The report describes the application of graph theory in dosimetry.

Several classical problems in graph theory in a reformulated form are applicable to the field of radiation safety.

We can represent a radiation situation on some territory in a form of undirected graph. Vertices of the graph form a regular grid, and edges connect neighboring vertices. Weight of each edge is equal to the dose, received by a person that has passed along this edge with some, fixed for the entire graph speed.

The report considers some problems of graph theory in their dosimetry interpretations.

The Shortest Path Problem answers the question how to go thru the radiation hazard area from point A to point B, and receive the lowest dose.

The traveling Salesman Problem determines order of passage the control points to obtain the minimum dose. For example points of planned determination of radiation situation.

Euler path problem helps to plan transport network bypass, so as to pass on every road once (where possible). This task is useful for determining the radiation situation using automatic dosimeter with georeference. In this case, the vertices of the graph are the crossroads, and the edges are the roads.

Route Inspection problem helps to plan transport network bypass, if there is no Euler path.

The problem of the shortest connection grid helps to connect some fixed number of dosimeters to one network in optimal way.

The problem of the critical path helps to choose the best option of a range of works, if the order of work is due by technological map of the enterprise.

R language is ideal for such tasks. The maximum useful packages are package "igraph", used to work with graphs; package "sp", allows to make georeferencing, and packages "raster", "rasterVis" and "rgl" for visualization.