**La Zanja Obsidian Elemental Anaylsis: Comparison between EDXRF and pXRF Results**

**Table 1: Elemental concentration values for obsidian sources identified by bench-top XRF and pXRF. All values are in parts per million and are rounded to the first whole number.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Source** |  | **Ti** | **Mn** | **Fe** | **Zn** | **Ga** | **Th** | **Rb** | **Sr** | **Y** | **Zr** | **Nb** | **Ba** | **Pb** |
| **Otumba** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bench-top | mean | 1015 | 302 | 1.15\* | 40 | 14 | 9 | 124 | 124 | 23 | 135 | 13 | 786 | 20 |
| (*n*=5) | std | 112 | 52 | 0.13\* | 6 | 3 | 4 | 4 | 9 | 2 | 6 | 1 | 95 | 2 |
| pXRF | mean |  | 401 | 9764 | 53 | 19 | 11 | 134 | 137 | 26 | 147 | 14 |  |  |
| (*n*=5) | std |  | 39 | 588 | 6 | 2 | 1 | 6 | 13 | 3 | 7 | 1 |  |  |
| **Ucareo** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bench-top | mean | 497 | 151 | 0.84\* | 38 | 18 | 14 | 157 | 17 | 25 | 119 | 12 | 124 | 19 |
| (*n*=34) | std | 159 | 51 | 0.10\* | 7 | 4 | 4 | 9 | 2 | 1 | 4 | 1 | 22 | 3 |
| pXRF | mean |  | 158 | 8697 | 48 | 18 | 15 | 165 | 14 | 26 | 129 | 15 |  |  |
| (*n*=34) | std |  | 42 | 736 | 15 | 1 | 3 | 12 | 3 | 2 | 7 | 2 |  |  |
| **Paredon** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bench-top | mean | 864 | 293 | 1.12\* | 60 | 21 | 17 | 176 | 10 | 50 | 205 | 42 | 37 | 29 |
| (*n*=5) | std | 158 | 11 | 0.10\* | 4 | 4 | 2 | 7 | 2 | 2 | 5 | 1 | 8 | 3 |
| pXRF | mean |  | 409 | 9639 | 69 | 20 | 20 | 186 | 5 | 51 | 215 | 46 |  |  |
| (*n*=5) | std |  | 46 | 777 | 11 | 2 | 3 | 17 | 1 | 2 | 14 | 3 |  |  |
| **Guadalupe**  **Victoria** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bench-top | mean |  |  |  | 34 | 19 | 7 | 102 | 65 | 14 | 78 | 12 | 935 | 15 |
| (*n*=2) | std |  |  |  | 23 | 6 | 0 | 7 | 5 | 3 | 8 | 3 | -- | 5 |
| pXRF | mean |  | 555 | 4995 | 29 | 18 | 7 | 109 | 69 | 16 | 85 | 12 |  |  |
| (*n*=2) | std |  | 2 | 44 | 12 | 1 | 0 | 10 | 4 | 0 | 8 | 0 |  |  |
| **Pachuca** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bench-top | mean | 1300 | 923 | 2.23\* | 205 | 29 | 10 | 207 | 8 | 110 | 917 | 89 | 8 | 27 |
| (*n*=2) | std | -- | -- | -- | 13 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | -- | 7 |
| pXRF | mean |  | 1168 | 16815 | 221 | 24 | 21 | 202 | 3 | 113 | 924 | 92 |  |  |
| (*n*=2) | std |  | 25 | 196 | 2 | 1 | 2 | 6 | 1 | 4 | 16 | 5 |  |  |

\* denotes percentage

