# Well Construction Log

ARCADIS Design & Consultancy for natural and built assets



**Well ID: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 1–3 | | | NR | | (0.0 - 30.0') 10" SHUR-GRIP SDR17 PVC Casing | | |
| 1–3 | | | NR | | (0.0 - 4.0') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand | (0.0 - 4.0') 9.8 bags | (0.0 - 4.0') 10 bags (102%) Note: Temporary backfill sand to fill annular space prior to vault installation. |
| 4–7 | | Topock - Fill | SP | | | | |
| 8–11 | | Topock - Fill | SP | | (4.0 - 17.1') Portland Cement 3% Bentonite Type I, II and V and Hydrogel | (4.0 - 17.1') 119.7 gallons | (4.0 - 17.1') 105 gallons (88%) Note: Grout seal |
| 10–18 | | | | | (0.0 - 19.7') 18.0" Borehole | | |
| 12–16 | | Topock - Fill | SP | | (15.5 - 16.5') Centralizer | | |
| 17–20 | | Topock - Alluvium Deposits | SM | | (17.1 - 22.0') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand | (17.1 - 22.0') 12 bags | (17.1 - 22.0') 12 bags (100%) Note: Transition sand between filter pack and grout seal. |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured pre-specific capacity for the shallow and deep screens respectively

# Well Construction Log



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| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15** | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 21 | | Topock - Alluvium Deposits | SM | | (17.1 - 22.0') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand | (17.1 - 22.0') 12 bags | (17.1 - 22.0') 12 bags (100%) Note: Transition sand between filter pack and grout seal. |
| 22 | | | | | (0.0 - 30.0') 10" SHUR-GRIP SDR17 PVC Casing | | |
| 23 | | Topock - Alluvium Deposits | GW-GM | | | | |
| 24 | | | | | | | |
| 25 | | | NR | | | | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | Topock - Alluvium Deposits | ML | | | | |
| 29 | | | | | | | |
| 30 | | | | | (30.0 - 55.3') 10" 25-Slot 316L SS Wire Wrap Screen | | |
| 31 | | | | | (22.0 - 58.6') Cemex #2/16 Mesh (16x30) Lapis Lustre Sand | (22.0 - 58.6') 89.4 bags | (22.0 - 58.6') 122 bags (136%) Note: Filter pack. Used >20% of the calculated volume due to potential voids forming during drilling. Swabbed for approximately 60 minutes prior to adding additional well materials. |
| 32 | | | | | (19.7 - 40.5') 18.0" Borehole | | |
| 33 | | | | | | | |
| 34 | IRZ-15-VAS-32-37 (13 ppb) 11/1/2018 13:00 | Topock - Alluvium Deposits | GM | | | | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | | | | | | | |
| 39 | | | | | | | |
| 40 | | | | | | | |



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# Well Construction Log

ARCADIS Design & Consultancy for natural and built assets

Sheet: 3 of 12

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15** | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 41 | | Topock - Alluvium Deposits | GM | | (30.0 - 55.3') 10" 25-Slot 316L SS Wire Wrap Screen; (19.7 - 40.5') 18.0" Borehole | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | Topock - Alluvium Deposits | GM | | (22.0 - 58.6') Cemex #2/16 Mesh (16x30) Lapis Lustre Sand; (40.5 - 59.7') 18.0" Borehole | (22.0 - 58.6') 89.4 bags | (22.0 - 58.6') 122 bags (136%) Note: Filter pack. Used >20% of the calculated volume due to potential voids forming during drilling. Swabbed for approximately 60 minutes prior to adding additional well materials. |
| 49 | | | | | | | |
| 50 | | | | | | | |
| 51 | | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | | | | | | | |
| 56 | | | | | (55.3 - 150.3') 10" SHUR-GRIP SDR17 PVC Casing | | |
| 57 | | | | | | | |
| 58 | | Topock - Alluvium Deposits | GM | | | | |
| 59 | | | | | | (58.6 - 59.8') 2.9 bags | (58.6 - 59.8') 4 bags (138%) Note: Transition sand between filter pack and intermediate seal. Used >20% of the calculated volume due to potential voids |
| 60 | | | | | (58.6 - 59.8') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand | | |



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# Well Construction Log



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|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15** | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 61 | | | | | (55.3 - 150.3') 10" SHUR-GRIP SDR17 PVC Casing | | forming during drilling. |
| 62 | | | | | | | |
| 63 | | | | | | | |
| 64 | IRZ-15-VAS-62-67 (0.459 J ppb) 11/2/2018 12:30 | Topock - Alluvium Deposits | GM | | | | |
| 65 | | | | | | | |
| 66 | | | | | | | |
| 67 | | | | | | | |
| 68 | | | | | | | |
| 69 | | | | | | | |
| 70 | | | | | (59.8 - 140.9') Bentonite seal pellets Pel-Plug (TR30) 3/8" | (59.8 - 140.9') 133.2 buckets | (59.8 - 140.9') 184 buckets (138%) Note: Intermediate seal. Used >20% of the calculated volume due to potential voids forming during drilling. |
| 71 | | | | | | | |
| 72 | | Topock - Alluvium Deposits | GW-GM | | | | |
| 73 | | | | | | | |
| 74 | | | | | | | |
| 75 | | | | | (74.5 - 75.5') Centralizer | | |
| 76 | | | | | | | |
| 77 | | Topock - Alluvium Deposits | SW-SM | | | | |
| 78 | | | | | | | |
| 79 | | | | | | | |
| 80 | | | | | | | |

(59.7 - 78.8') 18.0" Borehole

(78.8 - 98.4') 18.0" Borehole



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|---|---|---|---|---|---|
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| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 81–100 | | Topock - Alluvium Deposits | SW-SM | | (55.3 - 150.3') 10" SHUR-GRIP SDR17 PVC Casing | | |
| 87–97 | | Topock - Alluvium Deposits | GM | | (59.8 - 140.9') Bentonite seal pellets Pel-Plug (TR30) 3/8"; (78.8 - 98.4') 18.0" Borehole | (59.8 - 140.9') 133.2 buckets | (59.8 - 140.9') 184 buckets (138%) Note: Intermediate seal. Used >20% of the calculated volume due to potential voids forming during drilling. |
| 97–100 | | Topock - Alluvium Deposits | SM | | (98.4 - 116.7') 16.0" Borehole | | |



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|---|---|---|---|---|---|
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| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 101 | | | | | (55.3 - 150.3') 10" SHUR-GRIP SDR17 PVC Casing | | |
| 102 | | Topock - Alluvium Deposits | SM | | | | |
| 103 | | | | | | | |
| 104 | IRZ-15-VAS-102-107 (< 0.17 U ppb) 11/3/2018 16:15 | | | | | | |
| 105 | | Topock - Alluvium Deposits | SM | | | | |
| 106 | | | | | | | |
| 107 | | | | | | | |
| 108 | | | | | (98.4 - 116.7') 16.0" Borehole | | |
| 109 | | | | | | | |
| 110 | | | | | (59.8 - 140.9') Bentonite seal pellets Pel-Plug (TR30) 3/8" | (59.8 - 140.9') 133.2 buckets | (59.8 - 140.9') 184 buckets (138%) Note: Intermediate seal. Used >20% of the calculated volume due to potential voids forming during drilling. |
| 111 | | Topock - Alluvium Deposits | ML | | | | |
| 112 | | | | | | | |
| 113 | | | | | | | |
| 114 | | | | | | | |
| 115 | | | | | | | |
| 116 | | Topock - Alluvium Deposits | GM | | | | |
| 117 | | | | | | | |
| 118 | | Topock - Alluvium Deposits | ML | | (116.7 - 137.3') 16.0" Borehole | | |
| 119 | | | | | | | |
| 120 | | | | | | | |



