

Table 1. Representative major (oxides:wt.%) and trace elements (in ppm) compositions of sandstones in the study area.

| Sample No. | 08051703 | 08051705 | 08051804 | 08051809B | 08082405 | 08111606 | 08111609 | 09032706 | 09032707 | 08091003 | 08102604 | 09032604 | 09032606 | 09032607 | 09032608 | 09032612 | 09060103 | 09060109 |
|----------------------------------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Unit / Fm. | Iheya | Iheya | Iheya | Iheya | Iheya | Motobu | Motobu | Motobu | Motobu | Nago | Nago | Nago | Nago | Nago | Nago | Nago | Nago | Nago |
| (wt.%) | | | | | | | | | | | | | | | | | | |
| SiO ₂ | 72.08 | 73.88 | 78.06 | 82.93 | 75.37 | 81.10 | 73.81 | 74.14 | 73.97 | 73.12 | 78.60 | 70.99 | 79.88 | 82.72 | 79.94 | 77.36 | 78.68 | 78.47 |
| TiO ₂ | 0.41 | 0.47 | 0.37 | 0.27 | 0.34 | 0.28 | 0.60 | 0.36 | 0.38 | 0.57 | 0.26 | 0.72 | 0.42 | 0.37 | 0.46 | 0.41 | 0.38 | 0.35 |
| Al ₂ O ₃ | 14.40 | 13.52 | 11.67 | 8.59 | 13.02 | 11.06 | 13.91 | 14.26 | 13.59 | 14.08 | 10.67 | 14.93 | 10.79 | 8.85 | 10.61 | 11.58 | 11.67 | 11.18 |
| Fe ₂ O ₃ * | 3.43 | 3.15 | 2.73 | 2.62 | 3.14 | 0.84 | 4.65 | 2.96 | 2.54 | 4.56 | 3.89 | 5.06 | 2.70 | 2.08 | 2.79 | 3.04 | 2.45 | 2.57 |
| MnO | 0.05 | 0.04 | 0.11 | 0.03 | 0.06 | 0.00 | 0.07 | 0.04 | 0.09 | 0.03 | 0.04 | 0.04 | 0.02 | 0.03 | 0.01 | 0.02 | 0.04 | 0.05 |
| MgO | 1.74 | 0.96 | 0.70 | 0.66 | 0.99 | 0.21 | 1.63 | 1.03 | 0.67 | 1.56 | 1.18 | 1.99 | 1.04 | 0.68 | 0.90 | 1.60 | 0.68 | 1.20 |
| CaO | 0.54 | 0.75 | 0.79 | 0.74 | 0.39 | 0.24 | 0.38 | 1.09 | 2.16 | 0.40 | 0.40 | 0.97 | 0.50 | 0.88 | 0.27 | 0.50 | 0.22 | 0.87 |
| Na ₂ O | 4.70 | 4.50 | 3.63 | 3.07 | 4.01 | 4.56 | 2.07 | 3.79 | 5.19 | 3.59 | 4.65 | 2.37 | 2.94 | 3.35 | 3.47 | 3.46 | 2.88 | 2.54 |
