# Appendix C

## *C1.1.* Volume *Analysis*

### 1.1.1. Copco 1

Volume analysis was based on information supplied PacifiCorp in digital format. Each of the reservoirs containing trapped sediment. PacifiCorp digitized bathymetric contour lines. Sediment volume was determined by calculating the water volume beneath the surface of the reservoir using predam and post dam contours. The difference between predam and post dam water volume was calculated as the sediment volume. JC Headwaters (Eilers) conducted an analysis of total volume but provided no discussion of the technique or backup data. Personal communications with Joseph Eilers indicated that the method used for volume calculation differed from that used here. Volume calculations presented here agree well with JC Headwaters analysis for Copco 1 but Iron Gate and J. C. Boyle differ.

Predam and post dam surveys did not align well for Copco 1. In spite of that, JC Headwaters analysis of sediment volume for Copco 1 was similar the volume calculated in this report.

Predam surveys for Iron Gate and J. C. Boyle appear to have been conducted after cofferdam construction because contour lines on the predam surveys are not shown below cofferdam elevations. Therefore sediment volume below the cofferdam could not be directly analyzed and was estimated by extrapolation.

The volume calculated for Iron Gate was much larger than presented in JC Headwaters' analysis. JC Headwaters found only 23,000 cubic yards of material in J. C. Boyle reservoir. Comparison of pre and post dam surveys and J. C. Boyle Reservoir clearly shows sediment adjacent to the upstream face of the dam.

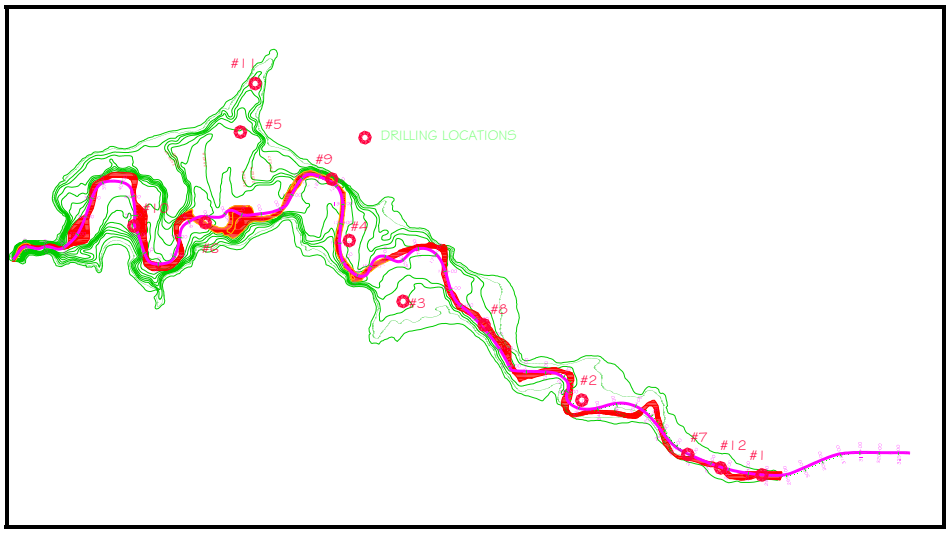


**Figure 1 2001 Bathymetric Survey Contour Map of Copco 1 Reservoir**

**Table 1 Copco 1 Sediment Volume Calculation**

| Reservoir Elevation ft | Original Area ft2 | Current Area ft2 | Sediment Volume ft3 |
|---|---|---|---|
| 2613 | 43,055,644 | 43,055,644 | - |
| 2602 | 40,446,283 | 40,446,283 | - |
| 2595 | 38,274,009 | 35,847,555 | 8,492,586 |
| 2590 | 35,642,177 | 32,562,750 | 13,764,699 |
| 2585 | 33,435,915 | 29,277,945 | 18,093,491 |
| 2580 | 30,645,077 | 26,214,667 | 21,470,949 |
| 2575 | 27,140,159 | 23,431,056 | 20,348,783 |
| 2570 | 24,041,990 | 20,790,592 | 17,401,252 |
| 2565 | 21,988,969 | 18,308,980 | 17,328,465 |
| 2560 | 19,659,281 | 16,182,001 | 17,893,169 |
| 2555 | 17,638,060 | 14,401,244 | 16,785,236 |
| 2550 | 15,234,457 | 12,226,029 | 15,613,108 |
| 2545 | 14,088,407 | 9,712,079 | 18,461,889 |
| 2540 | 10,411,023 | 7,451,646 | 18,339,261 |
| 2535 | 8,740,306 | 5,384,031 | 15,789,131 |
| 2530 | 7,164,260 | 3,918,404 | 16,505,327 |
| 2525 | 4,880,439 | 2,854,105 | 13,180,475 |
| 2520 | 3,850,695 | 1,698,216 | 10,447,033 |
| 2515 | 3,199,337 | 488,998 | 12,157,044 |
| 2510 | 1,035,338 | 65,792 | 9,199,713 |
| 2505 | 72,646 | 41,399 | 2,501,982 |
| 2500 | 49,083 | 0 | 200,826 |
| 2495 | 28,105 | 0 | 192,970 |
| 2490 | 9,102 | 0 | 93,016 |
| | Volume Cubic Feet | | 284,260,407 |
| | Volume Cubic Yards | | 10,528,163 |