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|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15** | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 121 | | Topock - Alluvium Deposits | GM | | (55.3 - 150.3') 10" SHUR-GRIP SDR17 PVC Casing | | |
| 122 | | | | | | | |
| 123 | | | | | | | |
| 124 | | Topock - Alluvium Deposits | ML | | | | |
| 125 | | | | | | | |
| 126 | | | | | | | |
| 127 | | | | | | | |
| 128 | | | | | | | |
| 129 | | | | | (116.7 - 137.3') 16.0" Borehole | | |
| 130 | | | | | (59.8 - 140.9') Bentonite seal pellets Pel-Plug (TR30) 3/8" | (59.8 - 140.9') 133.2 buckets | (59.8 - 140.9') 184 buckets (138%) Note: Intermediate seal. Used >20% of the calculated volume due to potential voids forming during drilling. |
| 131 | | | | | | | |
| 132 | | Topock - Alluvium Deposits | GM | | | | |
| 133 | | | | | | | |
| 134 | IRZ-15-VAS-132-137 (< 0.17 U ppb) 11/4/2018 12:40 | | | | | | |
| 135 | | | | | (134.5 - 135.5') Centralizer | | |
| 136 | | | | | | | |
| 137 | | | | | | | |
| 138 | | Topock - Alluvium Deposits | ML | | | | |
| 139 | | | | | (137.3 - 158.1') 16.0" Borehole | | |
| 140 | | | SM | | | | |



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|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15** | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
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| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 141 | | Topock - Alluvium Deposits | SM | | (55.3 - 150.3') 10" SHUR-GRIP SDR17 PVC Casing<br>(140.9 - 142.1') Cemex #0/30 Mesh (30x50) Lapis Lustre Sand | (59.8 - 140.9') 133.2 buckets<br>(140.9 - 142.1') 2.1 bags | (140.9 - 142.1') 3 bags (143%) Note: Transition sand between filter pack and intermediate seal. Used >20% of the calculated volume due to potential voids forming during drilling. |
| 142 | | | | | | | |
| 143 | | | | | | | |
| 144 | | | | | | | |
| 145 | | Topock - Alluvium Deposits | SM | | | | |
| 146 | | | | | | | |
| 147 | | | | | | | |
| 148 | | | | | | | |
| 149 | | | | | (137.3 - 158.1') 16.0" Borehole | | |
| 150 | | | | | (150.3 - 200.2') 10" 30-Slot 316L SS Wire Wrap Screen | | (142.1 - 207.5') 153 bags (136%) Note: Filter pack. Used >20% of the calculated volume due to potential voids forming during drilling. Swabbed for approximately 105 minutes prior to adding additional well materials, during swabbing well casing dropped approximately 0.5 ft. bgs. |
| 151 | | | | | (142.1 - 207.5') Cemex #2/12 Mesh (12x20) Lapis Lustre Sand | (142.1 - 207.5') 112.8 bags | |
| 152 | | Topock - Alluvium Deposits | SM | | | | |
| 153 | | | | | | | |
| 154 | | | | | | | |
| 155 | | | | | | | |
| 156 | | | | | | | |
| 157 | | | | | | | |
| 158 | | | | | | | |
| 159 | | | | | (158.1 - 177.8') 16.0" Borehole | | |
| 160 | | | | | | | |



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|---|---|---|---|---|---|
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| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 161 | | Topock - Alluvium Deposits | SM | | (150.3 - 200.2') 10" 30-Slot 316L SS Wire Wrap Screen | | |
| 162 | | Topock - Alluvium Deposits | ML | | | | |
| 163 | | | | | | | |
| 164 | IRZ-15-VAS-162-167 (3200 ppb) 11/5/2018 13:00 | | | | | | |
| 165 | | Topock - Alluvium Deposits | SM | | | | |
| 166 | | | | | | | |
| 167 | | | | | | | |
| 168 | | Topock - Alluvium Deposits | SM | | (158.1 - 177.8') 16.0" Borehole | (142.1 - 207.5') 112.8 bags | (142.1 - 207.5') 153 bags (136%) Note: Filter pack. Used >20% of the calculated volume due to potential voids forming during drilling. Swabbed for approximately 105 minutes prior to adding additional well materials, during swabbing well casing dropped approximately 0.5 ft. bgs. |
| 169 | | | | | | | |
| 170 | | | | | (142.1 - 207.5') Cemex #2/12 Mesh (12x20) Lapis Lustre Sand | | |
| 171 | | | | | | | |
| 172 | | Topock - Alluvium Deposits | GM | | | | |
| 173 | | | | | | | |
| 174 | | | | | | | |
| 175 | | Topock - Alluvium Deposits | GM | | | | |
| 176 | | | | | | | |
| 177 | | | | | | | |
| 178 | | | | | | | |
| 179 | | | | | (177.8 - 197.3') 16.0" Borehole | | |
| 180 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured pre-specific capacity for the shallow and deep screens respectively

# Well Construction Log

ARCADIS Design & Consultancy for natural and built assets



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15** | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 181 | | | | | (150.3 - 200.2') 10" 30-Slot 316L SS Wire Wrap Screen | | |
| 182 | | | | | | | |
| 183 | | Topock - Alluvium Deposits | GM | | | | |
| 184 | IRZ-15-VAS-182-187 (140 ppb) 11/6/2018 11:10 | | | | | | |
| 185 | | | | | | | |
| 186 | | | | | | | |
| 187 | | | | | | | |
| 188 | | Topock - Alluvium Deposits | ML | | (177.8 - 197.3') 16.0" Borehole | | |
| 189 | | | | | | | |
| 190 | | Topock - Alluvium Deposits | ML | | (142.1 - 207.5') Cemex #2/12 Mesh (12x20) Lapis Lustre Sand | (142.1 - 207.5') 112.8 bags | (142.1 - 207.5') 153 bags (136%) Note: Filter pack. Used >20% of the calculated volume due to potential voids forming during drilling. Swabbed for approximately 105 minutes prior to adding additional well materials, during swabbing well casing dropped approximately 0.5 ft. bgs. |
| 191 | | | | | | | |
| 192 | | Topock - Alluvium Deposits | ML | | | | |
| 193 | | | | | | | |
| 194 | | | | | | | |
| 195 | | | | | | | |
| 196 | | | | | | | |
| 197 | | | | | | | |
| 198 | | Topock - Alluvium Deposits | SM | | (197.3 - 218.0') 16.0" Borehole | | |
| 199 | | | | | | | |
| 200 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured pre-specific capacity for the shallow and deep screens respectively

# Well Construction Log



ARCADIS Design & Consultancy for natural and built assets

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15** | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 201 | | | | | | | |
| 202 | | | | | (202.0 - 203.0') Centralizer | | |
| 203 | | Topock - Alluvium Deposits | SM | | (142.1 - 207.5') Cemex #2/12 Mesh (12x20) Lapis Lustre Sand | (142.1 - 207.5') 112.8 bags | (142.1 - 207.5') 153 bags (136%) Note: Filter pack. Used >20% of the calculated volume due to potential voids forming during drilling. Swabbed for approximately 105 minutes prior to adding additional well materials, during swabbing well casing dropped approximately 0.5 ft. bgs. |
| 204 | | | | | | | |
| 205 | | | | | | | |
| 206 | | | | | (200.2 - 205.9') Sump and PVC End Cap | | |
| 207 | | | | | | | |
| 208 | | | | | | | |
| 209 | | Topock - Alluvium Deposits | ML | | (197.3 - 218.0') 16.0" Borehole | | |
| 210 | | | | | | | |
| 211 | | | | | | | |
| 212 | | | | | | | |
| 213 | | | | | | | |
| 214 | | | | | (207.5 - 232.6') Bentonite seal pellets Pel-Plug (TR30) 3/8" | (207.5 - 232.6') 56.2 buckets | (207.5 - 232.6') 66 buckets (117%) Note: Decommissioned rathole |
| 215 | | | | | | | |
| 216 | | Topock - Weathered Bedrock - conglomerate | ML | | | | |
| 217 | | | | | | | |
| 218 | | | | | | | |
| 219 | | | | | (218.0 - 232.6') 16.0" Borehole | | |
| 220 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured pre-specific capacity for the shallow and deep screens respectively

