

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

In September 2007 the Alaska Department of Environmental Conservation (DEC) released proposed revisions to 18 AAC 75 site cleanup rules for a 30-day public comment period. The comment period ended on October 22, 2007 but was extended to November 30, 2007 upon stakeholder request.

Comments were received from the Federal Aviation Administration, Coast Guard, consolidated Department of Defense (DoD) agencies, Municipality of Anchorage, Marathon Oil, ConocoPhillips, Alaska Oil and Gas Association, Solid Waste Association of North America, Alaska Department of Transportation and Public Facilities (ADOT&PF), and several private consultants and other individuals.

This summary groups the comments into the following similar categories.

General Comments.....	1
Solid Waste Facility Exemption	4
Soil Cleanup Levels – General	4
Soil Cleanup Levels – Table B1	6
Cleanup Levels – Table B2.....	11
Groundwater – Table C.....	14
Site Closure and Institutional Controls	16
Definitions.....	18
Guidance Documents	18

General Comments

Comment: DEC should not regulate site cleanups if the State is the responsible person or landowner. CERCLA Section 121(d)(4)(E) allows for a waiver of regulations (such as 18 AAC 75) when the state has not consistently applied (or demonstrated the intention to consistently apply) the regulation in similar circumstances at other remedial actions.

Response: DEC is mandated to oversee and/or conduct cleanups to ensure protection of human health, safety, welfare and the environment, regardless of land owner or responsible party.

Comments:

1. The proposed regulations are inadequately researched, poorly communicated, and contradict state recommended uses.
2. There is no improvement in clarity, flexibility, and scientific defensibility.
3. There is inadequate information regarding the reasons for the proposed changes to the cleanup levels.
4. There is not enough discussion of the changes or examples of the changes to understand how the proposed changes will work.

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

5. There is no assessment of the impact of the proposed regulation changes

Response: The department's goal is to improve clarity, defensibility, and flexibility during this and subsequent regulation packages. As the reader will see later in this responsiveness summary, the department has tabled several proposed revisions for the time being.

DEC disagrees with the opinion that there is inadequate information regarding the reasons for the proposed changes. A number of documents were available from DEC and placed on our web site for full public dissemination, including summary documents, the proposed revisions, and the underlying spreadsheets that show how the proposed cleanup levels were calculated.

The commenter is correct that DEC did not assess the potential impact of the proposed revisions. We assume the commenter meant monetary impacts. Generally, as cleanup levels are tightened (lowered) as a result of new science, cleanup costs may increase. Accurate quantification, however, is possible only on a chemical-specific and site-specific basis. For this reason DEC did not attempt to provide a general assessment of potential monetary impacts that may occur as the result of numerous revisions to the cleanup levels.

Comment: Smooth implementation is important. DEC needs to provide a clear schedule of when changes will take effect and stick with the schedule. Consultants need to know which sites will fall under existing and revised regulations.

Response: It is difficult to determine an exact implementation schedule because of unforeseen variables in the adoption process, such as the Department of Law's available resources to review and approve the final regulations package. We do, however, anticipate that adoption and filing will occur by fall 2008. Sites in the cleanup process at the time of adoption will be subject to the new cleanup levels.

Consultants working on cleanup projects during the transition period should compare the cleanup levels approved under the old regulations with the revised cleanup levels. Exposure pathways and assumptions should be re-evaluated; the assigned DEC project manager should be contacted if there are concerns. During the transition period DEC encourages the use of revised cleanup levels rather than those in current regulation.

Sites where cleanup has already been completed are subject to the revised cleanup levels. DEC is in the process of evaluating these sites and may require additional response actions, including the use of institutional controls, if it is determined that human health and the environment are not adequately protected. Our strategy is to evaluate potential exposure in tandem with remaining contaminant concentrations. In other words, if residual contaminant concentrations exceed the revised cleanup levels, this alone will not elicit an additional response action. For this reason DEC expects the number of sites requiring further action to be minimal.

Comments:

1. The science must be technically correct.
2. There must be clear separation between science and policy and a technical basis for the non-science.

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

Response: DEC agrees that there must be a sound technical basis for the cleanup levels and that policy-level decisions that impact such cleanup levels must be well documented.

Comment: Contaminated site cleanups often create more human health threats than not conducting remediation.

Response: It is the department's mandate to protect human health and the environment from the presence of oil and hazardous substances. This is balanced with a common sense approach to protect the public and workers during cleanup activities. Remedial options are evaluated while considering their protectiveness, as well as practicality, effectiveness, conformity to applicable regulations, and public comments. Non-chemical risks are evaluated site-specifically and may be included in risk management decisions.

Comment: The Statement of Cooperation (SOC) Workgroup should review comments submitted and formulate consensus recommendations.

Response: DEC is mandated to develop cleanup regulations. Having the SOC Workgroup respond to or concur with response to public comments on draft regulations is beyond the scope or role of the SOC.

Comment: Define de-minimis levels and incorporate into regulation.

Response: DEC has unsuccessfully attempted to define the term "de-minimis" in the past. Variables such as contaminant type and site-specific potential exposure pathways are problematic to the development of a generic definition that can be incorporated into regulation.

Comment: DEC must track developments and build protective measures for emerging contaminants that may cause significant ecological impacts.

Response: The cleanup levels in the regulatory tables do not reflect ecological thresholds. Emerging contaminants of ecological concern are addressed by periodically updating the screening levels found in Appendix D of the *Ecoscoping Guidance*. This guidance is posted to the Contaminated Sites Program website.

Comment: The Risk Assessment Information System (RAIS), sponsored by the Department of Energy, is not an objective source of scientific information on which the cleanup levels are based.

Response: The RAIS database uses the toxicity information hierarchy recommended by EPA and adopted by DEC. Physical and chemical input parameters used in the cleanup level equations are likewise obtained from RAIS and are from EPA supported sources, e.g., Waters 9 and EpiSuite. References are available for all values supplied by the RAIS database.

Comment: To avoid potential ethical dilemmas, DEC should modify the regulations to require third party sampling in situations where responsible persons have transferred risk to their consultants. For example, collecting a sample in one location versus another may result in significantly more cost to the consultant's employer.

