May 9, 2016

Pamela Creedon, Executive Director
Central Valley Regional Water Quality Control Board
10200 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

Re: Pit River – Lead

Dear Ms. Creedon,

The Sacramento Valley Water Quality Coalition (SVWQC or Coalition) and Pit River subwatershed respectfully request your determination that the subwatershed's Management Plan requirements for lead for the Big Lake represented drainages be deemed complete. The Pit River Subwatershed did not develop a Management Plan for lead as no pesticides or other products applied by growers in the subwatershed contain lead. The primary basis for this request is that the Pit River has been determined to meet the water quality objectives (WQOs) for lead. Additional factors supporting the request include the outreach conducted with members and non-member agencies in the subwatershed and Shasta and Lassen counties with regard to sediment and erosion control, and focused in the represented drainage area to further augment and expand implementation of management practices to manage discharges of agricultural pesticides to receiving waters, and limit the introduction of lead to such water bodies.

BACKGROUND FOR MANAGEMENT PLAN REQUIREMENT

The Pit River monitoring location at Pittville Bridge (PRPIT) is in the Big Lake drainage and is a representative monitoring site for SVWQC. Irrigated acreage in the Pit River subwatershed is represented by the Big Lake drainage and the monitoring site at Pittville Bridge. The Big Lake drainage is 247,975 acres, approximately 32,120 irrigated acres, and represents a total of just over 3 million acres (irrigated agriculture, open space, timber, and other significant land uses) in the Pit River subwatershed that includes the following represented drainages: Bieber, Alturas, Canby, Sweetbriar Creek, Upper Ash Creek, Little Valley, Cedar Creek, Pondosa, Lake Britton, Lower Hat Creek, Big Sage, Upper Hat Creek, Turner Creek, Big Bend, Dunsmuir, Squaw Valley, Upper Burney Creek, Lower Burney Creek, Hatchet Creek, Lower McCloud River, Kosk Creek, and Montgomery Creek. The Management Plan requirement for lead was originally triggered by exceedances observed in June 2009 (dissolved fraction only) and April 2011 (total and dissolved fractions).

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DATA AND EXCEEDANCES

Relevant monitoring data for lead are provided in **Table 1**. The monitoring results indicate the following:

- A total of eight (8) SVWQC sample events have been conducted for lead in the Pit River. There have been *three* (3) exceedances of the lead trigger limits, with the last exceedance observed in April 2011 (see **Table 1**).
- There have been five (5) SVWQC sample events conducted for lead over the last 4.5 years with no exceedances since April 2011.

Evaluations of the three observed lead exceedances (dissolved lead based on the California Toxics Rule freshwater chronic WQO that varies based on receiving water hardness, and total lead based on the Title 22 Maximum Contaminant Level (MCL) of 15 µg/L) show that they were not associated with significant agricultural activity (e.g., irrigation, cultivation) or flows, which are highly regulated in this region. There was approximately 0.25 inches of rain in the week preceding the June 2009 exceedance, and flows and turbidity did not appear to be elevated. The April 2011 exceedances occurred after a four day period with a total of ~1.35 inches of rain, with elevated flows and turbidity.

Additional lead data collected by the California Department of Water Resources (DWR) for the State's Surface Water Ambient Water Program (SWAMP) were combined with the lead data collected by the Coalition to calculate summary statistics for dissolved and total lead at the Pittville monitoring site covering the period November 2008 through May 2015 (see **Table 1**). The average concentration of total lead at PRPIT is 1.6 µg/L, while the median concentration is 0.22 µg/L. The average concentration of dissolved lead is 0.15 µg/L, while the median concentration is 0.01 µg/L. The only exceedances of the trigger limit for either total or dissolved lead were those observed in the SVWQC data set (see **Table 1**).

