

**Responses to Alabama Department of Environmental Management
Unresolved Review Comments on the
Draft-Final Remedial Investigation Report for Ranges Near
Training Area T-24A, Parcels 187(7), 88(6), 108(7)/82Q-X, 112Q, 113Q-X, 213Q and 214Q;
Fort McClellan, Calhoun County, Alabama
Facility I.D. No. AL4 210 020 562
Dated September 8, 2010**

Comments from Stephen A. Cobb, Chief, Governmental Hazardous Waste Branch, Land Division, dated June 24, 2011.

Specific Comments

Comment 75: **Page 6-1, Section 6.0. In addition to a review of toxicity data to ensure that values are up-to-date, exposure parameter assumptions used to calculate SSSLs should be updated to reflect current guidance. Significant changes have been made since the 1992 references with respect to dermal guidance. The most current United States Environmental Protection Agency (USEPA) recommended values for parameters, including but not limited to skin surface area (SA) and adherence factors (AFs), should be used. For example, the current guidance recommends the use of an AF of 0.2 mg/cm² for a child, yet an AF of 0.07 mg/cm² was assumed for a resident. Also, an SA of 1,800 cm² was assumed for the child residential receptor, but the current USEPA-recommended value is 2,800 cm². Please update all exposure parameters to reflect current guidance for all receptors. Also, SSSLs do not address vapor intrusion from groundwater into overlying structures. Please address this exposure pathway in the risk assessment for future residential and commercial exposure scenarios.**

Response 75: It must be remembered that the SSSLs are *site-specific* screening levels, and as such reflect agreement regarding exposure variables between ADEM, EPA Region 4 and the Army as documented in the approved installation-wide work plan. For example, the AF of 0.07 mg/cm² for the resident was specifically requested by the EPA reviewer. Agreed, however, that the EPA (2004) model for dermal uptake from water has been revised. The SSSLs have been revised to incorporate the newer EPA (2004) model.

Agree that the SSSLs do not address vapor intrusion into overlying buildings. The protocol for vapor intrusion evaluation approved by ADEM and EPA Region 4 for Redstone Arsenal (RSA) will be adapted to FTMC. Adaptation will involve substituting site-specific soil physical characteristics if available for those specific to RSA; otherwise, model defaults will be used.

Reference:

U.S. Environmental Protection Agency (EPA), 2004b, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final*, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP, July, including errata @ <http://www.epa.gov/oswer/riskassessment/ragse/index.htm> accessed 18 October 2007.

ADEM

Evaluation:

ADEM requests the use of current guidance values unless site-specific data is available that supports the use of a different value. Just as the SSSLs were revised to address the revision to the model for dermal uptake from water, the soil SSSLs should be revised to incorporate the most current recommended input parameter values. Please address.

Response to

Evaluation:

Based on discussions during the December 11-12 issues meeting with ADEM, the Army will document due diligence in considering new exposure risk data for human and ecological risk. This will entail recalculating SSSLs using the latest values in the human health risk assessment.

The variables for exposure to soil will be revised to reflect the latest guidance, which is EPA (2002) Supplemental SSL guidance and the EPA (2004) dermal guidance. Accordingly, the following will change:

- **Resident:** AF for the child will be changed from 0.07 to 0.2 mg/cm², and SA for the child will be changed from 1800 to 2800 cm². SA for the adult will change from 5250 cm² to 5700 cm². The changes in SA and AF necessitate changing the age-adjusted dermal factor from 2520 cm²-years/kg-day to 360 mg-year/kg-day as per the 2002 Supplemental SSL guidance. Equation 5.7 of the August 1998 final Installation-Wide Work Plan, the derivation of the cancer-based SSSL for residential soil, will be revised to accommodate these changes as follows:

$$\begin{aligned}
 &TR \cdot ATc \cdot (1/ FIso) \cdot (1/ EF) \cdot CF1 \\
 &= \\
 &^{SSSL}SLRESc \\
 &\quad (IFadj \cdot SFo) + (DSadj \cdot ABS \cdot SFd)
 \end{aligned}$$

where:

- ^{SSSL}SLRESc = cancer-based site-specific screening level for soil, resident (mg/kg, calculated)
- TR = target cancer risk (unitless, 1E-6)
- ATc = averaging time, cancer (days)
- FIso = fraction exposed to contaminated medium (unitless)
- EF = exposure frequency (days/year)
- CF1 = conversion factor 1E+6 mg/kg)
- IF adj = age-adjusted soil incidental ingestion factor (mg-years//kg-day)
- SFo = oral cancer slope factor (per mg/kg-day)
- DSadj = age-adjusted soil dermal uptake factor (mg-years/kg-day, assuming one event per day)
- ABS = dermal absorption factor (unitless)
- SFd = dermal cancer slope factor (per mg/kg-day).

- **Groundskeeper (see outdoor worker in SSL Supplemental Guidance):** EF for the groundskeeper will be changed from 250 to 225 days/year, AF will be changed from 0.01 to 0.2 mg/cm², and SA will be changed from 5250 to 3300 cm².