# Well Construction Log

ARCADIS Design & Consultancy for natural and built assets



**Well ID: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 01/11/2020 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 01/16/2020 | Shallow Well Elevation: | N/A | | |
| Drilling Co.: | Cascade | Deep Well Elevation: | N/A | Client: | PG&E |
| Drilling Method: | Dual Rotary | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Jon Martinez | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | A. & H. Amezguita | Borehole Diameter: | 15.5-18 inches | | |
| Logger: | Ellen Redner | Static Water Level: | See Log for Depths | Project Number: | RC000753.0051 |
| Editor: | Sean McGrane | Development End Date: | 6/29/2020 | | |
| Total Depth: | 232.6 ft bgs | Well Completion: | ☐ Flush ☐ Stick-up ☒ To Be Completed in Well Vault | | |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 221 | | | | | | | |
| 222 | | | | | | | |
| 223 | | | | | | | |
| 224 | IRZ-15-VAS-222-227 (< 0.17 U ppb) 11/7/2018 14:00 | Topock - Weathered Bedrock - conglomerate | ML | | (207.5 - 232.6') Bentonite seal pellets Pel-Plug (TR30) 3/8"<br>(218.0 - 232.6') 16.0" Borehole | (207.5 - 232.6') 56.2 buckets | (207.5 - 232.6') 66 buckets (117%) Note: Decommissioned rathole |
| 225 | | | | | | | |
| 226 | | | | | | | |
| 227 | | | | | | | |
| 228 | | | | | | | |
| 229 | | | | | | | |
| 230 | | | | | | | |
| 231 | | | | | | | |
| 232 | | | | | | | |
| 233 | | | | | End of Boring at 232.6 ft bgs. | | |
| 234 | | | | | | | |
| 235 | | | | | | | |
| 236 | | | | | | | |
| 237 | | | | | | | |
| 238 | | | | | | | |
| 239 | | | | | | | |
| 240 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: solid blue and hollow blue water table marks represent depth to water (ft. bgs.) measured pre-specific capacity for the shallow and deep screens respectively

# Drilling Log

ARCADIS Design & Consultancy for natural and built assets



**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Topock, California |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | | |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | | |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 1 | | NR | | | (0.0 - 2.0') (NR) | (0.0') Confirmed drill casing was centered on the pilot borehole prior to drilling. | (0.0 - 59.7') 1079 gallons of water used; 1000 gallons of water recovered; 79 gallons of water lost |
| 2 | | | | | | (0.5 - 25.0') Soft drilling | |
| 3 | | SP | | | (2.0 - 7.0') Topock - Fill; Poorly graded sand (SP); yellowish brown / moderate yellowish brown (10YR 5/4) | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | (7.0 - 17.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3) | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | (0.0 - 19.7) 1.65 mins/ft | | | (0.0 - 19.7') 18.0" Steel Casing | | (10.0') Observed trace amounts of Cemex #60 and Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 11 | | | | | | | |
| 12 | | SP | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | (17.0 - 22.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4) | | |
| 18 | | SM | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

ARCADIS Design & Consultancy for natural and built assets

# Drilling Log



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15** |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 21 | | SM | | | | (20.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 22 | | | | | | | |
| 23 | | GW-GM | | | (22.5 - 23.5') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); (10Y 3/2) | | |
| 24 | | NR | | | (23.5 - 27.0') (NR) | | |
| 25 | | | | | | | |
| 26 | | | | | | | |
| 27 | | ML | | | (27.0 - 29.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (10YR 4/3) | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | (19.7 - 40.5) 2.69 mins/ft | GM | | (19.7 - 40.5') 18.0" Steel Casing | (29.5 - 47.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3) | (30.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | | | | | | | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | | | | | | | |
| 39 | | | | | | | |
| 40 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Drilling Log

Sheet: 3 of 12

ARCADIS Design & Consultancy for natural and built assets

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15** |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 41 | (19.7 - 40.5) 2.69 mins/ft | GM | | (19.7 - 40.5') 18.0" Steel Casing | | (40.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 42 | | | | | | | |
| 43 | | | | | | (42.0 - 55.0') Soft drilling | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | | | | | (47.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2) | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | (40.5 - 59.7) 2.63 mins/ft | | | (40.5 - 59.7') 18.0" Steel Casing | | (50.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 51 | | | | | | | |
| 52 | | GM | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | | | | | | | |
| 56 | | | | | | | |
| 57 | | | | | (57.0 - 69.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/3) and reddish brown (5YR 5/3) | | |
| 58 | | | | | | | |
| 59 | | GM | | | | | |
| 60 | | | | | | | (59.7 - 79.8') 1683 |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Drilling Log

ARCADIS Design & Consultancy for natural and built assets



**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Topock, California |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | | |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | | |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 61 | | GM | | (59.7 - 78.8') 18.0" Steel Casing | | (60.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | gallons of water used; 1920 gallons of water recovered; 237 gallons of water gained |
| 62 | | | | | | | |
| 63 | | | | | | | |
| 64 | | | | | | | |
| 65 | | | | | | | |
| 66 | | | | | | | |
| 67 | | | | | | | |
| 68 | | | | | | | |
| 69 | (59.7 - 78.8) 3.03 mins/ft | | | | (69.5 - 74.5') Topock - Alluvium Deposits: Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3) | | |
| 70 | | GW-GM | | | | (70.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 71 | | | | | | | |
| 72 | | | | | | | |
| 73 | | | | | | | |
| 74 | | | | | | | |
| 75 | | | | | (74.5 - 87.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3) | | |
| 76 | | | | | | | |
| 77 | | SW-SM | | | | | |
| 78 | | | | | | | |
| 79 | (78.8 - 98.4) 3.98 mins/ft | | | (78.8 - 98.4') 18.0" Steel Casing | | (79.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 80 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Drilling Log

ARCADIS Design & Consultancy for natural and built assets



**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Topock, California |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | | |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | | |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 81–100 | (78.8 - 98.4) 3.98 mins/ft | SW-SM | | (78.8 - 98.4') 18.0" Steel Casing | (87.0 - 97.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3) | (80.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | (79.8 - 98.4') 534 gallons of water used; 5000 gallons of water recovered; 4466 gallons of water gained |
| | | GM | | | | (90.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| | | | | | | (91.0 - 95.0') Smooth drilling | |
| | (98.4 - 116.7) 2.82 mins/ft | SM | | (98.4 - 116.7') 16.0" Steel Casing | (97.0 - 104.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) | (98.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | (98.4 - 177.8') 9300 gallons of water used; 9000 gallons of water recovered; 300 gallons of water lost |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

ARCADIS Design & Consultancy for natural and built assets

# Drilling Log



**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 101 | | | | | | (100.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 102 | | SM | | | | (101.0 - 108.0') Rough drilling | |
| 103 | | | | | | | |
| 104 | | | | | | | |
| 105 | | SM | | | (104.5 - 106.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4) | | |
| 106 | | | | | | | |
| 107 | | | | | (106.5 - 116.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4) | | |
| 108 | (98.4 - 116.7) 2.82 mins/ft | | | (98.4 - 116.7') 16.0" Steel Casing | | | |
| 109 | | | | | | | |
| 110 | | | | | | (110.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 111 | | ML | | | | (111.0 - 113.0') Rough drilling | |
| 112 | | | | | | | |
| 113 | | | | | | | |
| 114 | | | | | | | |
| 115 | | | | | | (115.0 - 116.0') Rough drilling | |
| 116 | | | | | | | |
| 117 | | GM | | | (116.0 - 117.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4) | | |
| 118 | (116.7 - 137.3) 2.18 mins/ft | ML | | (116.7 - 137.3') 16.0" Steel Casing | (117.0 - 120.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4) | | |
| 119 | | | | | | | |
| 120 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

ARCADIS Design & Consultancy for natural and built assets

# Drilling Log

Sheet: 7 of 12

**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 121 | | GM | | | (120.0 - 121.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4) | (120.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 122 | | | | | (121.0 - 127.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown / moderate brown (5YR 4/4) | | |
| 123 | | | | | | | |
| 124 | | ML | | | | | |
| 125 | | | | | | | |
| 126 | | | | | | | |
| 127 | | | | | | | |
| 128 | | | | | (127.0 - 137.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4) | | |
| 129 | (116.7 - 137.3) 2.18 mins/ft | | | (116.7 - 137.3') 16.0" Steel Casing | | | |
| 130 | | | | | | (130.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 131 | | | | | | | |
| 132 | | GM | | | | | |
| 133 | | | | | | | |
| 134 | | | | | | | |
| 135 | | | | | | | |
| 136 | | | | | | | |
| 137 | | | | | | | |
| 138 | | ML | | | (137.0 - 139.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown / moderate brown (5YR 4/4) | | |
| 139 | (137.3 - 158.1) 1.63 mins/ft | | | (137.3 - 158.1') 16.0" Steel Casing | | | |
| 140 | | SM | | | (139.5 - 144.5') Topock - | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Drilling Log