Response: This comment appears to be focused on the Department of Defense's use of performance based contracts. These types of contracts do raise the question on whether the prime contractor is an

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

“impartial third party.” Rather than requiring a change in regulation, DEC must determine whether such contractors are “impartial third parties” under the existing regulations.

Solid Waste Facility Exemption

Comments:

1. Clarify the proposed repeal of the permitted solid waste exemption in 325(c)(2) and how the regulations in 18 AAC 75 would apply to a routine excavation in a solid waste landfill.
2. The proposed change will disrupt the established closure standards and cleanup procedures for inactive reserve pits managed under 18 AAC 60.440; the validity of all previous closures could be questioned.
3. Further definition is requested to prevent a situation in which a previously closed disposal facility could be forced to be cleaned up even though there is no risk.
4. The exemption in the current regulations allows for flexibility in how to apply cleanup standards to solid waste facilities.
5. If this exemption is removed without other provisions added, the potential liability to owners and operators of any active or historic unlined solid waste facility multiplies exponentially.

Response: DEC is withdrawing this proposed revision based on comments received.

Soil Cleanup Levels – General

Comment: The soil cleanup look-up tables were derived from EPA soil screening levels and were never meant to be cleanup levels.

Response: According to the EPA, “screening” refers to the process of identifying and defining areas, contaminants, and conditions at a particular site that do not require further federal attention. Generally, at sites where contaminant concentrations fall below soil screening levels (SSLs), no further action or study is warranted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Generally, where contaminant concentrations equal or exceed SSLs, further study or investigation, but not necessarily cleanup is warranted.

Alaska utilizes the EPA soil screening levels as a basis for its default cleanup levels. DEC derived the 18 AAC 75.341, Table B1 soil cleanup levels using the equations contained in the EPA’s Soil Screening Guidance (see publication 9355.4-23), modified to some degree with Alaska-specific input parameters.

Although the terminology is different the DEC process is similar to the EPA process. As with the EPA, higher concentrations may remain at a site if it can be shown that risks to human health and the environment are within the established thresholds, and if adequate exposure controls are implemented.

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

Comment: Please clarify the statement, "has been repealed and readopted in its entirety."

Response: This allowed a cleaner legal approach to the revisions. Without repealing and re-adopting the entire section, individual changes to Table B1 would have been a confusing matrix of bolded and parenthetical text, as required by the state's *Drafting Manual for Administrative Regulations*. Instead, we placed a cleanup levels comparison spreadsheet on the program web site to assist reviewers.

Comment: The method two soil cleanup tables should be revised to include default commercial/industrial risk-based cleanup levels in addition to the default residential cleanup levels presented in the tables.

Response: Exposure assumptions for default industrial/commercial levels can vary greatly in Alaska; defaults for commercial/industrial may not be adequately protective. Commercial/industrial cleanup levels may be generated site-specifically (method 3) under the current regulations.

Comment: Note 7 to Tables B1 and B2 should be revised to clearly state the migration to groundwater levels are only applicable when the soil contamination is in contact with an aquifer that could be a drinking water source or adjacent to surface water which could be a potential drinking water source.

Response: Migration to groundwater soil cleanup levels must be applied to all sites unless it can be documented that groundwater does not serve as a current or potential source of drinking water. Potential contaminant migration through groundwater to nearby surface water must also be considered. The most stringent surface water quality criteria (18 AAC 70) that must be met at an appropriate point of compliance within the contaminated aquifer are generally the aquatic life criteria.

Comment: The notice page and referenced links are misleading regarding basis and intent. It is not mentioned that 55 new chemicals are proposed for cleanup...and most of the 11 previously listed cleanup levels have been changed...The page indicates changes were due to updates from IRIS, but many of the proposed chemicals are not listed in IRIS.

Response: DEC believes sufficient information was placed on the Contaminated Sites web site to enable a reviewer to conduct an adequate review. Of particular mention is the addition of a spreadsheet that compares current and proposed cleanup levels.

Comments:

1. Responsible persons should continue to have the option to calculate and propose cleanup levels for contaminants that are not listed in the tables.
2. The proposed rule change could impact project schedules and costs should DEC not be able to provide a cleanup level in a suitable timeframe.
3. The proposed rule change may not consider site-specific conditions.
4. Site-specific cleanup levels for a hazardous substance not listed in regulation will be developed by the department rather than the responsible person. What affect does this change have on a risk assessment submitted by a responsible person under section 340(f)? Will the department update its *Risk Assessment Procedures Manual* to reflect this change?

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

Response: This housekeeping measure reflects what already occurs in practice. Since the site cleanup rules were implemented in 1999, consultants typically request the department to calculate cleanup levels for contaminants not listed in Table B1 (method 2) or Table C. Responsible persons may continue to propose cleanup levels for unlisted contaminants, but DEC will validate and approve these proposed cleanup levels in all cases. The option to propose alternative cleanup levels under method 3 (site-specific) or method 4 (risk assessment) will not change.

No additional regulatory burden will be placed on responsible persons with this change. No revisions to the *Risk Assessment Procedures Manual* are required.

Comment: Adding a carcinogenic/non-carcinogenic column to the various cleanup level lookup tables is misleading. In particular, the total petroleum fractions do not reflect the carcinogenicity of the parent product. For example, the gasoline fraction may not be carcinogenic but benzene is a known carcinogen that is significant constituent of gasoline.

Response: This modification is primarily a housekeeping measure to add clarity and to minimize confusion during proposed regulation updates. Table B1 and Table C currently list known carcinogens in bold font. This is confusing because the drafting manual for administrative regulations requires proposed regulatory revisions to also be displayed in bold font.

The commenter makes a good point that petroleum mixture constituents, such as benzene, are known carcinogens. This, and other petroleum cleanup level issues, will be explored by DEC as a result of comments received. At this time DEC is withdrawing all proposed revisions to Table B2.

Comment: Request references for changes to the slope factors and reference doses.

Response: Physical and chemical input parameters used in the cleanup level equations are obtained from RAIS and are from EPA supported sources, e.g. Waters 9 and EpiSuite. References are available for all values supplied by the RAIS database.

