APPENDIX D

EXAMPLE SCENARIOS

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Example Scenario No. 1
Duplicate Exposure Information for Different Exposure Points
(with Planning Tables 1 and 4)

Scenario Description: Data are available for several exposure points that are to be evaluated separately in the risk assessment. In this risk assessment, data will be evaluated separately for ingestion and dermal contact from three different slag piles (Slag Piles 1, 2, and 3) for the same scenario timeframe, medium, and exposure medium.

Planning Table Issues Associated with this Scenario:

The primary issue with this scenario is whether or how to show the exposure points on Planning Tables 1 and 4. Note that the exposure parameter values used for daily intake calculations are identical for each individual pathway, i.e. the values presented on Planning Table 4 are the same for all exposure points for each type of exposure route.

1. How will Planning Table 1 show the three separate exposure points?

Planning Table 1 will need to show the three separate exposure points since each data set will be evaluated separately in the risk assessment. Planning Table 1 needs to show:

Medium: Solid Waste
Exposure Medium: Solid Waste
Exposure Point: Slag Pile 1

Medium: Solid Waste
Exposure Medium: Solid Waste
Exposure Point: Slag Pile 2

Medium: Solid Waste
Exposure Medium: Solid Waste
Exposure Point: Slag Pile 3

2. Do the values used for daily intake calculations need to be shown three separate times on Planning Table 4 for each exposure point even though the values and intake equations are identical?

There are two options that can be followed:

Option 1: Complete Planning Table 4 according to the RAGS Part D instructions. For this example, Planning Table 4 would have three sets of identical values and intake equations, one for each exposure point.

Option 2: Complete Planning Table 4 using only one set of values and intake equations and indicate on the table that these values are identical for all three different exposure points. This can be accomplished by including "Slag Piles 1, 2, and 3" in the Exposure

Example Scenario No. 1 (continued)
Duplicate Exposure Information for Different Exposure Points
(with Planning Tables 1 and 4)

Point column and footnoting that these values and intake equations are the same for all three exposure points.

Option 1 is provided in the Example Tables in Appendix A. Option 2, consisting of a revised example Planning Table 4, is illustrated in the accompanying table.

Example Scenario No. 2
Modeled Inhalation from Showering (with Planning Tables 1, 2, 3, 4, and 7)

Scenario Description: Individuals may be exposed to chemicals of potential concern in air by inhalation of chemicals through showering. The inhalation pathway is modeled using an EPA-accepted inhalation model. For this example scenario, a model accepted by EPA regions, such as the Foster and Chrostowski Shower Model, is used to evaluate *future adult resident inhalation exposure to groundwater*. See Example Scenario 4 for illustrations of how to present modeled data.

Planning Table Issues Associated with this Scenario:

1. How will use of an inhalation model affect Planning Table 1?
   Planning Table 1 can accommodate this easily. Planning Table 1 can be completed to include an exposure medium (e.g., Water Vapors at Showerhead) and include the inhalation exposure route for all applicable scenarios. For this scenario example, Planning Table 1 would include a row that would describe this inhalation exposure pathway.

2. What data will be included in Planning Table 2 -- modeled air concentrations or measured groundwater concentrations?
   In this example, Planning Table 2 will show measured groundwater concentrations. The data will be screened against tap water screening values.

3. What data will be included in Planning Table 3?
   In this example, Planning Table 3 will show measured groundwater statistics.

4. How will the inhalation model parameters be shown on Planning Table 4?
   For this example, the upper left hand corner Summary Box and the exposure route, receptor population, receptor age, and exposure point fields should be completed. However, exposure parameters and intake equations do not need to be entered into the table if there are space limitations. In the exposure route column, enter "Inhalation" with a footnote. Include the footnote explanation beneath the table that describes the model to be used and the section of the risk assessment text where information regarding modeled intake development can be found. Supporting information that summarizes the modeled intake methodology and parameters used to calculate modeled intake values should be included in the Baseline Risk Assessment Report as an attachment. Non-standard tables may also be used to display modeled information. Refer to the Risk Assessment text for details on the modeled intake methodology, the parameters used to calculate modeled intake values, and the modeled air concentrations predicted by the model.

Example Scenario No. 2
Modeled Inhalation from Showering (with Planning Tables 1, 2, 3, 4, and 7)

5. How are the modeled results displayed on Planning Table 7?

   For this example, EPC values are calculated using measured groundwater data. They can be found on Planning Table 3. Intake/Exposure concentration values are values that are generated using the inhalation model. These values need to be included on this table. The risks and hazards will be calculated using the "Intake / Exposure concentration values" based on modeling and appropriate toxicity information.

