TECHNICAL SUPPORT DOCUMENT

Total Maximum Daily Load for Dissolved Cadmium, Dissolved Lead, and Dissolved Zinc in Surface Waters of the Coeur d'Alene Basin

FINAL

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TABLE OF CONTENTS

SECTION **PAGE**

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

TABLE OF CONTENTS
(Continued)

LIST OF FIGURES

1.0 INTRODUCTION

Lead and silver mining began in the South Fork Coeur d'Alene River (South Fork) in 1885, when lead-bearing rock was discovered in the drainage. In the early mining operation, ore was sorted from waste rock by hand and shipped out to smelters. In later years, concentrators were established within the mining district and tailings were produced. In most cases, tailings were disposed directly in the stream channels. Originally, the zinc in the ore was not commercially valuable and was discarded with the tailings. As zinc became commercially marketable, it joined silver and lead as the primary metals being mined in the valley. Initially, all mining operations in the area disposed of tailings by deposition in the streams. The Mine Owner's Association, which had been formed to control the threat of organized labor, constructed plank dams in Osburn and the Pinehurst Narrows in 1901 and 1902. These dams were constructed to control the tailings in the river which were causing flooding and resulting in law suits and damage claims.

In the 1920's, the first tailings impoundments were constructed. In the 1950's, mines started to use tailings to fill open mine areas. By the 1960's, tailings deposition directly into the waterways had ceased. In the mid-1960's, action was taken to stop mines and mills from discharging into the river as well as to stop towns from pumping raw sewage into the waterways. In addition to concentrators, metals recovery facilities were constructed in the Silver Valley. These included a smelter, an electrolytic zinc plant built in 1928, and a phosphoric acid/fertilizer plant in 1960. All of these operations had ceased by 1981.

Beginning in the 1970's, EPA issued wastewater discharge permits to mines and sewage treatment plants operating along the South Fork. In 1983, the Bunker Hill Mining and Metallurgical Complex was placed on the National Priorities List (NPL). EPA and the State of Idaho continue to fund and implement clean-up activities in the 21-square mile study area. In late 1997, EPA decided to conduct a basin-wide Remedial Investigation and Feasibility Study (RI/FS) to identify other sources of contamination, risks, and clean-up alternatives.

In September 1996, the United States District Court for the Western District of Washington ordered EPA, in concurrence with the State of Idaho, to develop a schedule for completion of total maximum daily loads (TMDLs) for all streams identified by the State of Idaho in its 1994 Section 303(d) list. In response to concerns over delays in submittal of TMDLs for the Coeur d'Alene (CDA) basin, and concerns about intergovernmental coordination between the States of Idaho and Washington and the Coeur d'Alene Tribe, EPA initiated development of a basin-wide TMDL in 1998. In a letter dated February 26, 1999, the State of Idaho proposed that EPA and the State jointly issue a TMDL for the basin. EPA and the State of Idaho released a proposed TMDL for public comment on April 15, 1999. The agencies held public hearings on the proposed TMDL in Wallace, Coeur d'Alene, and Osburn during a 120-day comment period.

EPA and the State of Idaho are jointly issuing the final TMDL. The State of Idaho is issuing (and EPA is simultaneously approving), the final TMDL for those waters within the jurisdiction of the State of Idaho. EPA is issuing the final TMDL for waterbodies within the Coeur d'Alene Reservation boundaries (see below for discussion of legal authority).

This document, which has been revised in response to public comments and new information, describes the information assembled and analyzed to develop the TMDL, including: applicable water quality standards, available water quality and flow data, calculation methods, legal and policy considerations, and implementation mechanisms. The proposed TMDL establishes loading capacities, wasteload allocations, load allocations, background conditions, and a margin of safety in accordance with federal regulations (40 CFR 130).

2.0 LEGAL AUTHORITY AND BACKGROUND

2.1 Legal Authority

EPA has the authority under section 303(d) of the Clean Water Act to approve the final TMDLs submitted by the State. EPA also has the legal authority to develop these TMDLs for the CDA basin in Idaho if the State is unable or unwilling to submit a TMDL. When Congress directed EPA to approve or disapprove State § 303(d) lists and TMDL submissions and to establish its own lists or TMDLs in the event EPA disapproves the State submission, Congress imposed very specific duties on EPA under section 303(d). However, EPA does not believe that its role under section 303(d) is limited to those narrow, although important, duties. It would be anomalous and contrary to Congress' intent in enacting this section if States could obstruct the implementation of section 303(d) simply by refusing to submit TMDLs in a timely fashion. Rather, EPA believes that the most reasonable interpretation of section 303(d) vests in EPA more general authority to ensure timely and meaningful implementation of section 303(d). This includes the discretionary authority to develop TMDLs in the absence of a State submission.

This interpretation of section 303(d) is also the basis for EPA's issuance of TMDLs for waters within reservation boundaries for tribes which have not been authorized under section 518(e). Under the authority of CWA section 518(e), EPA may approve eligible tribes to carry out the responsibilities of CWA section 303. While, at this time, the Coeur d'Alene Tribe has not yet been approved to exercise this authority, the Tribe has submitted its application for EPA approval of its water quality standards program. To the extent that waterbodies lie within reservation boundaries, it is EPA's position that EPA, rather than the State of Idaho, has the authority to develop TMDLs for those waters. It is acknowledged that ownership and jurisdiction over portions of the submerged lands underlying waters covered by this basin-wide TMDL are contested between the State of Idaho, United States and/or Coeur d'Alene Tribe. This TMDL is not intended as a waiver or admission of ownership or jurisdiction regarding the contested submerged lands by any of those parties.

In developing this basin-wide TMDL, EPA has utilized federally recommended "Gold Book" water quality criteria for those waters within Indian Country. EPA also considered the water quality standards of the downstream jurisdiction (Idaho) at the border. Those water quality standards are identical to EPA's Gold Book water quality criteria guidance. This approach ensures consistency within the basin and assures that the standards of the downstream state waters of Idaho and Washington will be met.

2.2 Background

The Idaho Department of Environmental Quality (DEQ) is authorized to issue and submit to EPA for approval this TMDL pursuant to section 303(d) of the Clean Water Act, Idaho Code §§ 39-101 through 39-130 and 39-3601 through 39-3624. Within the time frames established in the Idaho TMDL Schedule developed as a result of Idaho Sportsmen's Coalition v. Browner, W.D. Wash., C93-943-WD, the State originally developed draft TMDLs for the Coeur d'Alene River system based upon site-specific criteria. Idaho did not finalize and submit the TMDLs to EPA for approval, however, for a number of reasons, including the fact that the State could not use site-specific criteria while Idaho was still subject to the federally promulgated National Toxics Rule. In October 1998, the State changed the TMDL Schedule so that it could submit TMDLs after EPA removal of the State from the National Toxics Rule. The Plaintiffs in the Idaho Sportsmen's Coalition v Browner case raised concerns about the legality of this delay in TMDL development, while EPA raised concerns about its appropriateness.

The State has determined to proceed at this time with a final TMDL. EPA removed Idaho from the National Toxics Rule on April 12, 2000 (FR19659). Since Idaho had previously adopted EPA "Gold Book" criteria into its water quality standards, which are now the applicable standards for the Coeur d'Alene River basin, the NTR removal has no effect on the dissolved metals goals of the final TMDL. However, the removal from the National Toxics Rule does give the State the flexibility to employ water quality standards mechanisms such as site-specific criteria (SSC) and variances.

In the Coeur d'Alene basin, SSC have been under development for some time for the South Fork Coeur d'Alene River segment above Wallace (upstream of the Canyon Creek confluence). This effort has included extensive toxicity testing with a representative suite of resident species to determine the metals levels that will fully support aquatic biota in this segment. This work has been funded by the state of Idaho and Hecla Mining Company.

EPA and DEQ have evaluated the impact of a potential SSC on the TMDL. The draft SSC for the Wallace segment would not have any effect on the TMDL allocations, because Idaho water quality criteria would still be applied in the impaired segments downstream of the Wallace segment. Meeting these downstream criteria would require the same calculations and wasteload allocations in the TMDL. On the other hand, an SSC for the entire South Fork mainstem (from Pinehurst to the Montana border) could affect the TMDL allocations. This is because statewide criteria could be achieved in the mainstem Coeur d'Alene River after dilution of metals (in excess of the statewide criteria) in the South Fork by the relatively clean North Fork.

The State continues to be committed to the development of appropriate site-specific criteria and intends to complete its work with respect to such criteria. If site-specific criteria that impact the TMDL are developed and adopted by the State and approved by EPA, the State intends to modify the TMDL applicable to waters within its jurisdiction to reflect the site-specific criteria. Any substantive modification to the State's TMDL would be submitted to EPA for approval.

3.0 SCOPE OF THE TMDL

3.1 Pollutant Parameters

The TMDL is established for lead, cadmium, and zinc in the dissolved form in the water column. These metals parameters are considered the highest priority for TMDL development, because large portions of the CDA basin exceed the water quality standards for these metals. As a result of these exceedances, these metals are also important parameters in the NPDES permits and RI/FS analysis in the basin.

3.2 Geographic Scope

The geographic scope of the TMDL includes the entire CDA basin, from the headwaters to the Idaho-Washington border. Figure 3-1 presents a map of the drainages in the CDA basin. These drainages include the Idaho portion of the Spokane River, Coeur d'Alene Lake, St. Joe River, main stem Coeur d'Alene River, and the North and South Forks of the Coeur d'Alene River. Each of these streams has many named and unnamed tributaries.

Because the majority of sources are located in the South Fork portion of the basin, the TMDL components are established at a finer scale in this area. More detailed maps of the drainages and sources in the South Fork are included in Appendix A. A location key is provided in Appendix B.

3.3 Idaho 303(d) List

As required under Section 303(d) of the Clean Water Act, the State of Idaho has promulgated a listing of waters not currently meeting applicable water quality standards. A number of waterbodies in the CDA basin are included on the 303(d) list as impaired by metals.

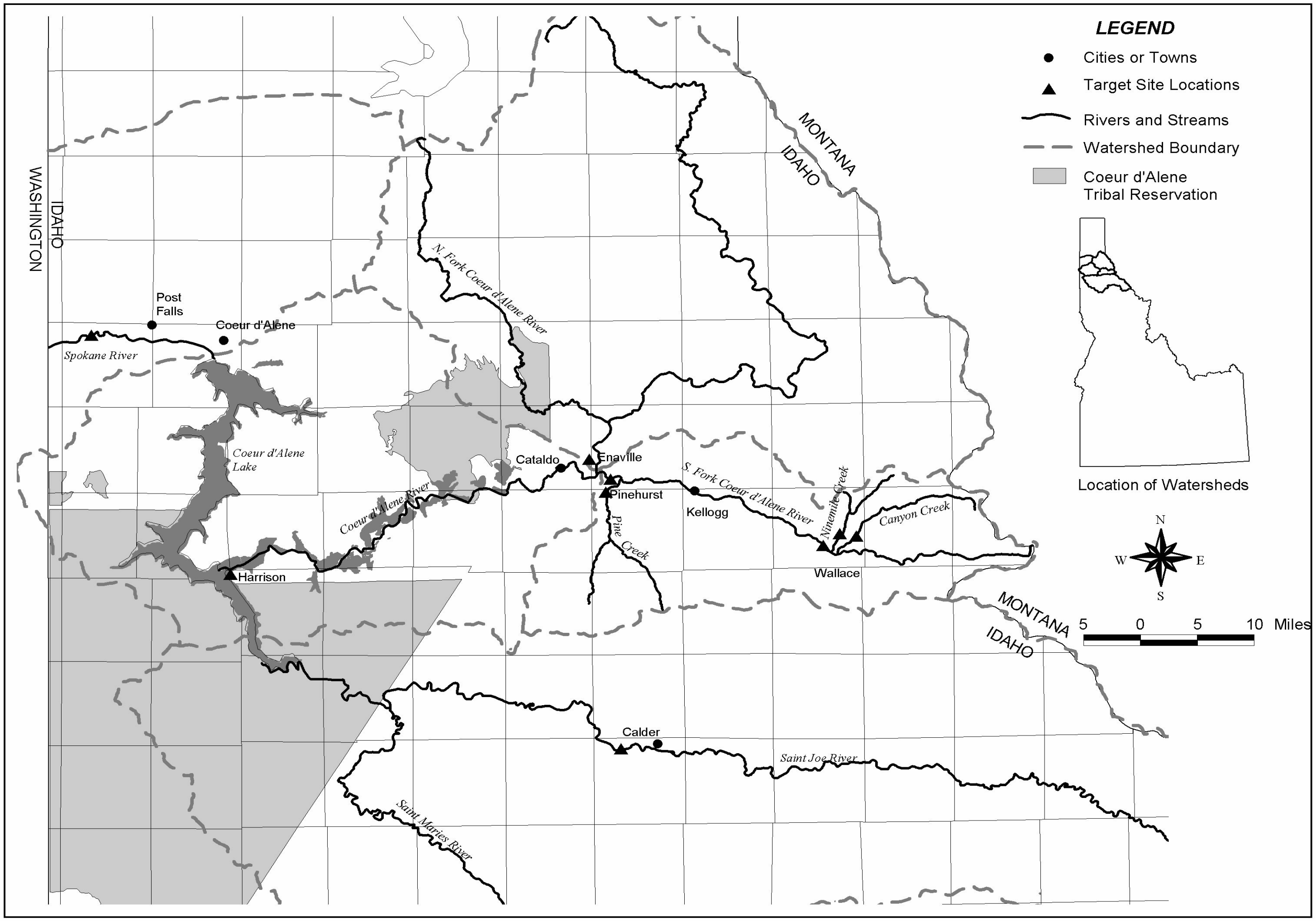

Figure 3-1 Map of Coeur d'Alene Basin

Table 3-1. Coeur d'Alene Basin Waterbodies on the 1998 Idaho 303(d) List for Metals

HUC	SEG #	WATERBODY NAME	SEGMENT BOUNDARIES	LENGTH (Mi.)
17010302	3513	South Fork Coeur d'Alene R.	Big Creek to Pine Creek	8.99
17010302	3514	South Fork Coeur d'Alene R.	Pine Creek to Bear Creek	1.79
17010302	3515	South Fork Coeur d'Alene R.	Bear Creek to Coeur d'Alene River	0.44
17010302	3516	South Fork Coeur d'Alene R.	Canyon Creek to Ninemile Creek	0.55
17010302	3517	South Fork Coeur d'Alene R.	Ninemile Creek to Placer Creek	0.33
17010302	3518	South Fork Coeur d'Alene R.	Placer Creek to Big Creek	7.56
17010302	3519	Pine Creek	E Fk Pine Creek to S Fk CDA River	5.28
17010302	3520	East Fork Pine Creek	Headwaters to Hunter Creek	5.19
17010302	3521	East Fork Pine Creek	Hunter Creek to Pine Creek	1.57
17010302	3524	Ninemile Creek	Headwaters to S Fk Coeur d'Alene R	4.91
17010302	3525	Canyon Creek	Gorge Gulch to South Fk CDA River	6.90
17010302	5084	Government Gulch	Headwaters to S.Fk of CDA River	3.53
17010302	5127	Moon Creek	Headwaters to S Fk CDA River	4.07
17010302	5661	Milo Creek	Headwaters to mouth	2.56
17010303	2001	Coeur d'Alene Lake	NA	NA
17010303	3529	Coeur d'Alene River	Black Lake to Thompson Lake	4.21
17010303	4015	Coeur d'Alene River	Cave Lake to Black Lake	4.00
17010303	4016	Coeur d'Alene River	Fortier Creek to Robinson Creek	0.80
17010303	4017	Coeur d'Alene River	Fourth of July Creek to Fortier Cr	10.50
17010303	4018	Coeur d'Alene River	French Gulch to Skeel Gulch	4.21
17010303	4019	Coeur d'Alene River	Latour Creek to Fourth of July Cr	4.09
17010303	4020	Coeur d'Alene River	Robinson Creek to Cave Lake	1.57
17010303	4021	Coeur d'Alene River	S Fk CDA River to French Gulch	2.13
17010303	4022	Coeur d'Alene River	Skeel Gulch to Latour Creek	1.16
17010303	4023	Coeur d'Alene River	Thompson Lake to CDA Lake	4.19
17010305	3552	Spokane River	CDA Lake to Huetter	3.45
17010305	3553	Spokane River	Huetter to Post Falls Bridge	4.89
17010305	3554	Spokane River	Post Falls Bridge to WA border	6.18

In the process of developing this TMDL, additional data and analysis indicate that metals criteria are exceeded in a number of additional tributaries to the South Fork Coeur d'Alene River. EPA has evaluated the available metals data and screened for stations that exceed water quality criteria at an assumed hardness of 100 mg/l (see "WQC" values in table below). Based on this analysis, the following tributaries exceed one or more of the metals criteria.