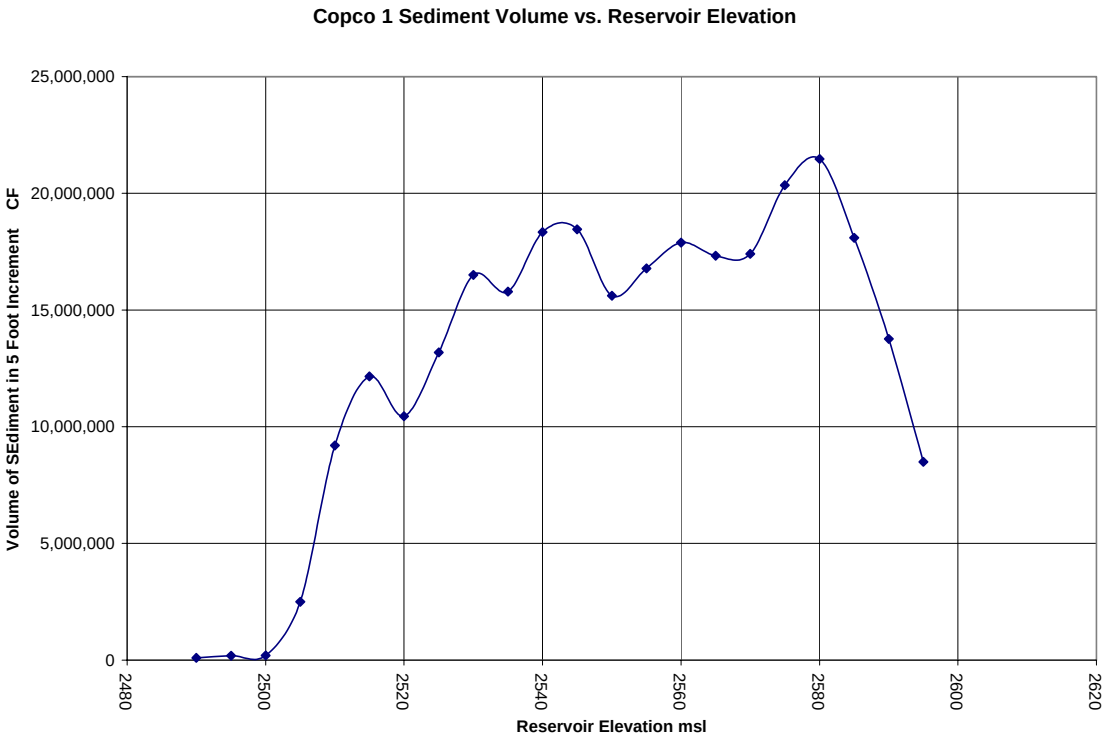


**Figure 2 Elevation in Copco 1 Reservoir vs. Volume**

### 1.1.2. Iron Gate

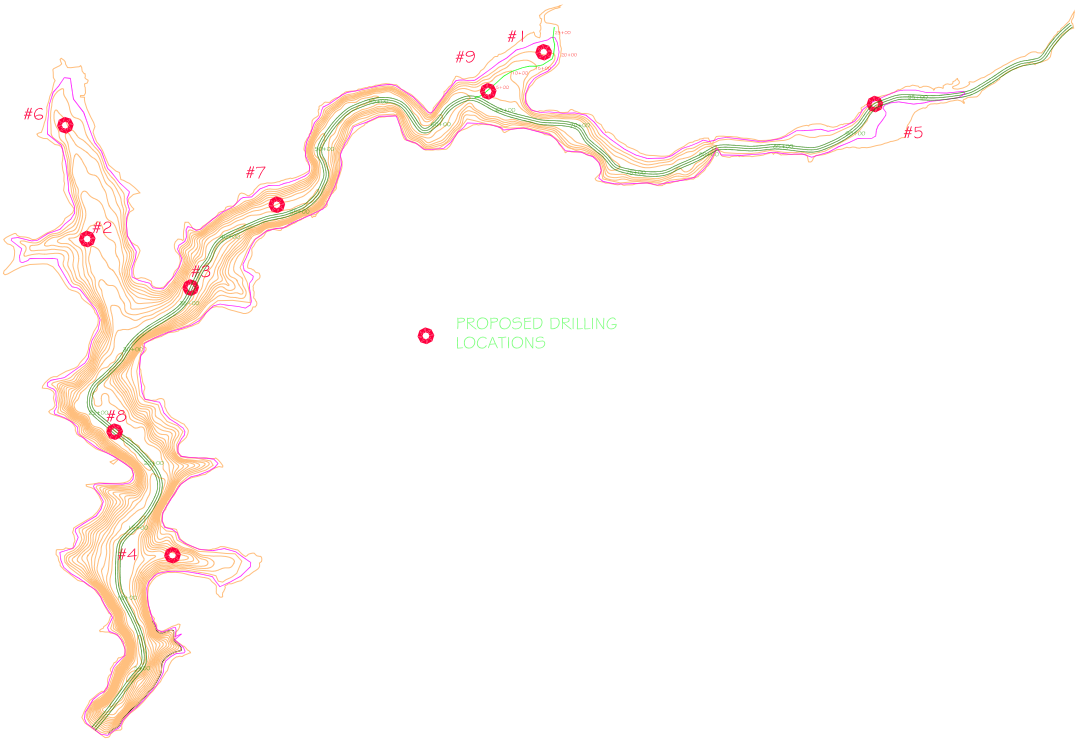


**Figure 3 2001 Bathymetric Survey Contour Map of Iron Gate Reservoir**

**Table 2 Volume Calculations for Iron Gate Reservoir.**

| Reservoir Elevation ft | Original Area ft2 | Current Area ft2 | Sediment Volume ft3 |
|---|---|---|---|
| 2325 | 41,837,908 | 40,876,586 | |
| 2320 | 38,699,444 | 38,376,271 | 3,211,237 |
| 2315 | 36,400,983 | 35,875,957 | 2,120,496 |
| 2310 | 34,102,522 | 33,375,643 | 3,129,761 |
| 2305 | 32,125,703 | 30,883,910 | 4,921,680 |
| 2300 | 30,148,885 | 28,443,723 | 7,367,387 |
| 2295 | 28,289,221 | 26,109,270 | 9,712,782 |
| 2290 | 26,429,558 | 24,275,980 | 10,833,822 |
| 2285 | 24,679,807 | 22,464,754 | 10,921,574 |
| 2280 | 22,930,056 | 20,738,715 | 11,015,983 |
| 2275 | 21,191,581 | 19,015,755 | 10,917,915 |
| 2270 | 19,453,105 | 17,302,701 | 10,815,575 |
| 2265 | 18,017,509 | 15,735,474 | 11,081,098 |
| 2260 | 16,581,912 | 14,565,138 | 10,747,021 |
| 2255 | 15,300,829 | 13,395,827 | 9,804,441 |
| 2250 | 14,019,746 | 12,228,903 | 9,239,613 |
| 2245 | 13,166,842 | 11,107,139 | 9,626,364 |
| 2240 | 12,313,938 | 10,076,363 | 10,743,194 |
| 2235 | 11,257,462 | 9,070,041 | 11,062,490 |
| 2230 | 10,200,986 | 8,111,975 | 10,691,079 |
| 2225 | 9,292,703 | 7,179,554 | 10,505,399 |
| 2220 | 8,384,420 | 6,286,461 | 10,527,768 |
| 2215 | 7,402,879 | 5,365,129 | 10,339,270 |
| 2210 | 6,421,338 | 4,405,774 | 10,133,284 |
| 2205 | 4,856,050 | 3,469,462 | 8,505,379 |
| 2200 | 3,290,762 | 2,560,457 | 5,292,233 |
| 2195 | 2,468,072 | 1,761,612 | 3,591,914 |
| 2190 | 1,645,381 | 1,077,792 | 3,185,122 |
| 2185 | 1,234,036 | 568,154 | 3,083,676 |
| 2180 | 822,691 | 218,863 | 3,174,273 |
| 2175 | 617,018 | 62,400 | 2,896,115 |
| 2170 | | | |
| | Volume Cubic Feet | | 239,197,945 |
| | Volume Cubic Yards | | 8,859,183 |