Soil Cleanup Levels – Table B1

Comment: What constitutes Direct Contact soil? Is it at the surface, 6" below ground surface (bgs), or other? How is the sample to be representatively collected?

Response: As with the former Ingestion pathway, Direct Contact may apply to the top 15 feet of soil. The collection of representative samples may vary on a site-specific basis and must be detailed in the site characterization work plan. The work plan is reviewed and approved by the assigned DEC project manager under 18 AAC 75.335.

Comment: If a hazardous substance is listed as carcinogenic, are the cleanup levels given based on the carcinogenic risk alone? What if a substance also has non-carcinogenic risks which would generate a different cleanup level?

Response: Although both are considered and calculated for cleanup levels, Table B1 always represents the more conservative value. For cumulative risk purposes, both carcinogenic and non-carcinogenic

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

effects must be considered.

Comment: Statewide Migration to Groundwater Cleanup Level

1. Proposed change to 18 AAC 75.341 (Table B1); Removal of Arctic Exemption to Groundwater Cleanup Levels. Maintain the Arctic zone exemption for sites with permafrost.
2. The combining of Arctic with under- and over 40-inch zones for migration to groundwater is not scientifically based.
3. Eliminating the specificity of the cleanup levels based on biomes may in fact create more administrative oversight.

Response: DEC intends to adopt a statewide migration to groundwater cleanup level for Table B1 contaminants. This is partially for simplicity and partially due to some revisions to the underlying soil-water partitioning equation for organic and inorganic contaminants.

The current migration to groundwater cleanup levels in the under-and over 40-inch zones were derived from a modified version of a standard three-phase soil-water partitioning equation. For greater technical defensibility, and to address groundwater resource degradation, the new equation changes the input parameters that can be modified site-specifically. Below is a comparison showing the differences between the old and new equations.

Current Equation	Revised Equation
Applicability – By climate zone	Applicability - Statewide
Dilution Attenuation Factor- Additive	Dilution Attenuation Factor - Multiplicative
Default Mixing Zone Depth – Varies by climate zone -may be modified site-specifically	Mixing Zone Depth – Fixed at 5.5 meters
Default Infiltration Rate – Varies by climate zone - may be modified site-specifically	Infiltration Rate – Fixed at 0.13 meters/year
Default Dilution Factor – Varies by climate zone	Default Dilution Factor – Fixed at 3.3 (due to fixed mixing zone depth and infiltration rate)
Default Attenuation Factor – Fixed at 10	Default Attenuation Factor – Default value of 4.0 may be modified on a chemical-specific basis

The soil-water partitioning equation (for Table B1 inorganic and organic compounds) is presented in the revised *Cleanup Levels Guidance*, adopted by reference in 18 AAC 75. The equation applies a three-phase partitioning model to determine the migration to groundwater cleanup levels. These contaminant

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

phases are vapor, dissolved, and adsorbed.

Petroleum hydrocarbons also exist as non-aqueous phase liquid (NAPL, or free product). For this reason DEC is exploring whether a technically more robust equation is possible for Table B2 contaminants. This work may eventually lead to a future regulation revision. In the meantime DEC is placing a moratorium on all proposed revisions to Table B2, including the underlying cleanup level equations.

In response to comments, footnote 7 to Table B1 has been expanded to state the migration to groundwater pathway may not be applicable on a site-specific basis, particularly for sites located in the Arctic zone.

Comments: Propylene Glycol

1. Glycols break down in the environment quickly.
2. If propylene glycol is added to the cleanup level tables it could possibly mean airports and other facilities where they are used would become contaminated sites.
3. The proposed revisions could have significant impacts on state facilities and private operations.
4. What is the definition of a “spill” versus an “application” of propylene glycol?

Response - Based on stakeholder comments, DEC will not incorporate propylene glycol cleanup levels into Table B1 and Table C at this time. Note that while propylene glycol cleanup levels will be removed from the lookup tables, they are still available on a site-specific basis if cleanup is warranted.

Comment: Some cleanup levels are below laboratory detection limits.

Response – Detection limit issues are addressed in 18 AAC 75.355.

Comment: Arsenic

1. Proposed footnote 15 to Table B1 appears to reinforce and extend arbitrary restrictions. There appears to be no attempt to understand the complex arsenic chemistry affecting drinking water or allow leach tests to help identify soils posing a risk. All excavation and fill operations appear to be subject to arbitrary CSP restriction with no allowed means of rebuttal. There is nothing in the proposed or existing regulations to distinguish this common chemical from others on the list. Cleanup levels appear to apply regardless of how the chemical got in the soil.
2. Expand footnote 15 (background arsenic) to include other metals. Requiring the cleanup of naturally occurring arsenic in soil to levels below background is unreasonable and inappropriate.
3. Note 15: The requirement for a background metals analysis should be expanded to include any metal known to have naturally occurring concentrations in the environment. The requirement to treat arsenic as the only naturally occurring metal which may be influenced by anthropogenic activity is arbitrary. Furthermore, the text should be revised to specify that anthropogenic activity must be site-related, and not construed to mean other such anthropogenic activities beyond the control of a site owner, such as aerial deposition of contaminants in the arctic from global sources

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

of human-induced contamination.

Response: Based on stakeholder comments, DEC has revised and simplified proposed footnote 15 to read: “Due to naturally occurring variable concentrations throughout the State of Alaska, arsenic must be evaluated as a contaminant of potential concern on a site specific basis.” The department will further evaluate issues related to inorganic contaminants in general for possible future regulatory revisions.

Comment: 2, 4-D - 2, 4-D is the world’s most common herbicide. A homeowner applying commonly available Weed B Gone at the recommended dosage will have contaminated the top foot of his lawn to about twice the cleanup level. There is nothing in the proposed or existing regulations to distinguish this common chemical from others on the list. Cleanup levels appear to apply regardless of how the chemical got in the soil.

Response –DEC recognizes the overlap between hazardous substances listed in the cleanup level tables and substances that are commonly applied to the environment, such as 2, 4-D. A homeowner who applies an approved herbicide at the recommended dosage is in compliance with federal and state laws. On the other hand, improper application or an uncontrolled release of 2, 4-D could elicit a cleanup.