Table 3-2. Metals Concentrations in Non-Listed South Fork Tributaries

Waterbody	Station	Maximum Reported Concentrations in ug/L		
		Dissolved Cd (WQC=1.0)	Dissolved Pb (WQC=2.5)	Dissolved Zn (WQC=105)
SF CDA River above Canyon Cr.	SF228	3.1	8.0	475
Gorge Gulch	CC392	1.9	27	172
East Fork Ninemile	NM291	2.9	4.0	397
Wilson Creek	NM292	1.4	2.5	354
Highland Creek	PC307	3.5	5.0	1370
Denver Creek	PC308	18	14	7410
Nabob Creek	PC310	4.8	16	3430
Bunker Creek	SF100	152	20	9910
Portal Creek	SF104	6.0	26	1300
Grouse Creek along Govt Gulch	SF110	306	21	10500
Slaughterhouse Gulch	SF218	1.0	3.4	190
Grouse Gulch near Wallace	SF223	17	19	2400
McFarren Gulch	SF250	2.5	< 2.5	272
Prospect Gulch	SF261	13	11	1720

Source: URS Greiner RI/FS Database, April 2000

This list is provided for informational purposes and does not account for site-specific differences in hardness levels.

3.4 Identification of Target sites

Due to resource constraints, it is not feasible to specifically develop loading capacities and allocations for each individual 303(d)-listed waterbody in the basin (including South Fork tributaries likely to be added in future listings) in this TMDL. The extent of this pollution problem and the attempt to address it at the basin scale necessitates the selection of a limited number of points-of-compliance or “target sites” that span the basin. Target sites are locations in the river network where the loading capacities for dissolved metals are calculated and allocated to upgradient sources contributing metals to the target site.

EPA selected nine target sites that would result a TMDL that is fair, equitable, and appropriate to the scale of the pollution problem. Target sites are located at the mouths of major tributaries or on mainstem junctions. EPA considered the location and number of contributing point and nonpoint sources in establishing the target sites. Also, each target site is located at a sampling station that has been used for synoptic sampling for water quality and discharge in the South Fork or has been historically monitored for discharge by the United States Geological Survey (USGS). Of the nine target sites, five sites are located in the South Fork, because of the large number of point source and nonpoint source discharges in this drainage. A list of the target sites is provided in the table below, and locations are depicted in Figure 3-1.

Table 3-3. TMDL Target Sites

Target Site Name	Description
Spokane River @ State Line	Idaho-Washington Border
St. Joe River @ Calder	USGS Station No. 12414500
Coeur d'Alene River @ Harrison	Near Mouth of Coeur d’Alene River
North Fork Coeur d'Alene River @ Enaville	USGS Station No. 12413000
South Fork Coeur d'Alene River @ Pinehurst	USGS Station No. 12413470; URS Greiner Station No. 271
Pine Creek	Mouth of Pine Creek; URS Greiner Station No. 315
South Fork Coeur d'Alene River @ Wallace	South Fork downstream from Ninemile Creek confluence; URS Greiner Station No. 233
Ninemile Creek	Mouth of Ninemile Creek south of Depot RV park; URS Greiner Station No. 305
Canyon Creek	Mouth of Canyon Creek at Frontage Road Bridge north of I-90; URS Greiner Station No. 288

With the exception of two target sites, each target site is located on a segment listed on the current Idaho 303(d) list. Target sites on the North Fork of the Coeur d’Alene River and St. Joe River are established for tracking purposes and allocation of loading capacity through the river network. These two rivers currently meet metals criteria based on available information.

3.5 Identification of Sources

To achieve water quality standards at the target sites, the TMDL must address all sources of dissolved metals to waters at a given target site. In the Coeur d’Alene River and tributaries, the loading capacity at each target site is allocated to all identified sources of dissolved metals that are upgradient from the target site. Thus, while the TMDL addresses impairment on 303(d)-listed waters, the allocations may include sources located along upstream watersheds that are tributary to the listed waterbody. Some of these smaller, upstream watersheds are not on the 303(d) list. Nevertheless, sources in these watersheds discharge metals to the upstream watershed, and the stream network then transports the metals downstream to the waters at the target site location. Therefore, inclusion of these sources in the TMDL is essential to ensure that water quality standards will be achieved, because metals discharged from these upstream watershed sources are contributing to water quality standards exceedances in both listed and unlisted waters. For example, the Star 1200 adit discharges dissolved metals to Grouse Creek, a tributary to the South Fork above Wallace, which is not included on the 1998 Idaho 303(d) list. Grouse Creek flows into the South Fork upstream from the Wallace target site. Since the metals from the Star adit ultimately reach the Wallace target site, this adit is included in the wasteload allocations for that target site, even though the creek immediately adjacent to the adit portal is not included on the current 303(d) list.

4.0 APPLICABLE WATER QUALITY STANDARDS

4.1 General

Water quality standards are adopted by states and tribes to maintain and restore the nation's waters for "beneficial uses" such as drinking, swimming, and fishing. The standards for a particular waterbody consist of a set of protected uses ("designated" uses), the water quality criteria necessary to protect these uses, and an "anti-degradation" requirement (see below). The water quality criteria can be expressed as numeric criteria (e.g., contaminant concentrations) or narrative criteria (e.g., "No toxics in toxic amounts"). The following discussions describe the water quality standards applicable to CDA basin waters.

4.2 Designated Uses

Title 1, Chapter 2 of the State of Idaho Department of Environmental Quality rules presents the State's water quality standards. Sections 100 and 110 present the Use Designations for Surface Waters in the Panhandle Basin of Idaho, including the South Fork Coeur d'Alene Subbasin, Coeur d'Alene Lake Subbasin, and Upper Spokane Subbasin (IDAPA 58.01.02.110[1]). The uses designated for the Spokane River, Coeur d'Alene Lake, mainstem Coeur d'Alene River, and the North Fork of the Coeur d'Alene River include the following:

- Domestic water supply
- Industrial and agricultural water supply
- Cold water biota
- Salmonid spawning

[1]Effective July 1, 2000, the citation to Idaho standards changed from IDAPA 16.01.02 to 58.01.02.

- Primary contact recreation
- Secondary contact recreation.

In addition, Coeur d'Alene Lake and the North Fork of the Coeur d'Alene River are designated as Special Resource Waters. Sections 56 and 400.01(b) describe specific requirements related to Special Resource Waters in Idaho.

The South Fork below Daisy Gulch and Canyon Creek below Gorge Gulch have been heavily impacted by historic and ongoing mining activities. Above these segment boundaries (Daisy Gulch and Gorge Gulch, respectively), the South Fork and Canyon Creek are designated for cold water biota, salmonid spawning, primary contact recreation, agricultural water supply, industrial water supply and domestic water supply. Below these boundaries, the South Fork and Canyon Creek are classified for:

- Industrial and agricultural water supply
- Secondary contact recreation
- Cold water biota

The cold water biota use designations for the South Fork below Daisy Creek, Canyon Creek and Shields Gulch, were promulgated by EPA on July 31, 1997 in accordance with section 303(c) of the Clean Water Act, 33 U.S.C. Sec. 313(c) (see 62 Fed. Reg. 41162, July 31, 1997). EPA's promulgation of water quality standards for Idaho was subsequently challenged in federal court. On March 15, 2000, the United States District Court for District of Idaho issued a decision largely upholding EPA's promulgation but vacating the cold water biota designation for Shields Gulch. The District Court ruling results in two sets of use designations applicable to Shields Gulch. Above the mining impacted area (P-8a), Shields Gulch is protected for cold water biota, salmonid spawning, primary contact recreation, agricultural water supply, industrial water supply and drinking water supply. Below the mining impact (P-8b), it is protected for secondary contact recreation, agricultural water supply and industrial water supply.

The CDA basin includes hundreds of tributaries not specifically addressed in the Idaho water quality standards. The standards include a default provision that designates these unspecified waters for cold water biota, primary or secondary contact recreation, agricultural water supply, and industrial water supply (IDAPA 58.01.02.101).

In summary, with the exception of Shields Gulch below the mining impact, the cold water biota use applies to all streams in the CDA basin.

4.3 Applicable Water Quality Criteria

For cadmium, lead, and zinc in the dissolved form in the water column, the water quality criteria designed to protect aquatic life from chronic exposure effects are the most stringent criteria that apply to waters in the CDA basin. The applicable criteria for the TMDL are established in the approved State of Idaho water quality standards (IDAPA 58, Title 01, Chapter 02). The criteria for dissolved cadmium, lead, and zinc in the Washington and Idaho standards are identical except for assumptions about hardness.

The toxicity of dissolved metals to aquatic life is dependent on the hardness of the river or lake waters. For this reason, the chronic criteria for dissolved cadmium, lead, and zinc are calculated from hardness-based equations. The following equations are established in both Idaho and Washington water quality standards:

Dissolved Cadmium Criteria = **(1.101672-[ln(hardness)(0.041838)])*(exp[0.7852(ln(hardness)) - 3.490])**

Dissolved Lead Criteria = **(1.46203-[ln(hardness)(0.145712)])*(exp[1.273(ln(hardness)) - 4.705])**

Dissolved Zinc Criteria = **0.986exp[.8473(ln(hardness)) + 0.7614]**

CDA basin waters exhibit a range of hardness levels, and river hardness in the basin is strongly related to the flowrate of the rivers. This relationship between river flow and hardness at various locations in the river network is evaluated in more detail under “Derivation of TMDL Elements” below. Hardness levels in the basin generally fall between 10 and 100 mg/l. However, the Idaho water quality standards set a minimum hardness to be used in calculating the criteria at 25 mg/l. Washington has applied the criteria equations at a hardness value of 20 mg/l in its approved TMDL for the cadmium, lead, and zinc in the Spokane River. Based on these considerations, the range of applicable dissolved metals criteria is depicted in Table 4-1.

Table 4-1. Range of Applicable Criteria in the Coeur d’Alene Basin

Metal	Criterion @hardness of 20 mg/l	Criterion @hardness of 25 mg/l	Criterion @hardness of 100 mg/l
Dissolved Cadmium	0.31 ug/l	0.37 ug/l	1.03 ug/l
Dissolved Lead	0.42 ug/l	0.54 ug/l	2.52 ug/l
Dissolved Zinc	27 ug/l	32 ug/l	105 ug/l

4.4 Anti-degradation

The Idaho anti-degradation requirements (IDAPA 58.01.02.051) are pertinent to the CDA basin TMDL. If a waterbody has better water quality than that necessary to support designated uses, the anti-degradation requirements dictate that the existing quality shall be maintained and protected, unless the state finds that a lowering of water quality (i.e., degradation) is necessary to accommodate important economic or social development.

While large portions of the CDA basin surface water network contain metals concentrations well above the applicable water quality criteria, a cursory review of the available data indicates that there are also a number of waters within the CDA basin with metals concentrations well below the water quality criteria. Anti-degradation requirements apply to any proposed activities that would lower water quality in these areas.

5.0 AVAILABLE DATA

5.1 Data Sources

A significant amount of monitoring information is available for the waterbodies in the CDA basin. The data can be classified as one-time studies and longer term, programmatic monitoring. Table 5-1 lists data sources and features of each data set that are pertinent to this TMDL. EPA evaluated these data as part of the development of the TMDL elements described in Chapter 6.

Table 5-1. Analytical Water Quality Data Available for CDA basin

Data set	Period of Record	Geographic Scope	Measured Features	Measured Parameters	Number of Samples
EPA	9/22/87-5/19/88	S. Fork (& major Tributaries)	Surface Water	Hardness Cadmium (dis) Lead (dis) Zinc (dis)	29 sites 101 samples
USGS	Nov. 20, 1989- Nov. 14, 1990	S. Fork	Surface Water	Cadmium (dis) Lead (dis) Zinc (dis)	1 site 5 samples
USGS	1991-1992	Coeur d’Alene Lake	Surface Water	Cadmium (tot rec) Lead (tot rec.) Zinc (tot rec.)	6 sites 146 samples
Idaho Dept. Env. Quality	Dec. 4, 1989-Jan. 23, 1990	S. Fork	Surface Water Effluent	Hardness Cadmium (dis) Lead (dis) Zinc (dis)	7 sites 36 samples

Table 5-1. Analytical Water Quality Data Available for CDA basin (Continued)

Data set	Period of Record	Geographic Scope	Measured Features	Measured Parameters	Number of Samples
Idaho Dept. Env. Quality	Jan.-Aug 1993	Pine Creek	Surface Water	Hardness Cadmium (tot) Lead (tot) Zinc (tot)	18 sites 90 samples
Idaho Dept. Env. Quality	Apr. 23- Sept. 28, 1993	Canyon Creek Ninemile Creek	Surface Water	Hardness Cadmium (dis) Lead (dis) Zinc (dis)	10 sites 36 samples
Idaho Dept. Env. Quality	Oct 26, 1993 - Sept. 14, 1995	S. Fork and tributaries	Surface Water	Hardness Cadmium (dis+tot) Lead (dis+tot) Zinc (dis+tot)	14 sites 451 samples
CH2MHill (for EPA)	Oct. 16-28, 1996 (once each site)	Bunker Hill site	Ground Water	Cadmium (dis) Lead (dis) Zinc (dis)	72 sites 72 samples
CH2MHill (for EPA)	Feb. 6-12, 1997 (once each site)	Bunker Hill site	Ground Water Surface Water	Cadmium (dis) Lead (dis) Zinc (dis) Flow (7 sites)	89 sites 89 samples
CH2MHill (for EPA)	Apr. 21-29, 1997 (once each site	Bunker Hill site	Ground Water Surface Water	Cadmium (dis) Lead (dis) Zinc (dis) Flow (12 sites)	92 sites 92 samples
CH2MHill (for EPA)	Sept.1997- Jan. 1998	Bunker Hill site	Ground Water	Cadmium (dis) Lead (dis) Zinc (dis)	11 sites 41 samples
CH2MHill (for EPA)	Oct. 1997 Feb. 1998	Bunker Hill site	Ground Water	Cadmium (dis) Lead (dis) Zinc (dis)	68 sites 136 samples
CH2MHill (for EPA)	Oct. 9, 1997 Feb. 9, 1998	Bunker Hill site S. Fork (few)	Surface Water	Cadmium (dis+tot) Lead (dis+tot) Zinc (dis+tot) Flow (4 sites)	17 sites 34 samples
McCulley, Frick, and Gilman (MFG)	May 14-18, 1991	S. Fork (& major Tributaries)	Surface Water	Cadmium (dis+tot) Lead (dis+tot) Zinc (dis+tot) Flow	57 sites 57 samples
MFG	Oct. 1-5, 1991	S. Fork (& major Tributaries)	Surface Water	Cadmium (dis+tot) Lead (dis+tot) Zinc (dis+tot) Flow	70 sites 70 samples

Table 5-1. Analytical Water Quality Data Available for CDA basin (Continued)

Data set	Period of Record	Geographic Scope	Measured Features	Measured Parameters	Number of Samples
EPA PCS and Facility/ Discharge Monitoring Reports	1996-1998	Discharges in the S. Fork (& major Tributaries) and Spokane River	Effluent	Cadmium (tot+tot rec) Lead (tot+tot rec) Zinc (tot+tot rec) (Also dissolved metals for Lucky Friday Mine) Flow	15 sites (monthly summaries) on South Fork, 3 sites on Spokane River
EPA Inspection Reports	Apr. 96 and Mar. 98	S. Fork (& major Tributaries)	Surface Water Effluent	Cadmium (tot) Lead (tot) Zinc (tot) (Also dissolved metals for Lucky Friday Mine) Hardness Flow	24 sites 42 samples
URS Greiner (for EPA)	Nov. 1997 and May 1998	S. Fork (& all Tributaries) N. Fork Mainstem St. Joe River Spokane River	Surface Water Effluent	Cadmium (dis+tot) Lead (dis+tot) Zinc (dis+tot) Hardness Flow	184 sites 380 samples
USGS	Oct. 1998 to Sept. 1999	S. Fork (& select Tributaries) N. Fork Mainstem St. Joe River Spokane River CDA Lake	Surface Water	Cadmium (dis+tot) Lead (dis+tot) Zinc (dis+tot) Hardness Flow	42 sites

Note: (dis) = dissolved
(tot) = total
(tot rec) = total recoverable

The State of Idaho sampling has produced the largest data sets over time at several key locations in the Coeur d'Alene river network, while USGS has collected the most recent data across the river network. The November 1997 and May 1998 URSG sampling, which was performed under EPA's Superfund program, was conducted at the finest geographic scale of all the sampling to date, with stations established at all tributary mouths to the South Fork outside of the Bunker Hill Superfund site. Also, the URSG efforts are the only synoptic field studies (i.e., studies that present data over a large area in a single period of time) that include parallel sampling of abandoned adit discharges. Appendix C provides a more detailed description of the studies completed by URSG in 1997 and 1998, MFG in 1991, IDEQ in 1993-1995, and CH2MHill in 1996-1998, and USGS in 1999. The URSG sampling locations are described in Appendix B.

