För och nackdelar med et web-baserat beräkningsverktyg. Erfarenheter från Norge.

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Norwegian Environmental Risk Assessment Guidelines

- SFT Guidelines completed 1999
- Result of a Norwegian R&D Project (1996-1999) prepared from 6 documents:
  - Human toxicology
  - Ecological risk assessment
  - Transport and reaction mechanisms
  - Site specific investigations and analysis
  - Models and systems for risk assessment
  - Soil clean-up values for most sensitive land use

Norwegian-Swedish Models

- Many similarities
  - Transport models
  - Chemical compounds
  - Human health exposure pathways (N+fish)
- Some major differences
  - Land-use approach (Most sensitive!)
  - Back-ground value approach
  - Ecotoxicological approach (ecological risk assessment)
  - Groundwater focus
  - Norway prepared the Excel worksheets and Internet versions of the model easily accessible to anybody

Soil clean-up values for most sensitive land use examples

Compound	Clean-up value	Measured backgr.	Comment
As	**2**	0.7-8.8	K_d leakage tests
Cr (III)	**25**	3-30	As above
Benzene	**0.005**	<0.1	EU RA changed values

The users (consultancies and local authorities) requested

- Training (given through Miljøringen network-paid by SFT)-2000
- Excel spreadheet to document changes (worked out through Miljøringen-paid by SFT)-2000:
  - **Beregningsverktøy SFT 99-01 Vers 1.0.xls**
  - **Brukermanual.doc**
  - **Eksponeringsskjema.doc**
  - **Eksempel Oljalyn.xls**

Web-baserat beräkningsverktyg
Web-based calculation tool

- Developed by FFI (Ministry of Defence Research Institute). Initiative taken by FFI and paid by the Ministry.

http://risiko-forurensetgrunn.ffi.no/hovedside.htm

My own experiences

- Web based tool mainly applied for training?
- Excel spreadsheet applied for site specific risk assessment and documentation to customers and authorities.
- No help-desk available (many questions initially, but no resources for assisting nor up-dating or clarifying unclear details)
- First up-dating of chemical data and including new data is presently performed (2005)
- Chemical database is also used for sediment risk assessment and for risk assessment of existing landfills
- Numerous inofficial databases have been developed in ”larger” clean-up projects with large funds available
- QA/QC of data unknown
- Risk assessment understanding limited

Site specific risk assessment (step 2)

Tabell I. Eksponeringsveier ved aktuell arealbruk. (Kun verdier i gull felt kan endres. Endringer skal begrun

Parametre	Standard verdi	Anvendt verdi	Enhet	Begrunnelse (Gule celler må fylles)
Eksponeringstid for oralt inntak av jord (barn)	365 8	365 0	UAKTUELL	1m jord på toppen
Eksponeringstid for oralt inntak av jord (voksne)	365 8	365 0	UAKTUELL	1m jord på toppen
Eksponeringstid for hudkontakt med jord (barn)	80 8	80 0	UAKTUELL	1m jord på toppen
Eksponeringstid for hudkontakt med jord (voksne)	45 8	45 0	UAKTUELL	1m jord på toppen
Oppholdstid utendørs (barn)	365 24	365 24	dager/år timer/dag	
Oppholdstid utendørs (voksne)	365 24	365 24	dager/år timer/dag	
Oppholdstid innendørs (barn)	365 24	365 24	dager/år timer/dag	
Oppholdstid innendørs (voksne)	365 24	365 24	dager/år timer/dag	
Fraksjon av grunnvann fra lokaliteten brukt som	100 %	0 %	UAKTUELL	Ikke anvendt
Fraksjon av inntak av grønnsaker dyrket på lokaliteten	30 %	0 %	UAKTUELL	Ny jord for rotsonen
Fraksjon av inntak av fisk fra nærliggende resipient	100 %	0 %	UAKTUELL	Ikke aktuelt

Site specific risk assessment (step 2)

Tabell II. Transport og reaksjonsmekanismer (tabell 21 s.99 i SFT 99:01A; Kun verdier i gule felt kan endres. Endringer skal begrunnes.)

