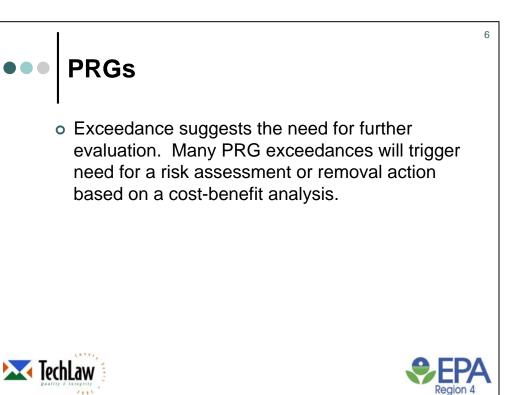
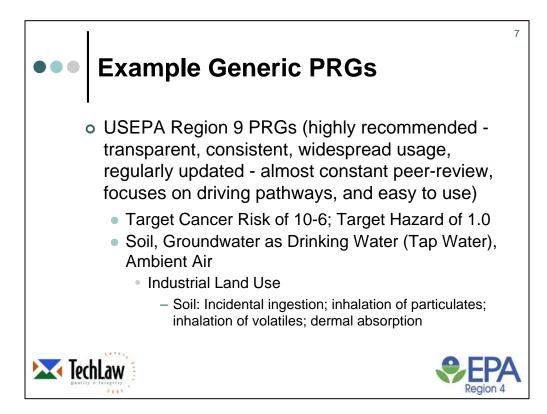
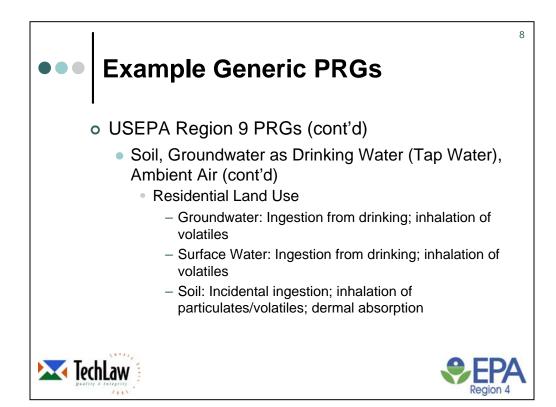
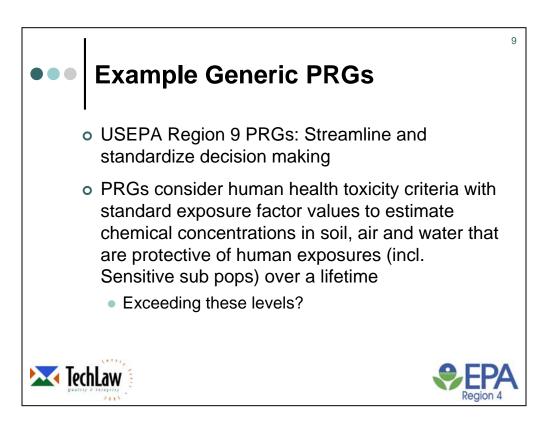


Based on goals and agreements with PRPs, any generic PRG may be considered as an RG (as most are - for effective screening of COPCs) as long as exposure parameter values and complete exposure routes match up with the PRG defaults.



