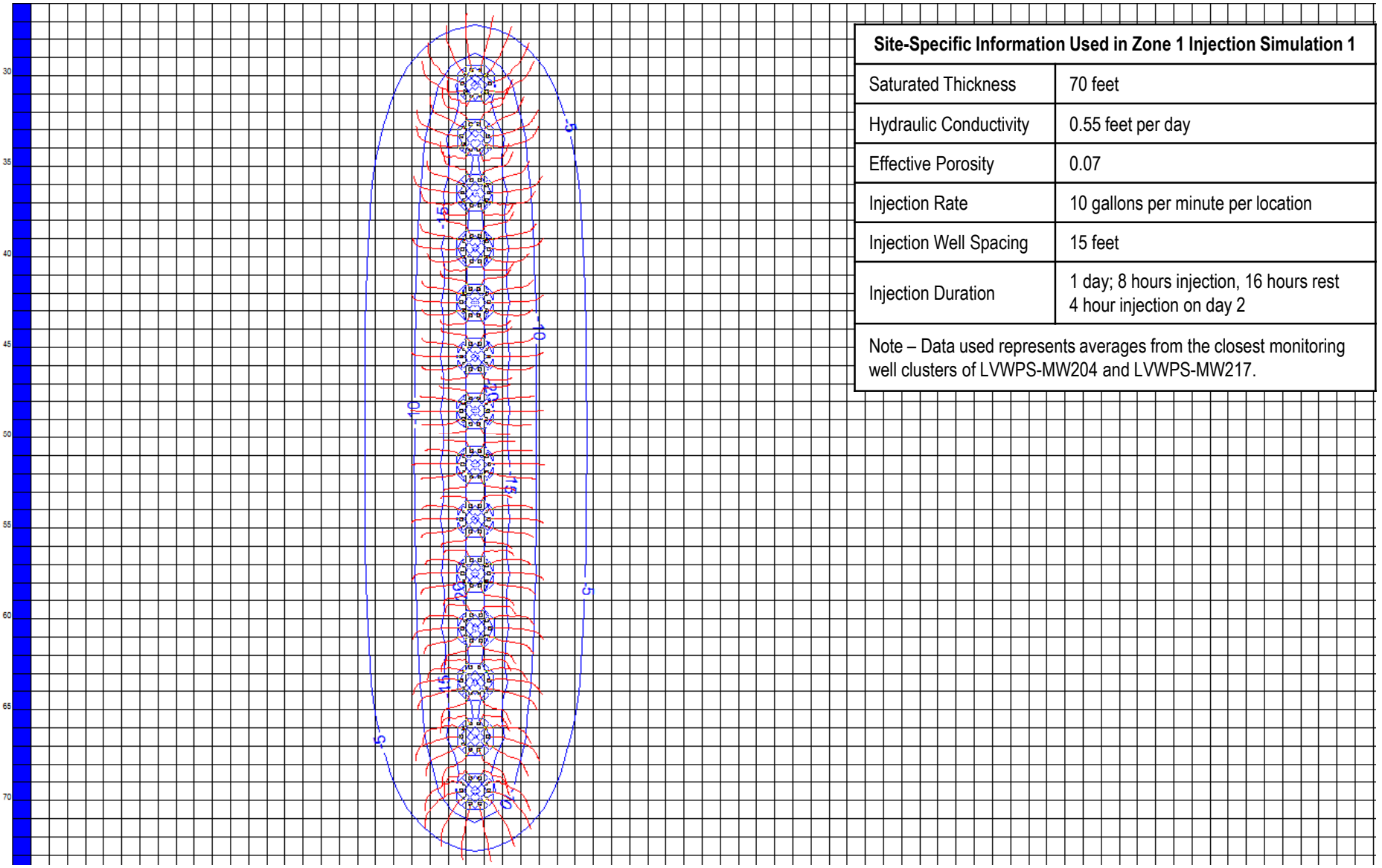
Parameters	Value	Notes
Injection Transect Length (ft)	200	
Targeted Treatment Thickness (ft)	70	Dual-nested injection wells to address large saturated thickness
Effective Porosity	0.07	As described in Section 4.2.1.3
Wet Soil Density (lbs/ft^3)	103	Estimated from the average wet soil density of the UMCf determined from Shelby tube samples collected during installation of monitoring wells LVWPS-MW202 and LVWPS-MW209.
Density of Substrate (lbs/gal)	8.08	Density of EOS PRO
Oil Retention Ratio (lb of oil/lb of soil)	0.0035	Approximated for purposes of preliminary design calculations using site-specific data, bench-scale adsorption studies, lessons learned from previous NERT studies, literature values, prior practitioner experience, and vendor consultation; Ratio could vary in final design depending on targeted lithology, hydrogeology, and geochemistry following injection well installation and baseline groundwater sampling.
Design Factor	0.5	Factor determined by remedial designer; Estimated based on technical experience from other ISB studies, site geochemistry (i.e., goal of minimizing sulfate reduction), hydraulic properties of the targeted lithology (i.e., goal of minimizing permeability loss, accounting for higher or lower groundwater flow rates), and vendor consultation.

Notes:
ft – feet
lbs/ft^3 – pounds per cubic foot
lbs/gal – pounds per gallon
lb of oil/lb of soil – pounds of oil retained per pound of saturated soil

Table I.2. Injection Scenarios for Injection Well Transect Design
Zone 1 Study Area – UMCf Only

Parameters	Scenarios									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Well spacing (ft)	5	10	15	20	25	30	35	40	45	50
Number of Dual-Nested Injection Wells	40	20	14	10	8	7	6	5	5	4
Total Number of Injection Wells	80	40	28	20	16	14	12	10	10	8
Targeted Treated Soil Mass (lbs)	5,659,850	11,319,700	17,828,528	22,639,400	28,299,250	35,657,055	41,599,898	45,278,800	57,305,981	56,598,500
Injection Volume/Well Location (gal)	720	2,879	6,477	11,515	17,992	25,908	35,263	46,058	58,292	71,966
Injection Volume Total (gal)	28,786	57,573	90,677	115,146	143,932	181,354	211,580	230,291	291,462	287,864
Potential Substrate Required (lbs)	19,809	39,619	62,400	79,238	99,047	124,800	145,600	158,476	200,571	198,095
Potential Substrate Required (gal)	2,452	4,903	7,723	9,807	12,258	15,445	18,020	79,238	24,823	24,517
Designed Substrate Quantity (gal)	1,226	2,452	3,861	4,903	6,129	7,723	9,010	9,807	12,412	12,258

Notes:
ft– feet
lbs – pounds
gal – gallons



Site-Specific Information Used in Zone 1 Injection Simulation 1	
Saturated Thickness	70 feet
Hydraulic Conductivity	0.55 feet per day
Effective Porosity	0.07
Injection Rate	10 gallons per minute per location
Injection Well Spacing	15 feet
Injection Duration	1 day; 8 hours injection, 16 hours rest 4 hour injection on day 2
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW204 and LVWPS-MW217.	

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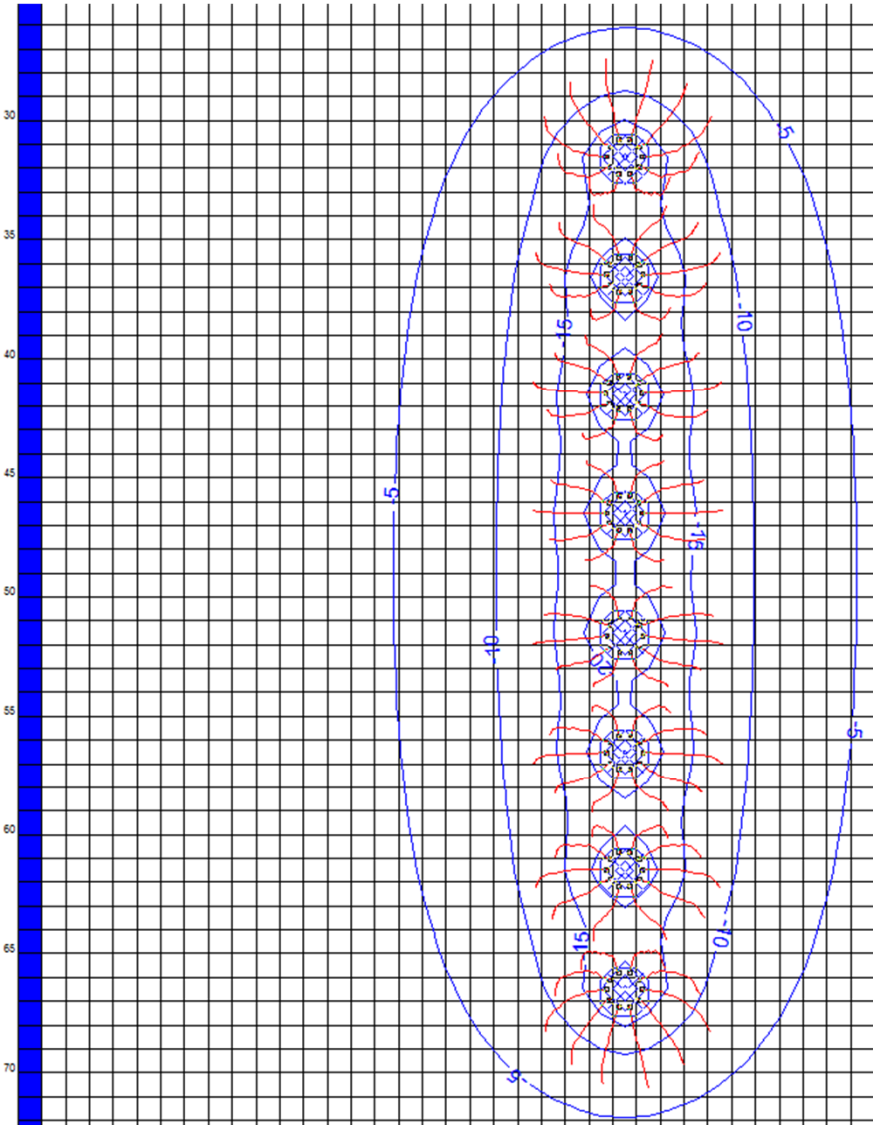
Figure No.
I.1



Site-Specific Information Used in Zone 1 Injection Simulation 2	
Saturated Thickness	70 feet
Hydraulic Conductivity	0.55 feet per day
Effective Porosity	0.07
Injection Rate	10 gallons per minute per location
Injection Well Spacing	25 feet
Injection Duration	3 days; 8 hours injection, 16 hours rest, 8 hour injection on day 4
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW204 and LVWPS-MW217.	

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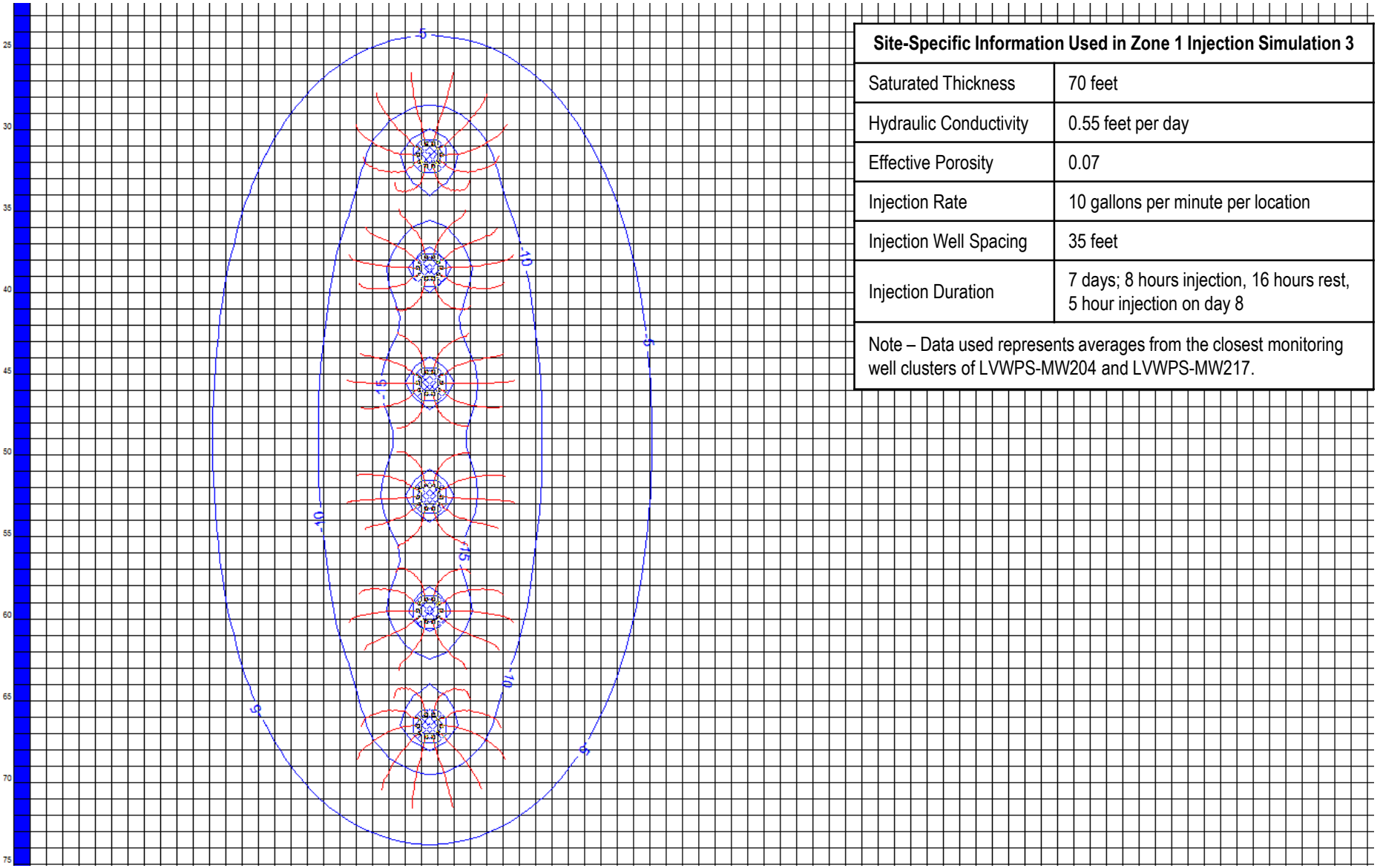

Site-Specific Information Used in Zone 1 Injection Simulation 3	
Saturated Thickness	70 feet
Hydraulic Conductivity	0.55 feet per day
Effective Porosity	0.07
Injection Rate	10 gallons per minute per location
Injection Well Spacing	35 feet
Injection Duration	7 days; 8 hours injection, 16 hours rest, 5 hour injection on day 8
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW204 and LVWPS-MW217.	