| K ₂ O | 2.57 | 2.64 | 1.87 | 0.99 | 2.60 | 1.67 | 2.81 | 2.26 | 1.35 | 2.04 | 0.26 | 2.84 | 1.63 | 0.97 | 1.47 | 1.98 | 2.97 | 2.73 |
| P ₂ O ₅ | 0.08 | 0.08 | 0.06 | 0.10 | 0.07 | 0.03 | 0.07 | 0.06 | 0.05 | 0.06 | 0.06 | 0.10 | 0.07 | 0.06 | 0.08 | 0.05 | 0.05 | 0.04 |
| L.O.I. | 1.48 | 1.32 | 1.15 | 1.20 | 1.25 | 0.45 | 2.21 | 1.97 | 2.37 | 1.86 | 1.63 | 2.69 | 1.49 | 1.42 | 1.22 | 1.39 | 1.68 | 1.61 |
| O.S. | (96.11) | (96.12) | (95.95) | (95.84) | (95.40) | (96.63) | (99.58) | (99.94) | (100.12) | (95.71) | (96.39) | (100.42) | (98.02) | (97.00) | (96.61) | (96.45) | (95.99) | (96.12) |
| (ppm) | | | | | | | | | | | | | | | | | | |
| Ba | 604 | 524 | 404 | 135 | 463 | 462 | 516 | 370 | 237 | 432 | 74 | 480 | 325 | 224 | 412 | 526 | 697 | 650 |
| Co | 10 | 8 | 11 | 8 | 6 | 5 | 17 | 14 | 10 | 9 | 7 | 18 | 10 | 12 | 9 | 10 | 16 | 10 |
| Cr | 198 | 206 | 228 | 226 | 188 | 286 | 66 | 177 | 243 | 67 | 214 | 74 | 126 | 164 | 145 | 121 | 193 | 148 |
| Nb | 10.6 | 12 | 8.8 | 9.5 | 9.8 | 8.4 | 13.1 | 9.2 | 7.6 | 10.6 | 7.1 | 12.9 | 10.5 | 8.8 | 10.3 | 6.5 | 7.4 | 6.9 |
| Ni | 58 | 49 | 44 | 34 | 45 | 32 | 15 | 30 | 41 | 21 | 42 | 16 | 14 | 16 | 19 | 24 | 32 | 26 |
| Rb | 78.4 | 90 | 63.9 | 36.9 | 91 | 47.1 | 111.7 | 89.9 | 55.1 | 73.6 | 15.9 | 114.7 | 61.2 | 38.1 | 54.7 | 60.6 | 88.2 | 77.1 |
| Sr | 176 | 173 | 177 | 70 | 135 | 166 | 118 | 191 | 230 | 140 | 78 | 151 | 92 | 126 | 96 | 161 | 140 | 109 |
| V | 42 | 51 | 36 | 29 | 41 | 13 | 85 | 38 | 42 | 68 | 28 | 103 | 35 | 28 | 35 | 62 | 45 | 45 |
| Y | 15.5 | 22 | 20.6 | 21 | 18.2 | 22.8 | 25.1 | 27.4 | 22.6 | 13.9 | 14.4 | 23.3 | 18.1 | 21.5 | 19.9 | 20.2 | 18.3 | 18.9 |
| Zr | 179 | 264 | 196 | 173 | 152 | 244 | 129 | 153 | 178 | 240 | 144 | 214 | 221 | 260 | 285 | 144 | 169 | 144 |

