Wiluite  

\[
\text{Ca}_{19}(\text{Al}, \text{Mg})_{13}(\text{B}, \square, \text{Al})_5(\text{SiO}_4)_{10}(\text{Si}_2\text{O}_7)_4(\text{O}, \text{OH})_{10}
\]

**Crystal Data:** Tetragonal.  
**Point Group:** 4/m 2/m 2/m.  
Prismatic crystals display dominant \{100\} and \{101\} with \{110\} and \{001\}, to 5 cm, and slightly elongated along \{001\}.

**Physical Properties:**  
**Cleavage:** Poor on \{100\}.  
**Fracture:** Irregular.  
**Tenacity:** Brittle.  
Hardness = 6  
D(meas.) = 3.36(3)  
D(calc.) = 3.358  
Nonfluorescent.

**Optical Properties:** Translucent.  
**Color:** Dark green, colorless to light yellowish green in thin section.  
**Streak:** Colorless.  
**Luster:** Vitreous.  
**Optical Class:** Uniaxial (+).  
\(\omega = 1.721(2)\), \(\epsilon = 1.725(2)\)  
Strong sector zoning: \{001\} sectors are cross-hatched, \{110\} and \{100\} sectors show fine striations.  
The \{001\} sector is slightly biaxial, with \(2\V = 0^\circ-10^\circ\); \{100\} sectors with higher birefringence, \(2\V = 10^\circ-25^\circ\).  
**Pleochroism:** Very weak.

**Cell Data:**  
**Space Group:** P4/mnm.  
\(a = 15.752(1)\) \(c = 11.717(1)\) \(Z = 2\)

**X-ray Powder Pattern:** Wilui River, Sakha Republic, Russian Federation.  
2.776 (100), 2.617 (61), 2.491 (61), 2.592 (43), 1.66 (26), 1.640 (23), 2.121 (20)

**Chemistry:**

\[
\begin{array}{ccc|c|c}
\text{SiO}_2 & 36.11 & 36.33 & \text{SrO} & 0.079 \\
\text{Al}_2\text{O}_3 & 12.03 & 11.97 & \text{Ce}_2\text{O}_3 & 0.18 \ 0.235 \\
\text{TiO}_2 & 0.80 & 0.71 & \text{La}_2\text{O}_3 & 0.298 \\
\text{MgO} & 6.48 & 5.27 & \text{B}_2\text{O}_3 & 3.06 \ 3.350 \\
\text{MnO} & 0.27 & & \text{BeO} & 0.016 \\
\text{FeO} & 1.21 & & \text{F} & 0.50 \ 0.774 \\
\text{Fe}_2\text{O}_3 & 32.28 & 5.11 & \text{H}_2\text{O} & 0.61 \ 0.239 \\
\text{CaO} & 35.54 & 35.26 & -\text{O} = \text{F} & 0.24 \ 0.33 \\
\hline
\text{Total} & 99.2 & 99.64
\end{array}
\]

(1) Wilui River, Sakha Republic, Russian Federation; average electron microprobe analysis, \(\text{H}_2\text{O}\) by LECO induction furnace, \(\text{FeO}\) by wet chemistry; corresponding to \((\text{Ca}_{18.97}\text{Ce}_{0.03})_{2+19}(\text{Al}_{0.53}\text{Ti}_{0.30} \text{Fe}^{3+}0.38\text{Mg}_{0.41}\text{Fe}^{2+}0.5\text{)}_{2+13}(\text{B}_{2.63}\text{Al}_{0.53}\text{Fe}^{3+}1.84\text{)}_{2+5}\text{Si}_{17.99}\text{O}_{68}(\text{OH})_{20.5}\text{O}_{7.97})_{2+10} .\)  
(2) Ariccia, Rome, Latium, Italy; average electron microprobe analysis, total includes \(\text{REE} = 0.058, \text{UO}_2+\text{ThO}_2+\text{Li}_2\text{O} = 0.004.\)

**Mineral Group:** Vesuvianite group.

**Occurrence:** In metasomatized skarn (Russia). In fragments of metasomatized carbonate-rich xenoliths in volcanic ejecta (Italy).

**Association:** Grossular, serpentine minerals, carbonate, limonitized pyrite, chlorite, ‘achtarandite’.

**Distribution:** From the Wilui River, Sakha Republic, Russian Federation [TL]. In Templeton Township, Quebec, Canada. At the Bill Waley mine, Tulare County, California, USA. In the ignimbrite quarry of Parco Chigi, Ariccia community, Rome, Latium, Italy.

**Name:** For the Wilui River, Russia.

**Type Material:** Canadian Museum of Nature, Ottawa, Ontario, Canada.

**References:**  