**Table 2: Complete results of Spectrace 5000 energy-dispersive XRF (EDXRF) spectrometer analysis performed at the Northwest Research Obsidian Studies Laboratory. NM denotes “not measured”.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample ID** | **Depth** | **Ti** | **Mn** | **Fe** | **Zn** | **Ga** | **Rb** | **Sr** | **Y** | **Zr** | **Nb** | **Ba** | **Pb** | **Th** | **Source** |
| LZO-3 | Surface | 976 | 285 | 1.05 | 64 | 23 | 170 | 8 | 52 | 203 | 42 | 31 | 26 | 16 | Paredon |
| LZO-6 | 0-25 | 682 | 234 | 0.88 | 39 | 20 | 162 | 16 | 26 | 118 | 13 | 118 | 23 | 17 | Ucareo |
| LZO-18 | 25-40 | 716 | 286 | 0.96 | 40 | 14 | 144 | 13 | 23 | 110 | 12 | 102 | 20 | 11 | Ucareo |
| LZO-31 | 140-160 | NM | NM | NM | 196 | 30 | 207 | 10 | 111 | 919 | 90 | NM | 22 | 8 | Pachuca |
| LZO-72 | 200-220 | 643 | 183 | 0.71 | 38 | 23 | 151 | 16 | 25 | 112 | 11 | NM | 22 | 13 | Ucareo |
| LZO-83 | 200-220 | 685 | 105 | 0.76 | 38 | 21 | 150 | 16 | 24 | 121 | 11 | NM | 22 | 14 | Ucareo |
| LZO-114 | 200-220 | 292 | 109 | 0.78 | 29 | 16 | 164 | 17 | 26 | 120 | 14 | NM | 16 | 16 | Ucareo |
| LZO-117 | 220-240 | 1094 | 265 | 1.05 | 43 | 17 | 124 | 123 | 20 | 136 | 11 | 719 | 19 | 7 | Otumba |
| LZO-118 | 220-240 | 395 | 141 | 1.04 | 36 | 22 | 149 | 17 | 23 | 116 | 13 | 159 | 15 | 11 | Ucareo |
| LZO-121 | 220-240 | 529 | 106 | 0.74 | 41 | 15 | 157 | 16 | 24 | 118 | 11 | NM | 15 | 14 | Ucareo |
| LZO-127 | 220-240 | 322 | 125 | 0.84 | 34 | 16 | 154 | 17 | 26 | 116 | 11 | NM | 20 | 9 | Ucareo |
| LZO-129 | 220-240 | 580 | 166 | 0.72 | 41 | 23 | 158 | 23 | 25 | 119 | 11 | NM | 19 | 13 | Ucareo |
| LZO-132 | 220-240 | 344 | 122 | 0.92 | 44 | 16 | 166 | 17 | 27 | 117 | 13 | NM | 23 | 10 | Ucareo |
| LZO-134 | 220-240 | NM | NM | NM | 53 | 23 | 177 | 21 | 26 | 127 | 13 | NM | 14 | 15 | Ucareo |
| LZO-155 | 220-240 | NM | NM | NM | 50 | 23 | 107 | 68 | 12 | 83 | 14 | NM | 18 | 7 | Guadalupe Victoria |
| LZO-175 | 240-260 | NM | NM | NM | 31 | 19 | 157 | 17 | 23 | 124 | 14 | NM | 16 | 23 | Ucareo |
| LZO-178 | 240-260 | NM | NM | NM | 35 | 12 | 150 | 15 | 25 | 121 | 12 | NM | 19 | 13 | Ucareo |
| LZO-179 | 240-260 | NM | NM | NM | 46 | 18 | 151 | 18 | 27 | 122 | 12 | NM | 18 | 6 | Ucareo |
| LZO-180 | 240-260 | NM | NM | NM | 61 | 17 | 174 | 9 | 49 | 215 | 44 | NM | 32 | 18 | Paredon |
| LZO-183 | 240-260 | NM | NM | NM | 47 | 17 | 171 | 16 | 26 | 119 | 13 | NM | 21 | 17 | Ucareo |
| LZO-185 | 240-260 | NM | NM | NM | 43 | 14 | 125 | 136 | 26 | 142 | 13 | NM | 19 | 9 | Otumba |