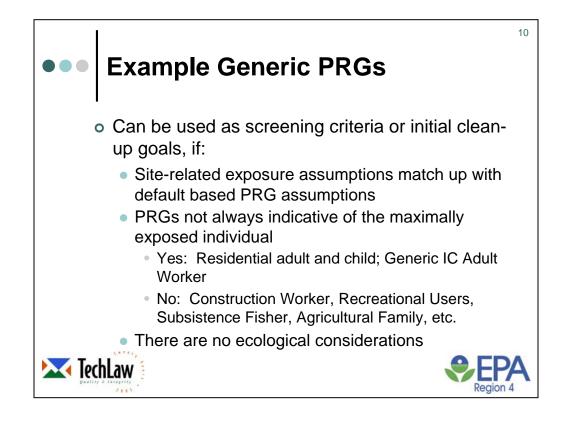




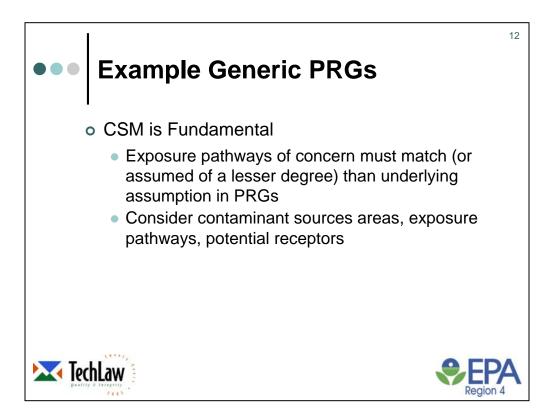


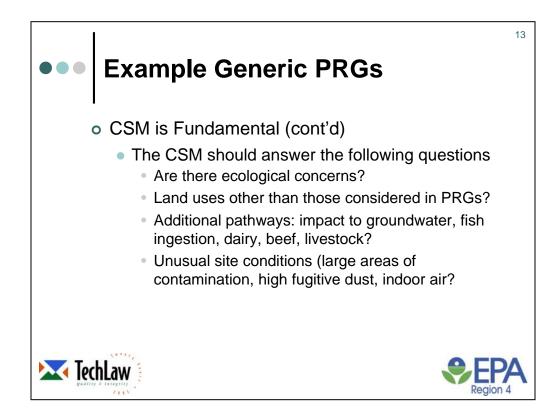
Exceeding these levels should not designate a site as "dirty" or trigger a response action.

Exceeding a PRG suggests a need for further evaluation (sampling, background/ambient levels, review of underlying assumptions, applicability of route-to-route extrapolations, use of chronic tox factors in assessing childhood exposures.

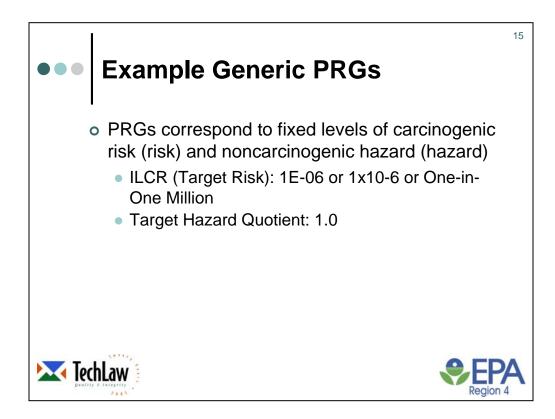


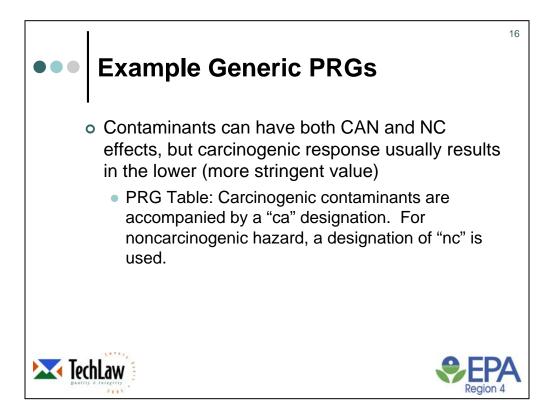
		EXPOSURE PATHWAYS, ASSUMING:		
			INDUSTRIAL LAND USE	
	Ground Water	Ingestion from drinking	Ingestion from drinking	
	Glound water	Inhalation of volatiles	Inhalation of volatiles	
		Dermal absorption from bathing	Dermal absorption	
	Surface Water	Ingestion from drinking	Ingestion from drinking	
		Inhalation of volatiles	Inhalation of volatiles	
		Dermal absorption from bathing	Dermal absorption	
		Ingestion during swimming		
		Ingestion of contaminated fish		
	Soil	Ingestion	Ingestion	
		Inhalation of particulates	Inhalation of particulates	
		Inhalation of volatiles	Inhalation of volatiles	
		Exposure to indoor air from soil gas	Exposure to indoor air from soil gas	
		Exposure to ground water contaminated by soil leachate	Exposure to ground water contaminated by soil leachate	
		Ingestion via plant, meat, or dairy products	Inhalation of particulates from trucks and heavy equipment	
		Dermal absorption	Dermal absorption	
Tochl aw	Footnote: *Exposure pathways cons	idered in the PRG calculations are in	ndicated in boldface italics.	



