

FLUIDS/HYDROSTATIC PRESSURE Unit 18

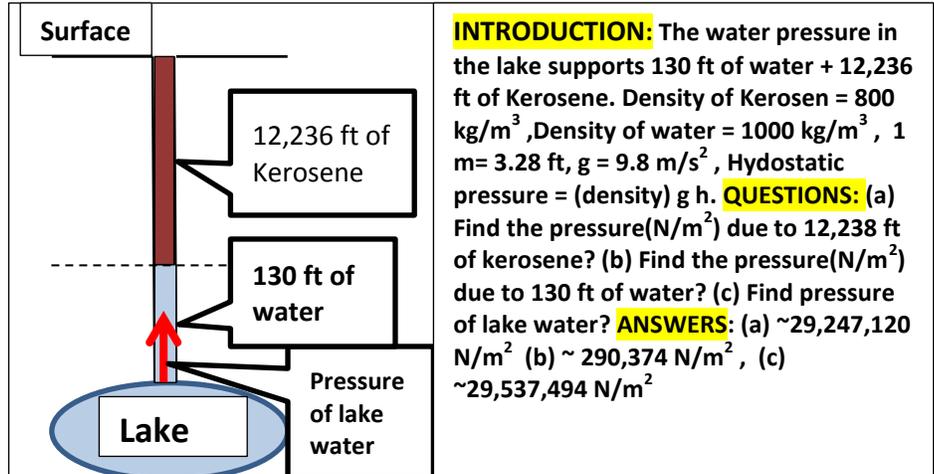
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& NYTimes February 8, 2012 by David M Herzenhorn and James Gorman, Send Dr Cise an e-mail on how you used this app.

Russian Scientists Bore Into Ancient Antarctic Lake

MOSCOW — In the coldest spot on the earth's coldest continent, Russian scientists have reached a freshwater lake **the size of Lake Ontario** after spending a **decade drilling through more than two miles of solid ice**, the scientists said Wednesday.



A man stood near a drilling apparatus at the Vostok research camp in on Jan. 13, 2006.



A statement by the chief of the Vostok Research Station, A. M. Yelagin, released by the director of the Russian Antarctic Expedition, Valery Lukin, said the **drill made contact with the lake water at a depth of 12,366 feet. As planned, lake water under pressure rushed up the bore hole 100 to 130 feet pushing drilling fluid up and away from the pristine water**, Mr. Yelagin said, **and forming a frozen plug that will prevent contamination**. Next Antarctic season, the scientists will return to take samples of the water. The first hint of contact with the lake was on Saturday, but it was not until Sunday that pressure sensors showed that the drill had fully entered the lake. **Lake Vostok, named after the Russian research station above it, is the largest of more than 280 lakes under the miles-thick ice that covers most of the Antarctic continent, and the first one to have a drill bit break through to liquid water from the ice that has kept it sealed off from light and air for somewhere between 15 million and 34 million years.** There have been much-disputed hints that life might still exist there. If so, that would give a great boost to hopes of finding life in similar conditions in icy water on one of the moons of **Jupiter**. Russian officials said the timing of the announcement was fitting because on Wednesday, Russia **celebrated "Science Day," commemorating the occasion in 1724 when Peter the Great signed an order establishing the St. Petersburg Academy of Sciences**. At a depth of more than two miles they reached a kind of ice different from the ice sheet and realized they had frozen lake water.

The drilling project has been Russian, not international. And the difficulties of drilling through more than two miles of ice and keeping the roughly five-inch bore hole from freezing over have been extraordinary. **The bore hole has had to be filled with kerosene to keep it from freezing over**, and the researchers have had to work in what are difficult conditions, to say the least. Nowhere does it get colder than at Vostok, in the middle of the East Antarctic ice sheet about 800 miles from the South Pole. The **coldest documented temperature on earth was recorded at Vostok in July 1983, minus 128.6**. Some environmentalists have raised objections to drilling to subglacial lakes because of the possibility of contamination. **The Russian plan to prevent the drilling fluid from reaching the pristine lake water was to plug the bottom of the bore hole with an inert fluid, Freon, and to drill the final distance with a heated drill tip instead of a motorized drill**. Enough kerosene would be removed to lessen the pressure in the bore hole so that **when the lake was reached, lake water would flow up the bore hole, then freezing and forming an icy plug**. That is exactly what happened, Russian scientists confirmed.