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BOB RILEY
GOVERNOR

July 10, 2009

Mr. Scott Bolton
Site Manager
US Army Transition Force
P.O. Box 5022
Fort McClellan, Alabama 36205

RE: ADEM Review and Evaluations: *Final Remedial Investigation (RI) based on Army's Responses to ADEM Comments on Draft-Final RI Report for Iron Mountain Road Ranges: Skeet Range, Parcel 69Q; Range 19, Parcel 75Q; Range 13, Parcel 71Q; Range 12, Parcel 70Q; Former Rifle Grenade Range at Skeet Range, Parcel 222Q-X; and Former Rifle Grande Range North of Washington Ranges, Parcel 221Q-X; including Army's Responses to ADEM Comments on Summary of Inorganic Data Evaluations for Surface Soil, Subsurface Soil, Groundwater, Surface water, and Sediment (Lines of Evidence Tables);* dated May 14, 2009 Fort McClellan, Calhoun County, Alabama
Facility I.D. No. AL4 210 020 562

Dear Mr. Bolton:

The Alabama Department of Environmental Management (ADEM or the Department) has reviewed the Final RI based on the Army's Responses to ADEM Comments on the Draft-Final RI Report for Iron Mountain Road (IMR) Ranges. The Final RI also contained the Army's Responses to ADEM Comments on the Lines of Evidence Tables originally submitted with the Draft RI for IMR. Attached are the Department's evaluations of both sets of the Army's responses to comments that remain unresolved.

If you have any questions or concerns regarding this matter please contact Mrs. Brandi Little at 334-274-4226 or via email at blittle@adem.state.al.us.

Sincerely,

Stephen A. Cobb, Chief
Governmental Hazardous Waste Branch
Land Division

SAC/TPS/BCL/mal

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ATTACHMENT

ADEM Evaluations

Final RI Based on Army's Responses to ADEM Comments on Draft-Final RI Report for Iron Mountain Road Ranges: Skeet Range, Parcel 69Q; Range 19, Parcel 75Q; Range 13, Parcel 71Q; Range 12, Parcel 70Q; Former Rifle Grenade Range at Skeet Range, Parcel 222Q-X; and Former Rifle Grande Range North of Washington Ranges, Parcel 221Q-X

Fort McClellan, Alabama

Specific Comments

Comment 85: <u>Page 6-9, Paragraph 2.</u> **Please revise the text to state that underestimating the size of the exposure unit (EU) will result in a higher source-term concentration (STC) only if the EU is centered over the source area. Please note that each area of contamination should be treated as an EU rather than combining all sources and parcels. Please provide a separate dataset to evaluate each parcel and release.**

Response 85: This comment addresses two separate issues. Regarding the first, the Army respectfully disagrees that underestimating the size of the EU will result in a higher STC only if the EU is centered over the source area (i.e., if lesser contaminated samples are not included in the data set). We agree that centering the EU over the source area will usually result in a higher STC, but also, on many occasions, will simply reducing the number of samples because the variance in the data set may be increased.

The second issue is that the reviewer requested that each parcel and source area should be evaluated as separate EUs. The request is reasonable, and the approach taken at the Bains Gap Road and Baby Bains Gap Road ranges was to evaluate each range as a separate EU. Some of the Iron Mountain Road ranges, however, are small, and few samples were taken so that it was deemed more reasonable to combine the data across the ranges. Generally, a request to reduce the size of EUs reflects concern that STCs will be diluted by data from less contaminated areas and that unacceptable risk might be overlooked. This possibility, however, is precluded because the concentration of each COPC at each sample location is compared with the maximum permissible concentration.

The foregoing is illustrated by the risk assessment for the on-site resident. COPCs in surface soil for the resident included antimony, arsenic, copper, lead, and the PAHs benzo(a)anthracene, benzo(a)pyrene and dibenz(a,h)anthracene (Table 6-12). COPCs in subsurface soil included antimony, lead and benzo(a)pyrene (Table 6-13). COPCs in total soil, therefore, included antimony, arsenic, copper, lead,

benzo(a)anthracene, benzo(a)pyrene and dibenzo(a,h)anthracene (Table 6-14). COPCs in groundwater were limited to 4-amino-2,6-dinitrotoluene (4-ADNT) (Table 6-15). COPCs in surface water (Table 6-16) and sediment (Table 6-17) were limited to lead. The cumulative ILCR and HI summed across all media (limited to total soil and groundwater because lead in surface water and sediment cannot be evaluated in this manner) for the on-site resident were 1.77E-4 and 1.10E+1, respectively (Table 6-18).