Fe₂O₃* represents Fe as Fe₂O₃. Major elements were recalculated to be 100 % volatile-free total. L.O.I.=loss on ignition. O.S.=original sum

Table 1. Continued

| Sample No. | 040315saio | 08091403 | 08092008 | 08110306 | 09070403 | 06031401B | 06031510A | 06082402B | 06082501-A | 06082601A | 06111310-A |
|----------------------------------|------------|----------|----------|----------|----------|-----------|-----------|-----------|------------|-----------|------------|
| Unit / Fm. | Nago | Kayo | Kayo | Kayo | Kayo | Kerama | Kerama | Kerama | Kerama | Kerama | Kerama |
| (wt.%) | | | | | | | | | | | |
| SiO ₂ | 74.41 | 81.20 | 81.18 | 79.93 | 78.95 | 74.59 | 78.46 | 78.48 | 78.75 | 78.11 | 76.54 |
| TiO ₂ | 0.54 | 0.37 | 0.35 | 0.36 | 0.50 | 0.39 | 0.19 | 0.23 | 0.24 | 0.19 | 0.28 |
| Al ₂ O ₃ | 14.36 | 10.42 | 10.78 | 9.53 | 10.42 | 16.21 | 12.69 | 13.25 | 12.42 | 12.68 | 14.13 |
| Fe ₂ O ₃ * | 3.06 | 2.00 | 1.59 | 3.31 | 4.36 | 0.78 | 0.65 | 1.07 | 0.82 | 0.86 | 1.48 |
| MnO | 0.01 | 0.00 | 0.00 | 0.03 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| MgO | 1.14 | 0.73 | 0.65 | 1.01 | 1.31 | 0.67 | 0.38 | 0.61 | 0.42 | 0.60 | 0.80 |
| CaO | 0.21 | 0.22 | 0.25 | 1.64 | 0.29 | 0.40 | 0.95 | 0.29 | 0.88 | 0.92 | 0.30 |
| Na ₂ O | 3.80 | 4.50 | 2.79 | 2.67 | 2.82 | 4.57 | 3.14 | 3.55 | 2.92 | 2.95 | 3.91 |
| K ₂ O | 2.42 | 0.50 | 2.34 | 1.41 | 1.19 | 2.37 | 3.53 | 2.47 | 3.52 | 3.67 | 2.50 |
| P ₂ O ₅ | 0.06 | 0.05 | 0.07 | 0.09 | 0.11 | 0.03 | 0.02 | 0.03 | 0.03 | 0.02 | 0.05 |
| L.O.I. | 1.58 | 0.94 | 1.16 | 2.20 | 1.59 | 1.81 | 2.06 | 1.22 | 0.81 | 0.91 | 1.36 |
| O.S. | (95.60) | (96.63) | (96.56) | (96.14) | (96.17) | (95.01) | (95.75) | (95.08) | (95.34) | (95.57) | (95.24) |
| (ppm) | | | | | | | | | | | |
| Ba | 469 | 118 | 519 | 320 | 239 | 574 | 876 | 578 | 883 | 876 | 619 |
| Co | 11 | 2 | 4 | 10 | 14 | 3 | 2 | 4 | 1 | 2 | 8 |
| Cr | 146 | 85 | 124 | 211 | 201 | 32 | 37 | 63 | 34 | 27 | 75 |
| Nb | 11.4 | 9.6 | 9.2 | 9.4 | 11 | 8.2 | 4.1 | 5.5 | 5.1 | 4.3 | 7.1 |
| Ni | 33 | 13 | 18 | 34 | 32 | 8 | 8 | 14 | 9 | 8 | 19 |
| Rb | 88.2 | 27.4 | 78.9 | 51.5 | 48.4 | 74.5 | 86.2 | 81.1 | 90.5 | 101.8 | 88.4 |
| Sr | 84 | 77 | 65 | 146 | 77 | 285 | 292 | 236 | 273 | 295 | 230 |
| V | 55 | 28 | 31 | 27 | 40 | 36 | 19 | 22 | 23 | 22 | 31 |
| Y | 16.2 | 18.6 | 20 | 20.6 | 26 | 14 | 13.1 | 10.2 | 9.4 | 7.8 | 10 |
| Zr | 252 | 256 | 263 | 211 | 302 | 210 | 99 | 128 | 128 | 108 | 137 |

Table 2 . Representative major (oxides:wt.%) and trace element (in ppm) compositions of greenstones in the study area .

