

# **Draft Revisions to MTCA Cleanup Levels**

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**June 21, 2010**

**Toxics Cleanup Program  
Department of Ecology**

# Topics

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- Comments on March 2010 discussion materials
- Method A Ground Water Cleanup Levels
  - Draft changes
  - Continuing evaluations
  - Non-changes
- Next Steps

# What did we hear about cleanup levels during and after the March 2010 meeting?

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1. General agreement that cleanup levels need to be updated based on new toxicity values in IRIS and NCEA.
  - Range of opinions on other toxicity values like Cal EPA values
  - Need to consider MCLs, background levels and PQLs when updating cleanup levels
2. Appears to be support on the use of EPA guidance on early-life stage exposure
  - Wide range of opinions on application to all carcinogens
  - Concerns about application to benzo[a]pyrene & PAH mixtures
3. Important to consider real world impacts resulting from updated cleanup levels

# Fork in the Road

When you come to a fork in the road, take it.  
Yogi Berra, New York Yankees

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# Summary of Ground Water Cleanup Level Draft Changes

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## Draft Changes

- Benzo[a]pyrene
- Chromium III
- Ethylene dibromide (EDB)

## Changes Under Consideration

- Arsenic
- Chromium VI
- Naphthalene
- PAH Mixtures
- Lead (Separate Document)
- TPH Mixtures (Ongoing Evaluation)

## No Changes Planned

- Ethylbenzene
- Tetrachloroethylene
- Toluene
- Trichloroethylene
- Vinyl chloride
- Other Method A Substances (Benzene, Cadmium, DDT, 1,2-Dichloroethane, Gross alpha and beta activity, Mercury, Methylene dichloride, MTBE, PCBs, Radium 226 and 226/228, 1,1,1 Trichlorethane & Xylenes)

# Questions to Keep In Mind During Discussion

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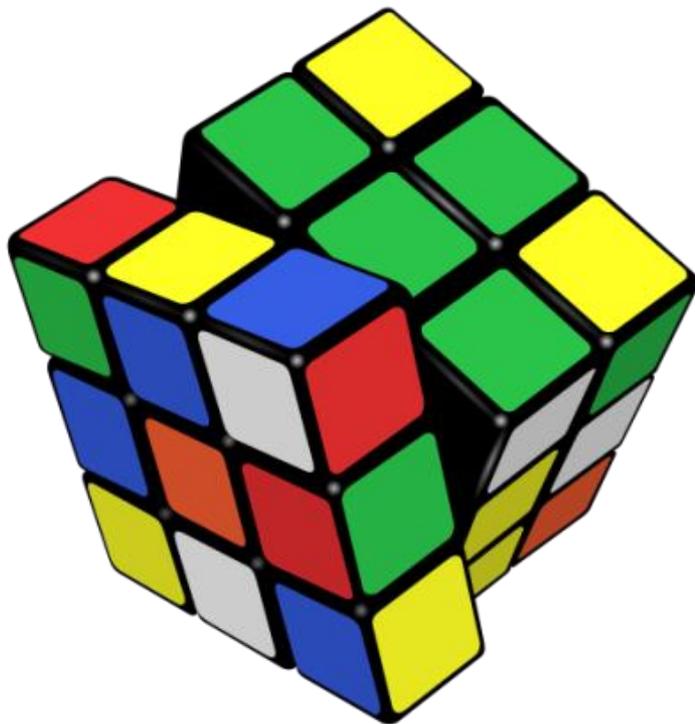
- Does rationale for revisions and non-revisions make sense?
- What are practical implications of the revisions?
- Ideas on ways to characterize and evaluate those impacts?
- Other options?