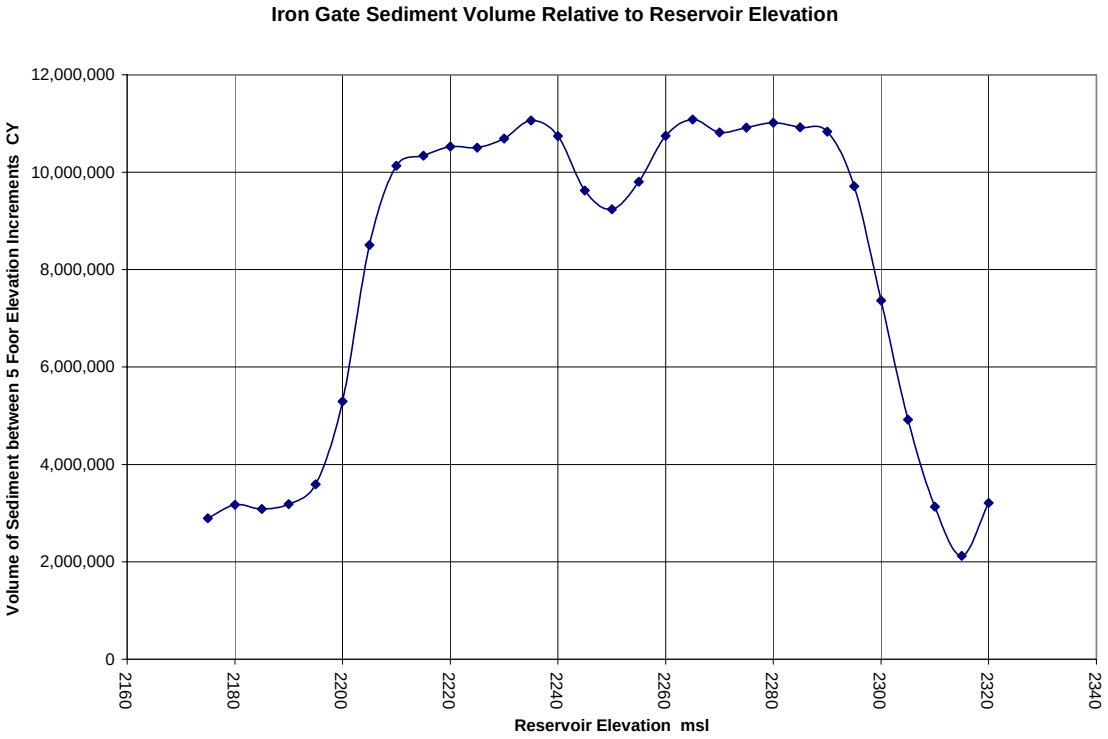


**Figure 4 Elevation in Iron Gate Reservoir vs. Volume**

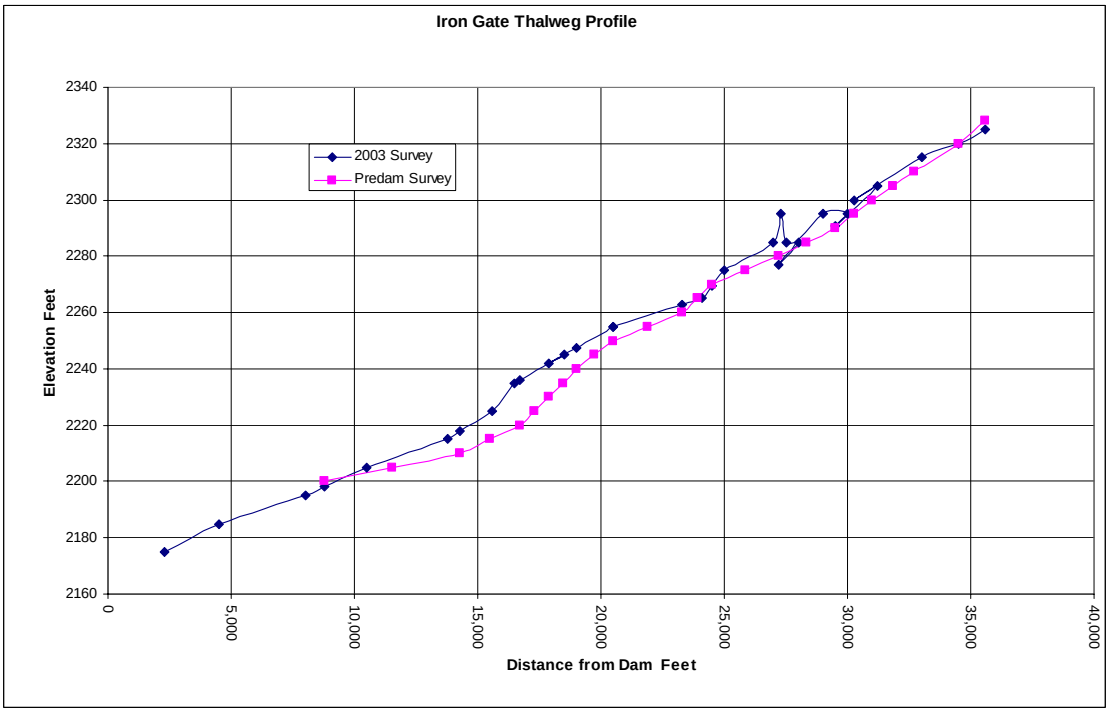


**Figure 5 Sediment Thickness along Iron Gate Reservoir**

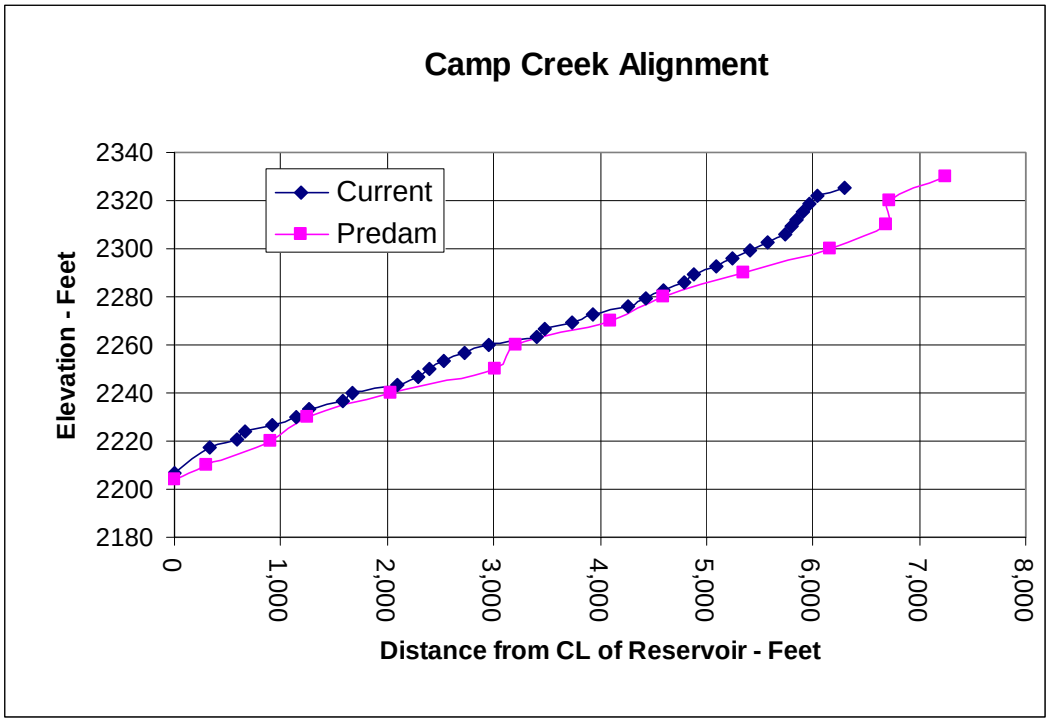


**Figure 6 Camp Creek Alignment Sediment Thickness**

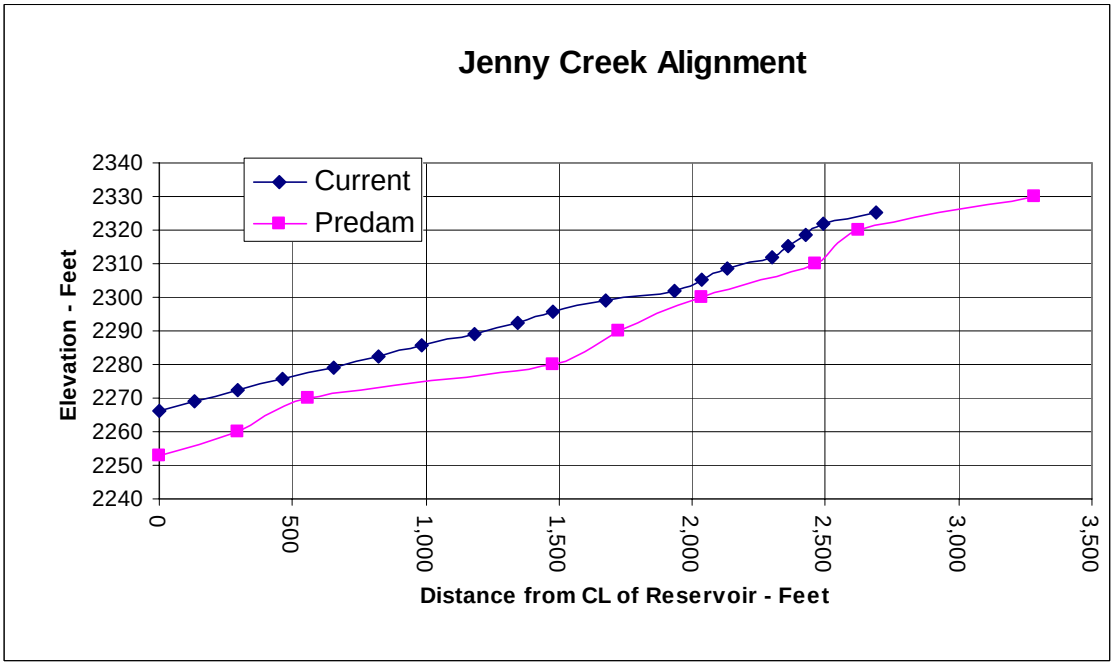


**Figure 7 Sediment Thickness along Jenny Creek Alignment**

### 1.1.3. J. C. Boyle

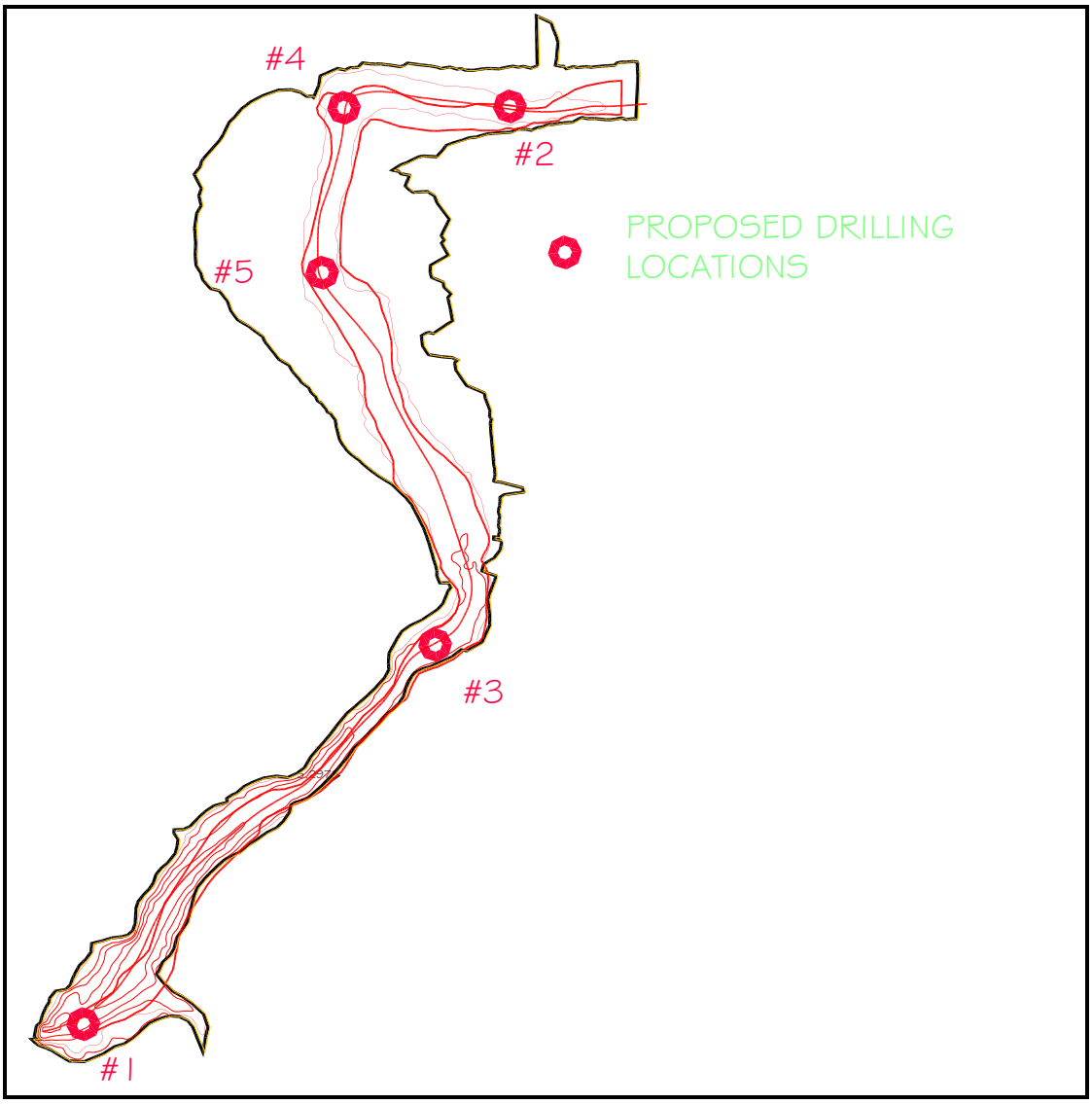


**Figure 8 Drilling Locations in J. C. Boyle Reservoir**

| Elevation | Reservoir Area ft2 | Reservoir Area ft2 | Volume Cubic Feet |
|---|---|---|---|
| 3792 | 14,714,226 | 14,712,790 | |
| 3790 | 9,872,312 | 10,289,432 | 415,684 |
| 3780 | 2,389,134 | 2,393,727 | 2,108,566 |
| 3770 | 1,203,378 | 1,715,497 | 2,583,559 |
| 3760 | 387,827 | 996,722 | 5,605,068 |
| 3750 | 20,000 | 467,386 | 5,281,404 |
| 3740 | | 84,000 | 2,656,931 |
| | Total Cubic Feet | | 18,651,211 |
| | Total Cubic Yards | | 690,786 |

## C1.2. Reservoir Erosion Analysis

Analysis of the eroded river channel cross section resulting from reservoir drawdown was based on:

1) Sediment volume in an area of the reservoir centered on the boring locations;
2) Gradation of grain sizes based grain size analysis of the borings.
3) An eroded section through the sediment with a width and bank slope shown in Table 3 through Table 5 was used to calculate volume of eroded sediment.
4) Average river width was based on the area of the predam river shown in Figure 9, of 5.1 million square feet divided by the length, 32,500 feet, for a width of approximately 156 feet. Estimated total volume of eroded sediment is approximately 4 million cubic yards corresponding to an eroded river width of 150 to 200 feet. TSS values were based on calculations of sediment shown for the 200 foot wide river and the trapping effects of a full Iron Gate Reservoir. A width of 200 feet may over estimate erosion slightly and assuming a full reservoir may underestimate the TSS slightly. More detailed analysis of erosion width and trapping efficiency variations with reservoir depth will be required to develop more accurate volume and TSS values.
5) The thickness of sediment in each tributary area (defined by each boring) was calculated as the volume (calculated from pre and post dam surveys) of the tributary area divided by the tributary area of the boring location (in other words not based on boring depth).
6) Definition of boundaries of each tributary area was determined by visually drawing boundaries lines around each boring location. The entire reservoir area was distributed among the various borings as illustrated in Figure 10, and Figure 11 for Iron Gate and Copco 1. At J. C. Boyle only one boring showed any sediment so no tributary areas were developed.

Table 3 through Table 5 show a range of eroded cross sections and side slope adjacent to the eroded river. The side slope is ratio of horizontal to vertical distance along the surface of the eroded bank. This analysis assumes that the river width is constant through out the tributary area. Further analysis will be needed to refine limits of river width and slopes imposed by predam river conditions. This will be accomplished by cutting cross section for the entire length of the river through the reservoirs at intervals of approximately 500 feet. Actual sediment depth along the river length at cross section intervals will help develop a better understanding of the actual erosion.

Details showing the basis for the calculation are presented for the information shown in Table 3 only, in the tables following Table 5. No particle shape factor was used in the calculations or determined in the analysis of the sediment. Iron Gate reservoir was assumed to be full during the drawdown of Copco 1 due to greater restrictions on slope stability considerations that may be imposed on Copco 1 Reservoir. Further analysis will

be required to provide more accurate estimates of the volume eroded during drawdown. These analyses were provided to project a range of results provided below.

TSS calculations assumed that sediment unit dry weight was 40 pcf. TSS values were based on dry weight of a 5 foot elevation increment of sediment dived by the weight of water in that increment plus the weight of water flowing through the reservoir in the amount of time required to lower the elevation of the reservoir 5 feet. TSS = 1E6x Ws /(Ww+Ws). Ws = Weight of the sediment. Ww = weight of the water.

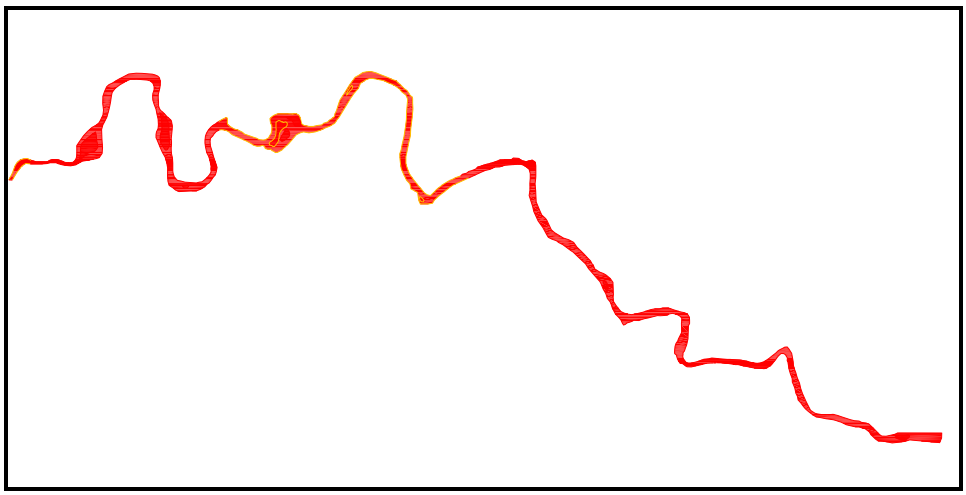

**Figure 9 Predam River in Copco 1 Reservoir**

In Table 3 through Table 5 below, the volume of sediment eroded is shown in the unlabled table immediately below the Table. For instance, in Table 3 an eroded width of 200 feet produces an eroded volume from all three reservoirs of 4,433,031 cubic yards. The division of the class sizes of this material is shown adjacent to the volume.

TSS calculations assumed that a constant fraction of eroded sediment, based on the eroded volume divided by the total reservoir volume, was eroded from each 5 foot interval as the reservoir was drawndown. Table 8 shows the eroded volume of sediment without consideration of trapping effects in Iron Gate Reservoir. Table 10 shows the total volume of eroded sediment for a 200 foot wide section including the effects of trapping in Iron Gate Reservoir. Table 6 shows the weighted volumes of silt, sand, gravel eroded from Copco 1 Reservoir.