Comments: Polychlorinated biphenyls (PCBs)

1. The proposed PCB migration to groundwater cleanup level (0.3 mg/kg) is overly conservative and beyond the intent of TSCA.
2. Proposed cleanup level for PCBs is too low.
3. The TSCA PCB cleanup rule is designed to be highly protective.
4. The reason given in the past for changing the PCB cleanup level was to obtain consistency with TSCA.
5. The PCB footnote (Table B1) and the human health risk based concentrations in the Cumulative Risk Guidance are confusing.
6. Note 9. The text states that a site may achieve unrestricted land use if PCBs are cleaned up to 1 mg/kg or less. However, the revised Table B1 includes a new migration to groundwater cleanup level (0.3 mg/kg) for PCBs which is even more conservative than the 1 mg/kg threshold.

Response: The department is withdrawing the proposal to place the 0.3 mg/kg migration to groundwater cleanup level in Table B1. Additional text has been included in footnote 9 noting that a cleanup level less than 1 mg/kg may be necessary to protect ecological receptors and ensure contaminant migration to groundwater does not occur.

DEC has adopted the Toxic Substance Control Act (TSCA) cleanup level of 1 mg/kg for PCBs, based on high occupancy (residential) land use. This value is the regulatory cleanup level present in 18 AAC 75.341 Table B1. Per footnote 9(B), an alternative PCB cleanup level can be developed through an approved site specific risk assessment. Site specific alternative cleanup levels for PCBs are also discussed on page 7 of the *Cumulative Risk Guidance*. Consistent with Table B1 footnote 9A, the cleanup level may be based on land use (1 mg/kg residential or between 1 mg/kg and 10 mg/kg) with an approved cap

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

and deed notice/institutional control, or 9(B) developed through a site-specific risk assessment. The human health risk based concentrations provided in the guidance table are intended for use in the cumulative risk calculations for sites with PCB concentrations remaining at or above 1/10 of the approved site cleanup level.

Comment: TCE - The proposed cleanup level for Trichloroethene (TCE) in soil is 0.020 mg/kg for migration to groundwater. References to current regulations appear incorrect. It seems that Technical Memorandum 06-003 dated August 10, 2006 was perhaps overlooked (at least in the comparison table). The Technical Memorandum updated the migration to groundwater cleanup levels for TCE.

Response: The TCE cleanup levels have been correctly updated.

Comment: bis (2-ethylhexyl) phthalate - Consider adding a footnote to bis (2-ethylhexyl) phthalate to indicate that this is a common laboratory contaminant, and that additional information may be necessary to validate that the contaminant is from the site.

Response: DEC does not believe this footnote addition is necessary. Third-party consultants are expected to raise this issue for DEC consideration in site characterization and cleanup reports.

Comment: Benzo(g,h,i)perylene - Request that the migration to groundwater cleanup level of 38,700 mg/Kg for Benzo(g,h,i)perylene be verified.

Response: This value is correct. The level is due to the estimated K_{oc} (soil organic carbon/water partition coefficient) for the compound.

Comment: Clarify the hierarchy of sources used to generate the proposed cleanup levels; many chemicals are not listed in IRIS.

Response: The hierarchy of sources previously used to generate the proposed cleanup levels is explained in the department's *Risk Assessment Procedures Manual* (RAPM), adopted by reference in regulation in 2000. This hierarchy is as follows:

- Integrated Risk Information System (IRIS);
- Health Effects Assessment Summary Table (HEAST);
- EPA Criteria Documents;
- ATSDR Minimal Risk Levels; and
- Other professionally peer reviewed documents.

The Risk Assessment Information System adopts the updated EPA hierarchy (2003), as follows:

- IRIS (Tier 1);
- Provisional Peer Reviewed Toxicity Values (PPRTVs) (Tier 2); and

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

- Other Toxicity Values (Tier 3).

DEC has chosen to utilize the more recent hierarchy to develop the revised cleanup levels. Details on the EPA hierarchy can be found at <http://rais.ornl.gov/homepage/hhmemo.pdf>.

Comment: Table B1 does not include inhalation cleanup levels for some previously listed chemicals; Appendix B of the *Cumulative Risk Guidance* calculates soil inhalation levels.

Response: Aldrin, chlordane, DDT, dieldrin, heptachlor, heptachlor epoxide, beta-hexachlorocyclohexane, PCBs, toxaphene, and lead were all considered not sufficiently volatile enough to warrant establishment of an inhalation cleanup level in Table B1 and/or may be solids at normal soil temperatures. However, these compounds should be considered if fugitive dust is a possibly completed pathway as suggested in the *Cumulative Risk Guidance*.

Compounds for which Table B1 does not list inhalation cleanup levels for, but the *Cumulative Risk Guidance* does include: aldrin, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chlordane, 2-chloronaphthalene, chrysene, DDT, dibenzo(a)anthracene, dieldrin, 1,3-dinitrobenzene, 2,3,7,8-TCDD, heptachlor, heptachlor epoxide, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, indo-1,2,3-c,d-pyrene, PCBs, and toxaphene. These compounds are not considered sufficiently volatile enough to calculate an inhalation cleanup level, and/or may be solids at normal soil temperatures. They should be considered if fugitive dust is a possible exposure pathway. Saturation levels in Table B1 are not used for cumulative risk calculations, so the risk values in the guidance may be different than what is in regulation. These compounds should be evaluated for their applicable cleanup levels in Table B1 and then considered for cumulative risk just as any other compound listed in Table B1.

Cleanup Levels – Table B2

Comment: How the department intends to use the Direct Contact, Inhalation, Migration to Groundwater, and Maximum Allowable Levels in Table B2 to manage and remediate a spill site in the Arctic Zone should be defined in the notes to this section or in a comprehensive guidance document.

Response: In response to stakeholder comments, no changes to Table B2 will be adopted at this time. The applicability of all cleanup levels to Arctic Zone sites will be explored during an upcoming technical and policy level evaluation of Table B2 cleanup levels.