# Many Factors Shape Cleanup Level Updates

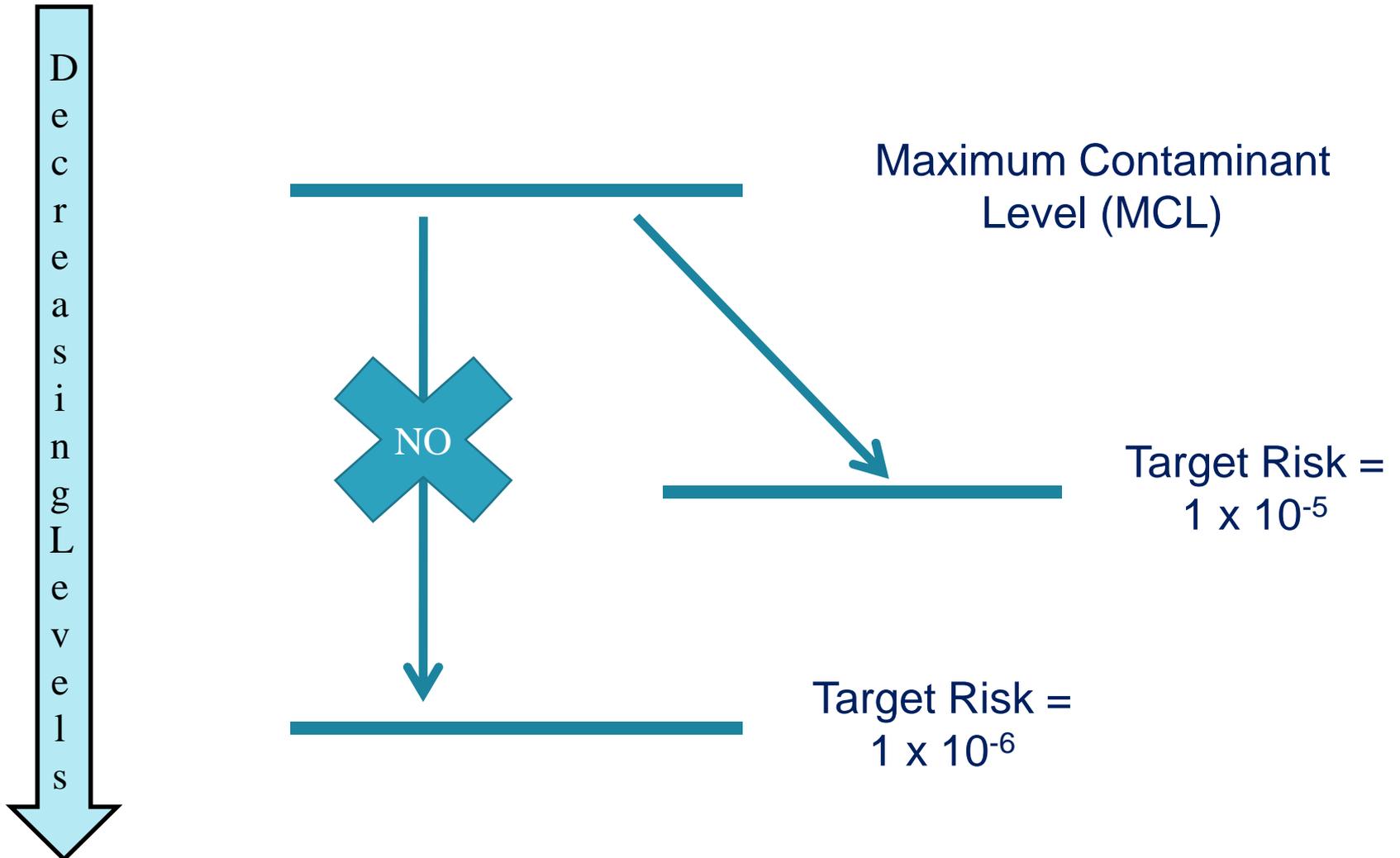
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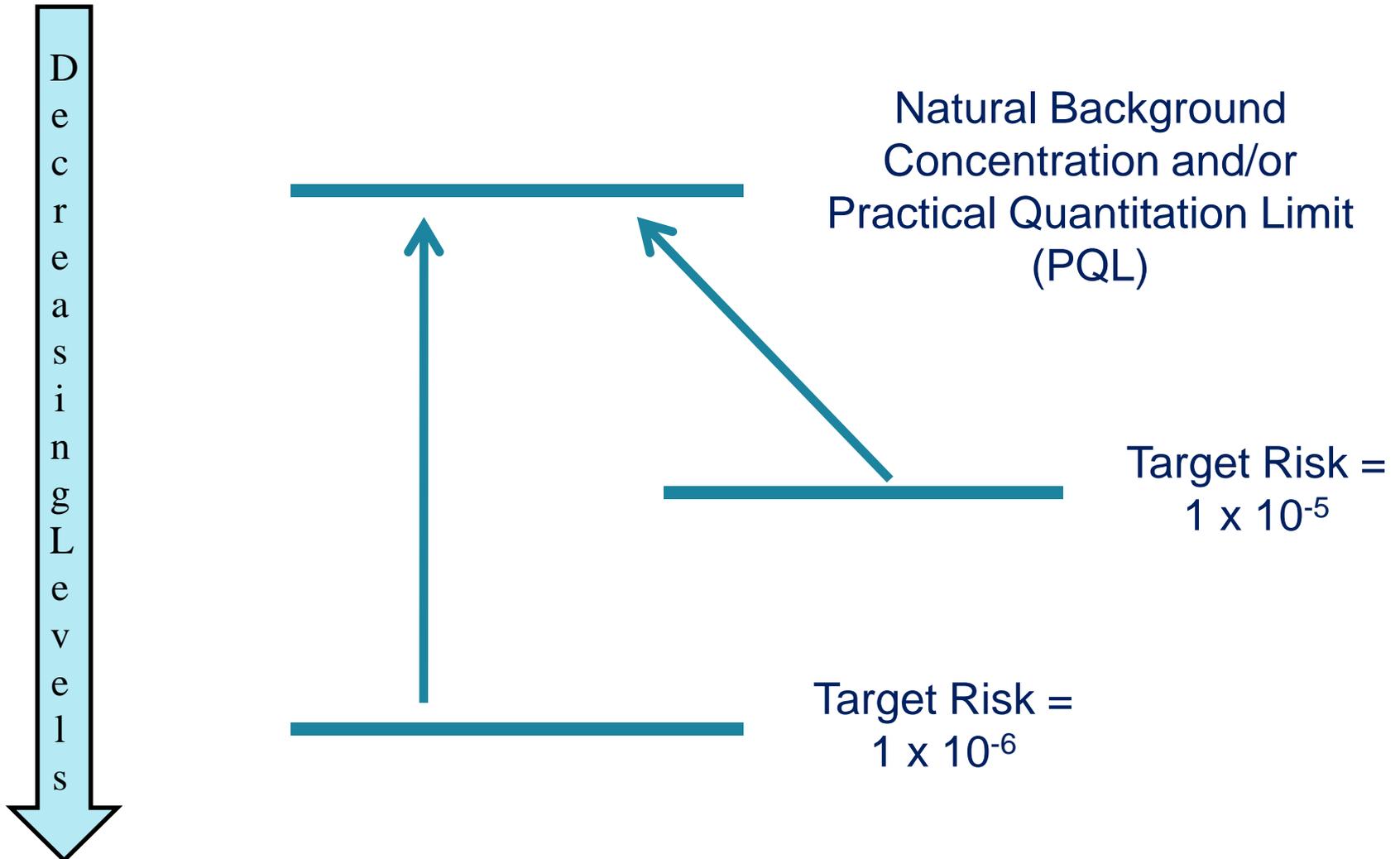