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Figure No.
I.3

Zone 2 Calculations and Modeling Simulations

Table I.3. Input Parameters for Design Calculations
Zone 2 Study Area - Alluvium

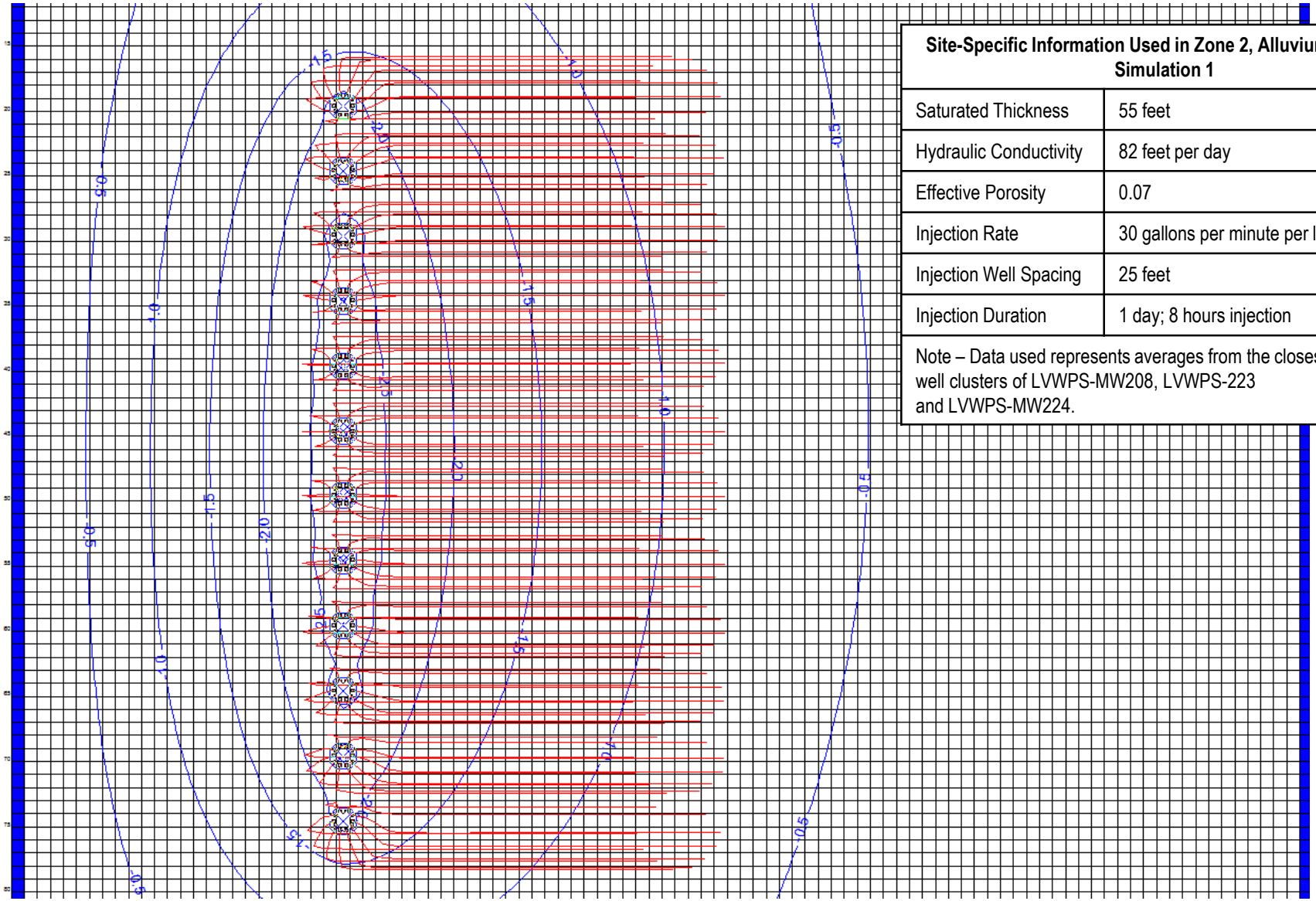
Parameters	Value	Notes
Injection Transect Length (ft)	300	
Targeted Treatment Thickness (ft)	55	Dual-nested injection wells to address large saturated thickness
Effective Porosity	0.07	As described in Section 4.2.1.3
Wet Soil Density (lbs/ft^3)	110	Estimated from the average wet soil density of the alluvium determined from Shelby tube samples collected during installation of monitoring wells LVWPS-MW202 and LVWPS-MW209.
Density of Substrate (lbs/gal)	8.08	Density of EOS PRO
Oil Retention Ratio (lb of oil/lb of soil)	0.002	Approximated for purposes of preliminary design calculations using site-specific data, bench-scale adsorption studies, lessons learned from previous NERT studies, literature values, prior practitioner experience, and vendor consultation; Ratio could vary in final design depending on targeted lithology, hydrogeology, and geochemistry following injection well installation and baseline groundwater sampling.
Design Factor	1.0	Factor determined by remedial designer; Estimated based on technical experience from other ISB studies, site geochemistry (i.e., goal of minimizing sulfate reduction), hydraulic properties of the targeted lithology (i.e., goal of minimizing permeability loss, accounting for higher or lower groundwater flow rates), and vendor consultation.

Notes:
ft – feet
lbs/ft^3 – pounds per cubic foot
lbs/gal – pounds per gallon
lb of oil/lb of soil – pounds of oil retained per pound of saturated soil

Table I.4. Injection Scenarios for Injection Well Transect Design
Zone 2 Study Area – Alluvium

Parameters	Scenarios									
	1	2	3	4	5	6	7	8	9	10
Well spacing (ft)	5	10	15	20	25	30	35	40	45	50
Number of Dual-Nested Injection Wells	60	30	20	15	12	10	9	8	7	6
Total Number of Injection Wells	120	60	40	30	24	20	18	16	14	12
Targeted Treated Soil Mass (lbs)	7,123,875	14,247,750	21,371,625	28,495,500	35,619,375	42,743,250	52,360,481	60,790,400	67,320,619	71,238,750
Injection Volume/Well Location (gal)	565	2,262	5,089	9,047	14,136	20,356	27,707	36,189	45,801	56,545
Injection Volume Total (gal)	33,927	67,854	101,781	135,707	169,634	203,561	249,362	289,509	320,609	339,268
Potential Substrate Required (lbs)	14,248	28,496	42,743	56,991	71,239	85,487	104,721	121,581	136,641	142,478
Potential Substrate Required (gal)	1,763	3,527	5,290	7,053	8,817	10,580	12,961	15,047	16,664	17,633
Designed Substrate Quantity (gal)	1,763	3,527	5,290	7,053	8,817	10,580	12,961	15,047	16,664	17,633

Notes:
ft– feet
lbs – pounds
gal – gallons



Site-Specific Information Used in Zone 2, Alluvium Injection Simulation 1	
Saturated Thickness	55 feet
Hydraulic Conductivity	82 feet per day
Effective Porosity	0.07
Injection Rate	30 gallons per minute per location
Injection Well Spacing	25 feet
Injection Duration	1 day; 8 hours injection
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW208, LVWPS-223 and LVWPS-MW224.	

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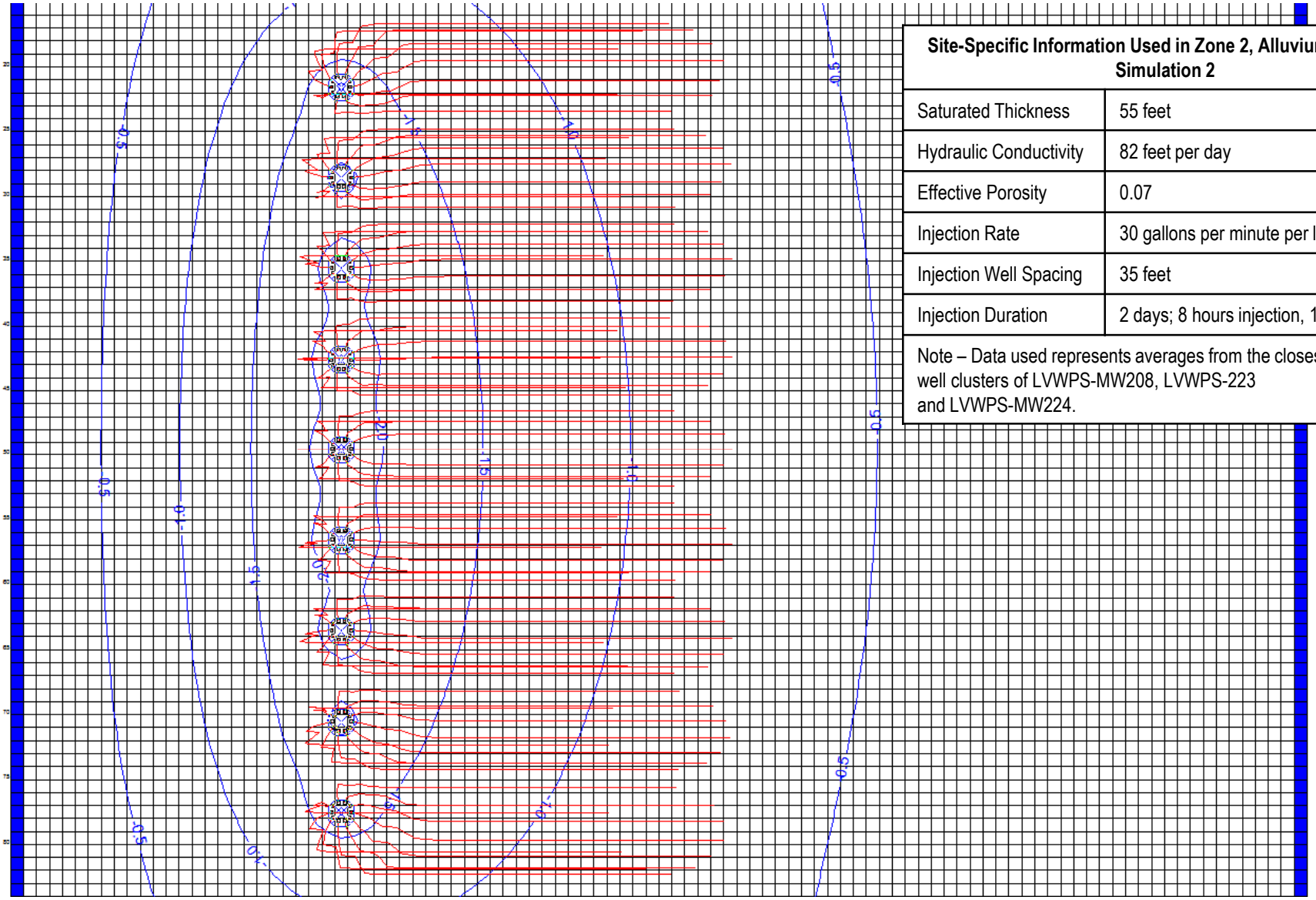

Site-Specific Information Used in Zone 2, Alluvium Injection Simulation 2	
Saturated Thickness	55 feet
Hydraulic Conductivity	82 feet per day
Effective Porosity	0.07
Injection Rate	30 gallons per minute per location
Injection Well Spacing	35 feet
Injection Duration	2 days; 8 hours injection, 16 hours rest

Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW208, LVWPS-223 and LVWPS-MW224.

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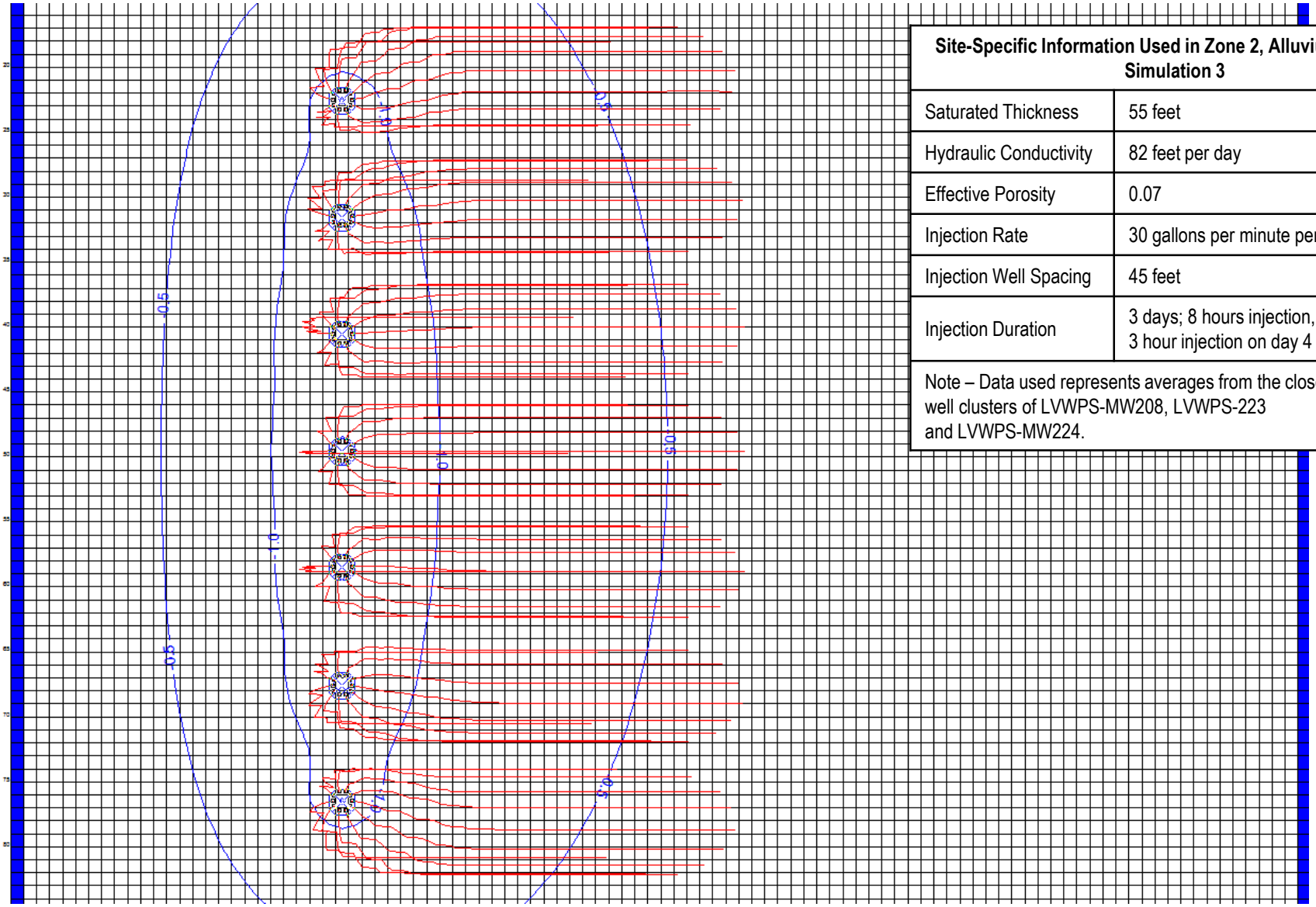

Site-Specific Information Used in Zone 2, Alluvium Injection Simulation 3	
Saturated Thickness	55 feet
Hydraulic Conductivity	82 feet per day
Effective Porosity	0.07
Injection Rate	30 gallons per minute per location
Injection Well Spacing	45 feet
Injection Duration	3 days; 8 hours injection, 16 hours rest 3 hour injection on day 4
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW208, LVWPS-223 and LVWPS-MW224.	

