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July 13, 2009

Mr. Jeff Killelea
Department of Ecology
P. O. Box 47600
Olympia, WA 98504-7600

Re: Comments concerning Ecology's Draft Industrial Stormwater General Permit

Dear Mr. Killelea:

On behalf of the Copper Development Association Inc. ("CDA"), we hereby transmit comments on Ecology's Draft Industrial Stormwater General Permit ("ISGP"). Our comments are focused on Ecology's proposed copper benchmarks which are both overly stringent and economically unachievable. The enclosed comments provide Ecology with alternative tools to take into consideration water quality toxicity mitigating factors including hardness, flow, and dilution. CDA appreciates the opportunity to present these views and looks forward to continuing to work with Ecology to develop more scientifically appropriate copper benchmarks for the ISGP.

Very truly yours,

Beth S. Ginsberg

The Copper Development Association Inc. ("CDA") appreciates the opportunity to comment on Ecology's proposed revisions to the Industrial Stormwater General Permit ("ISGP"). CDA is the technical information, market development, and engineering services arm of the U.S. domestic copper industry. Chartered in 1962, the CDA now serves 55 member companies comprising the principal producers and fabricators of copper and copper alloy mill products that supply the nation's building construction, wire and cable, transportation, industrial and consumer products markets.

The draft permit references copper (and galvanized) roofs as specific examples of roofing systems or surfaces that may contribute to stormwater pollutants. These are only two examples of materials, structures and surfaces that could present such concern. In fact, the Copper Industry's recent Continent-wide Voluntary Risk Assessment of all copper products in commerce in the European Union (Van Sprang, et al. in press) determined that copper roofing and exterior architectural products were among the least significant sources of copper emissions (agricultural and transportation sources made up almost 90% of the continent-wide emissions of copper). Either Ecology's list should be expanded to include all materials, surfaces, structures and applications that could potentially contribute contaminants, or the specific reference to copper and galvanized roofs should be removed. CDA urges Ecology not to single out copper roofing material in S3.B.2.b.viii for potential source control because the vast majority of copper emissions are likely associated with the transportation sector (at least in urban and suburban watersheds) and with agricultural uses of copper in mixed-use watersheds, not copper roofing or the industrial categories covered by this permit.

CDA's remaining comments address the proposed copper benchmarks. The benchmark values of 14 μg/L in Western Washington and 32 μg/L in Eastern Washington are both unnecessarily stringent to protect water quality, and economically unreasonable. The study from which the copper benchmarks were derived (Herrera 2009) provides an insufficient scientific and technical basis on which to support either of these benchmarks. CDA recommends that Ecology incorporate one or all of a suite of readily available and widely accepted tools that appropriately consider dilution factors and site-specific variables that more accurately reflect the real world conditions impacting the toxicity of stormwater discharges on affected receiving waters.

I. The Proposed Copper Benchmarks Are Overly Stringent And Arbitrary

A. The proposed ISGP fails to adequately consider real-world dilution factors

Ecology decided to use a single dilution factor of 5 in establishing the copper benchmarks, on the basis of an insufficient technical study conducted by Herrera. Use of a one-size-fits-all dilution factor of 5 is unreasonably conservative and arbitrary given the inherent variability of stormwater discharges and receiving water flows throughout the State. Most stormwater discharges are very small relative to the flows in the receiving water, and dilution is usually quite rapid. Almost all stormwater discharges will readily attain dilution factors much greater than 5 within seconds to a few minutes following discharge. For this reason, use of a single dilution factor of 5 ignores real-world dilution effects and results in overly conservative benchmarks.

B. The proposed copper benchmark fails to properly consider co-variance of hardness and stream flow

The state's copper water quality standards are hardness-dependent. The standards are lower (more stringent) at low hardness and higher (less stringent) at high hardness. The distinction between Western and Eastern Washington's benchmarks is based on differences in hardness of fresh water throughout the state. The Herrera Report considered the variation in hardness in the streams in deriving the benchmarks, but because it simply evaluated three arbitrary dilution factors (1, 5 and 10), it made no effort to model how stream hardness and stream flow are related. Although dilution may be less at times of low stream flow, hardness is typically higher. Because the Herrera Report does not appear to have accounted for the co-variance of these parameters, it rendered the benchmarks much more conservative than necessary.

Accordingly, the Herrera report provides an insufficient basis to support the technical validity of the proposed copper benchmarks. In contrast, EPA's draft Implementation Guidance (HydroQual 2008: "Calculation of BLM Fixed Monitoring Benchmarks for Copper at Selected Monitoring Sites in Colorado") for National Ambient Water Quality Criteria for Copper (USEPA 2007) provides a more robust technical basis to establish a copper benchmark. EPA Guidance takes into consideration time-variable flows and receiving water chemistries while ensuring maintenance of hardness-based standards for trace metals (HydroQual, 2008; p. 2). Ecology should consider use of these EPA methods for estimating benchmarks for stormwater constituents affected by time-variable flows and concentrations.