Comments: Petroleum Maximum Allowable Concentrations

1. There is no technical basis for the petroleum maximum allowable concentrations.
2. Request the maximum allowable issue moved to the next phase of the proposed regulation revisions.
3. Object to using a rigid concept regarding petroleum maximum allowables.
4. Maximum allowables create unreasonable demand for cleanup and a marginal reduction in risk at high cost; the cost increase diverts resources that could go towards cleaning up sites that do pose a

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

risk.

5. Request the concept of “maximum allowable concentrations regardless of risk” for petroleum hydrocarbons be replaced with “maximum allowable concentration based on risk.”
6. Request the technical basis and the decision making process used to select the maximum allowables.
7. DEC is required under AS 46.03.024 to “give special attention” to public comments concerning the cost of complying with regulations and to alternate practical methods of complying with the statute...being implemented by the regulation.
8. Suggest a cost versus risk analysis on a site specific basis.
9. AS 46.03.070 and the definition of pollution in AS 46.03.900(20) require consideration of risk when developing pollution standards. The Alaska Supreme Court agreed with this concept in *Strock v. State*, 526P2d 3 (Alaska 1974).
10. The proposed re-write ignores the requirements of AS 46.03.826; AS 46.03.865; AS 46.03.900(9); AS 46.08.900(6); and AS 46.09.900(4).
11. The proposed regulation is inconsistent with 18 AAC 75.340 in that it categorically dismisses risk and specific site conditions in designating maximum allowable levels of petroleum hydrocarbons which cannot be exceeded.
12. The current maximum allowable provision was discussed for nearly five years...and was carefully crafted to comply with Alaska Statute.
13. The proposed revision creates a situation where a generic numeric standard overrides a cleanup level calculated from a site-specific risk assessment.
14. The proposed revision will delay federal property transfers because sites will not obtain a site closure determination if above maximum allowables.
15. Remove the confusing maximum allowables column from Table B2.
16. There is no distinction between soils that are near the surface and soils at depth that are extremely unlikely to come in contact with people; there are little or no aesthetic or odor issues associated with soils deeper than 10’ below ground surface.
17. If contaminant concentrations over the maximum allowable concentrations are considered pollution, the implication is that concentrations less than the maximum allowables are not pollution.
18. *Note 13.* The proposed modification to DEC policy that petroleum in soil, both surface and subsurface, at levels above the maximum allowable concentrations is considered pollution **regardless** of risk creates an unreasonable demand for cleanup. Furthermore, this change in policy is unscientific and practically negates any flexibility the cleanup rules may provide under Methods

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

3 and 4.

Response: Based on comments received, DEC is withdrawing the proposed revision to the application of petroleum maximum allowable concentrations. Additionally, a moratorium has been placed on all other proposed changes that would affect Table B2.

Comments: Petroleum migration to groundwater cleanup levels

1. The Statement of Cooperation papers should be used to develop technically accurate and defensible migration to groundwater cleanup levels for petroleum
2. Object to applying a statewide migration to groundwater cleanup level to Arctic sites.
3. Object to applying the three-phase equation to both vadose zone and saturated zone soils.
4. Petroleum fraction cleanup levels do not reflect how fuels migrate in the subsurface.
5. Fuel contamination in groundwater is generally due to smear zone contact, not leachate migration.
6. The regulations should be updated to reflect four-phase partition modeling.
7. The cost-benefit of the proposed statewide migration to groundwater cleanup level was not adequately considered.
8. The proposal eliminates the ability to have different targets based on the wide range of climates existing in the state.
9. Recommend maintaining the Arctic zone exemption for sites with permafrost.
10. Excavating to 15 feet below ground surface is not an appropriate method to protect the migration to groundwater exposure pathway.
11. The use of soil leaching tests, such as SW 846 Methods 1311 and 1312, would avoid the problems inherent in the 3- and 3-phase partitioning equations.
12. It is environmentally irresponsible to continue to mandate a technically invalid cleanup level that forces responsible persons to use cleanup methods that exacerbate global warming.
13. Soil contaminated at 250 mg/kg will generally not result in groundwater contamination. The solubility for DRO (5.8 mg/L from *Guidance for Cleanup of Petroleum Contaminated Sites*) is so low that the oxygen available in precipitation (12.8 mg/L at 5° C) is sufficient to degrade any dissolved fuel.
14. Object to the assumption that a single statewide migration to groundwater cleanup level is protective of lateral contaminant migration to nearby surface waters in the Arctic zone.
15. The application of a single statewide migration to groundwater cleanup level to Arctic zone sites misrepresents the physical and chemical processes occurring at the sites and imposes an arbitrary criterion that may interfere with site closure and property transfer even when the transport to

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

surface water pathway has been properly addressed.

Response: Based on comments received, DEC is withdrawing the proposal to modify the current soil-water partitioning equation, as well as all other proposed modifications that would affect Table B2. This includes the proposed modification that would establish statewide migration to groundwater cleanup levels. A separate regulations package specific to petroleum will be generated to allow for a thorough technical analysis and diverse stakeholder input.

Comment: There appears to be some redundancy in the sampling requirements regarding sampling for the total petroleum fractions in addition to individual cleanup criteria; lab results for the ranges are often adversely affected by biogenic interference. Silica gel cleanup increases project costs.

Response: The department plans a comprehensive technical review of petroleum cleanup levels and may look into this issue at that time.

Comments:

1. The aliphatic/aromatic cleanup levels (Table B2) should not be repealed.
2. The total petroleum cleanup levels become arbitrary with the removal of the aliphatic/aromatic values.
3. The GRO, DRO and RRO cleanup/screening levels are directly based on the aromatic and aliphatic cleanup levels within the GRO, DRO and RRO equivalent carbon ranges.

Response: All proposed revisions to Table B2 are being withdrawn at this time. The department plans a comprehensive technical review of petroleum cleanup levels and may be making future revisions.