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Figure No.
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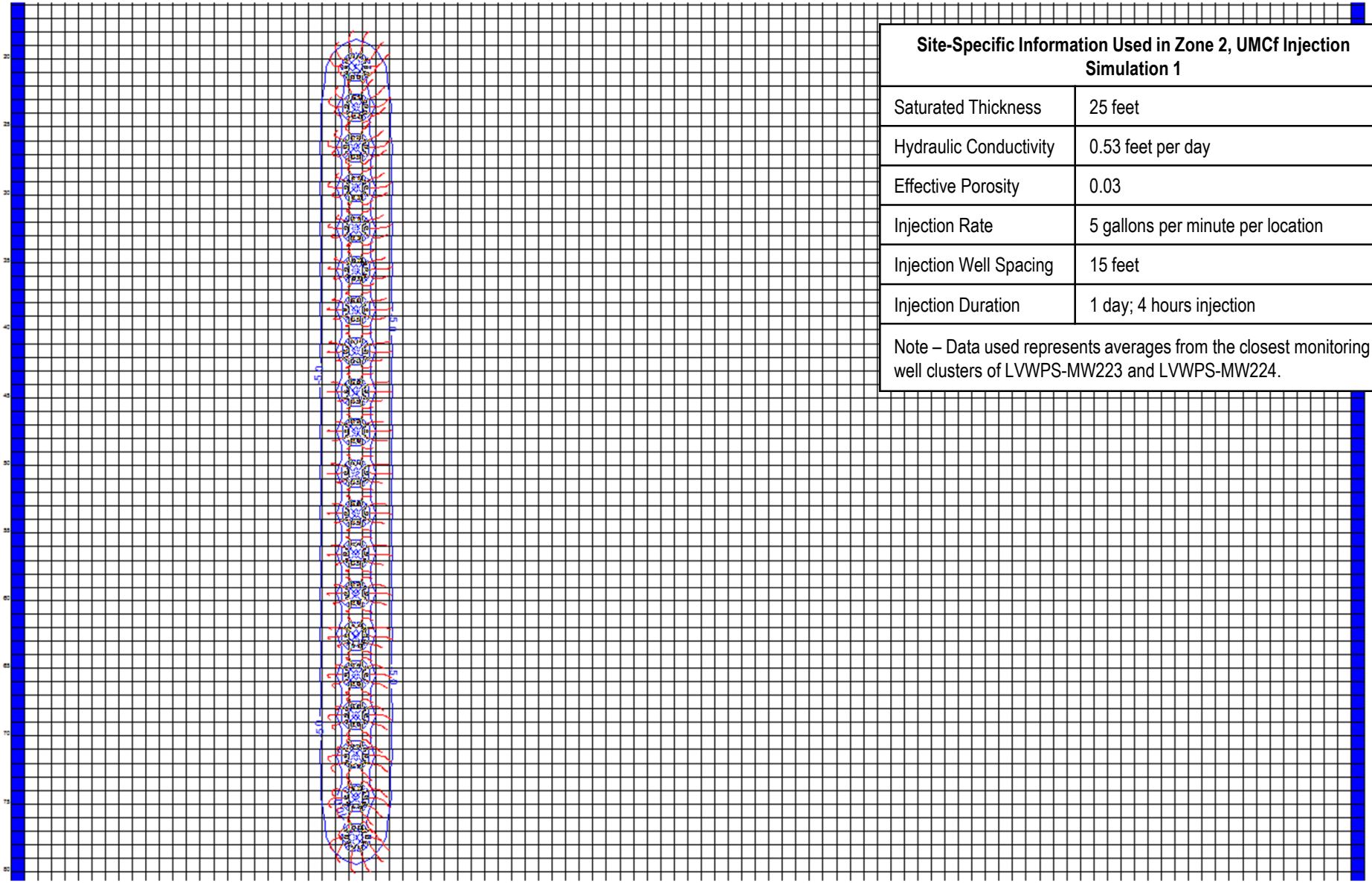
Table I.5. Input Parameters for Design Calculations
Zone 2 Study Area – UMCf

Parameters	Value	Notes
Injection Transect Length (ft)	300	
Targeted Treatment Thickness (ft)	25	Single injection well at each location
Effective Porosity	0.03	As described in Section 4.2.1.3
Wet Soil Density (lbs/ft^3)	103	Estimated from the average wet soil density of the UMCf determined from Shelby tube samples collected during installation of monitoring wells LVWPS-MW202 and LVWPS-MW209.
Density of Substrate (lbs/gal)	8.08	Density of EOS PRO
Oil Retention Ratio (lb of oil/lb of soil)	0.0035	Approximated for purposes of preliminary design calculations using site-specific data, bench-scale adsorption studies, lessons learned from previous NERT studies, literature values, prior practitioner experience, and vendor consultation; Ratio could vary in final design depending on targeted lithology, hydrogeology, and geochemistry following injection well installation and baseline groundwater sampling.
Design Factor	0.5	Factor determined by remedial designer; Estimated based on technical experience from other ISB studies, site geochemistry (i.e., goal of minimizing sulfate reduction), hydraulic properties of the targeted lithology (i.e., goal of minimizing permeability loss, accounting for higher or lower groundwater flow rates), and vendor consultation.

Table I.6. Injection Scenarios for Injection Well Transect Design
Zone 2 Study Area – UMCf

Parameters	Scenarios									
	1	2	3	4	5	6	7	8	9	10
Well spacing (ft)	5	10	15	20	25	30	35	40	45	50
Number of Single Injection Wells	60	30	20	15	12	10	9	8	7	6
Targeted Treated Soil Mass (lbs)	3,032,063	6,064,125	9,096,188	12,128,250	15,160,313	18,192,375	22,285,659	25,873,600	28,652,991	30,320,625
Injection Volume/Well Location (gal)	110	441	991	1,762	2,754	3,965	5,397	7,050	8,922	11,015
Injection Volume Total (gal)	6,609	13,218	19,827	26,437	33,046	39,655	48,577	56,398	62,456	66,091
Potential Substrate Required (lbs)	10,612	21,224	31,831	42449	53,061	63,673	78,000	90,558	100,285	106,122
Potential Substrate Required (gal)	1,313	2,627	3,940	5,254	6,567	7,880	9,653	11,208	12,412	13,134
Designed Substrate Quantity (gal)	657	1,313	1,970	2,627	3,283	3,940	4,827	5,604	6,206	6,567

Notes:
ft– feet
lbs – pounds
gal – gallons



Site-Specific Information Used in Zone 2, UMCf Injection Simulation 1	
Saturated Thickness	25 feet
Hydraulic Conductivity	0.53 feet per day
Effective Porosity	0.03
Injection Rate	5 gallons per minute per location
Injection Well Spacing	15 feet
Injection Duration	1 day; 4 hours injection
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW223 and LVWPS-MW224.	

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Figure No.
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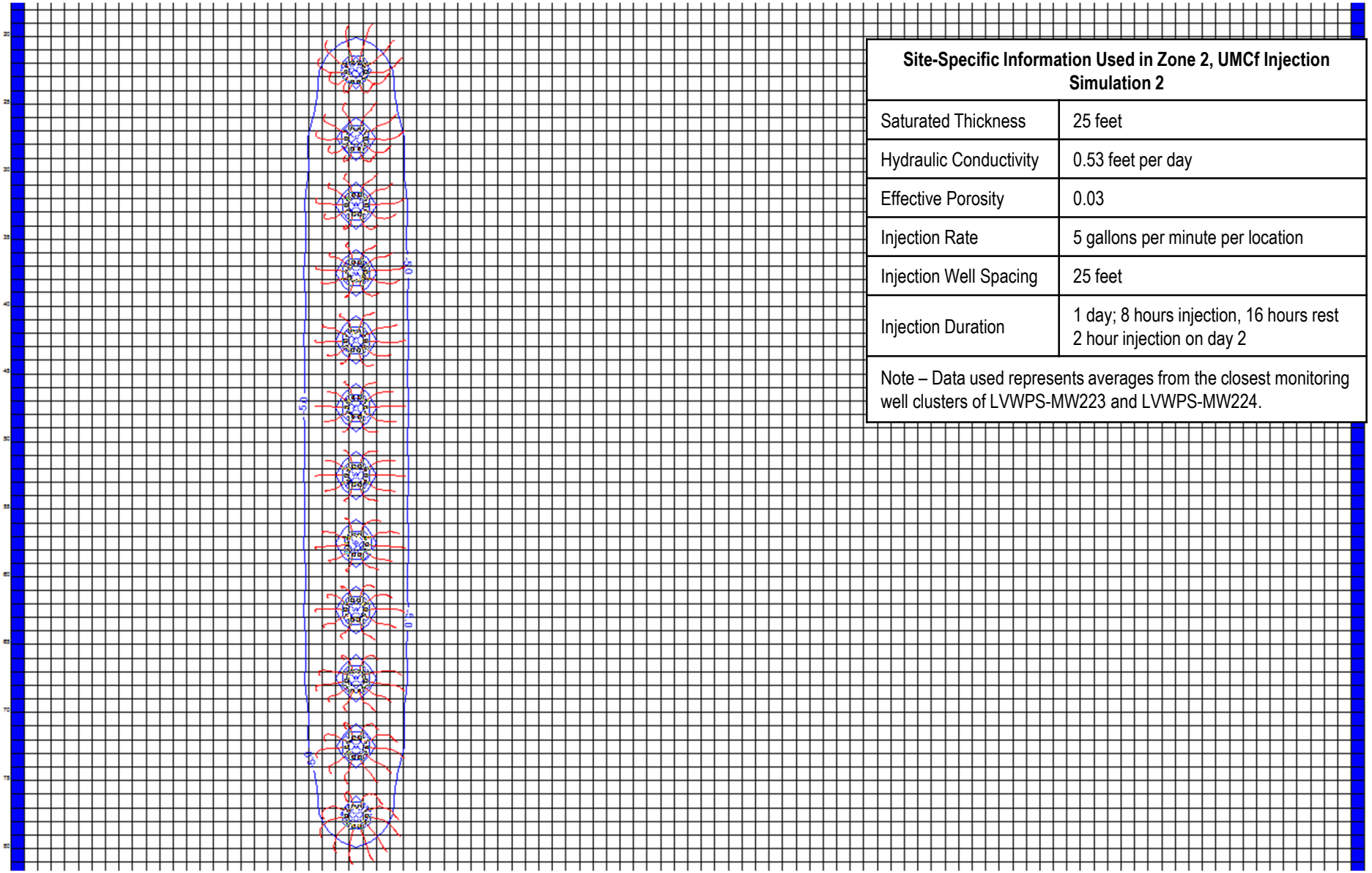

Site-Specific Information Used in Zone 2, UMCf Injection Simulation 2	
Saturated Thickness	25 feet
Hydraulic Conductivity	0.53 feet per day
Effective Porosity	0.03
Injection Rate	5 gallons per minute per location
Injection Well Spacing	25 feet
Injection Duration	1 day; 8 hours injection, 16 hours rest 2 hour injection on day 2
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW223 and LVWPS-MW224.	

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Figure No.
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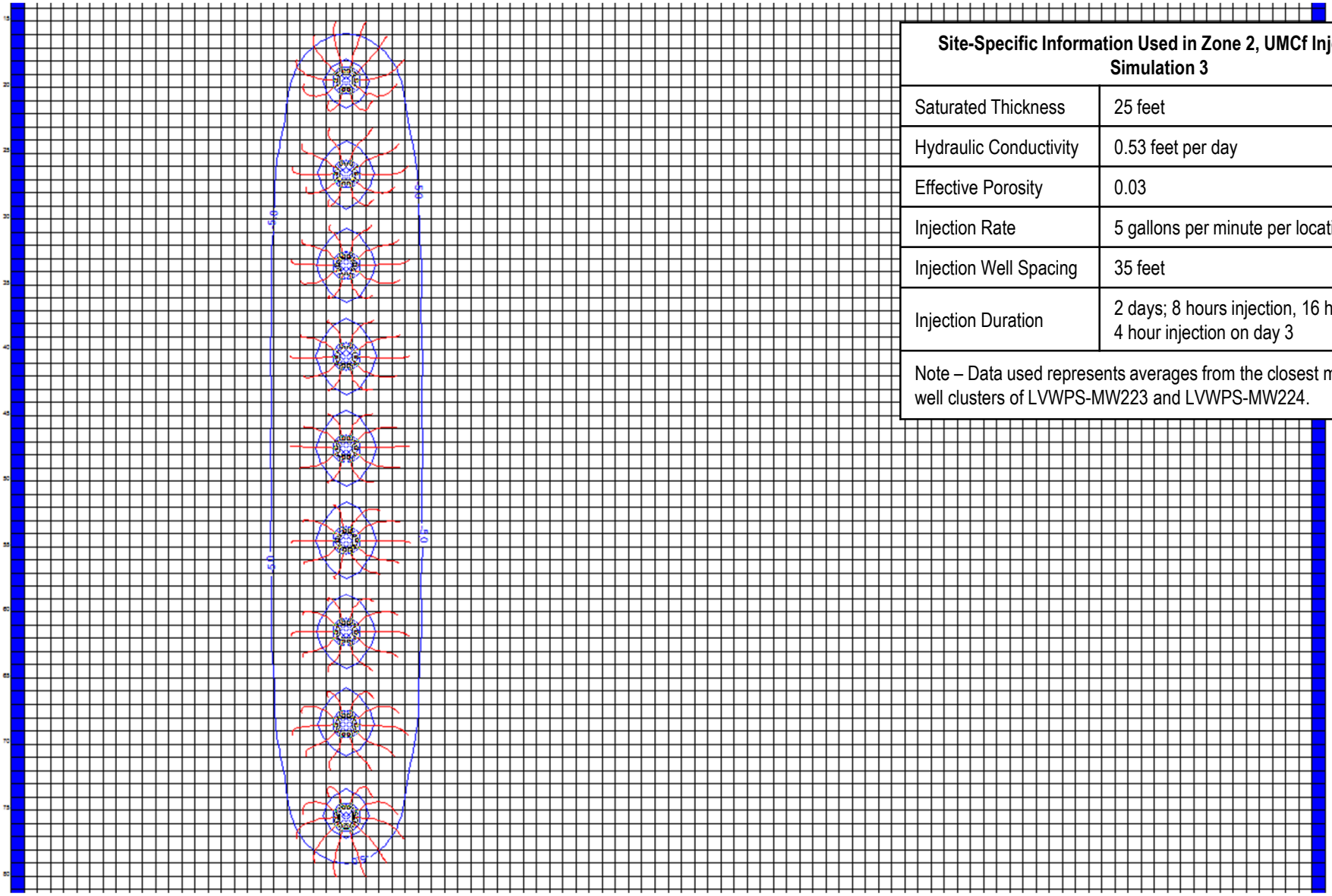

Site-Specific Information Used in Zone 2, UMCf Injection Simulation 3	
Saturated Thickness	25 feet
Hydraulic Conductivity	0.53 feet per day
Effective Porosity	0.03
Injection Rate	5 gallons per minute per location
Injection Well Spacing	35 feet
Injection Duration	2 days; 8 hours injection, 16 hours rest 4 hour injection on day 3
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW223 and LVWPS-MW224.	

