European regulatory developments standardization and approaches

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Presentation - overview

- European standardisation
- Parallel validation US EPA and CEN/TC292
- Robustness work in CEN/TC351
- Regulatory developments in EU
- Comparison of Dutch and German regulatory approach
- Content and eluate analysis
- Conclusions

Towards beneficial use of wastes and byproducts

- The significant increase in the beneficial use of materials, that formerly were considered wastes, leads to new requirements in environmental quality of products, particularly in relation to long term release behaviour of substances.
- Too simple test are no longer adequate and new testing tools are now available to deal with the questions to be answered.

Concerns

- Unrelated testing requirements for different regulations
- Too limited testing of long term effects
- Unnecessary duplication of testing
- Too limited selection of substances considered
- Different approaches in assessing environmental impact

Development of Standards and Materials Covered

Test/Matrix	Soil, sediments, compost and sludge	Waste	Mining waste	Construction products
pH dependence test	ISO/TS21268-4	CEN/TS14429	CEN/TS14429	CEN/TS14429
		CEN/TS14497	CEN/TS14497	
	EPA 1313 *	EPA 1313	EPA 1313	EPA 1313
Percolation test	ISO/TS21268-3	CEN/TS14405	CEN/TS14405	CEN/TC351/TS-3
	EPA 1314 *	EPA 1314	EPA 1314	EPA 1314
Monolith test		CEN/TS15683		CEN/TC351/TS-2
	EPA 1315 *	EPA 1315	EPA 1315	EPA 1315
Compacted granular test		NEN7347		CEN/TC351/TS-2
	EPA 1315	EPA 1315	EPA 1315	EPA 1315
Redox capacity		NEN 7348		NEN 7348
Acid rock drainage			PrEN15875	
Reactive surfaces	ISO/CD12782 parts 1-5	Vienna agreement		

* EPA drafts in preparation for inclusion in SW846

Same basic testing approach in different fields

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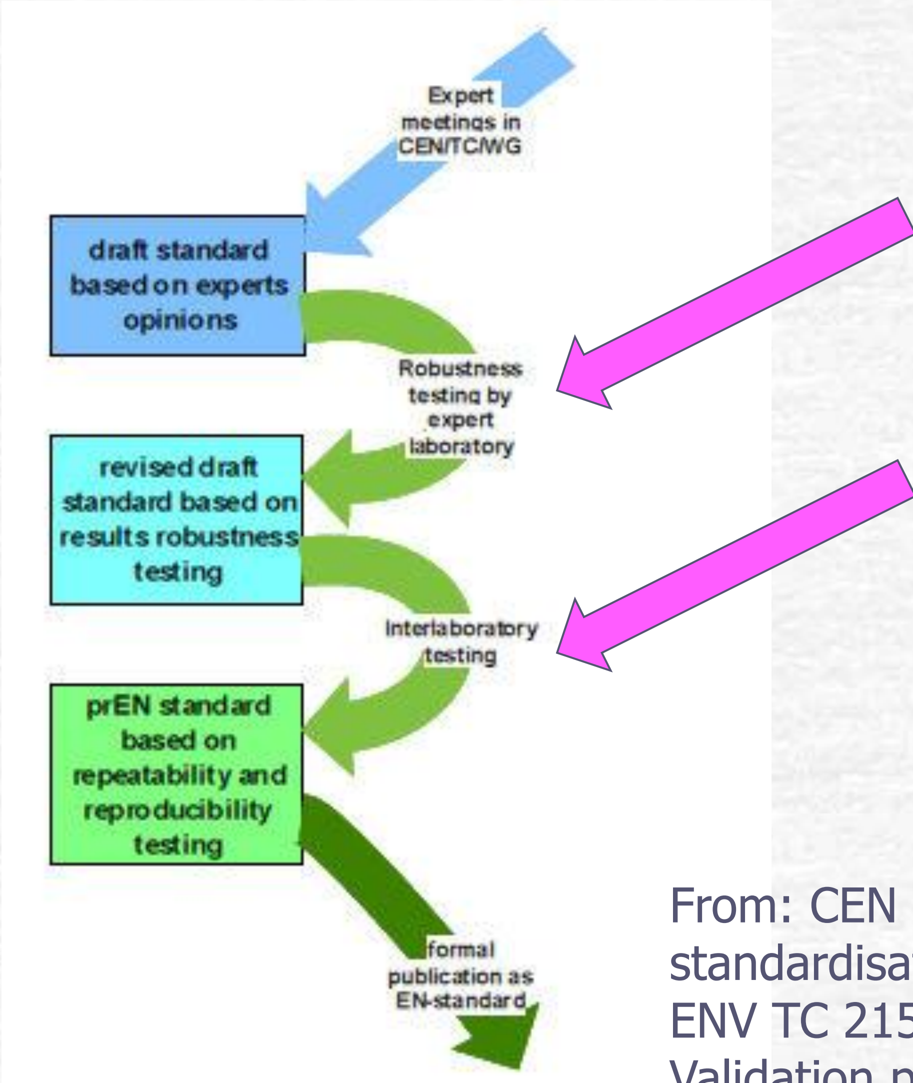
Steps in validation



