

# MEMO

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Date:

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Arcadis Project No.:

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Subject:

Response to MDEQ Request for Additional Information for the Recreational  
Evaluation at the RACER Saginaw Malleable Industrial Property

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Arcadis, U.S., Inc. (Arcadis), on behalf of the RACER Trust, has prepared this memo to respond to a request from Ms. Divinia Ries of the Michigan Department of Environmental Quality (MDEQ) for additional information on various proposed exposure parameters for a recreational evaluation of the RACER Saginaw Malleable Industrial (SMI) Property located in Saginaw, Michigan (the Site). The proposed recreational evaluation is intended to evaluate if conditions at the Site are protective of the possible future passive recreational use of the Site. As RACER and Arcadis understand, the park will mainly be used for passive recreational purposes such as bird watching and will have walking and biking paths and will not have playground areas. The Site is located along the Saginaw River and currently has various wetland and surface water areas.

In an email dated October 18, 2016, Ms. Ries requested:

1. Additional rationale for 12 of the proposed exposure parameters,
2. That a child-only recreational user be evaluated for the Site, and

3. An indication of whether each exposure parameter is an upper-bound or a central tendency estimate, if known, and a discussion of how a reasonable maximum exposure (RME) scenario is achieved using the combined exposure estimates.

After further correspondence, Arcadis and MDEQ agreed that various age groups would be used to evaluate the recreational receptor based on the toxicological endpoints evaluated (e.g., for non-cancer endpoints that are not based on developmental effects, a child-only recreational receptor would be evaluated; however, for carcinogenic and mutagenic effects, an age-averaged (child through adult) recreational receptor would be evaluated). Arcadis has updated the conceptual site model (CSM) to reflect these changes. Arcadis has also indicated whether each exposure parameter represents an upper-bound (“U”) or central tendency (“C”) estimate, if known, to the proposed exposure parameter tables. The updated CSM (showing changes in red text) and updated proposed exposure parameter tables are provided in Attachment 1 of this memo.

The following sections provide the requested rationale for the 12 proposed exposure parameters and a discussion of how the RME scenario is achieved using the proposed exposure parameters. The United States Environmental Protection Agency (USEPA) uses a mix of central tendency and RME parameters to develop an RME scenario (USEPA 2007).

### **Soil-to-Skin Adherence Factor**

The USEPA default soil adherence factors for recreational users, as presented in Table 1 of the USEPA Regional Screening Levels (RSLs) User’s Guide (USEPA 2016) were used. The USEPA’s recreational default soil adherence factors are the same as the residential default values, which account for dermal exposure to soil of the face, hands, forearms, and lower legs for receptors in all age groups, and adds in exposure to the feet for children. The adherence factors for each included body part are weighted by skin surface area for each body part. For children, the recommended activity was “playing in wet soil” with an adherence factor of 0.2 milligrams per square centimeter (mg/cm<sup>2</sup>), and for adults, the recommended activity was “gardening” with an adherence factor of 0.07 mg/cm<sup>2</sup> (USEPA 2007). The USEPA’s source of the default residential/recreational parameters (USEPA 2014) is the Risk Assessment Guidance for Superfund (RAGS) Part E (USEPA 2007), which indicates these are considered RME assumptions.

### **Sediment-to-Skin Adherence Factor**

The sediment-to-skin adherence factors were obtained from the Risk Assessment Information System (RAIS) Preliminary Remediation Goals (PRGs) for Chemicals Users’ Guide and calculator (University of Tennessee 2016). The PRG calculator provides constituent-specific concentrations in specific media which can be used to determine if further investigation or remedial actions are warranted. The PRG User’s guide provides a soil/sediment scenario for recreational users, with a default soil/sediment adherence factor of 0.2 mg/cm<sup>2</sup> for children and 0.07 mg/cm<sup>2</sup> for adults (University of Tennessee 2016). These values are consistent with the USEPA’s default soil adherence factors for recreational scenarios; however, default USEPA values were not available for sediment in the RSLs User’s Guide (USEPA 2016). These sediment-to-skin adherence factors are assumed to represent RME assumptions.

### **Exposure Duration**

The MDEQ default residential exposure duration of 32 years (broken out by age group, as applicable) was used for recreational users. The Site is located near a residential area. Based on this, the most likely users of the future park would be residents that live nearby. Similarly, the USEPA default recreational exposure

durations presented in the USEPA RSLs User's Guide are also consistent with the USEPA default exposure durations for residential scenarios. This exposure duration is considered to represent RME assumptions.

