Montana DEQ State Superfund Unit
Risk Assessment Scope Of Work - Example
December 2022

Purpose

A risk assessment is intended to estimate potential human health and environmental risks posed by current and potential future conditions assuming no further remediation of the Facility and to develop site-specific cleanup levels (SSCLs) protective of public health, safety, and welfare and the environment using exposure assumptions acceptable to DEQ. The risk assessment work plan describes the approach to the risk assessment and facilitates discussions as to the appropriate ways to evaluate current and future risks for the Facility and develop SSCLs. It is intended that most of the components of the risk assessment will be provided in the risk assessment work plan so that any discrepancies or discussion may be addressed before the risks are calculated and the report is prepared. For questions regarding risk assessment/analysis and fate and transport analysis, please see: State Superfund | Montana DEQ (mt.gov) under "Frequently Asked Questions" under the "Risk Assessment/Analysis" folder; the "Resources" on the right-hand margin of the same page; and Montana DEQ - General Field Data Needs For Fate And Transport Modeling - September 2008 (mt.gov).

All documents must be submitted in hard copy, modifiable electronic formats, and optimized portable document format (pdf). In addition, a schedule for submittal of all required work must be included for DEQ approval.

A. Components of the Risk Assessment Work Plan

The risk assessment work plan addresses both human health and ecological impacts and the fate and transport of contaminants through soils to groundwater. The risk assessment work plan includes the following information:

1. History and setting of the Facility, including demographic information
2. Data evaluation and selection of chemicals of potential concern (COPC)
    a. Data summary
    b. Data evaluation
    c. Selection of COPC(s) for each media
3. Human health risk assessment
    a. Exposure assessment
        i. Site conceptual exposure model
        ii. Potential receptors and exposure pathways
        iii. Exposure assumptions
        iv. Definitions of exposure areas and calculations of exposure point concentrations
        v. Calculation of chronic daily intakes
    b. Toxicity assessment
        i. Definitions of carcinogenic and non-carcinogenic risks
        ii. Carcinogenic slope factors and inhalation unit risks
        iii. Non-carcinogenic reference doses and reference concentrations
        iv. Uncertainties associated with toxicity assessment
    c. Risk Characterization
        i. A description of how cancer risk estimates will be derived

ii. A description of how non-carcinogenic hazard estimates will be derived
iii. Evaluation of uncertainties

d. Ecological risk assessment, including a description of how SSCLs based upon protection of ecological receptors will be calculated, if appropriate (for some sites this may only be a qualitative evaluation)

4. Fate and Transport Analysis to identify SSCLs protective of leaching to groundwater
5. Description of how SSCLs will be developed
    a. Human health-based SSCLs
    b. SSCLs based on fate and transport analysis
    c. Ecological risk-based SSCLs (for some sites this may only be a qualitative evaluation)
6. Completed tables 1, 2, 3, 4, 5, and 6 of EPA's Risk Assessment Guidance for Superfund (RAGS) Part D.
7. The provision for submittal of a draft risk assessment work plan for DEQ review and a final risk assessment work plan that incorporates all DEQ comments.

B. Components of the Risk Assessment Report

The risk assessment report provides data sufficient in quantity and quality to identify potential human health and environmental risks associated with current and future conditions at the Facility. The data represents potential exposures at the Facility. The risk assessment report includes the components developed in the risk assessment work plan and includes the following information:

1. DEQ approved history and setting of the Facility, data evaluation, exposure assessment, and toxicity assessment sections and tables from the risk assessment work plan
2. Calculation and discussion of the carcinogenic and non-carcinogenic risks for the receptors and pathways
3. Discussion of uncertainties
4. Ecological risk assessment
5. Fate and transport analysis
6. Calculation of SSCLs based on protection of human health via direct contact (i.e., ingestion, dermal, inhalation, etc.)
7. Calculation of SSCLs based on protection of groundwater
8. Calculation of SSCLs based on protection of ecological receptors, if appropriate (for some sites this may only be a qualitative evaluation)
9. Completed Tables 1-10 of RAGS Part D.
10. Summarize in a table and on a figure(s) the media, receptors, and exposure areas that exceed the SSCLs and potentially pose an unacceptable risk (see attached example tables).
11. The provision for submittal of a draft risk assessment report for DEQ review and a final risk assessment report that incorporates all DEQ comments on the draft risk assessment report.