This is the status today:

- CEN/TC351 Robustness work completed (TS-2 and TS-3)
- US EPA Intercomparison validation finalized (pH dependence, percolation , monolith, CGLT) Results available
- CEN/TC292 in the process of adopting EPA validation results to upgrade TS to EN's

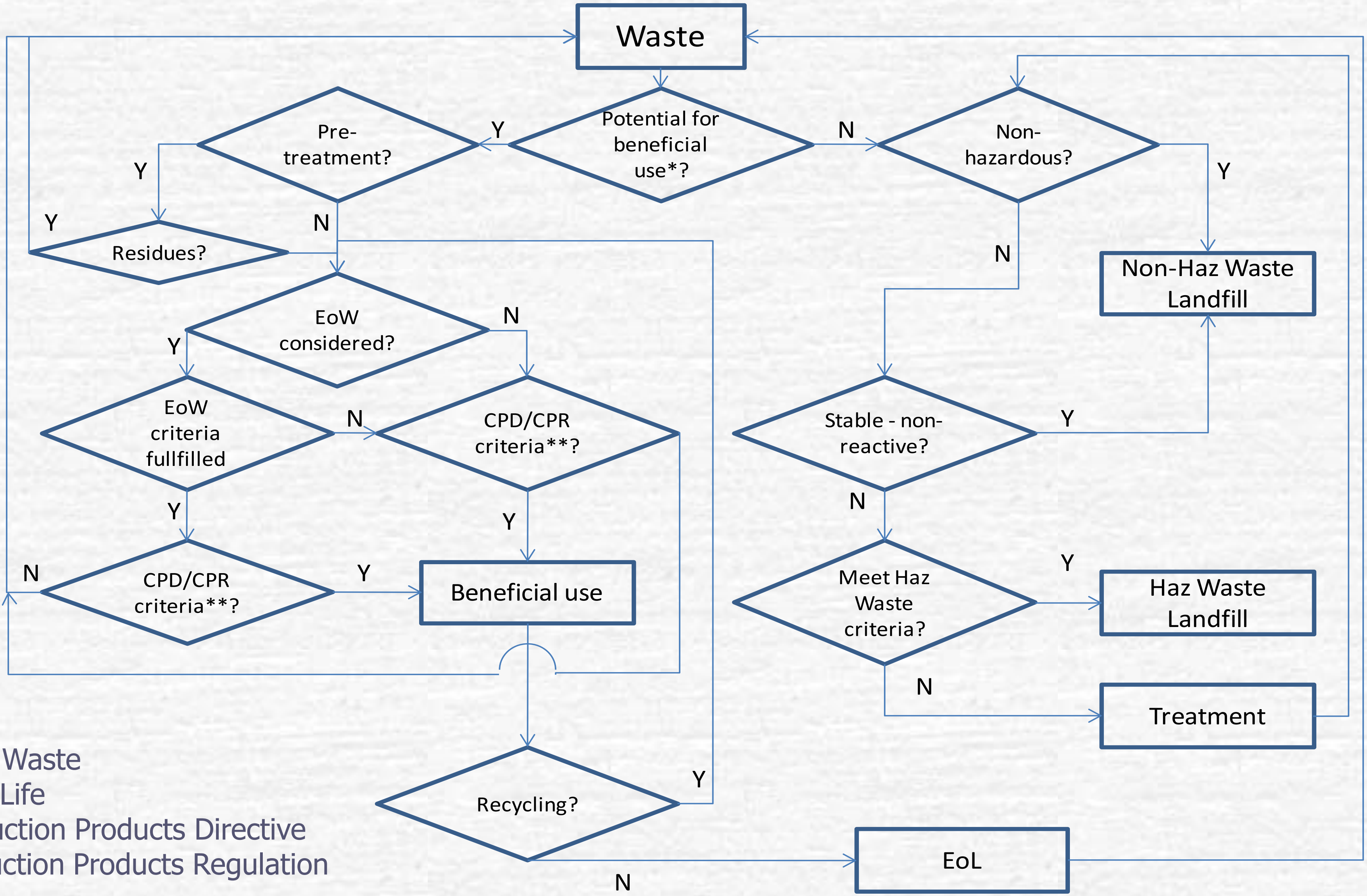
From: CEN Guide on validation tasks in the process of standardisation of environmental test methods, April 2008, ENV TC 215rev, supported by SABE Resolution 06/2008 - Validation policy

