HydroSolutions Pty Ltd

Hydrogeological & Environmental Consultants

PROJECTS

CONTAMINATED LAND & GROUNDWATER

Contam 1

MAJOR UK STEEL PRODUCER

Investigation of deep waste injection of coking effluent at former steelworks.

An investigation of groundwater impacts from 150 years of continual steel production was undertaken on a 23km2 site in Scotland. Scrubbed oily effluent from coke production was disposed under licence to disused coal workings beneath the plant. Complete rebound of the water table from mine dewatering has resulted in the resurgence of the effluent in a burn, or river tributary.

A conceptual hydrogeological model was developed. Groundwater movement is dominated horizontally by flow through high permeability worked coal seams, while vertical flows are limited by low permeability mudstone, enhanced by faulting and numerous shafts. Contaminants trapped locally may resurge in the future due to remobilisation of faults or settlement from mine working. A numerical groundwater model was developed to assess flow rates and direction.

Groundwater contamination comprises a laterally extensive plume of elevated Electrical Conductivity, ammonia and heavy metals that resurges approximately three kilometres from the site at a riverbank. Localised areas of phase-separated hydrocarbons (PSH) occur within the plume, resurging at the on-site burn occuring along a sub-vertical fault. Resurgent contaminants include ammonia, PSH, dissolved organic compounds and heavy metals, including cyanide.

The available natural attenuation and retardation of contaminants does not reach its theoretical capacity due to preferential groundwater flow in fissures and interconnected mine voids.

Options for management of contaminated groundwater were outlined. Removal or adequate containment of the source was not feasible on technical grounds. A management program comprising monitoring & control of contaminant resurgences through appropriate engineering methods was proposed. A permanently engineered solution including a partial retaining dam to concentrate resurging oils within a collection chamber including an oil-water separator was proposed, to be assessed through a feasibility study.

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