- **Construction worker:** Soil incidental ingestion will change from 200 mg/day to 330 mg/day, AF will change from 0.1 to 0.3 mg/cm², and SA will be changed from 5250 to 3300 cm².

The other receptor scenarios (e.g., residential site user, highway worker, National Guardsperson) were developed as site-specific receptors to capture the specific characteristics and designated future uses of the FTMC facility. Furthermore, no ADEM or EPA guidance currently exists for these scenarios. Therefore, the exposure assumptions for these receptors will not be revised.

In addition, ABS and GAF were updated according to the 2004 dermal guidance. Also, Kp, FA and tau were updated to reflect the 2004 dermal guidance values for uptake for water. When data were not available values for the water uptake parameters were calculated from the 2004 guidance methodology, using MW and log Kow values from EPA (2007). For simplicity it was assumed that steady state was not reached.

References: U.S. Environmental Protection Agency (EPA), 2007, *Estimation Program Interface (EPI) Suite Version 3.20*, Software for estimating physical properties, February, available at <http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm>.

U.S. Environmental Protection Agency (EPA), 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final*, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP, July, including errata @ <http://www.epa.gov/oswer/riskassessment/ragse/index.htm> accessed 18 October 2007.

U.S. Environmental Protection Agency (EPA), 2002, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, December.

Evaluation of Response :

The final sentence of the response states “For simplicity it was assumed that steady state was not reached.” This assumption is not consistent with the guidance and EPA specifically requests that “For long exposure times, Equation 3.3 should be used to estimate DAEvent for organic chemicals.” This equation assumes that steady state has not been reached. Since the event duration is known for each receptor and scenario, please calculate the DAEvent in accordance with the method stated in EPA’s Dermal Guidance. Please note that the response indicates that the residential site user is a site-specific exposure scenario and ADEM and EPA have no guidance for this receptor. It appears this is a typographical error as the residential adult and child receptor SSSLs were revised. Please address.

Final Response:	First issue: steady state: The reviewer correctly notes that RAGS Part E recommends use of the “steady state” equation for long exposure times. Although the exposure times for the receptor scenarios evaluated herein are “known,” (i.e., they are accepted exposure variable values), the event duration is not known, and the attainment of steady state depends on event duration as well as total exposure time. For the
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groundskeeper and construction worker, it is more reasonable to assume intermittent exposure; i.e., that their assumed exposure time of 1 hour is split between multiple events each 8-hour workday rather than to assume that they hold their hands in water constantly for an entire hour once a day. Similarly, it is more reasonable to assume that the youth recreational site user will wade intermittently during his 6-hours/day visit to the site. Therefore, the assumption that steady state is not reached under these intermittent exposure conditions is reasonable and justifies use of RAGS Part E Equation 3.2.

Dermal exposure for the on-site resident, on the other hand, is evaluated primarily for a bathing scenario, in which it is reasonable to assume that the event duration approximates the exposure time. Therefore, we agree to use RAGS Part E Equation 3.3 for chemicals for which time to attain steady state exceeds the 1-hour assumed exposure time.

Second issue: typo: Agreed; the sentence in question will be revised to, “The other receptor scenarios (e.g., recreational site user, highway worker, National Guardsperson)...”

Comment 83: **Page 6-15, Section 6.1.5.2. A clean up level for soil for a recreational site user should be developed based on a child exposure in accordance with EPA guidance. The guidance provides methodology for developing a cleanup standard for lead that is considered protective of a child exposed during intermittent recreational activities. The rationale provided for the exclusion of a child as a potential receptor is not justifiable because incidental soil ingestion could occur regardless of whether or not a child is supervised. Please include a child as a recreational receptor. This comment also applies for determining the lead cleanup level for sediment.**

Response 83: No EPA guidance was located stating that a cleanup level for lead in soil for a recreational site user should be based on exposure of a young child. Nonetheless, a cleanup level for lead in soil of 8,623 mg/kg was developed for the young child recreational site user by applying the IEUBK to EPA (2003) guidance as agreed during the October 2007 meeting with ADEM. Since the derived cleanup level of 8,623 mg/kg exceeds the EPA Region 4 acute criterion of 6,500 mg/kg, the acute criterion was adopted as the cleanup level. The acute criterion of 6,500 mg/kg is adopted also as the cleanup criterion for lead in sediment because the mode of exposure to sediment is similar to that for exposure to soil.

Reference:

U.S. Environmental Protection Agency (EPA), 2003, *Assessing Intermittent or Variable Exposures at Lead Sites*, Office of Solid Waste and Emergency Response, EPA-540-R-03-008, OSWER # 9285.7-76, November.