Parametre	Symbol	Standard verdi	Anvendt verdi	Enhet	Begrunnelse (Gule celler må fylles)
Jordspesifikke data					
Vanninnhold i jord	$\blacklozenge_w$	0,2	0,2	l vann/l jord	
Luftinnhold i jord	$\blacklozenge_a$	0,2	0,2	l luft/l jord	
Jordas tetthet	$\blacklozenge_s$	1,7	1,7	kg/l jord	
Fraksjon organisk karbon i jord	f_{oc}	1 %	1 %		
Jorda porøsitet	$\blacklozenge$	40 %	40 %		
Parametre brukt til beregning av konsentrasjon i innedørsluft					
Innvendig volum av huset	V_{hus}	240	240	m^3	
Areal under huset	A	100	100	m^2	
Utskiftingshastighet for luft i huset	I	12	12	d^{-1}	
Innlekkingshastighet av poreluft	L	2,4	2,4	m^3/d	
Dybde fra kjellergulv til forurensning	Z	0,5	0,5	m	
Diffusiviteten i ren luft	D_o	0,7	0,7	m^2/d	
Data brukt til beregning av konsentrasjon i grunnvann					
Jordas hydraulisk konduktivitet	k	0,00001 315,36	0,00001 315,36	m/s m/år	
Avstand til brønn	X	0	0	m	
Lengden av det forurensende området i gunnvannsstrømmens retning	L_{gw}	50	50	m	
Infiltrasjons faktor	IF	0,141	0,141	år/m	
Gjennomsnittlig årlig nedbørmengde	P	730	730	mm/år	
Infiltrasjonshastigheten	I	0,0751389	0,075139	m/år	Beregnet (IF • P^2)
Hydraulisk gradient	i	0,02	0,02	m/m	
Tykkelsen av akviferen	d_a	10	10	m	
Tykkelsen av blandingssonen i akviferen	d_{mix}	5,8697689	5,869769	m	Beregnet (ligning (10) i SFT 99:01a)
Data brukt til beregning av konsentrasjon i overflatevann					
Vannføring i overflatevann	Q_{sw}	500000	500000	m^3/år	
Bredden av det forurensende området vinkel-rett på retningen av grunnvannsstrømmen	L_{SW}	7,34	7,34	m	
Beregnet hastighet på grunnvannstrøming	Q_{di}	271,74006	271,7401	m^3/år	Beregnet (k • i • d_{mix} • L_{SW})

What can happen - example?

- Worksheets are easy to use, they give a RESULT for health risk!
- Qualification of input data?
- Qualification of changes in exposure pattern?
- Unless contamination spreading is considered nearly all ”problems” can be solved by sealing

Monitoring results site

Compound measured	No of samples	Average	Max
As	3	4	2.3
Naphthalene	3	60	43

Result of health risk assessment

Compound	Step 1 norm	Step 2 norm	Measured
As	2 (+100%)	61(-93%)	2.3 (4)
Naphthalene	0.8 (+7400%)	151 (-60%)	43 (60)

SFT's experiences

- Environmental objectives/acceptance criteria are not defined
- Sampling and analysis are insufficient
- Risk assessment is lacking
- Spreading assessment is lacking
- Conclusion is missing

SFT requires suppplementing sampling/investigations/evaluations

Important improvements points

- Define acceptance criteria
- Representative sampling
- Relevant parameters
- Evaluation of environmental impact
- Beter spreading evaluations (ditches, weather…)
- Verification of anticipations and calculations
- Better explanations
- More thorough conclusions

Improvement points

- SFT will be clearer, more precise, improve Guidelines
- Consultancies must be more comprehensive
- Problemowners must know the ”regulations”
- There will be stricter requirements and increased quality control

SFT's judgement of cause

- SFT and Ministry of Environment have required clean-up of old sinns
  - Focus on investigation and clean-up of many small sites
- Too much focus and partly misuse of modelling methods for acceptance criteria and spreadsheet for risk assessment

My reflections

- No qualification requirement for ”risk assessors”
  - CEN standard?
- Site investigation and risk assessment based on SFT’s requirements brings competition between Norwegian companies leading to:
    - Price only ”criteria” most places, limiting # of parameters, samples and experienced personnel
- Assessing spreading/leakage of contaminants is unresolved (In Norway; GW??)
- No regularity in up-dating information leading to ”clondyke”
- No help-desk
- Limited quality control and competence by authority

Pros and cons Web based system?

Activities	Pros	Cons
Training	**Always easily accessible** **Easily linked to expl.**	**Req's help desk & simplicity & professionality**
Improving & updating	**Easy to do technically with a minimum of resources**	**Easily outdated** **requires contin resources can stop creativity**
Quality Control	**Extremely transparent, easily controlled**	**Weaknesses easily spotted** **Requires clear messages**
Common European "ground"	**Chemical database?** **Exposure models?** **Test methods?** **Links to National & EU sources.**	**SLOW unless someone helps speeding up!!** **Requires "some" National and EU funding.**