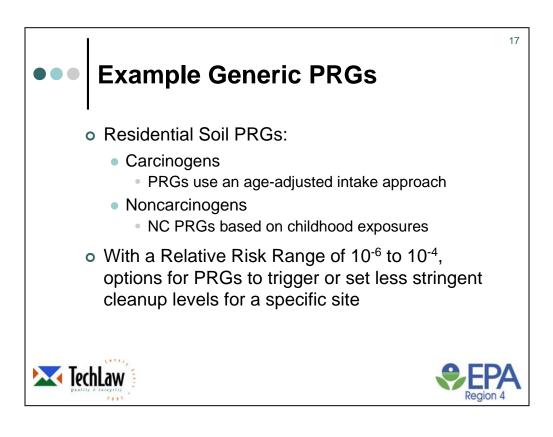


EXPOSURE PATHWAY	WEBSITE	
Migration of contaminants to an underlying potable aquifer	EPA Soil Screening Guidance: http://www.epa.gov/superfund/resources/soil/ index.htm California Water Board Guidance: http://www.swrcb.ca.gov/rwqcb2/rbsl.htm	
Ingestion via plant uptake	EPA Soil Screening Guidance: http://www.epa.gov/superfund/resources/soil/ index.htm EPA Fertilizer Risk Assessment: http://www.epa.gov/epaoswer/hazwaste/recyc lef/ertiliz/risk/	
Ingestion via meat, dairy products, human milk	EPA Protocol for Combustion Facilities: http://www.epa.gov/epaoswer/hazwaste/comb ust/riskvo.lhtm#volume1 California "Hot Spots" Risk Guidelines: http://www.oehha.ca.gov/air/hot_spots/HRSg uide_html	
Inhalation of volatiles that have migrated into basements or other enclosed spaces.	EPA's draft Subsurface Vapor Intrusion Guidance: http://www.epa.gov/correctiveaction/eis/vapo r.htm EPA's Version of Johnson & Ettinger Model: http://www.epa.gov/cerrpage/superfund/progr ams/risk/airmodel/johnson_ettinger.htm	
Ecological pathways	EPA Ecological Soil Screening Guidance: http://www.epa.gov/superfund/programs/risk/ ecorisk/ecossl.htm NOAA Sediment Screening Table: http://response.restoration.noaa.gov/cpr/sedi ment/squirt/squirt.html	





Within the PRG table, those contaminants administered on the basis of their carcinogenic potential are accompanied by a "ca" designation. For noncarcinogenic hazard, a designation of "nc" is used.



Carcinogens:

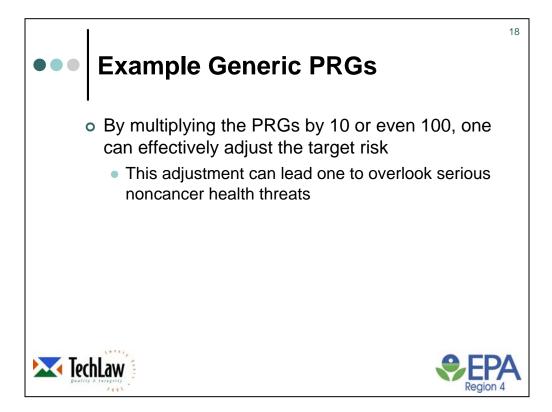
PRGs use an age-adjusted intake approach that takes into account daily soil ingestion rates, body weights, and exposure durations for children from 1 to 6 years of age and older age groups aged 7 to 31 years of age. This approach was chosen to be able to account for the higher intake rates relative to body weight under childhood exposures as well as the longer exposure durations associated with a long-term resident.