Sheet: 8 of 12

**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 141 | | | | | Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) | (140.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 142 | | SM | | | | | |
| 143 | | | | | | | |
| 144 | | | | | | | |
| 145 | | | | | (144.5 - 161.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) | | |
| 146 | | | | | | | |
| 147 | | | | | | (147.0 - 151.0') Rough drilling | |
| 148 | | | | | | | |
| 149 | (137.3 - 158.1) 1.63 mins/ft | | | (137.3 - 158.1') 16.0" Steel Casing | | | |
| 150 | | | | | | (150.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 151 | | | | | | | |
| 152 | | SM | | | | | |
| 153 | | | | | | | |
| 154 | | | | | | | |
| 155 | | | | | | | |
| 156 | | | | | | | |
| 157 | | | | | | | |
| 158 | | | | | | | |
| 159 | (158.1 - 177.8) 1.29 mins/ft | | | (158.1 - 177.8') 16.0" Steel Casing | | | |
| 160 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Drilling Log

Sheet: 9 of 12

**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 161 | (158.1 - 177.8) 1.29 mins/ft | SM | | (158.1 - 177.8') 16.0" Steel Casing | | (160.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 162 | | ML | | | (161.0 - 164.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); dark reddish brown (2.5YR 3/3) | | |
| 163 | | | | | | | |
| 164 | | | | | | | |
| 165 | | SM | | | (164.5 - 167.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) | (165.0 - 172.0') Drill rods chattering | |
| 166 | | | | | | | |
| 167 | | | | | | | |
| 168 | | SM | | | (167.0 - 172.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) | | |
| 169 | | | | | | | |
| 170 | | | | | | (170.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 171 | | | | | | | |
| 172 | | GM | | | (172.0 - 174.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4) | | |
| 173 | | | | | | | |
| 174 | | | | | | | |
| 175 | | GM | | | (174.5 - 187.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4) | | |
| 176 | | | | | | | |
| 177 | | | | | | (177.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 178 | (177.8 - 197.3) 1.53 mins/ft | | | (177.8 - 197.3') 16.0" Steel Casing | | | (177.8 - 232.6') 4900 gallons of water used; 8674 gallons of water recovered; 3774 gallons of water gained |
| 179 | | | | | | | |
| 180 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Drilling Log

Sheet: 10 of 12

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15** |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | [X] Yes [ ] No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 181 | | GM | | | | (180.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 182 | | | | | | | |
| 183 | | | | | | | |
| 184 | | | | | | | |
| 185 | | | | | | | |
| 186 | | | | | | | |
| 187 | | | | | | | |
| 188 | (177.8 - 197.3) 1.53 mins/ft | ML | | (177.8 - 197.3') 16.0" Steel Casing | (187.0 - 189.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4) | | |
| 189 | | | | | | | |
| 190 | | ML | | | (189.5 - 192.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4) | (190.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 191 | | | | | | | |
| 192 | | ML | | | (192.0 - 197.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4) | | |
| 193 | | | | | | | |
| 194 | | | | | | | |
| 195 | | | | | | | |
| 196 | | | | | | | |
| 197 | | | | | | | |
| 198 | (197.3 - 218.0) 1.28 mins/ft | SM | | (197.3 - 218.0') 16.0" Steel Casing | (197.0 - 200.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown (2.5YR 3/4) | | |
| 199 | | | | | | | |
| 200 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Drilling Log

Sheet: 11 of 12

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15** |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 201 | | | | | (200.0 - 206.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4) | (200.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 202 | | | | | | | |
| 203 | | SM | | | | | |
| 204 | | | | | | | |
| 205 | | | | | | | |
| 206 | | | | | | | |
| 207 | | | | | (206.5 - 212.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4) | | |
| 208 | | | | | | | |
| 209 | (197.3 - 218.0) 1.28 mins/ft | ML | | (197.3 - 218.0') 16.0" Steel Casing | | | |
| 210 | | | | | | (210.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 211 | | | | | | | |
| 212 | | | | | (212.0 - 232.6') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 4/6) | | |
| 213 | | | | | | | |
| 214 | | | | | | | |
| 215 | | | | | | | |
| 216 | | ML | | | | | |
| 217 | | | | | | | |
| 218 | | | | | | | |
| 219 | (218.0 - 232.6) 1.09 mins/ft | | | (218.0 - 232.6') 16.0" Steel Casing | | | |
| 220 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

ARCADIS Design & Consultancy for natural and built assets

# Drilling Log



**Boring No.: IRZ-15**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 12/19/2019 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 01/16/2020 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Dual Rotary | Total Depth: | 232.6 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Foremost DR-24HD | Conductor Casing Diameter: | 18 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Jon Martinez | Drill Casing Diameter: | 16 inches | | |
| Drilling Asst: | A. & H. Amezguita | Drill Bit: | 15 5/8" & 17 5/8" Tricone | Project Number: | RC000753.0051 |
| Tool-Pusher: | Arnold Lamon | Depth to First Water: | 26.0 ft bgs | | |
| Rig Geologist: | Ellen Redner | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Drilling Run (ft) and Average Penetration Rate | USCS Code | USCS Class | Casing Diameter | Description (See Pilot boring log for full geologic descriptions) | Drilling notes and observations confirming presence of temporary backfill material in drill cuttings | Drilling Fluid |
|---|---|---|---|---|---|---|---|
| 221 | | | | | | (220.0') Observed trace amounts of Cemex #3 MESH (8x10) Lapis Luster Sand in drill cuttings. | |
| 222 | | | | | | | |
| 223 | | | | | | | |
| 224 | | | | | | | |
| 225 | | | | | | | |
| 226 | (218.0 - 232.6) 1.09 mins/ft | ML | | (218.0 - 232.6') 16.0" Steel Casing | | | |
| 227 | | | | | | | |
| 228 | | | | | | | |
| 229 | | | | | | | |
| 230 | | | | | | | |
| 231 | | | | | | (230.0') Observed trace amounts of Plastering Sand in drill cuttings. | |
| 232 | | | | | | | |
| 233 | | | | | End of Boring at 232.6 ft bgs. | | |
| 234 | | | | | | | |
| 235 | | | | | | | |
| 236 | | | | | | | |
| 237 | | | | | | | |
| 238 | | | | | | | |
| 239 | | | | | | | |
| 240 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval

# Boring Log

ARCADIS Design & Consultancy for natural and built assets



**Boring No.: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Topock, California |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | | |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | | |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 1–2 | 0 | | | | NR | | (0.0 - 2.0') No recovery (NR); not logged during hand clearing | (0.0 - 5.0') Attempted to hand clear for utility clearance. | (0.0 - 257.0') No water used |
| 3–7 | 60 | | | Topock - Fill | SP | | (2.0 - 7.0') Topock - Fill; Poorly graded sand (SP); yellowish brown / moderate yellowish brown (10YR 5/4); very fine grained to medium grained, angular to round; little coarse to very coarse grained sand, angular to round; trace granule to small pebbles, subround; trace silt; trace clay; dry | | |
| 8–17 | 120 | | | Topock - Fill | SP | | (7.0 - 17.0') Topock - Fill; Poorly graded sand (SP); brown (10YR 4/3); very fine grained to medium grained, angular to round; little coarse to very coarse grained sand, angular to round; trace granule to small pebbles, subround; trace silt; trace clay; dry | | |
| 18–20 | 78 | | | Topock - Alluvium Deposits | SM | | (17.0 - 22.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark yellowish brown (10YR 4/4); very fine grained to very coarse grained, angular to subangular; some granule to large pebble, angular to subangular; some very fine to very coarse grained sand, angular to subround; some silt; trace clay; dry | (17.0 - 27.0') Core barrel and sediments were hot | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

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# Boring Log



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | Topock - Alluvium Deposits | SM | | | | |
| 22 | | | | | | | | | |
| 23 | | | | Topock - Alluvium Deposits | GW-GM | | (22.5 - 23.5') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); very dark grayish brown (10YR 3/2); granules to large pebbles, angular to subangular; little very fine to very coarse grained sand, angular; little silt; trace granule to small pebbles, subangular; moist | | |
| 24 | 78 | | | | NR | | (23.5 - 27.0') (NR); No recovery core barrel was hot and melted the sample bag part of the core fell through the rig deck into the hopper. | | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 27 | | IRZ-15-SS-25-30 11/14/2018 11:55 | | Topock - Alluvium Deposits | ML | | (27.0 - 29.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); brown (10YR 4/3); medium plasticity; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subangular; trace clay; wet | (27.0') Approximate depth of water table | |
| 28 | | | | | | | | | |
| 29 | | | | | | | | | |
| 30 | | | | Topock - Alluvium Deposits | GM | | (29.5 - 47.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (10YR 5/3); granules to medium pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, subangular to round; trace large pebbles, angular to subangular; wet | | |
| 31 | | | | | | | | | |
| 32 | 120 | IRZ-15-SS-30-35 11/14/2018 12:03 | IRZ-15-VAS-32-37 (13 ppb) 11/1/2018 13:00 | | | | | | |
| 33 | | | | | | | | | |
| 34 | | | | | | | | | |
| 35 | | | | | | | | | |
| 36 | | | | | | | | | |
| 37 | | IRZ-15-SS-35-40 11/14/2018 12:15 | | | | | | | |
| 38 | | | | | | | | | |
| 39 | 300 | | | | | | | | |
| 40 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

