

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-15

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Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1600	3	1	98	5	11	11, 22	1: 30° 40°, J, N, Mn+Fe, Su, P, SR 2: 60°, J, N, Mn+Fe, Su, P, SR 3: 70° 90°, J, N, Mn+Fe, Su, P, Wa, SR BASALT; medium gray; moderately weathered; moderately strong to strong; highly to occasionally intensely fractured; aphanitic mv (continued)	1138 1218	Run 3 shoe disturbed upon removal Advance 5" HWT casing to 10' 100% Water Circulation Return (WCR)	
1598	4	1	100	5	0	1, 3, 23, 3	1: 75°, J, N, Mn+Fe, Su, P, SR 2: 60°, J, N, Mn+Fe, Su, P, SR 3: 30° 40°, J, N, Mn+Fe, Su, P, SR	[15]	Run 4 shoe disturbed upon removal	
1596	5	1	100	4	14	12, 11, 12	1: 60°, J, N, Mn+Fe, Sp, P, SR 2: 40°, J, N, Mn+Fe, Su, P, SR 3: 80° 90°, J, N, Mn+Fe, Su, P, SR 4: 20° 40°, J, N, Mn+Fe, Su, P, Ir, SR R	[19]		
1594	6	2	100	3	0	4, 3, 34	1: 60°, J, N, Mn+Fe, Sp, P, SR 2: 50°, J, N, Mn, Su, P, SR 3: 75°, J, N, Mn+Fe, Su, P, SR 4: 10° 15°, J, N, Mn+Fe, Sp, P, SR 5: 90°, J, N, Mn+Fe, Su, P, SR	[14]	PL: 18003 psi	
1592	7	2	100	5	65	12, 3, 4, 3	1: 70°, J, N, Mn+Fe, Su, P, SR 2: 60°, J, N, Mn+Fe, Su, P, SR 3: 25° 30°, J, N, Mn+Fe, Sp, P, SR 4: 80°, J, N, Mn+Fe, Su, P, SR 5: 50°, J, VN, No, No, P, SR 6: 40°, J, N, Mn+Fe, Su, P, SR	[21]	UC: 9509 psi	
1590	8	2	100	3	35	5, 3, 6, 5	1: 50°, J, N, Mn+Fe, Su, P, SR 2: 30°, J, N, Mn+Fe, Su, P, SR 3: 60°, J, N, Mn+Fe, Su, P, SR	[20]	PL: 15908 psi PT #1 attempted from 25.5 - 40'; could not get packer to seal	

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Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
29	8	2	100	5	35	34 3 3 1	4: 80°, J, N, Mn+Fe, Su, P, SR BASALT; bush to med um gray; s ght y weathered; strong; h gh y fractured; aphan t c mv (continued)		1353 1402	
1588				4		2 2	↓ Becomes dusky purp e to b u sh gray w th 40° 50° fo at on/f ow fabr c			
31	9		91	6	12	2 2 3	1: 70° 80°, J, N, Mn+Fe, Su, P, SR 2: 40° 50°, J, N, Mn+Fe, Sp, P, SR 3: 10°, J, N, Mn+Fe, Sp, P Wa, SR	PT #2	[12]	
32				>6		2 2				
33				NA		2	Intense y fractured and broken on 70° 90° jo nts; Fe sta ned; no s ckens des or c ay present		1418 1433	
1586	10		100	0	0	12 3 3 3	1: 50°, J, N, Mn, Su, P, SR 2: 90°, J, N, Mn, Su, P, SR 3: 30° 40°, J, N, Mn+Fe, Sp, P, SR		[13]	
34				>6		3	Intense y fractured/broken		1440 1446	
35				5		1 2	1: 85° 90°, J, N, Mn+Fe, Su, P Ir, SR 2: 40° 50°, J, N, Mn+Fe, Su, P, SR			
1584	11		100	3	0	1			[14]	
36				5		1 2	↓ Becomes s ght y to moderate y weathered; ntense y fractured w th Fe&Mn sta ned fractures; no s ckens des or c ay present		1500 1510	
37				>6					[11]	
1582	12		100	0	0				1518 1142	End of day 7/11/2016 to set anchor
38				>6					[15]	Begin day 7/12/2016 AM water level=>27.0'
39	13		100	0	0		Poss b e s ough/cave		1146 1156	
40				4		11 1	1: 90°, J, ?, Mn+Fe, Su, P, SR ↓ Becomes s ght y weathered; h gh y fractured			
41				4		1 2	1: 20°, J, N, Mn+Fe, Sp, P, SR R 2: 70°, J, N, Mn+Fe, Sp, P, SR 3: 40°, J, N, Mn+Fe, Su, P, SR			
42				4		11 3	↓ Becomes aphan t c to porphyry c w th occas ona brecc a casts			
1580	14		100	3	64	4 5	4: 30°, J, N, Mn+Fe, Sp, P, SR 5: 80° 90°, J, N, Mn+Fe, Su, P Wa, SR		[26]	
43				1		3	↓ Becomes b u sh gray			PL: 22841 psi
44				1		M 2				
45										

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Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1578	45		3		4		1	BASALT; green sh to bush gray; slightly to locally moderate weathered; strong; highly to intensely fractured; aphanitic to locally porphyritic with occasional breccia casts and Ca carbonate nodules <i>mv (continued)</i>		1207 1234	
	46				>6		2, 3	1: 75°-90°, J, N, Mn+Fe, Su, P, SR 2: 10°-25°, J, N, Mn+Fe, Su, P, St, SR			
	47	15		100	0		2, 1	3: 70°, J, MW, Mn+Fe+Sd+Ca, Su+F, P, SR 4: 50°, J/Sh, MW, Mn+Fe+C+CR, Su+Pa, P, SR (possibly from cuttings)		[14]	
	48				>6		4, 1, 2, 2				
1576	49		4				2	Shoe disturbed; moderately weathered; weak		1249 1256	
	50				3		1, 2	1: 5°-10°, J, N MW, Mn+Fe, Su, P, Wa, SR 2: 85°, J, N, Mn+Fe, Su, P, SR			
	51	16		93	34		3, 1, 4	BASALT BRECCIA; mottled green sh and bush gray and dusky purple; slightly weathered; strong; highly fractured; casts are subangular to angular to 1". Vesicular elongations due to Ca carbonate suture on 49.8' 50.1' and 50.8' 52.4'		[19]	
	52				2		5, 3	3: 60°, J, N, Mn+Fe, Su, P, SR 4: 50°, J, N, Mn+Fe, Su, P, SR 5: 75°, J, N, Mn+Fe, Su, P, SR			
	53				NA		3				
	54				1		1	BASALT; bush gray; slightly weathered; very strong; moderately to highly fractured; aphanitic tophanitic; with occasional Ca carbonate nodules and 60° foliation/fabric		1309 1515	
1572	55	17		100	91		2	1: 60°, J, N, Mn+Fe, Su, P, SR 2: 30°, J, N, Mn+Fe, Su/Sp, P, SR		[28]	
	56				0						
1570	57				0						UC: 9233 psi
	58				1		2			1525 1532	
	59	18		100	72		1, 2, 3	1: 10°, J, N, Mn+Fe, Sp, P, SR 2: 70°, J, N, Mn+Fe, Su, P, SR 3: 20°, J, N, Mn+Fe, Sp, P, SR 4: 70°-80°, V, N, Ca, Pa, P, SR (possibly by mechanical)		[21]	
1568	60				0					1539 1546	
	61	19		100	53		4, 1, 2	Becomes dusky purple with green sh gray alteration rings up to 1.5"; mostly aphanitic 1: 50°, J, N, Mn+Fe, Sp, Ir Wa, R		[18]	

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Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
61	19	4	100	0	53		2: 15°, J, N, Mn+Fe, Su, P, SR BASALT; dusky purple and green sh gray; slightly weathered; very strong; moderately to highly fractured; aphanitic; with green sh gray alteration rinds up to 2"; with occasional Ca carbonate nodules		1551 1600	
1566				2		1 2	1: 20°, J, N, Mn+Fe, Sp, P, St, SR R 2: 55°, J, N, H+Mn+Fe, Su?, P, SR? 3: 70° 80°, J, N, Mn+Fe, Su, P, St, SR 4: 40°, J, N, Mn+Fe, Sp, P, SR			
63				2						
64	20	5	100	1	75	3	↓ Becomes mostly dusky purple; aphanitic tophanitic; without alteration rinds; 60° flow fabric/formation		[24]	
1564				2		3				
65				2		4				
66				3		M 1				1612 1618
67				3		2	1: 40°, J, VN, No, No, P, S 2: 70°, J, VN, No, No, P, S 3: 70°, J, N, Mn+Fe+Ca, Su+Pa, P, SR 4: 70° 80°, J, N, Mn+Fe+Ca, Su+Pa, P, SR			Run 20 shoe disturbed upon removal UC: 5102 psi
1562				0		3 M				
68	21		100	>6	39	5	↓ Becomes aphanitic to porphyritic; intensely fractured, many fractures are a long weak back mineralized layers. Anastomosing joint sets:		[20]	
69				>6		4	5: 20°, J, N, Mn+Fe, Sp, P, SR 6: 90°, J, N, Mn+Fe+Ca, Su+Pa, P, SR			Bit blocked off End of day 7/12/2016
70				>6		5	↓ Becomes fresh; very strong just below contact at 55° to core axis		1628 1131	Run 21 shoe disturbed upon removal Begin day 7/13/2016 AM water level=7.8'
1560				1		6				
71				1		1				
72	22		100	2	92	2	1: 60°, J, N, Mn+Fe+Ca, Sp, P, SR 2: 30°, J, VN, Fe+Ca, Sp, Ir, R 3: 45°, J, N, Ca, Pa, P, SR 4: 30°, J, VN, No, No, P, SR 5: 15°, J, VN, No, No, P, SR		[25]	
73				2		3				
1558				1		4				
74				1		5				
75				1						1143 1150
76	23		100	1	88	1	1: 80°, J, N, Fe+Ca, Su+F, P, S 2: 30°, J, VN, No, No, P, SR			
1556				1						
77						2				

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	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
77	23	6	100	1	88	3	BASALT; dusky purple; slightly weathered to fresh; very strong; moderately to highly fractured; aphanitic tophanitic, occasionally with brecciacasts; with 60° flow fabric/ orientation; with Ca cements and occasional Ca ctenodes		[21]	
78				2		4, 5	mv (continued)			
79				1			3: 30° J, N, Fe, Su, P, R 4: 15° J, N, Ca, F, P, R 5: 75° 90° J/V, N, Ca, F, P, Wa, SR		1204	Run 23 shoe disturbed upon removal
80				2		1			1212	
81				1		1	↓ Becomes highly to intensely fractured 1: 70° 80° J, N, Mn+Fe, Sp, P, SR S 2: 50° J, N, Mn+Fe, Sp, P, SR 3: 20° 30° J, N, Mn+Fe, Sp, P, SR 4: 90° J, N, Mn+Fe, Su, P, SR			
82	24		88	6	33	1, 1				[20]
83				5		3				
84				NA		4				
85						1	Cored over pieces; possibly enough		1225	Run 24 shoe disturbed upon removal
86				6		2			1233	
87	25		100	0		2	1: 90° J, N, Mn+Fe, Su, P, SR 2: 60° 70° J, N, Mn+Fe, Su, P, SR 3: 5° 10° J, VN, No, No, P, R			[15]
88				4		3				
89				1		1	↓ Becomes moderately to highly fractured 1: 70° J/V, N, Ca, Pa, P, SR 2: 30° J, VN, No, No, Ir, R (possibly mechanical) 3: 90° J/V, N, Ca, F, P, SR		1241	
90				1		1			1247	
91				1		2				
92	26		100	1	83	1				[27]
93				1		3, 2				
94				1		1				
95				0					1256	
96				0					1438	
97				1		1	1: 60° J, N, Fe+Ca, Sp+Pa, P, SR 2: 10° J, VN, No, No, P, Ir, R 3: 70° J/V, MW, Ca, F, P, SR			
98				1		1				
99	27		100	3	73	2, 3				[23]
100						2				

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	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1544	27	7	100	3	73	2	BASALT; dusky purple; fresh; very strong; moderately to highly fractured; aphanitic to phaneritic, occasionally with breccia casts; with 50°-70° flow fabric/foamation; with occasional calcite nodules and veins			
1542				2		2	4: 30°-35°, J, N, Ca, Sp, P, SR		1451	
				0		4			1506	
1540				0						
1538	28		100	3	44*	1	↓ Becomes highly fractured 1: 60°, J/V, N, MW, Ca, F, P, SR 2: 90°, J/V, N, Ca, Pa, P, SR 3: 45°, J, N, Ca, Pa, P, SR 4: 30°, J, VN, No, No, P, SR (possibly mechanical)		[24]	*Low RQD due to near vertical fracture down entire length of core
				2		1				
1536				3		2				
				3		4			1519	Run 28 shoe disturbed upon removal
				2		2	1: 70°, J/V, MW, Ca, F, P, SR 2: 90°, J, N, Fe, Su, P, SR 3: 55°, J, VN, Fe, Sp, P, SR 4: 0°, J, N, No, No, P, Wa, SR R (possibly mechanical) 5: 30°-35°, J, N, No, No, P, SR		1527	
				1		1				
1534	29		100	4	0*	3			[24]	*Low RQD due to near vertical fracture down entire length of core
				4		4				
				3		5				
				3		5				
1532				4		3				
				4		4				
1530				2		2			1540	
				2		1	↓ Becomes slightly weathered 1: 30°, J, N, No, No, P, SR		1549	
1528		8		1		M				
				1		M	BASALT BRECCIA; mottled greenish gray and dusky purple; slightly weathered; strong to very strong; highly fractured; with occasional calcite filled and partially filled vugs and vesicles			
				2		2	2: 90°, J, N, Fe, Su, P, SR			
				1		M	3: 45°, J, N, Ca, Sp, P, SR			
1526				2		M				
				2		1				
1524	30		100	2	33*	M			[18]	*Low RQD due to near vertical fracture down entire length of core Run 30 slipped out of barrel; trip rods to recover
				2		2				
				2		3				
1522										

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	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
109	30	8	100	?	33*	2	BASALT BRECCIA; mottled green sh gray and dusky purple; slightly weathered; strong to very strong; highly fractured; with occasional calcified and partially filled vugs and vesicles			RQD is minimum
110						12			1605	End of day 7/13/2016
1532				2		M			0757	Begin day 7/14/2016 AM water level=8.1'
111				1		3				
112	31		100		74	4				[14]
113				2		5				
1530				1		6				
114						7				
115				4		11				
116				3		2				
1528				3		3				
117	32		100	3	44	3				[24]
118				1		4				
119				3		5				
1526				2		6				
120				2		7				
121				1		M				
1524	33		100	1	62	5				[23]
122				2		6				
123				2		4				
124				2		M				
1522	34		100	0	100	7				
125						1				

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	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
125		9		1		1	BASALT BRECCIA; green sh gray, dusky purple, and dusky red; fresh; very strong; moderately to slightly fractured; aphanitic to porphyritic with subangular breccia clasts to 2" mv (continued)			
126	34		100	1	100	2				[24]
127				1		2	1: 70° J/B, VN, No, No, P, Wa, R (basalt/breccia contact) 2: 40° 50° J, VN, No, No, P, R			
128				0						
129				0						1058 1107
130				0						
131				1		1				
132	35		100	1	100	2	1: 10° 40° J, T, No, No, Ir, R 2: 60° J, MW, W, Ca, Pa, P, R (vuggy with calcite crystals) 3: 40° J/B, VN, No, No, P, R (basalt/breccia contact, possibly mechanically)			[38]
133				2		3				
134		10		1		1	BASALT; green sh gray; fresh; very strong; moderately to slightly fractured; aphanitic with occasional calcite veins 1: 20° J, VN, No, No, P, SR 2: 60° 90° J/V, N, Ca, Pa, P, Ir, R 3: 10° J, VN, No, No, P, SR			1115 1124
135				1		2				
136	36		100	1	94	3				[25]
137				0						
138				0						
139				0		M				1136 1146
140	37		100	0	100					
141				0		1	1: 60° V, N, Ca, F, P, SR?			

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	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
141						2					
1510	37	10	100	0	100		2: 35°, V, N, Ca, F, P, SR? BASALT; green sh gray; fresh; very strong; mass ve; aphan t c to phan t c, with occas ona Ca c te nodules and veins mv (continued)			[25]	
142				0							
143				0							
144				0		1					
1508				0						1158 1207	
145				0		V					
146				0							
1506	38	100	100	0	100	1	1: 55°, V, N, Ca, F, P, SR?			[21]	
147				0		M					
148				0							
149				0		M					
1504		11		0		V				1221 1232	
150				0							
151	39	100	100	0	100	V 1	BASALT BRECCIA; bu sh gray; fresh; very strong; s ght y fractured to mass ve; aphan t c to porphoryt c with occas ona dusky purp e and green sh gray brecc a casts 1: 45°, B (fow contact)			[35]	
152				0							
1502				0							
153				1		2	2: 15°, J, T, No, No, Ir, R (poss b y mechan ca)				
154				1		1	1: 60° 75°, J, VN, No, No, P, R 2: 10°, J, VN, No, No, P, R 3: 40°, J, VN, No, No, P, R			1240 1435	
155				1							
1500				2		2 3					
156	40	100	100	0	86		BASALT; green sh gray; fresh; very strong; s ght y fractured; aphan t c			[19]	
157											

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		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
157			11		2		V2 3V	BASALT; green sh gray; fresh; very strong; slightly fractured; aphanitic; with occasional Calcite veins 0.25" 0.5" wide, 45° mv (continued)			
158	40			100		86					
1498					0						
159					0		M				1451 1505
160					0						
161					0						
1496		41		100	0	100					[30]
162					0		V V				
163					0		V				
1494											1515 1520
164			12		1						
165					2		1	1: 45°, J, VN, No, No, P, R 2: 70° 75°, J, VN, Ca, Pa, P, R 3: 40° 60°, J, N, Ca+CR, F, P, Ir, SR R			
166		42		100	5	44	2 3 3 4	Green sh gray, dusky purple and white; moderately strong to strong; highly fractured with abundant 40° 80°, V, MW W, H+Ca, F, Ir, occasionally vuggy			[21]
1492					2		3 4	4: 10° 15°, J, N, Ca, Pa, P, Ir, R			
168					2		4	CALCITE veins; minor vugs; strong 5: 55°, J/Sh, N, MW, Ca+S/C+CR, Pa, P, S (possible washout up to 0.5") 6: 40°, J, ?, No, No, P, SR			
169					0		5 6	BASALT BRECCIA; dusky purple, green sh gray, and dusky red; fresh; very strong; moderately fractured; aphanitic to porphyritic; with subangular breccia clasts up to 2"; with occasional Calcite veins 1: 80°, J, N, Ca, F, P, SR 2: 20°/70°, J/V, N, Ca, F, P, St, SR			1534 1545
1490					0						
170					1						
171		43		100	0	100					[18]
172					1						
1488					1						
173											

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	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
173	43	12	100	0	100		BASALT BRECCIA; dusky purple, greenish gray, and dusky red; fresh; very strong; moderately fractured; aphanitic to porphyritic; with subangular breccia casts up to 3"; with occasional calcite veins <i>mv (continued)</i>		1601 1610		
174				0							
175				0							
1486				0							
176	44		100	1	100	1	1: 10° J, VN, No, No, P, R 2: 40° J, N, Ca, Pa, P, R		[17]		
177				1		2					
1484				0		M M				Run 44 shoe disturbed upon removal	
179		13		0					1628 1007	End of day 7/14/2016 Begin day 7/15/2016 AM water level=8.0'	
180				1		1	1: 10° 30' J, T, No, No, Ir, R 2: 55° J, VN, No, No, P, Wa, R				
1482	181	45	100	1	100	2			[15]		
182				0							
183				0		M M					
1480	184			0					1027 1038		
185				2		1	1: 55° 60' J, VN, Ca, Pa, P, R 2: 40° J, VN, Ca, Pa, P, SR				
186	46		100	0	92	2	Becomes predominantly dusky purple		[17]		
1478	187			1		1					
188				1		1					
189									1056		

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-15

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-15

Sheet 13 of 14

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
189		13					BASALT BRECCIA; dusky purple, greenish gray, and dusky red; fresh; very strong; moderately fractured; aphanitic to porphyritic; with subangular breccia casts up to 3"; with occasional calcite veins		1259	
1476				1			1: 40°, J, VN, Ca, Pa, P, SR 2: 50°, J, VN, No, No, P, S SR			
190				1						
191	47		100	1	90				[17]	
192				0			3: 60°, J, VN, Ca, Pa, P, SR 4: 50° 60°, J, VN, Ca, Pa, P, Wa, SR			
1474				2			BASALT; dusky red to purple; fresh; very strong; moderately to highly fractured; aphanitic to phanitic; with 50° 60° foliation/fabric; occasional calcite veins and nodules			
193				2						
194		14		1			↓ Becomes aphanitic without foliation/fabric 1: 55° 60°, J, VN, Ca, Pa, P, SR 2: 40° 45°, J, VN, Ca, Pa, P, SR		1316 1325	
195				1						
1472				1						
196	48		100	2	92				[13]	
197				2						
1470				1			↓ Becomes slightly fractured			
198				1						
199	49		100	0	100				1348 1400	Run 48 shoe disturbed upon removal
200				1			1: 40°, J, VN, Ca, Pa, P, SR		[14]	
1468				0					1405 1412	
201				0						
202				0						
203	50		100	1	100		1: 20°, J, VN, No, No, P, SR		[17]	
1466				0						
204				1			2: 45°, J/V, N, Ca, Pa, P, SR			
205				1					1430	

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-15



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-15

Sheet 14 of 14

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
205		14		0		V1	BASALT; dusky purple; fresh; very strong; moderately to highly fractured; aphanitic to phaneritic; occasional calcite veins and nodules  <i>mv (continued)</i>  1: 60°, V, MW, Ca, F, P, S 2: 40°, J, VN, Ca, Pa, P, SR 3: 20°, J, VN, Ca, Pa, P, SR 4: 60°, J, T, No, No, P, SR (possibly mechanically) 5: 60°, J/V, N, Ca, F, P, SR (possibly mechanically)		1440		
206						V2					
1464				1							
207	51		100	3	79*	V3 V4				[12]	
208		15		0		V M					*Lower 2.5 of Run 51 slipped out of barrel; trip rods to recover RQD is minimum
209				1		M V M 5					
1462											
210							TOTAL DEPTH = 209.9 FEET Caliper and Televiewer performed on 7/16/2016, and Neat cement grout performed 7/17/2016		1504		
211											
1460											
212											
213											
214											
1458											
215											
216											
217											
1456											
218											
219											
220											
1454											
221											

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-15



Depth 8.0' to 22.0'



Depth 22.0' to 35.5'





Depth 35.5' to 48.8'



Depth 48.8' to 63.5'



Depth 63.5' to 76.9'



Depth 76.9' to 91.0'





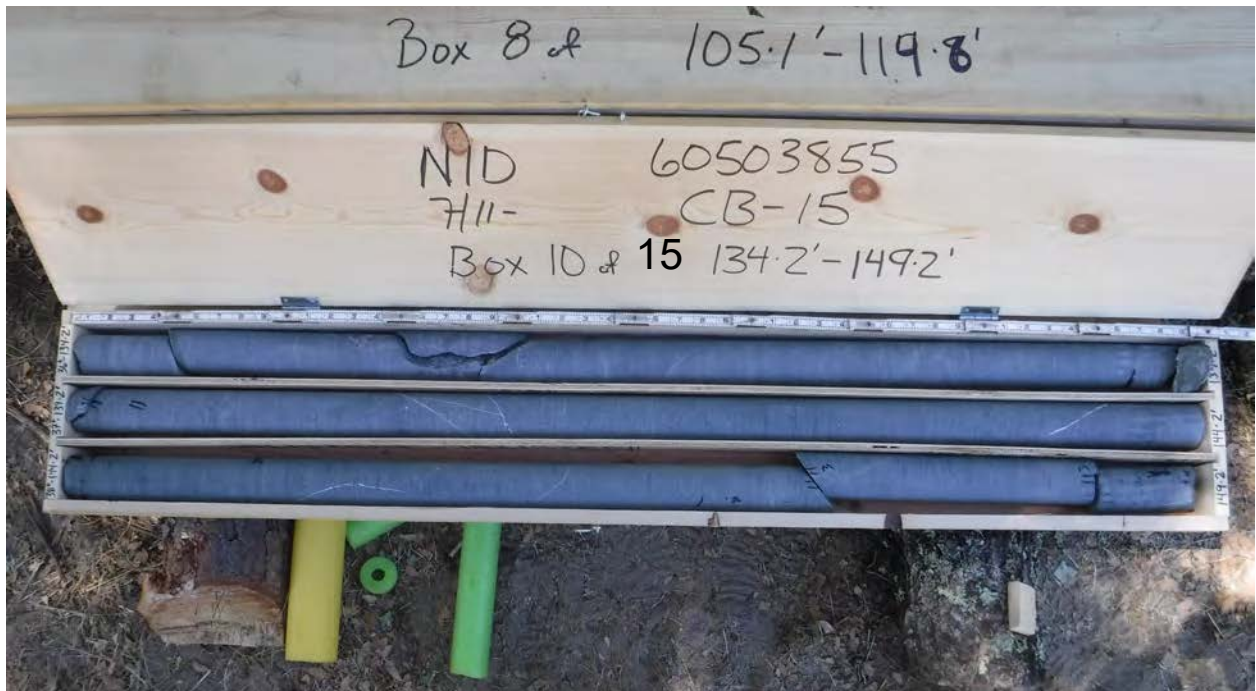
Depth 91.0' to 105.1'



Depth 105.1' to 119.6'



Depth 119.6' to 134.2'



Depth 134.2' to 149.2'





Depth 149.2' to 164.0'



Depth 164.0' to 178.7'





Depth 178.7' to 193.8'



Depth 193.8' to 207.9'





Depth 207.9' to 209.9'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-16**

Sheet 1 of 12

Date(s) Drilled	11/12/2016-11/16/2016	Logged By	B. Kozlowicz	Checked By	D. Simpson
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond	Total Depth of Borehole	173.9 feet
Drilling Rig Type	LF-70 Helicopter MOB Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	1602.7-ft
Groundwater Level	1.4-ft (River level)	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	50° / 185°
Borehole Completion	Neat cement grout to surface	Location	Axis 2 right side channel bottom ~10' from river	Coordinate Location	N 2141617.1 E 6838799.0