Noncarcinogens:

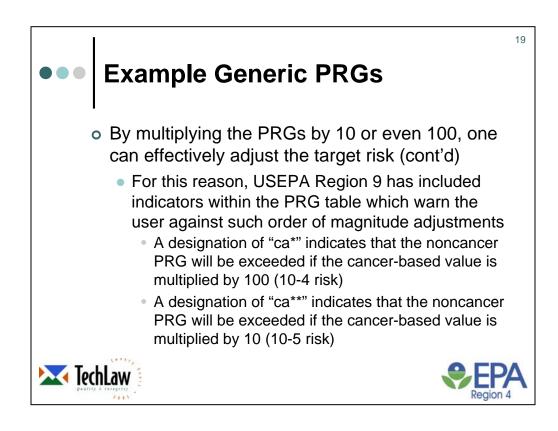
Age-adjusted approach is not used. NC PRGs based on childhood exposures and combines the higher childhood exposure with chronic toxicity criteria.

Toxicity-specific endpoints in children, dose-response curve is steep - marginal difference between NOAEL and LOAEL.

Because USEPA considers a Relative Risk Range of 10-6 to 10-4, some people have begun employing an order-of-magnitude approach to use of the PRGs to trigger remediation levels or to set less stringent cleanup levels for a specific site.

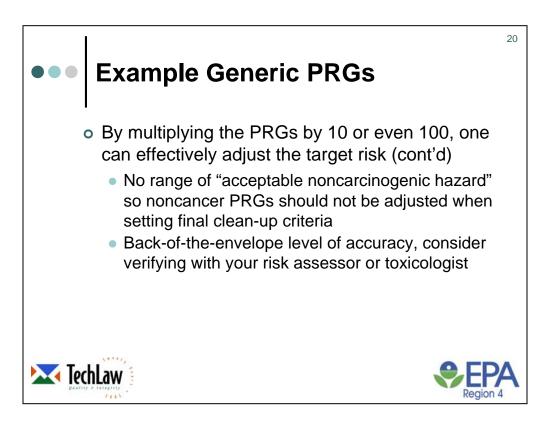


However: Because of the phenomenon discussed above for chemicals which can elicit cancer and noncancer effects (PRG generally reflective of cancer risk), this adjustment can lead one to overlook serious noncancer health threats.



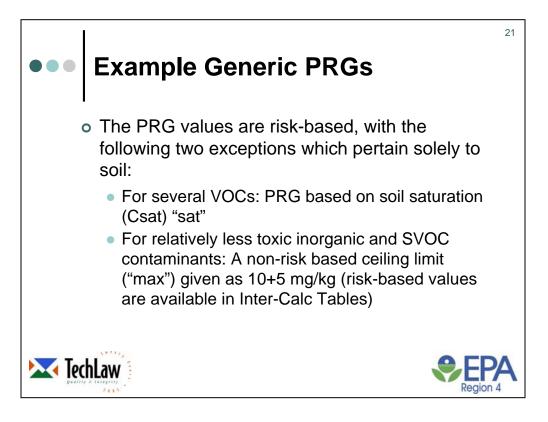
A designation of "ca*" indicates that the noncancer PRG will be exceeded if the cancerbased value that is presented is multiplied by a factor of 100 (to adjust to 10-4 risk).

A designation of "ca^{**}" is used to indicate that the noncancer PRG will be exceeded if the cancer-based value that is presented in the table is multiplied by a factor of 10 (to adjust the TR to 10-5).



There is no range of "acceptable noncarcinogenic hazard" so that under no circumstances should noncancer PRGs be multiplied by 10 or 100 when setting final clean-up criteria.

You can do this for back-of-the-envelope type comparisons, but consider verifying any such adjustments with your risk assessor or toxicologist.