Regulatory context

- Construction Products Directive (EU CPD)
- Construction Products Regulation (EU CPR - 2013).
- European Landfill Directive (EU LFD)
- End of Waste regulation (EU EoW)
- Waste Catalogue (EU WC)
- Hazardous Waste Directive (EU HW)
- REACH Regulation
- Soil Quality Regulation – Fertilizer use
- Groundwater Directive

With multiple regulations : preferably not multiple testing and multiple impact judment approaches for the same material or product

Disposal, treatment and beneficial use regulations



EoW = End of Waste
EoL = End of Life
CPD = Construction Products Directive
CPR = Construction Products Regulation

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Considerations for EoW criteria

- The limit values for End of Waste criteria would have to be quite strict, if all requirements on (waste) materials under the waste regulation would be eliminated based on EoW testing.
- Additional requirements will be necessary to make the EoW system work for 'alternative' materials. Options are:
  - Requirement on retrieval of material after intended use
  - Specification of accepted uses of the material
  - Minimum distance to groundwater
  - Minimum distance to surface water
  - Restrictions of the height of the application
  - Restrictions on the allowed rate of infiltration

Issues with the Hazardous Waste Directive

- Classification of waste as hazardous or non-hazardous has far reaching consequences for any handling or treatment of complex waste materials.
- For materials resulting from thermal processes and other mixed materials resulting from industrial processes, the identification of specific mineral associations as required by current hazard assessment approaches is complicated.
- Total content is clearly a very poor tool to assess hazardousness as it is often assumed that all of the substance is present in its most critical form.
- Ecotox testing, which is assumed to provide a better assessment, has serious problems in the interpretation of waste test data. Other ways to assess the hazard nature of such materials are needed to ensure that the possible beneficial use of "alternative" materials is not prevented by a wrong hazard classification.
- Currently, different regulatory approaches to health and environmental risks of materials can easily lead to conflicting decisions (Haz waste Directive, End of Waste, Construction Products Directive, Construction Product Regulation, Reach)

Hazard criteria

A range of properties determine the hazardous nature of waste, such as:
- explosive
- flammability,
- reactivity,
- carcinogenicity,
- mutagenicity
- ecotoxicity
- …

Multiple exposure pathways require considerations including waterborne and airborne transport, direct contact and ingestion routes.

In many cases, a central concern is the possibility of harmful substances being released from the (waste) material and thus adversely impacting human health or the environment.

Proposed way forward

- Identify complex 'waste' streams for which the identification of precise mineral or compound composition is not possible – residues from thermal processes, such as combustion, melting, etc.