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
0	0							COBBLES, GRAVEL, and SAND; rounded			Set rig anchor to 18' at 60° top of rock at 8' (60°) set concrete for anchor
1602	1							ALLUVIUM			
	2										
	3										
	4										
1600	5		1					Becomes w th occas ona rockfa boulders		0802	End of day 11/12/2016 Begin day 11/14/2016 100% Water Circulation Return (WCR) greenish-gray in color
1598	6	1		50	NA	NA		BOULDER; dark green sh gray; s ght y weathered; strong; porphyritic Basalt		[26]	
	7										Advanced through boulder 0% WCR
	8									0809 0837	100% WCR
1596	9										
	10	2		20	NA	NA				[30]	
	11									0843 0851	
1594	12							BOULDER; very dark green sh gray; s ght y weathered; strong; aphanitic Basalt w th Ca c te veins and occas ona f ed ves ces		[36]	0% WCR
	13	3		100	0	70					

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
1592	3	1	100	3	70		BOULDER; very dark green sh gray; slightly weathered; strong; aphanitic Basalt with Calcite veins and occasional feldspars (continued)		0856 0910	Continued 0% WCR	
1590	4		68	4	0	NR	COBBLES, GRAVEL, and SAND; rounded; with occasional rock fragments ALLUVIUM (continued)		[27]		
1588	5		75	4	15	NR	BASALT; dusky purple; slightly weathered; strong?; highly fractured; porphyritic with occasional angular breccia casts mv		[48]		
1586	6		29	NA	0	NR	Green sh gray; past calcareous 1: 40° 50°, J, N, Mn+Fe, Su, P, SR 2: 60°, J/Sh, N MW, C+CR, F, P, SR with fine roots, possibly rough 3: 85°, J/Sh, ?, C, Pa, P, SR		[42]		
1584	7		29	NA	0	NR	Intensely fractured; with cored over casts; possibly core loss 1: 70° 80°, J, N, C, Sp, P, SR 2: 40°, J, N, No, No, P, SR 3: 60°, J, VN, No, No, P, SR		[30]		
1582				NA			Becomes intensely fractured; cored over casts with Mn staining With clay and sand on fracture faces		[42]	0%-20% WCR	
				NA			1: 75° 85°, J, N, Mn+Fe, Sp, P, SR		[42]		
				NA					1201 1220		
				NA					1225		

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1580	8	2	>6	>6	0	1 2	BASALT; dusky purple; slightly weathered; strong; intensely fractured; aphanitic  mv (continued)  1: 80°, J, ?, No, No, P, SR 2: 50° 60°, J, VN, No, No, P, SR 3: 40°, J, N, No, No, P, SR	1248	0% WCR water at collar	
1578	9	100	>6	>6	0	1 2	<p>↓ Becomes aphanitic tophanitic with fine brecciated casts and 50° foliation/fow fabric</p> 1: 50°, J, N, Fe, Su, P, SR 2: 90°, J, N, Fe, Sp, P, SR	1252 1259	WC 3 1%	
1576	10	100	4	4	62	1 2 3	BASALT BRECCIA; bush gray and dusky purple; slightly weathered; strong to very strong; highly fractured; aphanitic tophanitic; with 50° foliation/fow fabric	1304 1309		
1574	11	100	1	1	80	1 2	1: 85°, J, N, Fe, Su, P, SR 2: 10° 20°, J, VN, No, No, P, SR R (possibly mechanically) 3: 50° 60°, J, N, Mn+Fe, Su, P, SR 4: 75°, J, N, Mn+Fe, Su, P, SR	1315 1322	WC 2 7%	
1572	12	3	0	0	67	1 2 3	1: 50°, J, N, Mn+Fe, Sp, P, SR 2: 50°, J/V, N MW, Ca, F, P, SR  6" Calc vein  ↓ Becomes coarser breccia fabric 3: 20°, J, VN, No, No, P, R 4: 60°, J, VN, Ca, Pa, P, SR	1327 1333	UC 15889 psi WC 2 1%	
1570	12	100	3	3	67	1 2 3	1: 30°, J, N, Ca, Pa, P, SR 2: 45°, J, VN, No, No, P, SR 3: 30°, J, N, No, No, Ir, R			

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-16

Sheet 4 of 12

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1568	12	3	100	2	67	4	BASALT BRECCIA; bush gray and dusky purple; slightly weathered; strong to very strong; highly fractured; aphanitic tophanitic mv (continued)		[49]	Continued 0% WCR water at collar
46				2		6	4: 30°, J, VN, No, No, P, SR 5: 60°, J/V, N, Ca+C, F, P, SR 6: 40° 50°, J, VN, No, No, P, SR 7: 60°, J, N, Ca, Sp, P, SR			
47				2		6				
1566	13			1		1	1: 60°, J, N, Ca, Pa, P, SR 2: 20°, J, VN, No, No, P, SR 3: 80° 90°, J, N, Ca, F, P, SR 4: 40°, J, N, Ca, Sp, P, SR		1339 1351	UC 11459 psi WC 2.3%
48				1		1				
49				1		1				
50				1		2				
1564	13		100	1	75	2	BASALT; greenish gray; fresh; very strong; highly fractured; aphanitic; with Ca carbonate veins		[62]	
51				2		3	5: 50°, J/Contact, N, Ca, Pa, P, SR 6: 40°, J, VN, No, No, Ir, R			
52				2		5				
53				2		6			1356 1401	
1562	14		100	2	76	1	1: 50°, J, N, Ca, F, P, SR 2: 30°, J, N, Ca, Pa, P, S SR 3: 75°, J/V, N, Ca, F, P, SR 4: 20°, J, N, Ca, Pa, P, S SR			
54				2		2				
55				2		3				
1560	14		100	2	76	2			[50]	
56				4		4				
57				3		4				
57				0		2	← Becomes moderately fractured		1406 0728	End of day 11/14/2016 Begin day 11/15/2016 AM water level=1.5'
1558	15	4		0		0				
58				0		0				
59				2		1				
60	15		100	1	96	2	1: 60°, J, VN, Ca, Sp, P, SR 2: 30°, J, N, Ca, Pa, P, SR 3: 40°, J/Contact, N, Ca, F, P, SR		[44]	intermittent WCR to casing
61				1		3				

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
61	15	4	100	0	96		Interbedded BASALT & BASALT BRECCIA; dusky purple; fresh; very strong; moderately fractured; aphanitic to phanitic; with 50° foliation/bands			
62				0			mv (continued)		0735 0745	
63				0						UC 9630 psi WC 0.8%
1554				1		1				
64				1		2				
65	16		100	1	96	3			[39]	
66				2		2				
1552				2		4				
67				1		2				
68				0					0753 0801	
1550				0						
69				0						
70	17		100	1	84	V V			[45]	
71				1		1				
1548				3		2 2 2				
72				2		2			0807 1055	
73		5		2		M 1				
74	18		100	3	57	1 3 3 3			[35]	
75				5		4				
76				>6		4 2 3			1101 1107	
1544	19		100	3	0	1 1			[17]	
77				0		2				

Report GEO CORE OAK C B MAP File N:\AECOM\ROCK CORE GPJ 1/30/2017 CB-16

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-16

Sheet 6 of 12

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
77	19	5	100	4	0	2	3: 50°, J, N, Fe, Su, P, SR Interbedded BASALT & BASALT BRECCIA; dusky purple; slightly weathered to fresh; strong to very strong; highly to occasionally moderately fractured; aphanitic to phanitic; with 40°-50° foliation fabric and occasional calcite veins		1113 1123	
78						3				
79				0		2	1: 35°, J, N, Fe, Su, P, SR 2: 70°, J, N, Fe, Su, P, SR 3: 40°-45°, J, VN, No, No, P, SR 4: 25°-30°, J, VN, No, No, P, SR			
1542				2		3				
80	20		100	1	98	4			[44]	
81				2		3				
1540				1		4				
82				0		3				
83	21		100	1	67	M	← Becomes BASALT BRECCIA 1: 70°, J, N, Ca, F, P, SR		1130 1144	WCR to top of casing
84				1		1			[22]	
1538				0		1			1149 1157	0%-25% WCR to top of casing
85				1		1				
86				0		1	1: 50°-60°, J, N, Ca, Pa, P, SR 2: 40°, J/V, N, Ca, F, P, SR R 3: 40°, J, N, Ca, Sp, P, SR			
87	22	6	100	2	93	2			[33]	
1536				1		1				
88				0		3				
89				0		1			1205 1211	UC 15284 psi WC 2.3%
1534				0		1	BASALT; dusky purple; fresh; very strong; moderately fractured			
90				0		1				
91	23		100	2	100	2	1: 80°, J, N, Ca, F, P, SR 2: 15°, J, VN, No, No, P, SR		[34]	
92				0		2				
1532				0		2				
93				0		2				

Report GEO\_CORE\_OAK\_C\_B\_MAP File N:\AECOM\ROCK CORE GPJ 1/30/2017 CB-16

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-16

Sheet 7 of 12

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
93	23	6	100	2	100	3	3: 0°, J/V, N, Ca, F, P, SR BASALT; dusky purple; slightly weathered to fresh; strong to very strong; moderately to highly fractured; aphanitic tophanitic with 45°-55° foliation on flow fabric and occasional Ca c te ve ns		1220 1228	
94				0		1	mv (continued)			
1530				0						
96	24		100	3	86	1 2	1: 20°, J, N, No, No, P, SR R 2: 35°-40°, J, N, Ca, F, P, SR 3: 10°-20°, J, VN, No, No, Ir, R 4: 40°, J, N, Ca, Sp, P, SR		[33]	
97						2 3 4				
1528				2						
98				1		3				
99				1					1237 1433	
1526				1		1 2	BASALT BRECCIA; dusky purple and green sh gray; fresh; very strong; highly to occasionally moderately fractured; 55° foliation on fabric			
100				1		1 2 3	1: 40°-45°, J, VN, No, No, P, SR 2: 50°-60°, J, N, Ca, Pa, P, SR 3: 20°, J, VN, No, No, P, SR		[33]	
101	25	7	100	2	74	2 3				
102										
1524				1		1				
103				4		2 2 2				
104				1		1	← 1" wide vuggy Ca c te ve n		1442 1447	
105				1		2				
1522				1		3	1: 50°, J, N, No, No, P, SR 2: 60°, J, N, Ca, F, P, SR 3: 70°, J, VN, No, No, P, SR 4: 40°-45°, J, N, Ca, Pa, P, SR			
106	26		100	0	96				[38]	
107						4				
1520				1						
108						4				
109				1					1455 1500	

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-16

Sheet 8 of 12

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
109		7		2		1	BASALT BRECCIA; dusky purple and buff gray; slightly weathered to fresh; very strong; highly to occasionally moderately fractured; 50°-60° foliation fabric and occasional calcite veins  mv (continued)			
110						2				
1518				2		2	1: 60°, J, N, Ca, Pa, P, SR 2: 50°, J, N, No, No, P, SR 3: 60°, J, VN, No, No, P, SR R			
111	27		100	0	86					[37]
112										
113				1		3				
1516				0						
114									1508	
115				2		1	1: 60°, J, N, Ca, Pa, P, R 2: 60°, J, VN, No, No, P, SR 3: 40°, J, N, No, No, P, SR 4: 50°, J, VN, Ca, Pa, P, SR		1513	
1514		8		2		2				
116	28		100	1	82	3				[38]
117						2				
118				1		4				
1512				2		3				
119						3			1521	
120				0					1526	
121				1		1	1: 50°-55°, J, VN, No, No, P, SR 2: 60°, J, VN, No, No, P, S SR			
1510	29		100	1	96	1				[38]
122						2				
123				2		2				
1508										
124				1		1	← Becomes dusky purple and dark green sh to buff gray		1534	
125	30		100	0	100				1539	

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-16

Sheet 9 of 12

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
125			8		0			BASALT BRECCIA; dusky purple and dk green sh to bush gray; slightly weathered to fresh; very strong; moderately to highly fractured; aphanitic to phanitic; 50°-60° foliation fabric and occasional Calcite veins			
1506	126	30		100	1	100	1	mv (continued)			[33]
	127				1		2	1: 60°, J, VN, No, No, P, SR 2: 45°, J/V, N, Ca, Pa, P, SR 3: 40°, J, VN, No, No, P, SR			
	128				1		3	Becomes mostly green sh to bush gray with less prominent foliation			
1504	129				1		1	Green sh gray with irregular pagoclastic phenocrysts to 0.2"			1548 0938
	130		9		0		1	1: 50°, J/V, N, Ca, Pa, P, SR	PT #5		End of day 11/15/2016 Begin day 11/16/2016
1502	131				0		1				[28]
	132				0						
	133				0						
1500	134				0		1				0949 0955
	135				0		1	1: 45°, J, VN, Ca, Pa, P, SR 2: 35°, J, VN, No, No, P, Ir, R 3: 10°, J, T, No, No, P, SR			
1498	136				1						[38]
	137		32	100	0	100					
	138				1		2				
	139				1		3	Becomes mostly bush gray; with angular breccia casts to 0.5"; without foliation fabric			1003 1012
1496	140				0						
	141	33		100	0	100					

Report GEO CORE OAK C.B. MAP File N:\AECOM\ROCK CORE GPJ 1/30/2017 CB-16

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-16

Sheet 10 of 12

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS		
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number							
141	33	9	100	0	100	1		BASALT BRECCIA; bush gray and oca y dusky purple; fresh; very strong; moderately to oca y s ght y fractured; aphan t c to phaner t c; w th angu ar brecc a casts to 0.5"		[37]			
142				1								1	mv (continued)
143				0								1	1: 10°, J, VN, No, No, P, R, R
144	10			0						1020			
145				1						1		1: 40°, J, T, No, No, P, SR	
146				1						1		2: 25°, J, VN, No, No, P, SR	
147	34	100	100	0	100	2				[38]			
148				1								2	↓ Becomes s ght y fractured
149				0								2	
1488	35	100	100	0	100	V				1033	[34]		
150				0						V			
151				0						V			
1486	36	100	100	0	100	1				1047	[29]		
152				0						1			1: 80°, J, N, Ca, Pa, P, SR
153				0						1			
1484	154	0	1						1052				
155	1												
156	0												
157													

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-16

Sheet 11 of 12

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
157											
1482		10		1			BASALT BRECCIA; bushy gray; fresh; very strong; moderately fractured; aphanitic tophanitic; with occasional calcite veins <i>mv (continued)</i>				
158	36		100		100	2	2: 15°, J, N, Ca, Pa, P, R				
159				1		1				1102	
1480				0		1	BASALT; bushy gray; fresh; very strong; moderately fractured; aphanitic 1: 35°, J/V, N, Ca, F, P, SR (possibly mechanically slightly vuggy)			1119	
161	37		100		100	2	2: 50°, J, N, Ca, Pa, P, SR 3: 25°, J, T, No, No, P, R			[33]	
162				0		3					
1478				1		M/3				1128	
164				0						1133	
1476				1		1 V	1: 70°, J/V, N, Ca, F, P, SR (top of 1" calcite vein) 2: 30°, J, VN, No, No, P, R			[31]	
166	38		100		100	2					
167				1							
1474				0							
169		11		0						1143	
170				0						1150	
1472				3		1	1: 20°-40°, J, VN, Ca+Ch, Pa, P, Wa, Sk (rake at 90°)				
171	39		100		92	2	Becomes green sh gray; with calcite veins 2: 60°, J/V, N, Ca, F, P, SR 3: 70°, J/V, N, Ca+Ch, F+Su, P, Sk (rake at 80°, top of 1" calcite vein)			[38]	
172				0		3 V					
173											

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-16

Sheet 12 of 12

Elevation, feet	Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
1470	173	39	11	100	0	92		BASALT; green sh gray; fresh; very strong; moderately fractured; aphanitic mv (continued)				
1468	174							<b>TOTAL DEPTH = 173.9 FEET</b> Caliper, Televiewer, and Neat cement grout performed 11/17/2016		1158	End of day 11/16/2016 pull rods and reset HWT casing shoe to 40' for downhole logging	
1466	175											
1464	176											
	177											
	178											
1462	179											
	180											
	181											
	182											
	183											
1460	184											
	185											
	186											
	187											
	188											
1458	189											

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16



Depth 5.0' to 29.0'



Depth 29.0' to 43.1'





Depth 43.1' to 58.0'



Depth 58.0' to 72.2'



Depth 72.2' to 86.6'



Depth 86.6' to 101.1'





Depth 101.1' to 115.4'



Depth 115.4' to 129.8'



Depth 129.8' to 143.9'



Depth 143.9' to 158.8'





Depth 158.8' to 173.9'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

## Log of Rock Core Boring CB-16A

Sheet 1 of 3

Date(s) Dr ed	11/18/2016	Logged By	D. Simpson	Checked By	S. Janowski
Dr ng Method	HQ-3 Wireline Core	Dr B t S ze/Type	3 7/8" HQ Diamond	Tota Depth of Boreho e	42.1 feet
Dr R g Type	LF-70 Helicopter MOB Rig	Dr ng Contractor	Ruen Drilling	NAVD 88 Ground Surface E evat on	1602.7-ft
Groundwater Leve	1.4-ft (River level)	Samp ng Methods	HQ-3 Wireline	Inc nat on from Hor zonta/Bear ng	57° / 185
Boreho e Compet on	Neat cement grout to surface	Locat on	Axis 2 right side channel bottom ~11' from river	Coord nate Locat on	N 2141617.1 E 6838799.0

E evat on, feet	Depth, feet	ROCK CORE						L thology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number					
0	0							COBBLES, GRAVEL, and SAND; w th BOULDERS	ALLUVIUM			Advance conductor casing to 11'
-1602	1											
	2											
-1600	3											Very slow advancement in cobbles and boulders
	4											
	5											
-1598	6											
	7											
-1596	8											
	9											
-1594	10							BASALT; dusky purple; s ghtly weathered; strong; ntense y fractured; phaner tic; w th fine white crystals	mv			Lost most Water Circulation Return (WCR)
	11		1								0842	
	12	1		85	>10	0					[12]	
-1592	13			NA							0852	

Report GEO CORE OAK C B MAP File N D AECOM ROCK CORE GPJ 1/30/2017 CB-16A

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-16A

Sheet 2 of 3

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1590	13	1					H	BASALT; dusky purple; slightly weathered; strong; intensely fractured; phanitic; with fine white crystals; 40° 60°, J, VN, No, No mv (continued)		0858	
	14	2		100	1	44				[24]	
	15				8					0902 0905	
	16	3		100	5	0				[36]	
	17				>6			Becomes aphanitic		0909 0913	
1588	18	4		100	>10	0		Moderately weathered; moderately strong		[30]	
	19				>10					0917 0920	
1586	20	5		100	4	0				[28]	
	21				NA	NR				0923 0927	0% WCR No drilling resistance top 12" of run (Void?)
	22	6		86	>6	0				[42]	Top and bottom of clay are disturbed from the fractured rock above and below during drilling and extrusion clay wrapped in plastic during review
1584	23				6			CLAY; dusky purple; pasty; stiff		0930 0937	
	24	7		100	11	35	1			[31]	
1582	25				1			1: 50° Contact BASALT BRECCIA; mottled dusky purple and greenish gray; slightly weathered; very strong; highly fractured		0942 0947	
	26	8		100	3	36	1	1: 70°, J, VN, Fe+Mn, Su, Wa, R 2: 50°, J, VN, Fe+Mn, Su, P, SR		[33]	
1580	27				4			Hightly weathered; weak		0951 1006	
	28	9		100	2	31	1	Becomes greenish gray		[72]	
	29				2			1: 45°, J, N, Fe, Su, P, SR 2: 40°, J, N, Fe, Su, Wa, R			

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-16A

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-16A

Sheet 3 of 3

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
29											
1578		2		>10				BASALT; green sh gray; s ght y weathered; very strong; ntense y fractured; aphan t c; 85° contact 29.1' 31.2'			
30	9		100		31			mv (continued)		[72]	
31				>10				1: 50°, J, N, Fe, Su, P, SR		1009 1014	
1576	10		100	>10	0					[42]	
32										1016 1022	
33		3		6				1: 45° Contact BASALT BRECCIA; mott ed dusky purp e and green sh gray; s ght y weathered; very strong; moderate y fractured			UC 20085 psi
34				0							
1574	11		100	1	92			2: 45°, J, N, Ca, F, P, SR		[49]	
35				0							
1572				2				3: 45°, J, VN, Ca+C, Pa, P, SR 4: 5°, J, N, Ca, Pa, P, SR			
37										1028 1032	
38				1				1: 45°, J, VN, Ca, Pa, Wa P, SR R			UC 21853 psi
39				0							
1570	12		100	2	86			↓ Becomes h gh y fractured 2: 55°, J, VN, Fe, Su, Wa, VR		[37]	
40											
41				1							
1568				2							
42										1040	
	TOTAL DEPTH = 42.1 FEET Neat cement grout to surface 11/18/2016										
43											
1566											
44											
45											

Report GEO CORE OAK C B MAP File ND AECOM ROCK CORE GPJ 1/30/2017 CB-16A



Depth 11.0' to 25.1'



Depth 25.1' to 37.9'





Depth 37.9' to 42.1'



**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-17**

Sheet 1 of 10

Date(s) Drilled	7/9/2016-7/12/2016	Logged By	S. Janowski	Checked By	D. Simpson
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond ADT 8	Total Depth of Borehole	152.5 feet
Drilling Type	LF-70 Track-Mounted Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	1718-ft
Groundwater Level	49.81-ft on 7/16/2016	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	60° / 0°
Borehole Completion	1.0-in Sch 40 PVC Piezometer	Location	Axis 2 South, Geophysics line 2-9	Coordinate Location	N 2141256.6 E 6838728.3

Elevation, feet	Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number						
1718	0		1		NA			CLAYEY SAND w th GRAVEL (SC); dry to moist; red; subangular BASALT GRAVEL to 2"; low plasticity FINES RESIDUAL SOIL			0933	Well: 1-in PVC solid well casing 0'-60' in neat cement grout with 12" Christy box installed at surface	
	1				NA		NR						
	2	1		20*		0					[35]	*Only gravels recovered	
1716	3				NA		00 320				0939 0943		
	4				NA		NR	FAT CLAY w th GRAVEL (CH); moist; light olive brown					
1714	5	2		67		0					[42]		
	6				NA			BASALT; medium dark gray; moderately weathered; strong; intensely fractured. Becomes slightly weathered to fresh; strong to very strong; highly fractured at 5.6'	mv		0946 0956		
	7	3		100		100		↓ Becomes back sh red 1: 50° 60°, J, N?, Mn, Sp, Wa, R			[29]		
1712	8										1000 1027		
	9							1: 30°, J, VN, No, No, Wa St, R VR (possibly mechanical)				UC 9004 psi Advance 5" HWT casing to 5'	
1710	10	4		100		64		↓ Becomes slightly weathered 2: 10°, J, VN N, Fe+Mn, Su, Wa, R 3: 70° 80°, J, VN N, Fe+Mn, Su, Wa, R			[45]		
	11												
1708	12							↓ Becomes dark gray					
	13	5		100		100		4: 75°, V/J, VN, Ca+Fe+Mn, F+Su, Wa, R			1033 1039		
								1: 80°, J/V, VN, Ca+Mn+Fe, F+Pa+Su, Wa, R					

Report GEO CORE OAK C BMP WELL File NDAECOM ROCK CORE GPJ 1/30/2017 CB-17

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-17

Sheet 2 of 10

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
1706	5	1	100	0	100	2	BASALT; redd sh dark gray; slightly weathered; strong; moderately fractured; with calcite filled vesicles mv (continued)			[50]	
1704						M					
1704						3	3: 60°, J, N MW, Fe+Mn, Su, Wa, VR				
1704							↓ Becomes medium dark gray; fresh; very strong			1044 1053	PL 24348 psi
1702		2									
1702	6		100	1	100	1	↓ Becomes slightly fractured 1: 75°, J, VN, Mn, Su, Wa, R SR			[45]	
1700						M					
1700						M					
1700						M					
1700						M	↓ Becomesphaneritic to porphyritic; decreasing calcite filled vesicles and voids			1100 1110	
1698	7		100	0	100	M				[66]	
1698						M				1111 1120	
1696	8		100	0	98	1	Increased calcite filled vesicles 1: 60°, V, T, H+Ca, F, P (ncp ent)			[50]	
1696						2	↓ Becomes moderately fractured 2: 30°, J, W, Fe, Su, Wa, R				Lost all Water Circulation Return (WCR) 10% WCR
1694						3	3: 15°, J, T, H+Uk, Uk, P (ncp ent)			1126 1134	
1694	9		96	0	80	1	↓ Becomes highly fractured 1: 70°, J, VN, Mn, Su, P, SR				Driller indicated soft drilling at 28 8'
1694						NA	Possibly clayey infilling washed out				

Report GEO CORE OAK C BMP WELL File NDAECOM ROCK CORE GPJ 1/30/2017 CB-17

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-17

Sheet 3 of 10

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
29		2					BASALT; medium dark gray; slightly weathered; strong to very strong; intensely fractured;phaneritic to porphyritic. Becomes fresh; moderately fractured at 29.7'				
1692	30	9	96		80	M	<p>mv (continued)</p> <p>Becomes dark gray; fresh; very strong; slightly fractured; with increased calcification of voids/vesicles</p>			[60]	
	31		0			M					
	32		0								
1690	33		0			2	2: 65°, V, T, H+Ca, F, P, VR (mechanically broken)			1139 1349	85% WCR
	34		0								
1688	35	10	100		100	1	1: 60°, V, VN, Ca+Ch, F+Su, P, R (mechanically broken)			[50]	
	36		0			M					
1686	37		0			M					
	38		0								
1684	39		0			1	<p>Becomes highly fractured</p> <p>1: 70°, J, VN, Fe, Su, Wa, SR            2: 80°, J/V, T, Ca+Fe, F+Su, P, SR            3: 50°, J, t, Fe, Su Sp, P, SR</p>				
	40	11	100		94					[50]	
	41		0			M					
1682	42		0			2, 3	Becomes moderately fractured				
	43		0			M					
1680	44	12	100		100	M				1412 1419	
	45		1			1	1: 50°, J, VN, Fe, Su, P, SR				

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/30/2017 CB-17

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-17

Sheet 4 of 10

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
	45		4	100	1	100	M	BASALT; dark gray; fresh; very strong; moderately fractured; phanitic to porphyritic; Ca cte crystallization and nfring of ves c es			[50]	85% WCR
	46	12		100	0	100	M	2: 10°, J, VN, Mn, Su, Wa, SR mv (continued)				
1678	47						M				1425 1432	
	48						M	↓ Becomes massive				
1676	49						M	↓ Becomes medium green sh gray				
	50	13		100	0	100	M				[43]	
1674	51						M					
	52						M					
	53						M				1439 1624	
1672	54						M					Well: Bentonite pellets seal 52'-56'
	55	14		100	0	100	M				[50]	
1670	56						M					
	57						M					
1668	58						M	↓ Becomes medium dark gray; aphanitic to phanitic; some Ca cte nfring of ves c es			1630 0827	End of day 7/9/2016
	59		5				M	1: 70° 80°, V, T VN, H+Ca, Pa, P, R (mechanical)				Begin day 7/11/2016 AM water level=27.3' Well: #2/12 Sand filter pack 56'-73'
1666	60	15		100	0	100	M				[33]	
	61											