- New scientific and regulatory information
- Current MTCA rule provisions on adjustments to state and federal drinking water standards
- Current MTCA rule provisions on adjustment to risk-based cleanup levels
- Draft MTCA rule changes for implementing early life stage exposure guidelines

# Adjustments to State and Federal Drinking Water Standards (Current Rule)



# Adjustments to Risk-Based Concentrations (Current Rule)



# Advisory Group Comments on Application of Early Life Stage Exposure Guidelines

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- General support for applying early-life stage adjustments to carcinogens with mutagenic MOA (EPA Policy)
  - Applying EPA policy is a reasonable first step (Boyden/Stoner)
- Range of opinions on whether policy should apply to all carcinogens
  - Lack of uniformity on defining mutagenic MOA; biological reasons for increased child sensitivity; err on side of caution (Dunn)
  - Reasons for not applying to all carcinogens (e.g., rapid pace of research, conclusive evidence for few compounds, EPA policies (Boyden/Stoner)
- Members identified technical and policy issues associated with application to benzo[a]pyrene/PAH compounds
  - Large uncertainties with high to low doses extrapolation; MTCA policies include conservative features; cleanup levels below background; draft EPA mixtures policy (Yost/Garry through Ernst)
  - 2007 MTCA amendments factored in early life stage exposure (Newlon)

