ECOSYSTEM DESCRIPTION OF A DRAINAGE AREA - A STRATEGY IN BIOSPHERE DESCRIPTIONS DURING SITE INVESTIGATIONS FOR A REPOSITORY OF SPENT NUCLEAR FUEL

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During the next few years the Swedish Nuclear Fuel and Waste Management Co. (SKB) performs site investigations at two sites in Sweden for a future repository of spent nuclear fuel. Novel methods based on systems and landscape ecology are developed to understand and model the radionuclide flow in the biosphere using site specific data for a safety assessment. This work describes the strategy for development of a descriptive ecosystem model for the surface ecosystem. The site description is needed to: a) perform a safety assessment that describes and analyzes different scenarios for radionuclide releases into the ecosystem and possible pathways for dispersal or accumulation radionuclides in the ecosystem, b) detect changes caused by the construction of a repository, c) establish a baseline for detecting long-term effects of the repository. The description adopts a site-specific approach focusing on the quantification of the properties that will constitute the descriptive model. The aim is also to present the methodology for determining the properties, to describe the development of the framework for the descriptive ecosystem models by integrating use of different properties, and finally, to present vital data from other site descriptive models such as those for geology or hydrogeology. The safety assessment will use an approach, among other methods, where transport and accumulation of radionuclides will be modelled by quantifying biogeochemical pathways of matter. The descriptive ecosystem model applied to the site was therefore built to describe and quantify processes affecting i.e. turnover of matter in a drainage area. The conclusions from applying this approach was that by have estimating the flow of matter the ecological and physical constrains on the system reduces the potential variations in outcome of future states of the ecosystem and thus also reduces the uncertainties in estimating radionuclide flow and consequences to humans and the environment.