**Table 3 Eroded Section**

| Eroded Section | |
|---|---|
| Base width | Side slope |
| 200 | 10 |

| | | | | |
|---|---|---|---|---|
| Total Eroded CY | 4,433,031 | 264,275 | 748,024 | 3,404,011 |
| | | Gravel | Sand | Silt |

**Table 4 Eroded Section**

| Eroded Section | |
|---|---|
| Base width | Side slope |
| 150 | 10 |

| | | | | |
|---|---|---|---|---|
| Total Eroded CY | 3,615,692 | 209,653 | 609,371 | 2,783,788 |
| | | Gravel | Sand | Silt |

**Table 5 Eroded Section**

| Eroded Section | |
|---|---|
| Base width | Side slope |
| 150 | 3 |

| | | | | |
|---|---|---|---|---|
| Total Eroded CY | 2,801,120 | 177,603 | 473,986 | 2,137,596 |
| | | Gravel | Sand | Silt |

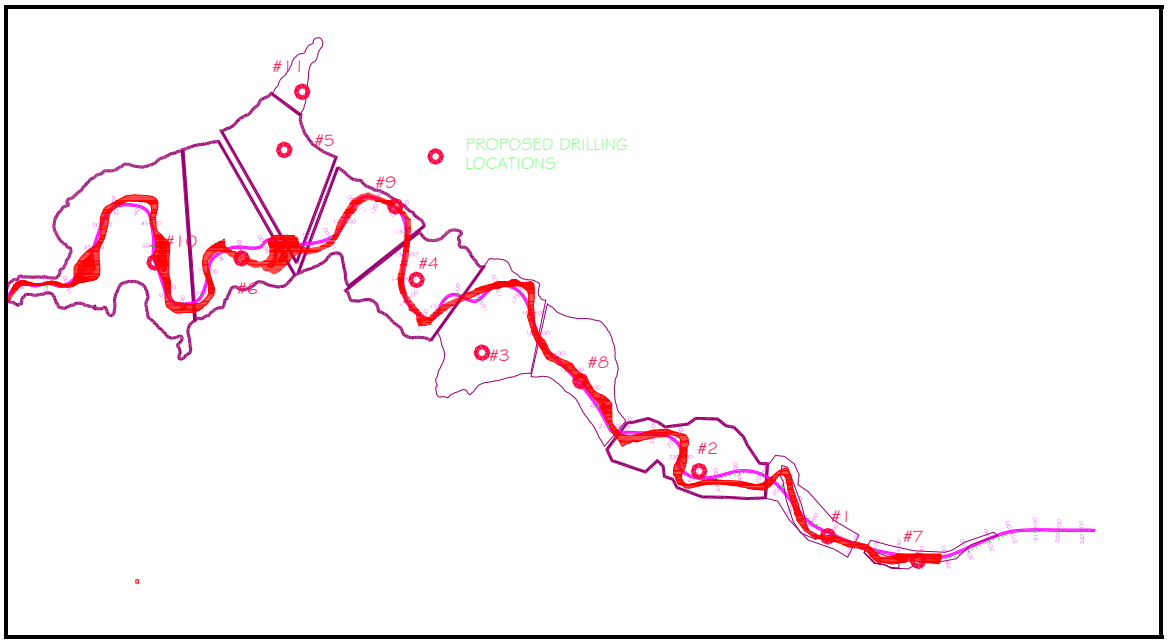


**Figure 10 Tributary Areas Used for Grain Size and Erosion Analysis for Copco 1**

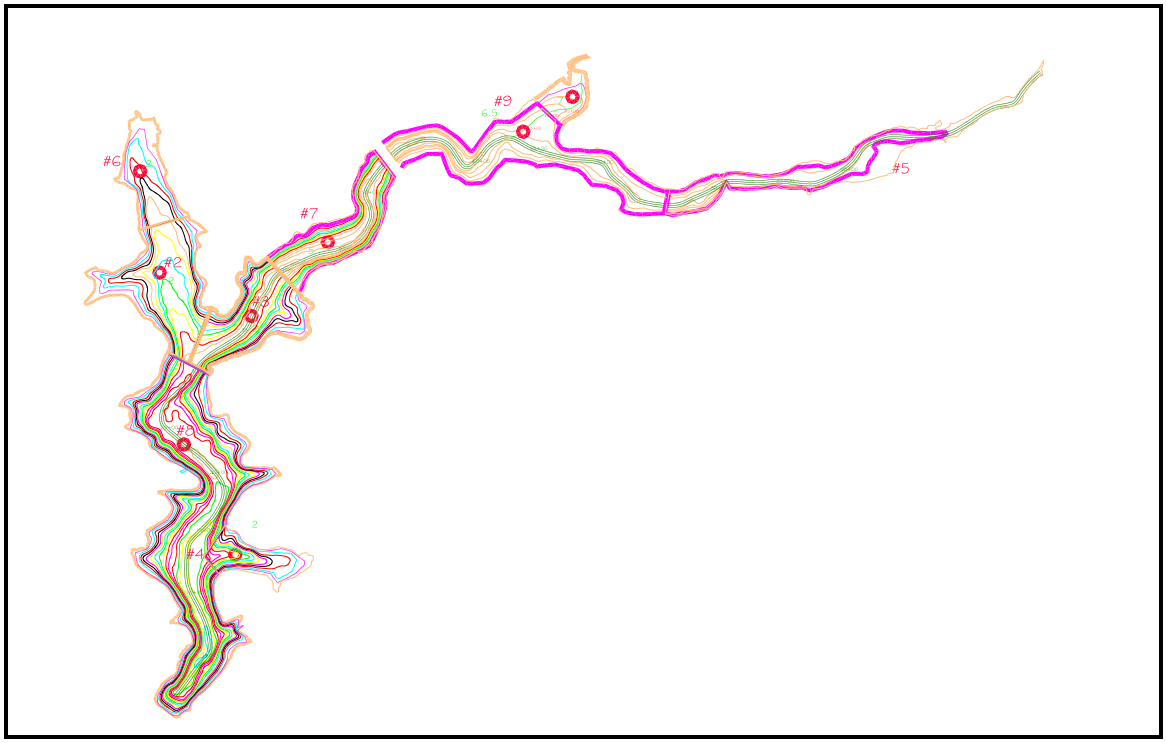


**Figure 11 Tributary Areas Used in Iron Gate Reservoir Grain Size and Erosion Analysis**

Table 6 Copco 1 Reservoir Sediment Sections Used in Grain Size and Erosion Analysis for 200 Foot Eroded River Section

| Copco Erosion Analysis | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Boring Location** | **Average Segment Elevation** | **River Length in Segment ft** | **Width ft** | **Depth ft** | **Volume CY** | **Gravel CY** | **Sand CY** | **Silt CY** | **Volume in Segment CY** | **% of Tributary Volume** |
| **C1** | **2602** | **984** | **266** | **6.55** | **63,411** | **43,056** | **17,184** | **3,171** | **67,818** | **94%** |
| **C12** | **2597** | **1,526** | **243** | **4.27** | **58,618** | **13,443** | **33,217** | **11,939** | **307,542** | **19%** |
| **C7** | **2592** | **2,739** | **236** | **3.63** | **87,018** | **5,047** | **73,095** | **8,876** | **239,724** | **36%** |
| **C2** | **2583** | **3,800** | **302** | **10.22** | **434,660** | **2,608** | **88,526** | **343,671** | **1,598,835** | **27%** |
| **C8** | **2568** | **2,700** | **262** | **6.21** | **162,858** | **1,791** | **27,604** | **133,381** | **751,815** | **22%** |
| **C3** | **2557** | **2,500** | **260** | **6.03** | **145,254** | **145** | **5,084** | **140,170** | **1,089,541** | **13%** |
| **C4** | **2547** | **3,000** | **300** | **9.98** | **332,283** | **332** | **16,448** | **316,500** | **1,477,089** | **22%** |
| **C9** | **2557** | **3,000** | **221** | **2.07** | **50,823** | **51** | **3,354** | **47,469** | **270,585** | **19%** |
| **C5** | **2552** | **2,878** | **302** | **10.23** | **329,767** | **3,298** | **67,767** | **259,032** | **1,693,653** | **19%** |
| **C6** | **2533** | **2,800** | **255** | **5.52** | **146,111** | **146** | **3,361** | **142,896** | **1,106,695** | **13%** |
| **C10** | **2510** | **6,700** | **264** | **6.45** | **422,940** | **423** | **138,301** | **284,216** | **2,203,462** | **19%** |
| **C11** | **2577** | **1,577** | **223** | **2.26** | **29,367** | **1,165** | **9,446** | **18,756** | **62,598** | **47%** |
| **Total Length feet** | | | **Copco Eroded** | | | **70,341** | **473,942** | **1,691,319** | **10,869,356** | |
| **34,204** | | | **2,263,110** | | | **3.1%** | **20.9%** | **74.7%** | **21%** | |

**Table 7 Iron Gate Reservoir Sediment Sections Used in Grain Size and Erosion Analysis for 200 Foot Eroded River Section**

| Iron Gate Volume Eroded | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Boring Location | Average Elevation | Length ft | Width ft | Depth ft | Eroded Volume CY | Gravel CY | Sand CY | Silt CY | Volume in Boring Section CY | % of Section Eroded |
| IG5 | 2325 | 9,842 | 234 | 3.41 | 290,675 | 187,485 | 62,786 | 40,404 | 494,882 | 59% |
| IG1 | 2305 | 1,600 | 270 | 7.05 | 112,926 | 1,242 | 61,545 | 50,026 | 203,555 | 55% |
| IG9 | 2270 | 7,709 | 290 | 8.98 | 743,416 | 2,974 | 205,926 | 534,516 | 1,798,894 | 41% |
| IG7 | 2224 | 4,102 | 268 | 6.83 | 278,354 | 4,175 | 15,309 | 259,148 | 772,893 | 36% |
| IG3 | 2210 | 3,117 | 269 | 6.88 | 213,507 | 427 | 3,416 | 209,664 | 870,623 | 25% |
| IG8 | 2197 | 10,007 | 273 | 7.26 | 733,129 | 10,264 | 8,064 | 714,801 | 3,019,649 | 24% |
| IG6 | 2286 | 2,972 | 253 | 5.27 | 146,536 | 3,517 | 22,127 | 120,892 | 387,411 | 38% |
| IG2 | 2246 | 5,184 | 261 | 6.10 | 305,772 | 9,938 | 69,869 | 226,119 | 985,692 | 31% |
| IG4 | 2227 | 2,608 | 273 | 7.26 | 191,094 | 191 | 2,102 | 188,992 | 232,111 | 82% |
| Total Length feet 47,141 | | | Iron Gate Eroded Volume CY 3,015,410 | | | 220,213 7.3% | 451,145 15.0% | 2,344,562 77.8% | 8,765,710 34% | |

**Table 8 Volume Eroded w/o Trapping in Iron Gate Reservoir as Drawdown Proceeds**

| | | | | |
|---|---|---|---|---|
| **Volume Eroded from Copco 1 and Iron Gate w/o Iron Gate Trapping CY** | **5,278,521 Total** | **290,554 Gravel** | **925,087 Sand** | **4,035,881 Silt** |

