Rebuttal To

Spokane River Metals TMDL
WAG Review Draft April 2016 Strategy Paper

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It is noted this paper states:

> "This document outlines the strategy for development of metals TMDLs (cadmium, lead, and zinc) for the Spokane River using the Load Duration Approach as outlined by the EPA (2007). Currently there are no metals TMDLs for the Spokane River."

It then goes on to state:

> "The City of Coeur d'Alene, the Hayden Area Regional Sewer Board, and the City of Post Falls' ***NPDES permits and their Clean Water Act Section 401 certification requires water quality-based effluent limits for lead, cadmium, and zinc to meet Idaho's water quality criteria at the end-of-pipe.*** No mixing zone may be authorized for cadmium, lead, or zinc. As such, any increase in the volume of wastewater discharged will increase the load of metals to the river, which is not allowed under Idaho's water quality standards." (Emphasis added.)

This is an inaccurate statement. The 401 Certification [1] actually states:

> ***"Pollutants of Concern***
>
> The City of Coeur d'Alene discharges the following pollutants of concern: carbonaceous biochemical oxygen demand (CBODs), total suspended solids (TSS), pH, *E. coli,* chlorine, ammonia, phosphorus, silver and zinc. Effluent limits have been developed for these pollutants of concern. Copper, lead, cadmium and nitrate+ nitrite are additional pollutants of concern for which a reasonable potential analysis was performed. No effluent limits were established for these pollutants because results of the analysis indicated they had no reasonable potential to exceed water quality standards."

The NPDES discharge permit also does not reflect mass loadings for cadmium, copper and lead; only silver and zinc. Table 1 is partially listed below. [2]

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[1] Idaho DEQ. June 5, 2014. Final 401 Water Quality Certification.

[2] . US EPA, Region 10. September 30, 2014.Table 1 - NPDES Permit No. ID0022853

Silver October – June Effluent Flow > 4.2 mgd	µg/L	8.01	—	22.5	Effluent	1/month	24-Hr. Comp.
	lb/day	0.401	—	1.13			Calculation[2]
Silver July – September and October – June when effluent flow is ≤ 4.2 mgd	µg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Zinc	µg/L	135	—	168	Effluent	1/month	24-Hr. Comp.
	lb/day	6.76	—	8.42			Calculation[2]
Temperature	°C	Report	—	Report	Effluent	5/week	Grab
Cadmium	µg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Copper	µg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Lead	µg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.

The permit Fact Sheet contains a table that lists the pollutants of concern and the "Reasonable Potential to Exceed" determinations: [3]

Table 2: Reasonable Potential Calculations

Effluent Percentile value	99%			State Water Quality Standard		Max concentration at edge of...												
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) ug/L	Acute ug/L	Chronic ug/L	Acute Mixing Zone ug/L	Chronic Mixing Zone ug/L	LIMIT REQ'D?	Pn	Max effluent conc. measured (metals as total recoverable) ug/L	Coeff Variation CV	s	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
Ammonia Jul - Sep Prev. Lim.	1.00	1.00	0.1000	6.75	1.43	9.01	1.54	YES	N/A	21.00	N/A	N/A	N/A	1.00	2.35	14.5	2.5% MZ Acute 25% MZ Chronic
Ammonia March - June Effluent	1.00	1.00	0.1000	6.75	2.17	7.05	0.52	YES	0.984	30.50	0.31	0.31	281	1.06	4.64	77.5	2.5% MZ Acute 25% MZ Chronic
Ammonia Nov. - Feb. Effluent	1.00	1.00	0.1000	6.75	2.80	1.34	1.07	NO	0.980	34.0	0.32	0.31	228	1.09	29.8	38.2	25% MZ
Ammonia Oct Effluent	1.00	1.00		6.7484	2.5724	5.62	0.51	NO	0.926	16.15	0.31	0.30	60.00	1.30	3.75	41.4	2.5% MZ Acute 25% MZ Chronic
Cadmium (EOP)	0.93	0.90		1.69	0.67	0.25	0.24	NO	0.955	0.21	0.43	0.41	101	1.29	1	1	RW Impaired; no MZ
Chlorine (Oct - June Prev. Lim.)	1.00	1.00		11.0	19.0	15.62	13.57	YES	N/A	390	N/A	N/A	N/A	1.00	25.0	28.7	25% MZ
Chlorine (July - Sept. Prev. Lim.)	1.00	1.00		11.0	19.0	7.05	7.05	NO	N/A	102	N/A	N/A	N/A	1.00	14.5	14.5	25% MZ
Copper (July - Sept)	0.86	0.88		4.61	3.47	0.94	0.96	NO	0.958	12.90	0.35	0.34	107	1.23	14.5	14.5	25% MZ
Copper (Oct - June)	0.86	0.88		4.61	3.47	0.54	0.48	NO	0.958	12.90	0.35	0.34	107	1.23	25.0	28.7	25% MZ
Lead (EOP)	0.15	0.15		80.8	3.1	0.58	0.58	NO	0.958	2.73	0.70	0.63	107	1.46	1	1	RW Impaired; no MZ
NO2 + NO3	1.00	1.00	0.0915		10.0		4.90	NO	0.215	12.4	0.60	0.55	3	5.62		14.5	25% MZ
Silver (July - Sept)	0.35	N/A		0.318	N/A	0.15	N/A	NO	0.958	3.30	1.43	1.06	107	1.88	14.5	N/A	25% MZ, No chronic criterion for Ag
Silver (October - June)	0.35	N/A		0.318	N/A	0.09	N/A	NO	0.958	3.30	1.43	1.06	107	1.88	25.0	N/A	25% MZ, No chronic criterion for Ag
Silver, Prev. Lim. (Oct - June)	0.35	N/A		0.318	N/A	0.45	N/A	YES	0.958	31.90	1.43	1.06	107	1.00	25.0	N/A	25% MZ, No chronic criterion for Ag
Zinc (EOP, prev. lim.)	0.88	0.88		148	149	177	177	YES	N/A	201	N/A	N/A	N/A	1.00	1	1	RW Impaired; no MZ