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LAS VEGAS WASH BIOREMEDIATION PILOT STUDY WORK PLAN ADDENDUM
HENDERSON, NEVADA

Zone 2 – UMCf – Screening Model Injection Simulation 3

Project No.:	117-7502018
Date:	JULY 12, 2019
Designed By:	ACC

Figure No.
I.9

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Zone 3 Calculations and Modeling Simulations

Table I.7. Input Parameters for Design Calculations
Zone 3 Study Area – UMCf-cg Only

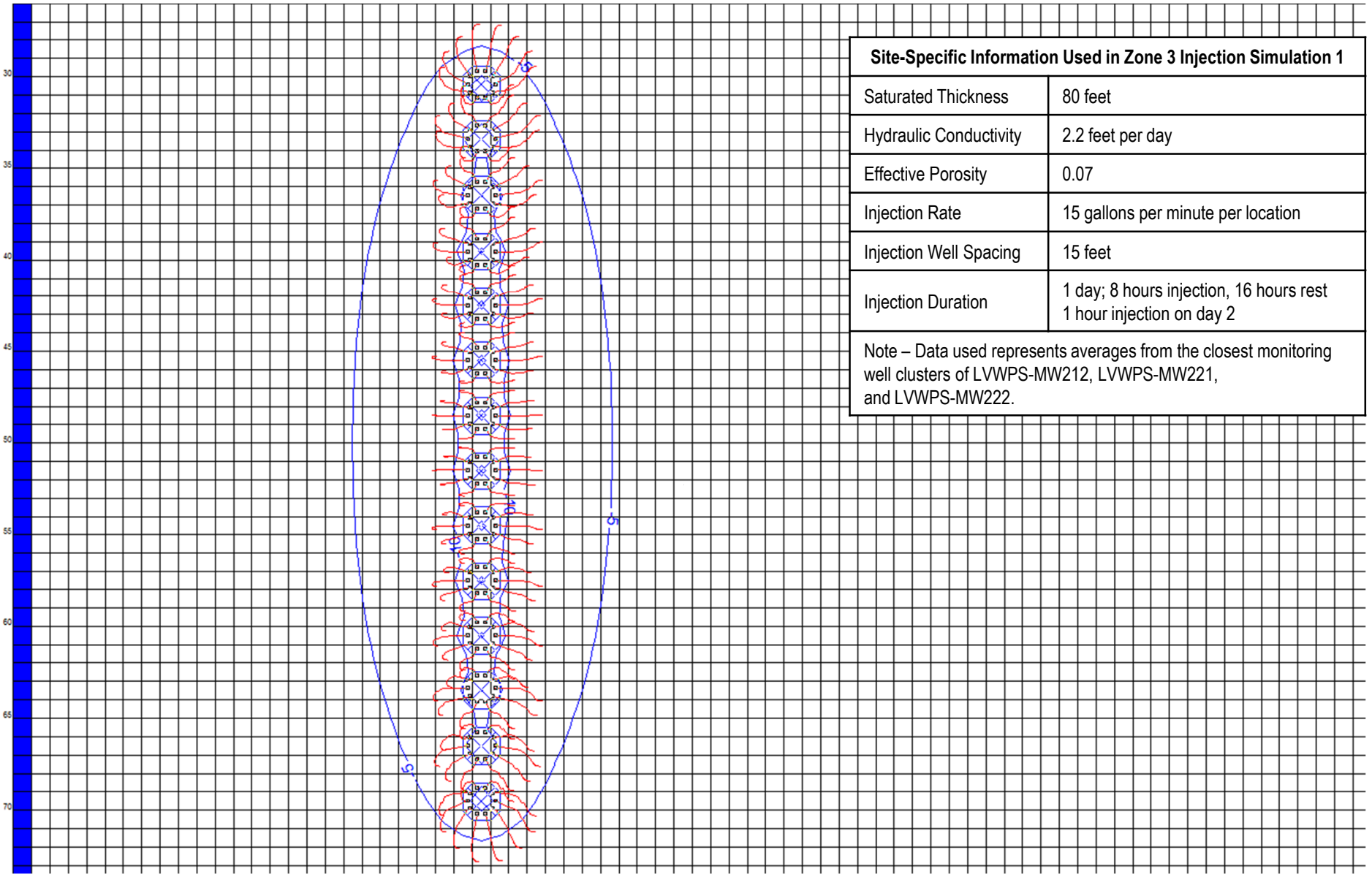
Parameters	Value	Notes
Injection Transect Length (ft)	200	
Targeted Treatment Thickness (ft)	80	Dual-nested injection wells to address large saturated thickness
Effective Porosity	0.07	As described in Section 4.2.1.3
Wet Soil Density (lbs/ft^3)	110	Estimated from the average wet soil density of the UMCf determined from Shelby tube samples collected during installation of monitoring wells LVWPS-MW202 and LVWPS-MW209.
Density of Substrate (lbs/gal)	8.08	Density of EOS PRO
Oil Retention Ratio (lb of oil/lb of soil)	0.0035	Approximated for purposes of preliminary design calculations using site-specific data, bench-scale adsorption studies, lessons learned from previous NERT studies, literature values, prior practitioner experience, and vendor consultation; Ratio could vary in final design depending on targeted lithology, hydrogeology, and geochemistry following injection well installation and baseline groundwater sampling.
Design Factor	0.5	Factor determined by remedial designer; Estimated based on technical experience from other ISB studies, site geochemistry (i.e., goal of minimizing sulfate reduction), hydraulic properties of the targeted lithology (i.e., goal of minimizing permeability loss, accounting for higher or lower groundwater flow rates), and vendor consultation.

Notes:
ft – feet
lbs/ft^3 – pounds per cubic foot
lbs/gal – pounds per gallon
lb of oil/lb of soil – pounds of oil retained per pound of saturated soil

Table I.8. Injection Scenarios for Injection Well Transect Design
Zone 3 Study Area – UMCf-cg Only

Parameters	Scenarios									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Well spacing (ft)	5	10	15	20	25	30	35	40	45	50
Number of Dual- or Triple-Nested Injection Well Locations	40	20	14	10	8	7	6	5	5	4
Total Number of Injection Wells (assumed 75% dual- and 25% triple-nested)	90	45	32	23	18	16	14	11	11	9
Targeted Treated Soil Mass (lbs)	6,468,400	12,936,800	20,375,460	25,873,600	32,342,000	40,750,920	47,542,740	51,747,200	65,492,550	64,684,000
Injection Volume/Well Location (gal)	822	3,290	7,402	13,160	20,562	29,609	40,301	52,638	66,620	82,247
Injection Volume Total (gal)	32,899	65,798	103,631	131,595	164,494	207,262	241,806	263,190	333,100	328,988
Potential Substrate Required (lbs)	22,639	45,279	71,314	90,558	113,197	142,628	166,400	181,115	206,302	226,394
Potential Substrate Required (gal)	2,802	5,604	8,826	11,208	14,010	17,652	20,594	22,415	25,532	28,019
Designed Substrate Quantity (gal)	1,401	2,802	4,413	5,604	7,005	8,826	10,297	11,208	12,769	14,010

Notes:
ft– feet
lbs – pounds
gal – gallons



Site-Specific Information Used in Zone 3 Injection Simulation 1	
Saturated Thickness	80 feet
Hydraulic Conductivity	2.2 feet per day
Effective Porosity	0.07
Injection Rate	15 gallons per minute per location
Injection Well Spacing	15 feet
Injection Duration	1 day; 8 hours injection, 16 hours rest 1 hour injection on day 2
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW212, LVWPS-MW221, and LVWPS-MW222.	

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Zone 3 – UMCf-cg Only – Screening Model Injection Simulation 1

Project No.:	117-7502018
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Designed By:	SRH

Figure No.
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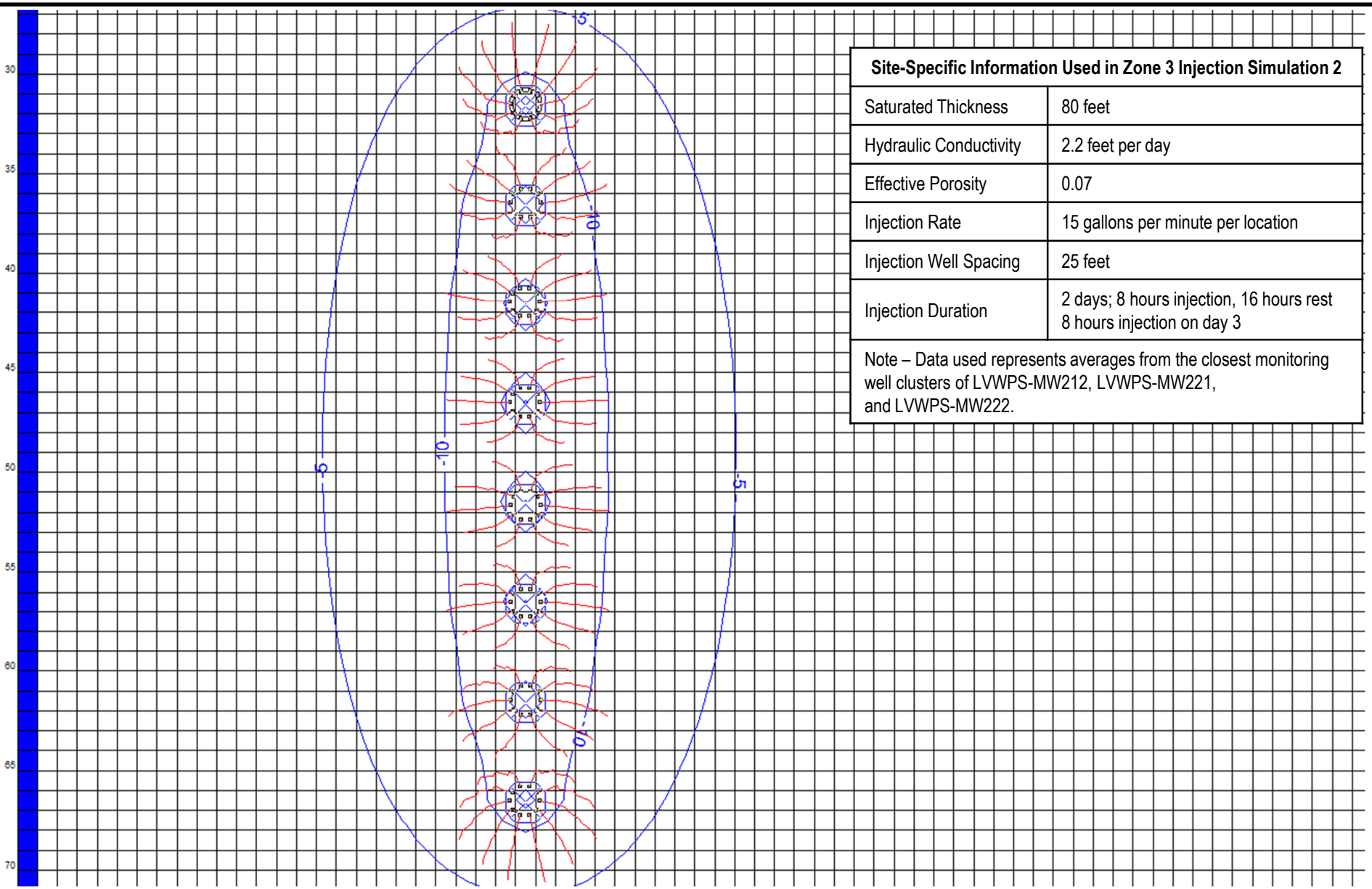

Site-Specific Information Used in Zone 3 Injection Simulation 2	
Saturated Thickness	80 feet
Hydraulic Conductivity	2.2 feet per day
Effective Porosity	0.07
Injection Rate	15 gallons per minute per location
Injection Well Spacing	25 feet
Injection Duration	2 days; 8 hours injection, 16 hours rest 8 hours injection on day 3
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW212, LVWPS-MW221, and LVWPS-MW222.	

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HENDERSON, NEVADA

Zone 3 – UMCf-cg Only – Screening Model Injection Simulation 2

Project No.:	117-7502018
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Designed By:	SRH

Figure No.
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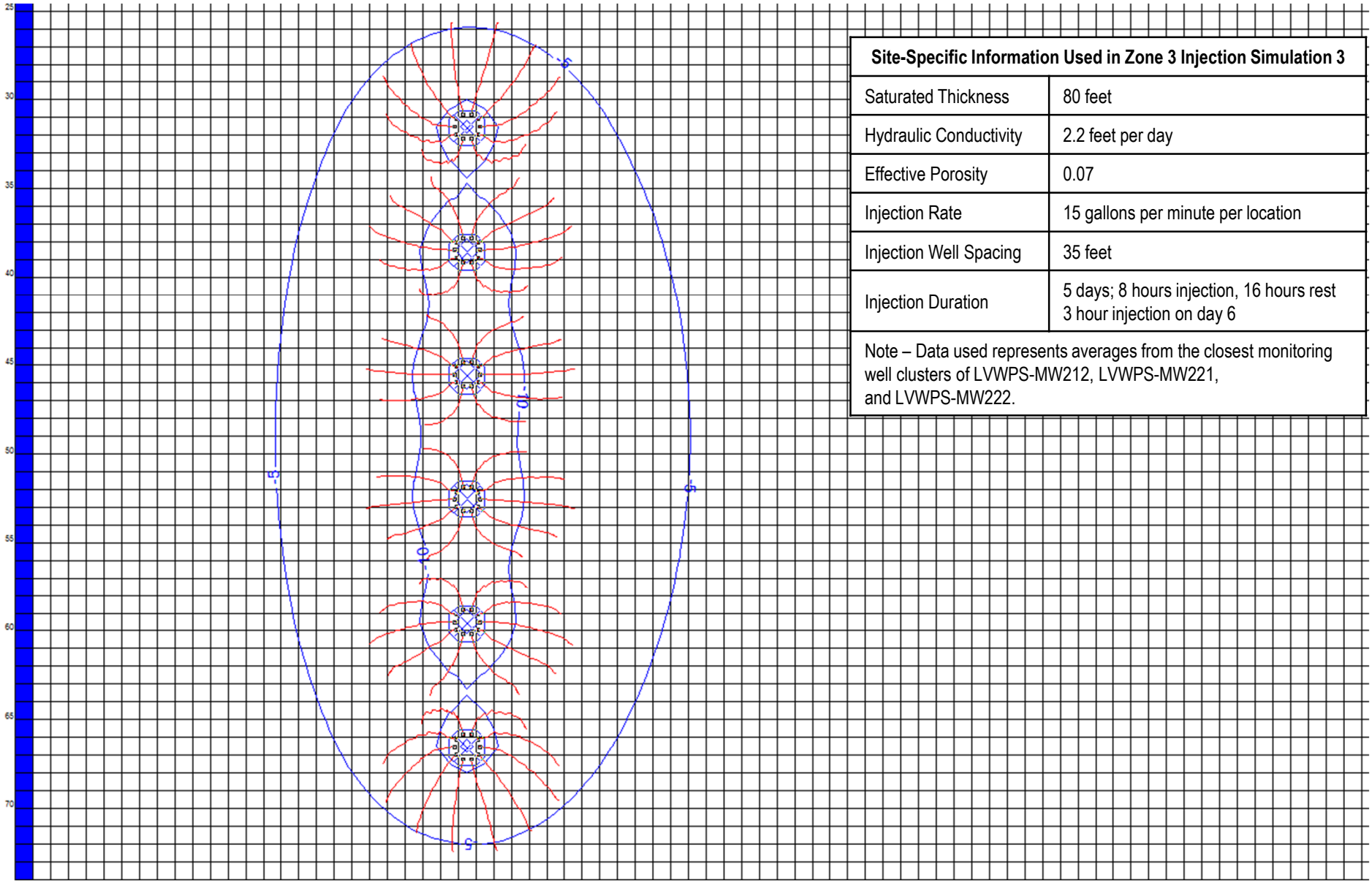

Site-Specific Information Used in Zone 3 Injection Simulation 3	
Saturated Thickness	80 feet
Hydraulic Conductivity	2.2 feet per day
Effective Porosity	0.07
Injection Rate	15 gallons per minute per location
Injection Well Spacing	35 feet
Injection Duration	5 days; 8 hours injection, 16 hours rest 3 hour injection on day 6
Note – Data used represents averages from the closest monitoring well clusters of LVWPS-MW212, LVWPS-MW221, and LVWPS-MW222.	