## Calculate Volume Eroded Assuming Iron Gate Reservoir Traps Initial Copco 1 Eroded Material

**Table 9 Distribution of Copco 1 Sediment by Section**

| **Percentage by Size Class** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fine Clay | Medium Clay | Coarse Clay | Very Fine Silt | Fine Silt | Medium Silt | Coarse Silt | Very Fine Sand | Fine Sand | Medium Sand | Coarse Sand | Very Coarse Sand | Gravel |
| C1 | 0.30% | 0.10% | 0.20% | 0.30% | 0.40% | 0.50% | 3.20% | 1.50% | 3.60% | 3.60% | 3.00% | 15.40% | 67.90% |
| C12 | 4.47% | 2% | 3% | 3% | 3% | 3% | 3% | 7% | 11% | 20% | 12% | 6% | 23% |
| C7 | 2% | 1% | 1% | 1% | 1% | 2% | 3% | 9% | 24% | 20% | 17% | 14% | 6% |
| C2 | 15% | 7% | 10% | 10% | 13% | 17% | 7% | 11% | 5% | 2% | 2% | 0% | 1% |
| C8 | 19% | 8% | 10% | 11% | 10% | 17% | 7% | 9% | 4% | 1% | 1% | 2% | 1% |
| C3 | 31% | 15% | 16% | 17% | 12% | 6% | 1% | 2% | 1% | 0% | 0% | 0% | 0% |
| C4 | 33% | 13% | 17% | 15% | 10% | 6% | 2% | 2% | 1% | 1% | 1% | 0% | 0% |
| C9 | 29% | 13% | 16% | 17% | 11% | 7% | 1% | 3% | 2% | 1% | 1% | 0% | 0% |
| C5 | 25% | 9% | 11% | 9% | 9% | 9% | 7% | 7% | 5% | 4% | 3% | 2% | 1% |
| C6 | 48% | 11% | 18% | 12% | 5% | 2% | 1% | 1% | 0% | 1% | 0% | 0% | 0% |
| C10 | 28% | 9% | 10% | 8% | 4% | 3% | 6% | 9% | 15% | 8% | 1% | 0% | 0% |
| C11 | 15% | 5% | 6% | 8% | 10% | 11% | 8% | 8% | 8% | 7% | 5% | 4% | 4% |

**Table 10 Volume Eroded including Trapping in Iron Gate Reservoir as Drawdown Proceeds for 200 foot section**

| | | | | |
|---|---|---|---|---|
| **Volume Eroded from Copco 1 and Iron Gate with Iron Gate Trapping CY** | 4,433,031<br>**Total** | 264,275<br>Gravel | 748,024<br>Sand | 3,404,011<br>Silt |

Table 11 Trapping Efficiency of Iron Gate Dam as Copco 1 Reservoir is Drawdonw at 3000 cfs Inflow

| Size in mm | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000975 | 0.00195 | 0.0039 | 0.0078 | 0.0156 | 0.0312 | 0.0624 | 0.1248 | 0.2496 | 0.4992 | 0.9984 | 1.9968 | 3.9936 | |
| Volume of Copco 1 Eroded Material by Size Class | | | | | | | | | | | | | |
| Fine Clay | Medium Clay | Coarse Clay | Very Fine Silt | Fine Silt | Medium Silt | Coarse Silt | Very Fine Sand | Fine Sand | Medium Sand | Coarse Sand | Very Coarse Sand | Gravel | Total |
| 190 | 63 | 127 | 190 | 254 | 317 | 2,029 | 951 | 2,283 | 2,283 | 1,902 | 9,765 | 43,056 | 63,411 |
| 2,618 | 918 | 1,505 | 1,622 | 1,641 | 2,032 | 1,602 | 4,357 | 6,389 | 11,450 | 7,230 | 3,791 | 13,443 | 58,598 |
| 1,566 | 696 | 870 | 870 | 1,044 | 1,479 | 2,349 | 7,571 | 20,884 | 17,491 | 14,880 | 12,270 | 5,047 | 87,018 |
| 66,358 | 31,296 | 41,438 | 42,597 | 57,230 | 74,617 | 30,136 | 46,509 | 22,602 | 10,287 | 8,259 | 869 | 2,608 | 434,805 |
| 31,432 | 12,784 | 16,612 | 17,914 | 15,960 | 27,930 | 10,749 | 14,983 | 5,700 | 2,280 | 1,954 | 2,687 | 1,791 | 162,776 |
| 44,448 | 21,062 | 23,095 | 24,693 | 17,576 | 8,570 | 726 | 3,050 | 1,017 | 581 | 291 | 145 | 145 | 145,399 |
| 110,318 | 44,360 | 55,325 | 48,846 | 34,225 | 18,442 | 4,984 | 7,476 | 3,655 | 2,160 | 1,828 | 1,329 | 332 | 333,280 |
| 14,535 | 6,810 | 8,284 | 8,487 | 5,540 | 3,558 | 254 | 1,525 | 813 | 559 | 356 | 102 | 51 | 50,874 |
| 81,452 | 30,668 | 34,790 | 29,679 | 28,525 | 30,668 | 23,249 | 22,754 | 17,313 | 12,366 | 10,223 | 5,111 | 3,298 | 330,097 |
| 69,695 | 16,364 | 26,300 | 17,679 | 7,306 | 3,507 | 2,046 | 1,315 | 584 | 731 | 584 | 146 | 146 | 146,403 |
| 119,481 | 38,910 | 41,025 | 31,721 | 15,226 | 14,380 | 23,473 | 38,065 | 64,498 | 31,932 | 2,538 | 1,269 | 423 | 422,940 |
| 4,523 | 1,547 | 1,840 | 2,310 | 2,868 | 3,358 | 2,310 | 2,486 | 2,300 | 2,026 | 1,576 | 1,057 | 1,165 | 29,367 |
| 546,616 | 205,480 | 251,211 | 226,609 | 187,395 | 188,857 | 103,908 | 151,042 | 148,040 | 94,145 | 51,620 | 38,542 | 71,506 | 2,264,969 |
| Iron Gate Trapping Efficiency by size % Passing through if Reservoir is Full | | | | | | | | | | | | | |
| 96% | 85% | 52% | 7% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Volume in Cy - Iron Gate Reservoir Full while Copco 1 is Drawndown | | | | | | | | | | | | | 37% |
| 524,698 | 174,452 | 130,517 | 16,512 | 5 | - | - | - | - | - | - | - | - | 846,184 |

## C1.3. Sediment Grain Size Analysis

Analysis of the grain size distribution was conducted based on information derived from the grain size analysis of the individual borings. As described in Section 0, a tributary area was assigned to each boring and the volume of sediment in that area derived from pre and post dam survey data provided by PacifiCorp was used to determine the volume of each individual tributary area assigned to the borings.

Average grain size distribution for the predam sediments was used to represent the entire tributary area for each boring. Average grain size % was multiplied by tributary areas to provide the volumes shown in Table 12 through Table 14 below. Raw data for each boring is presented following the tables.

**Table 12 Iron Gate Sediment Size Distribution**

| Iron Gate Reservoir<br>Sediment by Size Classification | | |
|---|---|---|
| Description | Volume | Fraction of Total<br>% |
| Fine Clay | 2,851,578 | 32% |
| Medium Clay | 837,812 | 9% |
| Coarse Clay | 880,271 | 10% |
| Very Fine Silt | 789,589 | 9% |
| Fine Silt | 790,565 | 9% |
| Medium Silt | 746,349 | 8% |
| Coarse Silt | 392,223 | 4% |
| Very Fine Sand | 432,540 | 5% |
| Fine Sand | 294,119 | 3% |
| Medium Sand | 162,390 | 2% |
| Coarse Sand | 128,554 | 1% |
| Very Coarse Sand | 74,461 | 1% |
| Gravel | 500,865 | 6% |
| Total | 8,881,316 | 100% |

**Table 13 Copco 1 Sediment Size Distribution**

| Copco 1 Reservoir<br>1.3.1.1.1. Sediment by Size Classification | | |
|---|---|---|
| Description | Volume CY | Fraction of Total % |
| Fine Clay | 2,886,969 | 27% |
| Medium Clay | 1,059,845 | 10% |
| Coarse Clay | 1,298,356 | 12% |
| Very Fine Silt | 1,154,559 | 11% |
| Fine Silt | 896,693 | 8% |
| Medium Silt | 849,826 | 8% |
| Coarse Silt | 468,591 | 4% |
| Very Fine Sand | 679,642 | 6% |
| Fine Sand | 665,429 | 6% |
| Medium Sand | 415,726 | 4% |
| Coarse Sand | 206,065 | 2% |
| Very Coarse Sand | 123,497 | 1% |
| Gravel | 173,912 | 2% |
| Total | 10,879,110 | |

**Table 14 J.C. Boyle Sediment Size Distribution**

| J.C. Boyle Reservoir<br>Sediment by Size Classification | | |
|---|---|---|
| Description | Volume CY | Fraction of Total % |
| Fine Clay | 27,984 | 4% |
| Medium Clay | 10,176 | 2% |
| Coarse Clay | 15,900 | 3% |
| Very Fine Silt | 17,172 | 3% |
| Fine Silt | 15,900 | 3% |
| Medium Silt | 20,988 | 3% |
| Coarse Silt | 17,172 | 3% |
| Very Fine Sand | 71,232 | 11% |
| Fine Sand | 358,704 | 56% |
| Medium Sand | 68,688 | 11% |
| Coarse Sand | 10,176 | 2% |
| Very Coarse Sand | 636 | 0% |
| Gravel | 636 | 0% |
| Total | 635,364 | |

### 1.3.2. Raw Data for Grain Size Distribution

| | | | |
|---|---|---|---|
| IG1- | S1 | <10 Phi Clay | 6.6% |
| IG1- | S1 | 9-10 Phi Clay | 2.9% |
| IG1- | S1 | 8-9 Phi Clay | 2.8% |
| IG1- | S1 | Very Fine Silt | 4.2% |
| IG1- | S1 | Fine Silt | 6.8% |
| IG1- | S1 | Medium Silt | 11.1% |
| IG1- | S1 | Coarse Silt | 9.9% |
| IG1- | S1 | Very Fine Sand | 16.1% |
| IG1- | S1 | Fine Sand | 17.7% |
| IG1- | S1 | Medium Sand | 12.6% |
| IG1- | S1 | Coarse Sand | 6.6% |
| IG1- | S1 | Very Coarse Sand | 1.5% |
| IG1- | S1 | Gravel | 1.1% |
| | | | |
| IG2- | S1 | <10 Phi Clay | 32.0% |
| IG2- | S1 | 9-10 Phi Clay | 10.0% |
| IG2- | S1 | 8-9 Phi Clay | 12.3% |
| IG2- | S1 | Very Fine Silt | 12.2% |
| IG2- | S1 | Fine Silt | 12.5% |
| IG2- | S1 | Medium Silt | 13.0% |
| IG2- | S1 | Coarse Silt | 4.4% |
| IG2- | S1 | Very Fine Sand | 1.2% |
| IG2- | S1 | Fine Sand | 0.8% |
| IG2- | S1 | Medium Sand | 0.7% |
| IG2- | S1 | Coarse Sand | 0.3% |
| IG2- | S1 | Very Coarse Sand | 0.2% |
| IG2- | S1 | Gravel | 0.5% |
| | | | |
| IG2- | S1C | <10 Phi Clay | 12.5% |
| IG2- | S1C | 8-9 Phi Clay | 5.2% |
| IG2- | S1C | 9-10 Phi Clay | 3.9% |
| IG2- | S1C | Very Fine Silt | 6.5% |
| IG2- | S1C | Fine Silt | 7.2% |
| IG2- | S1C | Medium Silt | 9.2% |
| IG2- | S1C | Coarse Silt | 7.0% |
| IG2- | S1C | Very Fine Sand | 11.5% |
| IG2- | S1C | Fine Sand | 11.0% |
| IG2- | S1C | Medium Sand | 8.4% |
| IG2- | S1C | Coarse Sand | 6.5% |
| IG2- | S1C | Very Coarse Sand | 5.1% |
| IG2- | S1C | Gravel | 6.0% |

