

The following suggested format for the Risk Assessment document to be submitted within the VRRRA program is not required. However, use of this format will facilitate the review/comment and response-to-comment process, thereby expediting the movement of the site through the program and ultimately obtaining the Certificate of Completion. The WVDEP suggests that the Risk Assessment document be printed on only one side of three-hole punch paper, using a Times New Roman 12 font and all one inch margins; and submitted in a WHITE 3-RING BINDER, with a cover page inside the front plastic cover, and the SITE NAME, VRRP PROJECT NUMBER, and SUBMITTAL DATE printed and inserted in the notebook spine's plastic cover. This will allow pages to be replaced easily if only minor revisions to the document are required, and will streamline the filing/retrieval system. Four copies of the risk assessment are required; one is sent to the archive, and three are sent to WVDEP – one for each of the following: the risk assessment reviewer, the project manager, and central files in Charleston.

**BASELINE AND RESIDUAL HUMAN HEALTH AND ECOLOGICAL RISK
ASSESSMENT**

for

**SITE NAME
CITY, COUNTY
WEST VIRGINIA
VRRP PROJECT NUMBER**

Submittal Date

VRRP Applicant:
COMPANY NAME

Address

Contact: Name, Position

Phone:

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Prepared by:
Licensed Remediation Specialist:

Name (LRS No.)

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Company Name

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Phone:

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LRS Company's Project No.

EXECUTIVE SUMMARY

TABLE OF CONTENTS

<u>Title</u>	<u>Page</u>
Submittal Letter	i
Cover Page	ii
Executive Summary	iii
Table of Contents	iv
List of Tables	v
List of Figures	
List of Attachments	
List of Appendices	
1.0 SITE DESCRIPTION AND HISTORY	
2.0 SITE INVESTIGATION AND IDENTIFICATION OF CHEMICALS OF CONCERN	
3.0 HUMAN HEALTH EXPOSURE AND RISK ASSESSMENT	
4.0 ECOLOGICAL RISK ASSESSMENT	
5.0 RESIDUAL HUMAN HEALTH EXPOSURE AND RISK ASSESSMENT..	
6.0 CONCLUSIONS AND RECOMMENDATIONS	
7.0 REFERENCES.....	

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

LIST OF APPENDICES

1.0 SITE DESCRIPTION AND HISTORY

On date, applicant and the West Virginia Department of Environmental Protection's (WVDEP) Office of Environmental Remediation (OER) entered into a Voluntary Remediation and Redevelopment Agreement (VRRRA) within the West Virginia Voluntary Remediation and Redevelopment Program (VRRP) to remediate the site name according to the standards, terms and conditions set forth under the West Virginia Voluntary Remediation and Redevelopment Rule (VRRR), Title 60 Code of State Regulations, Series 3, as established in the Voluntary Remediation and Redevelopment Act (VRRRA) W.Va. Code §22-22-1. The following risk assessment was conducted in accordance with the VRRR for the purpose of evaluating potential risks to human health and the environment posed by this site, and directing remediation efforts to reduce those risks to acceptable levels.

1.1 Physical Description of Site

- Geographic location
- Refer to site location map
- Description of physical setting of site and surrounding area
- Significant site reference points

1.2 General History and Land Use

1.2.1 Historical Land Use

- Ownership
- Operations
- Chemical Usage

1.2.2 Current Land Use

- Ownership
- Operations
- Chemical Usage

1.2.3 Anticipated Future Land Use

1.2.4 Land Use of Adjacent Properties

1.3 Geologic Conditions of Site

1.4 Hydrogeologic Conditions of Site

2.0 SITE INVESTIGATION AND IDENTIFICATION OF CHEMICALS OF CONCERN

2.1 Summary of Previous Site Investigations

2.2 Current Investigation

2.2.1 Soils

2.2.1.1 Chemicals Analyzed

2.2.1.2 Chemicals Detected

2.2.1.3 Comparison of Chemicals of Potential Concern to Screening Criteria

2.2.2 Groundwater

2.2.2.1 Chemicals Analyzed

2.2.2.2 Chemicals of Detected

2.2.2.3 Comparison of Chemicals of Potential Concern to Screening Criteria

2.2.3 Surface Water

2.2.3.1 Chemicals Analyzed

2.2.3.2 Chemicals of Detected

2.2.3.3 Comparison of Chemicals of Potential Concern to Screening Criteria

2.2.4 Sediment

2.2.4.1 Chemicals Analyzed

2.2.4.2 Chemicals of Detected

2.2.4.3 Comparison of Chemicals of Potential Concern to Screening Criteria

2.3 Summary of Chemicals of Concern

2.3.1 Soils

2.3.2 Groundwater

2.3.3 Surface Water

2.3.4 Sediment

3.0 HUMAN HEALTH EXPOSURE AND RISK ASSESSMENT

3.1 Site Conceptual Model for Potential Human Exposure

- Figure
 - Sources of contamination and receiving media
 - Migration pathways
 - Exposure points and exposure routes
 - Receptors

3.2 Incomplete Exposure Pathways

- Explanation of why each pathway is incomplete
 - Availability of public water supply
 - Deed restrictions or land use covenants
 - Engineering and institutional controls
 - Geology or hydrogeology of site
 - Fate and transport characteristics of chemicals of concern

3.3 Complete Exposure Pathways

- Pathways evaluated qualitatively
- Pathways evaluated quantitatively
 - Exposure point concentrations
 - Exposure models and corresponding parameter values
 - Estimated chemical intake values for individual pathways
 - Toxicity values for noncarcinogens
 - Carcinogenic slope factors

