



Executive summary

This case study report presents a risk assessment of the drinking water system in Březnice town, the Czech Republic. Březnice is located in central Bohemia, 80 km Southwest of Prague, with a population of 3500. Total drinking water production in the system is 380-520 m³/day. Water is abstracted from three groundwater sources located around the town, water from two sources is treated to remove iron and manganese and disinfected with chlorine gas; water from another source is only disinfected with sodium hypochlorite.

The risk analysis in this case study covers the system from source to service connection and was focused on identification of all hazardous events which may influence the quality of distributed water, either in terms of non-compliance with national drinking water quality standards or risks to compromise consumer's health, satisfaction or confidence.

Importance

This was the first attempt to prepare a water safety plan in the Czech Republic and therefore this work served as a pilot or model example for further applications in the country. Another important objective was to evaluate the applicability of the TECHNEAU Hazard Database, and some selected methods for risk assessment suggested for use within the TECHNEAU project.

Approach

This case study applies the CRA (Coarse Risk Analysis) method for risk identification and estimation process. The basis for the CRA is a description of the water supply system and a list of hazards and related undesired events that may occur in the system. For each event, the likelihood (probability) and consequence (impact) have been assessed using a scale of 5 categories. The consequent risk for each hazard (hazardous event) is expressed as, high, moderate, or low through a combination of the probability and the consequence of each hazard (event) by use of a risk matrix.

Result

There have been 47 different hazardous events identified and evaluated, 25 for the sources, 11 for the treatment process (and building), and 11 for the distribution system. 44 hazardous events have been further classified and expressed as "extreme risk" (1), "high risk" (15), moderate risk" (16) and "low risk" (12). As the water utility has not developed any own specific risk tolerability criteria, it was agreed within the Water Safety Plans team that both extreme and high risks would be considered as unacceptable, and therefore, risk reduction options will be developed for all extreme and high risks identified, while all low risks would be considered as acceptable. Regarding the moderate risks it was agreed to apply the ALARP (As Low As Reasonably Practicable) principle, i.e. the necessity of risk reduction options for these risks would be discussed with operator on a case by case basis. Some of these risks may be accepted if it is economically and/or technically unreasonable to reduce them, but a monitoring option for such risks should be suggested.

More information

Risk assessment case study. Březnice - Czech Republic (D.4.1.5e).

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TKI Categorisation

Classification					
Supply Chain	Process Chain	Process Chain (cont'd)	Water Quality	Water Quantity (cont'd)	
Source	Raw water storage	Sludge treatment	Legislation/regulation	- Leakage	
- Catchment	- Supply reservoir	- Settlement	- Raw water (source)	- Recycle	
- Groundwater	- Bankside storage	- Thickening	- Treated water		
- Surface water	Pretreatment	- Dewatering	Chemical	Risk Management / Consumers	
- Spring water	- Screening	- Disposal	- Organic compounds		
- Storm water	- Microstraining	Chemical dosing	- Inorganic compounds	Risk analysis	
- Brackish/seawater	Primary treatment	- pH adjustment	- Disinfection by-products	- Hazard identification	x
- Wastewater	- Sedimentation	- Coagulant	- Corrosion	- Risk estimation	x
Raw water storage	- Rapid filtration	- Polyelectrolyte	- Scaling	Risk evaluation	
- Supply reservoir	- Slow sand filtration	- Disinfectant	- Chlorine decay	- Risk tolerability decision	x
- Bankside storage	- Bank filtration	- Lead/plumbosolvency	Microbiological	- Analysis of options	
Water treatment	- Dune infiltration	Control/instrumentation	- Viruses	Risk reduction / control	
- Pretreatment	Secondary treatment	- Flow	- Parasites	- Risk reduction options	
- Primary treatment	- Coagulation/flocculation	- Pressure	- Bacteria	- Decision making	
- Secondary treatment	- Sedimentation	- pH	- Fungi	- Implementation	
- Sludge treatment	- Filtration	- Chlorine	Aesthetic	- Monitoring	
Treated water storage	- Dissolved air flotation(DAF)	- Dosing	- Hardness / alkalinity	Risk Communication	
- Service reservoir	- Ion exchange	- Telemetry	- pH	- Communication strategies	
Distribution	- Membrane treatment	Analysis	- Turbidity	- Potential pitfalls	
- Pumps	- Adsorption	- Chemical	- Colour	- Proven techniques	
- Supply pipe / main	- Disinfection	- Microbiological	- Taste	Trust	
Tap (Customer)	- Dechlorination	- Physical	- Odour	- In water safety/quality	
- Supply (service) pipe	Treated water storage			- In security of supply	
- Internal plumbing	- Service reservoir		Water Quantity	- In suppliers	
- Internal storage	Distribution			- In regulations and	

						regulators	
		- Disinfection			Source	Willingness-to-pay/acceptance	
		- Lead/plumbosolvency			- Source management	- For safety	
		- Manganese control			- Alternative source(s)	- For improved taste/ odour	
		- Biofilm control			Management	- For infrastructure	
		Tap (Customer)			- Water balance	- For security of supply	
		- Point-of-entry (POE)			- Demand/supply trend(s)		
		- Point-of-use (POU)			- Demand reduction		

TKI Categorisation (continued)

Contains		Constraints	Meta data				
Report	x	Low cost	<i>Author(s)</i>				
Database		Simple technology	<i>Organisation(s)</i>				
Spreadsheet		No/low skill requirement	<i>Contact name</i>				
Model		No/low energy requirement	<i>Contact email</i>				
Research		No/low chemical requirement	<i>Quality controller name</i>				
Literature review		No/low sludge production	<i>Quality controller organisation</i>				
Trend analysis		Rural location	Source				
Case study / demonstration	x	Developing world location	<i>Date prepared</i>				
Financial / organisational			Date submitted (TKI)				
Methodology	x		Date revised (TKI)				
Legislation / regulation							
Benchmarking							