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| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Variable influence on process** | | | **Process influence on variables** | | |
| **Influence present? (Yes/No Description)** | **Time period/Climate domain** | **Handling of influence (How/If not - Why)** | **Influence present? (Yes/No Description)** | **Time period/Climate domain** | **Handling of influence (How/If not - Why)** |
| Temperature in bedrock | Yes | Excavation/operation | Neglected; little significance compared with effects of drawdown and inflow to the repository. | Yes | Excavation/operation | Neglected; the effect is small. |
| Temperate | Effect of geothermal gradient on density and viscosity considered in main calculations. Impact of thermal effects from waste addressed in scoping calculations for SR-Can (Hartley et al. 2006). Effect negligible and so not considered for the current assessment. | Temperate | Neglected in the main calculations; the effect is small. Effect allowed for in the scoping calculations of the impact of the heat from the waste carried out for SR-Can, but effect negligible (Hartley et al. 2006). |
| Periglacial | Effect of geothermal gradient taken into account. Constant temperature distribution in time because effect of variations over time secondary to effect of permafrost. | Periglacial | Neglected; the effect is small. |
| Glacial | Neglected; secondary to effect of ice sheet. | Glacial |
| Groundwater flow | Yes | Excavation/operation | — | Yes | Excavation/operation | — |
| Temperate | Temperate |
| Periglacial | Periglacial |
| Glacial | Glacial |
| Groundwater pressure | Yes | Excavation/operation | Included in the model. | Yes | Excavation/operation | Determined from groundwater flow calculations. |
| Temperate | Temperate |
| Periglacial | Periglacial |
| Glacial | Glacial |
| Gas phase flow | Yes | Excavation/operation | Effect of the gas phase taken into account implicitly for the excavation/ operation phase using a model that represents the water table by a free surface. This can give the drawdown and inflow. Note that no gas is generated by the repository in this period. Effect of the gas phase taken into account explicitly in resaturation calculations using a simplified model of gas and water phase flow. | Yes | Excavation/operation | Not explicitly modelled because drawdown and inflows can be determined from a model with the water table treated as a free surface. Gas phase flow not explicitly represented in resaturation calculations using simplified model. |
| Temperate | Neglected in main flow calculations; small volume of gas generated and effects localised. Impact of gas assessed by scoping calculations for SR-Can (Hartley et al. 2006). | Temperate | Considered in estimates of the capacity for transport of dissolved gas carried out for SR-Can (Hartley et al. 2006). See Section 3.2 Gas flow/dissolution. |
| Periglacial | Neglected; effect secondary to effect of permafrost. | Periglacial | Neglected; gas flow is a relatively minor process. |
| Glacial | Neglected; secondary to effect of ice sheet. | Glacial |
| Repository geometry | Yes | Excavation/operation | A detailed representation of repository tunnels included in model. | No | Excavation/operation | — |
| Temperate | A detailed representation of repository tunnels included in local flow model. | Temperate |
| Periglacial | Neglected; effect secondary to other effects addressed. | Periglacial |
| Glacial | Neglected; secondary to other effects addressed | Glacial |
| Fracture geometry | Yes | Excavation/operation | Site-specific descriptions of geometry of fractures and fracture zones. | No | Excavation/operation | Indirect changes resulting from precipitation/dissolution not addressed because they are expected to be longterm and relatively very small. The changes to fracture aperture as a result of groundwater flow are not considered because they are considered to be small. The effect of possible high pore pressure beneath an ice sheet and ‘hydraulic jacking’ of fractures are addressed, see Section 4.3.7 |
| Temperate | Site-specific descriptions of geometry of fractures and fracture zones. Impact of EDZ addressed by assigning elevated hydraulic conductivity relative to the host rock. Changes over time neglected; small and within the uncertainties. | Temperate |
| Periglacial | Continuum models based on site-specific descriptions of geometry of fractures and fracture zones. | Periglacial |
| Glacial | Glacial |
| Rock stresses | No | Excavation/operation | Neglected. However the effects of the changes in the rock stresses during repository excavation operation and resaturation on the properties of the fractures in the vicinity of the repository taken into account through modelling of the EDZ. Stress changes are expected to be relatively small, apart from changes due to repository construction, thermal fluxes from the spent fuel, ice-loading, tectonic changes at very long times and earthquakes. | No | Excavation/operation | Neglected. Because effect generally small. |
| Temperate | Temperate |
| Periglacial | Periglacial |
| Glacial | Glacial |
| Matrix minerals | No | Excavation/operation | Neglected; little significance compared with other influences considered. | No | Excavation/operation | See chemical processes in Chapter 5 |
| Temperate | Temperate |
| Periglacial | Periglacial |
| Glacial | Glacial |
| Fracture minerals | No | Excavation/operation | Neglected; little significance compared with other influences considered. | No | Excavation/operation | See chemical processes in Chapter 5 |
| Temperate | Temperate |
| Periglacial | Periglacial |
| Glacial | Glacial |
| Groundwater composition | Yes | Excavation/operation | Site-specific salinity effects considered. | Yes | Excavation/operation | Transport of salinity by advection and matrix diffusion is modelled. |
| Temperate | Site-specific variations in and distribution of salinity and reference waters accounted for in the models. | Temperate | Transport of salinity and reference waters by advection and matrix diffusion is modelled. |
| Periglacial | Site-specific salinity effects considered. | Periglacial | Transport of salinity by advection and matrix diffusion is modelled. |
| Glacial | Glacial |
| Gas composition | No | Excavation/operation | — | Yes | Excavation/operation | Neglected; concentrations of dissolved gases are generally low. |
| Temperate | Temperate |
| Periglacial | Periglacial |
| Glacial | Glacial |
| Structural and stray materials | Yes | Excavation/operation | Sensitivity study in which permeability of nearby rock is reduced to simulate different levels of grouting. | Yes | Excavation/operation | Neglected; see Section 5.8 Degradation of grout. |
| Temperate | Grouting is, pessimistically, not represented. | Temperate | Neglected; see Section 5.8. |
| Periglacial | Pessimistically neglected. | Periglacial |
| Glacial | Glacial |
| Saturation | Yes | Excavation/operation | The effect of the changing saturation taken into account through models in which the unsaturated flow is handled in a simplified manner and in the region above the water table which in turn is represented is represented as a free surface (see Section 3.1.7). Addressed in calculations of flow in near-surface regions. | Yes | Excavation/operation | Modelled at the level of the ground being saturated or the water not present. Modelled in calculations of flow in nearsurface regions. |
| Temperate | Neglected. Unsaturated zone near surface has little effect on flow in deep rocks, which are saturated. Unsaturated zone taken into account in MIKE SHE calculations used to determine maximum potential recharge (precipitation less evapotranspiration). | Temperate | Neglected. Unsaturated zone near surface has little effect on flow in deep rocks, which are saturated. Unsaturated zone taken into account in MIKE SHE calculations used to determine maximum potential recharge (precipitation less evapotranspiration). |
| Periglacial | Neglected; the ground would generally be saturated beneath the permafrost (unless a sufficiently large gas bubble forms). | Periglacial | Neglected; the ground would generally be saturated beneath the permafrost (unless a sufficiently large gas bubble forms). |
| Glacial | Neglected; effects secondary to the effects of an ice sheet. | Glacial | Neglected; effects secondary to the effects of an ice sheet. |