Report GEO CORE OAK C BMP WELL File N:\AECOM\ROCK CORE GPJ 1/30/2017 CB-17

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
61			5					BASALT; medium dark gray; fresh; very strong; massive; aphanitic tophanitic; Calcite infilling of vesicles/voids mv (continued)				75%-85% WCR
	62	15		100	0	100						
1664					0		1					0836 0849
	63				2?		1					
	64						2 2 3	1: 70°, V, MW, H+Ca, F, Wa (mechanically broken) 2: 40°, J, T, No, No, P, SR (mechanically?) 3: 50°, V, VN, H+Ca+Ch, F+Su, P				No increased WCR loss at fractured zone
1662					4							
	65	16		100	2?	90	4	4: 50°, V/J, MW, Ca+Ch, F+Su, P, SR			[30]	Well: 1-in PVC 0.020 slotted well casing 60'-70'
	66				1?		2 2 M					
1660					0		M					
	67											
	68				1		1	1: 40°, J, VN, Fe, Su, P, SR				0859 0907
	69				0							
1658												
	70	17		100	0	96					[38]	
	71						2 1	2: 15°, J, VN, Fe, Su, P, SR Becomes fresh; massive				
1656					2							
	72						M M					0915 1054
	73		6		0							
1654					0							
	74				0							
	75	18		100	0	100	M 1 2	1: 65°, V, VN, H+Ca, Pa, Wa (mechanically) 2: 30°, V, T, H+Ca, Pa, Wa (mechanically)			[33]	Well: Bentonite pellets 73'-78'
1652					0							
	76				0							
	77				0		3	3: 20°, V, T, H+Ca, F, Wa				

Report GEO\_CORE\_OAK\_C\_BMP\_WELL\_File\_ND\_AECOM\_ROCK\_CORE\_GPJ\_1/30/2017\_CB-17

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-17

Sheet 6 of 10

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
77		18	6	100	0	100		BASALT; medium dark gray; fresh; very strong; massive; phanitic to porphyritic; Ca cements and filling of vesicles/voids			1103 1109	
	78							mv (continued)				
1650					0							
	79				0							
	80	19		100	0	100					[33]	Well: Neat cement grout 78'-152.5'
1648					0							
	81				0		M					
	82				0		1 M	1: 15°, V, VN MW, H+Ca, F, Wa				
	83				0		M				1118 1137	
1646					0							
	84				0							
	85	20		100	0	100	1	1: 75°, V, T, H+Ca, Pa, Wa, R (mechanically broken)			[33]	
1644					0							
	86				0							
	87				0							
1642					1		M	1: 60°-70°, V, T, H+Ca, F, Wa				
	88	7			0		2	2: 15°-25°, V/J, T, Ca+Fe, F+Sp, Wa, SR Becomes highly to moderately fractured				
	89				0		1					
	90	21		100	2	100	3	3: 50°, V/J, VN, Ca+Fe+Mn, F+Su, Wa, SR				
1640					0		2	Becomes more mottled with white Ca cements and filled vesicles			[33]	
	91				0		1					
	92				0		4	4: 60°, V, VN, H+Ca+Fe, F+Su, Wa, SR (partially open)				
1638					0		M					
	93	22		100	0	100	M				1202 1346	

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/30/2017 CB-17

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-17

Sheet 7 of 10

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number						
93		7		0			BASALT; dark gray; fresh; very strong; slightly fractured; phaneritic to porphyritic; Calcite veins and filling of vesicles/voids					
94						M1	mv (continued)					
1636				1			↓ Becomes moderately fractured 1: 70°, J/V, VN, Ca+Fe, Pa+Su, Wa, R					
95	22		100	100							[38]	
96				0								
97				1		M1	↓ Becomes slightly fractured					
1634												
98				0		M					1354 1401	
99				0								
1632				0		1/M	1: 35°, V, VN, H+Ca, F, Wa (mechanical)					
100	23		100	100							[30]	
101				0		M						
1630				0		M						
102				1?		M						
103		8		1?		M1	Few Calcified vesicles 1: 80°, V, VN, Ca, F, Wa, SR (possibly mechanical) 2: 50°, V, VN, Ca, F, Wa, SR (possibly mechanical)				1411 1419	
1628						M2						
104				0								
105	24		100	100							[27]	
106				0		M						
1626				0								
107				0		M						
108				0		M					1430 1438	
1624	25		100	100								
109				1		M1	1: 20°, V/J, VN, Ca+Ch, F+Su, Wa, SR					

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/30/2017 CB-17

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-17

Sheet 8 of 10

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
109			8		0			BASALT; dark gray; fresh; very strong; massive; phaneritic to porphyritic				
110	25			100	0			mv (continued)			[27]	
1622	111				0							
112					0	2/M		2: 70°, V, T, H+Ca, F, Wa, R VR (mechanical)				
113					0	M		Becomes greenish gray; porphyritic			1449 1457	
1620	114				0							
115	26			100	0						[30]	
1618	116				0							
117					0	M						
1616	118		9		0	M					1507 1517	
119					0							
1614	120	27		100	0	1		1: 60°, V, T, H+Ca, F, Wa (mechanical)			[27]	
121					0							
1612	122				0	M 2		2: 15°, V, N, H+Ca, F, Wa (mechanical)				
123					0	1						
124	28			100	1?	1 2		1: 30°-60°, V, N, MW, H+Ca, F, Wa St 2: 40°, V/J, T, Ca, Pa, Wa, SR (mechanical?) 3: 20°, J, VN, Ca, Pa, Wa, R				
1610	125				1	1 3						

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/30/2017 CB-17



End of day 7/11/2016  
 Begin day 7/12/2016  
 AM water level => 92.5'



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-17

Sheet 9 of 10

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	We Diagram	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
125			9	100	0	100	1/M	BASALT; dark green sh gray; fresh; very strong; slightly fractured; phanitic to porphyritic; Ca c te veins and nf ng of ves c es/vo ds			[30]	
126	28			100	0	100		mv (continued)				
1608	127				0		M M				0924 0933	
128					2		1	← Becomes slightly weathered to fresh; highly fractured on 1" Ca c te f ed vug				
129					1		2	1: 20°, J, VN, Fe+Mn, Su Su, Wa, R 2: 60°, J, VN, No, No, Wa, R 3: 50°, J, VN, Fe, Su Sp, Wa, R				
1606	130	29		100	1	94	1				[33]	
1604	131				2		3					
132				2?			M				0942 0949	
133		10			1?		1	1: 65°, J, VN, No, No, Wa, VR (poss b y mechan ca) 2: 25°, J, VN, No, No, Wa, VR (poss b y mechan ca)				
1602	134				1		M					
135		30		100	1	74	3	3: 30° 40°, J, N, Fe, Su Sp, Wa, SR R			[33]	
1600	136				2		M					
137					4		4 M	4: 60°, J/V, N, Uk+Fe, F +Su, Wa, R 5: 85°, J, VN, Fe, Su Sp, Wa St, VR			0958 1004	
1598	138				1		5	1: 80°, J, VN, Fe, Su, Wa, VR 2: 40°, J, VN, Fe, Su, Wa St, VR 3: 50°, J/V, MW, Ca+Fe, F +Su, P, R 4: 60°, J, VN, Ca+Fe, Pa+Su, St, VR 5: 20°, J, VN, No, No, Wa, SR (poss b y mechan ca)				
139					1		3					
140		31		100	1?	90	4				[33]	
1596	141						5					

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/30/2017 CB-17

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-17

Sheet 10 of 10

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Weir Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number						
141		10						BASALT; red and green sh gray; slightly weathered to fresh; very strong; moderately fractured; phanitic to porphyritic <i>mv (continued)</i>				
142	31		100	0	90							
143				1		M		1: 45°, V/J, N, Ca+Fe, F+Su Sp, Wa, R			1013 1026	
144				1		M						
145	32		100	0	100						[38]	
146				1		M		Calcified voids and vesicles more prevalent, 1/4" to 1"				
147				1		2		Becomes highly fractured 2: 70°, J, VN, Fe, Su, Wa, R				
148	11			1?		M					1034 1041	
149				1		2		1: 15°, J, N, No, No, Wa, VR (possibly mechanically) 2: 15°, J, VN, Fe, Su, P, SR				
150	33		100	1	90			Becomes moderately fractured			[33]	
151				1		3		3: 70°, J/V, VN N, Ca+Fe, F+Su, Wa, R VR				
152				0		M						
153						M		TOTAL DEPTH = 152.5 FEET Caliper, Televiwer and Piezometer Installation performed 7/13/2016			1050	
154												
155												
156												
157												

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/30/2017 CB-17



Depth 0.0' to 16.7'



Depth 16.7' to 30.4'





Depth 30.4' to 44.4'



Depth 44.4' to 58.3'





Depth 58.3' to 72.5'



Depth 72.5' to 87.5'





Depth 87.5' to 102.5'



Depth 102.5' to 117.5'





Depth 117.5' to 132.5'



Depth 132.5' to 147.5'



Depth 147.5' to 152.5'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-18**

Sheet 1 of 13

Date(s) Drilled	7/16/2016-7/21/2016	Logged By	S. Janowski	Checked By	D. Simpson
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond ADT 8	Total Depth of Borehole	200.0 feet
Drilling Rig Type	LF-70 Track-Mounted Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	1784-ft
Groundwater Level	145-ft on 7/20/2016	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	60° / 180°
Borehole Completion	Neat cement grout to surface	Location	Axis 2 North - Downstream RCC Toe	Coordinate Location	N 2141899.5 E 6838565.1

Elevation, feet	Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
1784	0							BASALT derived dr pad/road f	FILL		1435	Advance 5" HWT casing to 7'
	1											
	2											
1782	3											
	4										[11]	
	5											
1780	6											Lost all Water Circulation Return (WCR)
	7	1	1	100	NA	0		← BASALT GRAVEL to 3"; red; vesicular; with roots			1512	
	8						NR	← WOOD and GRAVEL			1523	
	9				NA						[21]	
1776	10	2		84		23		BASALT; dark green sh gray to moderate brown; slightly to moderately weathered; weak to moderately strong; highly fractured; vesicular; abundant Ca carbonate crystals and vesicification; red clayey fracture coating prevalent in upper 20'	mv		1525	
	11				2						1533	
	12				2			← Becomes intensely fractured				
1774	13	3		100	2	44		← Becomes green sh gray; slightly weathered; strong; highly fractured; not vesicular			1538	
								1: 90°, J, VN, Fe+Mn, Su, Wa, SR 2: 70°, J, VN, Fe+Mn, Su, P, SR			1546	PL 11345 psi

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18



Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1772	13	1					3	BASALT; green sh gray; slightly weathered; strong; highly fractured; abundant Ca cte crystals and ves cef ng; red clayey fracture coating prevalent in upper 20'			Continued 0% WCR
	14	3		100	3	44	3	mv (continued)		[54]	
	15				4		23	3: 40°, J, VN N, Fe+Ca, Su+Pa, Wa P, SR R			
	16				>10		3	↓ Becomes red; completely weathered; intensely fractured; clayey			
1770	16	4		100	0		1	↓ Becomes slightly weathered; less clay		1550	
	17				>10		12	↓ Without clay		1558	Run 4 only gravel recovered
	18	5		100	21		2	1: 80°, J, ?, Fe+Mn, Su, Wa, SR 2: 40°, J, VN MW, Mn+Fe+CR, Su+F, P Wa, SR		1600	Gravel slough
	19				6		2			1605	
1768	18	6		100	6	19	1	1: 35°, J, VN N, Fe+Mn, Su, Wa P, SR 2: 60°, J, VN, Fe+Mn, Su, Wa, SR		1607	Gravel slough
	19				6		11			1613	
	20				>6		1	1: 60°, J, ?, C+Fe, F+Su, P, SR 2: 75°, J, VN, Mn, Su, Wa, SR R		1616	
	21	7		100	10	38*	2			1622	
1766	21		2		2*		2	↓ Becomes highly fractured; with rehealed fractures		[48]	*Rehealed segments included in RQD calculation and in FPF
	22						2			1625	
	23	8		100	5	50	1	1: 70°, J, ?, Fe+Mn, Su, Wa, SR 2: 20°, J, N, Fe+Mn+Ca, Su+Sp, Wa, R 3: 40°, J, N, Fe+Mn+Ca, Su+Sp, Wa, R		1632	0.5' Gravel slough
1764	23						2			[72]	
	24				4		3	1: 40°, J, VN, Mn, Su, Wa, SR 2: 70°, J, VN, Fe+Mn, Su, P, SR		1633	End of day 7/16/2016
	25				NA		3	↓ Becomes intensely fractured; red clay nf ng		0835	Begin day 7/18/2016 AM water level=dry to 13' 1-2' of cave-in
1762	25	9		93		29*	1			[49]	*Rock does not meet soundness criteria for RQD calculation
	26				NA		3	BASALT BRECCIA; gray sh green; slightly to moderately weathered; moderately strong to strong; highly fractured; vesicular; abundant Ca cte and maf c minerals			
	27				4		3	3: 40° 50°, J, T, Fe+Mn+C, Su+Sp, P, SR 4: 75°, J, N, Fe+Mn+C, Su+Sp, Wa St, VR 5: 40°, J, N, Fe+C, Su+Pa, P, SR			
	28				2		4			0840	
1760	28	10		100		57*	5	1: 70°, J, N, Fe, Su, Wa, SR 2: 60°, J, N, Fe+C, Su+F, P, SR S		0847	
	29				>6		1	↓ Becomes gray sh red; highly to completely weathered; weak to extremely weak; intensely fractured to crushed; soft		[35]	*Rock does not meet soundness criteria for RQD calculation

Report GEO CORE OAK C B MAP File N:\AECOM\ROCK CORE GPJ 1/30/2017 CB-18



Elev at on, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %					
29	10	2	100	5	57*		BASALT BRECCIA; gray sh red; h gh y to comp ete y weathered; weak to extreme y weak; ntense y fractured to crushed; soft. Becomes gray sh green; s ght y weathered; strong; h gh y fractured; w th oca zed vo ds/ves ces somet mes hea ed w th Ca c te at 29.3' mv (continued)		0851 0857	Continued 0% WCR
1758				3			Unf ed ves ces/vugs 0.5" 1"			
31	11		100	1	86		1: 30° 40°, J, VN, Fe+Mn, Su, Wa, R VR 2: 80°, V, T, H+Ca, F, Wa St		[31]	UC 7769 psi
1756				2						
33	12		100	3	45		1: 5°, J, N, Fe+Mn, Su, Wa St, SR R 2: 70°, J, VN, Fe+Mn, Su, Wa, SR 3: 40°, J, VN, Fe+Mn, Su, Wa, R		0904 0915 [66]	PL 16715 psi
1754		3		1			Becomes very strong 1: 40° 50°, J, N, Fe+Mn, Su, Wa, R 2: 80°, V, T, H+Ca, F, Wa		0916 1106	Attempted a packer test 14'-34 1' unable to fill rods Test aborted 1 5' cave-in after test attempt
36	13		100	0	96		Becomes h gh y to oca y moderate y fractured			UC 8726 psi
1752				2			3: 80°, J, N, Fe+Mn, Su, Wa, R		[43]	
39				1						
1750				1					1113 1119	
41	14		100	3	95		1: 60°, J, N, Fe+Mn, Su, Wa, VR 2: 40° 50°, J, N VN, Fe+Mn, Su, Wa, VR		[33]	
1748				2						
43				1					1126 1133	
1746	15		100	0	80					
45				3			1: 30°, J, VN, Fe+Mn, Su, P, SR 2: 30°, J, N, Fe+Mn+C, Su+F, Wa P, SR R			

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1744	15	3	100	1	80	3	BASALT BRECCIA; green sh gray; slightly weathered; very strong; highly to moderately fractured; with occasional Ca c te n f ed ves c es mv (continued)		[50]	Continued 0% WCR dry to bit
1742	16	4	100	0	0	1	3: 40° 50°, J, VN, Mn, Su, Wa St, VR 4: 45°, J, VN, Fe+Mn, Su, Wa, SR		[30]	Only gravel recovered
1740	17		100	1	89	2	BASALT; green sh gray; slightly weathered; very strong; highly fractured; aphanitic 5: 45°, J, N, Fe+Mn+C, Su+F, P, SR		[46]	
1738	18		100	1	100	1	Intensely fractured Phanetic; with mostly Ca c te n f ed ves c es 1: 30°, J, N, Fe+Mn, Su, Wa, R VR 2: 50°, J, VN, Mn+Ca, F, P Wa, R SR		[54]	UC 17460 psi PT #2 34'-54' could not keep water in rods to seal ran 1 test step at highest pressure Add polymer to attempt to increase WCR
1736	19		100	0	100	M	Ca c te crista 1" x 1.5" 1: 70°, V, VN, H+Ca, F, P 2: 50°, J, ?, Mn, Su, St, VR Becomes fresh; slightly fractured		[38]	
1734	20		100	1	100	1	Phanetic Highly fractured 1: 90°, V/J, N, H+Fe+Ca, Su+Pa?, Wa+St, SR R 2: 30°, V, T, H+Ca, F, P, SR		[1611-1617]	Partially incipient fractures

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-18

Sheet 5 of 13

Elev at on, feet	ROCK CORE						L thology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number					
61		4	100	0	100		BASALT; ght green sh gray; fresh; very strong; s ght y fractured; aphan t c		[40]	Continued 0% WCR	
62	20	5	100	1	100	3	3: 30°, J, T, Mn, Su, Wa, R	mv (continued)			
63						M			1623 1631		
64				1		1	Becomes mass ve; phaner t c 1: 45°, V, W, Ca, F, Wa, SR				
65				0		M	L ght gray sh green				
66	21		100	0	100				[43]		
67				0							
68				0		M	Becomes green sh gray		1638 0821	End of day 7/18/2016 Begin day 7/19/2016 AM water level=48 4'	
69				0							
70				0		M					
71	22		100	0	100				[38]		
72				0		M					
73				0		1 M	1: 50°, V, MW, Ca, F, Wa, SR				
74	23		100	0	100	M			0829 0842		
75				0			Irregu ar, hea ed Ca c te ve ns 1: 35°, V, MW, H+Ca, F, St		[60]		
76				0					0843 1023		
77	24	6	100	0	100				[43]		

Report GEO\_CORE\_OAK\_C\_B\_MAP File N:\D\AECOM\ROCK CORE GPJ 1/30/2017 CB-18

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-18

Sheet 6 of 13

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
77		6		0			BASALT; green sh gray; fresh; very strong; massive; planaritic; occasional calcite filled veins and voids mv (continued)			Continued 0% WCR
78	24		100		100					
1716				0						
79						2 M1	2: 65°, V, T, N, H+Ca, F, Wa		1030 1038	
80				0			1: 85°, V, T, H+Ca+Mn, F+Su, P, SR (partially open) 2: 30°, V, MW, H+Ca (crystalline), F, P			
1714				0						
81	25		100		100					[30]
82										
83				1?		3	3: 40°, V/J, ?, Ca+Mn, Sp+Su, P, SR (possibly mechanically)			
1712				0		M			1046 1054	
84				0						
85						M	← Becomes slightly fractured			
1710	26		100	1	100	1	1: 60°, V, MW, Ca+Fe, F+Sp, Wa, R			[30]
86										
87				0		M				
1708				0		M				
88						M			1104 1113	
89				0						
1706				0						
90	27	7	100	0	100	M				[38]
91										
92				0						
1704				1						
93						1	1: 25°, J, VN, Mn, Su, P, SR			1121

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-18

Sheet 7 of 13

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
93		7		0				BASALT; green sh gray; fresh; very strong; moderately fractured; phanitic mv (continued)		1130	Continued 0% WCR
94				0							
1702				0							
95	28		100	1	100	1		1: 30° 40°, J/V, VN, Ca+Fe, F+Sp, P, SR		[38]	
96				0							
1700				0							
97				1							
98				0		1		← Becomes slightly fractured		1138 1148	
99				0							
1698				0							
100	29		100	0	100					[38]	
101				0							
1696				0							
102				1		1		1: 20°, V/J?, N, Ca+Fe, F+Su, Wa, VR (possibly mechanically)			
103						M				1156 1206	
1694	30		100	0	100					[30]	
104		8		0		M				1208 1444	
105				0		M					
106				0							
1692				0							
107	31		100	0	100					[27]	
108				0							
1690				1				← Becomes grayish blue 1: 60°, J, VN, Ch+Fe, Su Sp, Wa, R			
109						1				1455	

Report GEO CORE OAK C B MAP File N D AECOM ROCK CORE GPJ 1/30/2017 CB-18



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

# Log of Rock Core Boring CB-18

Sheet 8 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
109			8		0			BASALT; gray shaly blue; fresh; very strong; slightly fractured; phanitic; increasing Ca carbonate crystals		1503	Continued 0% WCR
	110				1	1		mv (continued)			
1688	111	32		100	100	2		↓ Becomes highly fractured 1: 20°, J/V, VN, Ca+Mn, Pa+Su, Wa, SR 2: 30°, J, VN, Fe, Su, Wa, R		[34]	
	112				1	M					
	113				1	2		↓ Becomes massive; with irregular headed carbonate veins and infill vesicles		1510 1523	
1686	114				0	M					
	115				0	M					
1684	116	33		100	100	M				[38]	
	117				0	M					
	118				0	M		← Carbonate and Olivine filled void		1531 1538	
1682	119		9		0	M					
	120				0	M					
1680	121	34		100	100	M				[33]	
	122				0	M					
1678	123				0	M				1547 1554	
	124				1	1		1: 20° 60°, J, VN, Fe+Mn, Su, St, VR			
1676	125	35		100	100			← Carbonate filled vesicles 1/4" 3/4"			

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-18

Sheet 9 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
125	35	9	100	0	100	2	BASALT; gray sh to green sh blue; fresh; very strong; massive to slightly fractured; phanitic; occasional irregular headed calcite veins (continued)		[38]	Continued 0% WCR	
126				0			2: 70°, V, N, H+Ca, F, Wa				
1674	127			0		M					
128				0		M M			1602 1608		
1672	129			0							
130				0							
131	36		100	0	100	1	1: 70°, V, N, H+Ca+Ch, F+Su, Wa, R (mechanically broken) 2: 50°, V, ?, H+Ca+Ch, F+Su, P, R (mechanically broken)		[33]		
1670	132			0		2					
133				0							
1668	133	10		1		1	1: 50°, J, VN, Mn, Su, P, SR 2: 70°, V, T, H+Ca, F, P		1617 1623		
134				0		2					
135				0							
1666	136	37	100	0	100				[33]		
137				0		M					
138				0		M					
1664	138			1		1	1: 40°, J/V, N, Ca+Fe+Mn+Uk, F+Su, Wa, SR		1632 1638		
139				0		M					
140				0		M					
1662	140	38	100	0	100				[30]		
141											

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
141			10		0			BASALT; bush gray; fresh; very strong; massive to slightly fractured; phaneritic			Continued 0% WCR
142	38			100	0	100		mv (continued)			
143					0		M				End of day 7/19/2016 1648
1660					0		M				Begin day 7/20/2016 0930
144					0						AM water level=47.5'
145					0						
1658	39			100	0	80					[27]
146					2		1	← Becomes slightly weathered; highly to locally intense fractured			
147					>6		1	1: 60° 90°, J, N, Fe+Mn, St, VR			
1656							2	2: 50°, Sh, W, CR+C +Fe+Mn, F+Su, Wa, R (red, clayey soft 1/2" wide joint, no slickensides)			
148			11		2		1				0941
149					1		2	1: 80°, J, VN, H+Fe+Mn, Su, Wa, SR (mechanically broken, port on missing)			0952
1654	40			100	0	79		← Becomes fresh; massive non-pent fracture			Add polymer to attempt to increase WCR
151					0		M				[26]
152					0		M				
1652					0		M				
153					0		M				1003
154					0						1012
1650					0						Add polymer to attempt to increase WCR
155	41			100	0	100					[26]
156					0		1	1: 45°, V, VN, H+Ca+Ch, F+Su, P, SR (mechanically broken)			
157					0		2	2: 35°, V, T, H+Ca+Ch, F+Su, P+St, SR (mechanically broken)			

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-18

Sheet 11 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1648	157	41	11	100	0	100	M	BASALT; bush gray; fresh; very strong; massive; phanitic			Continued 0% WCR
	158				0		M				Add polymer to attempt to increase WCR
	159				0		M				
1646	160	42		100	0	100	M			[28]	
	161				0		M				
1644	162				0		M				
	163				0		M				
	164		12		0		M				
1642	164				3		1	↓ Becomes slightly weathered; highly fractured; some fractures rehealed			
	165	43		100	5	37	2	1: 45°, J, VN, Fe+Mn, Su, P, SR 2: 80°-90°, J, VN, Fe+Mn, Su, Ir+Wa, SR R 3: 50°, J, VN, Fe+Mn, Su, St P, SR VR			
	166						23				
1640	166				4			↓ Becomes aphanitic			
	167				2		3				
	168						M				
1638	168				3		1	1: 30°, J, N, Fe+Mn, Su, Wa, SR			
	169				2		2	2: 80°, J, VN, Fe+Mn, Su, P, SR			
	170						3	3: 65°-80°, J, N?, Fe+Mn, Su, Wa, SR			
	170	44		100	0	71	M	↓ Becomes fresh; moderately fractured. With healed near vertical calcite veins 169.8' - 171.1'			
	171				0		M	↓ Becomes dusky purple; phanitic			[31]
	172				0		3				
	173				0		M				
	173										

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-18

Sheet 12 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1634	173		12		0		1	BASALT; gray sh red to dusky purple; fresh; very strong; moderate y fractured; banded aphanitic and phanitic; phanitic at 173' mv (continued)		1121	
	174				0		1	1: 50° 80°, V, T MW, H+Ca, F, Wa Becomes aphanitic on irregular 60° bonded contact			
	175						2 3	2: 75°, V, N, Ca+Fe, F+Sp, P, SR 3: 30°, V/J, N, Ca+Fe, Sp, P, SR			
1632	176	45		100	2	92	1			[27]	
	177				0			Becomes phanitic on bonded 80° contact			
	178		13		1		M	Becomes aphanitic on bonded 0° contact; banded throughout B=50°		1132 1138	
	179				2		M M	Becomes highly fractured; some key mechanical 1: 50°, B, VN, No, No, P, SR			
1628	180	46		100	2	70	1			[28]	
	181				2		M 1 1				
	182				2		1 1				
1626	183				2		1			1148 1155	
	184				2		1 2	1: 65°, J, T, Ca, Pa, Wa, R 2: 50°, B, T VN, Ca, Pa, P, S SR (some possibly mechanical)			
1624	185	47		100	3	74	3 2	3: 70°, V, T, H+Ca, F, P 4: 35°, V/J, VN, Ca, Pa, P, SR		[31]	
	186				4		4 2				
	187				3		2 2 2 2			1204 1312	
1622	188	48		100	2	83	1 2	1: 50°, V, MW, Ca+Mn, F+Su, P, SR 2: 50°, B, VN, Ca, Sp, Wa, SR			
	189							Banded purple and gray			