3.4 Risk Characterization

- Individual exposure pathways and chemicals of concern
 - Hazard quotients
 - Cancer risks
- Media specific exposure pathways and combined chemicals of concern
 - Hazard Indices
 - Cancer Risks
- Receptor specific combined exposure pathways and chemicals of concern
 - Hazard Indices
 - Cancer Risks

3.5 Uncertainty Analysis

- Site History and Reconnaissance
- Sample location and collection
- Chemical analysis
- Screening of chemicals of potential concern
- Exposure evaluation
- Toxicity characteristics
- Risk Characterization

4.0 De MINIMIS ECOLOGICAL SCREENING RISK ASSESSMENT

- to determine whether ecological receptors of concern are exposed to site-related stressors

4.1 Site Conceptual Model for Ecological Receptors

- qualitative evaluation of incomplete and complete exposure pathways
- a complete exposure pathway requires a source and mechanism of contaminant release to the environment; an environmental transport medium; a point of potential contact between and ecological receptor of concern and the environmental medium; and a feasible exposure route at the contact point
- potentially contaminated media include soil, sediment, surface water, biota, and groundwater that recharges to surface water or is taken up by deep rooted plants

4.2 Identification of receptors of concern

- defined as specific ecological communities, populations, or individual organisms protected by federal, state, or local laws and regulations or those local populations which provide important natural or economic resources, functions, and values
- if natural habitats exist, they must be described and characterized as to: general type of habitat; location of habitat relative to the rest of the site, to the source of contamination, and to potential migration pathways; area and topography; predominant physical and geographic features; dominant plant and animal species; soil and sediment types; human encroachment and interactions; and evidence of natural disturbance

4.3 Evidence of readily apparent harm

- visual evidence of stressed biota attributable to the release at the site including but not limited to fish kills or abiotic conditions
- visible presence of oil, tar, or other non-aqueous phase contaminant in soil over an area greater than two acres, or over an area equal to or greater than 1,000 square feet in sediment

4.4 Surface Water Data

- quantitative comparison of site-related surface water data to applicable surface water quality standards for protection of aquatic life and human health, or to benchmark criteria for chemicals of concern with no such standards

4.5 Other Pertinent Sampling and Analysis Data (if conducted)

4.6 Endpoint Measurement and Assessment (if conducted)

4.7 Checklist to determine the applicable ecological standard

- discussion of justification for off-ramping from ecological risk assessment, or for advancing to more detailed ecological assessment
- inclusion of Checklist in appendix

5.0 RESIDUAL HUMAN HEALTH EXPOSURE AND RISK ASSESSMENT

- 5.1 Remedial Actions
- 5.2 Confirmatory Sampling and Analysis
- 5.3 Comparison of Residual Levels of Chemicals of Concern to Screening Criteria
- 5.4 Residual Human Health Risk Assessment (see Section 3.0 above)
- 5.5 Residual Ecological Assessment (see Section 4.0 above)

6.0 CONCLUSIONS AND RECOMMENDATIONS

- 6.1 Summary
 - site history and land use
 - chemicals of concern
 - exposure assessment
 - risk characterization
- 6.2 Conclusions
 - baseline risks to human health
 - baseline risks to ecological health
 - residual risks to human health
 - residual risks to ecological health
- 6.3 Recommendations
 - proposed remedial actions
 - proposed engineering and institutional controls

7.0 REFERENCES

SUGGESTIONS FOR FORMATTING FIGURES AND TABLES

FIGURES:

- Figure 1 – site location map.
- Figure 2 - site drawing that includes underground utilities; storm water drains; storm sewers; groundwater well locations and other sampling points; surface water runoff; streams or other surface waters; buildings and other structures.
- Site Maps – include maximum concentrations of COCs; or put data table on map, but include same table in text as well.
- Potentiometric Surface Maps – use light blue lines for contours; or indicate groundwater plume concentration gradients with highest concentration in red and decreasing concentrations following the color spectrum from hottest (red) to coolest (violet). If concentrations are indicated in colored portions, be sure the numbers are clearly printed.

TABLES:

- Provide table(s) indicating the Target Analytes for each medium (or sample in each medium if they differ), and the detection limits (or range thereof) for each analyte.
- All analytical results from samples used in developing the site assessment, risk assessments, and remedial action work plan must be placed in table form by media. At least one of the reports must have the tables in a single section. The other reports may incorporate these tables by reference but the reference must be specific as the report name, page number and figure, table or appendix number. These tables should be included as an appendix in the Final Report. Where a site is subdivided for issuing separate COCs, the Final Report for each subdivision must include an appendix of tables showing any analytical data used in the site characterization, risk assessment or remedial selection for that Parcel. The location of data for the remaining parcels should be incorporated by reference.
- Show <numerical value of Detection Limit (“<0.001”) instead of just “ND”.
- Highlight COCs in yellow, or bold etc; but do not shade so dark that copying distorts
- In summary tables screening COPCs into COCs include the following columns: chemical name; CAS number; units; Detection Limit (or range thereof); number of detections/number of samples analyzed; range of detected concentrations or actual data (if only a few samples were taken); Upper 95% UCL or the mean (if applicable); Screening criteria; Retained as a COC? yes or no.
- Either provide a table showing the COPC and the justification for its elimination or discuss the justification in the text.
- Geoprobe data can only be used for screening purposes, not for risk assessment.