5.2 Data Limitations

While a significant amount of data is available for the TMDL analysis, a number of inconsistencies in the data require EPA to make interpretative judgments and assumptions. The limitations or inconsistencies in the data include:

- Lack of data for certain sources that presented access difficulties (e.g., snowpack) for field crews during a given sampling episode
- Limited hardness data at some sites
- Limited flow data at some sites
- Non-uniform sampling locations from one sampling period to the next
- Some data sets are summary information only (e.g., monthly averages, maxima)
- Varied NPDES permit monitoring requirements
- NPDES discharges are better characterized than unpermitted discharges
- Metals analyses vary between dissolved, total recoverable, and total form
- Some data sets have detection levels above the water quality criteria

These issues are not unusual in water quality analysis and regulation, because water quality and flow data are often collected using a variety of methods and for different purposes. Collectively, the above sources provide for the development of a sound and reasonable TMDL. In the descriptions below of the methods used to develop the TMDL, EPA explains its approach integrating and interpreting the varied data sources, including simplifying assumptions.

5.3 Current Metals Concentrations in the Basin

Table 5-2 summarizes current water quality in the basin based on available information in April 1999.

Table 5-2. Current Conditions at TMDL Target Sites (in ug/l)

Dissolved Cadmium

Target Site (URSG Station ID)	n	Min	Max	Avg	Std Dev
SF at Wallace (SF233)	21	2.4	16	9.7	3.7
Canyon Creek (CC287)	49	5.2	200	22	27
Ninemile Creek (NM305)	51	7.4	48	23	7.5
Pine Creek (PC305)	49	0.2	5.0	0.8	1.1
SF at Pinehurst (S271)	46	1.6	18	7.8	3.7
NF at Enaville (NF400)	9	< 1.0	< 1.0	< 1.0	NA
CDA River at Cataldo (USGS)	12	0.9	3.0	1.9	0.6
St. Joe R (SJ004)[1]	2	<0.04	<0.10	NA	NA
Coeur d'Alene Lake[2]	146	<1.0	2	<1.0[3]	NA
Spokane R (state line)	15	0.04	0.41	0.25	0.11

Table 5-2. Current Conditions at TMDL Target Sites (continued)

Dissolved Lead

Target Site (URSG Station ID)	n	Min	Max	Avg	Std Dev
SF at Wallace (SF233)	20	8.8	31	19	5.4
Canyon Creek (CC287)	49	20	223	43	31
Ninemile Creek (NM305)	51	4.0	91	48	19
Pine Creek (PC305)	49	1.0	11	2.4	1.8
SF at Pinehurst (S271)	46	0.8	12	4.7	3.4
NF at Enaville (NF400)	9	< 1.0	< 1.0	< 1.0	NA
CDA River at Cataldo (USGS)	12	1.5	8.0	4.0	2.0
St. Joe R (SJ004)[1]	2	<0.5	1.0	NA	NA
Coeur d'Alene Lake[2]	146	<1.0	41	3.3[3]	NA
Spokane R (state line)	15	0.06	3.9	0.7	1.0

Dissolved Zinc

Target Site (URSG Station ID)	n	Min	Max	Avg	Std Dev
SF at Wallace (SF233)	21	319	2280	1250	540
Canyon Creek (CC287)	49	688	6730	2770	1510
Ninemile Creek (NM305)	52	1787	9710	3730	1500
Pine Creek (PC305)	49	20	402	122	63
SF at Pinehurst (S271)	46	345	2920	1420	767
NF at Enaville (NF400)	9	3.0	20	7.4	5.7
CDA River at Cataldo (USGS)	12	169	797	403	206
St. Joe R (SJ004)[1]	2	4.2	<5.0	NA	NA
Coeur d'Alene Lake[2]	146	<10	390	99[3]	NA
Spokane R (state line)	15	22	105	73	25

[1]Only 2 sample results available for St. Joe River (URSG 1997-98), no averages or standard deviations calculated.
[2]Data are total recoverable concentrations from lake-wide samples obtained from the euphotic and lower hypolimnion zones. No dissolved data available for lake.
[3]Median concentration.
[4]All values in ug/l

Data Sources: South Fork (and tributaries) data collected by IDEQ, stored in URS Greiner RI/FS database (Dec. 1998)

North Fork data collected by USGS, stored in URS Greiner RI/FS database (Dec. 1998)

Cataldo data collected by IDEQ WY1996 monitoring in "Coeur d'Alene River Water Quality Assessment and Total Maximum Daily Load to Address Trace (Heavy) Metals Criteria Exceedences" (January 1998)

St. Joe River data collected by URS Greiner, stored in RI/FS database (Dec. 1998)

Coeur d'Alene Lake data collected by USGS, reported in "Nutrient and Trace-element Enrichment of Coeur d'Alene Lake, Idaho" (U.S. Geological Water-Supply Paper 2485. 1997)

Spokane R. data collected by Washington Department of Ecology in "Cadmium, Lead, and Zinc in the Spokane River" (Pub. 98-329, September 1998)

6.0 DERIVATION OF TMDL ELEMENTS

This chapter describes the derivation of the required "TMDL Elements", which include the water quality standards, loading capacity, natural background loads, gross allocations, wasteload allocations, load allocations, and margin of safety. These elements are consistent with the requirements of the TMDL regulations (40 CFR 130.7).

6.1 Approach to Calculating Loading Capacities at Target Sites

6.1.a. Seasonal Variation

Two approaches were considered to account for variability in river flows and hardness levels, which directly affect the loading capacity of CDA waters for dissolved metals. The first approach is to develop calendar-based, seasonal loading capacities. Critical flows and hardness levels over each particular season are derived, and one loading capacity and set of allocations for each metal would apply during that season.

The second approach, and the approach chosen for development of this TMDL, is to develop flow-based loading capacities. In this approach, the continuous range of river flow that occurs at each target site is broken down into ranges or tiers. The loading capacity for each breakpoint in the flow tiers is established. The applicable allocation for a given source does not depend on the time of year, but rather on the actual river flow at the time of discharge and a conservative estimate of the river hardness at that river flow. This approach was chosen because, unlike the calendar-based approach, this flow-based approach allows for allocations based on actual river discharge conditions and provides more flexibility in establishing and implementing allocations.

The technical information and analyses used to establish the appropriate flow tiers and hardness levels is provided below.

6.1.b. Flow Estimation

USGS has collected long-term flow records from several stations across the CDA basin, with some monitoring records dating back to the early 1900's. In addition, numerous field studies have been conducted in the CDA basin, focusing on a wide variety of assessment questions. Because studies were conducted for a variety of purposes, flow monitoring has not been conducted in a standardized fashion. A handful of one-time studies have included flow monitoring at numerous sites within the same time frame. These studies have been conducted by MFG (1991), MFG (1992), IDEQ (1994), and URSG (1998). Measurement locations, sampling techniques, analystical methods, and sample time frames have varied from one study to the next. In 1999, USGS conducted a major monitoring program of the river network, which included daily flow monitoring at key locations in the basin. Prior to 1999, flow data was very limited for tributaries to the South Fork CDA River, including TMDL target site tributaries (Canyon Creek, Ninemile Creek, and Pine Creek). The USGS monitoring program significantly increased the body of flow data for these target sites. EPA has used this new information to develop flow tiers for the previously ungauged tributaries. For the purpose of establishing consistent and reasonably accurate flow tiers, EPA has calculated linear regressions between tributary flows and flows at USGS stations with long term records. Using these relationships, EPA can estimate design flows at the less-monitored tributaries from the extensive record at the long term stations.

Flows Tiers

In order to represent the full range of river flows in a consistent manner, EPA calculates the TMDL elements for four flow conditions at each target site: 7Q10 low flow (see below) and the 10^{th}, 50^{th}, and 90^{th} percentile average daily flow. These design flows are used as breakpoints for four flow tiers in the TMDL: 7Q10 to 10^{th} percentile, 10^{th} percentile to 50^{th} percentile, 50^{th} percentile to 90^{th} percentile, and greater than 90^{th} percentile.

The characteristic flow used for water quality compliance programs in concert with chronic aquatic life criteria is the lowest 7-day average daily river flow that occurs with a 10-year return period (7Q10) (i.e., there is a 10 percent chance that this 7-day average river flow could occur in any given year). The 7Q10 is used in development of this TMDL because it is the threshold defined for use in the Idaho water quality standards.

For target sites with statistically sufficient long-term gauging of average daily river flow, the 7Q10 is calculated directly from the flow record. Table 6-1 shows 7Q10 and percentile river flows calculated for these stations using the Log Pearson Type III distribution.

Table 6-1. Flow Tiers for USGS Stations in the CDA basin

Station Name	USGS Station Number	Available Period of Record[1]	Discharge Percentiles			
			7Q10 (cfs)	10th	50th	90th
Spokane River @ Post Falls	12419000	1913-1997	211	906	2,980	17,400
St. Joe River @ Calder	12414500	1912-1997	241	374	1,000	6,470
CDA River @ Cataldo	12413500	1912-1997	239	348	1,100	6,870
North Fork CDA River @ Enaville	12413000	1911-1997	165	253	845	5,090
South Fork CDA River @ Pinehurst	12413470	1988-1997	68	97	268	1,290
South Fork CDA River @ Silverton	12413150	1967-1986	31	48	109	649
Placer Creek	12413140	1967-1997	1.0	3.6	15	97

[1]Source: USGS WATSTORE database

For target sites without a long-term flow record, EPA used the 1999 USGS data to examine the relationship between flows at a particular target site and two USGS stations with long term records. First, regressions were calculated for each site and the long-term Placer Creek station, because Placer Creek is closest in size to the target site creeks. Second, regressions were calculated between each target site and the nearest long-term station on the South Fork. The target site and selected long term stations are shown in Table 6-2. The flow data used for the estimations and graphs of the regressions are included in Appendix L.

The gauging station for Placer Creek is situated below a water intake structure operated by the East Shoshone Water District. Since past water withdrawals may have effected measured low flows at this gauge, EPA selected the South Fork gauges for use in estimating flows. As indicated in Table 6-3, the R^2 values for the South Fork regressions were either similar or higher than those for the Placer Creek regressions.

Table 6-2. Flow Relationships between Short-Term and Long-Term Sites

Target Site	Long-Term USGS Station	R-Squared Value	Regression Equation[1]
Canyon Creek	Placer Creek South Fork at Silverton	0.81 0.96	NA y = 0.23(x)
Ninemile Creek	Placer Creek South Fork at Silverton	0.84 0.79	NA y = .063(x)
Pine Creek	Placer Creek South Fork at Pinehurst	0.82 0.90	NA y =0.30(x)

[1] y = flow at target site
x = flow at long term gauge

y-intercept for each regression is fixed at zero.

South Fork at Wallace

The target site on the South Fork at Wallace is not included in the table, because USGS did not monitor this location in 1999. The flow at this site is estimated as the combined flows from Canyon Creek, Ninemile Creek, and the South Fork above the confluence with Canyon Creek. Flows at Canyon Creek and Ninemile Creek are calculated above. The remaining contribution requires an estimate of flows in the South Fork above Canyon Creek.

Two methods were considered to estimate 7Q10 river flows in the South Fork above Canyon Creek. The first method considered would be to determine runoff coefficients. Runoff coefficients are the unit runoff per unit drainage area for the watershed of interest. Runoff coefficients can be developed and applied to an ungauged target site using downstream gauged data. River flow and 7Q10 characteristic flows from the ungauged tributary can be estimated by multiplying the calculated runoff coefficient by the drainage area associated with the ungauged target site.

The other method considered was to utilize measured river flow data from synoptic sampling studies. Since several of the long-term gauged stations were also sampled during these studies, or automatically recorded, a ratio of river flow measured at a gauged station to river flow measured at an ungauged station can be calculated for that sampling event. The calculated ratio is then used to estimate design flows at ungauged locations using the design flows for gauged stations. The assumption used in this method is that the ratio calculated between one-time measured river flows and the ratio between the design flows are similar. EPA chose this method for the Wallace site, because it provides estimates using actual measured tributary flows rather than watershed area ratios.

Measured river flows reported by MFG (1992) for the fall 1991 and URSG (1998) for the fall 1997 at Wallace were used to the calculate river flow ratio. Three USGS gauges within the CDA basin with sufficient long term records to determine the 7Q10 were evaluated using the synoptic data. The stations compared were the Coeur d'Alene River@Cataldo, the South Fork@Silverton (USGS No. 12413150), and Placer Creek (USGS No. 12413140).

EPA's examination of the available flow information led to the selection of the MFG fall 1991 data and the South Fork@Silverton gauge. The gauged flows recorded at Silverton showed low variability during the period of the MFG synoptic sampling in 1991. Also, the sum of flows measured by MFG in 1991 at the upstream ungauged tributaries is in greater agreement with the recorded river flow at Silverton than the sum of similar flows in the URSG 1997 river flow data.

EPA has performed a check on the ratio calculated for the South Fork using the 1999 monitoring data. EPA calculated the difference between the mean flow at the Silverton station and the sum of mean flows at Canyon, Ninemile, and Placer Creeks in 1999. This difference represents a rough estimate of the combined contributions of surface flow in the South Fork above Wallace, groundwater recharge flows between Wallace and Silverton, and unmonitored flows in Lake Creek and Daly Gulch. The ratio of this difference to the mean flow at Silverton (0.54) is somewhat higher than the ratio of directly-measured Wallace/Silverton flows (0.43) calculated using the MFG 1991 data. This difference in ratios is to be expected given the additional inputs to flow at Silverton not captured in the 1999 monitoring, and the results of this check suggest that the estimates for the South Fork above Wallace are reasonably accurate and conservative.

Using the estimated ratio of Wallace/Silverton flows and the design flows at the Silverton gauge, the 7Q10, 10th, 50th, and 90th percentile flows for the South Fork above Canyon Creek are 13, 21, 47, and 279 cfs. These values are added to the Ninemile Creek and Canyon Creek flows to estimate the flows in the South Fork target site.

