In order to meet the requirement of fusion reactor developing and nuclear waste treatment, a concept of fission-fusion neutron source has been proposed with LiD cylinder in heavy water region of China Advanced Research Reactor (CARR) by slow neutrons to transfer to fusion neutron. The principal is the reaction of $^6\text{Li}(n,\alpha)$ to produce energetic tritium ion with 2.739 MeV in LiD by slow neutron, which will be bombarding the deuteron of LiD to induce fusion reaction to produce 14 MeV neutron. The fusion reaction rate will increase with the accumulation of tritium in LiD by the reaction between tritium and deuteron recoils produced by 14 MeV neutrons. When the concentration of tritium in LiD reaches $0.5 \times 10^{22}$ T/cm$^3$ and the fraction of fusion reaction induced by deuteron recoils with tritium approaches to 1, the 14 MeV neutron flux will be doubled and redoubled increasing to approach saturation in which the produced tritium at time $t$ is exhausted by fusion reaction to keep the constant of tritium concentration in LiD. At this case the 14 MeV neutron production rate is too high, it has to decrease the slow neutron flux with decreasing CARR reactor power progressively when the fusion neutron flux approaches to presetting value, for example $3.5 \times 10^{14}$ n/cm$^2$sec and will approach to saturation at the low level of neutron flux. This paper describes the principle of fission-fusion neutron source, including the production rate of fusion neutron, the accumulation rate and concentration of tritium, the fusion reaction rate induced by deuteron recoils with tritium, the 14 MeV neutron flux of inner surface of LiD cylinder in the heavy water region of CARR reactor without neutron depression and the influence factors. To consider the neutron depression an assembly of LiD rods in 20x20 cm with a centre hole in CARR reactor must be designed to optimize the fusion neutron flux in centre hole.