Groundwater – Table C

Comments:

1. Why is the convenient 10X rule being repealed and what will take its place?
2. Will sites where it has been applied be reopened?
3. Site specific alternative groundwater cleanup levels should be developed if groundwater is not a current or reasonably expected future source of drinking water.
4. Repeal of the 10X rule removes flexibility; the cost-benefit of this revision for the sake of simplicity was not adequately considered.
5. If it can be demonstrated that groundwater is not a currently or reasonably expected future source of drinking water (i.e. a groundwater use determination has been made under 18 AAC 75.350), then no unacceptable risk exists through either the migration to groundwater exposure pathway or through the groundwater exposure pathway. Thus, cleanup levels for these exposure pathways should be eliminated without the calculation of an alternate cleanup level.

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

6. Elimination of this rule will lead additional cleanup, or deed restrictions or notifications placed on groundwater beneath sites which in turn could impact property value. Although the ten-times rule is arbitrary, it allows for flexibility.
7. Although non-potable groundwater is not currently a high value commodity it is part of the State of Alaska and should be protected from pollution. By removing the current level of protection from this resource it could create free pollute zones.

Response: The primary reason for the repeal is that the ten-times rule is arbitrary and has no technical basis with respect to potential risk to human health and the environment. A 10-times increase in the cleanup level may not be protective of the vapor intrusion pathway, and may not be protective of groundwater uses other than drinking water (i.e., water quality standards). These issues may require the application of institutional controls, making a ten-times increase in cleanup levels insignificant with respect to cleanup costs or property values.

Sites where the 10-times rule has been applied under 18 AAC 75.375(2) will not typically be reopened. This is because a groundwater use determination has been conducted under 18 AAC 75.350, meaning that potential exposure through ingestion of contaminated groundwater is not problematic and that higher contaminant concentrations may remain in place. In limited cases DEC may find that other potential exposure pathways, particularly the vapor intrusion pathway which has recently become a concern, may be an issue. Additional response actions or institutional controls could be required in these circumstances.

Many of the comments pertain to the need for flexibility in terms of setting groundwater cleanup levels. Other options exist for alternative groundwater cleanup levels, including risk assessment and establishing alternative points of compliance. Additionally, in the event that a contaminant plume is stable and contaminant concentrations are decreasing, DEC may be able to approve natural attenuation as a remedy. No further active remediation is required, rendering the cost of a ten-times increase in cleanup levels fairly insignificant.

The ten-times rule is specific to groundwater that is not used as a current or reasonably expected future drinking water source. DEC recognizes that cleanup at these sites can be very expensive and that closure status can impact property values. We will work closely with the regulated public when these situations arise to determine a reasonable and protective resolution.

The implication of the comment regarding “free pollute zones” is that the 10-times rule offers some level of protection for non-drinking water aquifers, and that with its removal the department will allow groundwater pollution in a cavalier fashion. On the contrary, DEC believes that repeal of the 10-times rule, plus the exacting criteria under which an alternative point of compliance may be approved, will ensure residual groundwater contamination is effectively contained and managed under a risk-based approach.

Comment: Consider adding a footnote to bis (2-ethylhexyl) phthalate to indicate that this is a common laboratory contaminant, and that additional information may be necessary to validate that the contaminant is from the site. The proposed groundwater cleanup level is consistent with concentrations often encountered as laboratory contamination.

Response: DEC does not believe this footnote addition is necessary. Third-party consultants are expected

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

to raise this issue for DEC consideration in site characterization and cleanup reports.

Comment: Existing regulations pertaining to the hazard index should not be changed. That is, leave the cumulative risk hazard index reference at 1.0. When making risk management decisions at specific sites, DEC can mentally round risk calculations to one significant digit without changing the regulations.

Response: DEC considers this to be a housekeeping measure to synchronize with EPA's recommendation that the Incremental Lifetime Cancer Risk and Hazard Index should be expressed using one significant figure (EPA/540/1-89/002, 1989). The use of more than one significant figure implies a level of certainty in the estimate that simply cannot be justified given the inherent unknowns associated with the risk estimation process. More figures should be carried along through calculations leading up to the final risk number to minimize rounding errors and to make it possible for others to verify the calculations. All standard rounding rules must apply. This will ensure that the rounding procedures and cumulative risk standards are consistent between cleanup methods two, three, and four.

DEC's *Cumulative Risk Guidance*, adopted by reference, states that the cumulative cancer risk standard of 1×10^{-5} and hazard index standards of 1 shall not be exceeded across all exposure pathways. Therefore, a hazard index of 1 does not implicitly warrant an action. Risk management decisions shall still be made on a site specific basis.

Site Closure and Institutional Controls

Comments:

1. Request closure and conditional closure concepts be placed in regulation.
2. Request the basis for the closure/conditional closure concepts.
3. IC provisions of 18 AAC 75.375 remain vague and are not uniformly enforced.
4. There is no substantive basis for the proposed modification to remove ICs when the most stringent cleanup level protective of unrestricted use has been reached.
5. Updating the cleanup levels without addressing their fundamental representativeness and then linking site closure to achieving the erroneous cleanup levels is a disservice.
6. It is likely that because of the proposed revision to the petroleum maximum allowables, a number of industry sites which have been remediated to applicable cleanup levels and which pose no risk to human health and the environment will be reconsidered.
7. No definition of "most stringent level protective of unrestricted use" is provided.
8. Under the proposed revision to 18 AAC 75.375, site closure can only be achieved if the most stringent cleanup levels protective of unrestrictive uses are met, even if DEC concurs that higher

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

levels pose no risk.

9. If the cleanup level acceptable for site closure is only the most stringent it is not clear why 18 AAC 75.340 lists so many methods and cleanup levels, nor is it apparent under which circumstances DEC intended for these levels to be used.
10. Define “the most stringent cleanup level protective of unrestricted use.”
11. No regulation or guidance document currently available appears to separately acknowledge the “closure/conditional closure” concepts.
12. The proposed revision makes elimination of institutional controls impossible unless the most stringent cleanup levels protective of unrestricted use are met at a site. This requirement unfairly applies a principle that all sites are the same, the migration to groundwater pathway is complete, and thus an institutional control (i.e., restriction) is necessary.