# Application of Early Life Stage Exposure Guidelines

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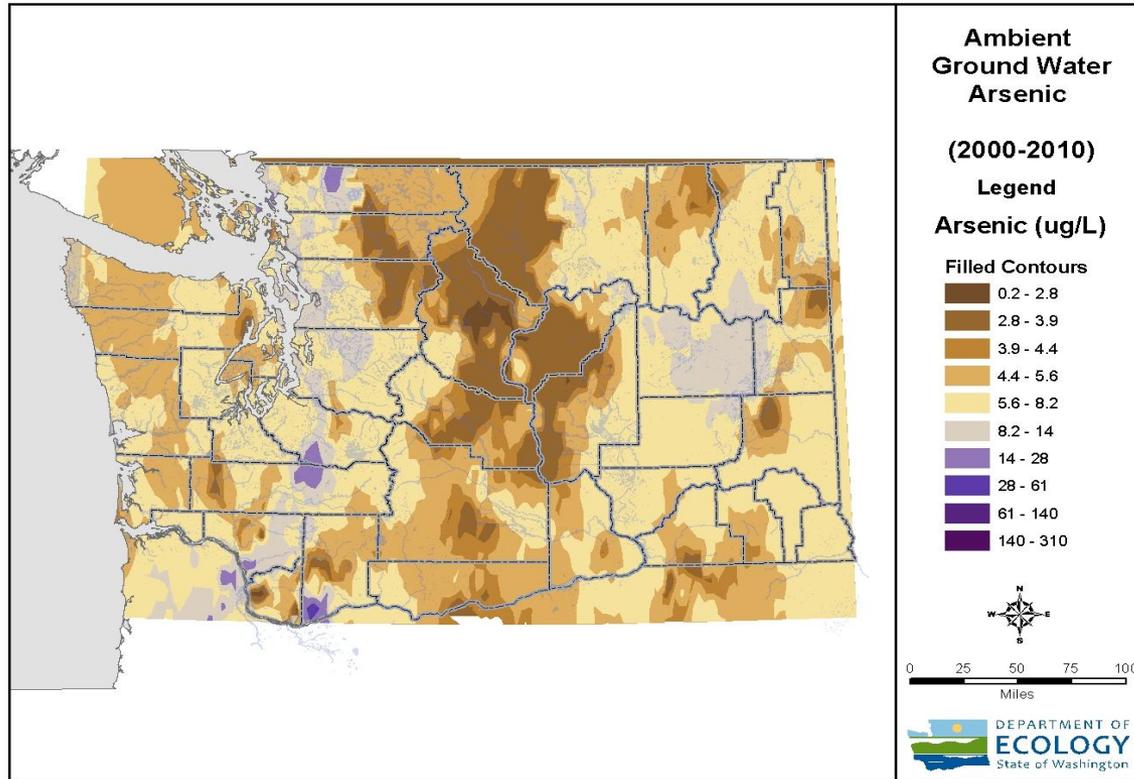
- Draft cleanup level updates are based on applying early life stage adjustments to carcinogens with a mutagenic mode of action (MOA)
  - There a credible scientific basis for applying early life stage adjustments to carcinogens with mutagenic MOA (as well as other carcinogens)
  - The EPA policy is the appropriate science policy choice given the overall MTCA risk management framework
    - Provides a high level of protection when implemented with MTCA framework (i.e.,  $10^{-6}$  risk level)
    - Consistent with MTCA statute and Ecology's general reliance on EPA risk assessment guidance
    - Consistent with policies adopted by other state agencies
- Ecology will include both the EPA and California guidelines in the regulatory analyses required under state law

# Arsenic

- Changes in last decade?
  - EPA adopted new drinking water standard (10 ug/L) in 2001
  - EPA published draft revisions to cancer slope factor in 2010
  - More ground water data is available (90<sup>th</sup> percentile is @ 10 ug/L)
- Potential implication for Method A Ground Water Cleanup Level:
  - Revised background analysis supports revision of Method A ground water cleanup level from 5 ug/L to 10 ug/L

| Arguments For Revision   | Arguments Against Revision  |
|--|---|
| Reflects information on background levels  | Inconsistent with draft revisions to EPA toxicity values                    |
| Consistent with current drinking water standard and cleanup levels in other states | SDWA cost-benefit analysis with new values would likely support a lower MCL |
| Consistent with MTCA decision framework  | MTCA policy on background needs to be revised                               |