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# Boring Log



**Boring No.: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Topock, California |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | | |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | | |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 41 | | | | | | | | | |
| 42 | | IRZ-15-SS-40-45 11/14/2018 12:24 | | Topock - Alluvium Deposits | GM | | | | |
| 43 | | | | | | | | | |
| 44 | | | | | | | | | |
| 45 | | | | | | | | | |
| 46 | | IRZ-15-SS-45-50 11/14/2018 12:43 | | | | | | | |
| 47 | | | | | | | | | |
| 48 | | | | | | | (47.0 - 57.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); grayish brown (10YR 5/2); granules to medium pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to rounded; little large to very large pebbles, angular to subangular; little silt; trace subangular; wet | | |
| 49 | | | | | | | | | |
| 50 | 300 | | | | | | | | |
| 51 | | IRZ-15-SS-50-55 11/14/2018 13:23 | | Topock - Alluvium Deposits | GM | | | | |
| 52 | | | | | | | | | |
| 53 | | | | | | | | | |
| 54 | | | | | | | | | |
| 55 | | | | | | | | | |
| 56 | | | | | | | | | |
| 57 | | IRZ-15-SS-55-60 11/14/2018 13:32 | | | | | | | |
| 58 | | | | | | | (57.0 - 69.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 5/3) and reddish brown (5YR 5/3); granules to medium pebbles, angular to subangular; some very fine to very coarse grained sand, subangular to round; little large to very large pebbles, angular to subangular; little silt; trace subangular; wet | | |
| 59 | | | | Topock - Alluvium Deposits | GM | | | | |
| 60 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 61 | | | | | | | | | |
| 62 | | IRZ-15-SS-60-65 11/14/2018 15:58 | | | | | | | |
| 63 | | | | | | | | | |
| 64 | 300 | | IRZ-15-VAS-62-67 (0.459 J ppb) 11/2/2018 12:30 | Topock - Alluvium Deposits | GM | | | | |
| 65 | | | | | | | | | |
| 66 | | | | | | | | | |
| 67 | | IRZ-15-SS-65-70 11/15/2018 09:30 | | | | | | | |
| 68 | | | | | | | | | |
| 69 | | | | | | | | | |
| 70 | | | | | | | (69.5 - 74.5') Topock - Alluvium Deposits; Well graded gravel with silt and sand (GW-GM); brown (7.5YR 4/3); granules to large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; little silt; trace very large pebbles, angular; trace subangular; wet | | |
| 71 | | | | | | | | | |
| 72 | 96 | IRZ-15-SS-70-75 11/15/2018 09:40 | | Topock - Alluvium Deposits | GW-GM | | | | |
| 73 | | | | | | | | | |
| 74 | | | | | | | | | |
| 75 | | | | | | | (74.5 - 87.0') Topock - Alluvium Deposits; Well graded sand with silt and gravel (SW-SM); brown (7.5YR 4/3); very fine grained to very coarse grained, angular to subround; and granules to very large pebbles, angular to subangular; little silt; wet | | |
| 76 | | | | | | | | | |
| 77 | | IRZ-15-SS-75-80 11/15/2018 09:45 | | Topock - Alluvium Deposits | SW-SM | | | | |
| 78 | | | | | | | | | |
| 79 | 108 | | | | | | | | |
| 80 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

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# Boring Log



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 81 | | | | | | | | | |
| 82 | | IRZ-15-SS-80-85 11/15/2018 09:50 | | Topock - Alluvium Deposits | SW-SM | | | | |
| 83 | | | | | | | | | |
| 84 | 108 | | | | | | | | |
| 85 | | | | | | | | | |
| 86 | | | | | | | | | |
| 87 | | IRZ-15-SS-85-90 11/15/2018 09:58 | | | | | (87.0 - 97.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); brown (7.5YR 4/3); granules to large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subround; trace very large pebbles, angular; trace clay; wet | | |
| 88 | | | | | | | | | |
| 89 | | | | | | | | | |
| 90 | | | | | | | | | |
| 91 | | | | | | | | | |
| 92 | 96 | IRZ-15-SS-90-95 11/15/2018 10:05 | | Topock - Alluvium Deposits | GM | | | | |
| 93 | | | | | | | | | |
| 94 | | | | | | | | | |
| 95 | | | | | | | | | |
| 96 | | | | | | | | | |
| 97 | | IRZ-15-SS-95-100 11/15/2018 10:15 | | | | | (97.0 - 104.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; and granules to very large pebbles, angular; little silt; trace angular; wet | | |
| 98 | | | | | | | | | |
| 99 | 96 | | | Topock - Alluvium Deposits | SM | | | | |
| 100 | | | | | | | | | |



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# Boring Log



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 101 | | | | | | | | | |
| 102 | | IRZ-15-SS-100-105 12/6/2018 10:25 | | Topock - Alluvium Deposits | SM | | | | |
| 103 | | | | | | | | | |
| 104 | 96 | | IRZ-15-VAS-102-107 (< 0.17 U ppb) 11/3/2018 16:15 | | | | | | |
| 105 | | | | Topock - Alluvium Deposits | SM | | (104.5 - 106.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown / moderate brown (5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebble, angular; some silt; trace angular; wet | | |
| 106 | | IRZ-15-SS-105-110 11/15/2018 11:00 | | | | | | | |
| 107 | | | | | | | (106.5 - 116.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; some granules to very large pebble, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation | | |
| 108 | | | | | | | | | |
| 109 | | | | | | | | | |
| 110 | | | | | | | | | |
| 111 | | | | Topock - Alluvium Deposits | ML | | | | |
| 112 | | IRZ-15-SS-110-115 11/15/2018 11:20 | | | | | | | |
| 113 | | | | | | | | | |
| 114 | 300 | | | | | | | | |
| 115 | | | | | | | | | |
| 116 | | | | Topock - Alluvium Deposits | GM | | (116.0 - 117.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4); granules to very large pebbles, angular to subangular; and silt; little very fine to very coarse grained sand, angular to subangular; wet; weak cementation | | |
| 117 | | | | | | | | | |
| 118 | | | | Topock - Alluvium Deposits | ML | | (117.0 - 120.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation | | |
| 119 | | | | | | | | | |
| 120 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

# Boring Log

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| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 121 | | | | Topock - Alluvium Deposits | GM | | (120.0 - 121.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4); granules to very large pebbles, angular to subangular; some silt; little very fine to very coarse grained sand, angular to subangular; wet | | |
| 122 | | | | Topock - Alluvium Deposits | ML | | (121.0 - 127.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown / moderate brown (5YR 4/4); medium plasticity; some granules to very large pebble, angular to subangular; little very fine to very coarse grained sand, angular to subangular; wet; weak cementation | | |
| 123 | | | | | | | | | |
| 124 | | | | | | | | | |
| 125 | | | | | | | | | |
| 126 | | | | | | | | | |
| 127 | | | | | | | | | |
| 128 | 300 | | | Topock - Alluvium Deposits | GM | | (127.0 - 137.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation; pebbles composed of metadiorite | | |
| 129 | | | | | | | | | |
| 130 | | | | | | | | | |
| 131 | | | | | | | | | |
| 132 | | | | | | | | | |
| 133 | | | | | | | | | |
| 134 | | | IRZ-15-VAS-132-137 (< 0.17 U ppb) 11/4/2018 12:40 | | | | | | |
| 135 | | | | | | | | | |
| 136 | | | | | | | | | |
| 137 | | | | | | | | | |
| 138 | 96 | | | Topock - Alluvium Deposits | ML | | (137.0 - 139.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown / moderate brown (5YR 4/4); low plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; wet; weak cementation | | |
| 139 | | | | | | | | | |
| 140 | | | | | SM | | (139.5 - 144.5') Topock - Alluvium Deposits; Silty sand with gravel | | |