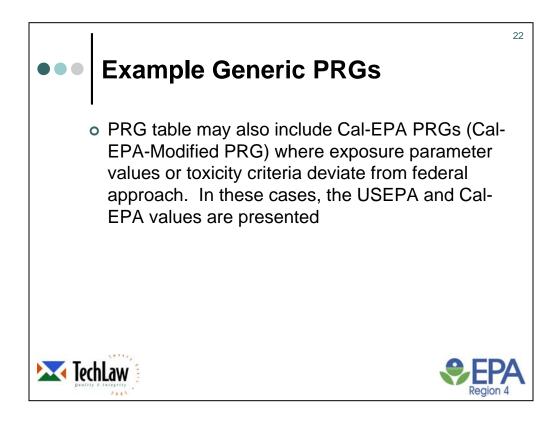
For several VOCs: PRGs based on soil saturation (Csat) "sat" - concentrations above this level indicate the potential presence of free-phase product - NAPL - invalidates the VF

For relatively less toxic inorganic and SVOC contaminants: A non-risk based ceiling limit ("max") given as 10+5 mg/kg (risk-based values are available in Inter-Calc Tables).

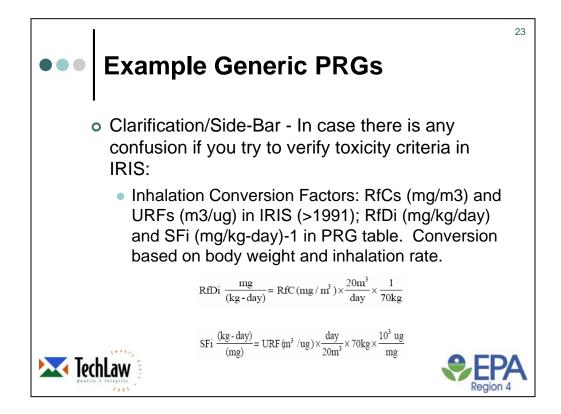
Risk-based values can exceed unity (> 1,000,000 mg/kg, which is not possible in reality).

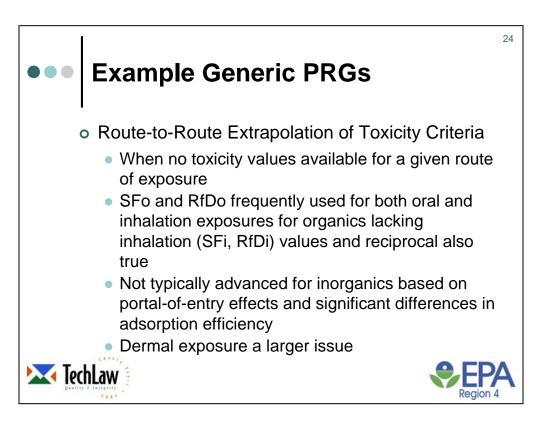
10+5 is equivalent to 10% by weight of the soil sample - above this certain contact/exposure assumption may be violated.

PRGs do not address short-term exposures (e.g., pica behavior in children or construction exposures) and toxicological data used generally are not applicable at such high concentrations under acute exposures.



CA DTSC - generally more protective - TCE notable exception Noted when a factor of 4 difference occurs.



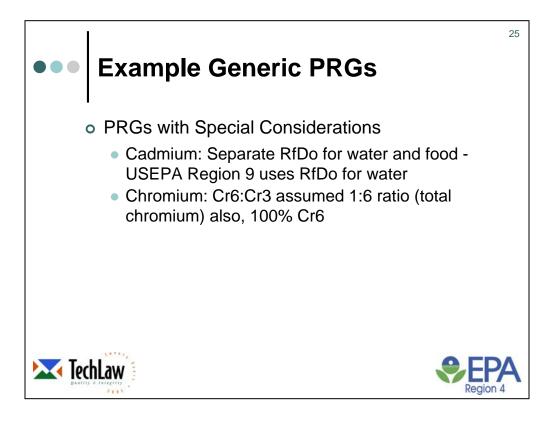


Dermal exposure a larger issue:

