

The invention relates to the field of nuclear engineering, and more particularly to systems for passively removing heat from inside the containment shells of water-cooled, water-moderated reactors, and is intended for cooling the containment shell of a reactor by the natural circulation of a coolant (water) in a loop within the system. The technical result is the improved efficiency of a heat sink, the improved stability of the flow of coolant in the loop and, as a result, the improved operating reliability of the system. The present system comprises at least one loop for circulating cooling water, containing: a heat exchanger, disposed inside a containment shell and comprising an upper collector and a lower collector, which are connected by heat exchange tubes; an upflow pipe and a downflow pipe, which are connected to the heat exchanger; a cooling water reserve tank, which is disposed outside the containment shell, higher than the heat exchanger, and is connected to the downflow pipe; and a steam relief device, which is connected to the upflow pipe and is disposed inside the water reserve tank, to which it is hydraulically connected. Furthermore, the upper and lower collectors of the heat exchanger are divided into sections of heat exchange tubes according to the following condition:  $L/D \leq 20$ , where L is the length of a section of the collector, and D is the inside diameter of the collector.