

Technical Memorandum

TO: Scott Hooton, Port of Tacoma
FROM: Kristy J. Hendrickson
DATE: October 7, 2016
RE: **Evaluation of Revised Water Quality Criteria Impact on
Protectiveness of Cleanup
Former Kaiser Aluminum Property
Tacoma, Washington
Project No. 000118.034.010**

Introduction

The Ecology Cleanup Action Plan (Washington State Department of Ecology July 1, 2016) describes the cleanup completed at the former Kaiser Aluminum Property, now owned by the Port of Tacoma. To confirm that the cleanup is protective of human health and the environment, groundwater will be monitored downgradient of the Spent Pot Lining Area and downgradient of the Former Log Yard Area for the constituents associated with those areas. In the Former Log Yard Area, groundwater will be monitored for arsenic. In the Spent Pot Lining Area, groundwater will be monitored for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and cyanide. Concentrations will be compared to cleanup levels for these constituents provided in the Ecology Cleanup Action Plan. The cleanup levels are based on protection of marine surface water and must be met at the property boundary, which is about 850 feet from the nearest marine surface water, the Hylebos Waterway.

Washington State recently revised the water quality criteria in Washington Administrative Code (WAC) 173-201A. The revised values are lower than the Cleanup Action Plan cleanup levels for two cPAHs (benzo[a]pyrene and dibenzo[a,h]anthracene) and total cyanide. For the other cPAHs and arsenic, the revised water quality criteria are higher than the cleanup levels. Table 1 shows the Cleanup Action Plan cleanup levels and the revised water quality criteria from WAC 173-201A.

Benzo(a)pyrene and Dibenz(a,h)anthracene

For benzo(a)pyrene and dibenzo(a,h)anthracene, the revised water quality criteria are less than the practical quantitation limit (PQL), the minimum concentration at which the analytical laboratory can accurately measure the concentration in a sample. Therefore, any comparison with the criteria for these two constituents would be done using the PQL. The PQLs are also shown in Table 1.

Prior to completion of the cleanup, groundwater monitoring was conducted in 2008 and 2012 at wells formerly located in the Spent Pot Lining Area. Neither benzo(a)pyrene nor dibenzo(a,h)anthracene was detected in groundwater at reporting limits less than the PQL. Therefore these earlier results would meet both the Cleanup Action Plan cleanup levels and the revised water quality criteria. Since that time, the waste material and associated soil at the Spent Pot Lining Area has been excavated and disposed off site, eliminating the source of contaminants to groundwater. Because the groundwater in

the Spent Pot Lining Area met the revised water quality criteria prior to the cleanup, groundwater concentrations downgradient of the Spent Pot Lining Area at the locations where groundwater enters the Hylebos Waterway are expected to also meet the revised water quality criteria.

Cyanide

Concentrations of total cyanide in groundwater samples collected in 2008 from three wells formerly located in the Spent Pot Lining Area are much lower than the Cleanup Action Plan cleanup level, although concentrations in two of the three wells exceed the revised water quality criterion.¹ Historically an additional offsite monitoring well was located about halfway between the Spent Pot Lining Area and the Hylebos Waterway. This well was located hydraulically downgradient from the Spent Pot Lining Area and the three associated monitoring wells. Sixteen samples were collected from this former well between 1994 and 2008; all of the results are less than the revised water quality criterion. Because the groundwater results from this offsite and downgradient well met the revised water quality criterion prior to the cleanup, groundwater concentrations at the locations where groundwater enters the Hylebos Waterway are expected to also meet the revised water quality criterion now that cleanup is complete.

Conclusion

The revised water quality criteria are greater than Cleanup Action Plan cleanup levels for the constituents associated with the Former Log Yard Area and the Spent Pot Lining Area except for benzo(a)pyrene, dibenzo(a,h)anthracene, and total cyanide. Groundwater samples collected prior to the cleanup from former wells in the Spent Pot Lining Area met the cleanup levels and the revised water quality criteria for benzo(a)pyrene and dibenzo(a,h)anthracene. Groundwater samples collected prior to the cleanup from a well downgradient of the Spent Pot Lining Area, located about halfway between the Spent Pot Lining Area and the Hylebos Waterway, met the cleanup level and the revised water quality criterion for total cyanide. Consequently, groundwater discharging to the Hylebos Waterway is also expected to meet the revised water quality criteria for these three constituents, and the cleanup described in the Cleanup Action Plan is protective of human health and the environment.

Limitations

This Technical Memorandum has been prepared for the exclusive use of the Port of Tacoma and applicable regulatory agencies for specific application to the Former Kaiser Aluminum Property located in Tacoma, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau

¹ Samples were not analyzed for total cyanide in 2012.

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This document has been prepared under the supervision and direction of the following key staff.

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Table 1
Groundwater Water Cleanup Levels and Revised Water Quality Criteria
Former Kaiser Aluminum Property
Tacoma, Washington

Constituent	Practical Quantitation Limit	MTCA Method B Cleanup Level from CAP	Water Quality Criteria Protection of Human Health Based on Ingestion of Aquatic Organisms Chapter 173-201A WAC
cPAHs (µg/L)			
Benzo(a)pyrene	0.014	0.018	0.0021
Benzo(a)anthracene	0.02	0.020	0.021
Benzo(b)fluoranthene	0.017	0.018	0.021
Benzo(k)fluoranthene	0.036	0.036	0.21
Chrysene	0.019	0.019	2.1
Dibenzo(a,h)anthracene	0.014	0.018	0.0021
Indeno(1,2,3-cd)pyrene	0.017	0.018	0.021
TEQ (a)		0.030	
TOTAL METALS (µg/L)			
Arsenic	0.39	8.0	10
CONVENTIONALS (mg/L)			
Total Cyanide		16	0.27
WAD Cyanide (b)	0.01	0.01	

(a) A toxicity equivalency quotient (TEQ) will be calculated for each sample containing carcinogenic PAHs above reporting limits and compared to the benzo(a)pyrene cleanup level in accordance with WAC 173-340-708(8)(e). However, federal and state criteria are established for individual cPAHs.

(b) National Recommended Water Quality Criteria is expressed as free cyanide. Yellow highlighting indicates basis for comparison with revised water quality criteria.

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

µg/L = micrograms per liter

mg/L = milligrams per liter

MTCA = Model Toxics Control Act

TEQ = toxicity equivalency

WAC = Washington Administrative Code

WAD = weak acid dissociable