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-18

Sheet 13 of 13

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS	
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						Fracture Drawing Number
189											
1620		13		0		M	BASALT; gray sh red to dusky purple; fresh; strong; highly fractured with some possibly mechanically banded aphanitic and oolitic phanitic				
190	48		100		83	2	mv (continued)		[28]		
191				3							
1618						3 3	3: 70°, J, VN, Ca, Pa, Ir, R VR				
192				2			Phanitic; irregular bonded contact				
193		14		0		M	Becomes phanitic; highly to moderately fractured; some fractures possibly mechanically		1323		
194				1		M	1: 40°, V/J, T VN, Ca, Pa, P, SR		1329		
1616						1					
194	49		100	1	100	1			[24]		
195						1					
196				2							
1614						1					
197				1		1	BASALT BRECCIA; green sh gray; fresh; very strong; with purple, angular fragments		1339		
197						2	1: 40°, V, W, Ca+Uk, F, P, SR 2: 40°, B, VN, Ca, Pa, Wa, SR		1346		
198				1			Aphanitic on 40° bonded contacts				
1612	50		100	100					[26]		
199				0		M					
200				0		M					
							TOTAL DEPTH = 200.0 FEET			1354	End of day 7/20/2016
							Caliper and Televiwer performed on 7/20/2016 ; Neat cement grout to surface performed 7/21/2016				Begin day 7/21/2016 AM water level=145' During setup for PT #6 water below transducer at 151'
1610											
201											
202											
203											
1608											
204											
205											

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/30/2017 CB-18



Depth 7.0' to 20.8'



Depth 20.8' to 34.1'





Depth 34.1' to 48.0'



Depth 48.0' to 61.7'



Depth 61.7' to 76.2'



Depth 76.2' to 90.0'





Depth 90.0' to 104.0'



Depth 104.0' to 118.0'





Depth 118.0' to 133.0'



Depth 133.0' to 148.0'



Depth 148.0' to 163.0'



Depth 163.0' to 178.0'





Depth 178.0' to 192.4'



Depth 192.4' to 200.0'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-19**

Sheet 1 of 8

Date(s) Dr ed	7/19/2016-7/20/2016	Logged By	B. Kozlowicz / D. Simpson	Checked By	D. Simpson
Dr ng Method	HQ-3 Wireline Core	Dr Bt Size/Type	3 7/8" HQ Diamond ADT 8	Tota Depth of Borehole	117.3 feet
Dr Rg Type	LF-70 Helicopter MOB Rig	Dr ng Contractor	Ruen Drilling	NAVD 88 Ground Surface E evat on	1610-ft
Groundwater Leve	11-ft on 7/20/2016	Samp ng Methods	HQ-3 Wireline	Inc nat on from Hor zonta /Bear ng	62° / 356°
Borehole Compet on	Neat cement grout to within ~20' of surface	Locat on	Axis 2 South - CFRD Plinth at riverbed; 12' N of CB-15	Coord nate Locat on	N 2141796.1 E 6839122.3

E evat on, feet	Depth, feet	ROCK CORE						L thology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number					
1610	0		1*		NA			STREAM ALLUVIUM			B Kozlowicz logging *Box 1 shared with CB-15 Box 15 0% Water Circulation Return (WCR)	
	1	1		33	NA	0	NR					
1608	2				NA			BASALT; med um gray; s ght y to moderate y weathered, angu ar BOULDERS, COBBLES, and GRAVEL; moderate y strong to strong; aphan t c to phaner t c w th Ca c te nodu es; Fe&Mn sta n ng on fractures		1005 1023		
	3				NA	>6		BASALT TALUS/LANDSLIDE DEPOSIT				
	4				NA			↓ Becomes dark ye ow sh brown; h gh y to comp ete y weathered; weak to extreme y weak; ntense y fractured				
					NA			↳ 10° 30°, Sh?, MW W, C +Sd, F				
1606	5	2		33	NA	0	NR			[30]		
	6				NA							
1604	7				NA			↓ Becomes med um gray; moderate y to h gh y weathered		1031 1036		
	8	3		100	NA	0		CLAYEY SAND (SC) w th rock fragments; dark ye ow sh brown; comp ete y weathered; extreme y weak; d sturbed; poss b e s de p ane 60° 70°		[11] 1044 1048		
	9				NA		NR					
1602	10	4		50	NA	0		CLAYEY SAND (SC) w th rock fragments; d sturbed		[15] 1056 1101		
	11				NA			Broken/cored over		[11] 1108		
1600	12	6		100	NA	0		Broken/cored over; h gh y weathered w th sand (poss b e s ough)		[10] 1130		
	13	7		100	NA	>6	11 2	BASALT 1: 30° 40°, J, N, Mn+Fe, Su, P, SR 2: 30°, Sh, W, Mn+Fe+C +CR, Su+F, P, SR				

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/16/2017 CB-19

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1598	7	1*	100	>6	0	2 1 1 3 3 4 4 4 4 4 4 3	BASALT; dark ye osh to gray sh brown; h gh y to oca y moderate y weathered; weak to moderate y strong; h gh y to oca y ntense y fractured/sheared; aphan t c to phaner t c. Intense y fractured and c ayey 14' 14.5'		[17]	Continued 0% WCR
							mv (continued)			
			NA			3	3: 90° J, N, Mn, Su, P, SR 4: 60° 70° J, N, Mn+Fe, Su, P, SR		1138 1145	
1596	8		90	>6	0	1 1 1 1 2 2 3	1: 75° 85° J, N, Mn+Fe, Su, P, SR 2: 45° J, N, Mn+Fe, Su, P, SR 3: 60° J/Sh, N MW, Mn+Fe+C +CR, Su+Pa, P, SR		[20]	
						1 1 1			1151 1156	
			4			1	↓ Becomes dusky purp e; s ght y weathered; strong; h gh y fractured; aphan t c to phaner t c w th occas ona Ca c te nodu es			
1594	9	2	100	4	0	2 2 3 4 5	1: 65° J, N, Mn+Fe, Su, P, SR 2: 25° 30° J, N, Mn+Fe, Su, PL, SR 3: 50° J, N, Mn+Fe, Su, P, SR 4: 40° J, N, Mn+Fe+C, Su+Pa, P, SR 5: 85° J, VN, Ca, Pa, P, SR		[17]	
						3	↓ Becomes very strong; w th 10° 20° fo at on/f ow fabr c		1202 1319	Advance 5" HWT casing to 14' 60%-80% WCR
			1							
			1							
1592	10		100	2	94	1 2 2	↓ Becomes green sh gray and dusky purp e; w th 10° fo at on/f ow fabr c		[24]	
						1 2	1: 70° J, N, No, No, P, SR 2: 60° J, N, Mn+Fe, Su, P, SR 3: 50° J, VN, No, No, P, SR 4: 85° J, ?, Mn+Fe+Ca, Su+Pa, P, SR			PL 13798 psi
			0							
			2			3 4				
1590										
			4*				W th d sso ved Ca c te ves ces; core d sturbed		1331 1350	*Run 11 core slipped out of barrel and overdrilled not recovered
1588	11		40*		0*	1 2 3			[21]	
			NA							
			NA			1			1357 1445	Change bit to new #8
						2	1: 60° J, N, Mn+Fe, Sp, P, SR 2: 0° 5° J, VN, No, No, P Wa, SR 3: 50° 70° J, N, Mn+Fe, Sp, P Ir, SR		[24]	PL 20089 psi
1586	12		100	2	71	2/H 3				
						1				
			2							
						1	1: 10° J, VN, Mn+Fe, Sp, P, SR		1451 1508	
			1		57					
29	13		100	1						

Report GEO CORE OAK C B MAP File N D AECOM ROCK CORE GPJ 1/16/2017 CB-19



Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1584	13	2	100	2	57	2, 3	BASALT; dusky purple and green sh gray; slightly weathered; strong to very strong; highly fractured; aphanitic to porphyritic with occasional breccia casts; with 10° foliation/fabric and occasional Ca c te ve ns and nodules  mv (continued)  2: 50°, J, VN, Mn+Fe, Sp, P, Wa, SR 3: 20°, J, N, Mn+Fe+Ca, Sp, P, SR 4: 40°, J, VN, Mn+Fe, Sp, P, SR 5: 45° 50°, J, N, Mn+Fe, Su, P, SR 6: 30°, J/V, N, Ca, Pa, P, SR		75% WCR	
1582						4, 5, 5.5, 5.5	↓ Becomes green sh gray; aphanitic; more Ca c te ve ns		1522 1536	
1580	14	3	100	2	43	1, 2, 3	1: 5° 10°, J, N, Mn+Fe+Ca, Su+Pa, P, SR 2: 70°, J/V, N, Mn+Fe+Ca, Su+Pa, P, SR 3: 90°, J, N, Mn+Fe+Ca, Su+Pa, P, SR 4: 50°, J, N, Mn+Fe, Su, P, SR 5: 20°, J, N, Mn+Fe+Ca, Sp, P, SR 6: 60°, J, N, Mn+Fe+Ca, Su+F, P, SR			
1578				2		4, 5, 5	60° 90°, V, MW W, H+Ca, F, Wa (vuggy)		[25]	
1576				1		6, 1, 2	1: 50°, J/V, N/W, Mn+Fe+Ca, Su+F, P, R (vuggy, 2" crystals Ca c te ve n) 2: 10°, J, N, Mn+Fe+Ca, Su+Pa, P, SR 3: 20°, J, N, Fe, Sp, P, R 4: 20° 60°, J, T, No, No, Ir, R		1548 1601	
1574	15		100	1	80	3, 4, 4	↓ Becomes dusky purple and green sh gray; aphanitic to porphyritic; with subangular to subrounded breccia casts and 20° 30° weak foliation/fabric		[19]	
1572				1		5, 6, 7	5: 40°, J, VN, No, No, P, SR 6: 20°, J, VN, No, No, P, SR 7: 60°, J, VN, No, No, P, SR			
				3		7, 5	↓ Becomes mosty dusky purple		1617 0927	
				1		1			End of day 7/19/2016 Begin day 7/20/2016 AM water level=11.0' PL 21071 psi	
1572	16		100	2	82	2, 3, 1, 1/V	1: 60°, J, N, Mn+Fe, Su, P, SR 2: 30°, J, N, Mn+Fe, Su, P, SR 3: 40°, J, N, Mn+Fe, Su, P, SR 4: 40°, J, VN, No, No, P, Ir, R 5: 5°, J, N, Fe, Sp, P, R		[15]	

Report GEO CORE OAK C B MAP File N D AECOM ROCK CORE GPJ 1/16/2017 CB-19

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-19

Sheet 4 of 8

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
1570		3		1		6	BASALT; dusky purple; slightly weathered to fresh; strong to very strong; highly to moderately fractured; aphanitic to porphyritic with occasional breccia casts; with weak 15°-25° foliation and occasional calcite nodules. Becomes fresh at 46.0'				
46	16		100		82	4	6: 60°, J, VN, Ca, Pa, P, SR mv (continued)				
47				1						0947	
1568		4		0						0956	>90% WCR
48				1		1	1: 45°, J, VN, No, No, P, SR				
49						2	2: 55°, J, N, Mn+Fe, Su, P, SR				
1566	17		100	2	92	3	3: 55°, J, VN, No, No, P, SR				[21]
50				1		4	4: 60°, J, N, Fe+Ca, Su+Pa, P, SR				
51				0							
1564				0						1011	
52				0						1019	
53				1		1	1: 20°, J, N, Fe, Su, P, SR				
54				2							
1562				1	100	3	1: 45°, J, VN, No, No, P, SR 2: 60°, J, VN, No, No, P, S 3: 25°, J, VN, No, No, P, SR 4: 60°, J, N, No, No, P, SR	↓ Becomes bushy gray and dusky purple, aphanitic to porphyritic on #2			[25]
55	18		100								
56				1		4					
1560				0							
57				2		11	1: 35°-40°, J, N, Fe+Ca, Sp+Pa, P, SR				1031
58				3		11	2: 65°, J, N, Ca, Pa, P, SR 3: 40°, J, VN, No, No, P, SR 4: 5°-10°, J, VN, No, No, P, SR 5: 50°, J, VN, No, No, P, SR	↓ Becomes aphanitic to porphyritic			1036
1558				4	71	3					
59	19		100			4					[21]
60				1		5					
61						4					

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/16/2017 CB-19

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-19

Sheet 5 of 8

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1556	61	19	4	100	0	71		BASALT; dusky purple, buff and greenish gray; fresh; strong to very strong; highly to moderately fractured; aphanitic to porphyritic; with 20°-30° foliation on flow fabric			
	62		5		3		1 2 1	mv (continued)		1050 1100	
	63				4		1 3 3	1: 60°, J, VN, No, No, P, SR 2: 30°, J, VN, No, No, P, SR 3: 20°-30°, J, N, No, No, P, SR 4: 70°, J, N, Ca, Pa, P, SR			
1554	64				3		1 2 4	5: 20°, J, N, Ca, Pa, P, SR 6: 30°, J, VN, No, No, P, R 7: 50°, J, N, Ca, Pa, P, SR			
	65	20		100	3	41	2 2			[26]	
	66				3		5 1 6				
1552	67				3		7 7				
	68				0			1: 30°, J, VN, No, No, P, St, SR 2: 60°, J, N, No, No, P, SR 3: 20°, J, N, Ca, Pa, P, SR		1112 1121	
	69				1		1				
1550	70	21		100	1	100	2			[18]	
1548	71				2		3 1				
	72				1		3	↓ Becomes moderately to locally highly fractured			
1546	73				1		1	1: 50°, J, VN, No, No, Wa, R 2: 55°, J, VN, No, No, P, Wa, SR 3: 30°, J, VN, No, No, P, SR 4: 60°, J, VN, No, No, P, SR 5: 45°, J, VN, No, No, P, SR		1138 1330	D Simpson logging
	74				0						
1544	75	22		100	1	96	2			[31]	
	76				1		3				
	77		6		2		4 5				

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/16/2017 CB-19

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-19

Sheet 6 of 8

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1542	77	22	6	100	0	96		BASALT; dusky purple, buff and green sh gray; fresh; strong to very strong; moderately fractured; aphanitic to porphyritic; with 20°-30° foliation on flow fabric		1340 1402	
	78				0			mv (continued)			
1540	79				1		1				
	80	23		100	1	100	M	1: 60°, J, VN, No, No, P, SR		[18]	
	81				1			BASALT BRECCIA; mottled dusky purple, buff and green sh gray; fresh; very strong; moderately fractured; subangular to angular breccia fragments to 4" within aphanitic matrix			
1538	82				1					1418 1423	
	83				1			← Becomes highly fractured 1: 30°, J, N, No, No, P, SR 2: 30°, J, VN, No, No, P, Wa, R 3: 20°, J, VN, No, No, P, Wa, R 4: 50°, J, VN, No, No, P, Wa, R 5: 45°, J, VN, No, No, Wa, R			
1536	84				2		M				
	85	24		100	2	83				[35]	
	86				2						
1534	87				1		M				
	88				0					1432 1438	
1532	89				1			1: 0°-5°, J, N, No, No, P, SR 2: 30°, J, N, No, No, P, SR 3: 40°, J, N, No, No, Wa, R			
	90	25		100	2	100				[30]	
1530	91				1						
	92		7		0		M				
	93	26		100	0	90				1448 1459	

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/16/2017 CB-19

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-19

Sheet 7 of 8

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
93		7		1		1	BASALT BRECCIA; mottled dusky purple, buff and greenish gray; fresh; very strong; moderately fractured; subangular to angular breccia fragments to 4" with nephelitic matrix			
94				0			mv (continued)			
1526	26		100		90				[27]	
95				2		2				
96				0		M				
1524				1					1510 1516	
97										
98				1		1	← Breccia casts become finer in size			
99				2		2	1: 50°, J, VN, Ca, Pa, St, R 2: 60°, J, VN, Ca, Pa, P, SR 3: 30°, J, VN, No, No, P, SR			
1522				0						
100	27		100		94	3	← Becomes slightly fractured		[34]	
101				1						
1520				0						
102				0					1525 1533	
103				0						
1518				0						
104				0						
105	28		100		100				[24]	
106		8		1		1	← Becomes moderately fractured			
1516				0			1: 50°, J, VN, No, No, P, SR			
107				0						
108				0					1546 1553	
1514	29		100		81	1				
109				1			1: 60°, V, N, Ca, F, P, SR 2: 45°, J, VN, No, No, P, SR			
				2		2				

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/16/2017 CB-19



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-19

Sheet 8 of 8

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
109		8					BASALT BRECCIA; mottled dusky purple, buff and greenish gray; fresh; very strong; moderately fractured; subangular to angular breccia fragments within aphanitic matrix			
110	29		100	1	81	3	mv (continued) 3: 45°, J, VN, Ca, Sp, P, SR		[26]	
111				0						
1512				3		3	Highly fractured 4: 75°, J, VN, Ca, Sp, P, SR			
112						4				
113				4		3	← 1" Quartz vein		1604 1612	
1510						11	1: 30°, J, N, No, No, Wa, SR			
114				2		2	← 1" Quartz vein			
115	30		100	2	80	3	2: 60°, J, VN, No, No, P, ? 3: 5°, V, N, Ca, F, P, S 4: 5°, J, VN, No, No, Wa, SR		[26]	
1508				1		4	← 1" Quartz vein			
116				2						
117						5	5: 45°, V, N, Ca, F, P, S		1624	
1506							TOTAL DEPTH = 117.3 FEET Caliper, Televiwer and Neat cement grout performed 7/22/2016			
118										
119										
1504										
120										
121										
1502										
122										
123										
124										
1500										
125										

Report GEO CORE OAK C B MAP File NDAECOM ROCK CORE GPJ 1/16/2017 CB-19



Depth 0.0' to 16.5'



Depth 16.5' to 32.1'





Depth 32.1' to 47.0'



Depth 47.0' to 62.1'





Depth 62.1' to 76.8'

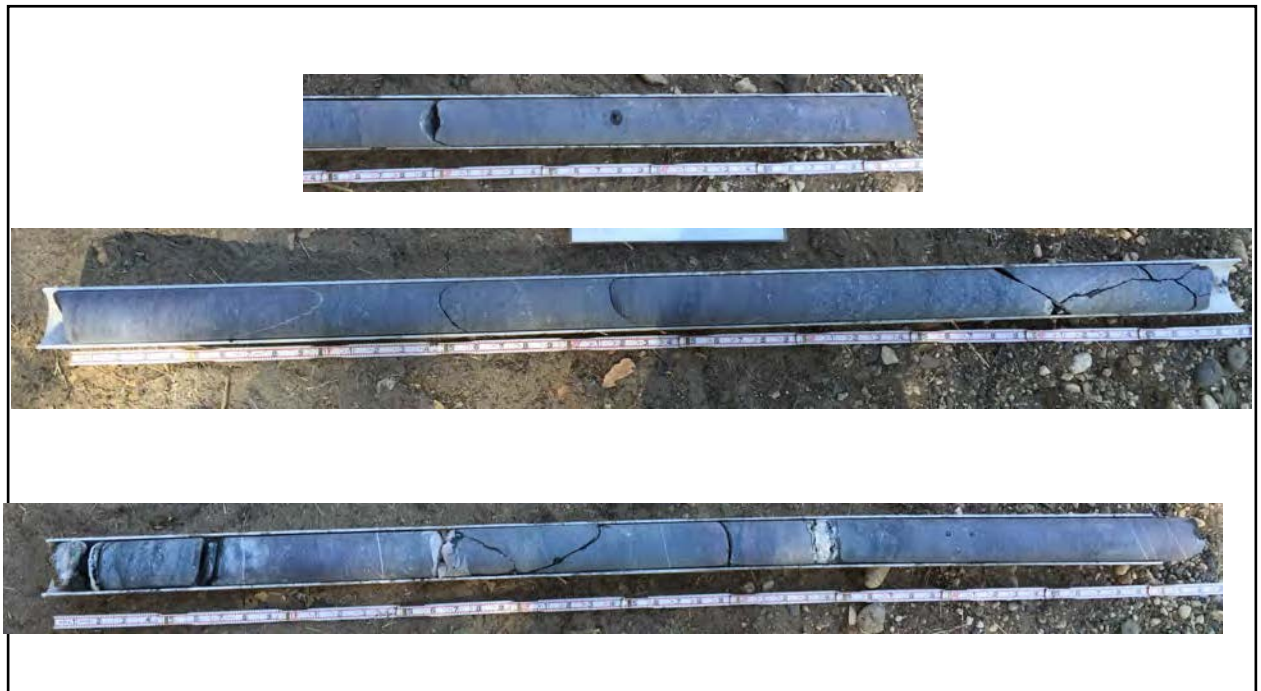


Depth 76.8' to 91.3'





Depth 91.3' to 105.0'



Depth 105.0' to 117.3'



**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-20**

Sheet 1 of 11

Date(s) Dr ed	8/3/2016-8/4/2016	Logged By	B. Kozlowicz	Checked By	D. Simpson
Dr ng Method	HQ-3 Wireline Core	Dr Bt Size/Type	3 7/8" HQ Diamond ADT 8	Tota Depth of Boreho e	168.3 feet
Dr Rg Type	LF-70 Track-Mounted Rig	Dr ng Contractor	Ruen Drilling	NAVD 88 Ground Surface E evat on	1686-ft
Groundwater Leve	17.6-ft on 8/5/2016	Samp ng Methods	HQ-3 Wireline	Inc nat on from Hor zonta /Bear ng	60° / 30°
Boreho e Complet on	Neat cement grout to surface	Locat on	Axis 2 South - Downstream RCC Toe	Coord nate Locat on	N 2141268.9 E 6838518.0

E evat on, feet	Depth, feet	ROCK CORE						L thology	MATERIAL DESCRIPTION	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number				
1686	0								CLAYEY GRAVEL w th SAND (GC); ye ow sh brown; w th BOULDERS and COBBLES ROAD FILL	1445	Advance 5" HWT casing to 3 5' 50%-75% Water Circulation Return (WCR)
	1										
	2										
1684	3										
	4		1		NA				Washed angular pieces of highly to moderately weathered BASALT; w th dark ye ow sh brown CLAYEY SAND (SC)	1450	
	5	1		26	NA	0	NR			[62]	
	6				NA						
	7				NA					1453 1505	
1680	8	2		35	NA	0	NR			[51]	Lost all WCR
	9				NA				BASALT; green sh gray; moderate y weathered; moderate y strong; ves cu ar; cored over angular c asts COLLUVIUM?	1507 1531	
	10				NA					[36]	
1678	11	3		50	NA	0	NR			1534 1541	~75% WCR
	12				NA					[16]	
	13				NA					1544 1551	
	14				NA					[29]	
1676	15	5		53	NA	0	NR			1555 1616	
	16				NA						

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017\_CB-20

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %				
1674	13		1		>6			BASALT; bush to medium gray and yellowish brown; highly weathered; weak; intensely fractured and brecciated with angular slightly weathered corestones on yellowish brown; extremely weak CLAYEY SAND (SC) matrix with small angular rock clasts		
	14				>6					
	15	6		96	4	42	1		[43]	
1672	16				0		1	↓ Becomes strong; slightly weathered; highly to moderately fractured; porphyritic with calcite nodules 1: 50°, J/Sh, MW W, Fe+Mn+Ca+Sd, Su+F, P, SR		
	17				2					UC 11480 psi
	18						12			1623 1639
1670	19				0			1: 40°, J, N, Mn+Fe, Su, P, SR 2: 60°, J, N, Mn+Fe, Su, P, SR		Advance 5" HWT casing to 8 5'
	20	7		100	2	38	4	↓ Becomes highly fractured 3: 75° 90°, J, N, Mn+Fe+Sd+C, Su+Pa, P, SR	[47]	
1668	21				5		4	↓ Becomes locally moderately weathered 4: 5° 15°, J, N, Fe+Mn+Sd+C, Su+Pa, P, Wa, SR 5: 20°, J, N, Mn+Fe, Su, P, SR		
	22				6		4			End of day 8/3/2016
	23	8		100	4	0	1, 2, 3, 4	1: 50°, J, N, Mn+Fe, Su, P, SR 2: 0° 5°, Dike/V, MW W, H+UK, F, P 3: 70°, J, N MW, Mn+Fe+Sd+C, Su+Pa, P, SR 4: 30°, J, N, Mn+Fe, Su, P, S	[17]	Begin day 8/4/2016 AM water level=13 4' likely perched on cave-in
1666	24	9	2	100	>6	0		Moderately weathered; intensely fractured	[24]	
	25				2		2	↓ Becomes very strong; moderately fractured	[24]	UC 9889 psi
1664	26				1					
	27	10		100	1	78	12	1: 60°, J, N, Mn+Fe, Su, P, SR 2: 20°, J, N, Mn+Fe, Su, P, SR	[43]	
1662	28				1		1			Lost all WCR
	29				2		2, 2			0804

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017 CB-20

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-20

Sheet 3 of 11

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %				
1660	29	2			1			BASALT; buff to medium gray; slightly weathered; very strong; moderately fractured; porphyritic; with calcite nodules mv (continued)	0816	~75% WCR
	30				0		1	1: 30°, J, VN, No, No, P, SR 2: 55°, J, VN, Ca, Pa, P, SR		
	31	11		100	100		2		[43]	
	32				1					
1658	33				1		1		0822	
	34				0				0830	
1656	35				0					
	36	12		100	100		1	1: 50°, J, VN, Ca, Pa, P, SR R 2: 35°, J, VN, Mn+Fe, Sp, P, SR 3: 55°, J, N, Ca+Ch, F+Su, P, SR	[44]	
1654	37		3		1		2			
	38				1		3			
	39				1		M			
1652	40				1		1	1: 60°, J, VN, Ca, Pa, P, SR	0837	
	41	13		100	100				0844	
1650	42				0					
	43				0					
	44	14		100	100		2	2: 30°, J/V, N, Ca+Ch, F+Su, P, SR	[38]	
1648	45				1		1	1: 70°, J/V, N, Ca, F, P, SR Green sh gray	0852	
					0				0903	