The EU evaluation for the on-site resident is explained in Section 6.6.2.2, pages 6-20 and 6-21. Lead, antimony and arsenic were identified as COCs, and all the sample locations on any range in which site-related concentrations exceeded their maximum permissible concentrations were identified. No site-related concentrations of copper exceeded the maximum permissible concentration. 4-ADNT does not share a target organ with the other noncancer-based COPCs; therefore, the HI of 1.50E-1 for this chemical is of no concern. The maximum detected concentrations of the PAHs fell below their maximum permissible concentrations.

In summary, comparing the concentration of each COPC in each sample for each receptor with their maximum permissible concentrations (or otherwise explaining that they do not represent an unacceptable health threat) permits identifying exactly where the receptor scenario would "fail" regardless of how many EUs are evaluated or how they are gerrymandered.

ADEM Evaluation: *The Army agrees that centering an EU over each source area usually results in higher EPCs. This should be done unless the Army demonstrates that data variability across sites is sufficiently similar to warrant combining datasets. Please address.*

Response to Evaluation: This comment addresses two separate issues. Regarding the first, the Army respectfully disagrees that underestimating the size of the EU will result in a higher STC *only* if the EU is centered over the source area (i.e., if lesser contaminated samples are not included in the data set). We agree that centering the EU over the source area will usually result in a higher STC, but also, on many occasions, will simply reducing the number of samples because the variance in the data set may be increased.

The second issue is that the reviewer requested that each parcel and source area should be evaluated as separate EUs. The request is reasonable, and the approach taken at the Bains Gap Road and Baby Bains Gap Road ranges was to evaluate each range as a separate EU. Some of the Iron Mountain Road ranges, however, are small, and few samples were taken so that it was deemed more reasonable to combine the data across the ranges. Generally, a request to reduce the size of EUs reflects concern that STCs will be diluted by data from less contaminated areas and that unacceptable risk might be overlooked. The consequence, that individual sample locations where the concentration of a COPC greater than its cleanup level may escape notice, is precluded because the concentration of each COPC at each

sample location is compared with the cleanup level, as was explained during the presentation on the Streamlined Risk Assessment during the meeting with ADEM on 12 October 2007.

ADEM Comment: **The response is acceptable as long as a maximum permissible concentration (MPC) is calculated for each COPC, not COC, and the target hazard index and cancer risk levels are 1.0 and 1.0E-04, respectively. It is not acceptable to use a value of 1.49, for example, as the target hazard index in calculating an MPC. It is also not acceptable to use a value of 1.49, for example, as the target cancer risk level in calculating MPCs.**

Final Response: It appears that the reviewer's concern reflects the possibility that selecting a large EU or failure to center the EU over the source area (highest concentrations) could lead to understating the STC and the resulting risk estimates. We would agree if the risk assessment used a typical baseline risk assessment paradigm. The streamlined risk assessment (SRA) approach used herein, however, precludes that difficulty, as explained below. The purpose of a risk assessment in an RI report is to provide information to the risk managers to support the development of remedial alternatives and to support the ensuing risk management decisions (EPA, 1991). In a typical baseline risk assessment for the resident this is accomplished by the following:

- Identifying COPCs based on the MDC, so that no chemical that could contribute significantly to risk is overlooked.
- Calculating cumulative risk and comparing the cumulative risk estimates with the appropriate trigger levels to determine whether chemical of concern (COC) identification is necessary.
- Identifying the COCs.
- Developing remedial goal options (RGO) for the COCs. Locating the EU for the resident over the area of highest concentration, as requested by the reviewer, is important in a typical baseline risk assessment so that the STCs and the resultant cumulative risk are not understated. The streamlined risk assessment (SRA) approach adopted and implemented at FTMC since the mid-late 1990s operates somewhat differently to accomplish the same goals, as follows:
- Identifying COPCs for the resident in the same manner as in a typical baseline risk assessment.
- Calculating cumulative risk; however this step is unnecessary because cumulative risk estimates are not compared with trigger levels. For this reason the position of the EU and the resulting magnitude of the STC are immaterial.
- COCs are not identified; instead, cleanup levels are developed from the SSSLs for ALL the COPCs for the resident.
- Contaminant concentrations in each sample are compared with the cleanup levels. The SRA approach permits identifying all areas where contaminant concentrations exceed cleanup levels regardless of how EUs are located. It is applied to the resident and construction worker, because a reasonable EU for these receptors would be somewhat smaller than the entire area represented by the data set. It is particularly useful when applied to shooting ranges where metals are the predominant contaminants, because the three-tiered background evaluation identifies each sample location where metals are present at concentrations exceeding background.

Reference:
U.S. Environmental Protection Agency (EPA), 1991, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," Memorandum from DR Clay, Assistant Administrator, to Regional Directors, OSWER Directive 9355.0-30, 22 April.

Evaluation Of Final Response: **The response is acceptable as long as a maximum permissible concentration (MPC) is calculated for each COPC, not COC, and the target hazard index and cancer risk levels are 1.0 and 1.0E-04, respectively. It is not acceptable to use a value of 1.49, for example, as the target hazard index in calculating MPCs for noncarcinogenic compounds. It is also not acceptable to use a value of 1.49E-04, for example, as the target cancer risk level in calculating MPCs. Please address. (Please note that 1.0E-04 is being used as the trigger cancer risk value since this risk assessment was in progress prior to the adoption of ARBCA.)**

Comment 86: **<u>Page 6-10, Paragraph 3.</u> According to the Alabama Risk-Based Corrective Action (ARBCA) guidance, the site-wide hazard index (HI) must be less than or equal to 1.0 (two significant digits), not 1. Please revise this paragraph and any calculations where a value greater than 1.0 was used or presented as 1 (i.e., any value up to 1.49 used in calculations as a target hazard quotient or target hazard index rather than 1.0).**

Response 86: Rounding to 1 is consistent with EPA (1989 and 2002) guidance, which suggests rounding risk estimates to one significant figure. Although not stated in the EPA guidance documents, the reason for rounding is so that an unrealistic level of precision is not implied in risk characterization, as would be the case if HI values were presented with two significant figures. All HI estimates include dividing an exposure term by a reference dose (RfD). (In a FTMC SRA, this is accomplished in deriving the SSSLs.) There is a great deal of uncertainty about the exposure term. Also, most RfD values incorporate an uncertainty factor ranging from 100 to 10,000. Implying that the product of two values with such great uncertainty can be expressed to the level of precision implied by two significant figures is mathematically inappropriate.

Furthermore, rounding is not only consistent with EPA guidance, it is consistent with the Installation-Wide Work Plan, which has been accepted by both EPA and ADEM. The IMR Ranges SRA was not performed under the ARBCA program, but the approved protocol qualifies as a site-specific RM-2 risk assessment under the ARBCA guidance.

Nonetheless, as requested by the reviewer, maximum permissible concentrations (cleanup levels) based on a target HI of 1.49 will be recalculated using an HI of 1.

References:

U.S. Environmental Protection Agency (EPA), 2002, ***Region 4 Human Health Risk Assessment Bulletins – Supplement to RAGS***, EPA Region 4, Atlanta, Georgia, online.

U.S. Environmental Protection Agency (EPA), 1989, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.

ADEM Evaluation: *Please clarify that a value of 1.0 will be used in the recalculation of SSSLs.*

Response to Evaluation: As requested by the reviewer, maximum permissible concentrations (cleanup levels) based on a target HI of 1.49 will be recalculated using an HI of 1. All SSSLs for noncancer effects have always been calculated within EXCEL spreadsheets using a target HI of 0.1.

ADEM Evaluation: Please clarify if a value of 1.0 will be used to recalculate the SSSLs. The Response to evaluation only indicates a value of 1 (one significant digit) will be used. Please revise the response to show two significant digits.