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Appendix J
Field Guidance Document for Injections

Summary: This Field Guidance Document (FGD) describes the general equipment and methodology to be used for batch mixing and injection of carbon substrate, amendments, and distribution water to ensure mixture consistency and appropriate subsurface distribution to promote in-situ bioremediation (ISB).

This FGD has been customized based on previous injection experience conducting ISB programs for the Nevada Environmental Response Trust (NERT). ISB injections into various lithologies including the alluvium, Upper Muddy Creek formation (UMCf), and UMCf-coarse grained (UMCf-cg) will be conducted as part of this pilot study. As a result, general procedures and equipment sizing/specifications may require modification depending on the targeted lithology (i.e., alluvium, UMCf, or UMCf-cg), total injectate quantities, and targeted injection rates. Because this is a pilot study (i.e. not final remedy), this FGD may be periodically updated based on the lessons learned during injections. It should be noted that this FGD follows general guidance and concurrence from EOS® Remediation, the inventor and distributor of the emulsified vegetable oil (EVO) product called EOS®, which is currently being used as the primary carbon substrate. Should a different carbon substrate be implemented, different mixing and injection procedures may be required.

Procedure:

1.0 INJECTION PROCEDURES

1.1 PERSONAL PROTECTIVE EQUIPMENT

At a minimum, the following personal protection equipment (PPE) is required for this task:

- Level D PPE consisting of: Hard hat (if overhead hazards are present), safety glasses, high visibility traffic vest, nitrile gloves, steel toe safety boots, and hearing protection (if noise hazards are present); and
- Additional PPE required during mixing operations should consist of long-sleeve shirts, cut proof gloves, face shields, dust masks, and spoggles (combined safety glass and goggle).

1.2 SITE PREPARATION

Before beginning any injection operations, the following preparations must take place:

- All personnel working at or in the immediate vicinity of the injection system are fitted with appropriate PPE;
- Combustible materials including (but not limited to) fuels, lubricants, and

coated rags are kept away from the work area; and

- All personnel review the safety data sheets (SDSs) for chemicals to be injected provided in Attachment A.

1.3 SYSTEM SPECIFICATIONS

The contractor will mobilize all equipment required for the injection system platform and associated equipment, which includes the following:

- Minimum of two double-walled frac tanks, typically each with a minimum working volume of 16,400 gallons, but may slightly vary depending on tank vendor;
- Generator to power injection trailer, typically a 300 kilo-volt-ampere (kva) generator (Tier 4 rated);
- Injection/extraction hosing consisting of 1-inch injection hose inserted into 2-inch lay-flat polyvinyl chloride (PVC) hose that is free of holes with water tight couplings securely fitted such that the 2-inch hose serves as secondary containment for the injection lines;
- Manifolds with flow meters for each injection line (capacity to connect to multiple injection wells simultaneously, depending on application);
- Flow meters with flow rate and totalizing capabilities placed using cam lock or quick connect fittings to insure quick and efficient replacement or cleaning, as needed;
- Glycerin-filled pressure gauges to be connected at each injection wellhead with a maximum range of 0 to 60 pounds per square inch (psi) to monitor back pressure during injections;
- Portable centrifugal pumps (typically each pump consists of a 75-horsepower system with up to 240 gallons per minute [gpm] nominal flow capacity, with multiple pumps required for larger targeted injection rates and targeted lithology) with 100% capacity recirculation line for injection of injectate solution and distribution water; Note: two pumps shall be mobilized so that there is one pump for injections and an additional pump as back up;
- Air operated double diaphragm pump(s) (typically 2-inch pumps with an approximate 140 gpm nominal flow capacity; diesel air compressor with approximately 175 to 195 cubic feet per minute) complete with a flow meter/totalizer to add chemicals to frac tanks;

- Submersible pump (typically a 6-inch pump with a 70 gpm flow capacity) and recirculation hose to recirculate injectate solution within the frac tank to ensure proper mixing;
- Submersible well pumps equipped for placement in 6-inch extraction wells (typically 4-inch pumps with 50 gpm nominal flow capacity installed with throttling valves and 1.5" Schedule 40 PVC pipe down well and 1.5" hose at surface) for extraction of groundwater;
- Portable generators (typically 7 kilowatts) to power submersible well pumps installed in extraction wells;
- Drip pans for potential seepage collection and containment at hose joints;
- Portable drip containment system with berms for injection system and oil tankers;
- Spill kits and portable vacuums; and
- 275-gallon plastic totes to containerize rinse water.

1.4 PROCEDURES FOR INJECTIONS OF CARBON SUBSTATE AND AMENDMENTS

This section provides an overview of the injection process and assumed that all injection wells and amendments have been pre-approved by the Nevada Division of Environmental Protection – Underground Injection Control.

1.4.1 INJECTION SYSTEM SET-UP

1. Set up portable drip containment for EVO tankers, amendments, and injection system platform and associated equipment.
2. Receive shipments of EVO (periodically delivered via 5,000-gallon tanker trucks as needed to minimize EVO on-site storage), chemical amendments (stored in original tightly closed containers until use), and frac tanks and place inside containment berms. Ensure all chemical containers are properly labeled. Record chemical name, supplier, delivery date and time, and quantity received for all injectate chemicals received on the Chemical Tracking Log field form provided in Attachment B. If required, provide notification to local fire department based on the quantity of chemicals that are ordered and stored on-site.
3. Place spill kits and portable vacuums within the work area for immediate deployment (as necessary).

4. Connect selected injection wells to the injection system via injection well connectors with pressure gauge.

5. Run injection hose from each injection well to a manifold system. The injection manifolds should be placed to minimize injection hose length required to reach each of the injection wells. Install flow meters on each outgoing injection line at the manifold to monitor injection flow rate and total gallons injected at each injection well. Install influent flow meter to monitor overall input into the manifold system.

6. Run 2-inch injection hose from each injection manifold to a centrifugal pump on the injection system platform. Connect centrifugal pump to frac tank discharge. Run 100% capacity recirculation line from the centrifugal pump to the frac tank.

7. Keep all injection line valves closed and centrifugal pumps off until injectate solution is properly mixed.

8. Install drip pans as secondary containment at connection points for injection hoses.

1.4.2 EXTRACTION SYSTEM SET-UP

This section provides an overview of the groundwater extraction process, which must be permitted by the Nevada Division of Water Resources and include a permit for each individual well used for extraction prior to extraction activities. This section is not applicable if the water source selected for injections is not extracted groundwater (i.e., City of Henderson municipal water, stabilized Lake Mead water, or other water source).

1. Measure depth to water and total well depth at each extraction well. Deploy submersible well pumps at each extraction point to specified depths. The groundwater is extracted using a submersible pump that is set at an appropriate depth in the required number of extraction wells. Install throttling valves to reduce flow to match yields as needed.

2. Set up portable generators to power extraction pumps. Run dual-walled hose from each extraction point to one of the frac tanks onsite. Install a flow meter on each extraction line to monitor flow rate and total gallons extracted from each extraction well. Mark each extraction point with traffic cones or similar high-visibility demarcation to alert vehicle traffic of uncovered well box and pump equipment.

3. If applicable based on field conditions encountered, install bag filters with basket strainers in parallel arrangement to filter extracted groundwater.

4. Turn on submersible pumps to start groundwater extraction system operation to begin accumulating extracted groundwater for batch mixing of injectate solution. Monitor and record extraction rates, extraction time periods, total volume extracted for each extraction well, and level of extracted groundwater that has accumulated in the frac tank in the Groundwater Extraction Log field form provided in Attachment B. Adjust throttling valves based on periodic well depth to water measurements to maintain steady and sustainable extraction rates.

1.4.3 BATCH MIXING

The injectate solution is to be mixed in the double-walled frac tanks in accordance with the batch formula specified for each injection event. Prior to implementing an injection event, all injectate solution quantities will be reviewed with the Nevada Division of Environmental Protection (NDEP). In general, the injectate solution will consist of EVO diluted with extracted groundwater or other approved water source (likely in a 1:4 [1 part EVO to 4 parts water] ratio, but may vary depending on the study application and objectives). Other amendments, such as phosphate solution, glycerin, and/or sodium sulfite (SDSs provided in Attachment A) will be added to each batch mixture in accordance with the batch formula. Finally, select injection events will include the injection of tracer dye in accordance with the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum. If extracted groundwater is used as the water source, the extraction wells will be sampled prior to the injection event to document the chemistry of the extracted groundwater.

Each batch of injectate solution will be prepared following a series of steps to ensure consistency in the mixing of the injectate solution.

1. Allow extracted groundwater pumped into the frac tank as described in Section 1.4.2 to accumulate until the desired volume of water for the injectate batch is achieved. The volume of extracted groundwater shall be determined based on the data obtained from the flow meters connected to each extraction well and by gauging the height to which the water has filled the frac tank. The height of the water in the frac tank is then compared to a chart provided by the frac tank vendor to confirm the volume in each tank. Record the time and volume of extracted groundwater addition on the Batch Mixing Log provided in Attachment B.

2. After the required volume of extracted groundwater for the individual batch has accumulated in the first frac tank in which the injectate solution will be mixed, move extraction lines to second frac tank to continue to accumulate groundwater for the next batch to be mixed.

3. After confirmation of the required extracted groundwater volume, all amendments will be prepared for transfer into the mixing frac tank. Personnel should don required PPE for chemical mixing (described in Section 1.1) prior to adding amendments to the mixing frac tank.

4. Prior to amendment addition, install a submersible pump (typically a 6-inch pump with a 70 gpm flow capacity) at one end of the tank, slowly lowering the pump using a stainless steel safety wire until the pump rests on the bottom of the tank. The pump is attached to a 2-inch recirculation hose that runs to the opposite end of the tank and then discharges to the top of the tank, recirculating the contents at a rate of approximately 70 gpm. The return recirculation hose shall be submerged to avoid cascading and aeration of injection solution. Recirculation will continue during the entire batch preparation process.

5. Continue operation of the submersible pump for continuous recirculation during the batch mixing process. Add the designed quantity of sodium sulfite, which is the first amendment to be added, directly into the top/front of the frac tank above the recirculation pump. Record the time and mass of sodium sulfite addition on the Batch Mixing Log provided in Attachment B.

6. Continue operation of the submersible pump for continuous recirculation during the batch mixing process. Using a 2-inch air diaphragm pump complete with 2-inch flow meter/totalizer to track the volume, add target volume of EVO, transferring the EVO from its delivery tanker to the front/top of mixing frac tank above the recirculation pump. The amount transferred is also confirmed by measuring the increase in tank volume (see Step 1 above). Record the time and volume of EVO addition on the Batch Mixing Log provided in Attachment B.

7. Continue operation of the submersible pump for continuous recirculation during the batch mixing process. Once the full volume of EVO transferred to the mixing frac tank has been confirmed and recorded, transfer the required volume of glycerin (second amendment to be added) to the front/top of the mixing frac tank, via an air diaphragm pump complete with flow meter/totalizer to track the volume of glycerin being added to the mixture. Record the time and volume of

glycerin and addition on the Batch Mixing Log provided in Attachment B.

8. Repeat the process described in Step 5 to add phosphate solution, which is the third amendment) and dye (if applicable) to the mixing frac tank.

9. After all amendments have been added to the mixing frac tank, continue running the submersible recirculation pump during the injection process while ensuring that the submersible recirculation pump remains adequately submerged. As the tank gets close to empty, turn off the recirculation pump before the submersible recirculation pump is no longer adequately submerged.

10. Record batch number, total volume, quantities and concentration of amendments, mixing equipment, and mixing time interval on the Batch Mixing Log field form provided in Attachment B.

11. Collect field readings for specific gravity and temperature of the injectate solution following mixing operations of each batch. Record readings on the Specific Gravity Log provided in Attachment B. Sample of injectate solution should be collected at the injectate solution sampling port (as indicated on the process flow diagram, Attachment C). Additionally, a stock injectate solution should be prepared using the EVO from each tanker truck delivered, extracted groundwater, and associated amendments. Measure and record temperature and specific gravity of the stock injectate solution on the Specific Gravity Log provided in Attachment B. The specific gravity measurement of the stock injectate solution will be used for comparison purposes to the regular measurements collected during the injection process to ensure mixture consistency (described in Section 1.4.4, Step 6).

1.4.4 Injection Operation

1. After the batch of injectate solution has been mixed in accordance with Section 1.4.3, reconfirm injection wells selected for injection are properly connected to manifold and injection system with valves closed in accordance with Section 1.4.1, Steps 4 through 7.

2. Turn on centrifugal pump to begin injection process. At each manifold, slowly open valves for each injection line, carefully monitoring flow rate and back pressure. Use pressure relief valve at each injection well head to purge air from each injection line with pressure relief tubing directed with tubing directing the sputtered injection solution into a bucket. Record injection start time, initial pressure, and flow rate data on the Daily Injection Log provided in Attachment B. Ensure that the

pressures observed at injection wells do not exceed the maximum permissible pressure as stated in the Underground Injection Control Permit issued for the Las Vegas Wash Bioremediation Pilot Study. If at any point, a pressure reading exceeds the maximum permissible pressure limit, immediately close valve to terminate injections at that injection well. Flow rates should be maximized to the extent possible while not exceeding the maximum permissible injection pressure limit.

3. During operation of the injection system, monitor and record flow rate and pressure readings at each injection well on an hourly basis on the Injection Pressure and Flow Rate Log provided in Attachment B.

4. Monitor total targeted volume prescribed for each injection well. When total volume injected for an injection well nears the target volume, closely monitor flow rate and volume. Upon reaching the targeted volume of injectate solution for an injection well, terminate injections at that injection well. Record time at which injections were terminated on the Daily Injection Log provided in Attachment B. Connect additional injection wells to manifold (as described in Section 1.4.1) and begin injections, as needed.

5. Monitor level of injectate solution in frac tank. Record injectate solution level and volume remaining in the frac tank on the Daily Injection Log provided in Attachment B.

6. Collect periodic samples from the injectate solution sampling port for field analysis of specific gravity and temperature to demonstrate injectate solution remains sufficiently mixed. Sample frequency may vary depending on application (batch size and injection rates). At a minimum, an initial specific gravity sample will be collected prior to initiating the injection of a new batch, followed by three subsequent samples throughout injection of each batch to ensure mixture consistency. Record readings on the Specific Gravity Log provided in Attachment B. Sample of injectate solution should be collected at the injectate solution sampling port (as indicated on the process flow diagram, Attachment C).

7. As extracted groundwater accumulates in additional frac tank(s), mix additional batches of injectate solution as described in Section 1.4.3, which includes resampling the batch solution for specific gravity and temperature to ensure consistency of injectate mixture in each batch. The mixing of additional batches should be performed concurrently while injecting the previously mixed batch from the other frac tank to minimize downtime. Injection rates should be considered in the timing of mixing additional batches so as to minimize the residence time of a batch solution within a tank prior to injection. After initial batch of

injectate solution is depleted, connect centrifugal pumps to frac tank in which the next batch of injectate solution has been mixed. Resume injections as described in Step 2 of this section.

8. Fill 275-gallon tote(s) with potable City of Henderson water from nearby hydrant. As amendment drums are emptied during batch mixing, rinse empty drums with a small amount (approximately 1 gallon per drum) of potable water in preparation for return to chemical supplier(s). Pour drum rinsate into mixing tank, and record addition of drum rinsate on Batch Mixing Log provided in Attachment B.