Lead is a relatively insoluble metal, with increasing solubility at lower pH. The dissolved fraction in Pit River at Pittville samples is variable, but is generally a low percentage of the total measured concentration. This is consistent with the relatively elevated pH in the Pit River, which has a median of 8.15 standard units for SVWQC monitoring data. The pH in samples with observed exceedances of the dissolved lead criterion were both on the basic side of normal, 8.49 and 7.43 standard units, respectively.
Overall, these monitoring data indicate that lead is (1) currently meeting water quality objectives and (2) is not a chronic problem in the Big Lake drainage. To this end, we concluded that Management Plan requirements for lead are no longer needed for the Pit River subwatershed.

SUMMARY OF EVALUATIONS SUPPORTING REQUEST

The following evaluations and factors support this request:

Assessment of Compliance with Water Quality Objectives	• All samples analyzed for dissolved lead since April 2011 have been in compliance with the CTR hardness-based freshwater chronic WQO, and all samples analyzed for total lead since April 2011 have been in compliance with Title 22 MCL of 15 µg/L (Considering the combined SVWQC and DWR data set, a total of 20 sampling events have been performed for lead over the past 4.5 years).

SOURCE EVALUATIONS

An evaluation of potential sources contributing to lead exceedances in the Big Lake drainage was completed in 2013[1]. The source evaluation found that there are no direct agricultural uses or applications of lead in Shasta or Lassen counties. Lead arsenate insecticides (used primarily on fruit-trees) were largely phased out in the late 1940's with the introduction of DDT[2]. Based on the predominant crop-types in the Big Lake drainage (pasture, wild rice, oats, wheat, grain, and hay) and the decades that have elapsed since lead arsenate pesticides were last used, legacy deposits of lead from historical lead arsenate use are unlikely to be a significant source of lead in Big Lake drainage.

The evaluation also found that the influence of flows are difficult to assess at the Pit River site near Pittville because there are no flow gaging stations nearby that reflect flows at the site, and the flows in the Pit River are highly influenced by diversions and power generation uses downstream. Although agricultural practices can result in increased sediment runoff, the lead exceedances at PRPIT were not associated with irrigation events, and were not associated with controllable runoff from agricultural fields. The June 2009 exceedance occurred following a 2-week period with about 1.75 inches of rain. In the 1-week period prior to the event, there were 0.25 inches of rain several days before the sample event. Under these conditions at this time of year, there is no significant irrigation and the conditions were unlikely to result in significant runoff from nearby agriculture. On the sample date of the June 2009 exceedance, flows were still relatively strong, the water was fairly clear (not notably turbid), and velocity was estimated by the sampling crew to be 2.5 feet per second. The sample collected in the previous month (May 20, 2009) under very similar flow conditions also had somewhat elevated lead (0.23 µg/L dissolved lead and 1.7 µg/L total lead, the third highest total and dissolved lead concentrations), but did not exceed ILRP Trigger Limits.

The April 2011 exceedance occurred on the fifth day of rainfall totaling approximately 1.35 inches. On the sample date of the April 2011 exceedance, flows were too high to safely measure and nearly bankfull (wetted channel ~190 feet wide), the water was visibly turbid, and velocity was estimated by the sampling crew to be 3 feet per second. The visibly high turbidity during this event was confirmed by lab analysis (117 NTU) and was also reflected in the elevated total suspended solids (113 mg/L) and total lead concentration (43 µg/L) measured in the sample.

