

ATTACHMENT I

Determining Hardness in Receiving Waters for Hardness Dependent Metals**Overview**

Dischargers required by this permit to determine the hardness of the receiving waters are subject to the metals NAL/NEL values in accordance with the table below. This table is derived from the U.S.EPA Multi-Sector permit which included the benchmarks (U.S.EPA benchmarks are synonymous with the NAL/NELs of this permit) for six hardness-dependent metals (i.e., cadmium, copper, lead, nickel, silver, and zinc) to further ensure compliance with water quality standards and provide additional protection for endangered species and their critical habitat. The table includes 'hardness ranges' from which NAL/NEL values are determined. To determine the appropriate hardness range applicable to the discharge, dischargers shall either reference existing third-party receiving water hardness data or sample the receiving waters for hardness. Once the site-specific hardness is known, the corresponding benchmark value for each metal is determined by comparing where the hardness data fall within 25 mg/L ranges, as shown in the table.

Hardness Ranges to Be Used to Determine NAL/NEL Values for Cadmium, Copper, Lead, Nickel, Silver, and Zinc.

All Units mg/L	NAL/NEL Values (mg/L, total)					
	Cadmium	Copper	Lead	Nickel	Silver	Zinc
0-25 mg/L	0.0005	0.0038	0.014	0.15	0.0007	0.04
25-50 mg/L	0.0008	0.0056	0.023	0.20	0.0007	0.05
50-75 mg/L	0.0013	0.0090	0.045	0.32	0.0017	0.08
75-100 mg/L	0.0018	0.0123	0.069	0.42	0.0030	0.11
100-125 mg/L	0.0023	0.0156	0.095	0.52	0.0046	0.13
125-150 mg/L	0.0029	0.0189	0.122	0.61	0.0065	0.16
150-175 mg/L	0.0034	0.0221	0.151	0.71	0.0087	0.18
175-200 mg/L	0.0039	0.0253	0.182	0.80	0.0112	0.20
200-225 mg/L	0.0045	0.0285	0.213	0.89	0.0138	0.23
225-250 mg/L	0.0050	0.0316	0.246	0.98	0.0168	0.25
250+ mg/L	0.0053	0.0332	0.262	1.02	0.0183	0.26

How to Determine Hardness for Hardness-Dependent Parameters.

Dischargers may select one of two methods to determine hardness – either individual grab sampling or use of existing third-party data. Regardless of the method used, the discharger is responsible for documenting the procedures used for determining hardness values. Once the

hardness value is established, the discharger shall include the value while reporting sampling and analysis data into SMARTS and to determine compliance with the permit.. The two method options for determining hardness are detailed in the following sections.

(1) Discharger Samples for Receiving Stream Hardness

This method involves collecting samples in the receiving water and submitting these to a laboratory for analysis. The discharger shall collect samples from the closest intermittent or perennial receiving water downstream of the facilities discharge location. The sample shall be collected wet weather conditions unless, however, collection of in-stream samples during wet weather events is impracticable or present safety issues. In that case, a dry weather sample may be used.

Hardness must be sampled and analyzed using approved methods as described in 40 CFR Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants).

(2) Referencing Existing Third-Party Hardness Data

Dischargers may submit receiving water hardness values collected by a third party provided the results are collected consistent with the approved 40 CFR Part 136 methods. These values may come from a local water utility, previously conducted stream reports, TMDLs, peer reviewed literature, or other government publications. Data shall be as current as possible but in no case more than 10 years old.

Water quality data for many of the nation's surface waters are available on-line or by contacting EPA or a state environmental agency. EPA's data system STORET, short for STORage and RETrieval, is a repository for receiving water quality, biological, and physical data and is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others. Similarly, state environmental agencies and the U.S. Geological Service (USGS) also have water quality data available that, in some instances, can be accessed online. "Legacy STORET" codes for hardness include: 259 hardness, carbonate; 260 hardness, noncarbonated; and 261 calcium + magnesium, while more recent, "Modern STORET" data codes include: 00900 hardness, 00901 carbonate hardness, and 00902 noncarbonate hardness; or the discrete measurements of calcium (00915) and magnesium (00925) can be used to calculate hardness. Hardness data historically has been reported as "carbonate," "noncarbonate," or "Ca + Mg." If these are unavailable, then individual results for calcium (Ca) and magnesium (Mg) may be used to calculate hardness using the following equation:

$$\text{mg/L CaCO}_3 = 2.497 (\text{Ca mg/L}) + 4.118 (\text{Mg mg/L})$$

When interpreting the data for carbonate and non-carbonate hardness, note that total hardness is equivalent to the sum of carbonate and noncarbonate hardness if both forms are reported. If only carbonate hardness is reported, it is more than likely that noncarbonate hardness is absent and the total hardness is equivalent to the available carbonate hardness.