9. During the injection process, flow meters should be visually inspected during hourly field recordings (Section 1.4.4, Step 3). All flow meters should be calibrated (performing a controlled test from one graduated tank to another) prior to use and periodically recalibrated during off-days to ensure proper operation. Additional calibrated flow meters should be present at the site at all times to replace a malfunctioning flow meter as required.

10. After injection wells have received the target volume of injectate solution, begin injection of distribution water (extracted groundwater or other water source). Continue distribution water injection until injection wells have reached their target distribution water volume. Monitor extraction and injection rates of the system. Depending on extraction rates achieved, injection of distribution water may be temporarily suspended to allow extracted ground water to accumulate. Effort should be made to maximize extraction time each day to increase injection efficiency and maximize injection rates.

11. At the end of each day, record time at which injections are terminated and the total volume injected into each injection well on the Daily Injection Log. After injection system has been shut down, turn off submersible pumps at each extraction well and record the total volume extracted from each well on the Groundwater Extraction Log. At the beginning of each day, turn on submersible pumps at each extraction well and resume injections as described in Section 1.4.4, Step 2.

12. The contractor is to perform daily inspections of all equipment and regular inspections of secondary containment.

13. The site is located in an open, unsecured area so overnight and weekend security will be provided.

14. All pumps and hoses are to be purged at the end of each working day by gravity feeding the injectate solution into the injection wells so that injectate solution does not remain in the lines overnight.

1.4.5 DEMOBILIZATION

1. Following completion of injection activities, flush injection and extraction lines into the connected injection wells using City of Henderson hydrant water contained in 275-gallon totes.

2. Oversee EVO tanker and amendment drum removal and demobilization of injection and extraction system equipment. Record date and time of amendment drum and EVO tanker pick up on the Chemical Tracking Log field form provided in Attachment B.

3. Contractor shall perform frac tank clean out using high-pressure steam in accordance with an approved Tetra Tech confined space entry permit and oversight.

Documentation:

Attachment A – Chemical Safety Data Sheets

Attachment B – Injection Field Forms

Attachment C – Process Flow Diagram

Notes:

Summary:	Attachment A – Chemical Safety Data Sheets
Documentation:	1. Emulsified Vegetable Oil – EOSPRO 2. Phosphate Solution – AQUAPURE® 3601 NSF 3. Glycerin – GLYCERINE 99.7% USP KOSH MUSIM GSO 4. Sodium Sulfite Technical Grade

EOS Remediation, LLC

EOS PRO

SAFETY DATA SHEET

Section 1: Identification	
Product Name:	**EOS Pro**
Chemical Description:	Mixture; vegetable oil emulsion
Manufacturer:	EOS Remediation PO Box 14266 Research Triangle Park NC 27709 (P): 919-873-2204 www.eosremediation.com
Recommended Use:	Groundwater bioremediation (environmental applications)
Restricted Use:	Not for human consumption.
24-Hour Emergency Contact:	ChemTel: United States (P): 800-255-3924 ChemTel: International (P): 813-248-0585

Section 2: Hazard(s) Identification	
Hazard Classification:	Irritant (skin and eye)
Signal Word:	Warning
Hazard Statement(s):	Potential eye and skin irritant.
Pictograms:	
Precautionary Statement(s):	Not for human consumption. Do not store near excessive heat or oxidizers. Avoid contact with eyes and skin. Wear protective gloves and eye protection.

Section 3: Composition/Information on Ingredients		
Common Name(s)	**CAS NO.**	**% by Weight**
Soybean Oil	8001-22-7	60
Food Grade Emulsifiers Trade Secret[1,2]	111-03-5	10
Soluble Substrates (glycerol) Trade Secret[1,2]	56-81-5	4
Water	7732-18-5	26

1 – The precise composition of this product is proprietary information. A more complete disclosure will be provided to a physician in the event of a medical emergency.
2 – The soluble substrates and emulsifiers are generally recognized as safe for food contact.

Section 4: First-Aid Measures	
Routes of Exposure	**Emergency First-Aid Procedures**
Inhalation	Remove to fresh air.
Eye Contact	Flush with water for 15 minutes; if irritation persists see a physician.
Skin Contact	Wash with mild soap and water.
Ingestion	Product is non-toxic. If nausea occurs, induce vomiting and seek medical attention.

Section 5: Fire-Fighting Measures	
Extinguishing Media:	CO_2, foam, dry chemical Note: Water, fog and foam may cause frothing and spattering.
Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and chemical resistant clothing. Use water spray to cool fire exposed containers.
Fire Hazard(s):	Burning will cause oxides of carbon.

Section 6: Accidental Release Measures	
Personal Precautions:	Avoid contact with eyes and skin. Do not consume.
Emergency Procedures:	N/A
Methods & Materials used for Containment:	Compatible granular absorbent
Cleanup Procedures:	Spread compatible granular absorbent over spill area and sweep using broom and pan; dispose in appropriate receptacle. Clean area with water.

Section 7: Handling and Storage	
Safe Handling & Storage:	Do not store near excessive heat or oxidizers.
Other Precautions:	Consumption of food and beverages should be prevented in work area where product is being used. After handling product, always wash hands and face thoroughly with soap and water before eating, drinking, or smoking.

Section 8: Exposure Controls/Personal Protection		
Exposure Limits		
OSHA PEL:	NE	
ACGIH TLV:	NE	
NIOSH REL:	NE	
Personal Protective Measures		
Respiratory Protection:	Not normally required. P95 respirator if aerosols might be generated.	
Hand Protection:	Protective gloves are recommended	
Eye Protection:	Recommended	
Engineering Measures:	Local exhaust ventilation if aerosols are generated	
Hygiene Measures:	Wash promptly with soap & water if skin becomes irritated from contact.	
Other Protection:	Wear appropriate clothing to prevent skin contact.	

Section 9: Physical and Chemical Properties			
Appearance:	White Liquid	Explosive Limits:	NE
Odor:	Vegetable Oil	Vapor Pressure:	NE
Odor Threshold:	NE	Vapor Density:	Heavier than air
pH:	6.0-7.0 (su)	Relative Density:	0.96-0.98
Melting Point/Freezing Point:	Liquid at room temperature	Solubility:	Dispersible
Boiling Point:	212°F (100°C)	Partition coefficient:	NE
Flash Point:	>300°F (149°C)	Auto-ignition Temperature:	NE
Evaporation Rate:	NE	Decomposition Temperature:	N/A
Flammability (solid, gas):	NE	Viscosity:	500-1500 cP

NE – Not Established

Section 10: Stability and Reactivity	
Stability:	Stable
Incompatibility:	Strong acids and oxidizers
Hazardous Decomposition Products:	Thermal decomposition may produce oxides of carbon
Hazardous Reactions/Polymerization:	Will not occur
Conditions to Avoid:	None known

Section 11: Toxicological Information		
Likely Routes of Exposure:		Ingestion, dermal and eye contact
Signs and Symptoms of Exposure:		None known
Health Hazards		
	Acute:	Potential eye and skin irritant
	Chronic:	None known
Carcinogenicity		
	NTP:	No
	IARC:	No
	OSHA:	No

Section 12: Ecological Information (non-mandatory)
There is no data on the ecotoxicity of this product.

Section 13: Disposal Considerations (non-mandatory)	
Waste Disposal Methods:	Dispose of according to Federal and local regulations for non-hazardous waste. Recycle, if practical.

Section 14: Transport Information (non-mandatory)
The product is not covered by international regulation on the transport of dangerous goods.
No transport warning required.

Section 15: Regulatory Information (non-mandatory)
N/A

Section 16: Other Information	
Date of Preparation:	29 May 2014
Last Modified Date:	27 June 2019
The information contained herein is based on available data and is believed to be correct. However, EOS Remediation, LLC makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained thereof. This information and product are furnished on the condition that the person receiving them shall make his/her own determination as to the suitability of the product for his/her particular purpose.	

BRENNTAG

SAFETY DATA SHEET

1. Identification

Product identifier **AQUAPURE® 3601 NSF (25 MG/L MAX)**

Other means of identification None.

Recommended use ALL PROPER AND LEGAL PURPOSES

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name Brenntag Pacific Inc.

Address 10747 Patterson Place
Santa Fe Springs, CA 90670

Telephone 562-903-9626

E-mail Not available.

Emergency phone number 800-424-9300 CHEMTREC

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards

Acute toxicity, dermal	Category 4
Skin corrosion/irritation	Category 1A
Serious eye damage/eye irritation	Category 1

Environmental hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Harmful in contact with skin. Causes severe skin burns and eye damage. Causes serious eye damage.

Precautionary statement

Prevention Do not breathe mist or vapor. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection.

Response If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Take off contaminated clothing and wash before reuse.

Storage Store locked up.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information 100% of the mixture consists of component(s) of unknown acute oral toxicity. 86.67% of the mixture consists of component(s) of unknown acute inhalation toxicity.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
PHOSPHORIC ACID		7664-38-2	32.67
SODIUM HYDROXIDE (NA(OH))		1310-73-2	13.335
Other components below reportable levels			53.995

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. When using, do not eat, drink or smoke. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices. Wash contaminated clothing before reuse.
Conditions for safe storage, including any incompatibilities	Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
PHOSPHORIC ACID (CAS 7664-38-2)	PEL	1 mg/m3
SODIUM HYDROXIDE (NA(OH)) (CAS 1310-73-2)	PEL	2 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value
PHOSPHORIC ACID (CAS 7664-38-2)	STEL	3 mg/m3
	TWA	1 mg/m3
SODIUM HYDROXIDE (NA(OH)) (CAS 1310-73-2)	Ceiling	2 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
PHOSPHORIC ACID (CAS 7664-38-2)	STEL	3 mg/m3
	TWA	1 mg/m3
SODIUM HYDROXIDE (NA(OH)) (CAS 1310-73-2)	Ceiling	2 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

The following are recommendations for Personnel Protective Equipment (PPE). The employer/user of this product must perform a Hazard Assessment of the workplace according to OSHA regulations 29 CFR 1910.132 to determine the appropriate PPE for use while performing any task involving potential exposure to this product.

Eye/face protection Wear safety glasses with side shields (or goggles) and a face shield. Face shield is recommended.

Skin protection

Hand protection For prolonged or repeated skin contact use suitable protective gloves.

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Liquid.

Color CLEAR COLORLESS

Odor NONE

Odor threshold Not available.

pH Not available.

Melting point/freezing point Not available.

Initial boiling point and boiling range 587.61 °F (308.67 °C) estimated

Flash point Not available.

Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	11.76 lbs/gal
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
Percent volatile	54 % estimated
Specific gravity	1.41

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Strong acids.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system. Prolonged inhalation may be harmful.
Skin contact	Causes severe skin burns. Harmful in contact with skin.
Eye contact	Causes serious eye damage.
Ingestion	Causes digestive tract burns.
Symptoms related to the physical, chemical and toxicological characteristics	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity	Harmful in contact with skin.
Skin corrosion/irritation	Causes severe skin burns and eye damage.
Serious eye damage/eye irritation	Causes serious eye damage.
Respiratory or skin sensitization	
Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
SODIUM HYDROXIDE (NA(OH)) (CAS 1310-73-2)			
Aquatic			
Crustacea	EC50	Water flea (Ceriodaphnia dubia)	34.59 - 47.13 mg/l, 48 hours
Fish	LC50	Western mosquitofish (Gambusia affinis)	125 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

DOT information on packaging may be different from that listed.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

PHOSPHORIC ACID (CAS 7664-38-2)	Listed.
SODIUM HYDROXIDE (NA(OH)) (CAS 1310-73-2)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

FEMA Priority Substances Respiratory Health and Safety in the Flavor Manufacturing Workplace

PHOSPHORIC ACID (CAS 7664-38-2)	High priority

US state regulations California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

PHOSPHORIC ACID (CAS 7664-38-2)
SODIUM HYDROXIDE (NA(OH)) (CAS 1310-73-2)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Toxic Chemical Substances (TCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 06-12-2017

Revision date	08-22-2017
Version #	02
HMIS® ratings	Health: 3 Flammability: 0 Physical hazard: 0
NFPA ratings	Health: 3 Flammability: 0 Instability: 1
Disclaimer	While Brenntag believes the information contained herein to be accurate, Brenntag makes no representation or warranty, express or implied, regarding, and assumes no liability for, the accuracy or completeness of the information. The Buyer assumes all responsibility for handling, using and/or reselling the Product in accordance with applicable federal, state, and local law. This SDS shall not in any way limit or preclude the operation and effect of any of the provisions of Brenntag's terms and conditions of sale.
Revision information	Hazard(s) identification: Response Hazard(s) identification: Supplemental information Accidental release measures: Personal precautions, protective equipment and emergency procedures Accidental release measures: Methods and materials for containment and cleaning up Handling and storage: Conditions for safe storage, including any incompatibilities Exposure controls/personal protection: Eye/face protection Exposure controls/personal protection: Hand protection Exposure controls/personal protection: Other Exposure controls/personal protection: PPE Symbols Toxicological information: Carcinogenicity Ecological information: Persistence / degradability

BRENNTAG

SAFETY DATA SHEET

1. Identification

Product identifier **GLYCERINE 99.7% USP KOSH MUSIM RSPO (FIBER) GSO**

Other means of identification

CAS number 56-81-5

Recommended use ALL PROPER AND LEGAL PURPOSES

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name Brenntag Pacific Inc.

Address 10747 Patterson Place
Santa Fe Springs, CA 90670

Telephone 562-903-9626

E-mail Not available.

Emergency phone number 800-424-9300 CHEMTREC

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

Environmental hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The substance does not meet the criteria for classification.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information 100% of the mixture consists of component(s) of unknown acute oral toxicity. 100% of the mixture consists of component(s) of unknown acute dermal toxicity. 100% of the mixture consists of component(s) of unknown acute inhalation toxicity.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
GLYCEROL		56-81-5	100

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed Headache. Nausea, vomiting.

Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Alcohol resistant foam. Dry powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Use water spray to reduce vapors or divert vapor cloud drift. This product is miscible in water. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

The following are recommendations for Personnel Protective Equipment (PPE). The employer/user of this product must perform a Hazard Assessment of the workplace according to OSHA regulations 29 CFR 1910.132 to determine the appropriate PPE for use while performing any task involving potential exposure to this product.

Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
Other	Wear appropriate chemical resistant clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Liquid.
Color	CLEAR
Odor	ODORLESS
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	65 °F (18.33 °C)
Initial boiling point and boiling range	554 °F (290 °C) 101.325 kPa
Flash point	390.0 °F (198.9 °C)
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	3.17
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Miscible
Partition coefficient (n-octanol/water)	-1.76
Auto-ignition temperature	739 °F (392.78 °C)
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	10.51 lbs/gal 1.26 g/ml
Dynamic viscosity	17 mPa.s (77 °F (25 °C))
Explosive properties	Not explosive.
Flammability class	Combustible IIIB estimated
Molecular formula	C3-H8-O3
Molecular weight	92.09 g/mol
Oxidizing properties	Not oxidizing.
Percent volatile	100 %
Specific gravity	1.26
VOC	100 % 100 % EPA estimated

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.

Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	No adverse effects due to inhalation are expected.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	Expected to be a low ingestion hazard.
Symptoms related to the physical, chemical and toxicological characteristics	Headache. Nausea, vomiting.