The source evaluation concluded that agriculture appears not to be the cause of the exceedances, and lead can enter the environment through a variety of non-agricultural sources, such as corrosion of plumbing materials, metal finishing, vehicle service facilities, or mining, smelting and refining activities[3]. Lead mining is not a significant economic activity in the Big Lake drainage; most historic lead mining in California has occurred in the Inyo Mountains in eastern California[4], well outside the Big Lake drainage. The sale of leaded gasoline for on-road vehicles

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[1] *Source Evaluation Report: Lead in Pit River*. Sacramento Valley Water Quality Coalition. May 2013

[2] Perya, F.J. (1988). *Historical use of lead arsenate insecticides, resulting soil contamination and implications for soil remediation.* Proceedings, 16th World Congress Soil Science, Montpellier, France. 20-26. Available online at: http://soils.tfrec.wsu.edu/leadhistory.htm

[3] http://www.epa.gov/lead

[4] Department of Conservation, Office of Mine Reclamation, and Abandoned Mine Lands Unit (2000). *California's Abandoned Mines – A Report on the Magnitude and Scope of the Issue in the State.* Volume 1. Office of Mine Reclamation.

was discontinued in 1996, though leaded fuel may still be used for some off-road applications (e.g., automobile racing fuel, aviation gasoline-Avgas, etc.). Lead-based paint for household use has been banned since 1978, but some road paint may still contain lead chromate. Since the sale of lead-based household paint and leaded automobile fuels has been banned, it is expected that most potential sources of lead may come from illicit discharges of lead-based paint, or weathering and runoff of soil containing legacy lead deposits.

The evaluation also reported one additional potential non-agricultural source of lead is a non-operational concrete block manufacturing facility located just upstream from the Pittville sampling location that has some potential for runoff to the river during storms. The Portland cement and fly ash used in concrete block manufacture may contain elevated lead, depending on the source materials used. Additional on-site investigation would be required to confirm whether this facility is a likely source of the lead, either from remaining manufacturing materials, or from other sources on site (e.g., abandoned vehicles, lead paint). However, based on proximity to the sampling site, unmanaged storm runoff, and several possible (but unconfirmed) sources of elevated lead, this site appears to have significant potential to be the cause of the exceedances.

Since the 2011 source evaluation, Subwatershed staff familiar with the area identified an additional potential source. There is a non-operational gas station that is near the North bank of the Pit River slightly upstream from the sampling location. Although the gas station is long-abandoned, it is possible that leakage or spillage of leaded gasoline left deposits in the soil that could migrate into the Pit River upstream from the sampling site and cause or contribute to elevated lead concentrations and exceedances.

OUTREACH AND EDUCATION

Outreach and education efforts are not specifically cited as a basis for this request. Because the sources of lead in the drainage are unknown and unlikely to be from current agricultural practices, there are no lead-specific management practices that can be implemented by growers in the drainage to reduce the frequency or magnitude of the lead exceedances observed in the Pit River. For this reason, outreach and education efforts specifically targeting lead have not been made in the subwatershed. However, growers and applicators in the subwatershed have been made aware of the Lead Management Plan and the consequences of any detections of lead. Additionally, agricultural management practices implemented by growers and applicators in the subwatershed with regard to sediment and erosion control practices to manage discharges of agricultural pesticides to receiving waters may have helped to limit the introduction of lead to such water bodies. Increased awareness of sediment and erosion control practices may have contributed, in part, to the lack of lead exceedances since April 2011.

Relevant Outreach & Education Conducted from 2010 – 2014

- 2010 – 7th Annual General Membership Meeting held in Alturas, CA on March 10
- 2010 – Univ. of CA Cooperative Extension and NRCS Irrigation Workshop held in Susanville, CA on June 9 (25 attendees)
- 2010 – Univ. of CA Cooperative Extension and NRCS Irrigation Workshop held in Adin, CA on June 10 (30 attendees)
- 2011 – 8th Annual General Membership Meeting held in McArthur on March 17 (45 attendees)
- 2012 – 9th Annual General Membership Meeting held in Bieber, CA on February 23 (60 attendees)
- 2013 – 10th Annual General Membership Meeting held in Bieber, CA on March 14 (62 attendees)

- 2013 – September 2013 NEWCA Newsletter included information on June and July 2013 lead monitoring results
- 2014 – 11th Annual General Membership Meeting held in Bieber, CA on March 13 (68 attendees)
- 2014 – June 2014 NEWCA Newsletter included education on irrigation management

