
Post-Demolition Residual Risk Assessment: Executive Summary



Reynolds Metals Company
TROUTDALE FACILITY

CH2MHILL

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Executive Summary

This report presents the results of a post-demolition residual risk assessment (RA) for the entire Reynolds Metals Company (RMC) facility, including Fairview Farms, in Troutdale, Oregon. This work was conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and *Memorandum WP No. 67: Post-Demolition Residual Risk Assessment Scoping Document for RMC-Troutdale* (CH2M HILL, 2005a).

Purpose of This Report

The post-demolition RA documents the final condition at the RMC-Troutdale site after completion of plant demolition and extensive remediation of the property. The site will be developed as a mixed-use general industrial complex consistent with the general industrial zoning currently designated for the property. This report addresses the reasonably anticipated future land uses at the site and considers exposure scenarios for direct contact pathways associated with soil for the most plausible future site users: site trespassers, recreational users, construction workers, excavation/trench workers, and standard occupational workers. An updated ecological risk assessment is also presented for the south wetlands area using current data representative of final conditions.

Background

The *Baseline Risk Assessment* (BLRA) (CH2M HILL, 2000) addressed potential human and ecological exposure pathways associated with soil, surface water, sediment, and biota for conditions existing before the extensive removal and remedial actions were conducted at the site. Since the preparation of the BLRA, removal and remedial actions and plant demolition have significantly reduced contaminated materials on the site, reduced potential sources of exposure, and eliminated certain exposure pathways. Removal of source material also has eliminated sources of contamination to groundwater. In addition, projected future land use changes required consideration of exposure scenarios different from those assumed in the BLRA.

This post-demolition RA builds on the previous BLRA work and evaluates residual risks now that removal and remedial actions are complete. Exposure to groundwater, surface water, sediment, and historical soil sources have been addressed by the BLRA and by the *Reynolds Metals Company Record of Decision for Interim Action* (U.S. Environmental Protection Agency [EPA], 2002) and are not addressed in this report.

Purpose of the Post-Demolition Risk Assessment

The purpose of this post-demolition RA is to estimate the realistic potential for risk to human health and ecological receptors posed by chemicals of potential concern present at the site following plant demolition and extensive remediation.

This post-demolition RA was conducted using standard EPA methodologies as well as additional approaches and assumptions agreed to by RMC, EPA, and the Oregon

Department of Environmental Quality (DEQ). The resulting risk estimates, along with other factors, serve as the basis of risk management decisions for the RMC-Troutdale site.

The main objective of the human health RA is to determine whether residual concentrations of chemicals in soil result in cancer or noncancer risks that exceed regulatory risk threshold levels. A consideration of reasonably anticipated future land uses provides identification of the most feasible human exposure pathways for future use of the RMC-Troutdale site.

The main objective of the ecological RA is to update the south wetlands ecological risk assessment that was presented in the BLRA, using characterization data representative of final site conditions and the most current regulatory guidance. The purpose is to document the effectiveness of a polychlorinated biphenyl (PCB) removal action in this area in September 1999, and to consider additional sampling data (since the BLRA) from the railroad embankment, south landfill, north landfill, and Company Lake. Ecological evaluations for other areas at the RMC-Troutdale site were documented in the BLRA.

Revised Conceptual Site Model

The physical setting of the site has changed since the BLRA because significant removal actions have been performed and plant buildings and structures have been demolished. In addition, a considerable amount of contamination has been removed, and projected land use conditions have been clarified.

Projected Future Land Uses

The RMC-Troutdale site will be developed as a mixed-use general industrial complex consistent with the general industrial zoning currently designated for the property. The site will be subdivided and built out over an extended period of time.

Proposed Exposure Areas

This post-demolition RA evaluates the entire RMC-Troutdale site, including Fairview Farms to the west and areas outside the dike to the north. The risk assessment was performed on four discrete exposure areas. These four areas are as follows:

1. Fairview Farms
2. Outside the dike
3. South wetlands
4. East Area (former plant area east of Sundial Road)

Human Receptors and Exposure Routes

The exposure scenarios appropriate for each of the identified areas are presented in Table ES-1.