| Sample No. | 08051809C2 | 08051809E | 09043001 | 09043004 | 09022702 | 0902270301 | 08090701 | 08090702 | 08091007 | 08112401 | 09060110 | 09061304 | 06031510-A |
|----------------------------------|------------|-----------|----------|----------|----------|------------|----------|----------|----------|----------|----------|----------|------------|
| Unit / Fm. | Iheya | Iheya | Iheya | Iheya | Motobu | Motobu | Nago | Nago | Nago | Nago | Nago | Nago | Kerama |
| (wt.%) | | | | | | | | | | | | | |
| SiO ₂ | 51.78 | 51.16 | 46.89 | 51.12 | 46.10 | 46.17 | 51.04 | 50.66 | 51.02 | 50.25 | 45.70 | 51.77 | 49.23 |
| TiO ₂ | 2.00 | 2.16 | 1.74 | 2.21 | 2.39 | 2.51 | 1.13 | 1.29 | 1.24 | 0.98 | 1.16 | 1.25 | 1.16 |
| Al ₂ O ₃ | 17.10 | 19.29 | 14.61 | 15.10 | 15.93 | 22.34 | 15.47 | 15.32 | 14.87 | 14.62 | 19.53 | 14.95 | 16.84 |
| Fe ₂ O ₃ * | 17.06 | 13.73 | 15.93 | 13.20 | 10.47 | 13.87 | 9.65 | 10.02 | 10.42 | 9.49 | 10.23 | 9.99 | 9.12 |
| MnO | 0.56 | 0.24 | 0.23 | 0.17 | 0.16 | 0.09 | 0.16 | 0.16 | 0.21 | 0.18 | 0.15 | 0.17 | 0.16 |
| MgO | 4.57 | 3.02 | 12.70 | 10.36 | 6.41 | 8.12 | 7.94 | 7.51 | 7.93 | 7.74 | 8.38 | 8.38 | 7.75 |
| CaO | 3.40 | 4.75 | 4.29 | 3.63 | 12.68 | 0.71 | 12.05 | 11.74 | 11.85 | 13.29 | 13.11 | 10.11 | 13.43 |
| Na ₂ O | 2.35 | 3.35 | 3.19 | 3.17 | 5.26 | 1.31 | 2.41 | 2.95 | 2.21 | 3.26 | 1.59 | 2.83 | 2.04 |
| K ₂ O | 0.99 | 1.99 | 0.20 | 0.72 | 0.33 | 4.29 | 0.06 | 0.23 | 0.15 | 0.12 | 0.05 | 0.43 | 0.15 |
| P ₂ O ₅ | 0.21 | 0.31 | 0.21 | 0.29 | 0.27 | 0.60 | 0.10 | 0.11 | 0.10 | 0.08 | 0.10 | 0.11 | 0.13 |
| L.O.I. | 4.1 | 2.9 | 8.8 | 7.7 | 9.8 | 6.4 | 2.1 | 1.8 | 2.1 | 2.7 | 3.8 | 2.4 | 0.8 |
| O.S.* | (99.15) | (99.02) | (100.83) | (100.45) | (99.76) | (99.40) | (99.51) | (99.50) | (99.74) | (98.97) | (100.29) | (100.10) | (99.39) |
| (ppm) | | | | | | | | | | | | | |
| Ba | 246 | 151 | 219 | 514 | 883 | 1695 | 8 | 21 | 23 | 17 | 7 | 36 | 26 |
| Co | 53 | 54 | 90 | 66 | 40 | 63 | 33 | 30 | 46 | 42 | 51 | 51 | 39 |
| Cr | 233 | 281 | 915 | 404 | 137 | 288 | 436 | 321 | 473 | 326 | 459 | 393 | 449 |
| Nb | 7.3 | 8.3 | 16 | 21.2 | 19 | 43.1 | 4.3 | 5.4 | 6 | 3.9 | 3 | 4.4 | 4.5 |
| Ni | 74 | 77 | 532 | 236 | 87 | 189 | 124 | 70 | 190 | 103 | 184 | 143 | 158 |
| Rb | 27.5 | 53.7 | 10.2 | 25.8 | 31.5 | 125.5 | 7.6 | 9.7 | 6.2 | 9.3 | 8.3 | 16.3 | 10.1 |
| Sr | 124 | 161 | 306 | 326 | 448 | 67 | 159 | 147 | 125 | 132 | 190 | 124 | 197 |
| V | 494 | 411 | 249 | 269 | 257 | 281 | 261 | 277 | 285 | 232 | 270 | 267 | 242 |
| Y | 37 | 52.6 | 15.7 | 18.8 | 22 | 49.1 | 27.7 | 28.9 | 28.6 | 21.8 | 27.3 | 26.8 | 24.5 |
| Zr | 89 | 98 | 99 | 122 | 143 | 209 | 70 | 78 | 72 | 70 | 81 | 87 | 90 |

Fe₂O₃* represents Fe as Fe₂O₃. Major elements were recalculated to be 100 % volatile-free total. L.O.I.=loss on ignition. O.S.*=Original Sum.