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017 CB-20

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-20

Sheet 4 of 11

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %				
1645	45	14	3	100	0	100		BASALT; bush to med um gray; slightly weathered to fresh; very strong; moderately fractured; aphanitic; with occasional calcite veins and nodules mv (continued)	[30]	
1646	46				0					
1647	47				1		2	2: 0° 5°, J/V, VN/MW, Ca, F, P, SR		
1648	48				0				0913 0919	
1649	49				0					
1650	50				1					
1642	51	15		100	94		1	1: 10°, J, VN, Ca, Pa, P, SR 2: 20°, J, T, No, No, P, R 3: 30°, J, VN, Ca+Ch, Pa+Sp, P, S SR	[33]	
1652	52		4		1		2	Highly fractured		
1653	53				2		3			0928 0933
1654	54				0					
1655	55				0					
1638	56	16		100	100		1	1: 0° 20°, J, T, No, No, Wa/lr, R	[33]	
1657	57				0					
1636	58				1		2	2: 30°, J, VN, Ca, F, P, SR		
1659	59				0			Becomes gray; porphyritic; with calcite nodules; with dusky purple; aphanitic intrusions/breccia	0942 0949	
1634	60				1		1	Highly fractured		
1660	61	17		100	88		2		1: 40°, J, VN, Mn, Sp, P, SR R 2: 60° 70°, J, N, Mn, Su, P, SR	[38]

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_11/30/2017 CB-20

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-20

Sheet 5 of 11

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS	
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					Fracture Drawing Number
61		4		2		2	BASALT; buff to green sh to med um gray; slightly weathered; very strong; moderate y fractured; aphanitic to porphyritic; with Ca te veins and nodules			
62	17		100	0	88	1	mv (continued)			
63				0				0957 1003		
64				2		12				
65				3		3	Highly fractured 1: 70° 80°, J, N, Mn+Fe, Su, P, Ir, SR 2: 30°, J, N, Mn+Fe, Su, P, SR 3: 60°, J, N, Ca+Fe, F+Sp, P, SR 4: 30°, J/V, N MW, Ca+Ch, F+Sp, P, SR 5: 70°, J, N, Ca, Pa, P, SR 6: 20°, J, N, Ca, F, P, SR			
66	18	5	100	1	85	4			[36]	
67				1		5				
68				1		6				
69				2		M				
70				0		1				
71	19		100	1	100				[37]	
72				0		1	1: 10°, J, N, No, No, P, SR			
73				1		2	2: 15°, J, N, Ca+Ch, Pa+Sp, P, SR			
74				0		M		1025 1111		
75				0						
76	20		100	0	100				[35]	
77				1		1	1: 0° 10°, J/V, N, Ca, Pa, P, R			

Report GEO\_CORE\_OAK\_C\_BMP\_NO\_PACK File N:\AECOM\ROCK\_CORE\GPJ\_1/30/2017\_CB-20



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-20

Sheet 6 of 11

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number				
77	20	5	100	1	100	1	BASALT; bush to medium gray; slightly weathered to fresh; very strong; slightly to moderately fractured; aphanitic to slightly porphyritic; with occasional Calcite veins			
78						11/11 MM	mv (continued)	1120 1127	Shoe disturbed	
1618				0						
79				0						
80		6								
1616	21		100		100			[34]		
81				1						
82				1		1	1: 0° 10°, J, T, No, No, P, Wa, SR 2: 70°, J, T, No, No, P, R			
1614				0		2		1136 1143		
83						M				
84				0						
85				1		1	1: 15°, J, VN, Ch, Sp, P, SR 2: 25°, J, VN, Ca+Ch, Pa+Sp, P, SR			
1612	22		100		100			[30]		
86				0						
87				1						
1610						2				
88				0				1153 1200		
89				0						
1608				0			↓ Becomes porphyritic with Calcite nodules			
90				0						
91	23		100		100			[30]		
92				1		1	1: 30°, J, VN, Ch, Sp, P, R			
1606				0						
93										

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017 CB-20

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-20

Sheet 7 of 11

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS	
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
93		6		0				BASALT; bush to med um gray; fresh; very strong; slightly to oca y h gh y fractured; aphan t c to porphoryt c; w th Ca c te nodules mv (continued)	1210 1216		
94				2		1	} H gh y fractured 1: 60°, J, VN, Ca, F, P, SR 2: 5°, J, T, Ca, Pa, P, SR				
1604						2					
95		7		0							
96	24		100		100				[33]		
97				0							
1602				0							
98				0							
99				1		1	} 1: 30°, J, N, Ca, F, P, SR			1225 1303	
1600				0							
100				0							
101	25		100		100				[30]		
1598				0							
102				2		2	} H gh y fractured 2: 10°, J, VN, Ca, Pa, P, R 3: 0°, J, T, No, No, P, SR R (poss b y mecha ca)				
103				2		3					1313 1319
1596				0							
104				1		1	} 1: 10°, J, VN, Ch, Su, P, S SR				
105				0							
1594	26		100		92				[30]		
106				0							
107				2		2	} H gh y fractured 2: 5° 10°, J, VN, Ca+Ch, Pa+Sp, Ir, R 3: 30°, J, VN, Ch, Sp, P, SR				
108				2		3					1329 1335
1592	27		100		100						
109											

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017 CB-20

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-20

Sheet 8 of 11

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number				
109		7						BASALT; bush to medium gray; fresh; very strong; slightly to moderately fractured; aphanitic to porphyritic; with calcite veins		
		8		0				mv (continued)		
110						1				
1590	27		100		100				[30]	
111				1				1: 0° 5', J/V, VN, Ca, F, P, Ir, SR 2: 20°, J/V, N, Ca, F, P, SR		
112						2				
113				0						
1588				0					1345	1352
114				0						
115				0				With calcite nodules		
1586				0						
116	28		100		100				[38]	
117				1		1				
118				1				1: 20°, J, T, Ca, Pa, P, Wa, SR 2: 50°, J, N, Ca, F, P, SR		
1584				1		2				
119				1		1			1400	1412
120				2		11		1: 30°, J, N, Ca+Ch, Pa+Sp, P, SR		
1582				1						
121	29		100		90			2: 40°, J, VN, Ca, F, P, SR	[38]	
122				0						
1580				1		3		3: 30°, J, VN, No, No, P, SR		
123				0						
124	30	9	100		90				1420	1433
1578				0						
125										

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017\_CB-20

Elevat on, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %				
125		9				1	BASALT; bush to med um gray; fresh; very strong; s ght y to oca y h gh y fractured; aphan t c to porphyrt c; w th Ca c te nodu es and ve ns and occas ona Ca c te vugs		
126	30		100		90		mv (continued)	[37]	
127				0		2	1: 25°, J, VN, No, No, P, SR 2: 80°, J, VN, Ca, F, P, SR 3: 45°, J, VN, No, No, P St, SR		
128				2		3		1441 1451	
129				0					
130				0					
131	31		100		100		← 1" Ca c te vug w th crysta s	[38]	
132				1		1/V V V	↓ Becomes h gh y to moderate y fractured ↓ V, MW, H+Ca, F (vuggy)		
133				1		2 3	1: 10° 20°, J, VN, No, No, Ir, R 2: 30°, J/V, VN, Ca, F, P, SR 3: 10°, J, T, No, No, P, R (poss b y mechan ca)	1459 1505	
134				1					
135				3		1 2 2	1: 45°, J, VN, No, No, P, SR 2: 20°, J, N, Ca, Pa, P, SR 3: 30°, J/V, Ca, F, P, SR 4: 70° 80°, J, VN, Ch, Sp, P, SR 5: 75° 90°, J, VN, Ca+Ch, Pa+Sp, P Wa, SR		
136	32		100		73	3		[35]	
137				1					
138				2		3 4 5			
139		10		1			↓ Becomes moderate y fractured	1514 1520	Shoe disturbed
140	33		100		100				
141				0					

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017 CB-20

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-20

Sheet 10 of 11

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number				
141		10	100	1	100		BASALT; bluish to medium gray; fresh; very strong; moderately fractured; aphanitic to porphyritic; with calcium nodules and veins mv (continued)	[30]		
142	33		100	1	100	1	1: 20°, J, VN, No, No, P, SR 2: 70°, J/V, N MW, Ca, F, P, SR (slightly vuggy)			
143						2	↓ Becomes slightly fractured			
1562			0					1530 1538		
144			0							
145			0							
1560			0							
146	34		100	0	100			[33]		
147			0							
1558			0							
148			0					1547 1559		
149			1							
1556			0			1	1: 10°, J, VN, Ca, Pa, P, SR			
151	35		100	0	100			[24]		
152			0							
1554			0							
153			0					1611 1618		
154		11	0							
1552			0							
155			2			1	↓ Becomes highly to moderately fractured 1: 60°, J/V, N, Ca, F, P, SR 2: 60°, J, VN, No, No, P, R 3: 50°, J, VN, No, No, P, SR			
156	36		100	1	100	2		[33]		
157						3				

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017 CB-20



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-20

Sheet 11 of 11

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %				
1550	157	36	11	100	0	100		BASALT; bush to med um gray; fresh; very strong; moderately fractured; aphanitic to porphyritic; with Ca c te nodules and veins mv (continued)		
	158				0				1627 1636	
	159				1		1	1: 60°, J, VN, Ca, Pa, P, SR		
1548	160				0					
	161	37		100		100			[30]	
	162				1		2	2: 60°, J, VN, No, No, P, SR 3: 50°, J, VN, No, No, P, SR		
1546	163				1		3	↓ Becomes slightly fractured		
	164				0				1646 1654	
1544	165				0					
	166	38		100		100			[27]	
1542	167				1		1	1: 40°, J, VN, Ca, Pa, P, SR Becomes dusky purple and bush gray; aphanitic tophanitic; without Ca c te nodules		
	168				NA					End of day 8/4/2016
1540	169							TOTAL DEPTH = 168.3 FEET Neat cement grout to surface 8/5/2016	1705	Begin day 8/5/2016 AM water level=17.6'
	170									
1538	171									
	172									
	173									

Report GEO CORE OAK C BMP NO PACK File N:\AECOM\ROCK CORE\GPJ\_1/30/2017\_CB-20



Depth 3.5' to 23.1'



Depth 23.1' to 36.7'





Depth 36.7' to 51.3'



Depth 51.3' to 65.8'



Depth 65.8' to 80.1'



Depth 80.1' to 94.8'





Depth 94.8' to 109.3'



Depth 109.3' to 123.9'





Depth 123.9' to 138.5'



Depth 138.5' to 153.5'



Depth 153.5' to 168.3'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-B1**

Sheet 1 of 13

Date(s) Drilled	5/31/2016-6/3/2016	Logged By	B. Kozlowicz	Checked By	D. Simpson
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond	Total Depth of Borehole	200.9 feet
Drilling Type	LF-70 Track-Mounted Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	1962-ft
Groundwater Level	60.2-ft	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	90°
Borehole Completion	1.0-in Sch 40 PVC Piezometer	Location	Ridge top in south borrow area	Coordinate Location	N 2146297.1 E 6839935.7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
1962	0		1					LEAN CLAY w th SAND (CL); st ff; mo st; red; trace GRAVEL; w th roots up to 2"			1618	Run 1 several root cores recovered
	1			0	NA			RESIDUAL SOIL, BASALT			[20]	Well: 4-in Steel Stovepipe Box at surface
1960	2				NA						1624	
	3				NA						1630	75%-100% Water circulation return (WCR)
1958	4		2	36	NA	NA					[75]	Well: 1-in PVC solid well casing -0'-60' in neat cement grout
	5				NA	NR						
1956	6				NA							
	7				NA			Becomes mottled yellowish red and greenish gray			1634	
	8				NA						1639	
1954	9		3	78	0			BASALT; yellowish red with light gray bands/casts; highly to completely weathered; extremely weak			[108]	
	10				NA			Residual healed fractures				
1952	11				NA	NR					1641	End of day 5/31/2016
	12				NA						0733	Begin day 6/1/2016
1950	13		4	97	0			Becomes mottled greenish gray and yellowish red; moderately to highly weathered; weak to very weak; highly fractured			[68]	100% WCR

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B1

Sheet 3 of 13

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Weir Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
1932	2			3		12	BASALT; light green sh gray w th redd sh brown se vages; s ght y to oca y moderate y weathered; strong; moderate y to h gh y fractured; phaner t c  mv (continued)			0841	
1930	8		100	0	85	3	1: 90°, J, N, Mn+Fe, Su, P, SR 2: 40°, J, N, Mn+Fe, Su, P, R 3: 60°, J, N, Mn+Fe, Su, P, SR 4: 40° 60°, J, N MW, Mn+Fe+Sd, Su+Pa, P, R			[53]	
1928				4		4	Redd sh brown; moderate y weathered				
1926	3		100	1		M 1	BASALT BRECCIA; light green sh gray w th redd sh brown se vages; s ght y to oca y moderate y weathered; very strong; moderate y to h gh y fractured; phaner t c  mv			0847 0854	
1924	9		100	1	85	2	1: 70°, J, VN, H+Fe+Mn+Ca, Su+F, P, SR 2: 50°, J, N, Mn+Fe, Su, P, SR 3: 40°, J, N, Mn+Fe+C, Su+Pa, P, R 4: 15°, J, VN, No, No, P, R (poss b y mechan ca)			[63]	
1922				1		3	Redd sh brown; moderate y weathered				
1920	10		100	0	42	M 1 11	Beomes mott ed/spotted redd sh brown and green sh gray; moderate y weathered; strong			0858 0930	Advance 5" HWT casing to 10' PL 17551 psi
1918	11		100	3	41	M	1: 80°, J, MW, Mn+Fe+C+Sd, Su+Pa, P, SR 2: 0° 10°, J, N, Mn+Fe, Su, Ir, R 3: 60°, J, N, Mn+Fe, Su, P, SR 4: 35°, J, N, Mn+Fe, Su, P, SR			[52]	
				1		3	Beomes s ght y weathered w th moderate y weathered zones a ong fractures; strong to very strong				
				3		4	Mott ed redd sh brown; moderate y weathered			0936 0954	Cuttings block core barrel pull rods
				2		1	1: 40°, J, N Mn+Fe, Su, P, SR R				

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1



Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
45		3		0			BASALT; green sh gray; slightly to moderately weathered; strong; highly fractured; aphanitic tophanitic; with coarse volcanic breccia zones				
1916	46	11	100	5	41	2	2: 30°, J/Sh, MW, Mn+Fe+CR, Su+F, P, SR Highly weathered; weak			[51]	
	47			3		3	3: 10° 30°, J, N, Mn+Fe+C, Su+Pa, P, SR R				
	48			5		3	Highly weathered; moderately strong				
1914	49	4		3		4	Becomes moderately weathered; strong 4: 80°, J, N, Mn+Fe, Su, P, SR 5: 30°, J, N, Mn+Fe, Su, P, SR			1000	
	50			3		1	1: 60°, J, N, Mn+Fe, Sp, P, St, SR 2: 10°, J, N, Mn+Fe, Su, P, SR R 3: 80°, J, N, Mn+Fe, Su, P, SR			1201	Advance 5" HWT casing to 15' Change to softer bit
1912	51	12	100	2	40*	2	Slightly weathered				
	52			1		4	4: 40°, J, N, Mn+Fe, Su, P, SR			[50]	*Rock does not meet soundness criteria for RQD calculation
1910	53			4		4	Slightly weathered				
	54			4		5	Becomes moderately to highly weathered; moderately strong				
	55			6		5	5: 20°, J, N, Mn+Fe, Su, P, SR 6: 60°, J/Sh, N, Mn+Fe+C, Su+Pa, P, SR			1207	
1908	56	13	88	6	12*	6	Becomes moderately weathered; moderately strong to strong			1213	Well: Bentonite pellets seal 53'-56'
	57			3		1	1: 30° 45°, J, N, Mn+Fe, Su, P, SR R 2: 10° 15°, J, N, Mn+Fe+C, Su+Pa, P, SR			[61]	*Rock does not meet soundness criteria for RQD calculation
	58			4		2	Becomes highly weathered; weak; intensely fractured				Well: #2/12 Sand filter pack 56'-88'
	59			>6		3	3: ? V, W, H+Ca, F, P (intensely fractured) 4: 20° 40°, J, N, Mn+Fe+C, Su+Pa, P, SR				
1904	60	14	100	NA		4	Becomes light green sh to buff gray; slightly weathered; very strong; highly to locally moderately fractured; porphyritic with aphanitic groundmass			1218	
	61			1		4				1223	UC 8 237 psi

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-B1

Sheet 5 of 13

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
61	14	4	100	5	68	2 3 3 3 3 4	BASALT; light green sh to bluish gray; slightly weathered; very strong; highly fractured; porphyritic with aphanitic groundmass; with occasional Ca cements  mv (continued)			[43]	
1900				5		3 3 3	1: 20° J, ?, Mn+Fe, Sp, P, SR 2: 60° J, N, Mn+Fe+Ca, Sp+Pa, P, S 3: 20° 30° J, N, Mn+Fe+Ca, Sp, P, S SR 4: 75° J, N, Mn+Fe, Su, P, S SR				
63				2		3 3 4	← Becomes slightly weathered to fresh				
1898		5		1		1				1230 1237	
65				1		2	1: 35° J, VN, Mn, Sp, P, Wa, SR 2: 30° J, VN, No, No, P, SR 3: 45° J, VN, Mn+Fe, Sp, P, SR 4: 75° J, N, Mn+Fe, Su, P, SR 5: 60° J, N, Mn+Fe, Su, P, SR				
1896	15		100	1	92	3				[50]	
67				2		1 4					
1894				2		5					
69				2		1 5				1243 1249	
1892				0		2	1: 30° J, N, Mn+Fe, Sp, P, SR 2: 80° J, N, Fe, Sp, P, SR 3: 10° 20° J, VN, No, No, P, Ir, SR R				Well: 1-in PVC 0.020 slotted well casing 60'-80'
71	16		100	2	88	1 3				[43]	
1890				1		3					
73				0							
1888				1		1				1256 1309	
75				1		2	1: 10° J, N, Mn, Su, P, SR 2: 80° J/V, N, Mn+Fe+Ca, Su+F, P, S 3: 0° 10° J, VN, No, No, P, St, SR 4: 50° J, N, Mn+Fe, Sp, P, SR				
1886	17		100	2	100	3 4				[51]	
77											

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-B1

Sheet 6 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
1884	77	17	5	100	0	100		BASALT; gray to medium gray, slightly weathered to fresh; very strong; highly to moderately fractured; porphyritic with aphanitic groundmass; with occasional calcite veins				
	78				1		1	mv (continued)				
1882	79		6		0					1315 1323	UC 21 806 psi	
	80				1		1	1: 25° V, W (open), Ca, F, P, R 2: 20° J, VN, No, No, P, Wa, SR 3: 60° 70° J/V, N, Mn+Fe+Ca, Su+F, P, S SR 4: 10° J, VN, Mn+Fe+Ch, Sp, P, SR				
1880	81	18		100	1	94					[50]	
	82				2		2					
	83				2		3					
	84				1		4					
1878	84				0					1329 1342		
	85				1		1	1: 20° 30° V, N?, H+Ca, F 2: 40° V, W, H+Ca+Ch, F 3: 0° 10° J, VN, No, No, P, SR 4: 60° 70° J/V, MW, Fe+Ca, Sp+F, P, SR				
1876	86				0		2					
	87				1		1					
	88	19		100	0	94					[38]	
1874	88				3		3					
	89				3		4					
	90				2		1			1350 1356		
1872	90				1		1	1: 70° J, N, Mn+Fe+Ca, Sp+Pa, P, SR 2: 0° 10° J/V, N, Ca, Pa, P, SR 3: 90° J/V, N, Ca, Pa, P, SR				Well: Bentonite pellets 88'-92'
	91				1		1					
1870	92	20		100	1	50					[43]	
	93				1		3					

Report GEO\_CORE\_OAK\_C\_BMP\_WELL\_File\_ND\_AECOM\_ROCK\_CORE\_GPJ\_1/16/2017\_CB-B1

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-B1

Sheet 7 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
93		20	6	100	2	50	2	BASALT; gray to medium gray; slightly weathered to fresh; very strong; highly to moderately fractured; phanitic to aphanitic; with calcite veins				Lower RQD due to near-vertical fractures
1868	94		7		1		1	Becomes fresh 1: 90°, J, N, Ca, F, P, SR 2: 15°, J, N, Ca, Pa, P, SR 3: 0° 10°, J, VN, No, No, P, Ir, R			1403 1412	
1866	95				1							Well: Neat cement grout 92'-200.9'
1866	96	21		100	2	27	2				[45]	
1864	97				1							
1864	98				2		3					
1862	99				0		1					1419 1426
1862	100				0			Aphanitic				
1860	101				0							
1860	102	22		100	1	100	1	1: 10° 15°, J, VN, No, No, P, SR			[44]	
1858	103				1		1					
1858	104				0							1433 1441
1856	105				1		1	1: 0° 10°, J, N, Ca, Pa, P, SR				
1856	106	23		100	0	100					[43]	
1854	107				1		1					
1854	108				0							
	109						M					

Report GEO\_CORE\_OAK\_C\_BMP\_WELL\_File\_ND\_AECOM\_ROCK\_CORE\_GPJ\_1/16/2017\_CB-B1

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-B1

Sheet 8 of 13

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number						
109	23	8	100	0	100		BASALT; bush to med um gray; fresh; very strong; highly to moderately fractured; phanetic to aphanitic; with calcite veins			1448 1504		
1852				0			mv (continued)					
110				0								
111	24		100	1	100					[42]		
1850				1		1	1: 10°, J, VN, No, No, P, SR 2: 5°, J/V, N, Ca, Pa, P, SR					
112				1		2						
113				0						1510 1519		
1848				0								
114				0								
115				1		1	1: 10°, J, N, No, No, P, SR 2: 85°-90°, J/V, N, Ca+Ch, Pa+Su, P, SR 3: 60°, J/V, N, Ca+Ch, Pa+Su, P Wa, SR			[49]		
1846	25		100	1	71							
116				1								
117				2		2						
1844				2		2						
118				0		3				1525 1535		
119				0								
1842				1		1	1: 30°, J, VN, No, No, P, R 2: 80°, J/V, N, Ca, F, P, S SR 3: 40°, J/V, N, Ca, F, P, SR 4: 20°, J, VN, No, No, P, SR			[52]		
120				1		2						
121	26		100	2	85	3						
122				2								
1840				1								
123				0		4 M						
124	9			0						1541 1549		
1838				2		M	1: 75°-80°, J/V, N MW, Fe+Ca+C, Sp+Pa, P, SR 2: 50°, J, VN, No, No, P Wa, SR					
125	27		100	2	62	1						

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B1

Sheet 9 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Weir Diagram	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
125		27	9	100	1	62		BASALT; bush to medium gray; fresh; very strong; highly to moderately fractured; phanitic to aphanitic; with calcite veins			[39]	
1836	126				1			mv (continued)			1553 1601	
	127				0							
1834	128				1							
	129	28		100	0	90	1	1: 10°, J, VN, No, No, P, SR			[43]	
	130				2							
1832	131				1						1608 1614	
1830	132				1			1: 70°, J/V, N, Ca, Pa, P, SR 2: 10°, J, N, Ca, Sp, P, SR 3: 60°, J/V, N, Ca, F, P, SR 4: 30°, J, VN, No, No, P, SR				
	133	29		100	1	93	2				[48]	
1828	134				1		3 4				1618 0750	End of day 6/1/2016 Begin day 6/2/2016 AM water level=17.6'
	135				2			1: 30°, J, N, Mn+Fe, Su, Ir St, R 2: 10°, J, N, Mn+Fe, Sp, P, Wa, SR 3: 70°, J/V, N, Mn+Fe+Ca, Su+F, P, SR 4: 20°, J, VN, No, No, P, SR 5: 20°, J, N, Ca, Pa, P, SR				
1826	136				1							
	137	30	10	100	2	86	3 2				[50]	
1824	138				2							
	139				2							
1822	140	31		100	0	100					0756 0803	
	141				1			↓ Becomes green sh gray, aphanitic; with 60°-70° foliation				

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B1

Sheet 10 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	We Diagram	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
141								BASALT; green sh gray; slightly weathered to fresh; very strong; moderately to slightly fractured; aphanitic; with Ca cte veins and 60° 70° at on/fabric				
1820	142	31	10	100	1	100	1	mv (continued) 1: 65° 70°, J, N, Fe, Sp, P, SR 2: 30°, J, VN, No, No, P, R			[33]	
	143				0							
1818	144				1		2	Becomes aphanitic BASALT with zones of volcanic BRECCIA with ~70° at on/fabric; with Ca cte veins			0812 0817	
	145				0							
1816	146				0							
	147	32		100	0	100	1	1: 75°, J, N, Ca, Sp, P, SR			[50]	
1814	148				1							
	149				0							
1812	150				0						0823 0828	
	151				0		1	Slightly weathered				
1810	152	33	11	100	1	100	1	1: 70° 90°, J/V, MW, Ca+Fe, F+Su, P IR, SR (vuggy with 1" redd sh brown weathered r nd)			[48]	
	153				0			BASALT BRECCIA; green sh gray to gray with dusky purple zones; fresh; very strong; moderately fractured				
1808	154				0		1				0834 0844	
	155				1			1: 70°, J, N, Fe, Sp, P Ir, R 2: 80°, J, N, Ca, Pa, P, SR 3: 10°, J, VN, No, No, P Wa, SR				
1806	156				0		2					
	157	34		100	1	88					[50]	

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B1

Sheet 11 of 13

Elev at on, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	We Diagram	Packer Test Intervals	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %						
157		34	11	100	0	88		BASALT BRECCIA; green sh gray to gray w th dusky purp e zones; fresh; very strong; moderate y fractured mv (continued)				
1804	158				1		3	BASALT/AMPHIBOLITE? and BASALT BRECCIA; green sh to med um gray; s ght y weathered to fresh; very strong; moderate y to s ght y fractured; phaner t c to porphy r t c; w th Ca c t e v e n s and weak 10° 20° fo at on			0850 0908	
1802	160				2		1	1: 30°, J/V, N, Ca, Pa, P, SR				
1800	162	35		100	0	98					[50]	
1800	163				0		M					
1798	164				0		M					
1798	164				1		1	>W th sub hor zonta fo at on 0° 25° 1: 60°, J, VN, No, No, P St, SR 2: 20°, J, VN, No, No, P, SR			0914 0920	
1796	166		12		0		M					
1796	166	36		100	1	100					[42]	
1794	168				1		2					
1794	168				2		1	1: 10°, J, VN, Ca, Pa, P, SR			0926 0943	Advance 5" HWT casing to 20'
169	170	37		100	0	80					[45]	
1792	170				1		1	1: 60°, J, VN, No, No, P, SR 2: 20°, J, VN, Ca+Ch, Pa+Sp, P, SR 3: 15°, J, VN, No, No, P, SR			0945 0951	
1790	172	38		100	0	93					[39]	
173					0			BASALT; green sh gray; fresh; very strong; h gh y to moderate y fractured				