ADEM

Evaluation: **The cleanup level presented in this response was developed using Equation 3 of the EPA guidance (2003) for calculating cleanup goals for intermittent exposures to recreational sites. This equation is used to derive a time-weighted average lead concentration for two sites with similar exposure, however, the use of this equation is not appropriate for a recreational site. Equation 8 of the guidance (2003) should be used, since it only takes into account outdoor exposure, where the time weighted average is calculated based on the portion of**

a child's outdoor time spent at the site. EPA's Exposure Factors Handbook establishes the time that a child spends outdoors on a daily basis as 7 hours on the weekend and 5 hours during the week, for an average of 5.6 hours per day. One day a week, the child spends 4 of the 5.6 hours on that day at the site recreating. Applying the Pbw and PbR of 400 mg/kg and 200 mg/kg, respectively, results in a cleanup goal protective of a child of 2,144 mg/kg. Please revise the cleanup level for lead contaminated sites where current and future uses is recreation to 2,144 mg/kg.

**Response to
Evaluation:**

Based on discussions during the December 11-12 issues meeting with ADEM, it was pointed out that neither of these values would actually be used as cleanup levels since ecological risk-based remedial goals will be much lower and will drive the cleanup. The group agreed that the young child recreational site user scenario could be excluded from the document provided that the risk assessment was revised to state that the youth recreational site user (7-17 years old) was the upper bound on risk and, as such, any conclusions reached regarding the youth recreational site user would also be applicable to the young child.

**Evaluation of
Response:**

ADEM disagrees that the group concurred with the Army's last statement in the Response to Evaluation at the December 11-12 meeting. It appears this Response was presented in the Draft version of the meeting minutes that were revised after a conference call in August 2009. The Final meeting minutes state that "it was agreed that the human health risk approach is not relevant for this site because the ecological cleanup goal for lead will be lower than the human health goal and will drive the cleanup. For future sites where the human risk will drive the goal, ADEM will verify if the child or youth is required for the trespasser scenario." Please replace the previous Response to Evaluation in the Final RI with the following as the rationale for not evaluating a child recreational receptor: "Ecological risk-based remedial goals will be much lower and will drive the cleanup. Therefore, a child recreational receptor was not quantitatively evaluated."

Final Response:	The rationale suggested by the reviewer will be adopted verbatim to expedite finalizing the document.
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Comment 89: Page 6-26, Section 6.2.4. The use of a trespasser receptor to characterize risks to recreational receptors for sites designated as open space is not appropriate. Recreational exposure is likely to be much higher than a trespasser, since a trespasser is assumed to be wrongfully entering a site. It is also assumed that a trespasser would enter a site fewer times and for shorter durations than a lawful recreational user. This coupled with only considering youths or adults instead of children as recreational receptors is likely to underestimate actual risks to child recreational receptors. Therefore, SSSLs for the child, youth, and adult recreational receptors should be developed and the risk assessment revised accordingly. With respect to lead, an SSSL for a child recreational receptor should be developed in accordance with the USEPA guidance *Assessing Intermittent or Variable Exposures at Lead Sites (2003)*. Please revise the risk assessment accordingly.

Response 89: A trespasser receptor was not used to characterize risks for recreational exposure. The recreational site user scenario in the approved installation-wide work plan was based on a youth because it was judged that a youth would have more opportunity than an adult or young child to engage in recreational activity. Lacking any EPA or ADEM guidance on recreational site use, the exposure scenario were hypothesized from scratch from assumptions deemed by ADEM, EPA and the Army to meet the intent of EPA's Reasonable Maximum Exposure paradigm. The minimal EPA (2000) Region 4 guidance for a trespasser, defined as a youth, was used *only* to identify the age, exposure duration and average body weight of a youth, from which other physiological variables (e.g., body surface area and breathing rate) could be estimated. Because it is assumed that a youth would engage in recreational activity more than an adult, and EPA (1989) notes that it is necessary to evaluate only the most highly exposed receptor for a given land-use scenario, it is not necessary to include an adult recreational site user as an additional receptor. However, as agreed during the October 2007 meeting with ADEM, a young child recreational site user was added as a new receptor. A cleanup level for lead in soil for the young child recreational site user was developed as recommended by EPA (2003).

References:

Environmental Protection Agency (EPA), 2003, *Assessing Intermittent or Variable Exposures at Lead Sites*, Office of Solid Waste and Emergency Response, EPA-540-R-03-008, OSWER # 9285.7-76, November.

Environmental Protection Agency (EPA), 2000, *Region 4 Human Health Risk Assessment Bulletins – Supplement to RAGS*, EPA Region 4, Atlanta, Georgia, online, <http://www.epa.gov/region4/waste/ots/healthbul.htm>.

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 see evaluation of Comment 83.

Response to

Evaluation: See response to Evaluation of Comment 83.

Evaluation of

Response: See Evaluation of Response of Comment 83.

Final Response: See final response to Comment 83.
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Comment 91: Page 6-32, Section 6.3. If the site is developed in the future, vapor intrusion may occur. Please revise this section to discuss the risks for a future resident and construction/industrial worker that should be addressed if development of these sites occurs in the future.

Response 91: Please see response to Comment 90 above.

ADEM

Evaluation: Please see evaluation of Comment 90.

Response to Evaluation: See response to Evaluation of Comment 90.

Evaluation of Response: **Barring the possibility of fractures in bedrock acting as transport conduits, the response is acceptable.**

Final Response: Evaluation noted.
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