| | | | |
|---|---|---|---|
| | | | 0.0% |
| IG3- | S1 | <10 Phi Clay | 41.6% |
| IG3- | S1 | 8-9 Phi Clay | 13.8% |
| IG3- | S1 | 9-10 Phi Clay | 13.9% |
| IG3- | S1 | Very Fine Silt | 12.8% |
| IG3- | S1 | Fine Silt | 10.0% |
| IG3- | S1 | Medium Silt | 5.8% |
| IG3- | S1 | Coarse Silt | 0.3% |
| IG3- | S1 | Very Fine Sand | 0.3% |
| IG3- | S1 | Fine Sand | 0.4% |
| IG3- | S1 | Medium Sand | 0.7% |
| IG3- | S1 | Coarse Sand | 0.2% |
| | | | 0.0% |
| IG4- | S1 | <10 Phi Clay | 51.3% |
| IG4- | S1 | 9-10 Phi Clay | 13.0% |
| IG4- | S1 | 8-9 Phi Clay | 15.2% |
| IG4- | S1 | Very Fine Silt | 8.6% |
| IG4- | S1 | Fine Silt | 7.2% |
| IG4- | S1 | Medium Silt | 3.1% |
| IG4- | S1 | Coarse Silt | 0.5% |
| IG4- | S1 | Very Fine Sand | 0.2% |
| IG4- | S1 | Fine Sand | 0.2% |
| IG4- | S1 | Medium Sand | 0.3% |
| IG4- | S1 | Coarse Sand | 0.3% |
| IG4- | S1 | Very Coarse Sand | 0.1% |
| IG4- | S1 | Gravel | 0.1% |
| | | | 0.0% |
| IG4- | S3 | <10 Phi Clay | 6.9% |
| IG4- | S3 | 9-10 Phi Clay | 2.5% |
| IG4- | S3 | 8-9 Phi Clay | 3.5% |
| IG4- | S3 | Very Fine Silt | 4.8% |
| IG4- | S3 | Fine Silt | 5.0% |
| IG4- | S3 | Medium Silt | 4.8% |
| IG4- | S3 | Coarse Silt | 0.8% |
| IG4- | S3 | Very Fine Sand | 3.9% |
| IG4- | S3 | Fine Sand | 3.8% |
| IG4- | S3 | Medium Sand | 4.1% |
| IG4- | S3 | Coarse Sand | 5.9% |
| IG4- | S3 | Very Coarse Sand | 8.9% |
| IG4- | S3 | Gravel | 45.0% |
| | | | 0.0% |

| | | | |
|---|---|---|---|
| IG5- | S1 | <10 Phi Clay | 1.8% |
| IG5- | S1 | 9-10 Phi Clay | 1.0% |
| IG5- | S1 | 8-9 Phi Clay | 0.9% |
| IG5- | S1 | Very Fine Silt | 1.8% |
| IG5- | S1 | Fine Silt | 2.3% |
| IG5- | S1 | Medium Silt | 2.5% |
| IG5- | S1 | Coarse Silt | 3.6% |
| IG5- | S1 | Very Fine Sand | 3.2% |
| IG5- | S1 | Fine Sand | 4.9% |
| IG5- | S1 | Medium Sand | 4.6% |
| IG5- | S1 | Coarse Sand | 4.1% |
| IG5- | S1 | Very Coarse Sand | 4.8% |
| IG5- | S1 | Gravel | 64.5% |
| | | | |
| IG6- | S1 | <10 Phi Clay | 23.6% |
| IG6- | S1 | 9-10 Phi Clay | 11.4% |
| IG6- | S1 | 8-9 Phi Clay | 8.9% |
| IG6- | S1 | Very Fine Silt | 9.5% |
| IG6- | S1 | Fine Silt | 10.1% |
| IG6- | S1 | Medium Silt | 15.0% |
| IG6- | S1 | Coarse Silt | 4.0% |
| IG6- | S1 | Very Fine Sand | 4.3% |
| IG6- | S1 | Fine Sand | 2.7% |
| IG6- | S1 | Medium Sand | 3.2% |
| IG6- | S1 | Coarse Sand | 3.7% |
| IG6- | S1 | Very Coarse Sand | 1.2% |
| IG6- | S1 | Gravel | 2.4% |
| | | | |
| IG6- | S2 | <10 Phi Clay | 3.2% |
| IG6- | S2 | 9-10 Phi Clay | 2.0% |
| IG6- | S2 | 8-9 Phi Clay | 1.7% |
| IG6- | S2 | Very Fine Silt | 2.9% |
| IG6- | S2 | Fine Silt | 3.5% |
| IG6- | S2 | Medium Silt | 4.0% |
| IG6- | S2 | Coarse Silt | 1.2% |
| IG6- | S2 | Very Fine Sand | 4.3% |
| IG6- | S2 | Fine Sand | 5.2% |
| IG6- | S2 | Medium Sand | 6.1% |
| IG6- | S2 | Coarse Sand | 5.9% |
| IG6- | S2 | Very Coarse Sand | 5.1% |
| IG6- | S2 | Gravel | 54.9% |
| | | | 0.0% |

| | | | |
|---|---|---|---|
| IG7- | S1 | <10 Phi Clay | 33.9% |
| IG7- | S1 | 9-10 Phi Clay | 11.2% |
| IG7- | S1 | 8-9 Phi Clay | 10.3% |
| IG7- | S1 | Very Fine Silt | 11.8% |
| IG7- | S1 | Fine Silt | 13.3% |
| IG7- | S1 | Medium Silt | 10.7% |
| IG7- | S1 | Coarse Silt | 1.9% |
| IG7- | S1 | Very Fine Sand | 1.7% |
| IG7- | S1 | Fine Sand | 1.0% |
| IG7- | S1 | Medium Sand | 1.1% |
| IG7- | S1 | Coarse Sand | 1.1% |
| IG7- | S1 | Very Coarse Sand | 0.6% |
| IG7- | S1 | Gravel | 1.5% |
| | | | |
| IG7- | S4 | <10 Phi Clay | 7.6% |
| IG7- | S4 | 9-10 Phi Clay | 3.5% |
| IG7- | S4 | 8-9 Phi Clay | 4.6% |
| IG7- | S4 | Very Fine Silt | 6.3% |
| IG7- | S4 | Fine Silt | 7.9% |
| IG7- | S4 | Medium Silt | 9.1% |
| IG7- | S4 | Coarse Silt | 6.3% |
| IG7- | S4 | Very Fine Sand | 7.5% |
| IG7- | S4 | Fine Sand | 7.8% |
| IG7- | S4 | Medium Sand | 7.3% |
| IG7- | S4 | Coarse Sand | 7.5% |
| IG7- | S4 | Very Coarse Sand | 7.8% |
| IG7- | S4 | Gravel | 16.8% |
| | | | |
| IG8- | S1 | <10 Phi Clay | 51.7% |
| IG8- | S1 | 9-10 Phi Clay | 12.5% |
| IG8- | S1 | 8-9 Phi Clay | 14.0% |
| IG8- | S1 | Very Fine Silt | 9.4% |
| IG8- | S1 | Fine Silt | 7.5% |
| IG8- | S1 | Medium Silt | 2.4% |
| IG8- | S1 | Coarse Silt | 1.3% |
| IG8- | S1 | Very Fine Sand | 0.2% |
| IG8- | S1 | Fine Sand | 0.2% |
| IG8- | S1 | Medium Sand | 0.3% |
| IG8- | S1 | Coarse Sand | 0.3% |
| IG8- | S1 | Very Coarse Sand | 0.1% |
| | | | 0.0% |
| | | | 0.0% |
| | | | 0.0% |

| | | | |
|---|---|---|---|
| IG9- | S1 | <10 Phi Clay | 11.9% |
| IG9- | S1 | 8-9 Phi Clay | 5.2% |
| IG9- | S1 | 9-10 Phi Clay | 5.4% |
| IG9- | S1 | Very Fine Silt | 7.6% |
| IG9- | S1 | Fine Silt | 10.9% |
| IG9- | S1 | Medium Silt | 18.4% |
| IG9- | S1 | Coarse Silt | 12.5% |
| IG9- | S1 | Very Fine Sand | 15.7% |
| IG9- | S1 | Fine Sand | 8.2% |
| IG9- | S1 | Medium Sand | 1.8% |
| IG9- | S1 | Coarse Sand | 1.5% |
| IG9- | S1 | Very Coarse Sand | 0.5% |
| IG9- | S1 | Gravel | 0.4% |
| | | | |

| | | | |
|---|---|---|---|
| C-1, | S-1 | Fine Clay | 0.3% |
| C-1, | S-1 | Medium Clay | 0.1% |
| C-1, | S-1 | Coarse Clay | 0.2% |
| C-1, | S-1 | Very Fine Silt | 0.3% |
| C-1, | S-1 | Fine Silt | 0.4% |
| C-1, | S-1 | Medium Silt | 0.5% |
| C-1, | S-1 | Coarse Silt | 3.2% |
| C-1, | S-1 | Very Fine Sand | 1.5% |
| C-1, | S-1 | Fine Sand | 3.6% |
| C-1, | S-1 | Medium Sand | 3.6% |
| C-1, | S-1 | Coarse Sand | 3.0% |
| C-1, | S-1 | Very Coarse Sand | 15.4% |
| C-1, | S-1 | Gravel | 67.9% |
| | | | 100.0% |
| C-1, | S-2 | Fine Clay | 0.4% |
| C-1, | S-2 | Medium Clay | 0.3% |
| C-1, | S-2 | Coarse Clay | 0.4% |
| C-1, | S-2 | Very Fine Silt | 0.5% |
| C-1, | S-2 | Fine Silt | 0.8% |
| C-1, | S-2 | Medium Silt | 1.0% |
| C-1, | S-2 | Coarse Silt | 0.9% |
| C-1, | S-2 | Very Fine Sand | 2.0% |
| C-1, | S-2 | Fine Sand | 3.8% |
| C-1, | S-2 | Medium Sand | 4.2% |
| C-1, | S-2 | Coarse Sand | 5.6% |
| C-1, | S-2 | Very Coarse Sand | 8.3% |
| C-1, | S-2 | Gravel | 71.8% |
| | | | 0.0% |
| | | | 100.0% |