MANAGEMENT PRACTICES

The suite of sediment and erosion control practices implemented by growers in the Big Lake Drainage and represented drainages (see **Table 2**), while not targeted to reduce the discharge of lead to receiving waters, limited the introduction of lead to such water bodies by reducing runoff of soil containing legacy or natural lead deposits. The individual management practices summarized from the Subwatershed's Farm Evaluations and presented in **Table 2** show that shorter irrigation times is an irrigation practice used to limit and control sediment and erosion for approximately 47% of agricultural acreage, and the use of cover crops or native vegetation is a cultural practice used to limit and control sediment and erosion for just under 57% of agricultural acreage. These management practice implementation rates are not low when considering that 71.5% of the acreage reported represents pasture, hay, alfalfa, and native vegetation. These permanent and semi-permanent crops have very low erosion potential and thus, require implementation of little to no additional sediment and erosion control practices. These crops aren't tilled and essentially represent the equivalent of a permanent "cover crop" management practice. The remainder of the crops (28.5% by acreage) are primarily represented by wild rice, orchards, grains, wheat, berries, and herbs/spices. Management practices in the Big Lake Drainage and represented drainages can also be characterized as percent implementation of one or more individual practices per land parcel, as shown in **Figure 1**.

CONCLUSIONS

Based on the monitoring results summarized above, the Pit River is meeting the Basin Plan water quality objectives for lead and has done so for the last 4.5 years. Based on the findings presented in this request, we conclude that agriculture does not use products containing lead, and the sediment and erosion control practices already implemented by growers to reduce the discharge of pesticides to surface waters are sufficient to reduce and limit the runoff of soil containing legacy or natural lead deposits.

As specified in the Management Plan Completion section of the MRP-1: Management Plan Requirements for Surface Water and Groundwater (Waste Discharge Requirements General Order for Growers within the Sacramento River Watershed that are Members of a Third Party Group; Order R5-2014-0030-R1), we respectfully request that you make a determination of the completeness of this Management Plan.

Sincerely,

David J. Guy
President
Northern California Water Association

cc: Sue McConnell, Tami Humphry, Susan Fregien, Bruce Houdesheldt, Claus Suverkropp

TABLES AND FIGURES

Table 1: Monitoring results for lead in Pit River water quality samples.

Data Source	SVWQC Event	Sample Date	Fraction	Concentration (µg/L)	CTR Hardness-Based Criterion for Dissolved Lead (µg/L)	Notes
DWR	n/a	11/4/2008	Dissolved	<0.04	2.3	
			Total	0.104		
DWR	n/a	02/24/2009	Dissolved	<0.04	2.1	
			Total	0.21		
DWR	n/a	05/05/2009	Dissolved	<0.04	2.0	
			Total	0.178		
SVWQC	39	05/20/2009	Dissolved	0.23	2.2	
			Total	1.7		
SVWQC	40	06/17/2009	Dissolved	**2.5**	2.3	1
			Total	2.9		
DWR	n/a	08/11/2009	Dissolved	<0.04	2.9	
			Total	0.042		
DWR	n/a	11/03/2009	Dissolved	<0.04	2.2	
			Total	0.108		
DWR	n/a	02/02/2010	Dissolved	<0.04	1.8	
			Total	0.182		
DWR	n/a	05/04/2010	Dissolved	0.106	2.1	
			Total	0.185		
DWR	n/a	08/03/2010	Dissolved	0.074	2.6	
			Total	0.084		
DWR	n/a	11/02/2010	Dissolved	<0.04	2.4	
			Total	0.184		
DWR	n/a	02/01/2011	Dissolved	<0.04	1.6	
			Total	0.266		
SVWQC	62	04/21/2011	Dissolved	**1.3**	0.97	1,3
			Total	**43**		2,3
DWR	n/a	05/03/2011	Dissolved	<0.04	1.5	
			Total	0.64		
SVWQC	63	05/18/2011	Dissolved	0.05	0.81	
			Total	0.82		
DWR	n/a	08/02/2011	Dissolved	0.141	1.9	
			Total	0.233		
DWR	n/a	11/01/2011	Dissolved	0.125	2.8	
			Total	0.213		
DWR	n/a	01/31/2012	Dissolved	0.042	1.8	
			Total	0.076		
DWR	n/a	05/08/2012	Dissolved	<0.04	2.0	
			Total	0.24		