It is noted in the strategy paper that in 2000, a judge declared that the TMDL for the basin was declared invalid as Idaho rule-making procedures were not followed. There was not invalidation of the methodology or findings contained within the document. The applicable section that addressed Waste Load Allocations is reproduced below. (Note that the term load is used when establishing concentration limits.)

"6.6.c. Wasteload Allocations for Spokane River Treatment Plants [4]

The State of Washington has issued an EPA-approved TMDL for metals in the Spokane River downstream of the state line (Washington Department of Ecology, 1999). Because the river and source conditions are similar in the Spokane River segment upstream of the state line, EPA

[3] US EPA Region 10. September 3, 2013. NPDES Permit No. ID0022853 Revised Fact Sheet

[4] US EPA Region 10, Idaho DEQ. August 2000. Technical Support Document – Total Maximum Daily Load for Dissolved Cadmium, Dissolved Lead, and Dissolved Zinc in Surface Waters of the Coeur d'Alene Basin.

allocates loading in a two-step method consistent with that used by the State of Washington in its Spokane River TMDL. In the first step, an upper bound concentration is calculated for each point source by applying the Idaho water quality criteria at the end-of-pipe using the effluent hardness (in other words, applying an "effluent-based criterion"). The effluent-based criterion accounts for differences between effluent and ambient hardness levels. The hardness levels of the three municipal discharges to the Spokane River in Idaho are higher than that of the river, because these cities pump groundwater for their water supplies, and this source water has a significantly higher hardness than the Spokane River.

In simple terms, applying the effluent-based criterion is analogous to treating the effluent discharge as if it were a tributary that has higher hardness levels than the mainstem river. As discussed earlier, metals toxicity decreases with increased hardness. The tributary would be allowed to achieve less stringent (i.e., higher) metals criteria by virtue of its elevated hardness levels. It can be shown that the mixture of the tributary and mainstem waters would not result in any local criteria exceedances. A detailed analysis of the relationship between the water quality criteria equations and the mixing of two waters with different hardness levels is included in the State of Washington TMDL.

In order to develop monthly average wasteload allocations for use in NPDES permits, it is appropriate to translate dissolved metal allocations into total recoverable metal allocations. EPA has calculated translators for the Spokane River (see Table 6-10). Since the translators from total recoverable to dissolved metal are 1.0 for cadmium and zinc, the equations for these metals provide both dissolved and total recoverable values. For lead, the characteristics of the criterion curve necessitate a different approach to achieve a total recoverable allocation. Consistent with the State of Washington TMDL, the dissolved criterion equation is converted to a total recoverable equation using a default conversion factor. The tangent line is then used, at the river hardness value, to calculate a total recoverable lead allocation. The effluent-based criteria for the
Spokane River dischargers are calculated using the equations in Table 6-18.

Table 6-18. Effluent-based Criteria Equations

Pollutant	Equation
Total Recoverable Cadmium	$y = \exp^{(.7852[(\ln(x)]-3.49)})$
Total Recoverable Lead	$y = .0261(x) - .1119$
Total Recoverable Zinc	$y = \exp^{(.8473[(\ln(x)]+.7614)}$

Notes:

y = criterion (µg/L)
x = effluent hardness (mg/L)

Provided facilities maintain effluent metals concentrations below the effluent-based criteria, effluent flow (and loading) can be increased without exceeding the loading capacity in the Spokane River. In addition, the wasteload allocation concentration is not dependent on the

river flow. For this reason, the wasteload allocation is expressed as a concentration (µg/l) rather than a load (lbs/day). A wasteload allocation expressed in this manner allows for future growth without the need to revise wasteload allocations.

In the second step of the allocation process, the current discharge level (or current "performance") is compared to the calculated effluent-based criterion during permit development, and the more restrictive value is assigned as the wasteload allocation for the facility. This step is similar to the final step (Step 8) of the allocation approach for the Coeur d'Alene River and tributaries.