Information on toxicological effects

Acute toxicity	Not known.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Product		Species	Test Results
GLYCEROL (CAS 56-81-5)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	51000 - 57000 mg/l, 96 hours

Persistence and degradability No data is available on the degradability of this substance.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

-1.76

Mobility in soil	No data available.
Other adverse effects	The product contains volatile organic compounds which have a photochemical ozone creation potential.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

Transportation information on packaging may be different from that listed.

15. Regulatory information

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

FEMA Priority Substances Respiratory Health and Safety in the Flavor Manufacturing Workplace

GLYCEROL (CAS 56-81-5) Other Flavoring Substances with OSHA PEL's

US state regulations

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Toxic Chemical Substances (TCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 09-23-2019

Revision date 09-23-2019

Version # 02

HMIS® ratings
Health: 0
Flammability: 0
Physical hazard: 0

NFPA ratings
Health: 1
Flammability: 1
Instability: 0

Disclaimer
While Brenntag believes the information contained herein to be accurate, Brenntag makes no representation or warranty, express or implied, regarding, and assumes no liability for, the accuracy or completeness of the information. The Buyer assumes all responsibility for handling, using and/or reselling the Product in accordance with applicable federal, state, and local law. This SDS shall not in any way limit or preclude the operation and effect of any of the provisions of Brenntag's terms and conditions of sale.

SAFETY DATA SHEET

SODIUM SULFITE Technical Grade

Revision Date 04/02/2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

- Trade name SODIUM SULFITE Technical Grade

1.2 Relevant identified uses of the substance or mixture and uses advised against

Uses of the Substance / Mixture

- Manufacture of pulp, paper and paper products
- photographic chemical
- Water treatment
- Reducing agents
- Dyes
- Bleaching agents
- Food additive

1.3 Details of the supplier of the safety data sheet

Company

SOLVAY CHEMICALS, INC.
3333 RICHMOND AVENUE
77098-3099, HOUSTON
USA
Tel: +1-800-7658292; +1-713-5256800
Fax: +1-713-5257804

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT CONTACT: CHEMTREC 800-424-9300 within the United States and Canada, or 703-527-3887 for international collect calls.

SECTION 2: Hazards identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture

HCS 2012 (29 CFR 1910.1200)

Eye irritation, Category 2A H319: Causes serious eye irritation.

2.2 Label elements

HCS 2012 (29 CFR 1910.1200)

Pictogram

Signal Word

- Warning

Hazard Statements

- H319 Causes serious eye irritation.

Precautionary Statements

Prevention

- P264 Wash skin thoroughly after handling.
- P280 Wear eye protection/ face protection.

Response

- P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P337 + P313 If eye irritation persists: Get medical advice/ attention.

2.3 Other hazards which do not result in classification

- H402: Harmful to aquatic life.

- Harmful if swallowed.
- Irritating to eyes.
- Hazardous decomposition products formed under fire conditions.
- May cause sensitization by inhalation.

SECTION 3: Composition/information on ingredients

3.1 Substance

- Not applicable, this product is a mixture.

3.2 Mixture

Hazardous Ingredients and Impurities

- No ingredients are hazardous.

Non Hazardous Ingredients and Impurities

Chemical Name	Identification number CAS-No.	Concentration [%]
Sulfurous acid, sodium salt (1:2)	7757-83-7	>= 98.5

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation

- Call a doctor immediately if allergic signs, particularly in the respiratory tract, are observed.
- Oxygen or artificial respiration if needed.
- Remove to fresh air.

Exposure to decomposition products

- If inhaled
- Remove to fresh air.
- Immediate medical attention is required.

In case of eye contact

- Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
- In the case of difficulty of opening the lids, administer an analgesic eye wash (oxybuprocaine).
- Immediate medical attention is required.

In case of ingestion

- If victim is unconscious:
- Never give anything by mouth to an unconscious person.

4.2 Most important symptoms and effects, both acute and delayed

In case of inhalation

Symptoms

- Headache
- Breathing difficulties
- Cardiac irregularities
- loss of consciousness and cardiopulmonary arrest

Effects

- Mild respiratory irritant
- May cause severe allergic respiratory reaction.
- Breathing of dust may aggravate asthma or other pulmonary diseases.

In case of eye contact

Effects

- Moderate eye irritation

4.3 Indication of any immediate medical attention and special treatment needed

- no data available

SECTION 5: Firefighting measures

Flash point	Not applicable
Autoignition temperature	no data available
Flammability / Explosive limit	no data available

5.1 Extinguishing media

Suitable extinguishing media

- Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media

- Water may be ineffective.

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire fighting

- Not combustible.
- Contact with water liberates hazardous gas.
- Sulphur dioxide

Hazardous combustion products:

- Sulphur dioxide
- Sulfur oxides

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- Wear self-contained breathing apparatus and protective suit.
- Use NIOSH approved respiratory protection.

Further information

- Approach from upwind.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel

- Avoid dust formation.

Advice for emergency responders

- Keep away from water.

6.2 Environmental precautions

- The product should not be allowed to enter drains, water courses or the soil.
- In case of accidental release or spill, immediately notify the appropriate authorities if required by Federal, State/Provincial and local laws and regulations.
- Should not be released into the environment.
- Do not flush into surface water or sanitary sewer system.

6.3 Methods and materials for containment and cleaning up

- Collect the product with suitable means.
- Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

- no data available

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- Persons with a history of skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
- Use only in well-ventilated areas.
- Avoid dust formation.
- Protect from moisture.
- Avoid prolonged or repeated contact with skin.

Hygiene measures

- Wash contaminated clothing before re-use.
- Eye wash bottle with pure water
- Use only in an area equipped with a safety shower.
- Handle in accordance with good industrial hygiene and safety practice.
- When using do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions

- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- For personal protection see section 8.

7.3 Specific end use(s)

- Sulfite-sensitive individuals may experience a severe allergic reaction. This product in contact with heat, water, ice, acids, or oxidizing agents releases sulfur dioxide gas which may be harmful or deadly when inhaled. Do not use in a dry form in the holds of fishing boats or walk-in coolers.
- Contact your supplier for additional information

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters

- Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Control measures

Engineering measures

- Ensure adequate ventilation.
- Provide appropriate exhaust ventilation at machinery and at places where dust can be generated.

Individual protection measures

Respiratory protection

- When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
- In the case of vapor formation use a respirator with an approved filter.
- Use NIOSH approved respiratory protection.
- In the case of dust or aerosol formation use respirator with an approved filter.

Hand protection

- Protective gloves

Eye protection

- Chemical resistant goggles must be worn.

Skin and body protection

- Preventive skin protection
- Wear suitable protective clothing.

Hygiene measures

- Wash contaminated clothing before re-use.
- Eye wash bottle with pure water
- Use only in an area equipped with a safety shower.
- Handle in accordance with good industrial hygiene and safety practice.
- When using do not eat, drink or smoke.

SECTION 9: Physical and chemical properties

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product information phone number in Section 1 for its exact specifications.

9.1 Information on basic physical and chemical properties

Appearance	Form: granular Physical state: solid solid Color: white white
Odor	odorless
Odor Threshold	no data available
pH	9.6 - 9.8 (10 g/l)
Boiling point/boiling range	Not applicable
Flash point	Not applicable
Evaporation rate (Butylacetate = 1)	no data available
Flammability (solid, gas)	The product is not flammable.
Flammability / Explosive limit	Explosiveness: Not applicable
Autoignition temperature	no data available
Vapor pressure	no data available
Vapor density	no data available
Density	Bulk density: 1.5 - 1.6 kg/m3
Solubility	Water solubility : 250 g/l (68 °F (20 °C))
Partition coefficient: n-octanol/water	log Pow: -4 (77 °F (25 °C))
Thermal decomposition	>= 1112 °F (>= 600 °C)
Viscosity	no data available
Explosive properties	no data available
Oxidizing properties	Not considered as oxidizing., oxygen scavenger

9.2 Other information

Molecular weight	126.04 g/mol

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

- no data available

10.4 Conditions to avoid

- Heat.
- Exposure to moisture.

10.5 Incompatible materials

- Water
- Acids
- Oxidizing agents

10.6 Hazardous decomposition products

- Sulphur dioxide
- Sulfur oxides

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity	LD50 : 820 mg/kg - Mouse LD50 : > 2,000 mg/kg - Rat
Acute inhalation toxicity	no data available
Acute dermal toxicity	no data available
Acute toxicity (other routes of administration)	no data available
Skin corrosion/irritation	Rabbit No skin irritation
Serious eye damage/eye irritation	Rabbit Eye irritation

Respiratory or skin sensitization no data available

Mutagenicity

Genotoxicity in vitro In vitro tests showed mutagenic effects

Genotoxicity in vivo no data available

Carcinogenicity no data available

This product does not contain any ingredient designated as probable or suspected human carcinogens by:
NTP
IARC
OSHA
ACGIH

Toxicity for reproduction and development

Toxicity to reproduction / fertility no data available

Developmental Toxicity/Teratogenicity no data available

STOT

STOT-single exposure no data available

STOT-repeated exposure no data available

Aspiration toxicity no data available

Further information Harmful if swallowed.
Moderate eye irritation
May cause sensitization of susceptible persons by inhalation of aerosol or dust.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish LC50 - 96 h : 100 mg/l - Carassius auratus (goldfish)

12.2 Persistence and degradability

Biodegradation

Biodegradability Method: Biochemical Oxygen Demand (BOD)
instantaneous reaction

12.3 Bioaccumulative potential

Bioconcentration factor (BCF)	Bioaccumulative potential
12.4 Mobility in soil	no data available
12.5 Results of PBT and vPvB assessment	no data available
12.6 Other adverse effects	no data available
Remarks	oxygen scavenger, Ecological injuries are not known or expected under normal use.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product Disposal

- Respect local/federal and national regulations for:
- Hazardous waste
- Contact waste disposal services.

Advice on cleaning and disposal of packaging

- To avoid treatments, as far as possible, use dedicated containers.
- Containers that cannot be cleaned must be treated as waste.
- In accordance with local and national regulations.

SECTION 14: Transport information

DOT
not regulated

TDG
not regulated

NOM
no data available

IMDG
not regulated

IATA
not regulated

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.

SECTION 15: Regulatory information

15.1 Notification status

Inventory Information	Status
United States TSCA Inventory	Listed on Inventory
New Zealand. Inventory of Chemical Substances	In compliance with the inventory
Canadian Domestic Substances List (DSL)	Listed on Inventory
Australia Inventory of Chemical Substances (AICS)	Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	Listed on Inventory
Korea. Korean Existing Chemicals Inventory (KECI)	Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	Listed on Inventory
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	Listed on Inventory

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

SARA Hazard Designation Sections 311/312 (40 CFR 370)

Fire Hazard	no
Reactivity Hazard	no
Sudden Release of Pressure Hazard	no
Acute Health Hazard	yes
Chronic Health Hazard	yes

Section 313 Toxic Chemicals (40 CFR 372.65)

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)

This material does not contain any components with a SARA 302 RQ.

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)

This material does not contain any components with a section 304 EHS RQ.

US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

This material does not contain any components with a CERCLA RQ.

15.3 State Regulations

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16: Other information

NFPA (National Fire Protection Association) - Classification

Health	2 moderate
Flammability	0 minimal
Instability or Reactivity	1 slight
Special Notices	None

HMIS (Hazardous Materials Identification System (Paint & Coating)) - Classification

Health	2 moderate
Flammability	0 minimal
Reactivity	1 slight
PPE	Determined by User; dependent on local conditions

Further information

- Product evaluated under the US GHS format.

Date Prepared: 04/02/2015

- ACGIH	American Conference of Governmental Industrial Hygienists
- OSHA	Occupational Safety and Health Administration
- NTP	National Toxicology Program
- IARC	International Agency for Research on Cancer
- NIOSH	National Institute for Occupational Safety and Health

TETRA TECH	**IN-SITU BIOREMEDIATION INJECTIONS FIELD GUIDANCE DOCUMENT**	
		Rev. 0.0
Las Vegas Wash Bioremediation Pilot Study	**Nevada Environmental Response Trust**	Date: November 2019
		Reviewed/Approved

Summary:	Attachment B – Injection Field Forms
Documentation:	1. Chemical Tracking Log 2. Groundwater Extraction Log 3. Batch Mixing Log 4. Daily Injection Log 5. Injection Pressure and Flow Rate Log 6. Specific Gravity Log

TETRA TECH

CHEMICAL TRACKING LOG

Task Name:	Task No:	Date:
Injection Event:	Task Manager:	Recorded by:

Chemical	Supplier	Date Received	Time Received	Quantity	Date of Container Pick-up	Time of Container Pick-Up	Comments

gpm - gallons per minute psi- pounds per square inch

TETRA TECH

GROUNDWATER EXTRACTION LOG

Task Name:	Task No:	Date:
Task Manager:	Injection Event:	Recorded by:

Date	Start Time	Stop Time	Extraction Well ID	Current Flow Rate	Total Volume Extracted (Totalizer)	Average Flow Rate (Total/Time)	Cumulative Event Total Volume	Comments
				gpm	gal	gpm	gal	
					Summary			
					Summary			
					Summary			

Date	Time	Tank Number	Current Tank Level	Current Tank Volume	Comments
			feet	gal	

Notes/Comments:

gal - gallons gpm - gallons per minute

TETRA TECH

BATCH MIXING LOG

Page ___ of ___

Task Name:	Task No:	Date:
Task Manager:	Injection Event:	Recorded by:

Date: ***Batch Number:*** ***Tank Number:***

Batch Formula

Chemical Name	Density	Mass	Volume	Concentration	Comments
	lbs/gal	lbs	gal	wt.%	
TOTAL					

Addition of Injectate Solution Chemicals

Chemical Name	Addition Start Time	Addition Stop Time	Addition Method and Equipment	Comments

Batch Mixing

Method	Equipment	Start Time	Stop Time

Notes/Comments:

lbs/gal - pounds per gallon gal - gallons lbs - pounds wt.% - weight percent

TETRA TECH

DAILY INJECTION LOG

Task Name:	Task No:	Date:
Injection Event:	Task Manager:	Recorded by:

Injectate: ***Tank Number:*** ***Batch Number:***

Injection Well ID	Start Time	Previous Total	Initial Pressure	Initial Flow Rate	Stop Time	Daily Volume Injected	Cumulative Volume Injected	Comments
		gal	psi	gpm		gal	gal	
					Summary			

Frac Tank Level			
Tank Number	Time	Level (ft)	Volume (gal)

Daily Comments/Notes:

gal - gallons gpm - gallons per minute psi- pounds per square inch ft - feet

TETRA TECH

INJECTION PRESSURE AND FLOW RATE LOG

Task Name:	Task No:	Date:
Injection Event:	Task Manager:	Recorded by:

