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February 25, 2013

U.S. Environmental Protection Agency
Water Permits Division
Attention: Mr. Bryan Rittenhouse
Industrial Stormwater Program
1200 Pennsylvania Avenue, NW
Washington, DC 20460-0001

Re: Comments on Copper Benchmark in Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP)

Dear Mr. Rittenhouse:

The Copper Stormwater Benchmark Coalition (CSBC) [comprised of the American Foundry Society, Institute of Scrap Recycling Industries, Non-Ferrous Founders' Society, Steel Founders' Society of American, Steel Manufacturers Association and Treated Wood Council (TWC)] is pleased to submit this report addressing to the current copper benchmark values in place in the 2008 Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP). This report is in anticipation of the upcoming proposed MSGP revision and public comment process.

The primary concern for CSBC and their member companies is the battery of extremely low benchmark values for copper.

<u>Executive Summary</u>

Copper is a hardness-dependent metal, meaning the benchmark value for a facility is based on the total hardness of the receiving stream. The copper benchmark values range from 0.0038 mg/L to 0.0332 mg/L and were established based on acute toxicity values to aquatic life. There are a number of scientific points that suggest that the current benchmark concentrations are not the ideal concentrations upon which to base an industrial stormwater benchmark value. The CSBC proposes recommendations based on four main concerns with the current copper benchmark values. These concerns are as follows:

1. The achievability of the current copper benchmark value at industrial facilities with the use of water quality controls.
2. The presence of copper above the current benchmark value in non-industrial stormwater discharges.
3. The failure of grab samples taken in the first 30 minutes of a stormwater event to accurately represent the pollutant concentrations coming from an industrial facility.
4. The misrepresentation of using total copper as the copper benchmark when acute toxicity criteria are derived from dissolved copper concentrations.

With these concerns in mind, we conducted extensive research looking into the supporting US EPA documentation, as well as online stormwater databases containing data from both industrial and non-industrial facilities. In addition, data from facilities of many TWC members were collected. From this research and data, the CSBC would like to offer four recommendations on the copper benchmark values for the US EPA's consideration, with the goal to better represent the original intent of benchmark monitoring in the MSGP.

1. **EPA should seek comments from impacted industry groups to gather a better understanding of representative copper values for various technology-based stormwater controls.**

While the EPA describes the use of benchmark values as means for facilities to assess the effectiveness of their stormwater control measures, the EPA provides no data as part of the 2008 MSGP that show whether current benchmark values are "technologically available and economically practicable and achievable in light of best industry practice to meet the technology-based effluent limitations." In addition, the current copper benchmark values are based on water quality criteria, not technology. From the data available in the US EPA's National Pollutant Discharge Elimination System National Stormwater Quality Database v. 1.1 (NSQD) as well as from the data gathered from the facilities of TWC members, there is strong evidence showing that the majority of stormwater sampling data available fails to meet the current copper benchmark. From the TWC members, we reviewed 924 samples taken from 45 locations at 22 facilities located throughout the United States. From the data collected, 93.8% of total copper samples failed to meet the current copper benchmark. These facilities currently employ numerous technology-based stormwater controls including retention ponds, detention ponds, rip rap spillways, and filtration units. Despite the failure to meet the copper benchmark at a high percentage for these CSBC facilities, none of the receiving waters for the facilities are listed as 303(d) impaired streams for copper. This demonstrates an important lack of evidence that copper levels above the current benchmarks do substantial harm to aquatic life.

The median total copper concentration for industrial sites within the US EPA NSQD was 0.022 mg/L and 0.016 mg/L for all land use categories. This concentration corresponds to an exceedance of the current benchmark for facilities whose receiving water body has a hardness of 125 mg/L and below (which is most water bodies in the United States). The International Stormwater Best Management Practice (BMP) Database, which compiles stormwater sampling results from mixed sources internationally including industrial, commercial, and residential facilities, lists removal efficiencies of 36-70% for total and dissolved copper for various technology-based stormwater controls. Even with these removal efficiencies, the majority of industrial facilities would still fail the current copper benchmark based on the hardness of their respective receiving water body. The current copper benchmark does not accurately reflect what is technologically achievable and economically practicable and achievable in light of best industry practice.