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# Boring Log

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| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 141 | | | | | | | (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; little silt; trace angular; wet | | |
| 142 | | IRZ-15-SS-140-145 11/15/2018 11:25 | | Topock - Alluvium Deposits | SM | | | | |
| 143 | 96 | | | | | | | | |
| 144 | | | | | | | | | |
| 145 | | | | | | | (144.5 - 161.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace angular; wet | | |
| 146 | | | | | | | | | |
| 147 | | IRZ-15-SS-145-150 11/15/2018 11:30 | | | | | (147'); increase in granules and very large pebbles, decrease in silt | | |
| 148 | | | | | | | | | |
| 149 | | | | | | | | | |
| 150 | | | | | | | | | |
| 151 | | | | | | | | | |
| 152 | 96 | IRZ-15-SS-150-150 11/15/2018 12:40 | | Topock - Alluvium Deposits | SM | | | | |
| 153 | | | | | | | | | |
| 154 | | | | | | | | | |
| 155 | | | | | | | (154.5'); decrease in silt, trace clay | | |
| 156 | | | | | | | | | |
| 157 | | IRZ-15-SS-155-160 11/15/2018 12:45 | | | | | | | |
| 158 | | | | | | | | | |
| 159 | 96 | | | | | | | | |
| 160 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

# Boring Log

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 161 | | | | Topock - Alluvium Deposits | SM | | | | |
| 162 | | IRZ-15-SS-160-165 11/15/2018 12:50 | | Topock - Alluvium Deposits | ML | | (161.0 - 164.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); dark reddish brown (2.5YR 3/3); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation | | |
| 163 | 96 | | IRZ-15-VAS-162-167 (3200 ppb) 11/5/2018 13:00 | | | | | | |
| 164 | | | | | | | | | |
| 165 | | | | Topock - Alluvium Deposits | SM | | (164.5 - 167.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace angular; wet | | |
| 166 | | IRZ-15-SS-165-170 11/15/2018 13:05 | | | | | | | |
| 167 | | | | | | | | | |
| 168 | | | | Topock - Alluvium Deposits | SM | | (167.0 - 172.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace angular; trace clay; wet | | |
| 169 | | | | | | | | | |
| 170 | | | | | | | | | |
| 171 | | | | | | | | | |
| 172 | 114 | IRZ-15-SS-170-175 11/15/2018 13:15 | | Topock - Alluvium Deposits | GM | | (172.0 - 174.5') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation | | |
| 173 | | | | | | | | | |
| 174 | | | | | | | | | |
| 175 | | | | Topock - Alluvium Deposits | GM | | (174.5 - 187.0') Topock - Alluvium Deposits; Silty gravel with sand (GM); reddish brown / moderate brown (5YR 4/4); granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subangular; some silt; wet; weak cementation | | |
| 176 | | | | | | | | | |
| 177 | | | | | | | | | |
| 178 | 108 | | | | | | | | |
| 179 | | | | | | | | | |
| 180 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

ARCADIS Design & Consultancy for natural and built assets

# Boring Log



**Boring No.: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Topock, California |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | | |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | | |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 181 | | | | | | | | | |
| 182 | | IRZ-15-SS-180-185 11/15/2018 13:27 | | | | | | | |
| 183 | 108 | | | Topock - Alluvium Deposits | GM | | | | |
| 184 | | | IRZ-15-VAS-182-187 (140 ppb) 11/6/2018 11:10 | | | | | | |
| 185 | | | | | | | | | |
| 186 | | | | | | | | | |
| 187 | | IRZ-15-SS-185-190 11/15/2018 13:25 | | | | | | | |
| 188 | | | | Topock - Alluvium Deposits | ML | | (187.0 - 189.5') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation | | |
| 189 | | | | | | | | | |
| 190 | | | | Topock - Alluvium Deposits | ML | | (189.5 - 192.0') Topock - Alluvium Deposits; Gravelly silt with sand (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation | | |
| 191 | | | | | | | | | |
| 192 | 108 | IRZ-15-SS-190-195 11/15/2018 13:30 | | | | | | | |
| 193 | | | | Topock - Alluvium Deposits | ML | | (192.0 - 197.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); no plasticity; some granules to very large pebbles, angular to subangular; some very fine to very coarse grained sand, angular to subround; wet; weak cementation | | |
| 194 | | | | | | | | | |
| 195 | | | | | | | | | |
| 196 | | | | | | | | | |
| 197 | | IRZ-15-SS-195-200 11/15/2018 13:35 | | | | | | | |
| 198 | 108 | | | Topock - Alluvium Deposits | SM | | (197.0 - 200.0') Topock - Alluvium Deposits; Silty sand with gravel (SM); dark reddish brown (2.5YR 3/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebbles, angular; some silt; trace angular; trace clay; wet | (197.0 - 202.0') Interval is coarse grained and very saturated | |
| 199 | | | | | | | | | |
| 200 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

# Boring Log

ARCADIS Design & Consultancy for natural and built assets



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | **Boring No.:** | **IRZ-15 Pilot** |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Topock, California |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 201 | | | | | | | (200.0 - 206.5') Topock - Alluvium Deposits; Silty sand with gravel (SM); reddish brown (2.5YR 4/4); very fine grained to very coarse grained, angular to subangular; some granules to very large pebble, angular; some silt; trace angular; trace clay; wet | | |
| 202 | | IRZ-15-SS-200-205 11/15/2018 13:45 | | | | | | | |
| 203 | 108 | | | Topock - Alluvium Deposits | SM | | | | |
| 204 | | | | | | | | | |
| 205 | | | | | | | | | |
| 206 | | | | | | | | | |
| 207 | | | | | | | (206.5 - 212.0') Topock - Alluvium Deposits; Sandy silt with gravel (ML); reddish brown (2.5YR 4/4); low plasticity; some very fine to very coarse grained sand, angular to subround; little granules to very large pebbles, angular to subangular; trace clay; wet; weak cementation | | |
| 208 | | IRZ-15-SS-205-210 11/15/2018 13:50 | | | | | | | |
| 209 | | | | Topock - Alluvium Deposits | ML | | | | |
| 210 | | | | | | | | | |
| 211 | | | | | | | | | |
| 212 | 108 | | | | | | (212.0 - 232.0') Topock - Weathered Bedrock - conglomerate; Sandy silt with gravel (ML); red (2.5YR 4/6); medium plasticity; little granules to very large pebbles, angular to subangular; little very fine to very coarse grained sand, angular to subround; trace clay; wet; weak cementation | | |
| 213 | | IRZ-15-SS-210-215 11/15/2018 14:00 | | | | | | | |
| 214 | | | | | | | | | |
| 215 | | | | | | | | | |
| 216 | | | | Topock - Weathered Bedrock - conglomerate | ML | | | | |
| 217 | | | | | | | | | |
| 218 | | IRZ-15-SS-215-220 11/15/2018 14:05 | | | | | | | |
| 219 | 96 | | | | | | | | |
| 220 | | | | | | | | | |



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# Boring Log



**Boring No.: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Project: | Final GW Remedy Phase 1 |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Location: | PG&E Topock, Topock, California |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | | |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 221 | | | | | | | | | |
| 222 | | | | | | | | | |
| 223 | | | | | | | | | |
| 224 | 96 | | IRZ-15-VAS-222-227 (< 0.17 U ppb) 11/7/2018 14:00 | Topock - Weathered Bedrock - conglomerate | ML | | | | |
| 225 | | | | | | | | | |
| 226 | | | | | | | | | |
| 227 | | | | | | | | | |
| 228 | | | | | | | (227.0 - 232.0'); some very fine to very coarse grained sand, angular to subround; little clay; wet; decrease in silt | | |
| 229 | | | | | | | | | |
| 230 | 60 | | | | | | | | |
| 231 | | | | | | | | | |
| 232 | | | | | | | | | |
| 233 | | | | | | | (232.0 - 237.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; some silt; trace angular; trace clay; moist | | |
| 234 | | IRZ-15-SS-232-237 11/15/2018 13:37 | | Topock - Weathered Bedrock - conglomerate | SM | | | | |
| 235 | 60 | | | | | | | | |
| 236 | | | | | | | | | |
| 237 | | | | | | | | | |
| 238 | | | | | | | (237.0 - 247.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to very coarse grained, angular to subround; some granules to very large pebbles, angular; some silt; trace angular; trace clay; moist | | |
| 239 | 108 | | | Topock - Weathered Bedrock - conglomerate | SM | | | | |
| 240 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

