



MARYLAND DEPARTMENT OF THE ENVIRONMENT

Voluntary Cleanup Program

Risk Assessment Guidelines

To expedite the review and approval of risk assessments used to establish measurable standards based on site-specific risk assessments for response action plans, the Maryland Department of the Environment recommends the following guidelines be used. The risk assessment evaluates potential risks at the site and should be based on the federal guidance document titled *Risk Assessment Guidance for Superfund*.

I. Introductory Information

A. Summary presenting the conclusions of the risk assessment and briefly describing the estimated risks to public health and the environment.

B. Introduction:

- ❑ Brief description of the site, location, and previous and current activities which have contributed to the contamination;
- ❑ Identification of each surface water body on or adjacent to the site, and the specific use designation for each surface water body as stated in the Code of Maryland Regulations (COMAR), Section 26.08.02;
- ❑ Identification, location and use of all wells within a half mile radius of the site that utilize groundwater (e.g., residential, production, monitoring, etc.);
- ❑ Direction of groundwater flow;
- ❑ Distance to the nearest surface water body in the direction of groundwater flow and the specific use designation for this surface water body as stated in the COMAR, Section 26.08.02;
- ❑ Map or series of maps that identify the location of all samples collected at the site and used in the risk assessment; and
- ❑ Data tables for all samples contained in the risk assessment including:
 - Date of sample collection;
 - Date of analysis;



- Depth of each soil, sediment, and groundwater sample;
- Detection limits;
- Analytical results; and
- All data qualifiers and explanations of qualifiers.

II. Human Health Risk Assessment

A. Hazard Identification section:

- ❑ Screening process used to identify contaminants of potential concern in each media. Screening values recommended by the Department include:
 - US EPA Region III Risk-Based Concentrations;
 - US EPA Soil Screening Levels; and
- ❑ Final list of chemicals of potential concern included in the human health risk assessment.

Note: As stated in US EPA guidance, risk-based concentrations for non-carcinogenic chemicals will be divided by 10 prior to comparison. Also, please follow all appropriate guidance for screening values. Other screening values may be used if approved by the Department.

B. Exposure Assessment section:

- ❑ Include current and proposed specific future use of the property (e.g., housing development, office space, manufacturing facility), if known;
- ❑ Identify current and proposed future use of the property as either residential, commercial, or industrial, consistent with definitions utilized by the Voluntary Cleanup Program;
- ❑ Identify all populations and subpopulations of concern. The Voluntary Cleanup Program typically evaluates the following populations, based on proposed future use:
 - Residential use: adult residents, youth (> 6 and < 18 years) residents, child (< 6 years) residents, and construction workers;
 - Commercial use: adult on-site workers, youth (> 6 and < 18 years) intermittent visitors, child (< 6 years) intermittent visitors, and construction workers; and
 - Industrial use: adult on-site workers, youth (> 6 and < 18 years) intermittent visitors, and construction workers;



- Evaluate all appropriate exposure pathways, including fate and transport assumptions. Pathways typically considered include:
 - Incidental ingestion of subsurface soil (during construction and excavation activities) and surface soil;
 - Dermal contact with subsurface soil (during construction and excavation activities) and surface soil;
 - Inhalation of fugitive dust from subsurface soil (during construction and excavation activities) and surface soil;
 - Inhalation of volatiles from subsurface soils into indoor air and outdoor air;
 - Ingestion of groundwater used as a potable water supply;
 - Dermal contact with groundwater;
 - Inhalation of volatiles while showering with groundwater used as a potable water supply;
 - Inhalation of volatiles from groundwater into indoor air and outdoor air;
 - Incidental ingestion of surface water while recreating;
 - Dermal contact with surface water;
 - Incidental ingestion of sediment; and
 - Dermal contact with sediment;
- Identify the exposure point concentration for each contaminant of concern, including how the exposure point concentration was quantified, if the data are normal or lognormal, and if the exposure point concentration represents the 95th upper confidence limit of the arithmetic mean, the maximum concentration, or some other value;
- Document all exposure models and assumptions used, including references for all assumptions and for each exposure pathway included in the risk assessment; and
- Calculate intakes for each exposure pathway included in the risk assessment.

Note: If the risk assessment is based on future industrial or commercial use of the property, it may be necessary to place a restriction on the property deed. To preclude the use of a restriction, the risk assessment may also include an estimated risk for future residential use. If the estimated risks for future residential, commercial and industrial use are within US EPA's recommended levels of risk, the deed restriction may not be necessary.



Note: "Intermittent visitors" includes trespassers, customers, and patrons. Other potentially exposed populations may be evaluated, when appropriate, based on site use. If these potentially exposed populations are not included, please provide the basis for that omission.

Note: These exposure pathways may be evaluated either quantitatively or qualitatively. Please provide an explanation for any exposure pathway not included in the risk assessment.

C. Toxicity Assessment section should include:

- Toxicity data for all noncarcinogenic chemicals;
- Toxicity data for all carcinogenic chemicals; and
- Evaluation of all chemicals for which no toxicity data are available.

Note: Toxicity information from the following sources is typically used: IRIS, HEAST, US EPA's NCEA office, and the US EPA Region III Risk-Based Concentration table. Toxicity data may be used from other sources if approved by the Department.

D. Risk Characterization section should include:

- Cumulative non-carcinogenic risk;
- Systemic non-carcinogenic risk;
- Cumulative carcinogenic risk;
- Discussion of the chemicals for which no toxicity data are available; and
- Discussion of uncertainty in the human health risk assessment.

III. Ecological Risk Assessment

A. Ecological Hazard Identification section should include:

- Description of all areas of the site at which ecological receptors may frequent;
- Conceptual site model that identifies all exposure pathways, media, fate and transport assumptions, and potential receptors;



- Description of the screening process used to identify contaminants of potential ecological concern in each media. Screening values recommended by the Department include:
 - Maryland ambient water quality standards;
 - US EPA recommended ambient water quality criteria;
 - US EPA draft sediment quality criteria;
 - US EPA sediment quality benchmarks;
 - National Oceanographic and Atmospheric Administration effects range median and low values for sediment; and
 - Appropriate screening values for terrestrial receptors;
- Final list of contaminants of potential concern that are included in the ecological risk assessment.

Note: Other screening values may be used if approved by the Department.

B. Ecological Exposure Assessment section should include:

- Discussion of potential ecological receptors at the site;
- Discussion of the potential for exposure at the site; and
- Description of assessment endpoints.

C. Ecological Risk Characterization section should include:

- Ecological risk associated with each contaminant of potential ecological concern in each media;
- Relevant field observations; and
- Discussion of the uncertainty in the ecological risk assessment.

This supplement is intended to aid a participant in preparing a risk assessment that protects public health and the environment and will meet the Department's approval. The Department reserves the right to request additional information necessary to meet the requirements of Title 7, Subtitle 5 of the Environment Article, Annotated Code of Maryland.