Based on the information in Table 6-19, all three municipalities on the Spokane River are expected to have final allocations based on current performance. The intent of this step in the allocation process is to prevent significant increases in metals discharges from sources in this basin, and this approach is consistent with anti-degradation requirements in the Idaho water quality standards. In the Spokane River, this approach also allows for allocation of remaining capacity to urban stormwater sources.

Table 6-19. Effluent-Based Criteria for Spokane River Facilities

Facility	Minimum Hardness (mg/L as $CaCO_3$)	Total Recoverable Cadmium (µg/L)		Total Recoverable Lead (µg/L)		Total Recoverable Zinc (µg/L)	
		Effluent Criterion	Current Perform.	Effluent Criterion	Current Perform.	Effluent Criterion	Current Perform.
Hayden	92	1.0	0.2	2.3	1.9	97	80
Coeur d'Alene	132	1.3	0.2	3.3	2.3	132	72
Post Falls	96	1.0	0.2	2.4	2.0	101	80

Notes:

1. The wasteload allocation for a facility will be the lower value of the current performance and effluent-based criterion. The above comparison is provided for informational purposes only. Final performance-based permit limits will be developed in the individual NPDES permits.
2. Minimum hardness is used because the criteria increase with increased hardness.
3. Current performance is the 90th percentile of the available discharge data.
4. Effluent criteria are Idaho water quality criteria values associated with the minimum hardness of the effluent."

Second, much of the NPDES regulations and associated guidance generally specify that mass-based water quality based effluent limits (WQBELs) are required in permits except when the standard is expressed in a way that does not make sense to take a mass-based approach or it is otherwise infeasible to do so. See 40 CFR 122.45(f).

> ***(f) Mass limitations.***
> ***(1)*** *All pollutants limited in permits shall have limitations, standards or prohibitions expressed in terms of mass except:*

(i) *For pH, temperature, radiation, or other pollutants which cannot appropriately be expressed by mass;*
(ii) *When applicable standards and limitations are expressed in terms of other units of measurement; or*
(iii) *If in establishing permit limitations on a case-by-case basis under § 125.3, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation (for example, discharges of TSS from certain mining operations), and permit conditions ensure that dilution will not be used as a substitute for treatment.*
(2) *Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations.*

Washington State developed a heavy metals TMDL in 1998 and it was implemented in 1999. Washington has a requirement that dischargers must incorporate the principle of "All Known And Reasonable Technology, known as AKART. This led to WLAs that were the lesser of the calculated toxicity in µg/L or performance-based concentrations.

The following is from the 1998 document.[5]

"Implementation of WLAs in NPDES Permits

The WLAs will be implemented as permit limits in the NPDES permits for each facility. Using statistical permitting procedures, Ecology will determine whichever potential limits are more restrictive based on comparison of:

- Potential limits based on meeting aquatic life criteria at effluent hardness, or
- Potential limits based on maintaining existing concentrations of metals in effluent (AKART), where adequate data exist.

Whichever method results in lower limits will be selected for the permit limit."

The 1999 Washington TMDL goes on to state: [6]

"The Spokane River Metals TMDL utilizes a different measure than "daily loads" to fulfill requirements of Section 303(d). Instead, the TMDL is expressed in terms of concentration as allowed under EPA regulations [defined as "other appropriate measures" in 40 CFR §130.2(i)]. In this case, a concentration measure is appropriate because the relationship between the effluent hardness-based criterion and the receiving water quality holds for all river and effluent flow rates. The use of effluent flow to establish a loading limit would not only be unnecessary, but also could be misconstrued to

[5] Washington State Department of Ecology. September 1998. Cadmium, Lead and Zinc in the Spokane River – Recommendations for Total Maximum Daily Loads and Waste Load Allocations, Pub. No. 98-329
[6] Ecology, 1999. Spokane River Dissolved Metals Total Maximum Daily Load Submittal Report. Publication No. 99-49-WQ.

represent a restriction on effluent flow. Also, a loading limit could require unnecessary TMDL and permit modifications to change loading limits as communities grow and flows increase."

Lastly, the following is quoted from the director of DEQ to two legislators: [7]

> "After consultation with my staff, and taking into consideration the additional information presented at the meeting, I believe section 055.04 must be applied in a manner that achieves its intended purpose of maintaining water quality to support designated and existing uses, in this case, specifically aquatic life uses. It also appears clear to me that an increase in the total amount or mass of metals discharged is not critical to ensuring protection of aquatic life in the Spokane River; instead, aquatic life is impacted by the concentration of metals in the river. In turn this means that water quality related to metals in this impaired stretch will be maintained, as required under the section 055.04 of the WQS, by ensuring that the concentration, rather than the mass, of metals is limited. DEQ intends to adjust the proposed certifications to allow an increase in the metals discharged as the communities plan for growth as long as the effluent concentration meets the criteria applicable to these metals."

It can be demonstrated that the more effluent dominated that the river becomes, the more assimilative capacity is added due to the high hardness of the effluent.

It is strongly recommended that DEQ take the approach of writing WLAs based on hardness and a concentration limit rather than a mass limit.

[7] Fransen, Curt A., Director Idaho DEQ. Letter to the Honorable Eric Anderson and George Eskridge. May 21, 2013.