2. **EPA should consider stormwater data for copper provided from other land use categories (including residential and commercial run-off) for further proof that the current copper benchmarks are not achievable at their current values.**

The US EPA NSQD also provides stormwater sampling data on total and dissolved copper concentrations for different land use categories. Looking at median concentrations for total copper for different land use categories and comparing those concentrations to the copper benchmark based on the receiving water body's hardness, the following land use categories fail to meet the current copper benchmark for industrial facilities: residential, mixed residential, commercial, mixed commercial, industrial, mixed industrial, freeway, and mixed freeway. In addition, the following land use categories also fail the current total copper benchmark using dissolved copper concentrations: residential, commercial, mixed commercial, industrial, mixed industrial, and freeway. Establishing a benchmark value for industrial facilities that is currently not being achieved at most residential facilities is contradictory to the stated intent of technology-based benchmark values, and intuitively inappropriate.

3. EPA should, at a minimum, raise the current copper benchmark concentrations by 24% to reflect the difference in stormwater pollutant concentrations coming from a grab sample during the first 30 minutes of a stormwater event versus stormwater pollutant concentrations over the duration of a longer stormwater event.

The current benchmark values for copper are based on grab samples taken from the first 30 minutes of a stormwater event (the first-flush). However, the acute toxicity values which determine the copper benchmark are typically derived from exposure durations of 96 hours (96 hour LC50, i.e. median lethal concentration). The pollutant concentration in stormwater run-off from most industrial facilities is significantly higher in the first-flush than in subsequent discharge and is not representative of the pollutant concentrations that biota will be exposed to. The US EPA NSQD contains both grab and composite samples for over 3,000 stormwater events from over 300 sites throughout the United States. The flow-weighted composite samples available are for the entire time of a discharge from a site for up to 3 hours. From comparisons of median total copper concentrations at industrial facilities from first-flush samples and composite samples, there was found to be a ratio of 1.24.

4. In addition to recommendation 3, apply an additional adjustment factor of 100% to the current copper benchmark to account for the reduced bioavailability of copper in total samples as compared to dissolved samples.

The current copper benchmark is for total copper, but dissolved copper is more representative of the bioavailability of copper. Furthermore, the acute criteria (which is the basis for the current benchmark value) is derived from dissolved copper concentrations. Because the reduced bioavailability of copper in total samples as opposed to dissolved samples is not accounted for in the benchmark, stormwater sampling data from the US EPA NSQD and TWC members' were analyzed. By comparing the differences in concentrations between total and dissolved copper, it was determined that the mean percentage decrease between total copper and dissolved copper concentrations from TWC facility data was 44.21%. The same analysis for the sampling data found in the US EPA NSQD yielded a percentage decrease of 57.46% from total copper to dissolved copper concentrations (i.e. total copper concentrations tend to be twice that of dissolved copper). It is our recommendation that as a result of these differences, the current total copper benchmark concentrations should be raised by 100%.

It is with these recommendations that the CSBC hopes to make the copper benchmark more representative of the effectiveness of stormwater controls at industrial facilities and more indicative of the potential impact to aquatic life.

A more detailed summary of our findings is presented in the Appendix to this letter.

We recommend that EPA cite these specific concerns in the upcoming proposed MSGP revisions and request more information on them in the public notice. We are certainly available to meet with you on these concerns.

Once again, the CSBC appreciates the opportunity to submit this report to the Agency. Please contact Mr. Jeff Miller of the Treated Wood Council (jeff_miller@treated-wood.org , 202-641-5427) if you have any additional questions.

Respectfully submitted,

Jerry Call
Executive Vice President
American Foundry Society

Raymond W. Monroe
Executive Vice President
Steel Founders' Society of America

Robin Wiener
President
Institute of Scrap Recycling Industries, Inc.

Thomas A. Danjczek
President
Steel Manufacturers Association

James L. Mallory
Executive Director
Non-Ferrous Founders' Society

Jeffrey T. Miller
President & Executive Director
Treated Wood Council

(submitted via email to rittenhouse.bryan@epa.gov)

APPENDIX

SUPPORTING DOCUMENTATION

Obtaining Data on the Achievability of the Copper Benchmark Values with the Use of Water Quality Controls

Stormwater sampling data were obtained from TWC members for total copper. We reviewed 924 samples taken from 45 locations at 22 facilities located throughout the United States. From this data, the median copper concentration of samples was found to be 0.11 mg/L. Comparing the received total copper concentrations to their respective benchmark, 93.8% of samples failed to meet the copper benchmark. These facilities currently employ numerous technology-based stormwater controls including retention ponds, detention ponds, rip rap spillways, and filtration units. Despite the failure to meet the copper benchmark at a high percentage for these TWC facilities, none of the receiving waters for the facilities are listed as 303(d) impaired streams for copper. This demonstrates an important lack of evidence that copper levels above the current benchmarks do substantial harm to aquatic life. Still, to explore the availability of additional controls to lower these concentrations to under the current benchmark, we examined two different stormwater databases as well as outside studies on technology-based stormwater controls.