# Arsenic Background Levels



# Arsenic Background Levels

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| Summary of Statewide Arsenic Ground Water Evaluation          |                |
|---|----------------|
| Number of wells   | 6,776          |
| Number of samples   | 18,238         |
| Concentration Range   | 0.2 – 310 ug/L |
| Median  | 5.0 ug/L       |
| Mean  | 6.1 ug/L       |
| 90 <sup>th</sup> percentile (assuming lognormal distribution) | 10.7 ug/L      |

# Arsenic (Questions)

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- Do you believe this is an appropriate change given EPA's ongoing reassessment of arsenic toxicity and the potential implications for future revisions to the federal drinking water standards?
- What are some of the practical implications of this revision in terms of cleanup actions and restoration time frames?

# Naphthalenes

- Changes in last decade?
  - Bioassays show increase cancer incidence via oral exposure
  - In 2009, EPA used study results to develop cancer slope of  $0.029 \text{ (mg/kg/day)}^{-1}$  for 1-methylnaphthalene
- Implication for Method A Cleanup Level:
  - Options based on cancer risks range from 10 to 90 ug/L.

| Arguments for Revisions   | Arguments Against Revisions  |
|---|--|
| Naphthalene and/or 1-methylnaphthalene classified as carcinogens by IARC, NTP and EPA   | EPA has not revised the IRIS database to reflect 2007 bioassay results.                |
| Some options are based on IRIS and NCEA toxicity value and EPA risk assessment guidance | Some options are based on Cal EPA toxicity values/VI screening levels are draft values |
| Consistent with MTCA decision framework   |  |

# Naphthalene (Questions)

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- Are there reasons why Ecology should not consider revising the Method A cleanup level for naphthalene?
  - Change is premature if based on toxicity values that are not published in IRIS, HEAST or NCEA (Boyden/Stoner)
  - Draft vapor screening levels do not provide sufficient justification for revisions (Boyden/Stoner)
- Are there other options that Ecology should consider when deciding how to address this issue?
- Do you have ideas on ways that Ecology can evaluate these options when preparing the environmental impact analysis and economic evaluations?

# What are some of the practical implications of a revised cleanup level?

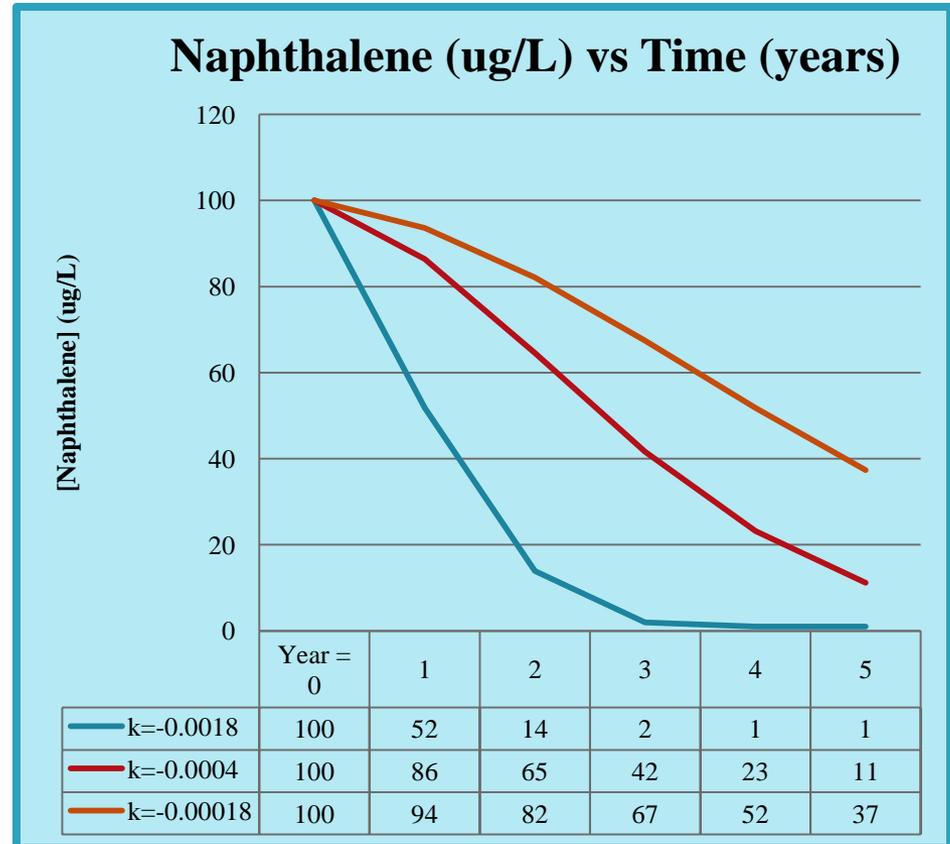
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| <b>Distribution of Naphthalene in Groundwater<br/>(Based on Data in EIM System/No Adjustment for Non-Detects)</b> |                   |       |
|---|-------------------|-------|
| Concentration Range   | Number of Samples | %     |
| Greater than 160 ug/L   | 1109              | 6.3%  |
| 80 to 160 ug/L  | 264               | 1.5%  |
| 40 to 80 ug/L   | 251               | 1.4%  |
| 20 to 40 ug/L   | 242               | 1.4%  |
| 10 – 20 ug/L  | 220               | 1.3%  |
| 5 to 10 ug/L  | 2160              | 12.3% |
| 4 to 5 ug/L   | 1328              | 7.6%  |
| 3 to 4 ug/L   | 139               | 0.8%  |
| 2 to 3 ug/L   | 264               | 1.5%  |
| 1 to 2 ug/L   | 1631              | 9.3%  |
| Less than 1 ug/L  | 9949              | 56.7% |
| Total EIM Sample Results  | 17557             |       |