Exposure Area	Human Health					Ecological
	Short-Term Trespasser	Recreational User	Construction Worker	Excavation/Trench Worker	Occupational Worker	
Outside the Dike	X	X				
Fairview Farms	X		X	X	X	
East Area	X		X	X	X	
South Wetlands	X		X	X		X

Human Health Risk Assessment Findings

Risk Quantification Results

The exposure assessment component of the risk assessment identifies the means by which individuals on or near the Troutdale site may contact chemicals in environmental media. The estimation of potential exposure requires specific assumptions to describe potential exposure situations. Upper-bound exposure assumptions are used to define reasonable maximum exposure (RME) conditions to provide a bounding estimate on exposure. In accordance with *Guidance for Conduct of Deterministic Human Health Risk Assessments* (DEQ, 2000a), deterministic risk assessments should also define central tendency estimates (CTEs) of exposure and risk. The results of the human health risk assessment are presented in Table ES-2.

Exposure Area	Exposure Scenario	Excess Lifetime Cancer Risk		Noncancer Hazard Index (RME and CTE)	Primary Excess Lifetime Cancer Risk Contributors (approximate percent contribution)
		CTE	RME		
Fairview Farms	Short-Term Trespasser	1×10^{-8}	2×10^{-7}	<1	None
	Construction Worker	3×10^{-8}	2×10^{-7}	<1	None
	Excavation/Trench Worker	1×10^{-9}	6×10^{-9}	<1	None
	Occupational Worker	2×10^{-7}	2×10^{-6}	<1	None
Outside the Dike	Short-Term Trespasser	1×10^{-7}	2×10^{-6}	<1	None
	Recreational User	1×10^{-7}	2×10^{-6}	<1	None
South Wetlands	Short-Term Trespasser	8×10^{-7}	1×10^{-5}	<1	Benzo(a)pyrene ELCR = 3×10^{-6} (32%) Dibenzo(a,h)anthracene ECLR = 2×10^{-6} (21%)
	Construction Worker	4×10^{-7}	3×10^{-6}	<1	None
	Excavation/Trench Worker	4×10^{-8}	3×10^{-7}	<1	None

Table ES-2 Human Health Risk Assessment Results Summary					
Exposure Area	Exposure Scenario	Excess Lifetime Cancer Risk		Noncancer Hazard Index (RME and CTE)	Primary Excess Lifetime Cancer Risk Contributors (approximate percent contribution)
		CTE	RME		
East Area	Short-Term Trespasser	9×10^{-8}	1×10^{-6}	<1	None
	Construction Worker	4×10^{-7}	2×10^{-6}	≤ 1	None
	Excavation/Trench Worker	1×10^{-8}	9×10^{-8}	<1	None
	Occupational Worker	1×10^{-6}	1×10^{-5}	<1	Benzo(a)pyrene ELCR = 5×10^{-6} (38%) Arsenic ELCR = 2×10^{-6} (17%)

This table provides the excess lifetime cancer risk and noncancer hazard index results for each exposure area and exposure scenario evaluated in this report. Also provided in Table ES-2 is a summary of the primary risk contributors and their respective contributions to the total area-specific risk estimate, when appropriate.

Comparison with Target Risk Levels

Risks for each exposure area are evaluated relative to goals established by DEQ that define acceptable risk for individual carcinogenic compounds to be set at one in one million (1×10^{-6}) excess risk for cancer and one in one hundred thousand (1×10^{-5}) for cumulative risks from carcinogenic compounds. Acceptable risk for noncarcinogenic constituents is set at a hazard index equal to 1. If calculated risks within an exposure area are below these target risk levels, risks are assumed to be acceptable and no further evaluation or action will be taken. This comparison is provided in Table ES-3.

Table ES-3 Comparison of Human Health Risk Results with Regulatory Risk Criteria					
Exposure Area	Exposure Scenario	DEQ Target Risk Exceedance—Is Total ELCR > 1×10^{-5} ?		Is Total HI for RME and CTE > 1.0?	Are Individual Chemical ELCRs > 1×10^{-6} ?
		CTE	RME		
Fairview Farms	Short-Term Trespasser	No	No	No	No
	Construction Worker	No	No	No	No
	Excavation/Trench Worker	No	No	No	No
	Occupational Worker	No	No	No	No
Outside the Dike	Short-Term Trespasser	No	No	No	No
	Recreational User	No	No	No	No
South Wetlands	Short-Term Trespasser	No	No	No	Yes. ^a Two polynuclear aromatic hydrocarbons (PAHs)
	Construction Worker	No	No	No	No
	Excavation/Trench Worker	No	No	No	No

Exposure Area	Exposure Scenario	DEQ Target Risk Exceedance—Is Total ELCR > 1×10^{-5} ?		Is Total HI for RME and CTE > 1.0?	Are Individual Chemical ELCRs > 1×10^{-6} ?
		CTE	RME		
East Area	Short-Term Trespasser	No	No	No	No
	Construction Worker	No	No	No	No
	Excavation/Trench Worker	No	No	No	No
	Occupational Worker	No	No	No	Yes. One PAH and arsenic. Arsenic concentrations are at background levels.