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B1

Sheet 12 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
173		38	12	100	1	93	3	BASALT; green sh gray; fresh; very strong; highly to moderately fractured; aphanitic to phanitic mv (continued)				
1788	174				0		M				0958	
								↓ Becomes banded with aphanitic BASALT			1007	
1786	176				1		1	1: 10°, J, N, Ca, Pa, P, SR 2: 60°, J, VN, No, No, P, SR 3: 35°, J/V, N, Ca, F, P, SR				
					1		2					
177		39		100	1	100	3				[50]	
					1							
1784	178				0		M					
1782	180		13		1		1	1: 15°, J, VN, Ca, Sp, P, SR 2: 75°, J/V, N, Ca, F, P, SR 3: 50°, J, N, No, No, P, SR 4: 10°, J, VN, No, No, P, Wa, SR 5: 70° 80°, J, N, Ca, Pa, P, R 6: 30°, J, VN, No, No, P, R 7: 20°, J, VN, No, No, P, R			1013	
					2		2					
1780	182	40		100	2	62	5				[50]	
					1							
1778	184				3		3					
					3							
					0							
1776	186				1		1	1: 20°, J, VN, No, No, P, SR 2: 65°, J, W, No, No, P, SR 3: 35°, J/V, N, Ca+Py, Pa+Sp, P, SR			1025	
					1							
1774	188	41		100	1	100	2				[ 13]	
					1							
					0		M	↓ Becomes slightly fractured				
189												

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-B1

Sheet 13 of 13

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
189			13		0			BASALT; light green sh to med um gray; fresh; very strong; slightly fractured; phanitic to porphyritic banded with aphanitic zones; with occasional dark gray inclusions and trace Pyrite and weak sub horizontal foliation			1017 1052	
1772	190				0			<i>mv (continued)</i>				
191					0							
1770	192	42		100		92		1: 20°, J, VN, Ca, Pa, P, SR 2: 60°, J, VN, Ca, Sp, P, SR			[43]	
193					2							
1768	194				2							
195			14		0			1: 10°, J, VN, No, No, P, SR 2: 50°, J, N, Ca, Pa, P, SR			1059 1109	
1766	196				2							
197		43		100		84					[51]	
1764	198				2							
199					2							
1762	200	44		100		87		1: 15°, J, VN, No, No, P, SR 2: 65°, J/V, N, Ca, F, P, SR			1115 1122	
201					1						[45]	
	201				2						1124	
	202							TOTAL DEPTH = 200.9 FEET P-wave survey performed 6/2/2016 - Neat cement grout to surface on 6/3/2016				
1760	202											
	203											
1758	204											
	205											

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B1





Depth 0.0' to 19.0'



Depth 19.0' to 34.0'





Depth 34.0' to 48.8'



Depth 48.8' to 64.0'





Depth 64.0' to 79.0'



Depth 79.0' to 94.0'





Depth 94.0' to 108.7'



Depth 108.7' to 123.2'





Depth 123.2' to 137.1'



Depth 137.1' to 151.2'





Depth 151.2' to 165.3'



Depth 165.3' to 179.4'





Depth 179.4' to 194.3'



Depth 194.3' to 200.9'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-B2**

Sheet 1 of 7

Date(s) Drilled	6/4/2016	Logged By	B. Kozlowski	Checked By	D. Simpson
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond	Total Depth of Borehole	100.0 feet
Drilling Type	LF-70 Track-Mounted Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	1866-ft
Groundwater Level	61.9-ft 6/10/2016	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	90°
Borehole Completion	Neat cement grout to surface	Location	South borrow area	Coordinate Location	N 2146048.5 E 6839267.2

Elevation, feet	Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
1866	0								CLAYEY SAND with GRAVEL (SC); dry to moist; yellowish brown to yellowish red; subangular gray basalt GRAVEL to 2.5" RESIDUAL SOIL/SAPROLITE			
	1											
1864	2											
	3											
1862	4		1								0759	75%-100% Water circulation return (WCR)
	5				NA							
1860	6	1		40		NA					[60]	
	7					NR						
1858	8											
	9								BASALT; yellowish to reddish brown; highly weathered; weak; highly fractured; porphyritic with aphanitic groundmass; with trace fine roots mv		0804 0834	Advance 5" HWT casing to 5'
1856	10	2		82					1: 30° J/Sh, W, Mn+Fe+Sd+C+CR, Su+F, P, SR 2: 90° J, N, Mn+Fe, Su, P, SR 3: 10° 20°, J, N MW, Mn+Fe+C, Su+Pa, P, SR		[50]	
	11											
1854	12								↓ Becomes brown sh gray; moderately strong		0838 0847	
	13	3		95	4	0			1: 30° 40°, J, N MW, Mn+Fe+C, Su+Pa, P, SR			

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B2

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1852	13	3	1	95	4	0	2	2: 60° 70°, J, N MW, Mn+Fe+C, Su+Pa, P, SR BASALT; yellowish to reddish brown; moderately to highly weathered; moderately strong; highly fractured; aphanitic; with subvertical foliation		[66]	
1852	14				4		1 1 2	mv (continued)		0849 0853	
1850	15				2		3 3	1: 55°, J, N, Mn+Fe, Su, P, SR 2: 80°, J, N, Mn+Fe, Su, P, SR 3: 0° 10°, J, N, Mn+Fe+C, Su+Pa, P, SR 4: 70°, J/Sh, N, Mn+Fe+C Su+Pa, P, S			
1850	16	4		100	4	0	4			[75]	
1848	17				NA			Highly to completely weathered; very weak			
1848	18				5		1 3 3	Becomes greenish gray with reddish brown mottling; moderately to highly weathered; weak; with 40° foliation/fabric			
1846	19				3		1 1 3	1: 10°, J, N, Mn+Fe, Su, P, SR R 2: 30°, V/Sh, W, Mn+Fe+Qz+CR, Su+F, P, SR 3: 30°, J, N, Mn+Fe, Su, P, SR		0857 0900	
1846	20				4		1	Highly weathered; extremely weak			
1844	21	5	2	100	6	0	2 1 3 3	Becomes olive to greenish gray; moderately strong		[75]	
1844	22				NA			Becomes highly to completely weathered; extremely weak			
1842	23				NA			Vuggy, crystalline Quartz veins; extremely weak, clayey matrix			
1842	24				NR		1			0904 0908	
1840	25				NA		1	Becomes greenish gray with reddish brown mottling; moderately weathered; moderately strong to strong			
1840	26	6		94	6	24*	2 1 3 3	1: 30°, J, N, Mn+Fe+C, Su+F, P, SR 2: 70°, J, N, Mn+Fe+C, Su+Sp, P, SR 3: 30°, J, N, Mn+Fe, Su, P, SR 4: 50°, J, N, Mn+Fe, Su, P, SR		[60]	*Rock does not meet soundness criteria for RQD calculation
1838	27				4		1 3 3				
1838	28				4		4 2 4 4				
	29						3			0913	

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B2



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B2

Sheet 3 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave seismic velocity, ft/sec	Drill time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1836	29	2			5		1 1 2 2 2 2	BASALT; green sh gray and redd sh brown; moderately to locally slightly weathered; moderately strong to strong; highly fractured; aphanitic tophanitic mv (continued)		0916	
	30				3		3 3	Highly weathered; weak			
1834	31	7		100	3	10	1 1 1 1	1: 55° 65°, J, N, Mn+Fe, Su, P, SR 2: 25° 30°, J, N, Mn+Fe, Su, P, SR 3: 70° 90°, J, N, Mn+Fe, Su, Ir, R 4: 70°, J, N, Mn+Fe, Su, P, SR		[58]	
	32				3		2 2				
	33				3		2 2				
1832	34	3			3		1 1 2 2	Becomes mostly redd sh brown; moderately weathered; moderately strong		0921 0926	
	35				3		3 4 4 4	1: 45° 55°, J, N, Mn+Fe, Su, P, SR 2: 80° 90°, J, N, Mn+Fe, Su, P, SR 3: 10° 30°, J, N, Mn+Fe, Su, P, SR 4: 70° 75°, J, N, Mn+Fe, Su, P, SR			
1830	36	8		100	3	0	3 4 4 4 2 1			[60]	
	37				2		2 2				
1828	38				5		3 3 2 2	Becomes intensely fractured		0931 0935	
1826	39	9		100	5	0	1 1 1 1 2 2	1: 30° 40°, J, N, Mn+Fe, Su, P, SR 2: 70° 90°, J, N, Mn+Fe, Su, P, SR		[34]	
	40				>6		1 1	Run has three fracture sets: 10° 20°; 30° 40°; and 70°, J, N, Mn+Fe, Su, P, SR		0938 0943	
1824	41	10		100	6	0	1 1	1: 30°, Sh/V, MW, Mn+Fe+C, Su+F, P, SR		[70]	
	42				>6			Becomes porphyritic			
1822	43				>6						
	44	11		100	>6	13				0946 0955	
	45										

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B2

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B2

Sheet 4 of 7

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave seismic velocity, ft/sec	Drill time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot					
45	11	3	100	>6	13	12 1 12 1 13	BASALT; buff to med um gray; slightly weathered; strong; highly fractured; aphanitic. Becomes highly fractured at 46' mv (continued)	2282	[45]	
1820	46			5		2 3	1: 15° 25°, J, N, Mn+Fe, Su, P, SR 2: 60°, J, N, Mn+Fe, Su, P, SR 3: 50°, J, N, Mn+Fe, Su, P, SR	3950	0959 1055	
1818	47			4		1 2 1 3 1	1: 40°, J, N, Mn+Fe, Su, P, SR 2: 75°, J, N, Mn+Fe, Su, P, SR 3: 60°, J, N, Mn+Fe, Su, P, SR	5078		
	48	12	100	4	39	1 13		6556	[40]	
1816	49		4	3		3 3		9459		UC 22 196.6 psi
	50			3		2 1		1100 1104		
	51			3		2	← Becomes slightly fractured; very strong 1: 60°, J, N, Mn+Fe, Su, P, SR 2: 5° 30°, J, N, Mn+Fe, Su, Ir, SR	14620		
1814	52	13	100	0	97			14697	[46]	
	53			0				12631		
1812	54			1		1	← Becomes highly fractured	7436	1109 1114	
	55			5		1 3 4 2 1	← Becomes strong 1: 30°, J, N, Mn+Fe, Su, P, SR 2: 80°, J, N, Mn+Fe, Su, P, SR 3: 40° 50°, J, N, Mn+Fe, Su, P, SR 4: 10° 20°, J, N, Mn+Fe, Su, P, SR	4024		
1810	56	14	100	4	55	4 3 2 3		4068	[49]	
	57			2		2 3	← Becomes fresh; highly to moderately fractured; porphyritic	6180		
1808	58			1		1		5370		
	59			0				6955	1120 1124	
1806	60	15	100	1	66		1: 30°, J, N, Mn+Fe, Su, P, SR	5852		
	61					1				

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B2

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Velocity, ft/sec	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %					
61	15	4	100	2	66	2	BASALT; bush to med um gray; s ght y weathered to fresh; strong to very strong; h gh y fractured; porphy r t c mv (continued)	5356		
1804						3	2: 75°, J, N, Mn, Su, P, SR 3: 10°, J, N, Mn, Su, P, SR	4410	[53]	
63		5		2		11	← Becomes strong; ntense y fractured	3965		
1802				6		1	4: 50°, J, ?, Mn+Fe, Su, P, SR 5: 80°, J, ?, Mn+Fe, Su, P, SR			
64						4		4113	1130	
65				4		1	1: 40° 50°, J, N, Mn+Fe, Su, P, SR w th weak 90° S k 2: 20° 30°, J, N, Mn+Fe, Su, P, SR 3: 70°, J, N, Mn+Fe+Ca, Su+Pa, P, SR 4: 90°, J/V, N, Mn+Fe+Ca, Su+F, P, SR	5159	1135	
1800				>6		2				
66						2		8042		
67	16		100	5	40	3	← Becomes h gh y to oca y moderate y fractured			
1798				2		2		13679	[50]	
68						2		19003		
69				1		2				
1796				0				20084	1141	
70									1145	UC 9 495 7 psi
1794				1		1	1: 65°, J, N, Mn+Fe, Su, P, SR 2: 50°, J, N, Mn+Fe, Su, P, SR 3: 30°, J, N, Mn+Fe, Su, P, Ir, R 4: 80°, J/V, N MW, Mn+Fe+Ca+Ch, Su+Pa, P, SR (vuggy) 5: 30°, J, N, Mn+Fe, Su, P, SR	19731		
71				1	81	2		17795		
1792									[58]	
72	17		100			3		18373		
73				1		4	← Becomes h gh y fractured	18081		
74				2		5				
1790								17424	1150	
75				3		1	1: 0°, J, N, Mn+Fe, Su, P, SR 2: 20°, J, N, Mn+Fe+Ca, Su+Pa, P, SR 3: 30° 40°, J/V, N MW, Mn+Fe+Ca, Su Pa, P, SR 4: 55°, J, N, Ca, Pa, P, SR 5: 30°, J, N, Mn, Su, P, SR 6: 80°, J/V, N, Mn+Fe, Su, P, SR	16959	1156	
76				3		2				
1790						3		19348		
77	18	6	100	2	54	3			[50]	

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B2

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B2

Sheet 6 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
	77		6		3		4	BASALT; buff to med um gray; slightly weathered to fresh; very strong; highly fractured; porphyritic. Becomes fresh at 78' mv (continued)	20678		
1788	78	18		100		54	5		20708		
					2		6				
	79						1	← Becomes highly to moderately fractured	20799	1202	1207
1786	80				0			1: 15°, J, VN, Mn+Fe, Su, P, SR 2: 60°, J/V, VN, Mn+Fe+Ca, Su+F, P, S	20379		
	81				0				18869		
1784	82	19		100		96	1		20337	[45]	
					0		2				
	83				0				20995		
1782	84				0				20660		
					1		1			1214	1218
	85				1				20646		
1780	86				1		1	1: 10° 20°, J, VN, Mn+Fe+Ca, Sp, P, SR 2: 85°, J/V, N, Mn+Fe+Ca, Su+F, P, SR (partly headed)	21039		
	87	20		100		100			21068	[50]	
					1						
1778	88				0		1		20954		
					0		2				
	89				3			← Becomes slightly weathered	19164	1224	1229
1776	90		7				1	← Becomes reddish brown to med um gray; moderately to slightly weathered; moderate to strong	17037		
					4		2	1: 70° 80°, J, N, Mn+Fe+Ca, Su+Pa, P, SR			
					4		1	2: 40° 50°, J, N, Mn+Fe+Ca, Su+Pa, P, SR			
	91				4		3	3: 10° 20°, J, N, Mn+Fe, Su, P, SR	15267		
					4		3	4: 10° 30°, J/V, MW, Mn+Fe+Ch+Qz, Su+Pa, P?, SR (vuggy, disturbed)			
1774	92	21		100		23	2		15068	[48]	
					6		3				
							2				
							3				
	93						3				

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B2



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B2

Sheet 7 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P-wave seismic velocity, ft/sec	Drill time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
93		21	7	100	2	23	5	5: 60°, J, N, Mn+Fe, Su, P, SR 6: 20°, J, VN, No, No, P, SR			
1772	94				1		6	BASALT; bushy to medium gray; slightly weathered; strong to very strong; highly to moderately fractured; aphanitic to oolitic porphyritic with occasional calcite veins		1235	
							1			1240	
	95				1		2				
1770	96				1		3	1: 80°, J, N, Mn+Fe, Su, P, SR 2: 35°, J, N, Mn+Fe+Ca, Sp, P, SR 3: 0° 15°, J, N, Mn+Fe, Sp, Ir, R 4: 25°, J, N, Mn+Fe, Sp, P, SR			
	97	22		100	1	98	4			[56]	
	98				0		5				
1768	98				1		6				
	99				2	75	7	1: 20° 25°, J, N, Mn+Fe, Su, P, SR		1245	
	99	23		75	2	75	8			1253	
1766	100						9			[36]	
	100						10			1255	
	101							TOTAL DEPTH = 100.0 FEET P-wave survey performed 6/9/2016 - Neat cement grout to surface on 6/10/2016			
	102										
1764	102										
	103										
	104										
1762	104										
	105										
	106										
1760	106										
	107										
	108										
1758	108										
	109										

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B2



Depth 3.5' to 21.1'



Depth 21.1' to 33.8'





Depth 33.8' to 48.9'



Depth 48.9' to 63.0'





Depth 63.0' to 76.2'



Depth 76.2' to 89.3'





Depth 89.3' to 100.0'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-B3**

Sheet 1 of 7

Date(s) Drilled	6/9/2016-6/10/2016	Logged By	B. Kozlownicz/K. Zeiger	Checked By	D. Simpson
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond	Total Depth of Borehole	101.3 feet
Drilling Rig Type	LF-70 Track-Mounted Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	1910-ft
Groundwater Level	71.0-ft 6/11/2016	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	90°
Borehole Completion	1.0-in Sch 40 PVC Piezometer	Location	South borrow area	Coordinate Location	N 2145847.5 E 6839820.1

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
1910	0							LEAN CLAY with GRAVEL (CL); red to reddish brown and greenish to olive grey; BASALT BOULDERS to 6" COLLUVIUM				
	1											
1908	2											
	3											
1906	4		1	NA							0827	B Kozlownicz logging
	5	1		94	0						[102]	Well: 1-in PVC solid well casing 2.85'-60' in neat cement grout
	6			NA								
1904	7			NA							0829	
	8	2		100	0	100		1: 10°, Contact 2: 10°, J, N, No, No, Wa P, SR? BASALT; medium gray; slightly weathered; strong; highly to moderately fractured; aphanitic; with some calcite nodules			0858	K Zeiger Logging
1902	9										[51]	
	10										0900	
	11	3		100	5	38					0936	Advance 5" HWT casing to 5'
	12										[50]	
1898	13	4		100		81					0941	
											0950	

Report GEO CORE OAK C BMP WELL File N:\D\AECOM\ROCK CORE GPJ 1/16/2017 CB-B3

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B3

Sheet 2 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Weir Diagram	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
1896	13	4	1	100	1	81	2	2: 30°, J, N, No, No, P, SR BASALT; green sh gray; slightly weathered; strong; highly to moderately fractured; aphanitic; with some Ca carbonate nodules			[48]	
	14				1		1	mv (continued)			0952 1004	
1894	15				6		2, 3	← Becomes medium brown; moderately weathered; moderately strong				
	16				0	78*	4	1: 20°, J, N, No, No, Wa, SR 2: 55°, J, N, Sd, Pa, P, SR 3: 55°, J, T, No, No, P, SR 4: 80°-85°, J, T, H+Uk, Uk, Wa, ? 5: 40°, J, N, No, No P, SR 6: 55°, J, MW, C+Sd, Pa, P, SR 7: 70°, J, MW, C+Sd, Pa, P, SR			[49]	
1892	17	5	2	100	1		5, 6					0% Water circulation return (WCR)
	18				>10		6, 7	← Becomes highly weathered; very weak; intensely fractured; oca y crushed Crushed				
1890	19				1		1	1: 60°, J, N, Fe+Mn, Su, P, S 2: 25°, J/B?, N, No, No, P, SR			1010 1037	Pump paper into hole to improve WCR 75% WCR after
	20				8		2, 2	← Becomes laminated				
1888	21	6	91	91	0		2, 2	Crushed			[50]	
	22				>10		3, 4, 4	3: 15°, J, N, C, Sp, Wa, SR 4: 80°, J, N, Fe+Mn, Su, P, S				50% WCR
1886	23	7	100	100	0		1, 2, 2, 2	← Becomes moderately weathered; moderately strong with weathering rinds around fractures			1041 1048	
	24				8		3, 2	1: 35°, J, N, Fe+Mn, Su, P, S 2: 15°, J, N, Fe+Mn, Su, P, S 3: 75°, J, MW, C+Fe, Sp+Su, Wa, SR			[48]	
1884	25	8	92	92	0		1, 2, 1, 3	1: 15°, J, N, Fe, Su, P, S 2: 30°, J, N, Fe, Su, P, S 3: 55°, J, N, Fe, Su, Wa, SR 4: 10°, J, W, Sd, F, Wa?, SR?			1050 1112	
	26				2		4	Crushed			[43]	
1882	27				4		5, 6	5: 40°, J, N, Fe, Su, Wa, SR 6: 70°, J, N, Fe, Su, P, S 7: 15°, J, N, Fe, Su, P, SR				
	28	9	100	100	5	55	1, 2, 2, 3	← Becomes green sh gray to medium brown; slightly to moderately weathered; moderately strong			1117 1124	75%-100% WCR
	29				5		4	1: 50°, J, N, Fe, Su, Wa, SR 2: 25°, J, N, Fe, Su, P, S 3: 15°-20°, J, T, Fe, Su, P, S 4: 40°, J, N, Fe, Su, Wa, SR				

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B3

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B3

Sheet 3 of 7

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number						
1880	9	2	100	5	55	55 65 66 67 68	5: 30°, J, MW, C, F, P, SR 6: 30°, J, T, H+Fe?, Pa, P 7: 30°, J, T, Fe, Pa+Su, P, SR 8: 40°, J, N, Fe, Su, Wa St, SR BASALT; green sh gray and moderate y brown; s ghty to moderate y weathered; moderate y strong; h gh y fractured; oca y am nated w th weather ng r nds on fractures mv (continued)			[47]		
1878	10	3	100	1	21	1 2 3 33 44 55 66 6	1: 70°, J, MW, Fe+Mn, Su, Wa, SR 2: 25°, J, N, Fe, Su, Wa, SR 3: 30°, J/V, W, Ca Pa, St, R 4: 30°, J, T, Fe, Su, P, S 5: 65°, J, N, Fe, Su, P, S 6: 25°, J, N, Fe, Su, P, S 7: 70°, J, MW, Fe, Su, Wa P, SR			1128 1135		
1876	11	4	100	>10	7	1 2 3 33 44 55 66 7	1: 70°, J, MW, Fe+Mn, Su, Wa, SR 2: 25°, J, N, Fe, Su, Wa, SR 3: 30°, J/V, W, Ca Pa, St, R 4: 30°, J, T, Fe, Su, P, S 5: 65°, J, N, Fe, Su, P, S 6: 25°, J, N, Fe, Su, P, S 7: 70°, J, MW, Fe, Su, Wa P, SR			1139 1147	75% WCR	
1874	11	4	100	4	21	2 2 33 33 4 4 5	1: 70°, J, N, Fe, Su+Sp, Wa, SR 2: 30°, J, N, Fe, Su, P, S 3: 15°, J, N, Fe, Su, P, S 4: 25°, J, MW, Fe, Su, P, S 5: 60°, J, N, Fe, Su, P, S 6: 35°, J, N, Fe, Su, Wa, SR 7: 85°, J, N, Fe, Su, Wa St, SR R 8: 75°, J, MW, Fe, Su, Wa, SR			[51]	PL 24805 psi	
1872	11	4	100	5	0	6 7 7 8				[54]		
1870	12	7	97	4	0	1 2 3 3 4 M	1: 30°, J, MW, Fe+Mn, Su, Wa, SR 2: 10°, J, N, Fe+Mn, Su, P, S 3: 90°, J, N, Fe+Mn, Su, Wa, SR 4: 30°, J, N, Fe+Mn, Su, Wa, SR 5: 10°, J, T, No, No, P, S			[37]		
1868	13	7	94	7	0	55 55 55 5	1: 30°, J, MW, Fe+Mn, Su, Wa, SR 2: 10°, J, N, Fe+Mn, Su, P, S 3: 90°, J, N, Fe+Mn, Su, Wa, SR 4: 30°, J, N, Fe+Mn, Su, Wa, SR 5: 10°, J, T, No, No, P, S			1152 1239		
1866	13	7	94	NA	0	12 22 22 22	1: 30°, J, MW, Fe+Mn, Su, Wa, SR 2: 10°, J, N, Fe+Mn, Su, P, S 3: 90°, J, N, Fe+Mn, Su, Wa, SR 4: 30°, J, N, Fe+Mn, Su, Wa, SR 5: 10°, J, T, No, No, P, S			1245 1257		
1866	14	6	100	0	0	3 2 22 1 12 1 1 1	1: 15°, J/V, MW, Ca, Pa, Ir, R 2: 20°, J, N, Fe, Su, P, S 3: 75°, J, N, Fe+Mn, Su, P, S			[26]		
1866	14	6	100	>6	0	1 12 1 1 1	1: 20°, J, N, Mn+Fe, Su, P, SR 2: 90°, J, N, Mn+Fe, Su, P, SR			1301 1306	B Kozlowski logging	

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B3



Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Weir Diagram	Packer Test Intervals	Dr. Time, 24 hr [Dr. Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %						
	45		4		5		11	BASALT; green sh gray and med um gray w th moderate brown weathered r nds; s ghtly to moderate y weathered; moderately strong to strong; h ghly to ntense y fractured; aphan tic; am nated				75% WCR PL 19671 psi
1864	46	14		100	0	34	1	mv (continued)			[50]	
	47				6	45	1	3: 40°, J, N, Mn+Fe, Su, P, SR 4: 60°, J, N, Mn+Fe, Su, P, SR 5: 30°, J, N, Mn+Fe, Su, P, SR				
	48				>6	11	1	↓ Becomes moderate y weathered; moderate y strong				
1862	48					6	1	6: 60°, J/V, MW, Mn+Fe+Sd+Ca, Su+F, P, SR (vuggy and Ca crista s)			1311 1317	
	49				NA	22	1	1: 60°, J, N, Mn+Fe, Su, P, SR 2: 20°, J, N, Mn+Fe, Su, P, SR 3: 60°, J/V, MW, Mn+Fe+Ca+C, Su+F, P, SR (vuggy w th Ca crista s n c ay matr x)				
1860	50	15		90	0	4	1	Ves cu ar			[30]	
	51				NA	2	1	4: 75°, J, N, Mn+Fe, Su, P, SR 5: ?°, V, W, Ca, Pa, ?, ? (d sturbed, w th Ca crista s)				
	52				2	2	1	↓ Becomes med um to bu sh gray; s ghtly weathered; strong to very strong; 30° Ca c te r ch am nat ons			1323 1339	UC 6 970 psi
1858	52	16		100	4	54	1	1: 30°, J, VN, No, No, P, SR 2: 20°, J, N, Mn+Fe, Su, Ir, SR 3: 40° 50°, J, N, Mn+Fe, Su, P, Ir, R 4: 30°, J, N, Mn+Fe, Su, Wa, SR 5: 60°, V, MW, Ca, Pa, P, SR (vuggy, open 0.2")			[14]	
	53				5	5	1	↓ Becomes not am nated				Well: Bentonite pellets seal 52'-55'
1856	54				5	6	1	6: 20°, J, N, Mn+Fe, Su, P, SR 7: 50°, J, N, Mn+Fe, Su, P, SR 8: 10°, J, N, Mn+Fe, Su, P, R			1351 1357	
	55				6	3	1	Broken; d sturbed				
	56	17		100	3	0	1	1: 30°, J, N, Mn+Fe+Ca, Su+Pa, P, SR 2: 55°, J/V, N, Mn+Fe+Ca, Su+Pa, P, SR 3: 80° 85°, J, N, Mn+Fe, Su, P, SR 4: 20°, J, N, Mn+Fe, Su, P, SR			[36]	
1854	57				>6	22	1					
	58	18		100	27	2	1	1: 70°, J, N, Mn+Fe, Su, P, SR 2: 60°, J/V, N, Mn+Fe+Ca, Su+F, P, SR 3: 60°, J/V, MW, Mn+Fe+Ca+C, Su, F, P, SR (d sturbed w th Ca crista s n c ay matr x)			1402 1408	Well: #2/12 Sand filter pack 55'-75'
1852	59				4	23	1				[45]	
	60	19		100	16	3	1	1: 55°, J/V, N, Mn+Fe+Ca, Su+F, P, SR 2: 30°, J, N, Mn+Fe, Sp, P, SR 3: 75°, J, N, Mn+Fe, Su, P, SR 4: 10° 20°, J, N, Mn+Fe, Su, P, SR			1410 1415	
1850	61				4	4	1				[38]	