Alternatively, Ecology should use the site-specific Kennedy-Jenks model that was prepared on behalf of Boeing during the recent advisory committee process. Boeing commissioned Kennedy-Jenks to develop a probabilistic model that could be used to develop discharger- and water body-specific benchmarks. The Kennedy-Jenks model differed from the Herrera model in a number of ways, including use of receiving water volumes and flows, and incorporating the co-variance of hardness and flows. The model provides a good tool for Ecology to develop site-specific permit benchmarks. The model could also be used to develop benchmarks covering a range of situations which the general permit could selectively apply to groups of dischargers (e.g., dischargers to the Columbia River, Puget Sound, small streams). CDA encourages Ecology to use the Kennedy-Jenks model to establish more reasonably balanced benchmarks that are both fully protective of receiving water quality and economically reasonable.

C. Ecology should use the water-effect ratio (WER) or EPA's Biotic Ligand Model (BLM) to develop copper benchmarks

As noted above, the copper benchmarks do not take into account the many chemical and physical factors that mitigate the toxicity of copper to aquatic organisms. For copper, these mitigating factors include water hardness, dissolved organic carbon (DOC), and alkalinity (Paquin et al. 2002, USEPA 2007), the concentrations of which can vary substantially from site to site, and across the range of flows at any particular site. Using only hardness as a modifying factor for metals criteria is an outdated approach that does not take into account a substantial body of peer-reviewed scientific literature demonstrating that additional modifying factors can and should be incorporated into regulatory benchmarks or standards, while providing the same levels of aquatic life protection (USEPA 1985, 1994, 2001, 2007). By not considering these factors, Ecology rendered the copper benchmarks overly conservative.

Both USEPA guidance and Washington's federally-approved Water Quality Standards ("WQS") provide ample support for using scientific procedures that take into account toxicity-mitigating factors, including:

1. Water-effect ratio (WER)

The WER procedure is intended to take into account how water quality characteristics affect the toxicity of contaminants (most typically metals) in laboratory dilution water relative to actual receiving water conditions. The WER is the quotient of contaminant toxicity (measured as an acute/chronic endpoint) in site water and its toxicity in laboratory water. In most cases, the site water endpoint (e.g., median lethal concentration, LC_{50}) will be higher than the endpoint calculated in laboratory waters, as natural waters typically contain ameliorating materials (e.g., organic carbon) not present at environmentally realistic concentrations in laboratory waters. This results in a WER greater than 1, indicating that site water reduces the apparent toxicity of copper. Use of a WER is more likely to provide the intended level of protection (compared to not using a WER) because it takes into account the site-specific modifying factors and potential interactions with other constituents of the site water (USEPA 1994).

The WER process is explicitly authorized as part of Washington's approved water quality standards. *See* WAC 173-201A-240 (Footnote "dd" in Table 240(3)). Accordingly, use of a WER to modify the proposed copper benchmark would provide a level of aquatic life protection sufficient to satisfy the existing copper WQS. Indeed, EPA guidance for establishing aquatic life criteria (USEPA 1985) and site-specific criteria (USEPA 1994) establishes that site-specific criteria derived through use of a WER (or any other approved method) provides the same levels of aquatic life protection as originally intended in the Clean Water Act, even if the resulting numeric criterion increases as a result of the presence of a water quality factor that mitigates toxicity (e.g., hardness, or DOC). Thus, site-specific copper benchmarks derived from a modification of the State WQS using a WER would provide the same level of aquatic life protection as intended in State WQS, but at concentrations that are more reflective of local conditions.

CDA recognizes, however, that development of site-specific WERs can be costly and time consuming and thus impractical for individual permittees. Ecology has previously incorporated a generic area-wide WER of 2.5 (derived from the median WER out of 17 total freshwater WERs ranging from 1.43 to 2.77) in establishing freshwater copper benchmarks in the 2005 boatyard general stormwater permit. This generic WER process was subsequently upheld by the Pollution Control Hearings Board. *See* PCHB Nos. 05-150, 151, 06-034 & 06-040), findings of fact #52. Implementation of this type of generic WER would raise the Western Washington copper benchmark to 35, and the Eastern Washington benchmark to 80. This type of WER would provide a cost-effective means of considering the water quality factors that influence copper toxicity thresholds in natural waters and would result in more reasonably balanced benchmarks that are both sufficiently protective and economically reasonable.

2. Alternatively Ecology should use EPA's *Biotic Ligand Model (BLM)*

Because copper toxicity is often controlled by water quality variables other than hardness (e.g., alkalinity, pH, dissolved organic matter, and major ions), a hardness equation is not the most appropriate method for determining site-specific criteria for copper. A computational model (called the Biotic Ligand Model; BLM) has been recently developed (Di Toro et al. 2000, Paquin et al. 2002) that considers how these water quality factors influence the chemical interactions between copper and the external binding sites on the organism that cause toxicity (e.g., fish gill). Given that the BLM is a mechanistic representation of how water quality factors influence these chemical interactions (in other words, an accurate mathematical model of the reduction in toxicity seen in laboratory tests to estimate a local WER), the BLM can be used to develop site-specific criteria that can be appropriately applied to all surface waters. The BLM was also incorporated as the foundation for the USEPA's national Ambient Water Quality Criteria for copper in freshwaters, and therefore is considered to be a nationally-valid method for criteria derivation that is fully protective of aquatic life and their uses (USEPA 2007). WAC 173-201A-240(4) allows and even directs the use of EPA's revised criteria in the use and interpretation of the state's toxic substances criteria.

