

GROUNDWATER & ENVIRONMENT NEWSLETTER

**A PERIODIC NEWSLETTER
COMPILED FOR
HYDROGEOLOGICAL &
ENVIRONMENTAL
PROFESSIONALS WITHIN
W.A. MINING & RESOURCE
COMPANIES.**

Risk Assessment

Definitions based on AS4360, Langley (Ed), 1998 & NEPC, 1999:

Consequence: the result/ effect of an event, good or bad

Environmental value: value/ benefit to public amenity/ safety/ health requiring protection

Frequency: No. of expected occurrences over a given time

Hazard: potential harm/ loss

Likelihood: a qualitative description of probability & frequency

Probability: likelihood of an outcome, ranging between 0 (impossible) & 1 (certain)

Risk: the probability of an event occurring & its likely consequences

Risk Assessment: (AS4360): Defining risk management priorities by comparing risks against standards/ levels/ qualitative criteria. (NEPC, 1999): Estimating impact of chemical/ biological/ physical agents on humans, plants & the ecology.

Source: origin of e.g. contaminants

Pathway: A process of contaminant movement from one place to another

Receptor: Entity adversely affected by exposure to a contaminant

Qualitative Risk Assessment

describes the likelihood & consequence of an event ranked e.g. (from High to Low), which may be developed into a risk matrix.

Case Study: A mining company wished to identify potential risks to human health/ environment from contaminants in soil & groundwater from industrial/ processing operations. Concentrations were compared to NEPC, 1999 soil investigation 'F' (commercial/

industrial), Ecological Investigation (EIL), groundwater investigation & ANZECC 2000 aquatic ecosystem trigger levels. Pathway & exposure scenarios were defined for specific receptors (site workers & the environment). Probability, exposure & consequence were ranked qualitatively, to provide an overall 'score', expressed as "Substantial" to "Low" risk. The risk matrix was used to define management priorities, including e.g. no action, further investigation, or remediation.



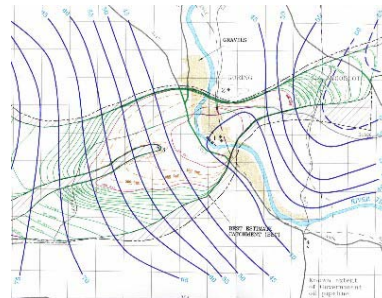
Quantitative Risk Assessment

will include a table of probabilities of specific occurrences & timeframes.

Case Study: A water undertaker sought to identify risk of a failure (derogation) of the drinking water guidelines (DWG) at a major groundwater public water supply (PWS) from chemical spillages within the catchment area.

The catchment & isochrones (equal time of travel) were defined using numerical modelling. The probability of a given spill size for a chemical listed on the DWG was estimated from accident/ hazchem spillage data expressed as No. of spills per length of road/ rail line/ pipeline per year, within a certain isochrone, based on a Poisson distribution.

For a given spill, water quality at the source was iteratively calculated based on distance/ retardation/ dispersion to determine whether the DWG were exceeded. Individual



spillage risks were summed to determine overall risk, expressed as the No. of derogation events occurring within periods of 1 to 100 years, as a lower & upper bound probability. The highest risk 'events' were compared to benchmarks for failure of public utilities & other engineering design criteria. An 'acceptable' risk of 0.01 derogation events/ year was proposed; the overall derogation frequency of 0.03055, (1 in 33 year event) exceeded this proposed risk level.

HydroSolutions Pty Ltd

We are a specialist hydrogeological consultancy providing expert services including investigation, potable & process resource development & dewatering. Our environmental capabilities include contaminated site investigation, remediation & risk assessment - qualitative/ quantitative, health, & ecological.

Next issue - Groundwater Modelling



What goes where & what does it mean?

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