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NIROP ABL ROCKET CENTER
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MEMORANDUM REVIEW OF EPA SOIL SCREENING GUIDANCE DOCUMENT REQUIREMENTS REGARDING ESTABLISHING SOIL CLEANUP LEVELS ABL ROCKET CENTER WV

3/3/1998

CH2MHILL

1802 Relevant Corr KR 4430

MEMORANDUM **CH2M HILL**

Review of EPA Soil Screening Guidance Document Requirements Regarding Establishing Soil Cleanup Levels for ABL

Call 3/12/98
303-623-1880
Pass Code 5191484
Presentation 4004498

TO: Dawn Hayes
Dave McBride
Tom Bass
Bruce Beach
Lou Williams
John Aubert

FROM: Greg Mott

DATE: March 3, 1998

The introduction of this document states that the purpose for this guidance is to "calculate risk-based, site specific, soil screening levels (SSLs) for contaminants in soil that may be used to identify areas needing further investigation at NPL sites". Further it states that "SSLs are not national cleanup standards. SSLs alone do not trigger the need for response actions or define "unacceptable" levels of contaminants in soil." "Generally, where contaminant concentrations equal or exceed SSLs, further study or investigation, but not necessarily cleanup, is warranted." In addition, in Exhibit 12 on page 29 of the User's Guide, one of the simplifying assumptions for the SSL migration to groundwater pathway is; "no NAPLs present (if NAPLs are present, the SSLs do not apply)".

For the reasons discussed above it would be wise for all of us to question the applicability of this guidance in determining cleanup levels for ABL based on the migration to groundwater pathway. The advantage in using an EPA guidance is that it strengthens our argument in justifying an approach lending credibility to the strategy used. However, if the applicability of the guidance is in question, this may not be an advantage.

Development of the SSLs is not significantly different from the method presented in the *Preliminary Remediation Goals for Site 1 Soil and Establishment of Background Concentrations,* October 18, 1996 (PRG Memo). This approach used the Summers Method and EPA's HELP Model. The SSL process from the guidance is conducted in four steps as follows:

STEP 1

Develop a conceptual site model for the site. This has already been accomplished.

STEP 2

Compare the conceptual site model to the SSL scenario. The SSLs are appropriate for use on sites where residential land use is reasonably anticipated. This step consists primarily of identifying the exposure pathways present and confirming that the site can be accurately described by the SSL scenario.

It has already been determined from the risk assessment that the exposure pathway of concern is the migration of soil contamination to groundwater and subsequent future residential use of contaminated groundwater.

STEP 3

Define data collection needs. The guidance document recommends the collection of the following parameters which can be used in equations in the guidance:

1. Soil Texture - needed for the HELP Model to calculate an infiltration rate. Soil texture is determined by a particle size analysis.
2. Dry Bulk density - needed for HELP to calculate total soil porosity. This is determined by collecting a Shelby tube in the field and lab analysis.
3. Total Organic Carbon (TOC) - needed to determine the organic carbon soil-water partition coefficient.

The only one of these parameters that have been measured at ABL is TOC. The mean TOC value for ABL Plant 1 (not Site 1 was used in the PRG Memo).

STEP 4

Calculate site-specific SSLs. The discussion of calculating SSLs for migration to groundwater is discussed on pages 28 - 32. According to the guidance, the SSL can be determined by two methods 1) using the Soil Screening Level Partitioning Equation for Migration to Groundwater, or 2) by performing the EPA Synthetic Precipitation Leaching Procedure (SW-846 Method 1312). The first method is very similar to the Summers Method used in the PRG Memo with a couple key differences discussed later. Both methods require the derivation of the dilution factor.

The dilution factor is calculated by first determining the mixing zone depth using equation 12 on page 31. The input parameters are outlined below:

1. L - the source length parallel to the groundwater flow is 10 ft (pit 3 dimension).
2. I - infiltration rate from HELP Model
3. K - Aquifer hydraulic conductivity (already measured in field)
4. I - hydraulic gradient (already measured in field)
5. d_a - aquifer thickness (already measured in field)

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The primary difference between this guidance and the Summers Method is in the determination of the mixing zone thickness. The Summers method considers the distance to the river (360 ft) as part of the mixing zone thickness calculation and allows for vertical and longitudinal dispersion determining a mixing zone thickness of 7 feet. The guidance does not consider longitudinal dispersion and therefore, the mixing zone thickness will probably be less than 3 feet. Although no explanation is offered in the User's Guide (it may be in the full guidance document) it may have been assumed that the location where the maximum exposure to contaminated groundwater for a future resident is from a future residential well placed in the pit itself (no longitudinal dispersion) and not down gradient from the pit (longitudinal dispersion). At first glance this assumption may seem appropriate but, the risk assessment indicated the reasonable maximum exposure would be from a future alluvial well. This well would have a well screen with a minimum length of 10 feet. Therefore, the reasonable maximum exposure to a future resident would be, at a minimum, from a 10 foot column of water. Therefore, even if only the top 3 feet of water was contaminated (the mixing zone) the reasonable maximum exposure would involve dilution over the entire 10 foot water column. For this reason this approach may not be appropriate.