Response: In response to these comments the department has elected to no longer use the designations “closed” and “conditionally closed.” The most stringent cleanup levels in Tables B1 & 2 will no longer be used to distinguish between closure categories. Instead, the designation “cleanup complete” will be used when sites meet the criteria for closure set forth in 18 AAC 75.380.

The proposed 18 AAC 75.375(f) “most stringent cleanup level protective of unrestricted use” text has been revised to parallel this decision. The final text submitted for adoption states: “if the concentrations of all residual hazardous substances remaining at the site are subsequently determined to be below the levels that allow for unrestricted use, the department will approve elimination of the institutional control.” This modification is necessary because removing an institutional control “if concentrations ...are subsequently determined to be below the applicable cleanup levels...” as possible under current regulation, may cause a violation of the Cleanup Rules if land-use changes or if residual contamination is moved off-site.

The most stringent level protective of unrestricted use is specific to the purpose of the control, media impacted and potential exposure scenarios. The department will approve removal of institutional controls when it determines that institutional controls are no longer needed to protect human health and the environment.

The department strives to approve, apply, and enforce institutional controls in a consistent manner.

Comment: 18 AAC 75.380(b)(11) - The proposed revision requires cumulative risk calculations be included in the written final cleanup report. This requirement duplicates effort and is not necessary. The site cleanup levels, approved through either Methods 2, 3, or 4 must already meet a cumulative risk standard. Thus, if all the approved cleanup levels are met for a site, and demonstrated as such in the final written report, providing cumulative risk calculations is unnecessary.

Response: The department does not view this as a duplication of effort, nor unnecessary. As the commenter correctly states, regulations [18 AAC 75.325(g) & (h)] clearly require cumulative risk criteria must be met when utilizing Method 2, 3, or 4 cleanup levels. Therefore, since the regulations require the cumulative risk to be calculated and evaluated, it is minimal additional information to include this data in the final report to the department. Furthermore, the department believes this is necessary to document

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

that this regulatory requirement has been performed and the cumulative risk criteria met.

Definitions

Comments: Qualified Person Definition

1. Object to changing the definition of qualified person.
2. Agree with the qualified person definition change.
3. How will the change to the definition of “qualified person” be implemented?
4. Five years experience is not equivalent to a bachelor’s degree.
5. The existing definition of a qualified person increases the likelihood of higher quality individuals performing site cleanup projects.
6. The best sampler I know does not have a college degree.
7. With the State having already eliminated the online list of Qualified Persons, the potential for unqualified persons to collect samples and interpret data has increased. The elimination of the college degree requirement would only worsen the situation. The degree requirement should be kept, or the State should delete all references to Qualified Persons and instead stipulate procedures and liabilities for sample collection, data interpretation, etc.
8. Does the changing of the qualifications of a qualified person under 18 AAC 75 affect the same "qualified person" under 18 AAC 78? Qualified person is required under 18 AAC 78, and has the same definition as 18 AAC 75. These two regulations overlap often, and it will be extremely confusing to have two different "qualified person" requirements.

Response: DEC does not believe substituting five years of specific experience for a college degree that may only indirectly relate will result in lower quality individuals performing the work. The assigned DEC project manager may request the resumes of all individuals assigned by the third-party contractor to ensure they meet the revised qualifications. This method is more effective than the list of Qualified Persons which could not be accurately maintained due to internal resource limitations.

The definition under 18 AAC 78 will remain unchanged for the time being. It is our intent to merge the two sets of cleanup regulations in the future.

Guidance Documents

Comments: Cleanup Levels Guidance

1. Page 3, Paragraph 1: Conservative Alaskan-specific soil parameters were used to derive soil cleanup values. Recommend allowing site-specific soil information to assess risk and derive

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

cleanup levels.

2. Page 12: Recommend that all sources for values be cited. The majority of these values are not found on the SSG or RAGS E, as cited in the text. Recommend that the table present footnotes stating that these values are subject to change and revision, and that the user should verify all values before using them to calculate risk or cleanup values.
3. Page 18: Recommend that the sources for the toxicity values be cited. EPA has not published toxicity values for these mixtures in IRIS.
4. Page 19: Table B2 soil cleanup levels were calculated based on an assumed default percentage of aromatic and aliphatic fractions within each carbon range. The technical basis for these chosen default values is not explained.
5. A default attenuation factor should not apply to all chemicals (equations 13 and 14).
6. Applying the three-phase migration to groundwater and potentially the migration to outdoor air equations at concentrations above the soil saturation concentration occurs for a significant number of compounds, including DRO, RRO, several PAHs, pesticides, etc.
7. Volatilization Factor – Equations 7 and 8 – The notes for this parameter refer to Equation 8 instead of Equation 9.
8. Absorption Fraction (Cleanup Levels Guidance - Table 1 - Dermal Route) – 2, 6-Dinitrotoluene – The value in Table 1 conflicts with Table: Chemical Specific Parameters – Carcinogenic and Non-carcinogenic. One table lists 2, 6-Dinitrotoluene ABS as 0.099 and one 0.99. The parameter should be 0.099 (as per Reifenrath, W.G. et al., 2002).
9. This document proposes adoption of a standard default mixing zone depth, dilution factor (DF), and attenuation factor (AF), which should not be modified. Any site-specific “alternate” cleanup levels approved using such data automatically implies that unconditional closure cannot be achieved.
10. The Chemical Specific Parameters - Carcinogenic and Non-carcinogenic table does not correctly **bold** all chemicals which have cancer slope factors listed.

Responses:

Comment 1 - Site-specific soil information may be used as appropriate for a given site in assessing risk and deriving site specific cleanup levels. This is specified in the third sentence of the referenced paragraph, “Under method three of 18 AAC 75.340(e), site specific parameters that may be modified are bolded in the parameter/definitions section which follows each equation.”

Comments 2 and 3 - The department utilized the Risk Assessment Information System (RAIS) database for the majority of the chemical specific parameters presented in the *Cleanup Levels Guidance*. RAIS is a central database which provides toxicity and chemical specific parameters. The RAIS database is

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

sponsored by: the U.S. Department of Energy (DOE), Office of Environmental Management, Oak Ridge Operations (ORO) Office. The references for the individual values can be obtained from RAIS at the following website; <http://rais.ornl.gov/>. The toxicity values in RAIS generally conform to the hierarchy of sources for toxicity data as referenced in the *Risk Assessment Procedures Manual* (RAPM). RAIS and other resources will be referenced in the *Cleanup Levels Guidance* as applicable.