Example Scenario No. 3
Measured Data and Subsequent Ingestion (Planning Tables 1, 2 and 3)

Scenario Description: Measured fish tissue data are available for evaluation in the risk assessment. The data are available for a specific species: trout. The measured data will be used in the risk assessment to determine the potential for adverse effects from ingestion of fish. This scenario is based upon fish tissue to show how to include measured data in the tables, but it can be applied to other exposure media.

Planning Table Issues Associated with this Scenario:

1. How will Planning Table 1 show fish tissue exposure?
   In this situation, it is assumed that the source of exposure for the fish was the sediment, Planning Table 1 will need to show a specific exposure point for the trout as follows:

   Medium: Sediment
   Exposure Medium: Fish Tissue
   Exposure Point: Trout

2. What data will be included in Planning Table 2 - measured fish tissue data or sediment data?
   Planning Table 2 will show measured trout analytical data. The data will be screened against fish tissue screening values.

3. What data will be included in Planning Table 3?
   Planning Table 3 will show measured fish tissue statistics for the trout.

Example Scenario No. 4
Modeled Data and Subsequent Ingestion (Planning Tables 1 and 2)

Scenario Description: Modeled fish tissue data are available for evaluation in the risk assessment based on concentrations of contaminants in the sediment. The modeled data will be used in the risk assessment to determine the potential for adverse effects from ingestion of the fish. This scenario is based upon fish tissue to show how to include modeled data in the tables, but it can be applied to other exposure media.

Planning Table Issues Associated with this Scenario:

The primary issue with this scenario is what data to show on Planning Table 2 and subsequent tables (modeled fish tissue or measured sediment data). There are two options for data presentation.

> Option 1 (Modeled Fish Tissue Concentrations): The modeled fish tissue concentrations could appear on Planning Table 2 in the Concentration Used for Screening column. These modeled concentrations would be screened against fish tissue screening values. The methodology used to develop the modeled concentrations should be referenced on the tables. This option should be used when screening on fish tissue concentrations.
>
> Option 2 (Measured Sediment Concentrations): Measured sediment concentrations could be presented on Planning Table 2. The measured concentrations are the values used as input in the model to determine predicted fish tissue concentrations. The modeling methodology could be discussed in the text and referenced on Planning Table 4. The model results would be used for intake calculations in Planning Table 7. This option should be used when screening on sediment concentrations.

1. How will Planning Table 1 show fish tissue exposure?

   Assuming the source of exposure for the fish is sediment, Planning Table 1 will need to show a specific exposure point for the fish as follows:

   Medium: Sediment
   Exposure Medium: Fish Tissue
   Exposure Point: Trout

2. What data will be included in Planning Table 2 - measured sediment data or modeled fish tissue data?

   See discussion of options, above, and footnotes on Planning Table 2.

Example Scenario No. 5
Modeled Data (Planning Table 1)

Scenario Description: The risk assessment uses data that have been modeled to evaluate potential risks. The modeling results are for spatial changes, temporal changes, and transfer between media.

Planning Table Issues Associated with this Scenario:

The issue associated with this scenario is how to identify and evaluate each different modeled data set. In this temporal change example, groundwater data have been modeled to represent concentrations in future years (1 year, 2 years, and 5 years in the future). This evaluation can be accommodated by assigning a separate exposure point to each future year.

1. How will Planning Table 1 be completed?

   Planning Table 1 could show temporal changes using the exposure point column, as shown on the accompanying table.

Example Scenario No. 6
Multiple Source Exposures (Planning Table 1)

Scenario Description: The risk assessment is evaluating the ingestion of fish tissue affected by both contaminated surface water and sediment.

Planning Table Issues Associated with this Scenario:

1. How will the medium, exposure medium, and exposure point be represented in Planning Table 1 for fish tissue?

The exposure point for fish tissue ingestion can be presented in two different ways, as described in the options below:

Option 1

Medium: Surface Water/Sediment
Exposure Medium: Fish Tissue
Exposure Point: Trout - contaminant uptake from surface water and sediment

This option should be used if screening will be performed against measured or modeled fish tissue data.

Option 2

Medium: Surface Water
Exposure Medium: Fish Tissue
Exposure Point: Trout - contaminant uptake from surface water

AND

Medium: Sediment
Exposure Medium: Fish Tissue
Exposure Point: Trout - contaminant uptake from sediment

This option should be used if screening will be performed against measured surface water or sediment data.

Example Scenario No. 7
Possible Summing Options (Planning Tables 9 and 10)

Scenario Description: The risk assessment is evaluating several different exposure points for a particular set of media and exposure media. The EPA risk assessor for the site may allow the risk assessor to use abridged versions of Planning Tables 9 and 10 which do not require the same level of summation as the version of Planning Tables 9 and 10 shown in Appendix A.

Planning Table Issues Associated with this Scenario:

1. How will the risk data be summed on Planning Tables 9 and 10 for medium, exposure medium, exposure point, and receptor (combination of scenario timeframe, receptor population, and receptor age)?

