

NEW SOURCE REVIEW CALCULATION FOR ADDITION OF CYANIDE FROM THE 200-BP-5 OPERABLE UNIT TO THE INFLUENT AT THE 200 WEST PUMP-AND-TREAT

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company

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APPROVED

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Terms

2WPT	200 West Pump-and-Treat
ARAR	applicable or relevant and appropriate requirements
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
gpm	gallons per minute
OU	operable unit
SQER	small quantity emission rate
TBACT	toxics best available control technology
VPAC	vapor phase granular activated carbon

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1 Purpose

The purpose of this calculation is to determine whether cyanide introduced to the 200 West Pump-and-Treat (2WPT) would meet or exceed the de minimis value for cyanide emissions as given in WAC 173-460-150, “Controls for New Sources of Toxic Air Pollutants,” “Table of ASIL, SQER and De Minimis Emission Values.” If the emission quantity is less than the de minimis value, then no further action is required. If the emission quantity is greater than the de minimis value, then toxics best available control technology (TBACT) must be applied prior to emission from the 2WPT treated off gas stack. Rather than re-running the dispersion model for the 2WPT, this calculation is also being performed to see if the emissions values are less than the small quantity emission rate (SQER), which is allowed under WAC 173-460-060(2), “Control Technology Requirements.” The SQER value can be found in WAC 173-460-150. Dispersion modelling is not required, if, after application of TBACT, the emitted cyanide value is less than the associated SQER.

2 Background

The 2WPT is regulated under *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) authority, and therefore does not require a permit for air emissions. However, substantive compliance with air emission requirements found in WAC 173-400, “General Regulations for Air Pollution Sources,” and WAC 173-460 that have been determined to be applicable or relevant and appropriate requirements (ARARs), must be achieved and maintained. The ARARs are provided in Appendix A of EPA et al., 2008, *Record of Decision, Hanford 200 Area, 200-ZP-1 Superfund Site, Benton County, Washington*. Substantive compliance with the air emission ARARs is described in Appendix C of DOE/RL-2009-124, *200 West Pump and Treat Operations and Maintenance Plan*.

Groundwater from the 200-BP-5 Operable Unit (OU) will be brought to the 2WPT where it will be treated for several contaminants of concern, including cyanide as a new contaminant. The addition of a new contaminant source requires a new source review under WAC 173-400-110, “New Source Review (NSR) for Sources and Portable Sources.”

3 Methodology

1. Determine the maximum flow rate of water from the 200-BP-5 OU.
2. Determine the maximum amount of cyanide contaminant within the water being pumped over from 200-BP-5.
3. Calculate the maximum potential cyanide contamination possible in water being sent to the 2WPT.
4. Find de minimis value for hydrogen cyanide in the table in WAC 173-460-150, and compare this value to the calculation.
5. If the de minimis value is not exceeded, then no other action is needed; otherwise proceed to step 6.
6. If the de minimis value is exceeded, find the SQER value in the table in WAC 173-460-150.
7. Apply the TBACT decontamination factor to the calculated emission value, and compare to the SQER.
8. If the SQER value is not exceeded, then no other action is needed.

4 Assumptions

A “worst case scenario” calculation was performed using information collected during the last year. A concentration of 365 µg/L for cyanide was used, since this was the highest value reported in the last 12 months of groundwater sampling for well YE27 (299-E33-268). Since the flow of groundwater from well YE27 varies between 80 and 120 gallons per minute (gpm), the assumed flow rate is 120 gpm to account for the maximum volume. It is assumed that all of the cyanide is in the form of hydrogen cyanide, and that all of the cyanide enters the gas phase. This is the most conservative estimate. Sample results for cyanide measured in the 200-BP-5 OU groundwater can be found in Table 1 below.

Table 1. Sample Results for Cyanide

Date	Lab	Cyanide Concentration (µg/L)
10/13/2015	TASL	259
10/29/2015	TASL	252
11/5/2015	TASL	307
1/12/2016	ALS	342
4/19/2016	TASL	365
8/25/2016	TASL	356

TASL = TestAmerica St. Louis laboratory

5 Calculation

Step 3)

$$\frac{120 \text{ gal}}{\text{min}} \times \frac{3.7854 \text{ L}}{\text{gal}} \times \frac{365 \mu\text{g}}{\text{L}} \times \frac{1440 \text{ min}}{\text{day}} \times \frac{\text{kg}}{10^9 \mu\text{g}} \times \frac{2.205 \text{ lb}}{\text{kg}} = 0.526 \frac{\text{lb}}{\text{day}} \text{ cyanide}$$

Step 7)

$$0.526 \frac{\text{lb}}{\text{day}} \text{ cyanide} \times 50\% \text{ tBACT effectiveness} = 0.263 \frac{\text{lb}}{\text{day}} \text{ cyanide}$$

6 Results

The de minimis value for cyanide from the table in WAC 173-460-150 is 0.0591 pounds/day. The calculated value for cyanide shows that 0.526 pounds/day is possible, which would exceed the de minimis value. Since the de minimis value is exceeded, a treatment method must be applied using TBACT as required in WAC 173-460. The 2WPT Operations and Maintenance Plan (DOE/RL-2009-124) specifies that the best available technology for off-gas treatment at the 2WPT is the use of vapor phase granular activated carbon (VPGAC). A conservative engineering estimate applies 50% reduction to cyanide emissions after application of TBACT, meaning the emission value is reduced to 0.263 pounds/day. In the table found in WAC 173-460-150, the SQER value for cyanide is 1.18 pounds/day. The calculated value for cyanide emissions are less than one quarter of the SQER, after applying TBACT with VPGAC. Therefore, no dispersion modelling is needed.

7 References

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at:
<https://www.csu.edu/cerc/researchreports/documents/CERCLASummary1980.pdf>.
- DOE/RL-2009-124, 2016, *200 West Pump and Treat Operations and Maintenance Plan*, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: <https://pdw.hanford.gov/document/0077130H>.
- EPA, Ecology, and DOE, 2008, *Record of Decision, Hanford 200 Area, 200-ZP-1 Superfund Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: <https://pdw.hanford.gov/document/00098825>.
- WAC 173-400, “General Regulations for Air Pollution Sources,” *Washington Administrative Code*, Olympia, Washington. Available at: <http://apps.leg.wa.gov/WAC/default.aspx?cite=173-400>.
173-400-110, “New Source Review (NSR) for Sources and Portable Sources.”
- WAC 173-460, “Controls for New Sources of Toxic Air Pollutants,” *Washington Administrative Code*, Olympia, Washington. Available at: <http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460>.
173-460-060, “Control Technology Requirements.”
173-460-150, “Table of ASIL, SQER and De Minimis Emission Values.”

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