U of A researcher finds never-seen mineral inside 'super-deep diamond'

The mineral, calcium silicate perovskite, is the fourth-most abundant mineral on Earth

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Researchers from the University of Alberta have found a never-before-seen mineral inside a diamond from the depths of South Africa.

The mineral, called calcium silicate perovskite, is the fourth-most abundant mineral on Earth with zetta-tonnes (or $10^{21}$ tonnes) of it deep below Earth's surface.

It was found unexpectedly by Graham Pearson, a professor in the University of Alberta's Earth and Atmospheric Sciences department, along with other researchers from the University of British Columbia.

"It's so unstable that we thought we'd never actually see it, to hold it in our hands at the surface of the Earth," Pearson told CBC's Radio Active Thursday. "It's really only through the unique physical properties of diamond that this sample has been preserved at all."

The diamond was found while training other researchers and is called a super-deep diamond, meaning it was found in a kimberlite at a much deeper than usual.

"The diamonds that most people have as jewelry come from around about 200 kilometres depth, which is very deep," Pearson said. But the super-deep diamonds are found 800 kilometres down.

Because diamonds are the most incompressible materials, the ones found deep in the Earth can trap otherwise-unstable materials and allow them to be viewable on the surface.

"[The kimberlites] are blasted toward the Earth's surface, preserving these unique pieces of Earth's mantle," Pearson said.

Mineral helps understanding of Earth

There's debate about how the diamonds end up containing the material. One school of thought suggests the diamonds come up via an inner churning inside the Earth. But Pearson thinks that process would be too slow.

He thinks the kimberlites, which are full of dissolved carbon dioxide, explode and send the rocks toward the surface. "Some part of them starts life very, very deep in the Earth and literally blasts this thing toward the surface — the diamonds and the inclusion — and that's how you get these unique materials preserved," Pearson said.

The new find confirms, for the first time, that calcium silicate perovskite exists.

Pearson said he hopes to use the material to further understand the timeframe for Earth's carbon cycle.

"[The diamond] provides a unique window to allow us to see these unique pieces of material from that depth."

Source: CBC News