# Should Ecology consider establishing action levels (based on biodegradation)?

- ❑ Naphthalenes degrade in the environment
- ❑ Average concentration over 30 year period will be lower than initial concentration
- ❑ Protective remediation levels or action levels might be established at levels that are higher than risk-based cleanup levels



# Benzo[a]pyrene

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- Changes in last decade?
  - EPA and OEHHA adopted early life stage exposure guidelines
  - OEHHA proposed revised public health goal for drinking water
  - EPA published draft procedures for PAH mixtures
- Implication for Method A Cleanup Level:
  - Ground water cleanup level should be lowered from 0.1 ug/L to 0.02 ug/L
- Rationale for revision:
  - Reflects current scientific information
  - Complies with EPA cancer guidelines
  - Complies with MTCA regulatory and statutory policies

# Benzo[a]pyrene (Questions)

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- Do you believe this is an appropriate change given current scientific information and federal guidance on early life stage exposures?
- The draft value for benzo[a]pyrene is equal to the PQL for Method 8270C (Selective Ion Monitoring (SIM)). Is this PQL consistent with your experience at cleanup sites in Washington?
- What are some of the practical implications of this revision in terms of cleanup actions and restoration time frames?
- Do you have ideas on ways that Ecology can evaluate these options when preparing the environmental impact analysis and economic evaluations?

# Carcinogenic PAH Mixtures (cPAH)

Those who cannot remember the past are condemned to repeat it.

George Santayana

| Carcinogenic PAH       |          | mg/kg | RPF  | TEQ | Exceeds CUL = 1 |
|------------------------|----------|-------|------|-----|-----------------|
| benzo[a]pyrene         | 50-32-8  | 0.8   | 1    | 0.8 | No              |
| benzo[a]anthracene     | 56-55-3  | 2.9   | 0.1  | 0.3 | No              |
| benzo[b]fluoranthene   | 205-99-2 | 2.5   | 0.1  | 0.3 | No              |
| benzo[k]fluoranthene   | 207-08-9 | 0.7   | 0.1  | 0.1 | No              |
| chrysene               | 218-01-9 | 2.8   | 0.01 | 0.0 | No              |
| dibenz[a,h]anthracene  | 53-70-3  | 0.4   | 0.1  | 0.0 | No              |
| indeno[1,2,3-cd]pyrene | 193-39-5 | 1.4   | 0.1  | 0.1 | No              |
| Sum, mg/kg             |          |       |      | 1.6 | Yes             |

## Split Mixtures Into Multiple cPAHs

- Treat each cPAH as a hazardous substance
- $10^{-6}$  cancer risk used to establish cleanup level for each cPAH
- $10^{-5}$  cancer risk is used to set cleanup levels for the whole mixture

## Lump cPAHs Together

- Treat the whole mixture like it is a single hazardous substance
- $10^{-6}$  cancer risk level is used to establish cleanup levels for the whole mixture

# PAH Mixtures

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2007

- Ecology decided to treat carcinogenic PAH mixtures as single hazardous substances (apply  $10^{-6}$  to mixture)
  - Margin of safety for early life stage exposure
  - Margin of safety b/c mixtures include more than 7 carcinogenic PAHs

2010

- Is it appropriate for Ecology to maintain the 2007 policy if early life stage exposure adjustments are explicitly made to carcinogenic PAHs?