The mixing zone depth is input into Equation 11 on the same page to determine the dilution factor. This equation uses input parameters already discussed. The dilution factor is then used to determine the target soil leachate concentration (C_w). This concentration can then be used to calculate an SSL using Equation 10 on page 29 or compared to the extract concentration from a leach test.

Equation 10 is similar to the Summers Method with the exception that the Summers Method is more conservative in that it doesn't account for volatilization in soil gas. However, this will likely have a small impact on the final SSL. The partition coefficient is determined in the same way as with the Summers Method by using only TOC for site specific data. However, the water-filled soil porosity, air-filled soil porosity, dry soil bulk density, soil porosity and soil particle density can be measured from site soil analyses if desired. Although these parameters are used to account for volatilization and measured values will likely have a negligible effect on the SSL in comparison to default values.

As with the Summers Method the soil-water partition coefficient could be determine by field sampling and laboratory testing and analysis. This would likely need to be repeated at least three times for each constituent of concern in order to ensure the precision and accuracy of the results.

The leach test results would simply be compared to the target soil leachate concentration and indicate if a soil concentration in a given sample would exceed or be below the target soil leachate concentration. Although this would be site specific, it would not result in a set cleanup level unless a very large data set was generated and it was statistically determined. The guidance does not address or recommend this approach.

Summary and Recommendations

The following conclusions and recommendations are outlined below for the Partnering Team's consideration. They are intended to clarify thoughts and conclusions and focus the discussion (in our conference call rescheduled for 3/12 at 1:00 PM) so the process of developing cleanup levels at ABL can move forward. They do not represent a firm position in which either the Navy or CH2M HILL is entrenched.

1. The purpose of the guidance is not to determine cleanup levels and therefore, it may be inappropriate to use it for this purpose.

2. The guidance is very similar to the Summers Method with the exception of the mixing zone determination and accounting for volatilization. The mixing zone depth is significant and for reasons discussed above (we should probably discuss this further) the mixing zone determination recommended in the guidance is less appropriate than that with the Summers Method. Because the volatilization is for the most part negligible in determining the SSL, the Summers Method appears to be more appropriate.

3. Precedent(s) (Bruce?) have been set for using the Summers Method for this purpose in Region III.

4. In order to make the Summers Method (or the Guidance) more site specific (the original goal from the last partnering meeting) the following parameters should be measured:

    - Unsaturated hydraulic conductivity and use it in the HELP Model to determine the infiltration rate.
    - Collect Site 1 TOC data.
    - Either use the approach recommended in the guidance for determining the soil water partition coefficient or, determine the soil water partition coefficient of the silty clay

layer at Site 1 by performing lab tests and analyses for the following primary organic constituents: TCE, vinyl chloride, PCE, methylene chloride, DCE, and TCA. The other VOCs can be determined using the method recommended in the guidance and used in the PRG Memo. It should be understood that this will be a significant undertaking to generate precise and accurate data requiring considerable QA/QC.

Dave Carbow, EPA guidance writer

Leaching,
group of soil mix w/acid
sol'n filter & analyze
leachate
- surface

→ Compare ↗ > 5 fail
< 5 pass

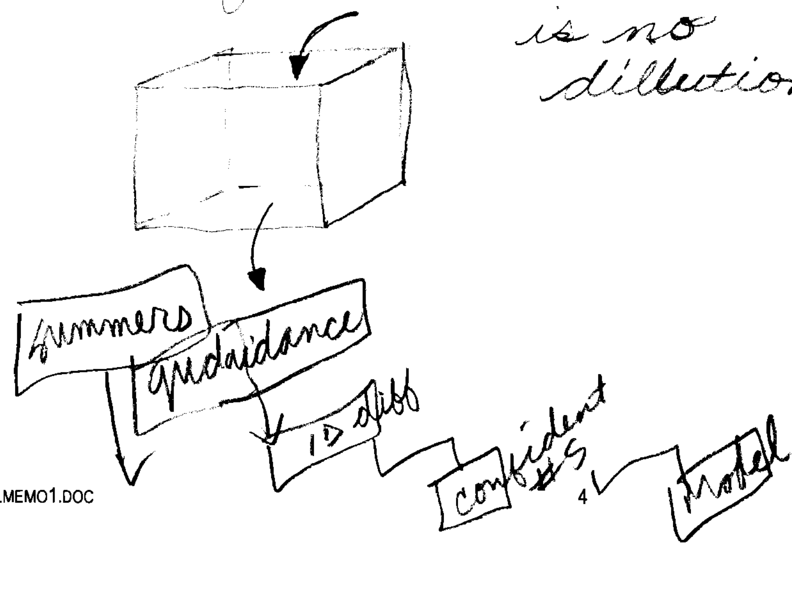
500
200
100
50
} only way to physically test

3ppb = 270,000 cyds

50 → 250

p 27-31

dilution
attenuation
factor to be 1
is no
dilution →



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