| LZO-190 | 240-260 | NM | NM | NM | 32 | 14 | 149 | 17 | 25 | 123 | 12 | NM | 21 | 18 | Ucareo |
| LZO-217 | 240-260 | NM | NM | NM | 32 | 20 | 161 | 13 | 26 | 115 | 12 | NM | 24 | 15 | Ucareo |
| LZO-219 | 240-260 | NM | NM | NM | 57 | 14 | 158 | 24 | 25 | 131 | 11 | NM | 18 | 18 | Ucareo |
| LZO-221 | 240-260 | NM | NM | NM | 60 | 19 | 179 | 14 | 47 | 203 | 42 | NM | 32 | 16 | Paredon |
| LZO-225 | 240-260 | NM | NM | NM | 35 | 21 | 149 | 16 | 24 | 119 | 14 | NM | 14 | 11 | Ucareo |
| LZO-236 | 240-260 | NM | NM | NM | 33 | 16 | 130 | 110 | 23 | 125 | 15 | NM | 19 | 5 | Otumba |
| LZO-237 | 240-260 | 518 | 205 | 0.86 | 23 | 18 | 161 | 15 | 25 | 120 | 10 | 90 | 22 | 13 | Ucareo |
| LZO-238 | 240-260 | 637 | 136 | 1.00 | 26 | 13 | 155 | 15 | 26 | 122 | 13 | 118 | 19 | 7 | Ucareo |
| LZO-241 | 240-260 | 887 | 279 | 0.67 | 38 | 17 | 135 | 83 | 21 | 127 | 15 | 678 | 21 | 10 | Unassigned |
| LZO-242 | 240-260 | 612 | 149 | 0.83 | 46 | 20 | 176 | 19 | 25 | 130 | 13 | 130 | 19 | 19 | Ucareo |
| LZO-243 | 240-260 | 356 | 114 | 0.83 | 39 | 22 | 159 | 16 | 26 | 121 | 15 | NM | 23 | 16 | Ucareo |
| LZO-245 | 240-260 | NM | NM | NM | 62 | 26 | 186 | 9 | 52 | 204 | 40 | NM | 30 | 19 | Paredon |
| LZO-347 | 260-280 | NM | NM | NM | 39 | 21 | 149 | 17 | 25 | 119 | 13 | 144 | 20 | 18 | Ucareo |
| LZO-349 | 260-280 | 304 | 121 | 0.83 | 32 | 15 | 157 | 16 | 24 | 118 | 12 | NM | 17 | 11 | Ucareo |
| LZO-350 | 260-280 | NM | NM | NM | 43 | 11 | 154 | 15 | 25 | 115 | 12 | NM | 19 | 13 | Ucareo |
| LZO-354 | 260-280 | 265 | 99 | 0.72 | 38 | 19 | 151 | 18 | 24 | 116 | 11 | NM | 16 | 14 | Ucareo |
| LZO-357 | 260-280 | NM | NM | NM | 31 | 23 | 158 | 16 | 25 | 112 | 14 | NM | 19 | 17 | Ucareo |
| LZO-373 | 260-280 | NM | NM | NM | 47 | 16 | 149 | 14 | 26 | 123 | 13 | NM | 19 | 13 | Ucareo |
| LZO-380 | 260-280 | NM | NM | NM | 48 | 17 | 154 | 15 | 25 | 119 | 13 | NM | 20 | 15 | Ucareo |
| LZO-398 | 260-280 | 567 | 165 | 0.90 | 45 | 22 | 174 | 15 | 25 | 117 | 13 | 127 | 21 | 12 | Ucareo |
| LZO-402 | 280-300 | NM | NM | NM | 30 | 14 | 149 | 15 | 24 | 120 | 13 | NM | 20 | 14 | Ucareo |
| LZO-403 | 280-300 | NM | NM | NM | 18 | 15 | 97 | 62 | 16 | 72 | 10 | 935 | 12 | 7 | Guadalupe Victoria |
| LZO-407 | 280-300 | NM | NM | NM | 37 | 20 | 166 | 18 | 28 | 116 | 13 | NM | 23 | 15 | Ucareo |
| LZO-412 | 280-300 | 752 | 301 | 1.20 | 53 | 21 | 169 | 8 | 49 | 202 | 42 | 43 | 27 | 18 | Paredon |