Final Response: The reviewer is confusing SSSLs with cleanup levels (see first sentence of comment). The noncancer SSSLs, used in the screening of site-related data to identify COPCs have always been based on an HI of 0.1. In order to respond to previous EPA comments on this series of documents, a typical EPA Region 4 "RGO" table will be prepared with cleanup levels (not SSSLs) based on HI values of 0.1, 1.0 and 3.0.

Evaluation of Final Response: **Please clarify if a value of 1.0 will be used to recalculate the MPCs. The response to evaluation only indicates a value of 1 (one significant digit) will be used. Please revise the response to show two significant digits. Also, please clarify whether a value of 1.0E-04 is used in calculating MPCs for carcinogenic compounds. (Please note that 1.0E-04 is being used as the trigger cancer risk value since this risk assessment was in progress prior to the adoption of ARBCA.)**

ATTACHMENT

ADEM Evaluations

Army's Responses to ADEM Comments on The Summary of Inorganic Data Evaluations for Surface Soil, Subsurface Soil, Groundwater, Surface water, and Sediment (Lines of Evidence Tables)

Fort McClellan, Alabama

General Comments

Comment 1: The tiered background data evaluation concepts underlying the data tables have reportedly already been agreed to by EPA and the generally methodology of using the 2 times rule and the statistical evaluation have been agreed to by ADEM and reaffirmed by ADEM during meetings at Ft McClellan. That specific agreement is consistent with ADEM guidance as it pertains to establishing and using soil background concentrations to eliminate soil COPECs. However, it was not accepted for application to sediment and surface water, since ADEM and CERCLA guidance specifies the use of data from upstream reference samples for sediment and surface water to establish "background" concentrations. Therefore, it seems reasonable to be consistent with prior commitments and agreements recognizing that the EPA has already agreed to the statistical methods for establishing soil background. However, site-specific surface water and sediment data from upstream samples should be used rather than the statistical lines of evidence, whenever possible, but only to assess incremental site risk relative to upstream/background as part of the risk characterization rather than for dismissing the contaminants prematurely at the preliminary stage of assigning COPECs even if they exceed risk-based screening values. Please address.

Response 1: It is important to understand the process of conducting ecological risk assessments at FTMC as it has evolved over the past ten years, including the agreements, compromises, and precedents that have been set and agreed upon by the BCT. Consistent with current USEPA and ADEM guidance, COPECs are initially identified in the SLERA by comparing the maximum detected constituent concentrations in each environmental medium to conservative ecological screening values (ESVs). Constituents whose maximum detected concentrations exceed their respective ESVs are identified as COPECs. In order to streamline the ecological risk assessment process, elements of step 3 of the 8-step ecological risk assessment process as outlined in USEPA's *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (1997) have been incorporated into the SLERA process at FTMC. Namely, the process of refining the initial list of COPECs is incorporated into the SLERA process. Whether the process of refinement of the list of COPECs is conducted at the end of the SLERA (Step 2) or the beginning of the Problem Formulation (Step 3) is, in practice, inconsequential from a technical perspective. Incorporating elements of Step 3 into the SLERA provides for the presentation of additional information into the SLERA that will allow risk managers to make more informed risk management decisions at the completion of the SLERA. It is the Army's

belief that providing risk managers with as much pertinent information at each risk management decision point is imperative to making informed decisions and that delaying the transfer of information to a later stage in the ecological risk assessment process substantially reduces the efficiency and transparency of the process.

Per USEPA Region 4 guidance (*Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders*, June 23, 2000): "Problem formulation begins with the refinement of the COPCs. This step is an opportunity for facilities to present a reasoned toxicological approach for the elimination of one or more COPCs from future consideration. At this step, negotiations are undertaken to alter assumptions associated with the Screening Level ERA. These assumptions include but are not limited to area use factors (e.g. home ranges), incidental soil/sediment intakes, background/reference location comparisons and the nature of the contaminants." (underline and bold added for emphasis). Further justification for including a background comparison within the COPEC refinement process is found in "Step 3: Problem Formulation" of the USEPA Region 4 guidance (2000) which states: "Risk management issues such as background comparison, are introduced for discussion among stakeholders at this stage." It is clear from these passages from the USEPA Region 4 guidance (2000) that comparison to background is an accepted practice in the refinement of the list of COPECs to be carried forward into the Problem Formulation and Study Design portions of the ecological risk assessment process.