Harrison

River flow in the mainstem of the Coeur d'Alene River below Cataldo and above Harrison is characterized by unsteady flows for the majority of the year. Flow through this reach is affected by backwater conditions caused by the stage (height) of Coeur d'Alene Lake. The 1999 USGS flow data collected at Harrison and Cataldo indicate that the flows at the two locations are nearly identical, with a regression coefficient (i.e., the predicted ratio between the sites) of approximately 0.99. Based on these data, the 7Q10 and the 10^{th}, 50^{th}, and 90^{th} percentile flows for the Cataldo gauge are directly applied in the TMDL as the estimated Harrison target site flows.

TMDL Flow Tiers

Based on the above analysis, the flow values used to calculate the TMDL elements are shown in Table 6-3.

Table 6-3. TMDL Flow Tiers

Target Site	URSG Station ID No.	Discharge Percentiles			
		7Q10 (cfs)	10% (cfs)	50% (cfs)	90% (cfs)
Spokane River @ state line[1]	NA	211	906	2,980	17,400
St. Joe River @ Calder [1]	NA	241	374	1,000	6,470
Coeur d'Alene River @ Harrison [1]	NA	239	348	1,100	6,870
North Fork CDA River @ Enaville [1]	NA	165	253	845	5,090
South Fork CDA River @ Pinehurst [1]	NA	68	97	268	1290
Pine Creek [2,3]	315	20	29	80	387
South Fork @ Wallace [6]	233	22	35	79	469
Ninemile Creek [2,4]	305	2.0	3.0	6.9	41
Canyon Creek [2,5]	288	7.1	11	25	149

[1] Average daily discharge data for nearest USGS gauge (long term data)
[2] Average daily discharge data for nearest USGS gauge (1999 monitoring)
[3] Regression of flows in Pine Creek and South Fork (Pinehurst)
[4] Regression of flows in Ninemile Creek and South Fork (Silverton)
[5] Regression of flows in Canyon Creek and South Fork (Silverton)
[6] Stream discharge data from MFG database, October 3, 1991 (MFG, 1992) for South Fork above Canyon Creek & Silverton. Flow is estimated as sum of Ninemile Creek, Canyon Creek, and South Fork above Canyon Creek.

6.1.c. Hardness and Water Quality Criteria

The chronic cold water biota criteria for dissolved cadmium, lead, and zinc are hardness-dependent. Toxicity of metals to aquatic life increases as hardness decreases. For this reason, hardness-based water quality criteria are most stringent at low hardness levels. The available data indicate that hardness levels vary from approximately 20 mg/l to 100 mg/l in waters of the Couer d'Alene River basin. Based on this variability in hardness levels, a range of water quality criteria apply to basin waters.

In some rivers, hardness levels vary depending on river flowrate. The available data indicate a strong flow/hardness relationship at most of the Coeur d'Alene River and tributary target sites. At these sites, hardness increases as flow decreases. This means that a higher water quality criterion is applicable to these waters under low flow conditions.

Since the TMDL elements are flow-based for the Coeur d'Alene River and tributaries, EPA has incorporated the flow/hardness relationship into the TMDL. At each target site showing a flow/hardness relationship, a linear regression between ln(flow) and hardness was performed using the available data for the target site. The resulting regression equation is used to predict hardness values at the flow tiers. The lower bound of a 90^{th} percentile confidence interval for the regression equation is used in the prediction. Hardness values were not estimated outside the range of available data, which did not include flows at or below the 7Q10 flows. Table 6-4 lists the flows, hardness values, and resulting criteria applied in the TMDL. The data and regression calculations for those sites that show a flow/hardness relationship is included in Appendix I.

6.2 Total Loading Capacity

The total loading capacity is calculated by multiplying the river flow rate by the water quality criterion concentration and a conversion factor (for "pounds per day" units) for each of the target sites. The values calculated for Coeur d'Alene River target sites are shown in Tables 6-5 through 6-7. The total loading capacity is not calculated in Coeur d'Alene Lake and Spokane River, because it is not needed for allocation of pollutant loads (see discussion in Section 6.7).

6.3 Loading Available for Allocation

Once the loading capacity is established, a series of calculations are performed, culminating in an allocation of a portion of the loading capacity to sources upstream of each target site. This series of calculations is depicted in Figure 6-1.

The portion of the loading capacity in the Coeur d'Alene River and tributaries that is available for allocation is equal to the total loading capacity minus the natural background load, upstream allocated load, and margin of safety. Each of these factors is described in detail in this section.

Table 6-4. Water Quality Criteria for Metals in the Coeur d'Alene Basin TMDL

Target Site	Flow Tier[1] (cfs)	River Hardness[2] (mg/l)	Dissolved Cd (ug/l)	Dissolved Pb (ug/l)	Dissolved Zn (ug/l)
288 Canyon	7.1	56	0.67	1.33	64
	11	56	0.67	1.33	64
	25	45	0.57	1.05	53
	149	25	0.37	0.54	32
305 Nine Mile	2.0	73	0.82	1.78	80
	3.0	73	0.82	1.78	80
	6.9	63	0.73	1.52	71
	41	36	0.48	0.81	44
233 South Fork Wallace	22	57	0.68	1.36	65
	35	56	0.67	1.33	64
	79	47	0.59	1.10	55
	469	25	0.37	0.54	32
315 Pine	20	25	0.37	0.54	32
	29	25	0.37	0.54	32
	80	25	0.37	0.54	32
	387	25	0.37	0.54	32
271 South Fork Pinehurst	68	101	1.00	2.54	105
	97	96	1.00	2.40	101
	268	71	0.80	1.73	78
	1,290	28	0.40	0.62	36
CDA River Harrison	239	47	0.59	1.10	55
	348	45	0.57	1.05	53
	1,100	36	0.48	0.81	44
	6,870	25	0.37	0.54	32
Spokane River	NA	20[3]	0.31	0.42	27

Notes
(1) These flows are estimates of the 7Q10, 10th, 50th, and 90th percentiles for each target site.
(2) Idaho water quality standards establish a 25 mg/l minimum for criteria calculation, while the Washington water quality standards contain no minimum.
(3) The applicable hardness value for the Spokane River at the Idaho-Washington border is 20 mg/l based on the approved Spokane River TMDL.

6.3.a. Natural Background Conditions

The TMDL takes into account estimates of the natural background loadings of metals in the Coeur d'Alene River. These loadings are subtracted from the loading capacity to determine the loading capacity available for allocation to point and nonpoint sources in the basin.

South Fork and Tributaries

Evaluation of natural background conditions in historic mining areas such as the Silver Valley is very difficult, because naturally mineralized areas are also disturbed throughout by mining activities. In these areas, actual natural background conditions may only occur in non-mineralized watersheds or high in the headwaters of mineralized watersheds. Under these constraints, EPA reviewed data from locations above mining influences in the South Fork and tributaries. Overall, the concentrations at the few available stations are very low, with cadmium and lead generally not detected and zinc detected at levels below 10 ug/l (which is below the Idaho water quality criterion). For example, EPA evaluated URSG Station 205 in the South Fork above Larson. Table 6-5 presents metals data collected by URSG for Station 205 and MFG for corresponding location SF-1.

Table 6-5. Background Dissolved Metal Concentrations at Station 205 (in ug/l)

Source	Date	Lead	Cadmium	Zinc
MFG	5/16/91	<3	<0.2	<20
MFG	10/4/91	<1	<0.2	<12
URS Greiner	11/10/97	<0.1	<0.04	6.78
URS Greiner	5/8/98	<0.2	<0.2	<10

There is a concern with the assumption that the water quality at this station reflects natural conditions throughout the basin. This site does not reflect the geology of the many mineralized areas of the basin, which could have historically delivered higher metals concentrations to the river network.

A group of experts involved in the ongoing Natural Resource Damage Assessment for this basin has recently produced a more comprehensive analysis of the river network in a report entitled "Release, Transport, and Environmental Fate of Hazardous Substances in the Coeur d'Alene River Basin, Idaho" (Maest et al., 1999). This assessment is a comprehensive evaluation of background conditions in over 40 watersheds of the South Fork, including conditions in mineralized areas of historic mining activity. Additional discussion is found in a rebuttal to the report (Runnels, 1999) and a response to the rebuttal (Maest et al, 2000). CH2M Hill has further evaluated and updated the estimates from the Maest report based on additional sampling data (CH2M Hill, 2000).

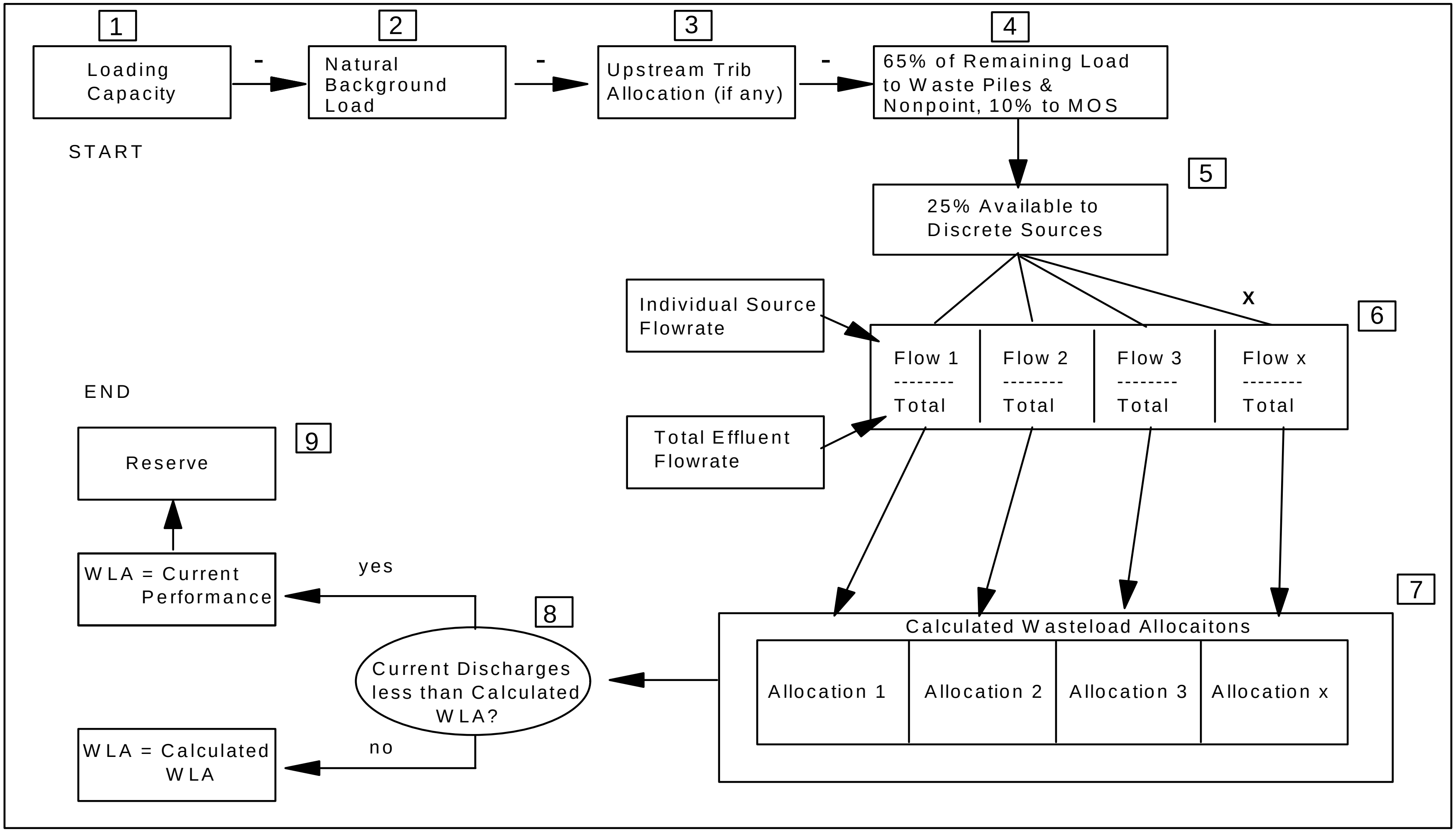

Figure 6-1 Flow Diagram for CDA River and Tributary Allocations

Table 6-6. Median Background Metals Concentrations in the South Fork Subbasin

Area	Dissolved Cadmium (ug/l)	Dissolved Lead (ug/l)	Dissolved Zinc (ug/l)
Upper South Fork	.06	.17	6.1
Page-Galena Mineral Belt	.16	.40	7.5
Pine Creek Drainage	.10	.21	3.1
Entire South Fork CDA Basin	.08	.21	6.1

Source: CH2M Hill, July 2000

While drainages with large producing mines and/or mill sites were excluded from the dataset underlying these estimates, the authors report that limited mining disturbances (e.g., small adits, waste rock piles) are observed in some of the watersheds included in the analysis. The inclusion of these watersheds by the authors provides better representativeness of the dataset with respect to mineralized watersheds. EPA has incorporated the baseline estimates from CH2M Hill (July 2000) into the TMDL, recognizing that they are conservative estimates with respect to natural background conditions. This conservative approach provides one element of the margin of safety for the TMDL (See Margin of Safety). Recognizing that the baseline estimates include some mining-influenced areas, EPA has used the median estimates in the final TMDL calculations rather than upper-percentile estimates.

The "Upper South Fork" estimates above are used at the Canyon Creek, Ninemile Creek, and South Fork at Wallace target sites. The "Entire South Fork CDA Basin" estimates are used at the Pinehurst target site. "Pine Creek Drainage" estimates are used at the Pine Creek target site.

North Fork and Mainstem Coeur d'Alene River

Metals concentrations in the North Fork are needed in order to calculate the TMDL elements in the mainstem Coeur d'Alene River at Harrison. Since the TMDL does not call for any reductions in metals in the North Fork, the current metals concentrations are used in the TMDL calculations rather than an estimate of natural background. EPA has made estimates for the North Fork at Enaville using the most recent monitoring information from the USGS (October 1998 to September 1999). The North Fork was below the detection limits for dissolved cadmium (1 ug/l) and dissolved lead (1 ug/l). Using an assumption that the North and South Fork have similar natural background characteristics, EPA has set the North Fork background values equal to the South Fork natural background estimates for cadmium (.08 ug/l) and lead (.21 ug/l). For zinc, the background value was set at the maximum detected value in the North Fork (5 ug/l).

The background concentrations for the Harrison target site are estimated by combining the natural background conditions in the South Fork and the background conditions in the North Fork. As described above, cadmium and lead estimates are identical for the South and North Forks, and are therefore the same for Harrison. For zinc, background concentrations and average river flows for the two forks are used in a mass balance to estimate the background zinc concentration in the mainstem at Harrison (5.3 ug/l).

6.3.b. Upstream Allocations

Some Coeur d'Alene River target sites are located downstream from other target sites. Because loading capacity builds with increased river flow, the allocation calculations (described below) begin at the target sites at the headwaters of the basin and step through each target site in the downstream direction. Before allocating loads at a target site, EPA subtracts the loading capacity allocated (i.e., already used) at any upstream target sites. For example, the loads allocated at the two headwater target sites (Canyon Creek and Ninemile Creek) are subtracted from the loading capacity downstream at Wallace; the remainder is allocated to sources contributing metals loads to the South Fork above the Canyon Creek confluence. Similarly, loads allocated at the Wallace site are subtracted from the loading capacity downstream at Pinehurst before allocating the remainder to sources contributing metals between Wallace and Pinehurst. For the mainstem Coeur d'Alene River site (at Harrison), the loading capacity allocated upstream at Pinehurst and background loading in the North Fork are subtracted from the loading capacity at Harrison prior to allocation.

The subtraction of all upstream loadings from the loading capacity at downstream target sites is based on an assumption that there is no in-stream attenuation of dissolved metals releases to the river network. This is one of the conservative assumptions that comprise the margin of safety for the TMDL. EPA provides additional information about fate and transport of metals in the Coeur d'Alene basin in Appendix G.