No dermal toxicity criteria in USEPA databases

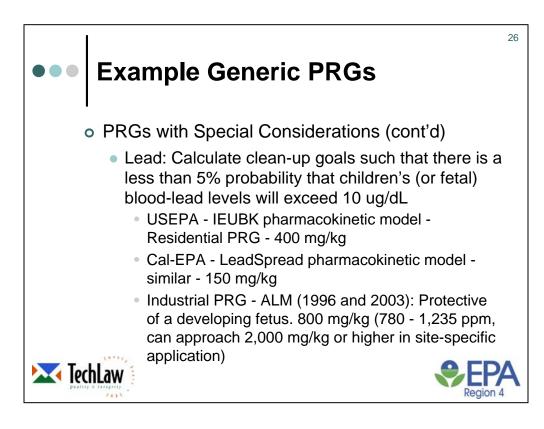
Defensible data for use in adjustment not available - so SFo/RfDo often applied w/o adjustment.

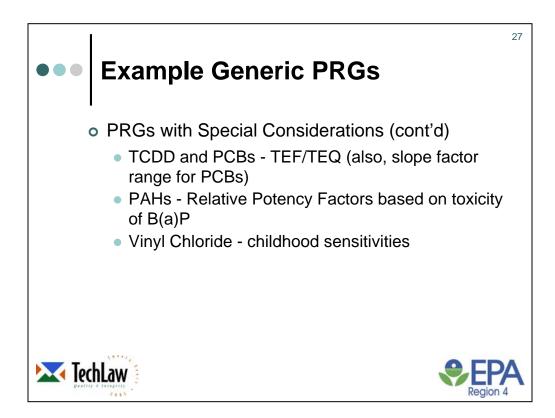
Although this is provided for carte blanche in the PRG tables, some contaminants are known to cause a direct toxic effect in the skin, contraindicating such an extrapolation: e.g., cPAHs (BaP) - mouse skin painting assays.

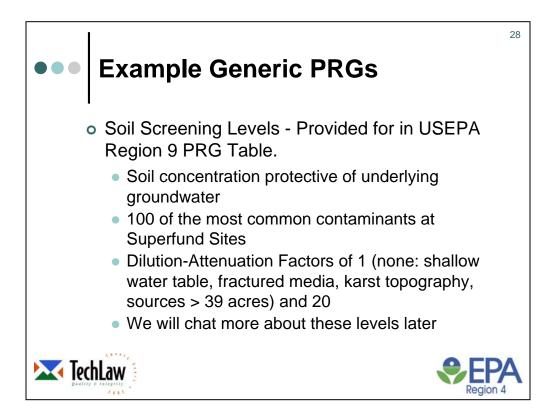


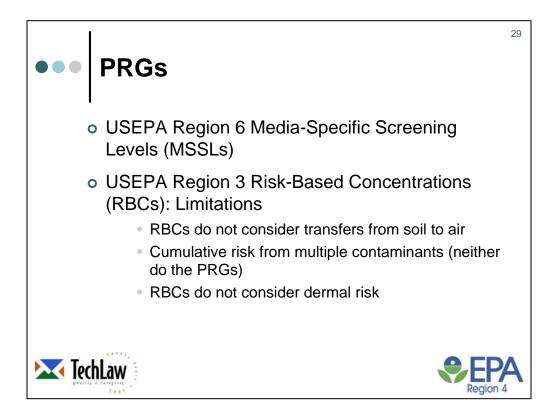
Cadmium

Separate RfDo for water and food - USEPA Region 9 uses RfDo for water (twice as conservative)