Furthermore, neither USEPA nor ADEM guidance specifies that background comparisons are solely applicable to soil or that background comparisons for surface water or sediment are invalid. In fact, the ADEM guidance cited in Specific Comment 3 below specifically states that background comparisons are appropriate and that "*[If an upstream sample is unattainable, a nearby site that has not been affected by the release should be used],*" *which is the case at the IMR and BGR Ranges at FTMC.* The background data set that has been approved for use by the BCT and used at FTMC over the past ten-plus years has been constructed from samples collected from nearby sites that have not been affected by operations at FTMC.

Furthermore, based on discussions between stakeholders at the December 2008 meeting at FTMC, it was agreed that background comparisons for soil, surface water, and sediment were consistent with ADEM guidance and were a valid screening tool for soil, surface water, and sediment. Based on the guidance cited above and agreements made at the December 2008 meeting, surface water and sediment constituents were not dismissed prematurely in the COPEC identification process.

Evaluation of Response 1: **ADEM concurs that at the December 2008 meeting at FTMC Stephen Cobb agreed that background comparisons for soil, surface water, and sediment were "not inconsistent with ADEM guidance" and thus were a valid screening tool for soil, surface water, and sediment. However, it also was discussed at that meeting that ADEM guidance on the selection of background or reference locations for surface water and sediment clearly states that the first choice of background data to be used in a Remedial Investigation (RI) is data from media samples collected at**

upstream locations. The use of data from media samples at background locations that are not upstream of site-affected sample locations is acceptable only when upstream samples are not available. Thus, in all future RI reports and ecological risk assessments (ERAs), the Army should clearly explain and fully document: (a) site-affected locations for which upstream reference samples were collected *versus* unavailable, so that non-upstream aquatic reference samples or statistical methods of defining background concentrations had to be used; and (b) that habitats of any non-upstream reference sites that had to be sampled to characterize background aquatic media concentrations are ecologically similar to site-affected habitats.

Comment 2: The tabulated listing does not include all the inorganic constituents known to be associated with small arms ranges. Please address.

Response 2: It must be remembered that the IMR Ranges are inactive ranges that were used for routine small arms training from approximately 10 to 50 years ago. Based on the additional metals cited in the updated guidance document for *operating* small arms ranges mentioned by the reviewer (see Comment 2 below), it would appear that these additional metals (e.g., cobalt, chromium, iron, nickel) are associated with more recent types of ammunition, as these metals were not identified in the 2003 ITRC guidance document for *closed* small arms ranges. These metals are not known to be associated with typical small arms ammunition such as that historically used at the IMR Ranges. This is further supported by the fact that analytical data from the IMR Ranges, as well as data from numerous other small arms ranges investigated at FTMC over the last 10 years, do not indicate the presence of elevated levels of other metals such as chromium, cobalt etc. The tables will be revised to indicate that the additional metals cited by the reviewer are not known to constituents of typical small arms ammunition such as that used at the IMR Ranges.

Evaluation of Response 2: **The proposed revision is acceptable. This applies also to Specific Comments 1, 2, and 4.**

Specific Comments

Comment 3: The Tier 1, 2, and 3 background data/methods should not be used to eliminate COPECs in surface water and sediment during the SLERA or BERA for regulatory and scientific reasons. EPA's CERCLA guidance and national policy for ERA do not permit the use of analytical data for "background" or upstream "reference" media samples as a screening step to eliminate COPECs from further evaluation during an ERA. While ADEM guidance does allow the use of twice the average background concentration for inorganic COPEC selection in soils, it does not allow the use of background (nor reference habitat) data to eliminate surface water and sediment COPECs in an ERA. COPECs should be identified in the ERA solely by comparing the maximum detected analyte concentrations in each medium to the lowest available of their respective ESVs, such as national ambient water quality criteria (AWQC; USEPA 2006) or sediment benchmarks established by EPA and/or corresponding state criteria. Prior use of background data to eliminate sediment and surface water COPECs from the ERAs at several sites has led to inappropriate and premature elimination of COPECs that exceeded their ESVs, such as

cobalt and mercury, the latter of which could pose significant risks of aquatic food web contamination and piscivorous wildlife exposure due to its high potential for biomagnification.