Data Source	SVWQC Event	Sample Date	Fraction	Concentration (µg/L)	CTR Hardness-Based Criterion for Dissolved Lead (µg/L)	Notes
DWR	n/a	02/06/2013	Dissolved	<0.04	1.4	
			Total	0.247		
DWR	n/a	05/07/2013	Dissolved	<0.04	2.0	
			Total	0.079		
SVWQC	88	06/26/2013	Dissolved	0.38	2.2	
			Total	0.94		
SVWQC	89	07/25/2013	Dissolved	0.05	2.2	
			Total	0.41		
DWR	n/a	08/06/2013	Dissolved	<0.04	2.4	
			Total	<0.04		
DWR	n/a	11/05/2013	Dissolved	<0.04	3.5	
			Total	0.205		
DWR	n/a	02/04/2014	Dissolved	<0.04	2.3	
			Total	0.077		
DWR	n/a	05/06/2014	Dissolved	<0.04	2.6	
			Total	0.054		
SVWQC	100	06/19/2014	Dissolved	0.04	2.2	
			Total	1.1		
SVWQC	101	07/22/2015	Dissolved	0.05	2.1	
			Total	0.75		
DWR	n/a	08/12/2014	Dissolved	<0.04	2.3	
			Total	<0.04		
DWR	n/a	11/05/2014	Dissolved	<0.04	3.0	
			Total	0.049		
DWR	n/a	02/03/2015	Dissolved	<0.04	2.0	
			Total	0.191		
DWR	n/a	05/05/2015	Dissolved	<0.04	3.6	
			Total	0.108		

1. Measured concentration exceeded the California Toxics Rule (CTR) hardness-based freshwater chronic criterion for the protection of aquatic life.

2. Measured concentration exceeded the Title 22 Primary Maximum Contaminant Level (MCL) of 15 µg/L for the protection of drinking water.

3. Turbidity (117 NTU) and Total Suspended Solids (113 mg/L) were elevated in this sample.

Table 2: Summary of Sediment and Erosion Control Practices Implemented in the Big Lake Drainage and Represented Drainages (Source: 2015 Farm Evaluation Survey).

PRACTICE CATEGORY **Individual Practice**	**Acres Reported**	**Percent of Total Acres Reported (54,269 acres)**
IRRIGATION PRACTICES FOR MANAGING SEDIMENT AND EROSION		
Shorter irrigation runs are used with checks to manage and capture flows.	25,723	47.4
The time between pesticide applications and the next irrigation is lengthened as much as possible to mitigate runoff of pesticide residue.	23,473	43.3
Catchment Basin.	22,211	40.9
Tailwater Return System.	19,902	36.7
No irrigation drainage due to field or soil conditions.	15,875	29.3
No Selection	7,229	13.3
In-furrow dams are used to increase infiltration and settling out of sediment prior to entering the tail ditch.	5,542	10.2
Use of flow dissipaters to minimize erosion at discharge point.	5,161	9.5
Use drip or micro-irrigation to eliminate irrigation drainage.	2,462	4.5
Other	455	0.8
PAM (polyacrylamide) used in furrow and flood irrigated fields to help bind sediment and increase infiltration.	250	0.5
CULTURAL PRACTICES TO MANAGE SEDIMENT AND EROSION		
Cover crops or native vegetation are used to reduce erosion.	30,723	56.6
Vegetated ditches are used to remove sediment as well as water soluble pesticides, phosphate fertilizers and some forms of nitrogen.	29,733	54.8
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	27,973	51.5
Minimum tillage incorporated to minimize erosion.	27,699	51.0
Creek banks and stream banks have been stabilized.	23,278	42.9
Berms are constructed at low ends of fields to capture runoff and trap sediment.	21,120	38.9
Vegetative filter strips and buffers are used to capture flows.	20,716	38.2
Sediment basins / holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff.	19,164	35.3
Storm water is captured using field borders.	16,219	29.9
Crop rows are graded, directed and at a length that will optimize the use of rain and irrigation water.	15,806	29.1
No storm drainage due to field or soil conditions.	13,129	24.2
Subsurface pipelines are used to channel runoff water.	9,082	16.7
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	8,398	15.5
Field is lower than surrounding terrain.	6,754	12.4