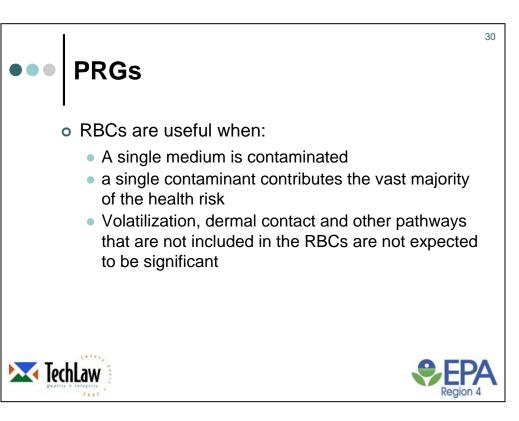


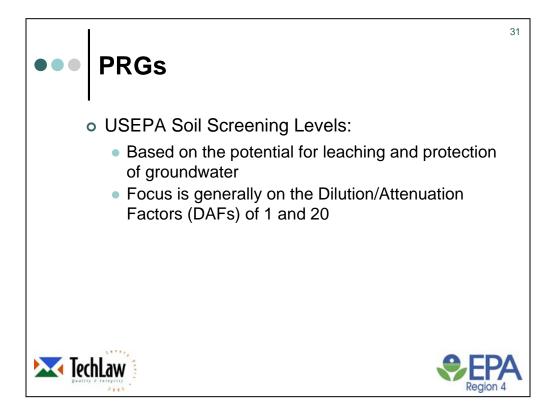




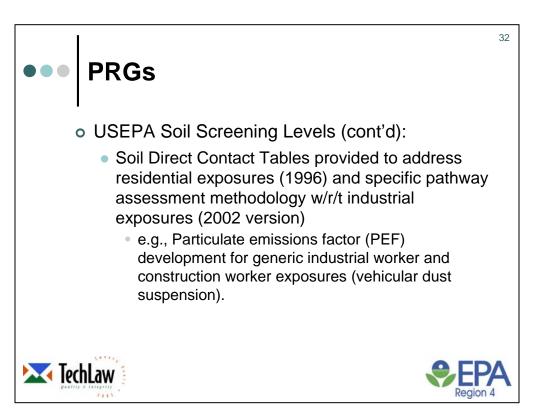


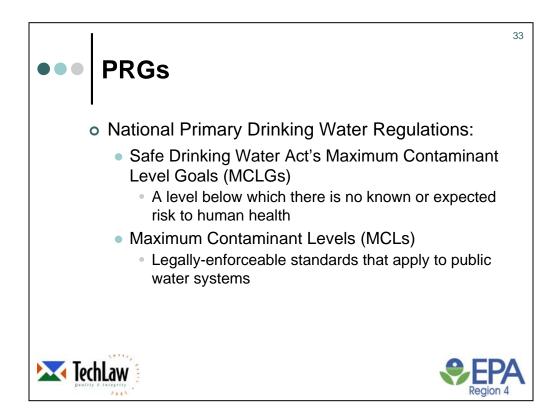
If we have time

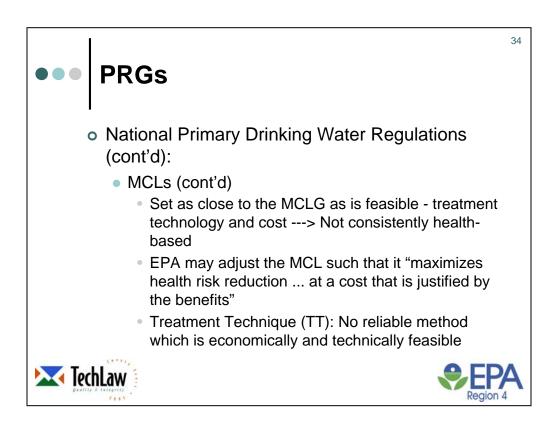




Soil screening values based on the potential for leaching and protection of groundwater Groundwater Protection SSLs account for a number of pathways, but focus is generally on the Dilution/Attenuation Factors (DAFs) of 1 and 20





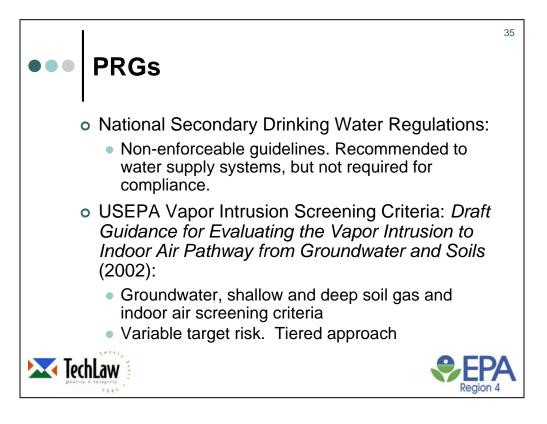


Set as close to the MCLG as is feasible using the best available treatment technology and taking cost into consideration (occurrence in the environment, human exposure and risks of adverse health effects in the general population analytical methods of detection, technical feasibility and impacts of regulation on water systems, the economy and public health) ---> Not consistently health-based

EPA may adjust the MCL for a particular class or group of systems to a level that "maximizes health risk reduction benefits at a cost that is justified by the benefits."