6.3.c. Margin of Safety

Section 303(d) of the Clean Water Act requires that TMDLs be established with a margin of safety to account for these uncertainties and insure the TMDL will achieve water quality standards. Each element of the TMDL is developed with some degree of uncertainty. While some uncertainties can be addressed using conservative analyses and assumptions, others cannot be addressed in that fashion. For this reason, the margin of safety for this TMDL consists of a combination of conservative assumptions used in building the TMDL elements and an explicit margin of safety equal to 10% of the loading capacity. The following is a discussion of the uncertainties considered in establishing this dual margin of safety.

Conservative Assumptions

The following conservative assumptions were employed in the development of the TMDL:

- Conservative estimates of natural background concentrations
- Lower bound of 90^{th} percentile confidence interval for hardness estimates
- Restriction of hardness predictions to the range of available flow data
- Exclusion of flow contributions from St. Maries River in load allocations for lake
- 5^{th} percentile translators for total recoverable wasteload allocations
- Conservative lead translator during peak runoff

Explicit Margin of Safety

There are other uncertainties in the TMDL not addressed by the above assumptions. In particular, there are uncertainties related to the flow and hardness predictions used to calculate the loading capacities and uncertainties in the identification and characterization of discrete sources.

With regard to flow and hardness values, there are uncertainties in the flow regression estimates for ungauged tributaries. This is particularly an issue for critical low flow conditions, which were extrapolated outside the range of the data (i.e., critical low flow conditions are not represented in the dataset). There are also uncertainties in the hardness predictions, because the datasets used to perform the regressions are modest in size and the strength of the correlations varies. To minimize the potential for over-predicting hardness levels, EPA has not extrapolated hardness values outside the range of available flow data and has used the lower bound of a confidence interval. Nevertheless, because the loading capacities are sensitive to flow and hardness predictions, EPA believes that an explicit margin of safety to address uncertainties in the predictions is prudent.

EPA has also identified two areas of uncertainty in the assignment of wasteload allocations for individual discrete sources (see discussion of the allocation process below). First is the potential that some discrete sources are omitted from the wasteload allocations. A margin of safety is appropriate to ensure that the sum of wasteload allocations, load allocations, and omitted source contributions does not exceed the loading capacity available for allocation. EPA has attempted to identify and sample all discrete sources in the South Fork and tributaries, and the TMDL establishes wasteload allocations for all sources with measurable discharges from the URSG database. EPA believes that any omissions from the discrete source inventory will be minor loadings.

A second source of uncertainty is associated with effluent variability. Available data is not sufficient to support an evaluation of individual versus aggregate variability in discrete loadings. The TMDL establishes wasteload allocations on a monthly average basis (see description of allocation process below). While EPA believes that individual source variability will not result in criteria exceedances at the target sites under most conditions, it is appropriate to apply a margin of safety for this uncertainty.

To account for the above uncertainties, EPA has established an explicit 10% margin of safety in the TMDL. EPA believes 10% is a reasonable value that will account for the specific uncertainties identified. After subtraction of the natural background load from the total loading capacity, 10% of the remaining loading capacity is subtracted for the margin of safety. The remainder is the loading available for allocation.

Table 6-7: Available Loading Capacity for Dissolved Cadmium								
Target Site	Flow Tier (cfs)	Loading Capacity (lbs/day)	Background (lbs/day)	Capacity Used Upstream (lbs/day)	Loading Avail. for Allocation (lbs/day)	Margin of Safety (10%) (lbs/day)	Gross Allocation (65%) (lbs/day)	Wasteload Allocation (25%) (lbs/day)
Canyon Creek CC288	7	2.57E-02	2.30E-03	NA	2.34E-02	2.34E-03	1.52E-02	5.85E-03
	11	3.98E-02	3.56E-03	NA	3.63E-02	3.63E-03	2.36E-02	9.07E-03
	25	7.70E-02	8.09E-03	NA	6.89E-02	6.89E-03	4.48E-02	1.72E-02
	149	2.97E-01	4.82E-02	NA	2.49E-01	2.49E-02	1.62E-01	6.21E-02
Ninemile Creek NM305	2	8.81E-03	6.47E-04	NA	8.17E-03	8.17E-04	5.31E-03	2.04E-03
	3	1.32E-02	9.71E-04	NA	1.22E-02	1.22E-03	7.96E-03	3.06E-03
	6.9	2.73E-02	2.23E-03	NA	2.50E-02	2.50E-03	1.63E-02	6.26E-03
	41	1.07E-01	1.33E-02	NA	9.38E-02	9.38E-03	6.09E-02	2.34E-02
South Fork at Wallace SF233	22	8.11E-02	7.15E-03	3.16E-02	4.24E-02	4.24E-03	2.75E-02	1.06E-02
	35	1.27E-01	1.13E-02	4.85E-02	6.69E-02	6.69E-03	4.35E-02	1.67E-02
	79	2.51E-01	2.55E-02	9.39E-02	1.31E-01	1.31E-02	8.55E-02	3.29E-02
	469	9.34E-01	1.52E-01	3.42E-01	4.40E-01	4.40E-02	2.86E-01	1.10E-01
Pine Creek PC315	20	3.98E-02	1.08E-02	NA	2.91E-02	2.91E-03	1.89E-02	7.26E-03
	29	5.78E-02	1.56E-02	NA	4.21E-02	4.21E-03	2.74E-02	1.05E-02
	80	1.59E-01	4.31E-02	NA	1.16E-01	1.16E-02	7.55E-02	2.91E-02
	387	7.71E-01	2.09E-01	NA	5.62E-01	5.62E-02	3.65E-01	1.41E-01
South Fork at Pinehurst SF271	68	3.81E-01	2.93E-02	7.14E-02	2.80E-01	2.80E-02	1.82E-01	7.00E-02
	97	5.23E-01	4.19E-02	1.09E-01	3.73E-01	3.73E-02	2.42E-01	9.31E-02
	268	1.16E+00	1.16E-01	2.48E-01	7.94E-01	7.94E-02	5.16E-01	1.98E-01
	1290	2.80E+00	5.57E-01	1.00E+00	1.24E+00	1.24E-01	8.03E-01	3.09E-01
North Fork at Enaville NF400	165	3.28E-01	7.12E-02	NA	NA	NA	NA	NA
	253	5.04E-01	1.09E-01	NA	NA	NA	NA	NA
	845	1.68E+00	3.65E-01	NA	NA	NA	NA	NA
	5090	1.01E+01	2.20E+00	NA	NA	NA	NA	NA
CdA River at Harrison	239	7.60E-01	1.03E-01	3.51E-01	3.05E-01	3.05E-02	2.75E-01	NA
	348	1.07E+00	1.50E-01	4.82E-01	4.40E-01	4.40E-02	3.96E-01	NA
	1100	2.87E+00	4.75E-01	1.16E+00	1.24E+00	1.24E-01	1.11E+00	NA
	6870	1.37E+01	2.96E+00	3.43E+00	7.29E+00	7.29E-01	6.56E+00	NA

Table 6-8: Available Loading Capacity for Dissolved Lead								
Target Site	**Flow Tier** (cfs)	**Loading Capacity** (lbs/day)	**Background** (lbs/day)	**Capacity Used Upstream** (lbs/day)	**Loading Avail. for Allocation** (lbs/day)	**Margin of Safety (10%)** (lbs/day)	**Gross Allocation (65%)** (lbs/day)	**Wasteload Allocation (25%)** (lbs/day)
Canyon Creek CC288	7	5.10E-02	6.51E-03	NA	4.45E-02	4.45E-03	2.89E-02	1.11E-02
	11	7.90E-02	1.01E-02	NA	6.89E-02	6.89E-03	4.48E-02	1.72E-02
	25	1.41E-01	2.29E-02	NA	1.18E-01	1.18E-02	7.67E-02	2.95E-02
	149	4.35E-01	1.37E-01	NA	2.98E-01	2.98E-02	1.94E-01	7.45E-02
Ninemile Creek NM305	2	1.92E-02	1.83E-03	NA	1.74E-02	1.74E-03	1.13E-02	4.35E-03
	3	2.89E-02	2.75E-03	NA	2.61E-02	2.61E-03	1.70E-02	6.53E-03
	6.9	5.64E-02	6.33E-03	NA	5.01E-02	5.01E-03	3.26E-02	1.25E-02
	41	1.80E-01	3.76E-02	NA	1.43E-01	1.43E-02	9.26E-02	3.56E-02
South Fork at Wallace SF233	22	1.62E-01	2.03E-02	6.19E-02	7.97E-02	7.97E-03	5.18E-02	1.99E-02
	35	2.51E-01	3.21E-02	9.50E-02	1.24E-01	1.24E-02	8.08E-02	3.11E-02
	79	4.67E-01	7.23E-02	1.68E-01	2.26E-01	2.26E-02	1.47E-01	5.65E-02
	469	1.37E+00	4.30E-01	4.41E-01	4.98E-01	4.98E-02	3.24E-01	1.24E-01
Pine Creek PC315	20	5.84E-02	2.27E-02	NA	3.57E-02	3.57E-03	2.32E-02	8.93E-03
	29	8.46E-02	3.28E-02	NA	5.18E-02	5.18E-03	3.36E-02	1.29E-02
	80	2.33E-01	9.06E-02	NA	1.43E-01	1.43E-02	9.28E-02	3.57E-02
	387	1.13E+00	4.38E-01	NA	6.91E-01	6.91E-02	4.49E-01	1.73E-01
South Fork at Pinehurst SF271	68	9.33E-01	7.70E-02	1.15E-01	7.41E-01	7.41E-02	4.81E-01	1.85E-01
	97	1.26E+00	1.10E-01	1.76E-01	9.74E-01	9.74E-02	6.33E-01	2.43E-01
	268	2.50E+00	3.04E-01	3.69E-01	1.83E+00	1.83E-01	1.19E+00	4.57E-01
	1290	4.28E+00	1.46E+00	1.19E+00	1.63E+00	1.63E-01	1.06E+00	4.07E-01
North Fork at Enaville NF400	165	4.81E-01	1.87E-01	NA	NA	NA	NA	NA
	253	7.38E-01	2.87E-01	NA	NA	NA	NA	NA
	845	2.47E+00	9.57E-01	NA	NA	NA	NA	NA
	5090	1.49E+01	5.77E+00	NA	NA	NA	NA	NA
CdA River at Harrison	239	1.41E+00	2.70E-01	9.27E-01	2.14E-01	2.14E-02	1.93E-01	NA
	348	1.96E+00	3.94E-01	1.26E+00	3.07E-01	3.07E-02	2.76E-01	NA
	1100	4.83E+00	1.25E+00	2.79E+00	8.01E-01	8.01E-02	7.21E-01	NA
	6870	2.00E+01	7.78E+00	7.39E+00	4.87E+00	4.87E-01	4.39E+00	NA

Table 6-9: Available Loading Capacity for Dissolved Zinc								
Target Site	**Flow Tier** (cfs)	**Loading Capacity** (lbs/day)	**Background** (lbs/day)	**Capacity Used Upstream** (lbs/day)	**Loading Avail. for Allocation** (lbs/day)	**Margin of Safety (10%)** (lbs/day)	**Gross Allocation (65%)** (lbs/day)	**Wasteload Allocation (25%)** (lbs/day)
Canyon Creek CC288	7	2.45E+00	2.34E-01	NA	2.22E+00	2.22E-01	1.44E+00	5.54E-01
	11	3.79E+00	3.62E-01	NA	3.43E+00	3.43E-01	2.23E+00	8.58E-01
	25	7.16E+00	8.23E-01	NA	6.34E+00	6.34E-01	4.12E+00	1.59E+00
	149	2.59E+01	4.90E+00	NA	2.10E+01	2.10E+00	1.37E+01	5.26E+00
Ninemile Creek NM305	2	8.63E-01	6.58E-02	NA	7.98E-01	7.98E-02	5.18E-01	1.99E-01
	3	1.30E+00	9.87E-02	NA	1.20E+00	1.20E-01	7.78E-01	2.99E-01
	6.9	2.63E+00	2.27E-01	NA	2.40E+00	2.40E-01	1.56E+00	6.01E-01
	41	9.72E+00	1.35E+00	NA	8.38E+00	8.38E-01	5.44E+00	2.09E+00
South Fork at Wallace SF233	22	7.74E+00	7.27E-01	3.01E+00	4.00E+00	4.00E-01	2.60E+00	9.99E-01
	35	1.21E+01	1.15E+00	4.63E+00	6.29E+00	6.29E-01	4.09E+00	1.57E+00
	79	2.35E+01	2.60E+00	8.74E+00	1.21E+01	1.21E+00	7.88E+00	3.03E+00
	469	8.17E+01	1.54E+01	2.94E+01	3.68E+01	3.68E+00	2.39E+01	9.21E+00
Pine Creek PC315	20	3.48E+00	3.34E-01	NA	3.15E+00	3.15E-01	2.05E+00	7.87E-01
	29	5.05E+00	4.85E-01	NA	4.57E+00	4.57E-01	2.97E+00	1.14E+00
	80	1.39E+01	1.34E+00	NA	1.26E+01	1.26E+00	8.19E+00	3.15E+00
	387	6.74E+01	6.47E+00	NA	6.09E+01	6.09E+00	3.96E+01	1.52E+01
South Fork at Pinehurst SF271	68	3.87E+01	2.24E+00	7.15E+00	2.93E+01	2.93E+00	1.90E+01	7.32E+00
	97	5.28E+01	3.19E+00	1.09E+01	3.88E+01	3.88E+00	2.52E+01	9.69E+00
	268	1.13E+02	8.82E+00	2.47E+01	7.95E+01	7.95E+00	5.17E+01	1.99E+01
	1290	2.47E+02	4.24E+01	9.77E+01	1.07E+02	1.07E+01	6.96E+01	2.68E+01
North Fork at Enaville NF400	165	2.87E+01	4.45E+00	NA	NA	NA	NA	NA
	253	4.41E+01	6.82E+00	NA	NA	NA	NA	NA
	845	1.47E+02	2.28E+01	NA	NA	NA	NA	NA
	5090	8.86E+02	1.37E+02	NA	NA	NA	NA	NA
CdA River at Harrison	239	7.10E+01	6.85E+00	3.37E+01	3.04E+01	3.04E+00	2.74E+01	NA
	348	9.97E+01	9.99E+00	4.56E+01	4.41E+01	4.41E+00	3.97E+01	NA
	1100	2.61E+02	3.16E+01	1.02E+02	1.27E+02	1.27E+01	1.14E+02	NA
	6870	1.20E+03	1.97E+02	2.44E+02	7.55E+02	7.55E+01	6.79E+02	NA

6.4 Proposed Allocation Method - CDA River and Tributaries

A range of options are available to allocate the loading capacity to sources of dissolved metals. A full list of options considered by EPA is summarized in Appendix D. The method adopted by EPA for the Coeur d'Alene River and tributaries is outlined in Figure 6-1, with explanations for each step provided below.

6.4.a. Source Categorization in Mining Areas

Mining sources in the Coeur d'Alene River and tributaries have been classified into three general categories: adits and impoundments, waste piles, and nonpoint sources. Adits and impoundments that discharge are point sources subject to technology-based and water quality-based requirements in NPDES permitting regulations. The term "point source" also includes waste piles. These "waste pile" point sources may discharge to receiving waters via surface water runoff and/or seepage, reaching the receiving water via overland flow, through a pipe, or through a groundwater hydraulic connection. Waste pile discharges are also subject to NPDES permitting regulations.

Based on the above, the only nonpoint sources of metals in the CDA basin are those mining wastes that were disposed directly into the receiving water in the past. These wastes are no longer confined to waste piles; rather, they are eroded and deposited in the bed and banks of the river or lakes downstream from the original disposal site.

While most of the pollutant loads from waste pile and nonpoint source areas have not been characterized in detail, EPA has identified and characterized over 70 individual "discrete" point source discharges to CDA basin waters. These "discrete" sources are those individually identified point sources with discharges that are readily observed and sampled. The TMDL establishes individual wasteload allocations for each of the discrete sources observed to date in the basin. These sources include adits, impoundments, visible waste pile seeps, and municipal wastewater treatment plants. The TMDL establishes gross allocations to the remainder of uncharacterized point sources (waste piles, urban stormwater) and nonpoint sources above each target site. Allocation between the large number of non-discrete source areas will require significantly more data and technical analyses than are currently available for this TMDL. Analysis of these non-discrete sources is a component of the ongoing RI/FS for the basin.