| LZO-414 | 280-300 | NM | NM | NM | 33 | 15 | 120 | 126 | 22 | 134 | 12 | NM | 18 | 16 | Otumba |
| LZO-420 | 280-300 | NM | NM | NM | 38 | 10 | 147 | 15 | 26 | 118 | 12 | NM | 20 | 18 | Ucareo |
| LZO-425 | 300-320 | 936 | 338 | 1.24 | 47 | 9 | 119 | 124 | 23 | 138 | 13 | 853 | 23 | 10 | Otumba |
| LZO-447 | -- | 1300 | 923 | 2.23 | 214 | 28 | 208 | 6 | 110 | 915 | 88 | 8 | 32 | 12 | Pachuca |

**Table 3: Results of pXRF analysis for samples also analyzed using EDXRF**.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample ID** | **Depth** | **Mn** | **Fe** | **Zn** | **Ga** | **Th** | **Rb** | **Sr** | **Y** | **Zr** | **Nb** | **Source** |
| LZO-3 | Surface | 336 | 8717 | 61 | 18 | 16 | 166 | 4 | 48 | 197 | 41 | Paredon |
| LZO-6 | 0-25 | 177 | 7621 | 39 | 18 | 10 | 144 | 11 | 24 | 118 | 12 | Ucareo |
| LZO-18 | 25-40 | 114 | 7861 | 28 | 17 | 13 | 151 | 12 | 23 | 118 | 14 | Ucareo |
| LZO-31 | 140-160 | 1151 | 16953 | 223 | 25 | 19 | 206 | 3 | 116 | 935 | 96 | Pachuca |
| LZO-72 | 200-220 | 164 | 8703 | 51 | 19 | 17 | 169 | 14 | 25 | 127 | 16 | Ucareo |
| LZO-83 | 200-220 | 200 | 8701 | 37 | 16 | 17 | 160 | 12 | 27 | 131 | 15 | Ucareo |
| LZO-114 | 200-220 | 128 | 9981 | 51 | 21 | 17 | 185 | 18 | 26 | 134 | 16 | Ucareo |
| LZO-117 | 220-240 | 399 | 10046 | 56 | 21 | 10 | 134 | 140 | 27 | 151 | 14 | Otumba |
| LZO-118 | 220-240 | 105 | 8310 | 48 | 18 | 14 | 162 | 15 | 22 | 126 | 14 | Ucareo |
| LZO-121 | 220-240 | 125 | 8952 | 48 | 16 | 18 | 172 | 15 | 27 | 130 | 17 | Ucareo |
| LZO-127 | 220-240 | 177 | 8337 | 53 | 18 | 14 | 161 | 12 | 25 | 123 | 15 | Ucareo |
| LZO-129 | 220-240 | 125 | 8385 | 42 | 19 | 13 | 160 | 15 | 23 | 129 | 14 | Ucareo |
| LZO-132 | 220-240 | 137 | 9221 | 35 | 20 | 19 | 180 | 11 | 30 | 128 | 15 | Ucareo |
| LZO-134 | 220-240 | 282 | 10275 | 63 | 19 | 14 | 186 | 19 | 29 | 144 | 19 | Ucareo |
| LZO-155 | 220-240 | 556 | 4963 | 38 | 19 | 6 | 116 | 71 | 16 | 90 | 12 | Guadalupe Victoria |
| LZO-175 | 240-260 | 109 | 9334 | 58 | 18 | 14 | 170 | 14 | 28 | 136 | 15 | Ucareo |
| LZO-178 | 240-260 | 148 | 8810 | 52 | 18 | 14 | 163 | 14 | 26 | 135 | 13 | Ucareo |
| LZO-179 | 240-260 | 210 | 10730 | 60 | 19 | 21 | 190 | 16 | 31 | 145 | 17 | Ucareo |
| LZO-180 | 240-260 | 442 | 10376 | 85 | 22 | 21 | 200 | 6 | 53 | 223 | 50 | Paredon |
| LZO-183 | 240-260 | 215 | 9941 | 66 | 20 | 16 | 182 | 16 | 29 | 129 | 17 | Ucareo |
| LZO-185 | 240-260 | 418 | 10526 | 45 | 19 | 13 | 136 | 143 | 30 | 155 | 15 | Otumba |