- Develop and alternative means of evaluating possible risk of exposure/release of potentially harmful substances for such category of materials

- A means of addressing this issue is through a combination of pH dependence test leaching combined with geochemical modelling (see paper IWWG conference - Chania 2012)

Differences in regulatory approaches in EU

Condition/aspect	Dutch regulation	German regulation
Point of compliance	In groundwater at a specified distance from the source	Interface between soil and groundwater
Environmental quality objectives	Soil quality and groundwater quality based on ecotoxic principles	Groundwater quality based on ecotoxic principles
Attenuation/ dispersion	Considered in the impact model (full geochemical speciation in soil and groundwater)	Not considered
Source term	Derived from leaching test data (L/S=10 and E=64 days)	Leaching test results (L/S=2)
Scope	Uniform criteria for respectively granular and monolithic products	Separate approach for concrete structures, roadbase applications, others
Impact judgment	Based on release expressed in mg/kg or mg/m^2 over a specified period (100 years)	Based on concentration in µg/l
Conditions considered	Wet dry cycles for application above groundwater; temperature correction for monolith leaching	Not considered
Test methods	Percolation test Monolith leach test	Percolation test Monolith leach test

Comparison of water quality objectives in EU

Groundwater limit values, ug/L

Substance	MTT-gw (NL), used for SQD	DE Geringfügigkeitsschwellenwerte	Factor NL/DE groundwater limit value
As	24	10	2.4
Ba	29	340	0.1
Cd	0.34	0.5	0.7
Cl	200000	258000	0.8
Co	2.6	8	0.3
Cr	8.7	7	1.2
Cu	1.1	14	0.1
F	1500	750	2.0
Hg	0.23	0.2	1.2
Mo	29	35	0.8
Ni	1.9	14	0.1
Pb	11	7	1.6
Sb	6.2	5	1.2
Se	5.3	7	0.8
SO4	100000	240000	0.4
V	3.5	4	0.9
Zn	7.3	58	0.1

MTT = "risk" values (ecotox), max permissible addition; MTR = Max Permissible Concentration (only F, Br, Cl, SO4)

Comparison of regulatory criteria in EU

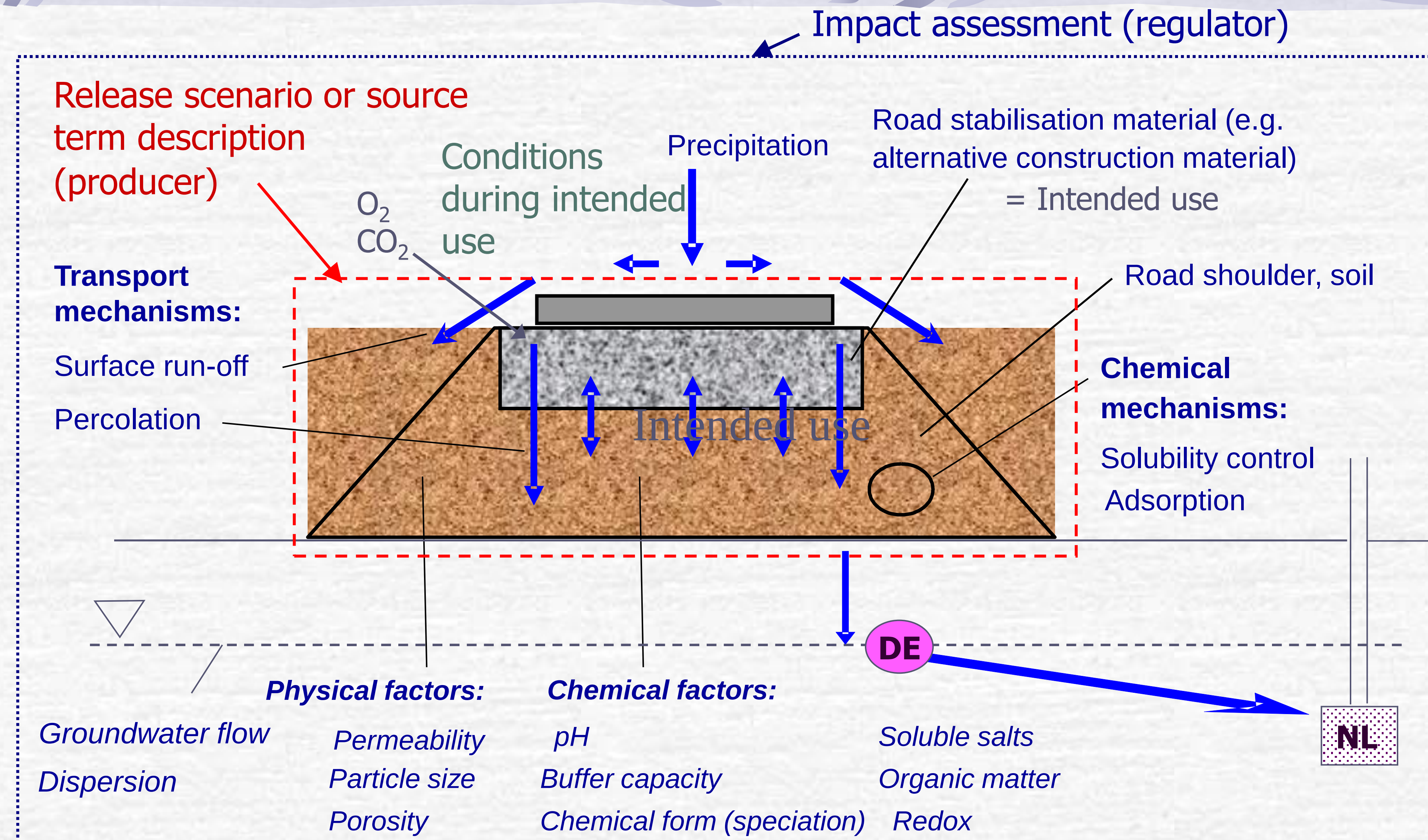
Table I. Release limits for construction products as defined in the SQD (2007)