Injectate: ***Tank Number:*** ***Batch Number:***

Injection Well ID	Date	Time	Pressure psi	Flow Rate gpm	Comments

gpm - gallons per minute psi- pounds per square inch

TETRA TECH

SPECIFIC GRAVITY LOG

NERT, Henderson, Nevada

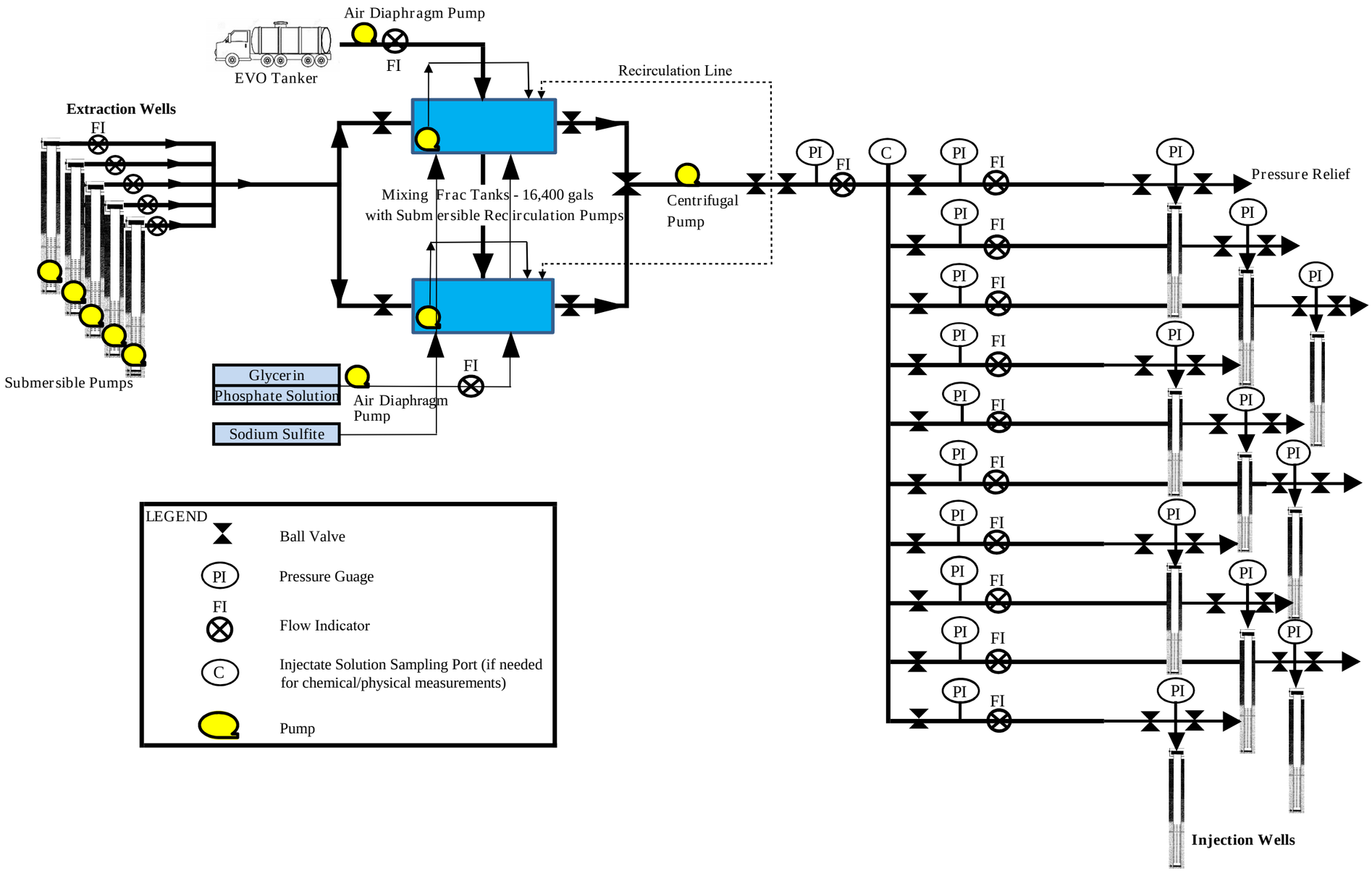
Task Name:	Task No:	Date:
Sample Collection Method:	Field Parameters Equipment and SN:	Task Manager:
Specific Gravity Test Equipment S/N:		Recorded by:

Date	Time	BATCH			Atmospheric Temperature (°C)	Hydrometer Calibration Temperature (°C)	Sample Duplicate ID	Sample Temperature (°C)	Specific Gravity	Comments
		Batch Number	Initial	Remaining at Sample Time						
			Tank Level: Volume:	Tank Level: Volume:			a			
							b			
							c			
							d			
							e			
			Tank Level: Volume:	Tank Level: Volume:			a			
							b			
							c			
							d			
							e			
			Tank Level: Volume:	Tank Level: Volume:			a			
							b			
							c			
							d			
							e			

Notes/Comments:

Summary:	Attachment C – Process Flow Diagram
Documentation:	1. Process Flow Diagram

Cascade Technical Services
Typical Process Flow Diagram for NERT Las Vegas Wash Bioremediation Pilot Study, Henderson, Nevada



Note: Because this Field Guidance Document process flow diagram is for a pilot study, it may be periodically updated based on lessons learned during injections.

Appendix K
Performance Criteria Tables

Table K.1 **Performance Criteria**

Performance Criteria	Description	Primary or Secondary
Contaminant Reduction	• Evaluate effectiveness of in-situ bioremediation (ISB) to create a biologically active zone for remediation of perchlorate- and chlorate-contaminated groundwater within a geologically complex area where perchlorate-contaminated groundwater is thought to be migrating into the Las Vegas Wash. • Determine whether remediation in the UMCf/UMCf-cg only in areas with known upward gradients (Zones 1 and 3, respectively) has any effect on contaminant concentrations in the overlying alluvial groundwater, and if so, whether the effect differs depending on UMCf lithology (comparison of results between Zones 1 and 3). • Determine if synergistic effects occur when both alluvium and UMCf are injected with carbon substrate (Zone 2) as combined remediation of these two units has not been evaluated to-date.	Primary
Distribution and Implementability	• Estimate the overall influence of substrate injection and biodegradation achievable in the areas downgradient of the injections during the pilot study. • Evaluate if dual-nested and/or triple-nested injection wells are effective in delivering substrate to large saturated thicknesses of alluvium, UMCf, and UMCf-cg; Compare distribution and injection rates for dual/triple-nested injection wells to single injection wells. • Evaluate injection protocols, achievable injection rates, injection well spacing and construction methods; Compare injection rates achieved in each of the three remediation zones to evaluate injectability into different lithological units. • Evaluate the distribution of carbon substrate in groundwater through dye tracer analysis and evidence of contaminant reduction and reducing conditions in downgradient and cross-gradient monitoring wells installed in the vicinity of the injection wells.	Primary
Carbon Substrate Longevity and Frequency of Injections	• Estimate or extrapolate the longevity of the carbon substrate and frequency of carbon substrate replenishment required to reduce perchlorate contamination in each lithological setting associated with the three remediation zones. • Compare carbon substrate longevity and frequency of injections for the various lithological settings (alluvium, UMCf, and UMCf-cg) in each of the three remediation zones.	Primary

Performance Criteria	Description	Primary or Secondary
Factors Affecting Technology Performance	Hydrogeologic characteristics (including but not limited to): • Presence of paleochannels, • Vertical gradients, • Groundwater flow rates (higher flow rates in alluvium; lower groundwater flow rates in the UMCf and UMCf-cg), • Variable lithological characteristics, • Hydraulic conductivity variations and resulting injectability, and • Large saturated thicknesses of the targeted treatment zone. Chemical and geochemical characteristics (including but not limited to): • Contaminant concentrations and distributions, • Presence of high quantities of sulfate, resulting in sulfate reducing conditions and over consumption of the carbon substrate, • Secondary mobilization of key metals, such as iron, manganese, and arsenic, and • Measurement of alkalinity and carbonates in the aquifer and associated anions, such as calcium in the groundwater, to evaluate potential for precipitation of metals.	Primary
Operations and Maintenance	Tasks associated with operations and maintenance (O&M) of the system include: • Monitoring injection rates and pressures at each injection well during carbon substrate injections, • Injection set-up, modifications, and improvements to injection operations (if required/to be determined) based on lessons learned following the first injection event, and • Determination of likely injection well rehabilitation timing (not included as part of the Las Vegas Wash Bioremediation Pilot Study due to the limited study duration; however, data can be collected to project the likelihood and timing of injection well maintenance based on comparisons to data and lessons learned from the on-going SWF Area Bioremediation Treatability study extension.	Primary

Performance Criteria	Description	Primary or Secondary
Adaptability	ISB has not been previously tested within a large alluvial paleochannel, the UMCf, or the UMCf-cg for remediation of perchlorate and chlorate. With this pilot study, the technology is being examined for ISB within a different, geologically-complex setting resulting in ISB testing in three distinct remediation zones/lithologies. The results from each of the three zones will be compared to evaluate adaptability of the ISB technologies to different lithologies likely to be encountered in a full-scale remedy.	Secondary
Scale-Up Considerations	Scale-up to meet the requirements of full-scale site remediation would involve treatability and/or pilot studies performed for a variety of site conditions that are likely to be encountered during full-scale remediation, such as source areas, deep and wide paleochannels, varying lithology of alluvium and UMCf/UMCf-cg, and unique geochemical conditions (e.g., high TDS and sulfate concentrations). The Las Vegas Wash Bioremediation Pilot Study was designed to evaluate ISB in relatively small areas within the alluvium, UMCf, and UMCf-cg. As a result, data will be collected during the pilot study to identify scale-up considerations for a variety of lithological settings; however, other treatability studies are being performed to evaluate other scale-up considerations, such as source area treatment and unique geochemical characteristics.	Secondary

***Table K.2* Performance Metrics and Confirmation Methods**

Performance Criteria	Performance Metric	Performance Confirmation Method
Primary Criteria (Quantitative)		
Contaminant Reduction	Effectiveness monitoring results will compare post-injection concentrations to baseline concentrations prior to injections to evaluate: • Reductions observed in perchlorate and chlorate concentrations in groundwater samples collected from monitoring wells located downgradient of the injection well transects within each remediation zone. • Reductions observed in perchlorate and chlorate concentrations in groundwater samples collected in the overlying alluvium within Zones 1 and 3 to determine if remediation of the UMCf/UMCf-cg has any effect on contaminant concentrations in the alluvium groundwater. • Reductions observed in nitrate concentrations in groundwater samples collected from monitoring wells located downgradient of the injection well transects. Nitrate is evaluated throughout the study since it is the most likely competing electron acceptor and perchlorate and chlorate biodegradation generally commences when denitrification is complete. • Ability of ISB to achieve a reduction in perchlorate concentrations to less the applicable or relevant and appropriate requirement (ARAR)/to be considered (TBC) criteria for perchlorate, which is currently the federal preliminary remedial goal (PRG) of 15 µg/L.	• EPA Method 314.0 (Perchlorate) • EPA Method 300.1 (Chlorate) • EPA Method 300.0 (Nitrate-N)
Distribution and Implementability	<u>Dye Tracer:</u> • Tracer dye observed in groundwater samples collected from monitoring wells located downgradient of the injection well transects will provide additional data with regards to distribution of the carbon substrate, radius of influence of the injection wells, and travel times of the injectate/dye. • Presence of tracer dye in groundwater samples collected from monitoring wells screened in the alluvium within Zones 1 and 3 will provide data to potentially determine upflux from the UMCf/UMCf-cg since injections are only being performed in the UMCf/UMCf-cg within these remediation zones. • Presence of tracer dye in surface water will possibly determine where the injected, tracer-tagged water from the study area is entering the Las Vegas Wash. <u>Overall System Performance:</u> • Evaluate if dual-nested injection wells are effective in delivering substrate to large saturated thicknesses of alluvium, UMCf, and UMCf-cg by examining concentration reductions in downgradient monitoring wells and assessing injection rates and pressures during injection activities. • Evaluate construction methods and lessons learned from the installation of dual/triple-nested injection wells. • Achieve reasonable injection rates by applying appropriate injection pressures to maximize subsurface distribution and analyze achievable injection rates and associated injection pressures within the different targeted lithologies.	• Visual inspection of groundwater • Analysis of charcoal samplers and groundwater samples per lab method for fluorescence • Experience/data collected from well construction and injection activities • EPA Method 314.0 (Perchlorate) • EPA Method 300.1 (Chlorate) • EPA Method 300.0 (Nitrate as N)

Performance Criteria	Performance Metric	Performance Confirmation Method
Carbon Substrate Longevity and Frequency of Injections	• Observe concentration rebounds following injection events to evaluate carbon substrate injection frequency required to maintain a biologically active zone for the reduction of perchlorate, chlorate, and nitrate within each of three remediation zones. • Monitor concentration reductions associated with varying injection quantities to determine optimal quantities of carbon substrate for subsequent injection events to maintain a biologically active zone. • Monitor aquifer geochemistry to evaluate the continued presence of the reducing conditions required for remediation of perchlorate, chlorate, and nitrate.	• EPA Method 314.0 (Perchlorate) • EPA Method 300.0 (Nitrate as N) • EPA Method 300.1 (Chlorate) • Field meter to collect data for dissolved oxygen and oxidation reduction potential
Factors Affecting Technology Performance	<u>Evaluation of Hydrogeological Characteristics:</u> • Injectability – Evaluate injection rates and pressures in the different lithological units with variations in hydraulic conductivities and porosities. • Distribution – Asses the effects of groundwater flow rates, vertical gradients, paleochannels, and large saturated thicknesses on technology performance (overlaps with Primary Criteria – Distribution and Implementability). <u>Minimal Impacts to Downgradient Groundwater Geochemistry:</u> • Sulfate – Evaluate the presence of sulfate reducing conditions (decreases in sulfate concentrations compared to baseline), which is undesirable as sulfate is an electron acceptor and potential carbon substrate consumer. • Metals, Alkalinity, and carbonates – Assess potential secondary mobilization of key metals (such as arsenic, iron, and manganese) at downgradient locations through comparing post-injection concentrations to baseline and evaluate calcium concentrations for potential precipitation of calcium carbonate. • Phosphorus – Because it is added to the injectate mixture to serve as a micronutrient, phosphorus concentrations will be monitored to confirm that it is used as a nutrient, adsorbed to the soil, and/or combined with cations such as calcium, rather than increasing its concentration in groundwater. • Total organic carbon (TOC) – Because a carbon substrate is being injected into the groundwater, TOC concentrations in both groundwater and surface water along the Las Vegas Wash downgradient of the pilot study will be monitored to confirm the injectate does migrate into the Las Vegas Wash.	• EPA Method 300.0 (Sulfate) • SW6010B/6020 (Dissolved Metals) • EPA Method 365.3 (Total Phosphorus) • SM2320B (Alkalinity) • SM5310B (TOC)
Operation and Maintenance	<u>Injection Wells:</u> • Observe injection pressures and injection rates during subsequent injection events to ensure continued injectability. • Evaluate potential biomass and/or precipitate buildup in the injection wells if decreased injection rates and increased injection pressures are observed. • Assess biomass/material buildup in the aquifer through potential changes in hydraulic conductivity of downgradient monitoring wells during post-injection aquifer testing. • Redevelopment of injection wells is not included in the Las Vegas Wash Bioremediation Pilot Study due to the short duration of the study. However, determining the need and frequency of injection well rehabilitation may be extrapolated from injection rates and injection pressure data collected during the Las Vegas Wash Bioremediation Pilot Study and compared to the results observed from the on-going SWF Area Bioremediation Treatability Study extension.	• Measurement of pressures and flow in injection wells during injection operations • Slug testing of monitoring wells

Performance Criteria	Performance Metric	Performance Confirmation Method
Secondary Criteria (Qualitative)		
Adaptability	• Use at other locations associated with the NERT site • Use with other lithological and/or geochemical settings.	Experience from demonstration
Scale-up Considerations	• Targeted lithology and contaminant concentrations. • Remedial action objectives. • Equipment, injection, and monitoring well layout. • Substrate addition and frequency of replenishment. • Analytical sampling evaluation criteria.	Experience from demonstration