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B3

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
1848	61	19	5	100	3	16	4 3 2 2	5: 50° J, N, Mn+Fe+Ca, Su+Pa, P, SR (vuggy) BASALT; buff to medium gray with reddish brown weathered rinds; slightly weathered; strong to very strong; highly to intensely fractured; aphanitic; calcite veins mv (continued)			1421 1432	50%-60% WCR
1846	62				4		5				[34]	
1846	63	20		100		29	12 3 3 4 4	1: 85° J, N, Mn+Fe, Su, P, SR 2: 15° J, N, Mn+Fe, Su, P, SR 3: 55° J, N, Mn+Fe+Ca, Su+Sp, P, SR 4: 55° V, W, Ca, F, P, SR (vuggy)			1435 1442	
1846	64				6		2				[17]	
1844	65	21		100	4	36	1 2 3 2	1: 50° J, N, Mn+Fe, Su, P, SR 2: 45° J, N, Mn+Fe, Su, P, SR 3: 45° J, N, Mn+Fe+Ca, Su+Pa, P, SR			1446 1540	No water in hole after Run 21
1844	66				3		1					
1842	67				3		2					
1842	68	22		100	2	43	3 4 5 6	1: 65° J, N, Mn+Fe, Su, P, SR 2: 20° J/V, N, Mn+Fe+Ca, Su+F, P, SR 3: 85° J, N, Mn+Fe, Su, P, SR 4: 50° J/V, N MW, Mn+Fe+Ca, Su+F, P, SR (vuggy) 5: 30° J, N, Mn+Fe, Su, P, SR 6: 70° J, N, Mn+Fe, Su, P, SR 7: 40° J, N, Mn+Fe, Su, P, SR			[40]	
1840	69				3		1 2					
1840	70				5		3 5 5				1547 1556	Well: 1-in PVC 0.020 slotted well casing 65'-75'
1838	71				3		1					
1838	72	23		100	1	86	2 2 3	Becomes fresh; very strong; moderately fractured; porphyritic 1: 30° J, N, Mn+Fe, Su, P, SR 2: 50° J/V, N MW, Mn+Fe+Ca, Su+F, P, SR (vuggy) 3: 15° 20° J, VN, Mn+Fe+Ca, Sp, P, Wa, SR			[42]	
1836	73				1		3					
1836	74				0		M				1602 1611	
1834	75				0							
1834	76	24		98	1	94	2 1 3	1: 10° J/V, N, Mn+Fe, Su+F, P, SR 2: 60° J, N, Mn+Fe, Su, P, SR 3: 50° J, N, Mn+Fe+Ca, Su+Pa, P, SR			[43]	
	77											

Report GEO\_CORE\_OAK\_C\_BMP\_WELL\_File\_ND\_AECOM\_ROCK\_CORE\_GPJ\_1/16/2017\_CB-B3

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B3

Sheet 6 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
77			6					BASALT; bush to med um gray; s ghty weathered to fresh; very strong; moderately fractured; porphory c; Ca c te ve ns mv (continued)				
1832	78	24		98		94	4	4: 0° 10°, J, T, No, No, P/lr, R				Well: Neat cement grout 75'-101'
	79										1618 1623	
1830	80						1	1: 20°, J, VN, Ca, Sp, P, SR				
	81											
1828	82	25		100		100		← Open Ca c te vug 0.5" 2"			[38]	
	83											
1826	84										1631 0805	End of day 6/9/2016 Begin day 6/10/2016 AM water level 67 5'
	85							1: 20°, J, VN, No, No, P, SR 2: 25° 60°, J/V, VN, Ca, Pa, P, St, SR 3: 90°, J/V, N, Ca, F, P, SR 4: 70°, J/V, N, Ca+Ch, F+Su, P, SR 5: 20°, J/V, VN, Ca, F, P, SR				
1824	86		7									
	87	26		100		88	2				[37]	
1822	88											
	89										0813 0827	
1820	90											
	91											
1818	92	27		100		88	1	1: 30°, J/V, N, Ca, F, P, SR 2: 30°, J, VN, Ca, Pa, P, SR			[45]	
	93											

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B3

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

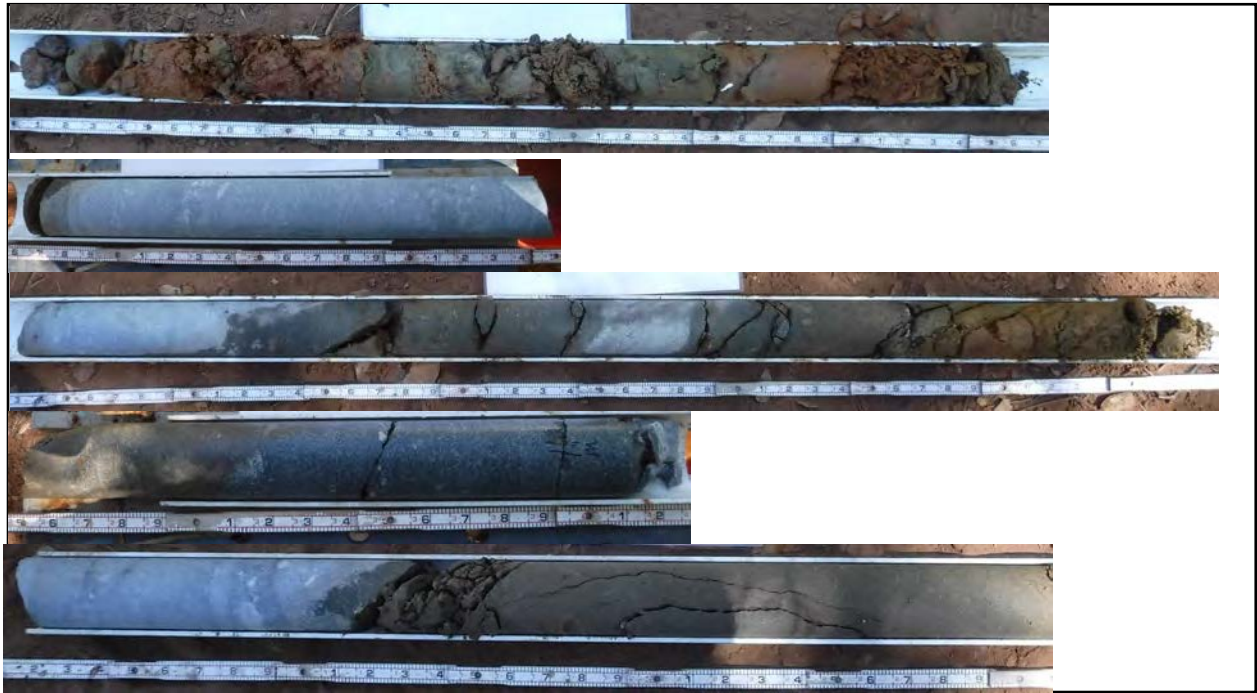
## Log of Rock Core Boring CB-B3

Sheet 7 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Well Diagram	Packer Test Intervals	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %						
93		27	7	100	3	88?	2 3 4	3: 10°, J/V, N, Fe+Ca, Su+Pa, P, SR 4: 30°, J/Sh?, MW, CR, F, P, SR				
1816	94				0		M	BASALT; buff, green sh, to medium gray; slightly weathered to fresh; very strong; highly to moderately fractured; aphanitic; wide calcite veins, occasionally brecciated and healed  mv (continued)			0834 0913	0 2' core stuck in barrel pull rods to remove
1814	95	28		100	1	96	1	1: 10°, J/V, N, Ca, F, P, SR 2: 60°, J/Sh, N, C, F, P, SR			[35]	
1814	96				0		2				0917 0924	
1812	97				3		11	Irregular calcite zone; white and light gray				
1812	98				NA		1		Moderately altered shear zone; very weak; crushed			
1810	99	29		100		61	2	1: 30°-40°, J, N, Ca, F, P, Ir, R 2: 10°, Sh, W, C+CR, F, P, S? 3: 55°, J, VN, No, No, P, S 4: 0°, J, N, Ca, Pa, P, St, R 5: 20°, J, VN, No, No, P, Wa, SR			[33]	
1810	100				2		3					
1810	101				1		4					
1810	101						5					
1808	102							TOTAL DEPTH = 101.3 FEET P-wave survey performed on 6/11/2016			0933	End of day 6/10/2016 Begin day 6/11/2016 AM water level 71.0'
1808	103											
1806	104											
1806	105											
1804	106											
1804	107											
1802	108											
1802	109											

Report GEO CORE OAK C BMP WELL File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B3





Depth 3.3' to 17.1'



Depth 17.1' to 30.4'



Depth 30.4' to 44.0'



Depth 44.0' to 57.8'





Depth 57.8' to 71.2'



Depth 71.2' to 85.9'



Depth 85.9' to 100.3'



**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-B4**

Sheet 1 of 7

Date(s) Dr ed	6/6/2016-6/7/2016	Logged By	B. Kozlowicz	Checked By	D. Simpson
Dr ng Method	HQ-3 Wireline Core	Dr Bt Size/Type	3 7/8" HQ Diamond	Total Depth of Borehole	103.5 feet
Dr Rg Type	LF-70 Track-Mounted Rig	Dr ng Contractor	Ruen Drilling	NAVD 88 Ground Surface E evat on	1871-ft
Groundwater Level	70.5-ft 6/10/2016	Samp ng Methods	HQ-3 Wireline	Inc nat on from Horizontal/Bear ng	90°
Borehole Completion	Neat cement grout to surface	Locat on	South borrow area	Coordinate Locat on	N 2146187.5 E 6840356.6

E evat on, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %					
0			1						1330		
-1870	1	1	31	NA	0	MR	CLAYEY GRAVEL w th SAND (GC); redd sh brown to moderate gray; h gh y to comp ete y weathered; extreme y weak; w th subangular porphy r c Basalt grave to 3"	RESIDUAL SOIL	[96]		
-1868	3			NA			SANDY LEAN CLAY w th GRAVEL (CL); st ff; moist; red	RESIDUAL SOIL/SAPROLITE	1332 1340		
-1866	5	2	96	NA	0		↓ Becomes ye ow sh red to strong brown; comp ete y weathered; extreme y weak; w th rock fabr c		[60]		
-1864	7			NA			BASALT; ght brown sh gray; h gh y to comp ete y weathered; extreme y weak; h gh y fractured; w th most fractures 30° 40° and 50° 60° w th ron and manganese oxide sta n ng	mv			
-1862	9			NA		NR			1345 1448		Advance 5" HWT casing to 5'
-1860	11	3	84	NA	0				[59]		
-1858	13			NA		NR			1453		

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B4

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B4

Sheet 2 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave seismic velocity, ft/sec	Drill time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1858	13		1		5			BASALT; reddish to yellowish brown; highly to locally completely weathered; very to extremely weak; intensely fractured; porphyritic with aphanitic groundmass		1515	
	14				5			Fractures: 40°, 80° 90°, and 60°, J, N, Fe+Mn+C, Su+Sp, P, SR			
1856	15	4		96	>6	0				[50]	
	16				5						
1854	17		2		NA						
	18				NA					1521	
	19				NA					1525	
1852	19				>6			Fractures: 20° 30°, 40° 50°, and 60° 90°, J, Fe+Mn+C +Sd, Su+Sp			
	20	5		89	>6	0				[44]	
1850	21				>6						
	22				>6			↓ Becomes medium gray; moderately weathered; weak to moderately strong			
	23	6		100	>6	0		1: 30° 35°, J, N, Mn+Fe, Su, P, SR 2: 70°, J, N, Mn+Fe, Su, P, SR 3: 90°, J, N, Mn+Fe+C, Su+Pa, P, SR		[42]	
	24				NA					1538	
	25	7		14	NA	0				1543	
1846	25				NA						
	26									1547	
	27	8		100	>6	0		Broken with iron and manganese oxide staining and clay and sand inf		1552	
1844	27				>6					[30]	
	28	9		87	>6	0		↓ Becomes dark yellowish brown; moderately to highly weathered; weak to moderately strong		1554	
	29				NA			1: 50°, J, N, Mn+Fe, Su, P, SR 2: 30°, J, N, Mn+Fe, Su, P, SR		1600	
1842	29				79	0				1603	
										0824	

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B4

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B4

Sheet 3 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave seismic velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1842	29	10	2	79	>6	0	1 12 12	1: 20°, J, N, Mn+Fe, Su, P, SR 2: 60° 70°, J, N, Mn+Fe+C+Sd, Su+Pa, P, SR BASALT; med um gray w th dark ye ow sh brown zones; s ghtly to moderate y weathered; moderate y strong to strong; ntense y fractured; porphyrt c w th aphan t c groundmass		[29]	casing to 10'
	30			NA			NR	mv (continued) Becomes dark ye ow sh brown; h ghly weathered; weak to very weak		0828 0833	
1840	31				>6			Fractures: 10° 30°, occas ona y steeper, J, MW, Fe+Mn+C, Su+Pa			
	32	11		100	>6	0		D sturbed Quartz ve n			[43]
	33		3		>6			Med um to o ve gray; moderate y weathered; moderate y strong			
	34			NA				Gray sh brown; extreme y weak			0838 0844
1836	35	12		81	>6	0		Becomes h ghly to comp ete y weathered; extreme y weak; c aye y			[52]
	36			NA			NR	Becomes h ghly weathered; very weak			0847 0852
1834	37				>6			Becomes h ghly fractured, Fe+Mn+C+Sd, Su+Sp			
	38				5	0		Fractures become most y hea ed			[45]
1832	39	13		100	4			1: 60°, J/V, MW, Mn+Fe+C, Su+F, P, S			
	40				4						
1830	41			NA			1	Comp ete y weathered; extreme y weak; c aye y			0858 0905
	42	14		100	5	0	1	Becomes o ve gray to ye ow sh brown; moderate y weathered; moderate y strong; h ghly to ntense y fractured 1: 30°, J, N, Mn+Fe, Su, P, SR 2: 30°, J/V, Mn+Fe+C, Su+F, P, SR			[44]
1828	43				>6		2				
	44	15		91	NA	47	1 1 1 1	Comp ete y weathered; extreme y weak; c aye y			0909 0917
1826	45										

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B4

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B4

Sheet 4 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Velocity, ft/sec	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1826	45		3		4		1	BASALT; buff gray; slightly weathered; strong; highly fractured; porphyritic with aphanitic groundmass			
	46	15		91		47	1	mv (continued)	4605	[43]	UC 11 211 psi
1824	47				3		1	1: 20° 30°, J, N, Mn+Fe+Sd, Su+Pa, P, SR 2: 70°, J, N, Mn+Fe, Su, P, R	4425		
	48				NA		1		4034	0923	
1822	49		4		NA		2	Intensely fractured and broken	3685	0930	
	50	16		100		38	2	Green sh gray; aphanitic dikes on 30° contacts	3849	[38]	
1820	51						1	1: 10° 20°, J, N, Mn+Fe, Su, P, SR 2: 30°, J, N MW, Mn+Fe+Sd, Su+Pa, P, SR 3: 45°, J, N, Mn+Fe, Su, P, SR 4: 0° 5°, J, N, Mn+Fe, Sp, P, Ir, R	4149		
	52						1		4739	0940	75% Water circulation return (WCR)
1818	53	17		100		76	1	1: 70°, J, N, Mn+Fe, Su, P, SR 2: 25° 30°, J, N, Mn+Fe+C, Su+Pa, P, SR	4733	[30]	
	54						2		4857	0945	
1816	55						1	1: 50°, J, N, Mn+Fe, Su, Ir, R 2: 30° 35°, J, N, Mn+Fe, Su, P, SR 3: 85° 90°, J, N, Mn+Fe, Su, P, SR	6964		UC 21 583 psi
	56						2	Becomes very strong; moderately to locally highly fractured	10145		
1814	57	18		100		59	2		7836	[38]	
	58						1		12618		
1812	59						3		19760	1000	
	60	19		100		100	3		13509	1005	
1810	61						0				

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B4



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B4

Sheet 5 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave seismic velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1810	61	19	4	100	2	100	1	BASALT; buff to med gray; slightly weathered; very strong; highly to moderately fractured; occasionally porphyritic with aphanitic groundmass; occasional calcite veins	12656	[37]	
	62		5				1	mv (continued)	13171		
					1						
1808	63				0		2	1: 0° 10°, J, N, Mn+Fe, Sp, P, SR 2: 25°, J, VN, Mn+Fe, Sp, P, SR	7061		
	64				0				5762	1013 1019	
1806	65				1		1	1: 15°, J, MW, Mn+Fe, Sp, P, SR 2: 30°, J, VN, No, No, P, SR 3: 50°, J/V, N MW, Mn+Fe+Ca, Su+Sp, P, SR	6588		
	66	20		100	0	100			12975	[44]	
1804	67				2		2		11980		
	68				0		3		15078		
1802	69				1		1	1: 0°, J/V, N, Ca, F, P, R 2: 10°, J, VN, No, No, P, SR 3: 50° 60°, J, VN, Ca, Sp, P, SR 4: 30°, J/V, N, Mn+Fe+Ca, Su+F, P, SR 5: 30°, J/V, VN, Ca, F, P, SR 6: 60°, J/V, VN, Ca, F, P, S	18271		
	70				0				18372		
1800	71	21		100	2	92	2		18215	[45]	
	72				2		3		18468		
					2		4				
1798	73				2		2.6		18769		
	74				2		M	Shoe broken on removal	1053 1059		
					2			1: 70°, J, N, Ca, F, P, SR 2: 30°, J, VN, Ca, Pa, P, SR 3: 80° 90°, J, VN, No, No, Ir, R 4: 50°, J, VN, No, No, P, SR 5: 60°, J, N, Ca, Sp, P, SR	17729		
1796	75	22		100	3	50	2 3		17949	[41]	
	76				3		4 1 2 5		18003		
1794	77		6		3		M	Shoe broken on removal	1104		

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B4

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B4

Sheet 6 of 7

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave seismic velocity, ft/sec	Drill time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1794	77		6		0			BASALT; buff to medium gray; slightly weathered to fresh; very strong; slightly to moderately fractured; aphanitic; with steeply dipping calcite veins	18052	1114	
	78				0			mv (continued)	18396		
1792	79	23		100	0	100			18576	[43]	
	80				1				18383		
1790	81				1		1	1: 30°, J, VN, No, No, P, SR 2: 60°, J, VN, Ca, Pa, P, SR	18122		
	82				0		1		18062	1121 1128	
1788	83	24		100	0	100		1: 80°, V, W, H+Ca, F, P 2: 10°-20°, J, VN, No, No, Ir, SR (possibly mechanically)	17659	[54]	
	84				1		2		1130 1152		
1786	85				1		1	1: 25°, J, VN, No, No, P, SR R 2: 10°, J, VN, Ca, Sp, P, SR	17742		
	86	25		100	0	100			18249		
1784	87				1		2		17510	[46]	
	88				0						
1782	89				0				1158 1219		Advance 5" HWT casing to 20'
	90				0						
1780	91	26	7	100	0	100				[38]	
	92				0						
	93				1		1	1: 5°, J, T, No, No, P, R (possibly mechanically)			

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B4

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B4

Sheet 7 of 7

Elevation, feet	Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	P-wave seismic velocity, ft/sec	Drill time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
1778	93	26	7	100	0	100	M	BASALT; bush to medium gray; fresh; very strong; slightly fractured; aphanitic; with steeply dipping calcite veins  mv (continued)		1227 1234		
	94				0							
1776	95				0							
	96	27		100	0	100				[33]		
1774	97				0							
	98				0							
1772	99				0					1243 1250		
	100				0							
1770	101	28		100	0	74	1	1: 55°, J, N, Mn+Fe, Su, P, R 2: 60° 70°, J, VN, Ca, Pa, P, SR 3: 40°, J, N, Ca, Pa, P, R 4: 20°, J, VN, No, No, P, SR		[38]		
	102				2		2					
	103				3		3					
1768	103				3		4					
	104							TOTAL DEPTH = 103.5 FEET P-wave survey performed on 6/9/2016			1258	
1766	105											
	106											
1764	107											
	108											
1762	109											

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B4



Depth 0.0' to 17.0'



Depth 17.0' to 33.3'





Depth 33.3' to 48.3'



Depth 48.3' to 61.8'





Depth 61.8' to 76.3'



Depth 76.3' to 90.4'



Depth 90.4' to 103.5'

**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-B5**

Sheet 1 of 6

Date(s) Drilled	6/8/2016	Logged By	B. Kozlowicz	Checked By	D. Simpson
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond	Total Depth of Borehole	79.0 feet
Drilling Type	LF-70 Track-Mounted Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	1940-ft
Groundwater Level	58.0-ft 6/10/2016	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	90°
Borehole Completion	Neat cement grout to surface	Location	South borrow area	Coordinate Location	N 2146590.5 E 6839917.5

Elevation, feet	Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
1940	0		1		NA			CLAYEY GRAVEL with SAND (GC); stiff/medium dense; dry to moist; yellowish brown to red  RESIDUAL SOIL				
	1				NA	0						
1938	2	1		31	NA	0	NR	BASALT; greenish gray; slightly weathered; boulder				
	3				NA							
1936	4				NA			BASALT; red to reddish yellow and yellowish brown; completely weathered; extremely weak; clayey with rock fabric  BASALT SAPROLITE				
	5				NA							
1934	6	2		84	NA	0		BASALT; reddish yellow to yellowish brown; highly to completely weathered; very to extremely weak; abundant healed fractures with Fe and Mn staining, occasionally MW with Clay inf				
	7				NA							
1932	8				NA		NR	BASALT; reddish yellow to yellowish brown; highly to completely weathered; very to extremely weak; abundant healed fractures with Fe and Mn staining, occasionally MW with Clay inf				
	9				NA							
1930	10				NA			BASALT; reddish yellow to yellowish brown; highly to completely weathered; very to extremely weak; abundant healed fractures with Fe and Mn staining, occasionally MW with Clay inf				
	11	3		96	NA	0						
1928	12				NA			BASALT; reddish yellow to yellowish brown; highly to completely weathered; very to extremely weak; abundant healed fractures with Fe and Mn staining, occasionally MW with Clay inf				
	13				NA							

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B5



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-B5

Sheet 2 of 6

Elevat on, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seism c Velocity, ft/sec	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS	
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %						Fracture Drawing Number
13		3	1	96	NA	0	NR	BASALT; redd sh ye ow to ye ow sh brown; h gh y to comp ete y weathered; very to extreme y weak; oca y c ayey; abundant hea ed fractures w th Fe and Mn sta n ng, occas ona y MW w th C ay nf ; porphoryt c w th aphan t c groundmass  mv (continued)		0901 0918		
1926	14				NA							
	15				NA							
1924	16	4		94	NA	0				[64]		
	17				NA							
1922	18				NA		NR					
	19		2		NA			↓ Becomes occas ona y med um gray; s ght y to moderate y weathered; h gh y fractured w th Fe+Mn sta n ng		0923 0927		
1920	20				NA							
	21	5		95	NA	0				[60]		
	22				NA			} Gray; s ght y to moderate y weathered				
1918	23				NA		NR			0931 0935		
	24	6		85	NA	0		} Gray and brown; moderate y weathered		[39]		
1916	25				NA		NR			0937 1004		
	26	7		94	>6	0		} Gray; moderate y weathered		[43]		
	27				NA		NR					
1912	28	8		94	NA	0				1009 1013		
	29											

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B5

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B5

Sheet 3 of 6

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1910	29	8	2	94	NA	0		BASALT; reddish to dark yellowish brown; highly to moderately weathered; very weak to moderately strong; highly to intensely fractured; abundant healed fractures with Fe and Mn staining, occasionally with clay infill; porphyritic with aphanitic groundmass and calcite nodules		[51]	
	30				NA			mv (continued)		1017 1023	
1908	32	9		92	>6	0		Gray and brown; moderately weathered		[48]	
	33				NA					1026 1056	
1906	34	10	3	89	>6	0		Gray and brown; moderately weathered		[27]	
	35				NA			Mostly gray; moderately weathered; moderately strong; intensely fractured		1058 1103	
1904	36	11		100	>6	0				[36]	
	37				NA					1106 1112	
1902	38	12		86	>6	0				[44]	
	39				NA					1115 1142	Advance 5" HWT casing to 17'
1900	40	13		100	3	56		Medium gray; slightly weathered; strong		[36]	
	41				NA			Becomes reddish brown; highly weathered; very weak; occasionally clayey		1145	Advance 5" HWT casing to 22'
1898	42	14		92	NA	0					
	43				NA						
1896	44	15		66	NA	0				1212 1220	
	45										

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B5

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

# Log of Rock Core Boring CB-B5

Sheet 4 of 6

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1894	45		3		NA			BASALT; redd sh to dark ye ow sh brown; h gh y weathered; weak to very weak; ntense y fractured; oca y c ayey; porphoryt c w th aphan t c groundmass and Ca c te nodu es			
	46	15		66	NA	0		mv (continued)		[56]	
	47				NA						
1892	48				NA		NR				
	49		4		NA					1225	
1890	50	16		59	NA	0				[58]	
	51				NA		NR				
1888	52				NA			↓ Becomes ye ow sh brown; moderate y to h gh y weathered; weak			
	53	17		92	>6	0				[48]	
1886	54				NA		NR				
	55				NA						
1884	56	18		80	>6	0		↓ Becomes brown sh ye ow to ye ow sh red; moderate y weathered; moderate y strong; h gh y fractured		[53]	
	57				5						
1882	58				4						
	59	19		100	>6	14		↓ W de, vuggy Ca c te ve n w th C ay, d sturbed and broken		[56]	
	60				5						
1880	60				0	100		↓ Becomes med um gray; s ght y weathered; strong; w th Pyr te crysta s up to 0.1"			
	61	20		100	0	100					