# Chromium III

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- Current value = 50 ug/L for total chromium (may use 100 ug/L if only chromium III is present)
- Changes in last decade?
  - In 2007, chromium VI found to increase cancer incidence via oral exposure in National Toxicology Program study
  - NJDEP used study results to develop cancer slope of  $0.5 \text{ (mg/kg/day)}^{-1}$
- Implication for Method A Cleanup Level
  - Establish separate values for chromium III and VI
  - Set Method A value for chromium III equal to MCL (100 ug/L)
- Rationale for revision:
  - Reflects current scientific information
  - Equal to state and federal drinking water standard
  - Complies with MTCA regulatory and statutory policies

# Chromium VI

- Changes in last decade?
  - In 2007, chromium VI found to increase cancer incidence via oral exposure in National Toxicology Program study
  - In 2009, NJDEP used study results to develop cancer slope of  $0.5 \text{ (mg/kg/day)}^{-1}$ . NJDEP value published in EPA/ORNL tables
- Implications for Method A Cleanup Level:
  - Risk-based cleanup (MCL adjusted to  $10^{-5}$  risk) is 2 ug/L

| Arguments for Revision   | Arguments Against Revision  |
|--|---|
| Consistent with current scientific information (e.g., results of NTP bioassay)         | EPA has not developed oral cancer slope factor. Revision would be based NJDEP value |
| NJDEP cancer slope factor was peer-reviewed and is consistent with draft Cal EPA value | Chromium VI is transformed to chromium III in the environment                       |
| Consistent with MTCA decision framework  | NJDEP did not include chromium VI cleanup level in November 2009 rule revisions     |

# Chromium (Questions)

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- Do you believe this is an appropriate change given current scientific information and state and federal guidance?
  - Change is premature if based on toxicity values that are not published in IRIS, HEAST or NCEA (Boyden/Stoner)
  - Regional Screening Tables provide an appropriate basis for revisions (Dunn)
- Chromium VI can be reduced to chromium III under certain environmental conditions. How often is chromium VI a cleanup issue at sites you are involved with?
- What are some of the practical implications of this revision in terms of cleanup actions and restoration time frames?
- Do you have ideas on ways that Ecology can evaluate these options when preparing the environmental impact analysis and economic evaluations?

# Ethylene dibromide (EDB)

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- Changes in last decade?
  - In 2003, EPA revised the cancer slope factor in IRIS database from 85 to 2 (mg/kg/day)<sup>-1</sup>
- Implication for Method A Cleanup Level:
  - Ground water cleanup level should be raised from 0.01 ug/L to 0.05 ug/L
- Rationale for revision:
  - Reflects current scientific information
  - Equal to state and federal drinking water standard
  - Complies with MTCA regulatory and statutory policies
  - Consistent with other state cleanup programs

# EDB (Questions)

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- Are there reasons why Ecology should not consider making this change?
- Change is appropriate based on revisions to toxicity values (Boyden/Stoner)

# Rationale for Certain Non-Revisions

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- Ethylbenzene – Ongoing EPA health assessment
- Tetrachloroethylene – Ongoing EPA health assessment
- Toluene – Consideration of chemical-specific information on inhalation pathway
- Trichloroethylene – Ongoing EPA health assessment
- Vinyl chloride – MCL adjusted for  $10^{-5}$  cancer risk equals current Method A value

# Next Steps on the Way to the Finish Line

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- Review feedback and comments from MTCA/SMS Advisory Group
- Discuss toxicity data hierarchy issues at June 24 Vapor Work Group meeting
- Consider feedback and comments when preparing draft updates for Method A soil cleanup levels
- July 26 MTCA/SMS Advisory Group (soil cleanup levels + Ecology reactions to GW comments)
- Fall 2010 – Complete revised draft cleanup levels & supporting evaluations