Parameter		Monolith	Granular material	Isolated application
		E_{64d} in mg/m^2	mg/kg d.m.	mg/kg d.m.
Antimony	(Sb)	8.7	0.16	0.7
Arsenic	(As)	260	0.9	2
Barium	(Ba)	1.5	22	100
Cadmium	(Cd)	3.8	0.04	0.06
Chromium	(Cr)	120	0.63	7
Cobalt	(Co)	60	0.54	2.4
Copper	(Cu)	98	0.9	10
Mercury	(Hg)	1.4	0.02	0.08
Lead	(Pb)	400	2.3	8.3
Molybdenum	(Mo)	144	1	15
Nickel	(Ni)	81	0.44	2.1
Selenium	(Se)	4.8	0.15	3
Tin	(Sn)	50	0.4	2.3
Vanadium	(V)	320	1.81	20
Zinc	(Zn)	800	4.5	14
Bromide	(Br)	670	20	34
Chloride	(Cl)	110000	616	8800
Fluoride	(F)	2500	55	1500
Sulfate	(SO4)	165000	1730	20000

German regulation	
	Monolith
	E_{56d} mg/m^2
Sb	5.2
As	10.3
Ba	351
Cd	0.52
Cr	7.2
Co	8.2
Cu	14.4
Hg	0.21
Pb	7.2
Mo	36.1
Ni	14.4
Se	7.2
V	4.1
Zn	60
Cl	258000
F	773
SO4	247000