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B5

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

### Log of Rock Core Boring CB-B5

Sheet 5 of 6

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
61		4		0			BASALT; medium gray; fresh; very strong; slightly to moderately fractured; aphanitic; with occasional calcite veins  mv (continued)				
1878	20		100	0	100					[59]	
63				1		1	1: 30°, J, VN, Ca, PA, P, R				
1876		5		0							
65				0			1: 10°, J, VN, Ca+Ch Sp, P, R 2: 90°, J/V, N, Ca, Pa, P, SR				
1874	21		100	0	100					[49]	
68				2		2	1: 10° 20°, J, VN, No, No, P, R				
1872				0							
70				1		1	1: 10° 20°, J, VN, No, No, P, R				
1870				0							
71				1		1	1: 10° 20°, J, VN, No, No, P, R				
1868	22		100	0	100					[42]	
72				0			1: 10° 20°, J, VN, No, No, P, R				
1866				2		1					
74				0			1: 10° 20°, J, VN, No, No, P, R				
1864	23		100	0	100					[50]	
75				0							
76				0							
77											

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B5



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B5

Sheet 6 of 6

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
77			5		0			BASALT; medium gray; fresh; very strong; slightly to moderately fractured; aphanitic; with occasional calcite veins mv (continued)			
1862	78	23		100	0	100					
	79							TOTAL DEPTH = 79.0 FEET Neat cement grout to surface 6/10/2016			
1860	80										
	81										
1858	82										
	83										
1856	84										
	85										
1854	86										
	87										
1852	88										
	89										
1850	90										
	91										
1848	92										
	93										

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B5



Depth 0.0' to 18.7'



Depth 18.7' to 33.4'





Depth 33.4' to 48.7'



Depth 48.7' to 64.2'



Depth 64.2' to 79.0'



**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-B6**

Sheet 1 of 4

Date(s) Drilled	6/23/2016	Logged By	K. Zeiger	Checked By	B. Kozlowski
Drilling Method	HQ-3 Wireline Core	Drill Bit Size/Type	3 7/8" HQ Diamond 8-9 Face-Discharge	Total Depth of Borehole	58.0 feet
Drill Rig Type	LF-70 Track-Mounted Rig	Drilling Contractor	Ruen Drilling	NAVD 88 Ground Surface Elevation	2016-ft
Groundwater Level	Not encountered before rotary wash	Sampling Methods	HQ-3 Wireline	Inclination from Horizontal/Bearing	90°
Borehole Completion	Neat cement grout to surface	Location	North borrow area, middle of road	Coordinate Location	N 2147953.1 E 6841283.3

Elevation, feet	Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	P wave Velocity, ft/sec	Drill Time, 24 hr Rate, ft/hr	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
2016	0		1		NA			SANDY CLAY (CL); medium stiff to very stiff; dry to moist; dark reddish brown; fine-grained SAND; medium plasticity FINES; with rootlets		0837		
	1				NA		NR	--RESIDUAL SOIL--				
2014	2	1		62	NA	0				[43]	pp=0.75 tsf	
	3				NA						pp=3.25 tsf	
2012	4				>10		1	BASALT; yellowish brown; moderately weathered; weak; intensely fractured to locally crushed; aphanitic				
	5						1			0844		
	6				4		1	1: 10°, J, N, Fe, Sp, Wa, SR 2: 75°, J, N, No, No, Pl, SR Becomes highly fractured		0853		
2010	7	2		100	4	10*	1			[36]	*Rock does not meet soundness criteria for RQD calculation	
	8				5		1					
2008	9				>10		1	Becomes highly to moderately weathered; weak to very weak; intensely fractured		0858		
	10						2	1: 20°, J, N, Cl, Sp, Wa, SR 2: 40°, J, N, Cl, Sp, Wa, SR		0909		
	11				>10		3	3: 30°-60°, J, T, No?, No?, Wa, SR 4: 70°, J, N, No, No, Pl, SR				
2006	12	3		80	>10	0	4	Becomes highly weathered; very weak		[43]		
	13				2							
2004	14				NA		NR					
	15											
	16											
	17											
	18											
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Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B6



Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Dr Time, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
13			1		>10		1	BASALT; yellowish brown; highly weathered; very weak; intensely fractured to locally crushed; aphanitic --mv-- (continued)		0923	95% Water Circulation Return (WCR)
2002	14				6		2 3 3	With Fe and Mn partially healed fractures 1: 10°-40°, J, T, Cl, Sp, Wa, SR 2: 50°, J, MW, Fe+Mn, Su, St, R 3: 55°, J/B?, N, Fe+Mn, Su, Pl, SR 4: 10°, J, VN, No, No, Pl, SR			
	15				8	0	2 3 3			[38]	
2000	16	4		100			2 3 4				
	17				>10		1 4	Completely weathered; extremely weak			
	18		2		2		4	Becomes moderately weathered; weak; highly fractured			
1998	19				3		1 1 2 3 3	1: 20°-30°, J, N, Fe+Mn, Su, Pl, SR 2: 30°, J, N, Cl+Sd, Pa, Wa, SR 3: 20°, J, N, Cl+Sd, Pa, Pl, SR? 4: 50°-60°, J, N, Fe+Mn, Su, Wa-Pl, SR Completely weathered; extremely weak		0931 0935	
	20				5	0	2 3 3			[27]	
1996	21	5		88			2 3 4	Completely weathered; extremely weak			
	22				NA		4 4 4				
1994	23				7		1 2 2 3 3	Becomes intensely fractured 1: 40°, J, N, Fe+Mn, Su, Pl, SR 2: 70°, J, N, Fe+Mn, Su, Pl, SR 3: 10°, J, N, Fe+Mn, Su, Wa, SR 4: 50°, J, N, Cl+Sd, Pa, St, R		0944 0958	
	24				NA		4			[17]	
1992	25				NA		2 2				
	26				NA		12	1: 15°, J, N, Fe+Mn, Su, Wa, SR 2: 55°, J, T, No, No, Wa, SR 3: 30°, J, N, Fe+Mn, Su, Pl, SR 4: 15°, J, MW, Sd, Pa, Wa, SR 5: 10°-50°, J, MW, Fe, Su, St, R		1007 1010	Advance 5" HWT casing to 4'
1990	27	7		75	>10	10*	1 3 3	Crushed		[30]	*Rock does not meet soundness criteria for RQD calculation
	28				>10		3 4 3	Becomes yellowish brown mottled with greenish gray; slightly to moderately weathered; weak to moderately strong		1462	
1988	29	8		100	90		5	Becomes slightly weathered; strong; highly fractured		3745 1018 1045	

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B6

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B6

Sheet 3 of 4

Elevation, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
1986	8	2	100	1	90	1	BASALT; greenish gray; slightly weathered with moderately weathered selvages; strong; highly fractured; aphanitic --mv-- (continued)	8080	[11]	Continued 95% WCR UC 11 484 psi
1986				3		2, 3	1: 40°, J, N, Fe+Mn, Su, Wa, SR 2: 40°, J, N, Fe+Mn, Su, Wa-Pl, SR 3: 60°, J, MW, Cl, Fi, Pl, ?	9163	1056 1102	
1984	9		100	4	59	1, 2, 11	1: 30°, J, N, Py, Sp, Wa, SR 2: 40°, J, T, Fe+Mn, Su, Pl, SR 3: 70°, J, T, Fe+Mn, Su, Pl, SR 4: 5°, J, N, No, No, Pl, S	10688	[15]	
1984		3		3		3, 4, M		14592	1109 1116	
1982				1		1	1: 5°, J, MW, No, No, Wa, SR Becomes very strong; highly to moderately fractured	16190		
1980	10		100	0	100	2, 3, 4	2: 5°, J, T, No, No, Wa, SR 3: 20°, J, N, Fe+Mn, Su, Pl, SR 4: 30°, V, N, Ca, Pa, Wa, SR	15853	[31]	
1980				3		3		15624		
1978				1		1		15469		
1978				0		M		16179	1126 1212	
1976				2		1	1: 20°, J, N, Fe+Mn, Su, Pl, SR 2: 30°, J, N, Fe+Mn, Su, Wa, SR 3: 25°, J, MW, No, No, Ir, R 4: 50°, J, MW, Sd, Pa, Pl, SR 5: 30°, J, N, No, No, Wa, SR	16465		
1976	11		100	0	96	2		16510		
1974				1		3		16850	[27]	
1974				1		4	Crushed	16960		
1974				1		5		16776		
1972				1		M		17176	1224 1229	PL 22948 psi
1972	12	4	100	0	100	1	1: 40°, J, N, No, No, St, R	17136		
1972				1		1				

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B6

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B6

Sheet 4 of 4

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number					
45	12	4	100	0	100		BASALT; greenish gray; slightly weathered; very strong; highly to moderately fractured --mv-- (continued)	16789	[28]	Continued 95% WCR	
1970				1		2	2: 15°, J, N, No, No, Wa-St, R	17137			
47				0		M		17243			
1968				1		1	1: 30°, V, T, Ca, Fi, Pl, SR Becomes phaneritic	16156	1240 1244	UC 13 745 psi	
49				1		2	2: 25°, J, N, No, No, Wa-St, R	15522			
1966				0	100		Becomes aphanitic	16799	[23]		
51				0				16375			
1964				2		2			1257 1259		
53				0		1	Becomes slightly fractured; with flow banding 1: 25°, J, N, No, No, Wa, SR 2: 20°, B				
1962				0		2					
55				0	100	2	Becomes phaneritic		[29]		
1960				0		2					
57				0							
1958									1310	6/24/2016 AM water level=12.5'	
59							TOTAL DEPTH = 58.0 FEET P-wave survey performed on 6/24/2016				
1956											
61											

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B6





Depth 0.0' to 17.1'



Depth 17.1' to 32.5'



Depth 32.2' to 44.0'



Depth 44.0' to 58.0.'

**Project: Proposed Water Storage Project**  
**Project Location: Nevada and Placer Counties, CA**  
**Project Number: 60393322/60503855**

**Log of Rock Core Boring CB-B7**

Sheet 1 of 4

Date(s) Dr ed	6/24/2016	Logged By	K. Zeiger	Checked By	B. Kozlowski
Dr ng Method	HQ-3 Wireline Core	Dr Bt S ze/Type	3 7/8" HQ Diamond	Tota Depth of Borehole	53.0 feet
Dr Rg Type	LF-70 Track-Mounted Rig	Dr ng Contractor	Ruen Drilling	NAVD 88 Ground Surface E evat on	2075-ft
Groundwater Leve	Not encountered before rotary wash	Samp ng Methods	HQ-3 Wireline	Inc nat on from Hor zonta/Bear ng	90°
Borehole Compet on	Neat cement grout to surface	Locat on	North borrow area	Coord nate Locat on	N 2148326.4 E 6841787.5

E evat on, feet	Depth, feet	ROCK CORE					L thology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Dr T me, 24 hr [Dr Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %					
0			1		NA			LEAN CLAY (CL); soft; dry; redd sh brown; w th abundant organ cs TOPSOIL	1354		98% Water Circulation Return (WCR)
-2074	1	1		70	NA	0			[26]		pp=<0 25 tsf
	2				>10			1: 10°, J, N, No, No, P, SR; 2: 10°, B BASALT; ye ow sh brown; comp ete y weathered; extreme y weak; w th root ets and roots. Becomes med um green; moderate y weathered; moderate y strong; phaner t c; w th fow band ng at 2.6'			pp=3 25 tsf
-2072	3							↓ Becomes bu sh grey; s ghtly weathered w th moderate y weathered fracture r nds; strong; h gh y to moderate y fractured; w th occas ona Ca c te ve ns	1401		PL 10676 psi
	4							↓ Becomes phaner t c	1406		
-2070	5							1: 40°, J, N, Fe+Mn+Ca, Su+Pa, P, SR 2: 10°, J, N, Fe+Mn+Ca, Su+Pa, P, SR 3: 5°, J, N, Fe+Mn, Su, Wa, SR 4: 5°, J, W, C, F, Wa, SR	3878		
	6	2		100	1	76		Moderate y weathered	[43]		
-2068	7				3				3837		
	8							↓ W thout fow band ng	5563		
-2066	9							1: 60°, J/V, N, Ca+Fe, Pa+Sp, P, SR 2: 40°, se vages 3: 10°, J, N, Fe+Ca, Su+Pa, Wa, SR 4: 10°, J, N, Fe, Su, Wa, SR 5: 70°, J, N, No, No, Wa, SR	8206	1413	UC 8
	10								1418		521 psi
-2064	11	3		100	2	94			12183		
	12								14212		
-2062	13							↓ Becomes s ghtly weathered; s ghtly fractured	14638		
									15550		
									1426		

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B7

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B7

Sheet 2 of 4

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave seismic velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
2062	13		1		0		M	BASALT; bushy gray; slightly weathered; strong; slightly fractured; aphanitic tophanitic mv (continued)	15648	1431	100% WCR
	14				0		M		15485		
2060	15				0	1	M		15874		
	16	4	2	100	0	100	M	1: 85°, J, T, H+Fe, F, Wa, P 2: 10°, J, N, No, No, St, R		[34]	
	17				0		M		15707		
2058	17				1		2	↓ Becomes highly to moderately fractured	15195		
	18				0		M	↓ With 2.5" moderately weathered rinds 1: 5° 10°, J, T, H+Fe, F, Wa, P? 2: 35°, J, N, Fe+Mn+Ca, Su+Pa, P, SR 3: 15°, J, N, No, No, Wa, SR	12622	1440 1444	
2056	19				1		1		11769		
	20				2		2		11960		UC 14 638 psi
	21	5		100	2	100	2-H		11960	[33]	
2054	21				0		1		12618		
	22				1		3	↓ Becomes slightly fractured	15393		
2052	23				0		M		15915	1453 1457	
	24				0		M		16225		
2050	25				0	96	M		15855	[38]	
	26	6		100	3		1	Moderately weathered 1: 10°, J, MW, Fe+Mn, Su, P, SR	14302		
2048	27				0		M		14789		
	28				1	94	M		15496	1505 1512	
2046	29	7		100	1	94	1	↓ Becomes moderately to highly fractured			

Report GEO CORE OAK C BMP P-WAVE NO PACK File N D AECOM ROCK CORE GPJ 1/16/2017 CB-B7



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B7

Sheet 3 of 4

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
2046	29		2		1			BASALT; buff gray; slightly weathered with moderate weathered fracture rinds; strong; moderately to highly fractured; phanitic mv (continued)	15634		100% WCR continued
	30		3						15724		
		7		100	1	94		1: 5° 10°, J, N, Fe+Mn, Su, P, SR 2: 15°, J, N, Ca, Sp, Wa, St, R (possibly mechanically due to shoe removal) 3: 70°, V, VN, H+Ca, F, Ir 4: 20°, J, N, No, No, Wa, SR (possibly mechanically due to shoe removal)		[38]	
2044	31				1				15402		
	32				3?				15473		
2042	33					23			15577	1520 1529	
	34				2			1: 20°, J, N, No, No, Wa, P, SR 2: 30°, V, T, Ca, Pa, P, SR 3: 40°, J, N, Fe+Mn, Su, P, SR 4: 30°, V, T, H+Ca, F, Wa	15691		
2040	35				2				15701		
	36	8		100	1	100				[38]	
	37				0				15432		
2038	38				0			Moderately weathered; 1.5" wide along 45° headed fracture with anastomosing calcite veins; without weathered fracture rinds	14650		
	39				0				9713	1537 1542	
2036	40				1			Becomes highly fractured 1: 25°, J, N, No, No, P, SR 2: 5°, J, N, Fe+Mn, Su, Wa, SR	6942		
	41	9		100	>6	64		Highly weathered; weak. Intensely fractured/crushed 40.4' - 41.6'	4691		[27]
2034	42				>6			3: 10° - 40°, J, N, Fe+Mn, Su, Wa, Ir, SR R	3499		
	43				0			4: 30°, J, N, Ca, So, Wa, R 5: 70°, V, MW?, H+Ca, F, Wa	5426		
2032	44				2			1: 30°, J, N, Ca, Sp, P, S 2: 70°, V, T, N, H+Ca, F, Wa, Ir 3: 30°, V, N, Ca, Sp, P, SR	8578	1553 1600	
	45	10	4	100	0	86			13330		

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B7

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B7

Sheet 4 of 4

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	P wave Seismic Velocity, ft/sec	Drill Time, 24 hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %					
2030	45	10	4	100	3	86	3	BASALT; bush gray; slightly weathered; strong; highly fractured; phanitic; with anastomosing calcite veins	15187	[30]	100% WCR continued
	46				3		4 5 6 22	4: 35°, J, N, Fe, Sp, P, SR 5: 60°, J, N, Fe+Ca, Sp+Pa, P, SR 6: 20°, J, N, Fe+Ca, Sp+Pa, P, R 7: 5°, J, VN, No, No, Wa, SR			
2028	47				3		2 17				
	48				2		M 1	← Becomes brecciated and reheated with calcite veins		1610 1616	
2026	49				2		1	1: 10° 20°, J, N, No, No, Wa, SR 2: 15° 30°, J, N, Fe+Mn, Pa, Wa P, SR 3: 90°, J, MW, Fe+Mn, Su+Pa, Wa, SR			
	50				4	70	2 2 2				
2024	51	11		100	4		3 2			[43]	
	52				0						
2022	53							<b>TOTAL DEPTH = 53.0 FEET</b> P-wave survey performed on 6/28/2016		1623	
	54										
2020	55										
	56										
2018	57										
	58										
2016	59										
	60										
2014	61										

Report GEO CORE OAK C BMP P-WAVE NO PACK File NDAECOM ROCK CORE GPJ 1/16/2017 CB-B7



Depth 0.0' to 15.3'



Depth 15.3' to 29.7'



Depth 29.7' to 43.7'



Depth 43.7' to 53.0.'



**Project:** Proposed Water Storage Project  
**Project Location:** Nevada and Placer Counties, CA  
**Project Number:** 60393322/60503855

**Log of Rock Core Boring CB-B8**

Sheet 1 of 5

Date(s) Dr ed	6/29/2016	Logged By	B. Kozlowski	Checked By	S. Janowski
Dr ng Method	HQ-3 Wireline Core	Dr B t S ze/Type	3 7/8" HQ Diamond	Tota Depth of Boreho e	68.1 feet
Dr R g Type	LF-70 Track-Mounted Rig	Dr ng Contractor	Ruen Drilling	NAVD 88 Ground Surface E evat on	2092-ft
Groundwater Leve	26.1-ft 1.5 hours after completion of drilling	Samp ng Methods	HQ-3 Wireline	Inc nat on from Hor zonta /Bear ng	90°
Boreho e Complet on	Neat cement grout to surface	Locat on	North borrow area	Coord nate Locat on	N 2147861.3 E 6841905.8

E evat on, feet	Depth, feet	ROCK CORE						L th ogy	MATERIAL DESCRIPTION	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number				
2092	0							SANDY LEAN CLAY w th GRAVEL (CL); med um st ff; dry to mo st; dark red COLLUVIUM/RESIDUAL SOIL		Run 1 not retained	
	1	1		17	NA	0	NR		[90]		
2090	2				NA						
	3		1		NA						
2088	4				NA						
	5	2		100	NA	0		LEAN CLAY w th SAND (CL); st ff; mo st; red to strong brown w th green sh gray mott ng RESIDUAL SOIL (Basa t der ved)	[75]		
2086	6				NA						
	7				NA						
2084	8				NA					0824	
	9				NA						
2082	10	3		100	NA	0		BASALT/SAPROLITE; strong brown; comp ete y weathered; extreme y weak; w th occas ona h gh y weathered angu ar corestones w th Mn and Fe sta ng; and res dua rock fabr c mv	[75]		
	11				NA						
2080	12				NA						
	13							Shoe damaged on remova		0828	

Report: GEO\_CORE\_OAK\_C\_BMP\_NO\_PACK; File: NID\_AECOM\_ROCK\_CORE.GPJ; 1/16/2017 CB-B8

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B8

Sheet 2 of 5

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %				
2078	13	1		NA				BASALT/SAPROLITE; strong brown; highly to completely weathered; very to extremely weak; with highly weathered angular corestones with Mn and Fe staining mv (continued)	0834	
2076	14			NA						
	15			NA						
2074	16	4	90	NA	0				[60]	
	17			NA						
	18			NA		NR				
2072	18		2	NA					0839 0844	
	19			NA						
	20	5	92	>6	0			Becomes highly to locally completely weathered; very weak; highly to intensely fractured with Fe and Mn staining on fractures	[50]	
	21			4						
2070	22			NA		NR				
	23			NA				Completely weathered; extremely weak	0850 0857	
2068	24			NA						
	25			NA				Completely weathered; extremely weak; disturbed; possible no recovery zone		
2066	25	6	66	>6	0			BASALT; bluish to greenish gray and yellowish brown; moderately to locally highly weathered; weak to moderately strong; intensely fractured mv	[50]	
	26			NA						
	27			NA		NR				
2064	28			NA					0903 0911	Brief Water Circulation Return (WCR) loss
	28	7	47	NA	13	NR				50% WCR
	29									

Report: GEO\_CORE\_OAK\_C\_BMP\_NO\_PACK; File: NID\_AECOM\_ROCK\_CORE.GPJ; 1/16/2017 CB-B8

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B8

Sheet 3 of 5

Elevation, feet	Depth, feet	ROCK CORE					Lithology	MATERIAL DESCRIPTION	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
		Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %				
29										
	29	7	2	47	NA	13		BASALT; bushy to medium gray; slightly to oolitic gray to moderately weathered; strong to oolitic very weak; highly to intensely fractured; aphanitic tophanitic	[36]	50% WCR continued
2062	30				>6	1		mv (continued)		
	31				5	1		1: 45° 55°, J, ?, Mn+Fe+C, Su+Sp, P, SR	0916 0948	0% WCR (dry to bit)
2060	32	8		70	NA	0		Fractures partially clay filled; with Fe and Mn staining	[17]	
	33								0955 0958	
	34	9		100	>6	0			[12]	
2058	35				>6				1003 1014	Pump paper into hole to improve WCR
	36	10	3	60	NA	9			[34]	Soft drilling
2054	37				NA					
	38				NA				1022 1027	
2052	39				NA			Highly to completely weathered; very to extremely weak on 35°, J/Sh, MW, C, F		
	40				NA					
	41	11		47	NA	20			[34]	
2050	42				NA			Moderately weathered; moderately strong. Becomes bushy gray; slightly to oolitic moderately weathered; strong; highly fractured; aphanitic tophanitic with occasional calcite veins		
	43				3	1		1: 30°, J/Sh, W, Mn+Fe+Sd+C+CR, Su+F, P, SR	1035 1045	30% WCR
2048	44	12		87	NA	9		Moderately weathered; moderately strong; intensely fractured and broken; with numerous J, MW, W, C, F		
	45				>6					

Report: GEO\_CORE\_OAK\_C\_BMP\_NO\_PACK; File: NID\_AECOM\_ROCK\_CORE.GPJ; 1/16/2017 CB-B8

Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

Log of Rock Core Boring CB-B8

Sheet 4 of 5

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %				
45	12	3	87	5	9	12	BASALT; medium to bush gray; slightly weathered; strong; highly fractured; aphanitic to phanitic; with occasional calcite veins mv (continued)	[34]	30% WCR continued	
2046	46			4		12		1: 60° 65°, J, N, Mn+Fe, Su, P, SR 2: 30° 40°, J, N, Mn+Fe, Su, P, SR 3: 80° 90°, J, VN, Mn+Fe+Ca, Su+Pa, P, Ir, SR 4: 50°, J, N, Mn+Fe, Su, P, SR	1053 1058	
2044	48			6		13	1: 40°, J, N, Mn+Fe, Su, P, SR 2: 80° 90°, J, N, Mn+Fe+Ca, Su+Sp, P, SR 3: 50° 60°, J, N, Mn+Fe, Su, P, SR 4: 5°, J, N, Mn+Fe, Su, P, SR	[21]		
2042	50			3		3	1: 65°, J, N, Mn+Fe, Su, P, SR 2: 80°, J, N, Mn+Fe, Su, P, SR 3: 20° 30°, J, N, Mn+Fe, Su, P, SR	1105 1109		
2040	52	14	100	2	77	3	↓ Becomes very strong	[27]	PL 26584 psi	
2038	54			1		3	↓ Becomes moderately fractured	1116 1151		
2036	56	15	100	2	88	1		[33]		
2034	58			0		1		1200 1203		
2032	60			1		1	↓ Becomes highly fractured 1: 25°, J, MW, Mn+Fe+C, Su+Pa, P, SR 2: 0° 10°, J, VN, Mn+Fe, Su, P, SR		UC 54 054 psi	
61	61	16	100	1	69	2		[37]		

Report: GEO\_CORE\_OAK\_C\_BMP\_NO\_PACK; File: NID\_AECOM\_ROCK\_CORE.GPJ; 1/16/2017 CB-B8



Project: Proposed Water Storage Project  
 Project Location: Nevada and Placer Counties, CA  
 Project Number: 60393322/60503855

## Log of Rock Core Boring CB-B8

Sheet 5 of 5

Elevation, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES AND OTHER TESTS
	Run No.	Box No.	Recovery, %	Fractures per Foot	RQD, %	Fracture Drawing Number				
61		4		5	69	34	BASALT; medium to bush gray; slightly weathered; strongly fractured; aphanitic to phanitic; with occasional calcite veins <i>mv (continued)</i>  3: 50° J, N, Mn+Fe, Su, P, SR 4: 30° J, N, Mn+Fe+C, Su+Pa, P, SR 5: 70° J, N, Mn+Fe, Su, P, SR 6: 30° J, N, Mn+Fe+Ca, Su+Pa, P, SR  1: 10° 15° J, N, Mn+Fe, Su, P, SR 2: 55° 65° J, N, Mn+Fe, Su, P, SR 3: 30° 40° J, N, Mn+Fe, Su, P, SR 4: 30° J/V, MW, Ca+Ch, F+Su, P, SR (partly dissolved)		30% WCR continued	
2030 62	16		100			15				
63				4		11				
63						6				
63						6				
63						12				
2028 64				4		33		1211		
65				1		3		1222		
65	17		100	2	69	1				
2026 66				2		2		[28]		
67				2		1			UC 18	
67						2			444 psi	
67				3		4				
67						3				
2024 68						3		1233		
<b>TOTAL DEPTH = 68.1 FEET</b> <b>Hole left open for P-wave survey, but collapsed to 31' below ground.</b> <b>Survey not completed. Neat cement grout to surface 7/21/2016</b>									13.48 water level=26.1'	
69										
2022 70										
71										
2020 72										
73										
2018 74										
75										
2016 76										
77										

Report: GEO\_CORE\_OAK\_C\_BMP\_NO\_PACK; File: NID\_AECOM\_ROCK\_CORE.GPJ; 1/16/2017 CB-B8



Depth 3.0' to 18.0'



Depth 18.0' to 36.2'



Depth 36.2' to 54.2'



Depth 54.2' to 68.1'