# Boring Log

ARCADIS Design & Consultancy for natural and built assets



**Boring No.: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 10/31/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/13/2018 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Topock, California |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | | |
| Drill Rig Type: | Boart Longyear Track | Borehole Diameter: | 6-12 inches | | |
| Driller Name: | Nick Petrone | Depth to First Water: | 26.0 ft bgs | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Sampling Method: | 4 inch x 10 ft Core Barrel | Project Number: | RC000753.0051 |
| Logger: | A. Garcia / C.Mills | Sampling Interval: | Continuous | | |
| Editor: | Sean McGrane | Converted to Well: | ☒ Yes ☐ No | | |

| Depth (ft) | Recovery (in) | Sieve Sample ID | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Soil Description | Drilling Notes | Drilling Fluid |
|---|---|---|---|---|---|---|---|---|---|
| 241 | | | | | | | | | |
| 242 | | | | | | | | | |
| 243 | | | | | | | | | |
| 244 | 108 | | | Topock - Weathered Bedrock - conglomerate | SM | | | | |
| 245 | | | | | | | | | |
| 246 | | | | | | | | | |
| 247 | | | | | | | | | |
| 248 | | | | | | | (247.0 - 255.0') Topock - Weathered Bedrock - conglomerate; Silty sand with gravel (SM); red (2.5YR 4/6); very fine grained to medium grained, angular to subround; some granules to very large pebbles, angular; some silt; trace coarse to very coarse grained sand, subangular to round; trace clay; moist | | |
| 249 | | | | | | | | | |
| 250 | | | | | | | | | |
| 251 | | | | Topock - Weathered Bedrock - conglomerate | SM | | | | |
| 252 | 108 | | | | | | | | |
| 253 | | | | | | | | | |
| 254 | | | | | | | | | |
| 255 | | | | | | | | | |
| 256 | | | | Topock - Competent Bedrock - conglomerate | | | (255.0 - 257.0') Topock - Competent Bedrock - conglomerate; red (2.5YR 4/6); friable | | |
| 257 | | | | | | | | | |
| | | | | | | | End of Boring at 257.0 ft bgs. | | |
| 258 | | | | | | | | | |
| 259 | | | | | | | | | |
| 260 | | | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion; U = not detected above the laboratory reporting limit, J - estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the collection of samples from the temporary well; apparent partial recoveries can be the result of potential compaction of sediments in the core bag

# Temporary Backfill Log

ARCADIS Design & Consultancy for natural and built assets

Sheet: 1 of 13

**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | Project: | Final GW Remedy Phase 1 |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Location: | PG&E Topock, Needles, California |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | | |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 0 | | | | | (0.0 - 0.5') Steel Plate | | Note: Steel plate BMPs in place |
| 1 | | | NR | | | | |
| 2 | | | | | (0.5 - 4.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (0.5 - 4.0') 6.3 bags | (0.5 - 4.0') 4 bags (63%) Note: Surface seal sand. Used <20% of the calculated volume due to loose dredge sands collapsing during removal of 12 inch conductor casing. |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | Topock - Fill | SP | | (0.0 - 9.0') 12" Borehole | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | Topock - Fill | SP | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | (9.0 - 257.0') 6" Borehole | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | Topock - Alluvium Deposits | SM | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

# Temporary Backfill Log

ARCADIS Design & Consultancy for natural and built assets



**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Project: | Final GW Remedy Phase 1 |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Location: | PG&E Topock, Needles, California |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 21 | | Topock - Alluvium Deposits | SM | | | | |
| 22 | | | | | | | |
| 23 | | Topock - Alluvium Deposits | GW-GM | | | | |
| 24 | | | | | | | |
| 25 | | | NR | | | | |
| 26 | | | | | | | |
| 27 | | Topock - Alluvium Deposits | ML | | | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | IRZ-15-VAS-32-37 (13 ppb) 11/1/2018 13:00 | Topock - Alluvium Deposits | GM | | | | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | | | | | | | |
| 39 | | | | | | | |
| 40 | | | | | (9.0 - 257.0') 6" Borehole | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

ARCADIS Design & Consultancy for natural and built assets

# Temporary Backfill Log



**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Project: | Final GW Remedy Phase 1 |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Location: | PG&E Topock, Needles, California |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | | Topock - Alluvium Deposits | GM | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis; (9.0 - 257.0') 6" Borehole | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 51 | | | | | | | |
| 52 | | Topock - Alluvium Deposits | GM | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | | | | | | | |
| 56 | | | | | | | |
| 57 | | | | | | | |
| 58 | | Topock - Alluvium Deposits | GM | | | | |
| 59 | | | | | | | |
| 60 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

ARCADIS Design & Consultancy for natural and built assets

# Temporary Backfill Log



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15 Pilot** | |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 61 | | | | | | | |
| 62 | | | | | | | |
| 63 | | | | | | | |
| 64 | IRZ-15-VAS-62-67 (0.459 J ppb) 11/2/2018 12:30 | Topock - Alluvium Deposits | GM | | | | |
| 65 | | | | | | | |
| 66 | | | | | | | |
| 67 | | | | | | | |
| 68 | | | | | | | |
| 69 | | | | | | | |
| 70 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 71 | | | | | | | |
| 72 | | Topock - Alluvium Deposits | GW-GM | | | | |
| 73 | | | | | | | |
| 74 | | | | | | | |
| 75 | | | | | | | |
| 76 | | | | | | | |
| 77 | | Topock - Alluvium Deposits | SW-SM | | | | |
| 78 | | | | | | | |
| 79 | | | | | | | |
| 80 | | | | | | | |

(9.0 - 257.0') 6" Borehole



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

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# Temporary Backfill Log



**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Project: | Final GW Remedy Phase 1 |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Location: | PG&E Topock, Needles, California |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 81 | | | | | | | |
| 82 | | | | | | | |
| 83 | | Topock - Alluvium Deposits | SW-SM | | | | |
| 84 | | | | | | | |
| 85 | | | | | | | |
| 86 | | | | | | | |
| 87 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 88 | | | | | | | |
| 89 | | | | | | | |
| 90 | | | | | (9.0 - 257.0') 6" Borehole | | |
| 91 | | | | | | | |
| 92 | | Topock - Alluvium Deposits | GM | | | | |
| 93 | | | | | | | |
| 94 | | | | | | | |
| 95 | | | | | | | |
| 96 | | | | | | | |
| 97 | | | | | | | |
| 98 | | Topock - Alluvium Deposits | SM | | | | |
| 99 | | | | | | | |
| 100 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

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# Temporary Backfill Log



**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 101 | | | | | | | |
| 102 | | Topock - Alluvium Deposits | SM | | | | |
| 103 | | | | | | | |
| 104 | IRZ-15-VAS-102-107 (< 0.17 U ppb) 11/3/2018 16:15 | | | | | | |
| 105 | | Topock - Alluvium Deposits | SM | | | | |
| 106 | | | | | | | |
| 107 | | | | | | | |
| 108 | | | | | | | |
| 109 | | | | | | | |
| 110 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 111 | | Topock - Alluvium Deposits | ML | | | | |
| 112 | | | | | | | |
| 113 | | | | | | | |
| 114 | | | | | | | |
| 115 | | | | | | | |
| 116 | | Topock - Alluvium Deposits | GM | | | | |
| 117 | | | | | | | |
| 118 | | Topock - Alluvium Deposits | ML | | | | |
| 119 | | | | | | | |
| 120 | | | | | | | |

(9.0 - 257.0') 6" Borehole



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

# Temporary Backfill Log

Sheet: 7 of 13

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15 Pilot** | |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 121 | | Topock - Alluvium Deposits | GM | | | | |
| 122 | | | | | | | |
| 123 | | | | | | | |
| 124 | | Topock - Alluvium Deposits | ML | | | | |
| 125 | | | | | | | |
| 126 | | | | | | | |
| 127 | | | | | | | |
| 128 | | | | | | | |
| 129 | | | | | | | |
| 130 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 131 | | | | | | | |
| 132 | | Topock - Alluvium Deposits | GM | | | | |
| 133 | | | | | | | |
| 134 | IRZ-15-VAS-132-137 (< 0.17 U ppb) 11/4/2018 12:40 | | | | | | |
| 135 | | | | | | | |
| 136 | | | | | | | |
| 137 | | | | | | | |
| 138 | | Topock - Alluvium Deposits | ML | | | | |
| 139 | | | | | | | |
| 140 | | | SM | | | | |