Example

Site ABC

Receptors at Risk from COCs in Contaminated Media in Each Exposure Unit

Human Health Risk Assessment (See July 2015 RAR, Tables 2.1, 2.2, 2.3, 2.4, 2.5, & 2.6)

Contaminated Media (below)	Exposure Units (right)	Railyard	Park	Residential Area and City ROWs	River Slough
Surface Soil		■Residential ■Adolescent Trespasser ■Industrial Worker ■Construction Worker ■Leaching to Groundwater	■Residential ■Child Recreational User ■Industrial Worker ■Construction Worker ■Leaching to Groundwater	■Residential ■Construction Worker ■Leaching to Groundwater	---
Subsurface Soil		■Construction Worker. ■Leaching to Groundwater	---	■Construction Worker ■Leaching to Groundwater	---
Sediment		---	---	---	■Child Recreational User
Groundwater		■DEQ-7 ■RSLs ■2018 RBSLs	■DEQ-7 ■RSLs ■2018 RBSLs	■DEQ-7 ■RSLs ■2018 RBSLs	---
Surface Water		---	---	---	■DEQ-7 ■RSLs ■2018 RBSLs
Free Product		■Present	■Intermittently Present	■Intermittently Present	■Entrained in Deep Sediment

Ecological Risk Assessment

Contaminated Media (below)	Exposure Units (right)	Railyard	Milwaukee Park	Residential Area and City ROWs	Tongue River Slough
Surface Water		---	---	---	■1,2
Sediment		---	---	---	■2

1 = Pesticides and iron > DEQ-7

2 = Chemicals > Ecological Receptor SSCLs

Example

Chemicals of Concern > SSCLs (See July 2015 RAR, Tables 6.1 through 6.13)							
COC\Exposure Unit, Media	**Railyard**	**Park**	**Residential Area and City ROW**	**Slough Sediment**	**Surface Water**	**Groundwater**	**Maximum Concentration > Leaching-to-Groundwater SSCL**
arsenic	**1,r,iw**		**1,r,cw** **2,r**			**3**	***x***
barium			**2,r**			**3**	
iron						**3**	
lead, 5 µg/dL	◆Construction Wkr ◆Industrial Wkr ◆Resident	◆Construction Wkr ◆Industrial Wkr ◆Resident	◆Constr. Wkr ◆Indust. Wkr ◆Resident	◆Resident			
lead, 10 µg/dL	◆Construction Wkr ◆Resident	◆Construction Wkr ◆Resident	◆Resident	◆Resident			
manganese						**3**	
mercury			**2,r,cw**		**3**		
benzene						**3**	***x***
mtbe							***x***
1,2,4-trimethylbenzene						**3**	
1,3,5-trimethylbenzene						**3**	
2-methylnaphthalene						**3**	***x***
bis(2-ethylhexyl)phthalate						**3**	
C9-C18 aliphatics			**2,cw**			**3**	
C19-C36 aliphatics						**3**	
C11-C22 aromatics			**2,cw**			**3**	***x***
naphthalene						**3**	***x***
4,4'-ddd					**3**		
4,4'-dde					**3**		
α-chlordane					**3**		
heptachlor epoxide					**3**		
arochlor 1260	**1,r,iw**						
benzo-a-anthracene		**1,r,iw**	**1,r**	**1,cru**			
benzo-a-pyrene	**1,r,iw**	**1,r,iw**	**1,r**	**1,cru**			
dibenzo(a,h)anthracene	**1,r,iw**			**1,cru**			
benzo-b-fluoranthene	**1,r,iw**	**1,r,iw**		**1,cru**			
benzo(k)fluoranthene				**1,cru**			
indeno(1,2,3-cd)pyrene				**1,cru**			
free product	Present	Intermittently Present	Intermittently Present	Entrained In Deep Sediment			
Chemical Present But With No Tox Data; Addressed in Uncertainty Sections							
acenaphthalene	**4**	**4**	**4**	**4**	**4**	**4**	
benzo(g,h,i)perylene	4	**4**	**4**	**4**			
carbazole						**4**	
4-isopropyltoluene	**4**					**4**	
phenanthrene	**4**	**4**	**4**	**4**	**4**	**4**	

1 = cumulative carcinogenic risk > 1E-5
2 = cumulative non-carcinogenic hazard quotient > 1
3 = exceeds SSCLs (see Tables 6.1 & 6.2)
4 = addressed qualitatively in RA
r = residential
cru – child recreational user
iw = industrial worker
cw = construction worker