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Monitoring of caves microclimate in Škocjan Caves, Slovenia

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The area of Škocjanske jame was designated as Unesco World Heritage Site in 1986. The Parliament of the Republic of Slovenia founded the Škocjanske jame Regional Park in 1996 and enacted two legal documents: Škocjan Caves Regional Park Act and Decree on the founding of the Public Service Agency Park Škocjanske jame, Slovenia.

The park is stated as protected area of III category by International Union for Conservation of Nature, IUCN.

Ramsar Convention designated cave system as Wetland of international importance in 1999.

As The Karst Biosphere Reserve Škocjan Caves became part of UNECO - Man and Biosphere programme in 2004.

In accordance with the Law on the Škocjanske jame Regional Park, Slovenia, Official Gazette 56/96, Article 16, according to which the public agency must monitor the situation in the caves and on the surface in Park Škocjanske jame, a monitoring programme is being prepared, joining experts from many fields and including the local people and voluntary rangers.

Monitoring of cave microclimate and assay the influence of tourist visit to vulnerable underground ecosystem include constant monitoring in the cave, including the following parameters: radon, moisture, temperature, CO_2, air flow, microbiological indicators of the air quality. The dynamic of abiotic parameters will be presented in accordance with metrological data obtained from meteorological station and visitors'

statistics in correlation with microbiological data obtained from summer analysis of the caves air.

A survey of radon and radon decay product concentrations in several caves in a limestone region in Slovenia was initiated in 1986. The reason for carrying out these surveys, were dose estimates obtained for the guides and medical staff working in the caves. Daily average radon gas concentration determined ranged from several 100 Bq/m^3 up to 27 kBq/m^3. Higher values were measured in the summer period. The equilibrium factors derived ranged from 0.05 to 0.89, with the higher values being measured in the winter period in vertical caves. In horizontal caves (with two entrances located opposite one another) these values ranged between 0.55 and 0.89. Annual doses estimated on the basis of various lung models ranged from 10 mSv to 85 mSv per year and per 2000 working hours.

There is new radiation protection regulation in Slovenia, valid from October 2002, based on Council Directive 96/29, Article 40, affecting exposures to elevated radon and radon daughter concentrations among underground workers. The health inspectorate can impose radiation monitoring measures for the purposes of performing dose calculations for underground workers.

Occupational safety of the employees will be demonstrated as part of monitoring system.

Monitoring programme of caves microclimate is based on directives of Ministry of the Environment, and Spatial Planning of Republic Slovenia and also Ministry of Health of Republic Slovenia, and presenting a part of large Biosphere Reserve Integrated Monitoring.

In order to asses the human impact to the cave system also the beneficial effects of caves microclimate could be presented by implementing scientific approach and education in every days work.