Table 3 . Representative chemical composition of detrital garnet.

| Sample No. | 08051705 | 08051804 | 08051804 | 08051804 | 08051804 | 09032612 | 09032612 | 09032612 | 09032612 |
|--------------------------------|----------|----------|----------|----------|----------|------------|------------|------------|------------|
| Anal.No. | Gar1-1 | Gar1-4 | Gar2-3-1 | Gar2-5-1 | Gar2-8-2 | nago1-g2.2 | nago2-g1.2 | nago4-g1.4 | nago4-g2.3 |
| Unit· Fm. | Iheya | Iheya | Iheya | Iheya | Iheya | Nago | Nago | Nago | Nago |
| (wt.%) | | | | | | | | | |
| SiO ₂ | 38.28 | 37.49 | 37.65 | 37.81 | 37.74 | 37.03 | 39.18 | 38.48 | 37.65 |
| TiO ₂ | 0.10 | 0.04 | 0.18 | 0.18 | 0.14 | 0.04 | 0.00 | 0.02 | 0.01 |
| Al ₂ O ₃ | 21.53 | 20.77 | 21.11 | 21.00 | 21.15 | 20.46 | 21.89 | 21.86 | 21.18 |
| Cr ₂ O ₃ | 0.15 | 0.00 | 0.16 | 0.19 | 0.08 | 0.00 | 0.03 | 0.07 | 0.03 |
| FeO | 33.97 | 25.37 | 33.95 | 35.77 | 37.17 | 25.96 | 28.89 | 30.12 | 35.71 |
| MnO | 1.01 | 14.11 | 1.03 | 1.25 | 1.11 | 12.72 | 0.28 | 0.49 | 1.32 |
| MgO | 4.74 | 0.76 | 4.20 | 2.54 | 2.26 | 0.69 | 9.12 | 7.99 | 3.74 |
| CaO | 0.94 | 2.02 | 1.13 | 2.39 | 1.49 | 3.18 | 1.11 | 0.93 | 1.02 |
| Total | 100.72 | 100.56 | 99.41 | 101.13 | 101.14 | 100.07 | 100.49 | 99.95 | 100.65 |
| O = | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Si | 3.02 | 3.04 | 3.02 | 3.01 | 3.02 | 3.02 | 3.01 | 2.99 | 3.00 |
| Ti | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 2.00 | 1.98 | 1.99 | 1.97 | 1.99 | 1.97 | 1.98 | 2.00 | 1.99 |
| Cr | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fe ³⁺ | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 |
| Fe ²⁺ | 2.24 | 1.72 | 2.27 | 2.38 | 2.48 | 1.77 | 1.86 | 1.96 | 2.38 |
| Mn | 0.07 | 0.97 | 0.07 | 0.08 | 0.08 | 0.88 | 0.02 | 0.03 | 0.09 |
| Mg | 0.56 | 0.09 | 0.50 | 0.30 | 0.27 | 0.08 | 1.04 | 0.93 | 0.44 |
| Ca | 0.08 | 0.18 | 0.10 | 0.20 | 0.13 | 0.28 | 0.09 | 0.08 | 0.09 |
| Total cations | 7.97 | 7.97 | 7.97 | 7.98 | 7.98 | 8.00 | 8.00 | 8.00 | 8.00 |
| Py | 18.9 | 3.1 | 17.0 | 10.2 | 9.1 | 2.8 | 34.7 | 30.9 | 14.8 |
| Alm | 76.1 | 58.2 | 77.3 | 80.2 | 84.0 | 58.8 | 61.7 | 65.4 | 79.3 |
| Gro | 2.7 | 5.9 | 3.3 | 6.8 | 4.3 | 9.2 | 3.0 | 2.6 | 2.9 |
| Sp | 2.3 | 32.8 | 2.4 | 2.8 | 2.5 | 29.2 | 0.6 | 1.1 | 3.0 |
| And | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Py:pyrope, Alm:almandine, Sp:spessartine, Gro:grossular, And:andradite.

Fe³⁺ calculated based on charge balance.