Some of the sampled adits are located high in the watersheds of the upper portion of the basin, and some are located some distance from the nearest gulch or creek. Investigation and monitoring efforts to date identified adit locations, adit discharge flow rates, and the chemical make-up of adit discharges. The discharge pathways to receiving waters have not been documented for some adits. For the purposes of this TMDL, EPA has made a conservative assumption that some fraction of dissolved metals from adit discharges enter the nearest gulch or creek down-gradient from the adit location. Based on this assumption, all adits are assigned a wasteload allocation. EPA also assumes that all significant adit discharges are identified and assigned wasteload allocations, and that any unidentified adits are accounted for in the margin of safety (see section 6.4.c.).

The allocation applies to the loading of the source to the receiving water. EPA and DEQ anticipate that an adit with a subsurface or otherwise difficult-to-access discharge to a receiving water will be regulated (based on the TMDL wasteload allocations) and monitored at the adit portal. If it is demonstrated during permitting that an adit portal discharge is attenuated prior to reaching the receiving water, the limits that apply to the adit portal can be adjusted upward while remaining consistent with the TMDL wasteload allocations. For NPDES permits, the permittee will bear the burden of demonstrating any attenuation of the source between the monitoring location and the receiving water.

6.4.b. Gross Allocation at Each Target Site

In this TMDL, a gross allocation is made as the first division of available loading capacity among the general categories of sources.   The TMDL allocates 25% of the loading available to individually identified discrete sources above each target site. The 25% allocation to discrete point sources is consistent with the mixing zone guidelines in the Idaho state water quality standards (IDAPA 58.02.01.060.01.e.iv.). A mixing zone is a portion of a river that is allowed to exceed chronic water quality criteria. Mixing zones for rivers are commonly expressed as a portion of the river flow that can be used for dilution of a point source discharge (assuming the discharge is above water quality criteria to some degree) to levels below the water quality criteria. The state of Idaho guidelines state that a mixing zone should not exceed more than 25% of the stream flow. The TMDL allocates the same proportion of the loading capacity (25%) to the group of individually identified discrete sources in the CDA basin. The remaining 75% of the loading capacity is allocated to a margin of safety (10%, see discussion below) and waste piles and nonpoint sources (65%).

EPA and DEQ are not directly applying the mixing zone regulation in this TMDL, and the agencies do not take the position that the state’s 25% mixing zone guideline dictates the percentage of the loading capacity to be allocated to point sources. Rather, this guideline reflects state policy on the use of river flow for assimilation of point source discharges, allowing up to 25% of the flow for this purpose. Because loading capacity is directly proportional to the river flow, there is a nexus between mixing zones and TMDL allocations. Therefore, it is reasonable to analogize to this guideline and allow the use of the guideline maximum of 25% of the loading capacity for point source discharges. This analogy provides a reasonable, objective policy basis for distributing the river’s loading capacity between discrete point sources and non-discrete sources.

In selecting the above gross allocation breakdown, EPA considered several alternatives. EPA considered the simplistic approach of citing that “background” (as opposed to “natural background") metals exceed the Idaho water quality criteria and allocating zero to the individual discrete sources, with the remainder of the load capacity allocated to waste piles and nonpoint sources. EPA does not believe this is a reasonable option, because it does not allow continued operations at municipal treatment plants and operating mines. Another option would be to establish end-of-pipe water quality criteria concentrations as the wasteload allocations for individual discrete sources (based on a conservative hardness estimate). However, to quantify non-discrete allocations by subtracting from the loading capacity, EPA would need to assign not only a concentration but also a flow to each discrete source at each flow tier. The available information for the majority of discrete sources is not sufficient to assign source flowrates that correspond to each target site flow tier.

EPA also considered different percentage breakdowns in the gross allocation. One option was to allocate according to estimates of the current contribution of point sources to the instream metals loadings. Because calculations indicate that the percentage contribution varies substantially between target sites and between metals, EPA chose not to employ this allocation scheme. For all metals and sites, EPA's gross estimates of the contribution of discrete sources ranged from 7% (cadmium in Pine Creek) to 100% (zinc above Wallace) of the total current loadings. At the Pinehurst target site, the discrete source contributions were estimated at 28% for cadmium and 12% for zinc (lead estimates were highly variable).

Given the above examination, EPA concludes that a 25% gross allocation to individual discrete sources at each target site is both straightforward and reasonable. EPA believes it is reasonable to set aside a majority of the loading capacity for waste piles and nonpoint sources, given the magnitude of metals contributions from these sources in this basin. EPA also believes that the 25% allocation to point sources will enable active facilities to continue operations while also resulting in improvements to current wastewater management in the basin.

Consistent with the requirements of the TMDL regulations at 40 CFR 130.2(i), the sum of wasteload allocations (including individual allocations to discrete sources and gross allocations for waste piles), load allocations (including allocations to nonpoint sources and natural background loadings), and the margin of safety is equal to the loading capacity at each target site.

Over the long term, EPA plans to refine the gross allocations for waste piles and nonpoint sources into individual allocations, as data collection and analysis proceeds for the RI/FS in the basin. The RI/FS analysis may also lead to adjustments in some of the individual allocations to discrete sources, particularly those for abandoned mine adits.

6.4.c. Wasteload Allocations to Discrete Sources

The 25% gross allocation to discrete sources is further allocated to individual sources based on the average flowrates of the discrete sources within the target site watershed. Discharge flow data were obtained from EPA's Permit Compliance System and Discharge Monitoring Reports, EPA Inspection Reports, the URSG 1997-1998 and MFG 1991 sampling events, and other sources. Appendix E describes EPA's specific sources for and methodologies used in calculating average flows from each discrete source.

EPA recognizes that the use of the average flowrates to calculate allocations for all flow tiers does not take into seasonal variation in flows between individual sources. In an attempt to correlate individual source types to stream flow, EPA compared data from NPDES-permitted sources with long-term flow measurements to the corresponding stream flow data for the USGS Station at Elizabeth Park. While EPA observed some increased source flow under high stream flow conditions, these relationships were not consistent and varied significantly by source. Similarly, EPA found that flows in the Bunker Hill Kellogg Tunnel and the South Fork Coeur d'Alene River are poorly correlated (CH2M Hill, 2000). Since source flows do not necessarily correlate to river flows, EPA has allocated loadings among discrete sources using a single flow ratio (based on average flow rates) for all river flow tiers.

Steps 1 through 5 on Figure 6-1 are explained in earlier sections. The remaining steps in the development of wasteload allocations for individually identified discrete sources are as follows:

Step 6 For each flow scenario (7Q10, 10th, 50th, and 90th percentile), the gross allocation for discrete point sources (25%) is divided by the total average flowrate of all the discrete discharges (i.e., the sum of the individual average flowrates). The resulting ratio, in pounds of metal per unit flow, is used in Step 7 to derive flow-proportioned wasteload allocations. An illustration of the practical effect of flow-proportioning is as follows: if Source A discharges at twice the flowrate of Source B on average, its calculated wasteload allocation is twice that of Source B.

Step 7 The ratio derived in Step 6 is multiplied by each individual average discharge flow to establish the calculated wasteload allocation to that source. This is repeated for each design flow. The calculated allocations by target site, parameter, and source are shown in Appendix H.

Step 8 The last step in the allocation involves a comparison between current discharge levels and the calculated wasteload allocation for a given source. If the current discharge concentrations are below the concentration associated with the wasteload allocation, the assigned allocation is set at the current discharge level. This adjustment ensures that sources already meeting their allocation do not increase loadings above current levels. EPA believes this allocation step is consistent with anti-degradation requirements and appropriate in the context of basin-wide cleanup activities. The evaluation of current discharge levels necessary to complete this step will be performed as part of the development of individual NPDES permits.

Step 9 When a permit containing performance-based limits (Step 8) is issued, the loading equal to the difference between the calculated wasteload allocations in the TMDL and the performance-based limits for that facility will be reserved to allow for future growth (new or expanding facility). The reserve allocation created by a permitting action can only be used by new or expanding facilities within the same target site or at a target site downstream of permitted source. This limitation on the use of the reserve is necessary to insure that use of the future growth reserve does not result in exceedances of the gross allocation for discrete sources at upstream target sites. EPA also notes that allocation of the future growth reserve to individual sources will require formal modification of the TMDL.

6.5 Refinement of Wasteload Allocations for CDA River and Tributaries

6.5.a. Translators

In order to express wasteload allocations in a manner consistent with NPDES permitting regulations (40 CFR 122.45), the dissolved wasteload allocations are translated into total recoverable wasteload allocations in the TMDL. "Total recoverable metal" is a measure of the amount of metal in both the dissolved and particulate phase in a water sample. Its use in permitting reduces the potential impacts on downstream biota from effluent metals shifting from the particulate phase to the (more bioavailable) dissolved phase upon discharge.

EPA has evaluated the ratio of total recoverable metal to dissolved metal in the Coeur d'Alene River and tributaries (this ratio is also called a "translator"). Cadmium and zinc in the river are almost entirely in the dissolved form at all of the target sites (i.e., the translator is approximately 1). For lead, the particulate fraction is a significant portion of the total lead concentration at a number of target sites. Appendix G includes more discussion of physical/chemical processes that affect the total-to-dissolved ratios for metals in the water column.

EPA also reviewed the available data for the South Fork Pinehurst station to determine whether the total-to-dissolved ratio varies with respect to river flow. Over the range of flow tiers established in the TMDL (68 cfs to 1290 cfs), there was no discernible relationship between river flow and the total-to-dissolved ratios for cadmium, lead, and zinc.

Recent data collected by the USGS indicates that during peak runoff events, the total-to-dissolved ratio for lead increases significantly in basin waters. The flows at which this phenomenon occurs are higher than the top flow tier in the TMDL (greater than 1290 cfs). Since the total-to-dissolved ratio at the top flow tier is more stringent than the actual ratio during peak runoff events, the lead translators in the TMDL provide a margin of safety during peak runoff events.

Table 6-10. Translators from Dissolved to Total Recoverable Metal

Target Site	Metal	No. of Samples[3]	Translator (Total/Dissolved)
Canyon Creek	Cadmium	49	1.0
Ninemile Creek	Cadmium	39	1.0
South Fork @ Wallace	Cadmium	17	1.0
Pine Creek	Cadmium	38	1.1[2]
South Fork @ Pinehurst	Cadmium	50	1.0
Spokane River @ state line[1]	Cadmium	29	1.0
Canyon Creek	Lead	66	1.1
Ninemile Creek	Lead	61	1.1
South Fork @ Wallace	Lead	20	1.2
Pine Creek	Lead	47	1.0
South Fork @ Pinehurst	Lead	59	2.3
Spokane River @ state line[1]	Lead	26	3.2
Canyon Creek	Zinc	28	1.0
Ninemile Creek	Zinc	24	1.0
South Fork @ Wallace	Zinc	9	1.0
Pine Creek	Zinc	30	1.0
South Fork @ Pinehurst	Zinc	36	1.0
Spokane River @ state line[1]	Zinc	30	1.0

[1] Some Spokane River data (8 samples) used in this calculation (Oct 1997 to Aug 1998) are provisional data from the Department of Ecology (lab QC only).

[2] This is a case where the upstream translator is higher than a downstream translator. In this case, metal discharged in particulate form could change to the dissolved form downstream. Therefore, the translator applied to Pine Creek for cadmium is adjusted to 1.0, the translator calculated downstream at Pinehurst.

[3] Sample results reporting a higher dissolved than total value were eliminated from the data set for this analysis. This artifact is primarily found in the cadmium and zinc data.

EPA has calculated the translator for each sample taken at or near a target site. From this group of values, EPA has calculated a 5th percentile value in order to assure compliance with water quality standards. This translator is then multiplied by the dissolved wasteload allocation to derive the total recoverable wasteload allocation. Table 6-10 lists the calculated translators and Appendix J includes the data used in the calculations.

6.5.b. Implementation of Flow-based Allocations in Permits

Flow-based allocations in a TMDL can be incorporated into NPDES permits as monthly average effluent limitations (note that additional limitations may also be included as required by the NPDES regulations). Rather than a single monthly average limit, a set of limits with associated river discharge rates can be included in the permit. The applicable permit limit is dependent on the discharge measured at the gauging station on the day (or over the month) of sampling. Using this approach, however, the Permittee will be required to report the corresponding river flow at the target site along with effluent monitoring information. The NPDES permit will set forth the specific reporting requirements necessary to insure compliance with the flow-based allocations.

The TMDL establishes wasteload allocations at four flow tiers. The TMDL includes language allowing for flexibility to interpolate between these flow tiers to establish additional flow tiers and associated permit limits in an NPDES permit. EPA's permits program will balance the need for flexibility with the additional compliance-tracking burden when considering any requests from permittees for additional flow tiers in their individual NPDES permits.

The calculated wasteload allocations for sources in the CDA River and tributaries are listed in Tables 6-11 through 6-15 below.

Table 6-11 : Calculated Wasteload Allocations for Individual Sources - Canyon Creek (URSG Site CC288)

All values in lbs/day

		Total Recoverable Cadmium				Total Recoverable Lead				Total Recoverable Zinc			
Station ID	Flow (cfs)	7Q10L	10th Percentile	50th Percentile	90th Percentile	7Q10L	10th Percentile	50th Percentile	90th Percentile	7Q10L	10th Percentile	50th Percentile	90th Percentile
CC817 Hecla #3	0.0684	4.85E-05	7.51E-05	1.43E-04	5.14E-04	1.01E-04	1.57E-04	2.68E-04	6.79E-04	4.58E-03	7.10E-03	1.31E-02	4.36E-02
CC355 Gem	0.26	1.84E-04	2.85E-04	5.42E-04	1.96E-03	3.85E-04	5.96E-04	1.02E-03	2.58E-03	1.74E-02	2.70E-02	4.99E-02	1.66E-01
CC816 Star/Phoenix Tailings (001)	2.34	1.66E-03	2.57E-03	4.88E-03	1.76E-02	3.46E-03	5.37E-03	9.19E-03	2.32E-02	1.57E-01	2.43E-01	4.49E-01	1.49E+00
CC357 Woodland Park Seep	0.0038	2.69E-06	4.17E-06	7.92E-06	2.86E-05	5.63E-06	8.72E-06	1.49E-05	3.77E-05	2.55E-04	3.95E-04	7.29E-04	2.42E-03
CC372 Tamarack #7	1.59	1.13E-03	1.75E-03	3.32E-03	1.20E-02	2.35E-03	3.65E-03	6.24E-03	1.58E-02	1.07E-01	1.65E-01	3.05E-01	1.01E+00
CC353 Hercules #5	1.707	1.21E-03	1.87E-03	3.56E-03	1.28E-02	2.53E-03	3.92E-03	6.70E-03	1.69E-02	1.14E-01	1.77E-01	3.28E-01	1.09E+00
CC371 Blackbear Fraction	1.165	8.25E-04	1.28E-03	2.43E-03	8.76E-03	1.72E-03	2.67E-03	4.57E-03	1.16E-02	7.81E-02	1.21E-01	2.24E-01	7.42E-01
CC373 Anchor	0.008	5.67E-06	8.78E-06	1.67E-05	6.02E-05	1.18E-05	1.83E-05	3.14E-05	7.94E-05	5.36E-04	8.31E-04	1.53E-03	5.09E-03
CC354 Hidden Treasure	0.72	5.10E-04	7.90E-04	1.50E-03	5.42E-03	1.07E-03	1.65E-03	2.83E-03	7.14E-03	4.83E-02	7.48E-02	1.38E-01	4.58E-01
Tiger/Poorman	0.4	2.83E-04	4.39E-04	8.34E-04	3.01E-03	5.92E-04	9.17E-04	1.57E-03	3.97E-03	2.68E-02	4.15E-02	7.67E-02	2.55E-01