Ecology could use EPA's Biotic Ligand Model (BLM) as a lower cost surrogate for conducting a WER. Using the concentration of 10 commonly-monitored water quality constituents (e.g., calcium, magnesium, dissolved organic carbon, dissolved inorganic carbon, chloride, among others), the BLM calculates acute and chronic copper criteria concentrations using methods consistent with Clean Water Act goals and required levels of aquatic life protection. The BLM can generate both higher and lower standards depending on the site water characteristics (Van Genderen et al. 2007). The model can also be used to predict the acute toxicity of copper to several sensitive aquatic test organisms (e.g., *Ceriodaphnia dubia*, rainbow trout, *Oncorhynchus mykiss* and the fathead minnow, *Pimephales promelas*) under user-selected water quality conditions, and can also be used to predict WER values for a wide range of natural waters (Santore et al. 2008). Model predicted WERs can also be combined with empirical WERs: this approach was used to derive site-specific WQS for copper in portions of the South Platte River, Colorado (Chadwick Ecological Consultants 2004).

II. The Proposed Copper Benchmarks Are Not Economically Reasonable

As presently proposed, the average industrial facility subject to the general permit cannot afford to comply with the proposed copper benchmarks. The draft permit proposes to impose the copper benchmarks on four particular SIC groups; primary metals (33xx), metals mining (10xx), automobile salvage and scrap recycling (5015 and 5093), and metals fabricating (34xx). The Fact Sheet identifies that as of October 6, 2006, there were at least 281 affected facilities subject to these proposed benchmarks. The Fact Sheet acknowledges that many of these permittees will be required to install active stormwater treatment systems for copper and refers to a boatyard stormwater treatment study. *See* ISGP Fact Sheet at 78. Thus, Ecology expressly acknowledges that the average treatment costs associated with the copper benchmarks in the boatyard permit are both analogous and highly relevant in assessing the likely costs of meeting the proposed copper benchmark established in the draft ISGP.

The latest draft Boatyard General Permit imposes a seasonal average copper benchmark of 14.7 μg/L with a daily maximum benchmark of 29 μg/L. *See* November 5, 2008 Draft Boatyard Permit at 17. The Fact Sheet for the Boatyard General Permit identifies copper treatment costs of $255,000 per acre. "The net present value of the most cost-effective treatment device of the three pilot treatment devices was $255,000 per acre (Arcadis 2008). The Arcadis study further estimated that the cost for treatment and preparation work for a two acre boatyard would range between $400,000 to $900,000." *See* Boatyard Fact Sheet at 17.

Using the most cost-effective treatment costs of $255,000 per acre established by the Arcadis study and assuming that the average industrial facility is 2 acres, and that only fifty percent (50%) of the industrial permittees in the four industrial sectors subject to the proposed copper benchmarks will actually be required to implement copper treatment to meet the Western Washington copper benchmark of 14 μg/L, the total treatment costs will exceed $70,000,000 (140 x 2 x $255,000). CDA believes that the $70,000,000 cost figure is likely to be low because the ISGP Fact Sheet identifies many other industry groups that Ecology may consider subjecting to copper benchmarks.

Given the exorbitant treatment costs imposed by the proposed copper benchmark, CDA supports provisions in the Draft ISGP that allow Ecology to waive structural source control BMPs or Treatment BMPs that are deemed infeasible, or unnecessary to prevent water quality standards exceedances. *See* Draft ISGP S8.B.4.b and c, S8.C.4.b and c, and S8.D.1.b and c. Because the Kennedy-Jenks model, WERs and BLM models provide a scientifically sound basis on which to base treatment waiver requests, CDA suggests that Ecology explicitly authorize their use in the treatment waiver process, and eliminate the arbitrary 90-days requirement in which to seek such a waiver.

III. Conclusion

The state needs to strike a better balance in establishing benchmarks that are both environmentally protective and economically reasonable. The proposed copper benchmarks are unreasonably stringent and economically unachievable. Ecology should incorporate use of WERs, the BLM, and the Kennedy-Jenks dilution model to establish benchmarks that better reflect the site-specific variables which mitigate the toxicity of stormwater copper discharges on receiving waters including: hardness factors, stream flow, dissolved organic carbon, and alkalinity. The methodology used by the Herrera Report is a blunt tool that arbitrarily disregards these real-world factors. CDA strongly encourages Ecology to use the alternative processes described-above, to establish copper benchmarks that are fully protective of receiving waters yet ultimately achievable by the average stormwater discharger subject to the ISGP.

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