First, a statistical analysis was performed on stormwater data from the International Stormwater Best Management Practice (BMP) Database. This database compiles stormwater sampling results from mixed sources internationally, including industrial, commercial, and residential facilities. Table 1 shows removal efficiencies of median total copper concentrations at the inlet versus outlet for various BMPs.

Table 1: Removal Efficiency (%) Summary Table for Total Copper

BMP Type	Removal Efficiency for Median Total Copper Concentration
	In vs Out
Grass Strip	70.23
Bioretention	54.88
Bioswale	39.78
Composite	46.20
Detention Pond	46.61
Manufactured Device	24.29
Media Filter	46.72
Porous Pavement	40.09
Retention Pond	47.86
Wetland Basin	36.36

From Table 1, the technology-based stormwater controls reduced median total copper concentrations with a removal efficiency of 36-70%. Even with these removal efficiencies, the majority of industrial facilities would still fail the current copper benchmark based on the hardness of their respective receiving water body.

Additionally, we examined the US EPA National Pollutant Discharge Elimination System National Stormwater Quality Database v. 1.1 (NSQD), which contains over 3,000 events from over 300 sites throughout the United States. The NSQD compiled stormwater sampling data containing total copper concentrations at industrial sites, and the median total copper concentration was 0.022 mg/L. This concentration would cause an exceedance of the copper benchmark for receiving water bodies with hardness of 150 mg/L and below.

We then contacted businesses who sold high-end technology-based stormwater controls to identify the best controls available on the market. These technology-based controls mimicked water treatment processes and included enhanced media filtration systems, gravity settling tanks, and polishing filtrations tanks. Through the use of top-down filtration with a slow-sand filter, a biofilm layer forms on top of the enhanced media which removes copper in stormwater. In series, these technologies could remove copper from stormwater at a removal efficiency of 70-90%. For some industrial facilities, this technology may provide a high enough removal efficiency to comply with the copper benchmark; however, this technology would still not be sufficient for most facilities.

From the data analyzed, the current copper benchmark does not accurately reflect what is technologically achievable and economically practicable and achievable in light of best industry practice. In addition, we have not been able to locate any EPA data or study that has shown otherwise.

Obtaining Data on Copper Concentrations in Non-Industrial Stormwater

The US EPA NSQD also includes median total copper concentrations for different land use categories. These data were analyzed to see which land use categories failed the current total copper benchmark using the hardness published. The results are shown in Table 2 below. The bolded values (9 out of 11) show concentrations which fail to meet the respective copper benchmark.

Table 2: Summary of US NPDES Phase 1 Stormwater Data in the NSQD

Land Use Categories	**Total Copper (mg/l)**	**Total Hardness (mg/l)**	**Benchmark Value of Copper as a Function of the Tested Hardness (mg/l)**
Overall	**0.0160**	38	0.0056
Residential	**0.0120**	32	0.0056
Mixed Residential	**0.0160**	40	0.0056
Commercial	**0.0170**	36.5	0.0056
Mixed Commercial	**0.0175**	36	0.0056
Industrial	**0.0208**	39	0.0056
Mixed Industrial	**0.0230**	29.3	0.0056
Freeway	**0.0347**	34	0.0056
Mixed Freeway	**0.0140**	83	0.0123
Open Space	0.0100	150	0.0221
Mixed Open Space	0.0090	64.2	0.0090

As can be seen above, the majority of land use categories fail the current copper benchmark for industrial facilities. Establishing a benchmark value for industrial facilities that is currently not being achieved at most residential facilities is contradictory to the stated intent of technology-based benchmark values.

Obtaining Data that Correlated Pollutant Concentrations in Grab Samples to Pollutant Concentrations in Flow-Weighted Composite Samples

The US EPA NSQD released a report in September of 2005 which compiled and analyzed the stormwater monitoring information obtained from the NPDES Phase 1 permit applications during the period of 1992-2002. Because grab and composite samples were required for each event, comparisons were able to be made between first-flush samples within the first 30 minutes of discharge and flow-weighted composite samples for the entire time of discharge for up to 3 hours. Commercial, industrial, and institutional areas were sorted, and a ratio for each was calculated comparing first flush samples to composite median concentrations. The results for total copper at industrial facilities were reviewed, and the median values of total copper concentrations for first-flush and composite samples were found to be different at a ratio of 1.24.