| | | | |
|---|---|---|---|
| C-10 | S-1 | Fine Clay | 47.8% |
| C-10 | S-1 | Medium Clay | 15.9% |
| C-10 | S-1 | Coarse Clay | 16.1% |
| C-10 | S-1 | Very Fine Silt | 11.0% |
| C-10 | S-1 | Fine Silt | 3.0% |
| C-10 | S-1 | Medium Silt | 1.2% |
| C-10 | S-1 | Coarse Silt | 3.8% |
| C-10 | S-1 | Very Fine Sand | 0.6% |
| C-10 | S-1 | Fine Sand | 0.2% |
| C-10 | S-1 | Medium Sand | 0.2% |
| C-10 | S-1 | Coarse Sand | 0.1% |
| C-10 | S-1 | Very Coarse Sand | 0.1% |
| C-10 | S-1 | Gravel | 0.1% |
| | | | 100.1% |
| C-10 | S-6 | Fine Clay | 8.7% |
| C-10 | S-6 | Medium Clay | 2.5% |
| C-10 | S-6 | Coarse Clay | 3.3% |
| C-10 | S-6 | Very Fine Silt | 4.0% |
| C-10 | S-6 | Fine Silt | 4.2% |
| C-10 | S-6 | Medium Silt | 5.6% |
| C-10 | S-6 | Coarse Silt | 7.3% |
| C-10 | S-6 | Very Fine Sand | 17.4% |
| C-10 | S-6 | Fine Sand | 30.3% |
| C-10 | S-6 | Medium Sand | 14.9% |
| C-10 | S-6 | Coarse Sand | 1.1% |
| C-10 | S-6 | Very Coarse Sand | 0.5% |
| C-10 | S-6 | Gravel | 0.1% |
| | | | 0.0% |
| | | | |
| C-11 | S-1 | Fine Clay | 22.6% |
| C-11 | S-1 | Medium Clay | 8.6% |
| C-11 | S-1 | Coarse Clay | 10.1% |
| C-11 | S-1 | Very Fine Silt | 11.4% |
| C-11 | S-1 | Fine Silt | 15.4% |
| C-11 | S-1 | Medium Silt | 16.7% |
| C-11 | S-1 | Coarse Silt | 6.8% |
| C-11 | S-1 | Very Fine Sand | 5.1% |
| C-11 | S-1 | Fine Sand | 1.1% |
| C-11 | S-1 | Medium Sand | 0.4% |
| C-11 | S-1 | Coarse Sand | 0.5% |
| C-11 | S-1 | Very Coarse Sand | 0.9% |
| C-11 | S-1 | Gravel | 0.4% |
| | | | 0.0% |

| | | | |
|---|---|---|---|
| C-11 | S-3 | Fine Clay | 11.3% |
| C-11 | S-3 | Medium Clay | 3.5% |
| C-11 | S-3 | Coarse Clay | 4.0% |
| C-11 | S-3 | Very Fine Silt | 6.0% |
| C-11 | S-3 | Fine Silt | 6.7% |
| C-11 | S-3 | Medium Silt | 8.4% |
| C-11 | S-3 | Coarse Silt | 8.0% |
| C-11 | S-3 | Very Fine Sand | 10.0% |
| C-11 | S-3 | Fine Sand | 11.0% |
| C-11 | S-3 | Medium Sand | 10.3% |
| C-11 | S-3 | Coarse Sand | 7.9% |
| C-11 | S-3 | Very Coarse Sand | 5.6% |
| C-11 | S-3 | Gravel | 7.3% |
| | | | 0.0% |
| | | | |
| C-11 | S-4 | Fine Clay | 12.3% |
| C-11 | S-4 | Medium Clay | 3.7% |
| C-11 | S-4 | Coarse Clay | 4.7% |
| C-11 | S-4 | Very Fine Silt | 6.2% |
| C-11 | S-4 | Fine Silt | 7.2% |
| C-11 | S-4 | Medium Silt | 9.2% |
| C-11 | S-4 | Coarse Silt | 8.8% |
| C-11 | S-4 | Very Fine Sand | 10.3% |
| C-11 | S-4 | Fine Sand | 11.4% |
| C-11 | S-4 | Medium Sand | 10.0% |
| C-11 | S-4 | Coarse Sand | 7.7% |
| C-11 | S-4 | Very Coarse Sand | 4.3% |
| C-11 | S-4 | Gravel | 4.2% |
| | | | 0.0% |
| | | | |
| C-12 | S-1 | Fine Clay | 0.8% |
| C-12 | S-1 | Medium Clay | 0.4% |
| C-12 | S-1 | Coarse Clay | 0.6% |
| C-12 | S-1 | Very Fine Silt | 0.9% |
| C-12 | S-1 | Fine Silt | 1.0% |
| C-12 | S-1 | Medium Silt | 1.5% |
| C-12 | S-1 | Coarse Silt | 1.9% |
| C-12 | S-1 | Very Fine Sand | 4.9% |
| C-12 | S-1 | Fine Sand | 15.5% |
| C-12 | S-1 | Medium Sand | 46.0% |
| C-12 | S-1 | Coarse Sand | 21.7% |
| C-12 | S-1 | Very Coarse Sand | 2.6% |
| C-12 | S-1 | Gravel | 2.1% |

| | | | |
|---|---|---|---|
| | | | 0.0% |
| | | | |
| C-12 | S-2 | Fine Clay | 11.5% |
| C-12 | S-2 | Medium Clay | 4.0% |
| C-12 | S-2 | Coarse Clay | 6.6% |
| C-12 | S-2 | Very Fine Silt | 6.6% |
| C-12 | S-2 | Fine Silt | 6.2% |
| C-12 | S-2 | Medium Silt | 7.2% |
| C-12 | S-2 | Coarse Silt | 5.0% |
| C-12 | S-2 | Very Fine Sand | 14.9% |
| C-12 | S-2 | Fine Sand | 13.7% |
| C-12 | S-2 | Medium Sand | 7.4% |
| C-12 | S-2 | Coarse Sand | 7.7% |
| C-12 | S-2 | Very Coarse Sand | 6.0% |
| C-12 | S-2 | Gravel | 3.2% |
| | | | 0.0% |
| | | | |
| C-12 | S-4 | Fine Clay | 1.1% |
| C-12 | S-4 | Medium Clay | 0.3% |
| C-12 | S-4 | Coarse Clay | 0.5% |
| C-12 | S-4 | Very Fine Silt | 0.8% |
| C-12 | S-4 | Fine Silt | 1.2% |
| C-12 | S-4 | Medium Silt | 1.7% |
| C-12 | S-4 | Coarse Silt | 1.3% |
| C-12 | S-4 | Very Fine Sand | 2.5% |
| C-12 | S-4 | Fine Sand | 3.5% |
| C-12 | S-4 | Medium Sand | 5.2% |
| C-12 | S-4 | Coarse Sand | 7.6% |
| C-12 | S-4 | Very Coarse Sand | 10.8% |
| C-12 | S-4 | Gravel | 63.5% |
| | | | 0.0% |
| C-2, | S-1 | Fine Clay | 13.6% |
| C-2, | S-1 | Medium Clay | 6.5% |
| C-2, | S-1 | Coarse Clay | 7.9% |
| C-2, | S-1 | Very Fine Silt | 10.3% |
| C-2, | S-1 | Fine Silt | 10.5% |
| C-2, | S-1 | Medium Silt | 12.9% |
| C-2, | S-1 | Coarse Silt | 7.3% |
| C-2, | S-1 | Very Fine Sand | 14.5% |
| C-2, | S-1 | Fine Sand | 8.4% |
| C-2, | S-1 | Medium Sand | 3.4% |
| C-2, | S-1 | Coarse Sand | 2.9% |
| C-2, | S-1 | Very Coarse Sand | 0.3% |
| C-2, | S-1 | Gravel | 1.5% |

| | | | |
|---|---|---|---|
| | | | 0.0% |
| C-2, | S-4 | Fine Clay | 14.8% |
| C-2, | S-4 | Medium Clay | 7.3% |
| C-2, | S-4 | Coarse Clay | 9.4% |
| C-2, | S-4 | Very Fine Silt | 8.9% |
| C-2, | S-4 | Fine Silt | 12.0% |
| C-2, | S-4 | Medium Silt | 21.6% |
| C-2, | S-4 | Coarse Silt | 9.2% |
| C-2, | S-4 | Very Fine Sand | 10.2% |
| C-2, | S-4 | Fine Sand | 3.7% |
| C-2, | S-4 | Medium Sand | 1.5% |
| C-2, | S-4 | Coarse Sand | 1.1% |
| C-2, | S-4 | Very Coarse Sand | 0.1% |
| C-2, | S-4 | Gravel | 0.2% |
| | | | 0.0% |
| C-2, | S-5 | Fine Clay | 17.4% |
| C-2, | S-5 | Medium Clay | 7.8% |
| C-2, | S-5 | Coarse Clay | 11.3% |
| C-2, | S-5 | Very Fine Silt | 10.2% |
| C-2, | S-5 | Fine Silt | 17.0% |
| C-2, | S-5 | Medium Silt | 17.0% |
| C-2, | S-5 | Coarse Silt | 4.3% |
| C-2, | S-5 | Very Fine Sand | 7.4% |
| C-2, | S-5 | Fine Sand | 3.5% |
| C-2, | S-5 | Medium Sand | 2.2% |
| C-2, | S-5 | Coarse Sand | 1.7% |
| C-2, | S-5 | Very Coarse Sand | 0.2% |
| C-2, | S-5 | Gravel | 0.1% |
| | | | 0.0% |
| C3-S | S1 | <10 Phi Clay | 30.6% |
| C3-S | S1 | Medium Clay | 14.5% |
| C3-S | S1 | Coarse Clay | 15.9% |
| C3-S | S1 | Very Fine Silt | 17.0% |
| C3-S | S1 | Fine Silt | 12.1% |
| C3-S | S1 | Medium Silt | 5.9% |
| C3-S | S1 | Coarse Silt | 0.5% |
| C3-S | S1 | Very Fine Sand | 2.1% |
| C3-S | S1 | Fine Sand | 0.7% |
| C3-S | S1 | Medium Sand | 0.4% |
| C3-S | S1 | Coarse Sand | 0.2% |
| C3-S | S1 | Very Coarse Sand | 0.1% |
| C3-S | S1 | Gravel | 0.1% |
| | | | 0.0% |