The department acknowledges the values are subject to change based on the latest scientific studies and/or data. The department will determine if revisions to the table values are warranted and issue the appropriate documentation. A footnote to the table is not deemed necessary at this time.

Comment 4 - Research performed during the initial development of the 18 AAC 75 cleanup levels indicated that the typical breakdown products of aliphatic/aromatic compounds are highly variable. To maintain the department's overall conservative approach, and because fuel constituents vary considerably, the proposed default composition of the percent aliphatic and percent aromatics was set at 120% of the total. This conservatively overestimates the potential risk due to the high variability in fuel constituents.

Comment 5 - The revised soil-water partitioning equations (equations 13 and 14) will only apply to Table B1 contaminants. Based on comments received, chemical-specific attenuation factors will be allowed if the responsible person can document their defensibility. The default dilution factor in the revised equation will remain fixed because the department agrees with the SOC recommendation to adopt a fixed mixing zone depth of 5 meters (18 feet). See Appendix A for further discussion.

Comment 6 - The department recognizes that a "one size fits all" equation may not work perfectly for all contaminants listed in Table B1. However, the three-phase partitioning model is a conservative and defensible approach generally applicable to most contaminants.

As indicated in previous comments, the department is placing a moratorium on all proposed revisions to Table B2. For the time being the current soil-water partitioning equation for organic compounds will continue to apply. This has been added as equation 15 in the *Cleanup Levels Guidance*. In the future we anticipate this equation will be replaced by one that is more technically robust in that it will account for four-phase petroleum hydrocarbon partitioning.

Comments 7 and 8 – Appropriate corrections have been made.

Comment 9 – Please reference the earlier discussion in the "site closure and institutional controls" section, and the Appendix A discussion on the soil-water partitioning equation.

Comment 10 - All compounds with cancer slope factor have been bolded.

Comments: Cumulative Risk Guidance

1. The sections that discuss the methods for assessing risks for petroleum hydrocarbons appear inconsistent with the establishment of maximum allowable concentrations for groups of petroleum hydrocarbons
2. Clarify the application of Csat caps and risk screening levels in the *Cumulative Risk Guidance*.
3. The intent of the changes is unclear relative to the Fugitive Dust Contaminants of Potential

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

Concern due to human activities. It is also unclear what receptor of concern is relevant in the proposed change. Is this focus of this section the protection of the public or workers from inhalation exposures? For remediation and future land use worker protection, there are standards to monitor and protect workers against fugitive dusts and specific contaminants above the permissible exposure limits (PELs). There are also various controls for the generation of fugitive dusts during work activities (i.e., BACT) and best management practices.

4. The proposed revisions are **inconsistent** with current EPA risk assessment guidance and implementation of the National Contingency Plan (NCP). The phrase “does not equal or exceed” the cumulative noncarcinogenic risk standard at a hazard index of one (1) creates a new, and more stringent risk standard.
5. Public Review Draft *Cumulative Risk Guidance*, Rounding in Cumulative Risk: The revised guidance document states that individual chemical cancer risk and hazard quotients should be rounded to two significant figures, but the cumulative risk summations should be expressed using one significant figure.
6. Public Review Draft *Cumulative Risk Guidance*, Indicator Compounds Table - Ethylbenzene is noted with an * in the table of indicator compounds for petroleum contaminated sites, indicating it is a carcinogenic compound. However, the table of Human Health Risk-Based Concentrations in Appendix B does not **bold** ethylbenzene as a carcinogen, nor does it include levels based on carcinogenic effects. Furthermore, the *Cleanup Level Guidance* does not **bold** this chemical either or provide cancer slope factors to use in determining potential cancer risks.

Response:

Comments 1 and 2 - Cumulative risk for petroleum hydrocarbons is calculated using toxicity information for known fuels constituents with available toxicity data collectively as outlined in the *Cumulative Risk Guidance*. Petroleum cleanup levels are calculated using a different approach whereby the toxicity of a surrogate compound is assumed to represent that for the total fuel. This approach is taken in lieu of the lack of available toxicity data on total fuels none the less for the multitude of fuel constituents.

Comment 3 –Changes relative to fugitive dust contaminants of potential concern are due to human activities. The receptor of concern is determined on a site specific basis whether that be a resident or site worker. The department provides guidance on the calculation of risk for each receptor as appropriate based upon chronic lifetime exposure scenarios. Occupational Safety and Health Administration PELs are intended for use as short term exposure limits not intended for determination of risk due to lifetime exposure to contaminants.

Comment 4 – DEC concurs with this comment. The reference has been change to “does not exceed.”

Comment 5 – Comment noted.

Comment 6 - Ethylbenzene is bolded in the regulation tables as a carcinogen and inhalation cleanup levels for the Under 40” and Over 40” zones are based upon cancer risk. The inhalation cleanup level for ethylbenzene in the arctic zone however is based upon Csat. Ethylbenzene is considered a carcinogen for the inhalation pathway. Direct contact cleanup levels are based upon non-cancer risk. The cumulative risk guidance has been updated to bold ethylbenzene in the appendix table. Text will also be added to clarify

Response to Comments
Proposed Revisions to 18 AAC 75 Site Cleanup Rules
June 18, 2008

that it is to be considered a carcinogen for only the inhalation pathway. Therefore, when calculating cumulative risk for ethylbenzene, both carcinogenic and non-carcinogenic risk should be calculated for the inhalation pathway, but only non-carcinogenic risk should be calculated for the direct contact pathway.

For clarity, additional text has been added to the *Cumulative Risk Guidance* (page 4) as follows: “*Also as an example, ethylbenzene is considered a carcinogen for the inhalation pathway. Therefore, when calculating cumulative risk for ethylbenzene, both carcinogenic and non-carcinogenic risk should be calculated for the inhalation pathway, but only non-carcinogenic risk should be calculated for the direct contact pathway.*”