CERCLA guidance for ERA encourages comparisons of site versus "background" COPEC concentrations and hazard quotients (HQs) *in the risk characterization*, to document the relative, site-derived *incremental* risks to ecological receptors, as a basis for guiding subsequent risk management decisions. Background data should be used to compare sediment and surface water HQs within site-impacted habitats to the corresponding HQs in aquatic and wetland *reference* habitats *not* affected by the site, but *only after* (a) surface water or sediment COPECs are identified by screening the maximum detected analyte concentration against its lowest available ESV, and (b) total site risks are calculated for each COPEC that exceeds an ESV.

When evaluating incremental risk, statistically-derived background data on local/regional COPEC concentrations are ecologically inferior to site-specific analytical data for surface water and sediment samples, collected from *upstream or reference* habitats. Section 2.3.7(d) of the *Alabama Environmental Investigation and Remediation Guidance* (ADEM, March 2005) also specifies that an upstream location should be sampled to establish surface water "background" for flowing water conditions:

For flowing water situations, samples should be collected from a minimum of three locations. If possible, the first sample should be collected downstream of an area of actual or suspected release, the second sample collected at the point of the actual or suspected release, and the third sample should be collected upstream of the area of the actual or suspected release. The ***upstream sample should be used to determine background levels*** *[If an upstream sample is unattainable, a nearby site that has not been affected by the release should be used].*

ADEM guidance in Section 2.3.7(e) prescribes the same approach to the sampling of sediments: *The factors that should be considered when conducting a sediment sampling event.*

Finally, Section C.5.1 (d) of *Appendix C – Sampling Methods* of this ADEM guidance also specifies surface water sampling of upstream locations: *A control station upstream from the waste source is as important as the stations downgradient, and should be chosen with equal care to ensure representative results.*

Thus, whenever possible, ambient concentrations of sediment and surface water COPECs *actually encountered* by aquatic biota (or their terrestrial predators) within upstream/upgradient habitats should be used to calculate incremental site-related sediment and surface water risks in the ERA. These incremental risks should be discussed *the risk characterization*, along with other lines of evidence (e.g., COPEC bioavailability), to evaluate the overall significance of any site-derived ecological risks for sediment and surface water.

Response 3: COPECs were not eliminated prematurely or inappropriately. USEPA Region 4 and ADEM guidance were appropriately applied in the identification and selection of

COPECs in each environmental medium at the IMR and BGR Ranges at FTMC. Please see Response to General Comment 1.

Evaluation of Response 3: **ADEM agreed at the December 2008 meeting at FTMC that using site *versus* background data comparisons to refine COPEC selection for surface water and sediment is "not inconsistent with ADEM guidance." However, ADEM guidance clearly prescribes the first choice of background analytical data for sediment and surface water as media samples collected from upstream locations unaffected by the site. Thus, samples and analytical data from non-upstream background/reference habitats are acceptable for use in COPEC selection only when media samples are not available for upstream locations unaffected by the site. The premature elimination of surface water COPECs cited in this comment as an inappropriate use of a background screen was the use of statistical data on background concentrations of cobalt and mercury in non-upstream surface water reference samples to eliminate these metals as COPECs in the Final SLERA (1/3/07) and Draft BERA Problem Formulation for the T24A Ranges. That misuse of statistical data for non-upstream surface water samples as background to eliminate cobalt and mercury as surface water COPECs was inappropriate because: (a) upstream surface water samples were available, sampled, and found to have no detectable cobalt or mercury; (b) there was no justification for using the tiered background methodology instead of applying the preferred upstream surface water sample data; and (c) the maximum detected concentrations of both metals exceeded the ESVs being used at that time. Since both metals were subsequently eliminated as surface water COPECs in the Final BERA Problem Formulation, based on the agreed use of alternative ESVs, the initial misuse of background data cited in the comment was eliminated. Thus, in all future RI reports and ERAs, Army should preferentially apply surface water and sediment data from upstream reference habitats. Where available, those upstream sediment and surface water data should supersede: (a) any data from non-upstream, reference samples; and (b) the use of alternative statistical methods to estimate local or regional background concentrations.**