B, Tl, CN^- and NH_4^+ additional regulatory parameters in Germany

Processes in a Road Base Application - definitions



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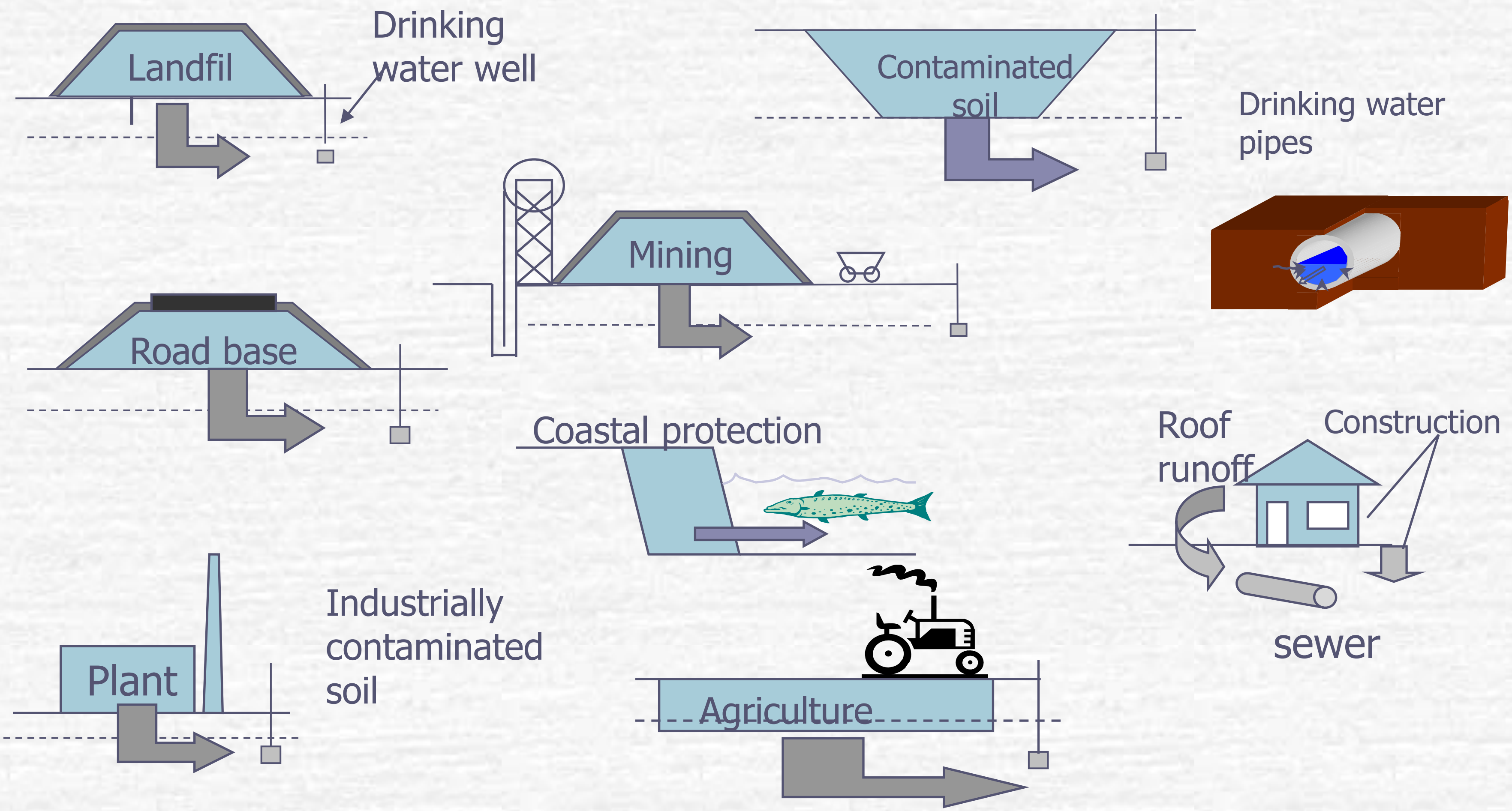
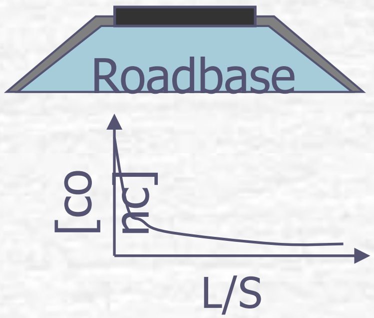
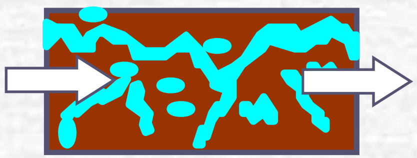
DIFFERENT IMPACT SCENARIOS........



.... SIMILAR PROBLEM





Point of compliance

SOURCE TERM → TRANSPORT → IMPACT

Different for each scenario - material, changes over time (carbonation, redox), etc.

Transport in unsaturated zone and saturated zone to point of compliance - Similar for each scenario

In first instance a generic sensitive soil system is assumed, which can later be adapted to the actual situation

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Conclusions

- There is no need for multiple testing tools to assess release from coal ash and coal ash containing products (or any other material for that matter). Three main leaching tools as presented and now harmonised between US and EU will suffice.
- The impact assessment approaches need to be harmonised to be more consistent across material types, intended use applications and release of substances of concern
- Regulatory criteria development should be harmonised to avoid diverging criteria leading to unnecessary burden for industry with double testing and limitations to use for obscure reasons.
- The use of relevant leaching information in assessing the consequences of draft limit values on re-use recycling targets while keeping high environmental standards will be highly beneficial. Observations on field behaviour in addition to laboratory testing data is important in this respect.