Treatment Technique (TT): An enforceable level of performance for public water systems when there is no reliable method which is economically and technically feasible

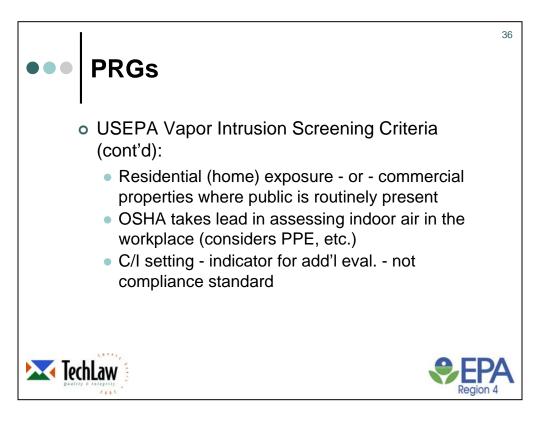
Lead and copper are regulated by Treatment Technique that requires systems to control the corrosiveness of their water (Cu = 1.3 mg/L, Pb = 0.015 mg/L)



Non-enforceable guidelines regarding contaminants that may cause cosmetic effects such as ... Eew ... skin or tooth discoloration) or aesthetic effects (such as taste, odor and color ... Yum) in drinking water. Recommended to water supply systems, but not required for compliance. Many states adopt these standards

Groundwater, shallow and deep soil gas and indoor air screening criteria. The subsurface media screening values are based on attenuation factors, with the indoor air concentration as a target. Best for use with sub-slab soil gas data.

Variable target risk. Tiered approach. Need I say it? Only for VOCs

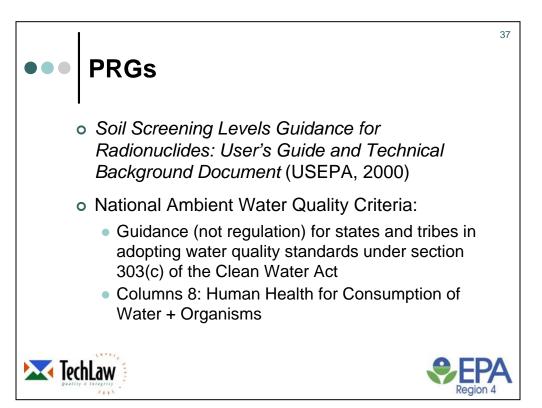


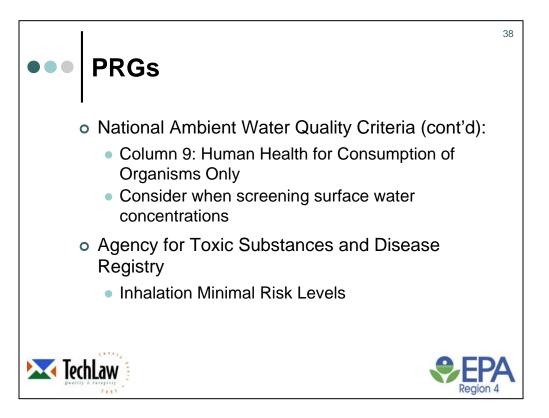
Primarily for use in assessing residential (home) exposure - or commercial properties where public is routinely present (e.g., stores, hospitals, libraries, schools, hotels, etc.)

OSHA takes lead in assessing indoor air in the workplace (considers PPE, etc.).

Can be used to assess industrial setting - as an indicator for the need for additional evaluation - not as compliance standards.

Need to make adjustments for building-specific air volumes, air exchange rates, etc. To be used in tandem with USEPA's User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings (2003)





Considers new fish ingestion rate of 17 g/day