PRACTICE CATEGORY		
Individual Practice	**Acres Reported**	**Percent of Total Acres Reported (54,269 acres)**
No Selection	5,256	9.7
Other	415	0.8

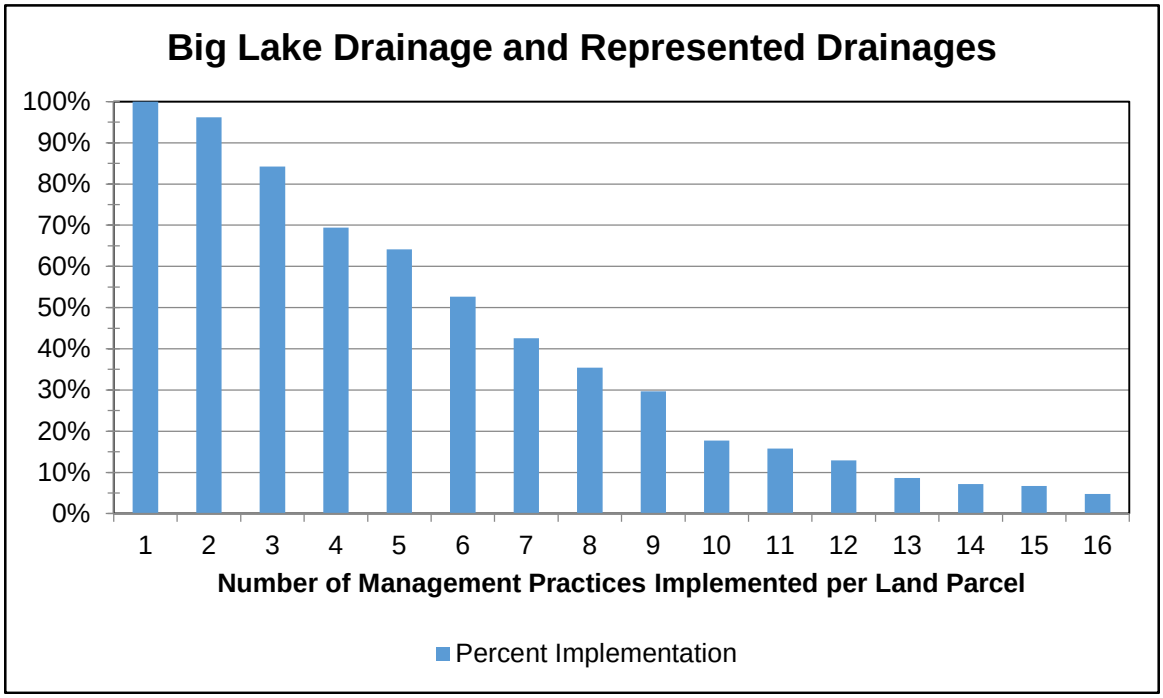

Figure 1: Percent Implementation of Erosion and Sediment Control Management Practices in the Big Lake Drainage and Represented Drainages per Land Parcel.