### **Exposure Frequency for Soil (Dermal Contact, Ingestion, and Inhalation)**

The exposure frequency of 75 days per year for soil is based on the default soil exposure frequency for recreational scenarios presented in the RAIS PRGs for Chemicals User's Guide (University of Tennessee 2016). An exposure duration of 75 days per year represents approximately 1 to 2 days of exposure per week.

### **Exposure Frequency for Sediment and Surface Water (Dermal Contact and Ingestion)**

The exposure frequencies for sediment and surface water are based on the proposed soil exposure frequencies and were adjusted to account for exposure only during warmer months. Based on professional judgment, the warmer months were identified as May through September, which have average monthly high temperatures greater than 70 degrees Fahrenheit (Weather Channel 2016). The sediment and surface water exposure frequency is calculated as 75 days per year  $\times$  (5 months / 12 months), which is equal to approximately 32 days per year. It was assumed that adult dog walkers would not contact sediment or surface water.

### **Exposure Time (Soil)**

The exposure time for exposure to soil by recreational users is based on the data available in Chapter 16 of the USEPA's Exposure Factors Handbook (USEPA 2011). Age group-specific values were derived from the mean duration spent in "Other Locations" (park, playground listed for highest average time) for all respondents under 12 years of age from Table 16-10, and the mean time spent "Outdoors at Park" from Table 16-84. In Table 16-10, the mean duration for all respondents was 79 minutes per day (1.3 hours per day). In Table 16-84, the mean time ranged between 1.3 hours per day (birth to < 1 month and 3 months to <6 months) to 2.6 hours per day (11 to <16 years). An average time spent in parks for all age groups was rounded to 2 hours per day.

The exposure time for adolescent trespassers was conservatively assumed to be the same as for recreational users.

The exposure time for adult dog walkers is based on information obtained online (pedigree.com 2016) about recommended time for walking a dog.

These exposure times represent central tendency estimates.

### **Exposure Time (Sediment and Surface Water)**

The sediment exposure time was based on professional judgement and the soil exposure time. It was assumed that recreational users and trespassers would spend approximately half of their time at the park playing in surface water bodies, including the wetland and various surface water areas located at the Site. The selection of the exposure time was based on conservative, health-protective, assumptions.

### **Soil Ingestion Rate**

The USEPA default soil ingestion rates for recreational users of 200 milligrams per day (mg/day) for children and 100 mg/day for adults, as presented in the USEPA's RSLs User's Guide (USEPA 2016),

were used. These values are consistent with USEPA default residential soil ingestion parameters and represent upper-bound estimates of combined soil and indoor dust ingestion. Inclusion of the indoor dust ingestion portion of the soil ingestion rate is considered conservative, as exposure at the Site will only occur outdoors. The soil ingestion rate represents an RME approach.

### **Sediment Ingestion Rate**

The recommended soil (including outdoor dust) ingestion rate for the “General Population Central Tendency” from the USEPA’s Exposure Factor Handbook (USEPA 2011) was used as the sediment ingestion rate. For children, an age-averaged value of 40 mg/day was used. For older receptors, the central tendency value for ages 6 to < 21 years was used.

### **Exposed Skin Surface Area for Sediment Contact**

The exposed skin surface area for sediment contact assumes that the receptor is wading in surface water areas present at the Site. The skin surface areas include the head, hands, forearms, lower legs, and feet. Values were obtained from the MDEQ’s “Cleanup Criteria and Screening Levels Development and Application” document (MDEQ 2016a) and were based on recommended values from USEPA’s Exposure Factors Handbook (USEPA 2011). For children, ages 0 to 6 years old, the skin surface area values proposed for sediment contact are consistent with the MDEQ default residential exposed skin surface area values for soil contact, as those default values include the feet. For older receptor age groups (i.e., greater than 6 years old), the surface area of the feet for each age group was added to the default residential surface area for soil contact, as they do not include the feet.

### **Discussion of How a Reasonable Maximum Exposure Scenario is Achieved**

The USEPA describes an RME scenario as individuals or exposures at the upper end of the population distribution (greater than 90<sup>th</sup> percentile, but not above the distribution). Using a mix of central tendency exposure parameters with RME exposure parameters and constituent-specific toxicity values, as is proposed by Arcadis, will result in an overall RME and health-protective scenario.

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