(9.0 - 257.0') 6" Borehole



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

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# Temporary Backfill Log



**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 141 | | | | | | | |
| 142 | | Topock - Alluvium Deposits | SM | | | | |
| 143 | | | | | | | |
| 144 | | | | | | | |
| 145 | | | | | | | |
| 146 | | | | | | | |
| 147 | | | | | | | |
| 148 | | | | | | | |
| 149 | | | | | | | |
| 150 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis; (9.0 - 257.0') 6" Borehole | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 151 | | | | | | | |
| 152 | | Topock - Alluvium Deposits | SM | | | | |
| 153 | | | | | | | |
| 154 | | | | | | | |
| 155 | | | | | | | |
| 156 | | | | | | | |
| 157 | | | | | | | |
| 158 | | | | | | | |
| 159 | | | | | | | |
| 160 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

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# Temporary Backfill Log



**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 161 | | Topock - Alluvium Deposits | SM | | | | |
| 162 | | | | | | | |
| 163 | | Topock - Alluvium Deposits | ML | | | | |
| 164 | IRZ-15-VAS-162-167 (3200 ppb) 11/5/2018 13:00 | | | | | | |
| 165 | | Topock - Alluvium Deposits | SM | | | | |
| 166 | | | | | | | |
| 167 | | | | | | | |
| 168 | | Topock - Alluvium Deposits | SM | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis — (9.0 - 257.0') 6" Borehole | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 169 | | | | | | | |
| 170 | | | | | | | |
| 171 | | | | | | | |
| 172 | | Topock - Alluvium Deposits | GM | | | | |
| 173 | | | | | | | |
| 174 | | | | | | | |
| 175 | | Topock - Alluvium Deposits | GM | | | | |
| 176 | | | | | | | |
| 177 | | | | | | | |
| 178 | | | | | | | |
| 179 | | | | | | | |
| 180 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

# Temporary Backfill Log

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**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Project: | Final GW Remedy Phase 1 |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Location: | PG&E Topock, Needles, California |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 181 | | | | | | | |
| 182 | | | | | | | |
| 183 | | Topock - Alluvium Deposits | GM | | | | |
| 184 | IRZ-15-VAS-182-187 (140 ppb) 11/6/2018 11:10 | | | | | | |
| 185 | | | | | | | |
| 186 | | | | | | | |
| 187 | | | | | | | |
| 188 | | Topock - Alluvium Deposits | ML | | | | |
| 189 | | | | | | | |
| 190 | | Topock - Alluvium Deposits | ML | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis; (9.0 - 257.0') 6" Borehole | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 191 | | | | | | | |
| 192 | | | | | | | |
| 193 | | Topock - Alluvium Deposits | ML | | | | |
| 194 | | | | | | | |
| 195 | | | | | | | |
| 196 | | | | | | | |
| 197 | | | | | | | |
| 198 | | Topock - Alluvium Deposits | SM | | | | |
| 199 | | | | | | | |
| 200 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

ARCADIS Design & Consultancy for natural and built assets

# Temporary Backfill Log



## Well ID: IRZ-15 Pilot

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | | |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 201 | | | | | | | |
| 202 | | | | | | | |
| 203 | | Topock - Alluvium Deposits | SM | | | | |
| 204 | | | | | | | |
| 205 | | | | | | | |
| 206 | | | | | | | |
| 207 | | | | | | | |
| 208 | | | | | | | |
| 209 | | Topock - Alluvium Deposits | ML | | | | |
| 210 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 211 | | | | | (9.0 - 257.0') 6" Borehole | | |
| 212 | | | | | | | |
| 213 | | | | | | | |
| 214 | | | | | | | |
| 215 | | | | | | | |
| 216 | | Topock - Weathered Bedrock - conglomerate | ML | | | | |
| 217 | | | | | | | |
| 218 | | | | | | | |
| 219 | | | | | | | |
| 220 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

ARCADIS Design & Consultancy for natural and built assets

# Temporary Backfill Log



| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | **Well ID: IRZ-15 Pilot** | |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Client: | PG&E |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Project: | Final GW Remedy Phase 1 |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | Location: | PG&E Topock, Needles, California |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed<br>Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 221 | | | | | | | |
| 222 | | | | | | | |
| 223 | | | | | (4.0 - 227.0') Cemex #3 MESH (8x10) Lapis Lustre Sand Lapis | (4.0 - 227.0') 99.3 bags | (4.0 - 227.0') 89 bags (90%) Note: Backfill sand |
| 224 | IRZ-15-VAS-222-227 (< 0.17 U ppb) 11/7/2018 14:00 | | | | | | |
| 225 | | | | | | | |
| 226 | | Topock - Weathered Bedrock - conglomerate | ML | | | | |
| 227 | | | | | | | |
| 228 | | | | | | | |
| 229 | | | | | (227.0 - 232.0') Wildcat Washed Plastering Sand | (227.0 - 232.0') 1.4 bags | (227.0 - 232.0') 3 bags (214%) Note: Indiactor sand. Used >20% of the calcluated volume due to potential voids forming during drilling. |
| 230 | | | | | (9.0 - 257.0') 6" Borehole | | |
| 231 | | | | | | | |
| 232 | | | | | | | |
| 233 | | | | | | | |
| 234 | | Topock - Weathered Bedrock - conglomerate | SM | | | | |
| 235 | | | | | | | |
| 236 | | | | | (232.0 - 247.0') Bentonite seal chips Puregold medium chips | (232.0 - 247.0') 4.4 bags | (232.0 - 247.0') 6 bags (136%) Note: Decommissioned rathole. After placement of 6 bags of bentonite chips and tagged at 238 ft, the bentonite expanded to 202 ft. bgs in the casing, the over chipped portion was cleaned out of the casing to 232 ft bgs |
| 237 | | | | | | | |
| 238 | | Topock - Weathered Bedrock - conglomerate | SM | | | | |
| 239 | | | | | | | |
| 240 | | | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole

# Temporary Backfill Log

ARCADIS Design & Consultancy for natural and built assets



**Well ID: IRZ-15 Pilot**

| | | | | | |
|---|---|---|---|---|---|
| Date Started: | 11/13/2018 | Surface Elevation: | 480.53 ft amsl | Client: | PG&E |
| Date Completed: | 11/15/2018 | Northing (NAD83): | 2103151.55 | | |
| Drilling Co.: | Cascade | Easting (NAD83): | 7615773.15 | Project: | Final GW Remedy Phase 1 |
| Drilling Method: | Sonic Drilling | Total Depth: | 257 ft bgs | Location: | PG&E Topock, Needles, California |
| Driller Name: | Nick Petrone | Borehole Diameter: | 6-12 inches | | |
| Drilling Asst: | T. Aylmer/J. Candelaria | Depth to First Water: | 26.0 ft bgs | | |
| Logger: | A. Garcia / C.Mills | Editor: | Sean McGrane | Project Number: | RC000753.0051 |

| Depth (ft) | Groundwater Sample ID | Geologic Formation | USCS Code | USCS Class | Well Construction | Calculated Material Volumes | Material Volumes Installed Note: percentages are the actual volume vs the calculated volume |
|---|---|---|---|---|---|---|---|
| 241–260 | | Topock - Weathered Bedrock - conglomerate | SM | | (232.0 - 247.0') Bentonite seal chips Puregold medium chips | (232.0 - 247.0') 4.4 bags | (232.0 - 247.0') 6 bags (136%) Note: Decommissioned rathole. After placement of 6 bags of bentonite chips and tagged at 238 ft, the bentonite expanded to 202 ft. bgs in the casing, the over chipped portion was cleaned out of the casing to 232 ft bgs |
| | | Topock - Weathered Bedrock - conglomerate | SM | | (9.0 - 257.0') 6" Borehole; (247.0 - 257.0') 100% Portland Cement Type I. II and V | (247.0 - 257.0') 15.7 gallons | (247.0 - 257.0') 35 gallons (223%) Note: Decommissioned rathole. Used >20% of the calculated volume due to potenital voids forming during drilling and grout migration into the formation. |
| | | Topock - Competent Bedrock - conglomerate | | | | | |



Abbreviations: USCS = Unified Soil Classification System, ft = feet, bgs = below ground surface, amsl = above mean sea level, GW = groundwater, ppb = parts per billion, BMP = Best Management Practices for stormwater, U = not detected above the laboratory reporting limit, J = estimated value, NR = no recovery; Notes: blue water table symbol represents depth to water measured during the first VAS interval; granular backfill material was removed during overdrilling of the pilot borehole