With atomic energy we are crossing a threshold, but are we entering or just leaving?

Much has been said and written about the awful devastation, which would be caused by an atomic war. It has been suggested, and with just cause, that such a war probably would wipe out civilization, leaving the remnants of the human race in atavistic savagery, if there were ant remnants. Dr. Hugh Keenlyside, former Under Secretary of State for External affairs for Canada estimates that there are in existence at the present time more than 150,000 nuclear devices, many more than are required to do the job!

Consider what would happen when an atomic bomb explodes. The fission process, which comprises the explosion, releases enormous quantities of energy, which originates within even the hottest star. If only 10% of the energy available in Uranium 235 or Plutonium were suddenly converted into heat, the temperature of the mass would jump to the order of fifty billion degrees centigrade. Even if the blast were diluted by five hundred times as much inert material as there was active material, the temperature would still be of the order of one hundred million degrees.

Now the temperature of the sun, as we determine it, is about six thousand degrees on the surface and about ten or twenty million degrees in the interior. It is presumed to derive its energy from the conversion of hydrogen to helium through an intermediate cycle involving carbon, oxygen and nitrogen, which cycle progresses very smoothly at the sun's temperature. If, however, the sun's temperature were much higher the hydrogen could convert directly, first into deuterium, tritium, and helium, without benefit of the time delay and stabilizing action of the carbon-nitrogen-oxygen cycle, and would produce most probably an explosion of increasing magnitude which would continue until it either ran out of hydrogen or the eventual expansion of the gases produced a sufficient drop in temperature to stop the reaction.

Suppose that an atomic bomb (either fission or fusion type) landed a large body of fresh water such as one of our four Great Lakes, and furthermore, that it sank to a considerable depth before exploding. The explosion, when it did take place, would be confined by walls of water consisting largely of hydrogen, since two thirds of the atoms in water are hydrogen. Before the bubbles of hot gases resulting from the explosion could overcome the inertia of the water and rise to the surface, it is almost certain that the water directly in contact with the blast would be heated to temperatures comparable with the blast itself, one hundred million degrees or hotter. At such a temperature the hydrogen in the water would be in prime condition to convert directly into helium and would in fact become a "hydrogen bomb" with the release of about the same or greater energy per unit mass as was released from the active material of the bomb itself.

Consequently, a thermo-nuclear chain reaction would probably set in which would be cumulative and self-propagating. Once initiated it would contain increasing in intensity until stopped either by lack of hydrogen or the eventual drop in temperature of the expanding gases. In any case the reaction would probably persist until most of the available hydrogen had gone up in helium.

Should such a thing happen, even by accident, and an atom bomb explode deep inside one of our fresh water lakes, with thousands of tons of hydrogen available, there could result a blast of such intensity that it would envelope the entire planet in a few seconds, vaporizing everything on its surface and maybe even shattering the core, and producing a celestial display visible throughout our galaxy. Unfortunately, we would be in no position to observe it as we would have ceased to exist.

The foregoing is not idle speculation. It is based on the same data, calculations and measurements which produced the atom bomb, and the fact of the bomb is grim testimony to its potentialities. We may well ask ourselves the question – we are crossing the threshold, but are we entering or just leaving?