| | | | |
|---|---|---|---|
| C3-S | S4A | <10 Phi Clay | 17.2% |
| C3-S | S4A | Medium Clay | 4.7% |
| C3-S | S4A | Coarse Clay | 7.0% |
| C3-S | S4A | Very Fine Silt | 8.9% |
| C3-S | S4A | Fine Silt | 14.1% |
| C3-S | S4A | Medium Silt | 13.3% |
| C3-S | S4A | Coarse Silt | 12.4% |
| C3-S | S4A | Very Fine Sand | 9.8% |
| C3-S | S4A | Fine Sand | 6.3% |
| C3-S | S4A | Medium Sand | 3.2% |
| C3-S | S4A | Coarse Sand | 1.9% |
| C3-S | S4A | Very Coarse Sand | 0.8% |
| C3-S | S4A | Gravel | 0.2% |
| | | | 0.0% |
| C3-S | S4B | <10 Phi Clay | 21.1% |
| C3-S | S4B | Medium Clay | 13.1% |
| C3-S | S4B | Coarse Clay | 13.1% |
| C3-S | S4B | Very Fine Silt | 17.4% |
| C3-S | S4B | Fine Silt | 10.3% |
| C3-S | S4B | Medium Silt | 6.9% |
| C3-S | S4B | Coarse Silt | 1.2% |
| C3-S | S4B | Very Fine Sand | 4.1% |
| C3-S | S4B | Fine Sand | 3.5% |
| C3-S | S4B | Medium Sand | 3.0% |
| C3-S | S4B | Coarse Sand | 3.6% |
| C3-S | S4B | Very Coarse Sand | 1.9% |
| C3-S | S4B | Gravel | 1.0% |
| | | | 0.0% |
| C-4, | S-1 | Fine Clay | 29.2% |
| C-4, | S-1 | Medium Clay | 12.1% |
| C-4, | S-1 | Coarse Clay | 16.0% |
| C-4, | S-1 | Very Fine Silt | 15.4% |
| C-4, | S-1 | Fine Silt | 13.2% |
| C-4, | S-1 | Medium Silt | 7.4% |
| C-4, | S-1 | Coarse Silt | 1.9% |
| C-4, | S-1 | Very Fine Sand | 2.2% |
| C-4, | S-1 | Fine Sand | 1.0% |
| C-4, | S-1 | Medium Sand | 0.6% |
| C-4, | S-1 | Coarse Sand | 0.6% |
| C-4, | S-1 | Very Coarse Sand | 0.7% |
| C-4, | S-1 | Gravel | 0.1% |
| | | | |

| | | | |
|---|---|---|---|
| C-4, | S-6 | Fine Clay | 37.2% |
| C-4, | S-6 | Medium Clay | 14.6% |
| C-4, | S-6 | Coarse Clay | 17.3% |
| C-4, | S-6 | Very Fine Silt | 14.0% |
| C-4, | S-6 | Fine Silt | 7.4% |
| C-4, | S-6 | Medium Silt | 3.7% |
| C-4, | S-6 | Coarse Silt | 1.1% |
| C-4, | S-6 | Very Fine Sand | 2.3% |
| C-4, | S-6 | Fine Sand | 1.2% |
| C-4, | S-6 | Medium Sand | 0.7% |
| C-4, | S-6 | Coarse Sand | 0.5% |
| C-4, | S-6 | Very Coarse Sand | 0.1% |
| C-4, | S-6 | Gravel | 0.1% |
| | | | 0.0% |
| C-5, | S-1 | Fine Clay | 40.8% |
| C-5, | S-1 | Medium Clay | 15.0% |
| C-5, | S-1 | Coarse Clay | 16.3% |
| C-5, | S-1 | Very Fine Silt | 12.4% |
| C-5, | S-1 | Fine Silt | 7.9% |
| C-5, | S-1 | Medium Silt | 5.0% |
| C-5, | S-1 | Coarse Silt | 0.9% |
| C-5, | S-1 | Very Fine Sand | 1.0% |
| C-5, | S-1 | Fine Sand | 0.3% |
| C-5, | S-1 | Medium Sand | 0.2% |
| C-5, | S-1 | Coarse Sand | 0.2% |
| C-5, | S-1 | Very Coarse Sand | 0.1% |
| C-5, | S-1 | Gravel | 0.1% |
| | | | |
| C-5, | S-3 | Fine Clay | 8.6% |
| C-5, | S-3 | Medium Clay | 3.6% |
| C-5, | S-3 | Coarse Clay | 4.8% |
| C-5, | S-3 | Very Fine Silt | 5.6% |
| C-5, | S-3 | Fine Silt | 9.4% |
| C-5, | S-3 | Medium Silt | 13.6% |
| C-5, | S-3 | Coarse Silt | 13.2% |
| C-5, | S-3 | Very Fine Sand | 12.8% |
| C-5, | S-3 | Fine Sand | 10.2% |
| C-5, | S-3 | Medium Sand | 7.3% |
| C-5, | S-3 | Coarse Sand | 6.0% |
| C-5, | S-3 | Very Coarse Sand | 3.0% |
| C-5, | S-3 | Gravel | 1.9% |
| | | | |

| | | | |
|---|---|---|---|
| C-6, | S-1 | Fine Clay | 47.7% |
| C-6, | S-1 | Medium Clay | 11.2% |
| C-6, | S-1 | Coarse Clay | 18.0% |
| C-6, | S-1 | Very Fine Silt | 12.1% |
| C-6, | S-1 | Fine Silt | 5.0% |
| C-6, | S-1 | Medium Silt | 2.4% |
| C-6, | S-1 | Coarse Silt | 1.4% |
| C-6, | S-1 | Very Fine Sand | 0.9% |
| C-6, | S-1 | Fine Sand | 0.4% |
| C-6, | S-1 | Medium Sand | 0.5% |
| C-6, | S-1 | Coarse Sand | 0.4% |
| C-6, | S-1 | Very Coarse Sand | 0.1% |
| C-6, | S-1 | Gravel | 0.1% |
| | | | |
| | | | 0.0% |
| C-7, | S-1 | Fine Clay | 1.8% |
| C-7, | S-1 | Medium Clay | 0.8% |
| C-7, | S-1 | Coarse Clay | 1.0% |
| C-7, | S-1 | Very Fine Silt | 1.0% |
| C-7, | S-1 | Fine Silt | 1.2% |
| C-7, | S-1 | Medium Silt | 1.7% |
| C-7, | S-1 | Coarse Silt | 2.7% |
| C-7, | S-1 | Very Fine Sand | 8.7% |
| C-7, | S-1 | Fine Sand | 24.0% |
| C-7, | S-1 | Medium Sand | 20.1% |
| C-7, | S-1 | Coarse Sand | 17.1% |
| C-7, | S-1 | Very Coarse Sand | 14.1% |
| C-7, | S-1 | Gravel | 5.8% |
| | | | |
| | | | 0.0% |
| C-7, | S-4 | Fine Clay | 9.7% |
| C-7, | S-4 | Medium Clay | 4.6% |
| C-7, | S-4 | Coarse Clay | 5.6% |
| C-7, | S-4 | Very Fine Silt | 7.3% |
| C-7, | S-4 | Fine Silt | 10.4% |
| C-7, | S-4 | Medium Silt | 16.8% |
| C-7, | S-4 | Coarse Silt | 15.3% |
| C-7, | S-4 | Very Fine Sand | 17.6% |
| C-7, | S-4 | Fine Sand | 8.7% |
| C-7, | S-4 | Medium Sand | 2.4% |
| C-7, | S-4 | Coarse Sand | 1.4% |
| C-7, | S-4 | Very Coarse Sand | 0.1% |
| C-7, | S-4 | Gravel | 0.1% |

| | | | |
|---|---|---|---|
| | | | 0.0% |
| C-8, | S-1 | Fine Clay | 18.8% |
| C-8, | S-1 | Medium Clay | 8.3% |
| C-8, | S-1 | Coarse Clay | 10.9% |
| C-8, | S-1 | Very Fine Silt | 12.3% |
| C-8, | S-1 | Fine Silt | 9.7% |
| C-8, | S-1 | Medium Silt | 15.9% |
| C-8, | S-1 | Coarse Silt | 5.1% |
| C-8, | S-1 | Very Fine Sand | 8.6% |
| C-8, | S-1 | Fine Sand | 3.6% |
| C-8, | S-1 | Medium Sand | 1.4% |
| C-8, | S-1 | Coarse Sand | 1.2% |
| C-8, | S-1 | Very Coarse Sand | 2.0% |
| C-8, | S-1 | Gravel | 2.1% |
| | | | 0.0% |
| C-8, | S-3 | Fine Clay | 19.8% |
| C-8, | S-3 | Medium Clay | 7.4% |
| C-8, | S-3 | Coarse Clay | 9.5% |
| C-8, | S-3 | Very Fine Silt | 9.7% |
| C-8, | S-3 | Fine Silt | 9.9% |
| C-8, | S-3 | Medium Silt | 18.4% |
| C-8, | S-3 | Coarse Silt | 8.1% |
| C-8, | S-3 | Very Fine Sand | 9.8% |
| C-8, | S-3 | Fine Sand | 3.4% |
| C-8, | S-3 | Medium Sand | 1.4% |
| C-8, | S-3 | Coarse Sand | 1.2% |
| C-8, | S-3 | Very Coarse Sand | 1.3% |
| C-8, | S-3 | Gravel | 0.1% |
| | | | 0.0% |
| C-9, | S-1 | Fine Clay | 28.6% |
| C-9, | S-1 | Medium Clay | 13.4% |
| C-9, | S-1 | Coarse Clay | 16.3% |
| C-9, | S-1 | Very Fine Silt | 16.7% |
| C-9, | S-1 | Fine Silt | 10.9% |
| C-9, | S-1 | Medium Silt | 7.0% |
| C-9, | S-1 | Coarse Silt | 0.5% |
| C-9, | S-1 | Very Fine Sand | 3.0% |
| C-9, | S-1 | Fine Sand | 1.6% |
| C-9, | S-1 | Medium Sand | 1.1% |
| C-9, | S-1 | Coarse Sand | 0.7% |
| C-9, | S-1 | Very Coarse Sand | 0.2% |
| C-9, | S-1 | Gravel | 0.1% |
| | | | 0.0% |

| | | | |
|---|---|---|---|
| C-9, | S-3 | Fine Clay | 9.9% |
| C-9, | S-3 | Medium Clay | 3.4% |
| C-9, | S-3 | Coarse Clay | 4.3% |
| C-9, | S-3 | Very Fine Silt | 5.7% |
| C-9, | S-3 | Fine Silt | 5.6% |
| C-9, | S-3 | Medium Silt | 7.1% |
| C-9, | S-3 | Coarse Silt | 4.7% |
| C-9, | S-3 | Very Fine Sand | 8.4% |
| C-9, | S-3 | Fine Sand | 9.5% |
| C-9, | S-3 | Medium Sand | 9.4% |
| C-9, | S-3 | Coarse Sand | 8.7% |
| C-9, | S-3 | Very Coarse Sand | 6.3% |
| C-9, | S-3 | Gravel | 16.9% |

| Location | Vertical | Type | Value | Value % | Volume |
|---|---|---|---|---|---|
| J-1, | S-1 | > 10 Phi Clay | 4.40 | 4% | 27,984 |
| J-1, | S-1 | 9-10 Phi Clay | 1.60 | 2% | 10,176 |
| J-1, | S-1 | 8-9 Phi Clay | 2.50 | 3% | 15,900 |
| J-1, | S-1 | Very Fine Silt | 2.70 | 3% | 17,172 |
| J-1, | S-1 | Fine Silt | 2.50 | 3% | 15,900 |
| J-1, | S-1 | Medium Silt | 3.30 | 3% | 20,988 |
| J-1, | S-1 | Coarse Silt | 2.70 | 3% | 17,172 |
| J-1, | S-1 | Very Fine Sand | 11.20 | 11% | 71,232 |
| J-1, | S-1 | Fine Sand | 56.40 | 56% | 358,704 |
| J-1, | S-1 | Medium Sand | 10.80 | 11% | 68,688 |
| J-1, | S-1 | Coarse Sand | 1.60 | 2% | 10,176 |
| J-1, | S-1 | Very Coarse Sand | 0.10 | 0% | 636 |
| J-1, | S-1 | Gravel | 0.10 | 0% | 636 |
| | | | | | 636,000 |