Table 6-12 : Calculated Wasteload Allocations for Individual Sources - Ninemile Creek (URSG Site NM305)

All values in lbs/day

Station ID	Flow (cfs)	Total Recoverable Cadmium 7Q10L	Total Recoverable Cadmium 10th Percentile	Total Recoverable Cadmium 50th Percentile	Total Recoverable Cadmium 90th Percentile	Total Recoverable Lead 7Q10L	Total Recoverable Lead 10th Percentile	Total Recoverable Lead 50th Percentile	Total Recoverable Lead 90th Percentile	Total Recoverable Zinc 7Q10L	Total Recoverable Zinc 10th Percentile	Total Recoverable Zinc 50th Percentile	Total Recoverable Zinc 90th Percentile
NM360 Interstate-Callahan (IC) #4	0.040	4.11E-05	6.17E-05	1.26E-04	4.72E-04	9.65E-05	1.45E-04	2.78E-04	7.90E-04	4.02E-03	6.03E-03	1.21E-02	4.22E-02
NM362 IC Waste Rock	1.790	1.84E-03	2.76E-03	5.64E-03	2.11E-02	4.32E-03	6.48E-03	1.24E-02	3.53E-02	1.80E-01	2.70E-01	5.42E-01	1.89E+00
NM363 IC Tailings Seep	0.004	4.11E-06	6.17E-06	1.26E-05	4.72E-05	9.65E-06	1.45E-05	2.78E-05	7.90E-05	4.02E-04	6.03E-04	1.21E-03	4.22E-03
NM361 Rex #2	0.020	2.06E-05	3.09E-05	6.31E-05	2.36E-04	4.82E-05	7.24E-05	1.39E-04	3.95E-04	2.01E-03	3.01E-03	6.05E-03	2.11E-02
NM364 Tamarack 400 Level	0.040	4.11E-05	6.17E-05	1.26E-04	4.72E-04	9.65E-05	1.45E-04	2.78E-04	7.90E-04	4.02E-03	6.03E-03	1.21E-02	4.22E-02
NM366 Tamarack #5	0.030	3.09E-05	4.63E-05	9.46E-05	3.54E-04	7.24E-05	1.09E-04	2.08E-04	5.92E-04	3.01E-03	4.52E-03	9.08E-03	3.16E-02
NM368 Rex Tailings Seep	0.020	2.06E-05	3.09E-05	6.31E-05	2.36E-04	4.82E-05	7.24E-05	1.39E-04	3.95E-04	2.01E-03	3.01E-03	6.05E-03	2.11E-02
NM359 Success #3	0.010	1.03E-05	1.54E-05	3.15E-05	1.18E-04	2.41E-05	3.62E-05	6.94E-05	1.97E-04	1.00E-03	1.51E-03	3.03E-03	1.05E-02
NM367 Dayrock 100	0.007	6.99E-06	1.05E-05	2.14E-05	8.03E-05	1.64E-05	2.46E-05	4.72E-05	1.34E-04	6.83E-04	1.02E-03	2.06E-03	7.17E-03
NM369 Silver Star	0.0096	9.87E-06	1.48E-05	3.03E-05	1.13E-04	2.32E-05	3.47E-05	6.67E-05	1.90E-04	9.65E-04	1.45E-03	2.90E-03	1.01E-02
NM370 Duluth	0.011	1.13E-05	1.70E-05	3.47E-05	1.30E-04	2.65E-05	3.98E-05	7.64E-05	2.17E-04	1.11E-03	1.66E-03	3.33E-03	1.16E-02
NM374 Success Tailings	0.003	3.50E-06	5.25E-06	1.07E-05	4.02E-05	8.20E-06	1.23E-05	2.36E-05	6.71E-05	3.42E-04	5.12E-04	1.03E-03	3.59E-03

Table 6-13 : Calculated Wasteload Allocations for Individual Sources - South Fork at Wallace (URSG Site SF223)

All values in lbs/day

		Total Recoverable Cadmium				Total Recoverable Lead				Total Recoverable Zinc			
Station ID	Flow (cfs)	7Q10L	10th Percentile	50th Percentile	90th Percentile	7Q10L	10th Percentile	50th Percentile	90th Percentile	7Q10L	10th Percentile	50th Percentile	90th Percentile
SF607 Lucky Friday Outfall 001	1.27	1.52E-03	2.40E-03	4.72E-03	1.58E-02	3.43E-03	5.35E-03	9.73E-03	2.14E-02	1.43E-01	2.26E-01	4.35E-01	1.32E+00
SF609 Lucky Friday Outfall 003	0.85	1.02E-03	1.61E-03	3.16E-03	1.06E-02	2.30E-03	3.58E-03	6.51E-03	1.43E-02	9.59E-02	1.51E-01	2.91E-01	8.84E-01
SF328 Star/Morning Waste Rock	1.59	1.90E-03	3.00E-03	5.90E-03	1.98E-02	4.29E-03	6.69E-03	1.22E-02	2.68E-02	1.79E-01	2.82E-01	5.44E-01	1.65E+00
SF 396 Square Deal	0.08	9.57E-05	1.51E-04	2.97E-04	9.94E-04	2.16E-04	3.37E-04	6.13E-04	1.35E-03	9.03E-03	1.42E-02	2.74E-02	8.32E-02
SF395 Golconda	0.03	3.59E-05	5.67E-05	1.11E-04	3.73E-04	8.10E-05	1.26E-04	2.30E-04	5.06E-04	3.39E-03	5.33E-03	1.03E-02	3.12E-02
SF627 Mullan STP	0.413	4.94E-04	7.80E-04	1.53E-03	5.13E-03	1.12E-03	1.74E-03	3.17E-03	6.97E-03	4.66E-02	7.34E-02	1.41E-01	4.29E-01
SF338 Snowstorm #3	2	2.39E-03	3.78E-03	7.43E-03	2.49E-02	5.40E-03	8.42E-03	1.53E-02	3.37E-02	2.26E-01	3.55E-01	6.84E-01	2.08E+00
SF339 Copper King	0.0564	6.75E-05	1.07E-04	2.09E-04	7.01E-04	1.52E-04	2.37E-04	4.32E-04	9.51E-04	6.37E-03	1.00E-02	1.93E-02	5.86E-02
SF345 Morning #4	0.0152	1.82E-05	2.87E-05	5.64E-05	1.89E-04	4.11E-05	6.40E-05	1.16E-04	2.56E-04	1.72E-03	2.70E-03	5.20E-03	1.58E-02
SF346 Morning #5	0.0111	1.33E-05	2.10E-05	4.12E-05	1.38E-04	3.00E-05	4.67E-05	8.51E-05	1.87E-04	1.25E-03	1.97E-03	3.80E-03	1.15E-02
SF347 Star 1200 Level	0.695	8.31E-04	1.31E-03	2.58E-03	8.64E-03	1.88E-03	2.93E-03	5.33E-03	1.17E-02	7.84E-02	1.23E-01	2.38E-01	7.23E-01
SF349 Grouse	1.82	2.18E-03	3.44E-03	6.76E-03	2.26E-02	4.92E-03	7.66E-03	1.39E-02	3.07E-02	2.05E-01	3.23E-01	6.23E-01	1.89E+00
SF386 Adit in Beacon Light Area	0.0003	3.59E-07	5.67E-07	1.11E-06	3.73E-06	8.10E-07	1.26E-06	2.30E-06	5.06E-06	3.39E-05	5.33E-05	1.03E-04	3.12E-04
SF389 Unnamed Adit Deadman Gulch	0.011	1.32E-05	2.08E-05	4.08E-05	1.37E-04	2.97E-05	4.63E-05	8.43E-05	1.86E-04	1.24E-03	1.95E-03	3.76E-03	1.14E-02
SF390 Reindeer Queen	0.011	1.32E-05	2.08E-05	4.08E-05	1.37E-04	2.97E-05	4.63E-05	8.43E-05	1.86E-04	1.24E-03	1.95E-03	3.76E-03	1.14E-02

Table 6-14 : Calculated Wasteload Allocations for Individual Sources - Pine Creek (URSG Site PC315)

All values in lbs/day

Station ID	Flow (cfs)	Total Recoverable Cadmium 7Q10L	Total Recoverable Cadmium 10th Percentile	Total Recoverable Cadmium 50th Percentile	Total Recoverable Cadmium 90th Percentile	Total Recoverable Lead 7Q10L	Total Recoverable Lead 10th Percentile	Total Recoverable Lead 50th Percentile	Total Recoverable Lead 90th Percentile	Total Recoverable Zinc 7Q10L	Total Recoverable Zinc 10th Percentile	Total Recoverable Zinc 50th Percentile	Total Recoverable Zinc 90th Percentile
PC329 North Amy	0.322	3.48E-03	5.04E-03	1.39E-02	6.73E-02	4.27E-03	6.20E-03	1.71E-02	8.27E-02	3.77E-01	5.47E-01	1.51E+00	7.29E+00
PC330 Amy	0.005	5.40E-05	7.83E-05	2.16E-04	1.05E-03	6.64E-05	9.62E-05	2.65E-04	1.28E-03	5.85E-03	8.49E-03	2.34E-02	1.13E-01
PC331 Liberal King	0.005	5.40E-05	7.83E-05	2.16E-04	1.05E-03	6.64E-05	9.62E-05	2.65E-04	1.28E-03	5.85E-03	8.49E-03	2.34E-02	1.13E-01
PC332 Lookout	0.027	2.92E-04	4.23E-04	1.17E-03	5.64E-03	3.58E-04	5.20E-04	1.43E-03	6.94E-03	3.16E-02	4.58E-02	1.26E-01	6.12E-01
PC333 Upper Lynch	0.001	1.08E-05	1.57E-05	4.32E-05	2.09E-04	1.33E-05	1.92E-05	5.31E-05	2.57E-04	1.17E-03	1.70E-03	4.68E-03	2.27E-02
PC334 Lynch/Nabob	0.0006	6.48E-06	9.40E-06	2.59E-05	1.25E-04	7.96E-06	1.15E-05	3.19E-05	1.54E-04	7.02E-04	1.02E-03	2.81E-03	1.36E-02
PC335 Nevada-Stewart	0.091	9.83E-04	1.43E-03	3.93E-03	1.90E-02	1.21E-03	1.75E-03	4.83E-03	2.34E-02	1.07E-01	1.54E-01	4.26E-01	2.06E+00
PC336 Highland Surprise	0.038	4.10E-04	5.95E-04	1.64E-03	7.94E-03	5.04E-04	7.31E-04	2.02E-03	9.76E-03	4.45E-02	6.45E-02	1.78E-01	8.61E-01
PC375 Highland Surprise Waste Rock	0.0106	1.15E-04	1.66E-04	4.58E-04	2.22E-03	1.41E-04	2.04E-04	5.63E-04	2.72E-03	1.24E-02	1.80E-02	4.96E-02	2.40E-01
PC337 Sidney (Red Cloud Creek Adit)	0.006	6.48E-05	9.40E-05	2.59E-04	1.25E-03	7.96E-05	1.15E-04	3.19E-04	1.54E-03	7.02E-03	1.02E-02	2.81E-02	1.36E-01
PC340 Upper Little Pittsburg	0.002	2.16E-05	3.13E-05	8.64E-05	4.18E-04	2.65E-05	3.85E-05	1.06E-04	5.14E-04	2.34E-03	3.39E-03	9.37E-03	4.53E-02
PC341 Lower Little Pittsburg	0.006	6.48E-05	9.40E-05	2.59E-04	1.25E-03	7.96E-05	1.15E-04	3.19E-04	1.54E-03	7.02E-03	1.02E-02	2.81E-02	1.36E-01
PC343 Nabob 1300 Level	0.066	7.13E-04	1.03E-03	2.85E-03	1.38E-02	8.76E-04	1.27E-03	3.50E-03	1.70E-02	7.73E-02	1.12E-01	3.09E-01	1.50E+00
PC344 Big It	0.00106	1.15E-05	1.66E-05	4.58E-05	2.22E-04	1.41E-05	2.04E-05	5.63E-05	2.72E-04	1.24E-03	1.80E-03	4.96E-03	2.40E-02
PC348 Upper Constitution	0.079	8.53E-04	1.24E-03	3.41E-03	1.65E-02	1.05E-03	1.52E-03	4.19E-03	2.03E-02	9.25E-02	1.34E-01	3.70E-01	1.79E+00
PC351 Marmion Tunnel	0.0089	9.61E-05	1.39E-04	3.85E-04	1.86E-03	1.18E-04	1.71E-04	4.73E-04	2.29E-03	1.04E-02	1.51E-02	4.17E-02	2.02E-01
PC352 Seep Below Nevada Stewart	0.0028	3.02E-05	4.39E-05	1.21E-04	5.85E-04	3.72E-05	5.39E-05	1.49E-04	7.19E-04	3.28E-03	4.75E-03	1.31E-02	6.34E-02
PC 400 Adit Upstream of Little Pittsburg	0.000422	4.56E-06	6.61E-06	1.82E-05	8.82E-05	5.60E-06	8.12E-06	2.24E-05	1.08E-04	4.94E-04	7.16E-04	1.98E-03	9.56E-03

Table 6-15 : Calculated Wasteload Allocations for Individual Sources - South Fork above Pinehurst (URSG Site SF271)

All values in lbs/day

		Total Recoverable Cadmium				Total Recoverable Lead				Total Recoverable Zinc			
Station ID	Flow (cfs)	7Q10L	10^{th} Percentile	50^{th} Percentile	90^{th} Percentile	7Q10L	10^{th} Percentile	50^{th} Percentile	90^{th} Percentile	7Q10L	10^{th} Percentile	50^{th} Percentile	90^{th} Percentile
SF382 Silver Dollar	0.015	7.00E-05	9.30E-05	1.98E-04	3.09E-04	4.07E-04	5.35E-04	1.00E-03	8.93E-04	7.31E-03	9.68E-03	1.99E-02	2.67E-02
SF393 Western Union (Lower Adit)	0.001	4.67E-06	6.20E-06	1.32E-05	2.06E-05	2.71E-05	3.57E-05	6.70E-05	5.96E-05	4.87E-04	6.46E-04	1.32E-03	1.78E-03
SF3 Central Tmt Plant	4.990	2.33E-02	3.10E-02	6.59E-02	1.03E-01	1.35E-01	1.78E-01	3.34E-01	2.97E-01	2.43E+00	3.22E+00	6.60E+00	8.90E+00
SF620 Page STP	3.870	1.81E-02	2.40E-02	5.11E-02	7.97E-02	1.05E-01	1.38E-01	2.59E-01	2.31E-01	1.89E+00	2.50E+00	5.12E+00	6.90E+00
SF383 St. Joe	0.007	3.27E-05	4.34E-05	9.25E-05	1.44E-04	1.90E-04	2.50E-04	4.69E-04	4.17E-04	3.41E-03	4.52E-03	9.26E-03	1.25E-02
SF384 Coeur d'Alene (Mineral Point)	0.005	2.33E-05	3.10E-05	6.61E-05	1.03E-04	1.36E-04	1.78E-04	3.35E-04	2.98E-04	2.44E-03	3.23E-03	6.62E-03	8.92E-03
SF385 Unnamed Adit	0.001	3.27E-06	4.34E-06	9.25E-06	1.44E-05	1.90E-05	2.50E-05	4.69E-05	4.17E-05	3.41E-04	4.52E-04	9.26E-04	1.25E-03
SF600 Caladay	0.210	9.80E-04	1.30E-03	2.77E-03	4.32E-03	5.70E-03	7.49E-03	1.41E-02	1.25E-02	1.02E-01	1.36E-01	2.78E-01	3.74E-01
SF602 Galena	1.300	6.06E-03	8.06E-03	1.72E-02	2.68E-02	3.53E-02	4.64E-02	8.71E-02	7.74E-02	6.34E-01	8.39E-01	1.72E+00	2.32E+00
SF623 Smelterville STP	0.421	1.96E-03	2.61E-03	5.56E-03	8.66E-03	1.14E-02	1.50E-02	2.82E-02	2.51E-02	2.05E-01	2.72E-01	5.57E-01	7.51E-01
SF624 Sunshine 001	3.120	1.46E-02	1.94E-02	4.12E-02	6.42E-02	8.46E-02	1.11E-01	2.09E-01	1.86E-01	1.52E+00	2.01E+00	4.13E+00	5.56E+00
Coeur/Galena 002	0.775	3.62E-03	4.81E-03	1.02E-02	1.60E-02	2.10E-02	2.76E-02	5.19E-02	4.62E-02	3.78E-01	5.00E-01	1.03E+00	1.38E+00
Consolidated Silver	0.300	1.40E-03	1.86E-03	3.97E-03	6.18E-03	8.14E-03	1.07E-02	2.01E-02	1.79E-02	1.46E-01	1.94E-01	3.97E-01	5.35E-01

6.6 Proposed Allocation Method - Coeur d'Alene Lake and Spokane River

The allocation approach for Coeur d'Alene Lake and the Spokane River is significantly different than the approach used for the Coeur d'Alene River and tributaries. The differences stem from the significant differences in the number, types, and proximity of metals sources in the Coeur d'Alene Lake/Spokane River area. If the Coeur d'Alene River allocations were achieved and the lake continues to act as a sink for dissolved metals (see discussion below), the Spokane River would likely meet water quality standards if current metals concentrations were maintained by discrete sources along the Spokane River. This contrasts with the need for significant reductions from both discrete and non-discrete sources upstream in the Coeur d'Alene River to meet water quality standards.