^a Individual chemical ELCRs do not exceed 1×10^{-6} when assuming a more realistic trespass frequency of less than 11 days per year at south wetlands, as described in Section 4.6.2 of the main report.

The Troutdale site meets DEQ's 1×10^{-5} cumulative target risk and total hazard index (less than 1.0) for the CTE case for all human health exposure scenarios. The site also meets the 1×10^{-6} individual target risk criterion for the CTE case for all human health exposure scenarios.

For the RME case, the Troutdale site meets DEQ's 1×10^{-5} cumulative target risk and total hazard index (less than 1.0) for all human health exposure scenarios. The site also meets the 1×10^{-6} individual target risk criterion, except for the RME site trespasser scenario at south wetlands and the RME occupational worker scenario at the East Area. However, the individual target risk criterion is not exceeded for these two areas under the CTE scenario. The slight exceedance of the 1×10^{-6} individual target risk for the RME site trespasser scenario at south wetlands is not considered significant in light of the results seen for the CTE case for this site. An additional calculation indicated that even if the trespass frequency were assumed to be 11 days per year, there would be no exceedances of the 1×10^{-6} individual target risk for this area. For trespass exposure at south wetlands, an exposure frequency of about 5 days per year (assumed under the CTE case) is more reasonable than the 26 days per year assumed under the RME case,¹ and results in acceptable risk. In addition, the thick vegetation and standing water would serve to minimize direct contact with soil at south wetlands.

In addition to the above risk estimates, all soil samples in the Fairview Farms area, outside the dike area, south wetlands, and East Area met the risk-based screening levels identified in DEQ's *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, 2003), except one sample in south wetlands.

South Wetlands Ecological Risk Assessment Findings

A post-demolition residual ecological RA was performed for south wetlands to document the effectiveness of a PCB removal action in this area in September 1999, and the addition of

¹ The exposure frequency of 26 days per year was used as a high-end default in the BLRA and was carried over here for consistency, but it does not reflect actual trespass observed at south wetlands.

sampling data (since the BLRA) from the railroad embankment. The ecological RA provides an assessment of the potential impacts on wildlife of residual concentrations at south wetlands, assuming that site development does not occur. If the area is developed in the future, then the ecological risk results will become invalid at that time. Additional areas at the RMC site where ecological exposures could occur were previously addressed during the BLRA.

This ecological RA for south wetlands was conducted using a tiered approach, structured to focus the ecological RA on the contaminants of potential ecological concern and receptors with the greatest potential for ecological exposure. Tier 1 consists of a screening-level ecological assessment that serves to narrow the field of chemicals detected in site media to those that are of most concern to ecological receptors. Tier 2 uses site-specific information to provide more realistic exposure estimates and to better characterize risk for south wetlands, but only for those chemicals and receptors that were not screened out during Tier 1.

The previous BLRA indicated that the contaminants of potential ecological concern with the highest potential for ecological exposure were PCBs, primarily in south wetlands, and fluoride and polynuclear aromatic hydrocarbons (PAHs), primarily within Company Lake. Since the BLRA, these constituents have been addressed by the remedial actions at Company Lake (as outlined in the interim Record of Decision [EPA, 2002]) and the PCB removal action in September 1999 at south wetlands.

The results of the Tier 2 ecological RA presented here indicate that these actions have been effective in further reducing ecological risk in south wetlands within acceptable levels. The removal action at south wetlands was effective at reducing the PCB exposure point concentration in surface soil by 65 percent.

Conclusion

Using the results of this post-demolition residual risk assessment, RMC has demonstrated that acceptable risk levels have been achieved for the property such that deed restrictions on soil are not required for the potential exposure scenarios evaluated, except as presupposed in the evaluation. These presuppositions include prohibiting residential use of the site and requiring that clean fill is placed over south wetlands prior to occupational use. RMC has accomplished this level of risk reduction by eliminating sources of contamination to the groundwater and to human and ecological receptors through soil removal, capping, offsite disposal, and grading. No further remedial action is anticipated.