The summing of risk for these exposure pathway elements can be presented in two different ways, as described in the options below. The EPA risk assessor will determine the type of summing that is appropriate for a particular site.

Option 1

Summing will occur in the standard fashion at four levels: medium, exposure medium, exposure point, and receptor.

Option 1 is shown in the accompanying tables and in Appendix A

Option 2

Summing will occur at fewer levels only: e.g., for exposure point and receptor only. Consult the EPA risk assessor to determine the appropriate procedure to follow.

Option 2 is shown in the accompanying tables.

Example Scenario No. 8
Child/Adult Lifetime Cancer Risk (Planning Tables 1, 4, 7, 9)

Scenario Description: For this risk assessment the lifetime risk will be evaluated. Lifetime risk evaluates the combined risk from childhood through adulthood.

Planning Table Issues Associated with this Scenario:
In some regions, lifetime cancer risks are calculated by adding child and adult risk estimates together. In other regions, age-adjusted exposure factors are used to calculate lifetime cancer risk.

1. How should lifetime cancer risk be presented on Planning Table 1?
   For the "receptor age" column, choose from the picklist and enter "Adult", "Child", and "Child/Adult"

2. How should the other Planning Tables be completed?
   Two options are presented:

   Option 1–Child/Adult calculated through summing cancer risks for separate Child and Adult receptors

   Planning Tables 1, 4, and 7 would have separate Child and Adult receptor ages. Planning Table 1 would also show a Child/Adult receptor to indicate that the Child/Adult analyses will be performed. Planning Table 4s would be developed for Child and Adult receptors with appropriate exposure factor values. A Planning Table 4 would also be shown for the Child/Adult receptor with no exposure factor values provided. Instead, a note would indicate that Child/Adult cancer risks will be calculated based upon the sum of Child cancer risk and Adult cancer risk.

   Planning Table 7s and 9s would then be developed for three receptor ages: Child, Adult, and Child/Adult (a version of Planning Tables 7 and 9 combining the Child and the Adult cancer risk data into a single Child/Adult table with a note that the data on the table was derived from summing the Child and Adult data).

   Option 2–Child/Adult calculated using age-adjusted exposure factors

   As in Option 1, Planning Tables 1, 4, and 7 in Option 2 would show separate Child and Adult receptor ages as well as the Child/Adult receptor age. For the Option 2 Planning Table 4, the Child/Adult receptor age would be shown with age-adjusted exposure factor values. For the Option 2 Planning Tables 7 and 9, the Child/Adult cancer risks would be calculated using age-adjusted exposure factor values.

Example Scenario No. 9
Transfer of Contaminants Through Multiple Media (Planning Table 1)

Scenario Description: The risk assessment evaluates the potential adverse effects from contaminants in soil that is taken up by plants and then taken up by an animal that is then ingested by human receptors.

Planning Table Issues Associated with this Scenario:

1. How can Planning Table 1 accommodate this three-way transfer?
   Planning Table 1 can accommodate this scenario as follows:

   Medium: Soil
   Exposure Medium: Animal Tissue
   Exposure Point: Beef from cattle grazing in field

This example scenario assumes that only the first and last media are of interest and no evaluation is needed for intermediate media. Consult with the EPA Risk Assessor to determine if screening is to be conducted on intermediate media (e.g., in an exposure scenario in which a contaminant moves from soil to plant tissue to animal tissue, whether an evaluation should be conducted for the intermediate plant tissue step).

Example Scenario No. 10
Lead Data Example (Lead Worksheets)

Scenario Description: Lead is present in site soil and the child and adult lead models were used to evaluate blood lead levels. The standard tables do not accommodate lead model results.

Planning Table Issues Associated with this Scenario:

1. Since there are no standard tables that accommodate lead, how should lead results be presented?
   The Lead Worksheets should be completed to demonstrate the evaluation performed and the results of analysis.

Examples of completed Lead Worksheets follow.

Example Scenario No. 11
Radiation Data Example

Scenario Description: The site has radiological and chemical waste associated with it and radiological and chemical analyses were performed as part of the investigation. Potential adverse health effects will be evaluated in the risk assessment.

Planning Table Issues Associated with this Scenario:

Since radiological risk assessment uses different methodologies and terminologies than chemical risk assessment, how can the radiological risk assessment data be shown in the Planning Tables?

Planning Table 6.4 (Cancer Toxicity Data - External (Radiation)) and Planning Table 8 (Calculation of Radiation Cancer Risks) were developed by the Workgroup. The carcinogenic risk sections of Planning Tables 9 and 10 were expanded to include an External (Radiation) column. The following radiological risk example includes these Planning Tables.

Note: Many of the Example Planning Tables (i.e., those Example Planning Tables that do not specifically address radionuclides) provided for this Example Scenario are identical to those from Appendix A.