From this data, it is recommended that the current copper benchmark concentrations are raised by 24% at a minimum to reflect the difference in stormwater pollutant concentrations coming from a grab sample during the first 30 minutes of a stormwater event versus stormwater pollutant concentrations in longer composite samples.

Obtaining Data that Correlated Total Copper Concentrations to Dissolved Copper Concentrations

The acute toxicity criteria for biota which dictated the current benchmark concentration for copper was derived from dissolved copper concentrations. However, the copper benchmark is for total copper. Because the reduced bioavailability of copper in total samples as opposed to dissolved samples is not accounted for in the benchmark, the sampling data obtained from TWC members were analyzed to compare the differences in concentration between total copper and dissolved copper. From this, it was determined that the mean percentage decrease between total copper and dissolved copper concentrations was 44.21%.

The stormwater data for copper in the US EPA NSQD were also compared, and it was found that dissolved copper concentrations were an average of 57.46% lower than total copper concentrations.

Figure 1 below shows a scatter plot of dissolved copper concentrations versus total copper concentrations, which was put together by Robert Pitt, Alex Maestre, and Renee Morquecho of the University of Alabama, analyzing data points from the US EPA NSQD. As is expected, few data points fall on the y=x line and most lie under the y=x line, indicating that dissolved copper concentrations are less than total copper concentrations (sometimes by as much as an order of magnitude).

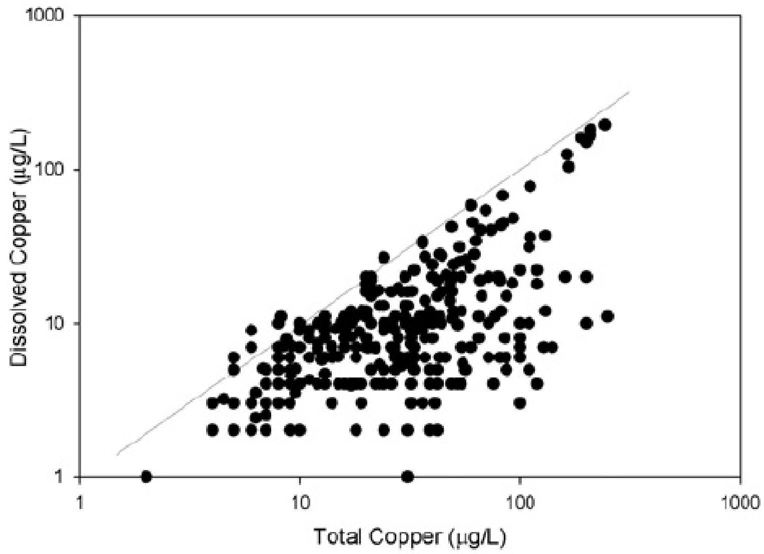

Figure 1: Dissolved vs Total Copper Concentration from US EPA NSQD Sampling Data

It is our recommendation that as a result of these differences, the current total copper benchmark concentrations should be raised by 100%.

Additional Information

The Nationwide Urban Runoff Program, established by the US EPA, was created to examine issues with urban runoff. An interim report was published in March 1982 and again as a final report in December 1983 detailing the many studies, technical reports, and the summary database created detailing detention and recharge devices, urban runoff effects on the water quality of rivers and streams, street sweeping as a water pollution control, and more. In Volume 1 of this report, a table is given showing regional differences in toxic concentrations for copper given a stream's total hardness. Suggested values are then given for threshold effects (mortality of the most sensitive individual of the most sensitive species) and significant mortality (a) (mortality of 50 percent of the most sensitive species) and (b) (mortality of the most sensitive individual of 25th percentile sensitive species). Table 4 shows this data below, along with the current benchmark for copper.

Table 4: Toxic Concentration Levels

Pollutant	Stream Total Hardness (mg/L)	Suggested Values For			Current Benchmark Value (mg/L)
		Threshold Effects (mg/L)	Significant Mortality (mg/L)		
			(a)	(b)	
Total Copper	50	0.020	0.050	0.090	**0.0090**
	200	0.080	0.180	0.350	**0.0285**
	300	0.115	0.265	0.500	**0.0332**

While this report is from 1983, the disparity between current benchmark values and suggested values in the above table is worth noting.