| LZO-190 | 240-260 | 133 | 8309 | 42 | 17 | 13 | 156 | 14 | 26 | 135 | 14 | Ucareo |
| LZO-217 | 240-260 | 233 | 9316 | 54 | 19 | 18 | 177 | 13 | 29 | 128 | 16 | Ucareo |
| LZO-219 | 240-260 | 96 | 8942 | 103 | 20 | 13 | 170 | 25 | 25 | 140 | 17 | Ucareo |
| LZO-221 | 240-260 | 389 | 10128 | 69 | 19 | 21 | 201 | 6 | 53 | 231 | 48 | Paredon |
| LZO-225 | 240-260 | 167 | 8799 | 54 | 16 | 17 | 173 | 12 | 26 | 126 | 16 | Ucareo |
| LZO-236 | 240-260 | 434 | 8942 | 49 | 16 | 11 | 142 | 120 | 24 | 136 | 15 | Otumba |
| LZO-237 | 240-260 | 167 | 9153 | 51 | 19 | 19 | 177 | 13 | 29 | 130 | 17 | Ucareo |
| LZO-238 | 240-260 | 108 | 8787 | 38 | 17 | 12 | 159 | 13 | 26 | 130 | 15 | Ucareo |
| LZO-241 | 240-260 | 321 | 7244 | 30 | 18 | 11 | 122 | 78 | 24 | 120 | 16 | Unknown Source |
| LZO-242 | 240-260 | 180 | 8308 | 36 | 17 | 10 | 153 | 11 | 25 | 129 | 13 | Ucareo |
| LZO-243 | 240-260 | 168 | 7919 | 45 | 18 | 14 | 159 | 16 | 27 | 127 | 13 | Ucareo |
| LZO-245 | 240-260 | 439 | 10094 | 70 | 22 | 22 | 193 | 4 | 53 | 218 | 47 | Paredon |
| LZO-347 | 260-280 | 129 | 8095 | 31 | 15 | 16 | 158 | 13 | 25 | 127 | 16 | Ucareo |
| LZO-349 | 260-280 | 146 | 8141 | 52 | 18 | 17 | 163 | 13 | 22 | 121 | 16 | Ucareo |
| LZO-350 | 260-280 | 144 | 8447 | 65 | 17 | 16 | 173 | 14 | 27 | 124 | 16 | Ucareo |
| LZO-354 | 260-280 | 172 | 8290 | 35 | 17 | 14 | 157 | 13 | 28 | 128 | 12 | Ucareo |
| LZO-357 | 260-280 | 140 | 8719 | 43 | 21 | 13 | 175 | 13 | 28 | 130 | 18 | Ucareo |
| LZO-373 | 260-280 | 131 | 8532 | 38 | 15 | 14 | 157 | 11 | 29 | 131 | 16 | Ucareo |
| LZO-380 | 260-280 | 117 | 8341 | 39 | 18 | 14 | 161 | 15 | 26 | 131 | 14 | Ucareo |
| LZO-398 | 260-280 | 117 | 7316 | 29 | 17 | 13 | 144 | 9 | 24 | 109 | 15 | Ucareo |
| LZO-402 | 280-300 | 200 | 8065 | 41 | 17 | 16 | 153 | 12 | 26 | 121 | 13 | Ucareo |
| LZO-403 | 280-300 | 554 | 5026 | 21 | 17 | 7 | 103 | 66 | 16 | 80 | 12 | Guadalupe Victoria |
| LZO-407 | 280-300 | 216 | 8718 | 70 | 18 | 22 | 166 | 13 | 30 | 125 | 14 | Ucareo |
| LZO-412 | 280-300 | 439 | 8882 | 59 | 18 | 17 | 169 | 3 | 50 | 205 | 46 | Paredon |
| LZO-414 | 280-300 | 335 | 9756 | 61 | 19 | 11 | 131 | 153 | 26 | 149 | 14 | Otumba |
| LZO-420 | 280-300 | 180 | 8331 | 44 | 20 | 15 | 160 | 14 | 27 | 129 | 15 | Ucareo |
| LZO-425 | 300-320 | 418 | 9551 | 54 | 19 | 10 | 125 | 130 | 23 | 144 | 14 | Otumba |
| LZO-447 | -- | 1186 | 16676 | 219 | 23 | 23 | 197 | 2 | 110 | 913 | 89 | Pachuca |