6.6.a. Sources in Coeur d'Alene Lake and the Spokane River

Aside from the dissolved metals in the Coeur d'Alene River, the only other potentially significant source of metals to the lake is the release (or "flux") of dissolved metals from the contaminated sediments on the lake bottom to the overlying water column. Results of studies to ascertain the magnitude and direction of metals fluxes from the lake sediments are summarized in Appedix F. The most direct measurements of metals fluxes at the lake bottom indicate that the sediments deliver a dissolved metals loading to the water column. Furthermore, the magnitude of measured fluxes were significant in relation to Coeur d'Alene River loadings.

At the same time, the available flow/concentration data at the lake boundaries indicate that dissolved metals loadings in the Spokane River (at the Post Falls dam) are lower than loadings delivered by the Coeur d'Alene River. This suggests that other physical, chemical, and/or biological processes are occurring in Coeur d'Alene Lake that result in a net loss of dissolved metals from the water column. These processes are not fully understood, and study of the lake is ongoing. It is also recognized that cleanup actions over the long term could affect both the sediment fluxes and other lake processes. Based on the magnitude of the measured fluxes from the sediments and the uncertainty about long term changes in lake dynamics, EPA believes it is prudent to establish a load allocation for net loadings from lake sediments to the water column. Net loadings in this case are defined as the difference between loadings at the mouth of the Couer d'Alene River and in the Spokane River at the lake outlet. The development of this allocation is described below.

Along the Spokane River, between the lake and the state line, the only identified sources of metals are three municipal treatment plants (Hayden Lake, Coeur d'Alene, and Post Falls) and urban stormwater.

6.6.b. Load Allocations for Net Loadings from Lake Sediments

The load allocation for lake sediments is calculated in a straightforward manner based on an idealized view of the lake as the confluence of two large rivers. The predominant inflows to

Coeur d'Alene Lake are from the St. Joe River and Coeur d'Alene River. That portion of the lake's loading capacity derived from the Coeur d'Alene River is already allocated to upstream sources in the TMDL. However, the St. Joe River's loading capacity is not allocated. The loading capacity delivered to the lake by the St. Joe River (i.e., the total loading capacity minus the current background loading for a particular metal) can be allocated to the lake sediment source.

The load allocation is calculated for the same flow tier percentiles as those used for the Coeur d'Alene River and tributaries (7Q10, 10th, 50th, and 90th percentiles). The available water quality data for the St. Joe River (9 samples) indicates that hardness is generally below the 25 mg/l lower bound in the Idaho water quality standards (the highest sample value was 27 mg/l). EPA has applied the water quality criteria for a hardness of 25 mg/l in calculating the loading capacity at the four flow tiers. Background levels are below detection for dissolved cadmium and lead, though detection levels vary within the dataset. EPA has estimated background in the St. Joe by applying one-half the lowest detection level for cadmium (.02 ug/l) and lead (.25 ug/l), and using the highest detected value for zinc (4.2 ug/l).

Table 6-16. St. Joe River Loading Capacity and Background

Flow (cfs)	St. Joe Loading Capacity (lbs/day)			Background Loading (lbs/day)		
	Dissolved Cadmium	Dissolved Lead	Dissolved Zinc	Dissolved Cadmium	Dissolved Lead	Dissolved Zinc
241	0.48	0.70	41.6	0.02	0.33	5.5
374	0.74	1.09	64.6	0.04	0.50	8.5
1,000	2.00	2.92	173	0.11	1.4	23
6,470	12.9	18.9	1,120	0.70	8.7	147

Table 6-17. Load Allocations for Net Loadings from Coeur d'Alene Lake Sediments

Flow at Calder (cfs)	Dissolved Cadmium (lbs/day)	Dissolved Lead (lbs/day)	Dissolved Zinc (lbs/day)
241	0.46	0.38	36
374	0.71	0.59	56
1,000	1.9	1.6	150
6,470	12	10	970

The above load allocation is established conservatively by using the flow measured at the USGS station at Calder. The actual flow into the lake includes contributions from the St. Maries River, downstream from the Calder station.

6.6.c. Wasteload Allocations for Spokane River Treatment Plants

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 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 (ug/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 (ug/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 (ug/l)		Total Recoverable Lead (ug/l)		Total Recoverable Zinc (ug/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 90^{th} percentile of the available discharge data.
4. Effluent criteria are Idaho water quality criteria values associated with the minimum hardness of the effluent.

6.6.d. Wasteload Allocations for Urban Stormwater

EPA has no information on the metals loadings entering Coeur d'Alene Lake and the Spokane River from urban stormwater. Nevertheless, metals are commonly present in urban stormwater, and therefore the TMDL must address these sources in the allocation process. The TMDL stipulates that, upon issuance of a permit with performance-based limits in the Coeur d'Alene Lake/Spokane River area, the reserve loadings associated with the differences between the effluent criterion values and the performance-based values are reserved for municipal stormwater sources in the area.

7.0 TMDL IMPLEMENTATION ISSUES

7.1 General

Under current regulations, an implementation plan is not a required element of a TMDL. Nevertheless, EPA has considered implementation issues in the development of this TMDL. This section of the document provides a preliminary discussion of several of these issues.

7.2 FACA Report

EPA believes the metals contamination in the CDA basin meets the description of "Impairments Due to Extremely Difficult Problems" in the Report of the Federal Advisory Committee on the TMDL Program (FACA Report, EPA, July 1998). The clean-up of abandoned mine wastes in the Coeur d'Alene is certainly "technically and/or practically very difficult and extremely costly." The report makes several recommendations for design and implementation of TMDLs for "special challenge sources", notably the following:

> "The Committee recommends that, where necessary, a TMDL implementation plan involving special challenge sources allow a relatively longer timeframe for water quality standards attainment. Different timeframes for implementation of (waste)load allocations may be needed for special challenge vs. existing sources. For example, existing sources may be required to achieve necessary load reductions quickly (i.e., within a compliance

> schedule in a 5-year NPDES permit), even if achieving prescribed load reductions for these historic sources is anticipated to take longer. In such a situation, the state may consider relying more on a phased (or iterative) TMDL approach, in which expected loading reductions from special challenge sources over the long-term are factored in when establishing short-term allocations for permit limits for point sources." (FACA Report, page 42).

In the CDA basin TMDL, EPA believes that most of the waste piles and eroded tailings in the bed and banks of the basin rivers can be viewed as "special challenge sources." EPA has begun to address the contamination by establishing specific allocations for discrete point sources in the basin. EPA does not currently possess the necessary information to establish specific allocations for the waste piles and nonpoint (bed and banks) sources. However, these sources are currently the subject of the Superfund RI/FS for the basin.

7.3 Coordination of Clean Water Act and Superfund Authorities

EPA has explored a conceptual framework to effectively use its authorities under the CWA and CERCLA in the CDA basin. EPA proposes to issue NPDES permits that incorporate the TMDL wasteload allocations to operating NPDES facilities in the basin, including mining facilities and municipal sewage treatment plants. In the meantime, further study and identification of other sources can proceed in the RI/FS, culminating in a Record of Decision (ROD) that will identify the plan for clean-up of waste piles, inactive adits, and tailings in the river bed and banks.

Figure 7-1 displays conceptually how EPA plans to coordinate CWA and CERCLA authorities such that they essentially support one another as both processes unfold. The narrative below corresponds to the 13 points in the chart and provides a brief explanation of important steps in both processes.

1. <u>Water Quality Standards</u>

As described in this document, water quality standards form the basis of the TMDL and are goals for CERCLA actions (see also discussion of "ARARs" under "Feasibility Study" below).

2. <u>Remedial Investigation (RI)</u>

Under CERCLA, an RI may be performed to determine the nature and extent of contamination in a particular area. This normally entails a review of existing data and collection of additional information to fill in data gaps. The RI will examine all environmental media (e.g., surface water, soils, groundwater), evaluate risks to human health and ecosystems, and identify specific sources of pollution. The TMDL Technical Support Document is analagous to the RI, albeit with a narrowed focus on surface water quality and no risk analysis. Some of the information gathered to support the RI was used in the development of the TMDL.

The RI will also generate 'risk-based' cleanup levels, and these cleanup levels may apply to dissolved metals in the water column. The development of risk-based cleanup levels may employ laboratory and field methods that are similar to those used to develop site-specific criteria under the CWA.

3. Total Maximum Daily Load (TMDL)

Described in this document.

4. Feasibility Study (FS)

The FS will develop remedial goals based on the risk assessments and will also identify Applicable or Relevant and Appropriate Requirements (ARARs). ARARs are cleanup standards or other requirements specified in state and federal laws. Actions taken under CERCLA must comply with ARARs unless they are explicitly waived. As shown in the flowchart, the TMDL provides information for consideration in the ARAR identification process. The FS will develop a range of remedial action alternatives and then, for each alternative, evaluate the feasibility of meeting remedial goals according to 7 criteria, including compliance with ARARs, protection of human health and the environment, implementability and cost. Two additional criteria, state and local acceptance, will be evaluated in the ROD, after comments on the RI/FS and proposed plan have been received. Treatability studies may be conducted to support evaluation of remedial alternatives.

5. NPDES Permits

A number of sources of pollution in the CDA basin are sources with existing NPDES permits, issued pursuant to the CWA. These sources include three operating mines (Lucky Friday, Coeur/Galena and Sunshine), three inactive mines (Caladay, Consolidated Silver, and Star/Morning) and several municipal wastewater treatment plants (Mullan, Page, Smelterville, Hayden, Post Falls, and Coeur d'Alene). Once a TMDL has been established, EPA will begin developing NPDES permits for the operating mines and municipalities along the South Fork. The schedule for issuing the South Fork municipal permits will be coordinated with any variance actions. The appropriate approach to address all inactive mine adits will be evaluated in the RI/FS process. Decisions on next steps to implement the TMDL for these adits will be made in the Superfund Record of Decision.

It is possible that final NPDES permits will include compliance schedules to allow operators a specified time to install the necessary treatment or water management measures to meet the new permit limits. Variances may be considered on a case-by-case basis.

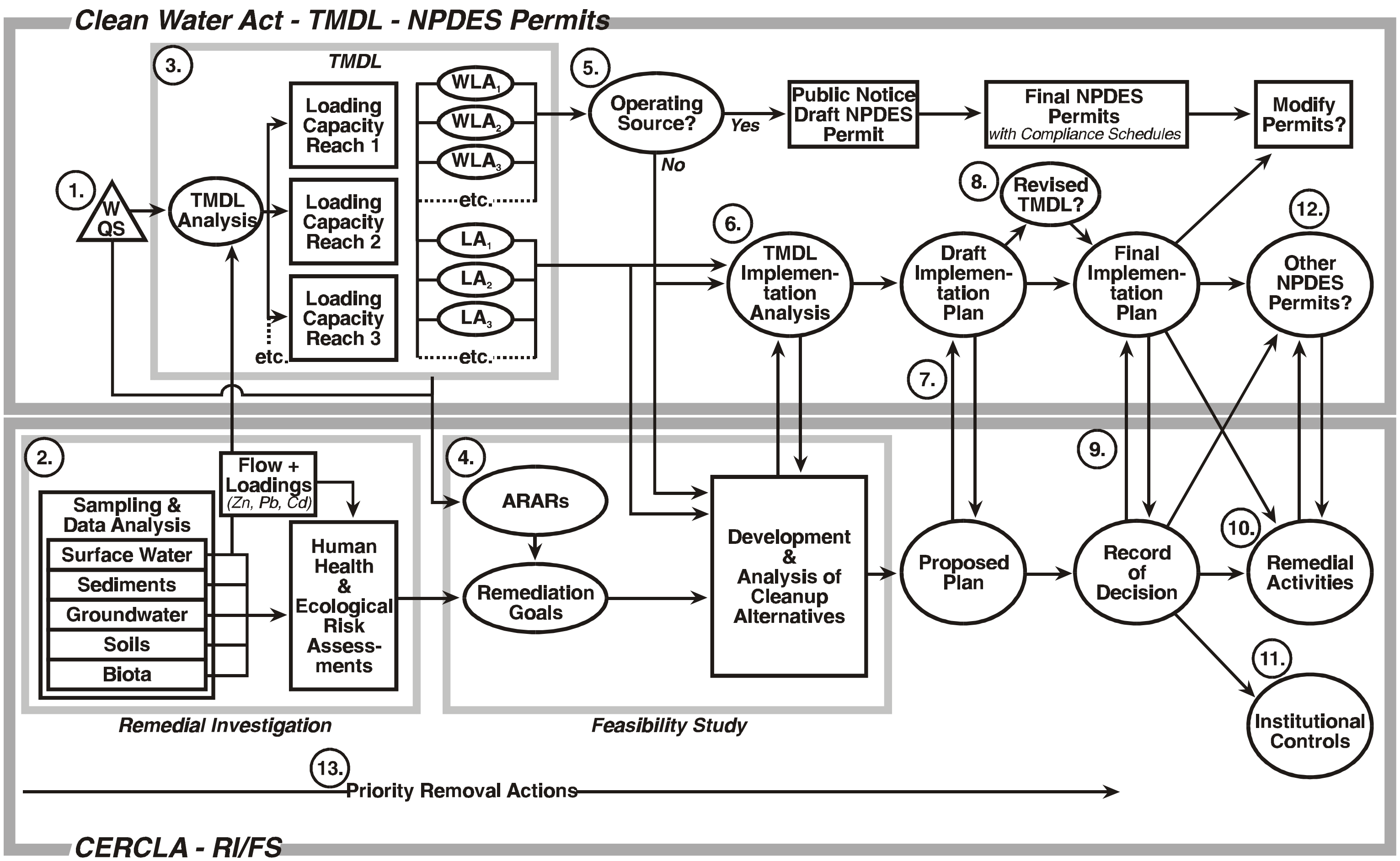

Figure 7-1 Coordinating Clean Water Act and CERCLA Activities

6 & 7. CERCLA Feasibility Study and TMDL Implementation Analysis

The FS and TMDL Implementation Analysis are focused on the same question: how, and on what schedule, will source reductions and other control measures be achieved to meet environmental goals? The TMDL plan is focused on surface water quality, while the FS is broader in scope, addressing other media in addition to surface water (and potentially other surface water pollutants, such as other metals, nutrients, etc.). Thus, the TMDL implementation analysis draws upon the data and analysis in the RI/FS.

A consistent, informed understanding of the feasibility and scheduling of pollution controls will require strong interagency coordination to ensure sharing of information between state/federal/local agencies.

8. Possible TMDL Revisions

The TMDL can be revised in the future to reflect new information (such as information from the RI/FS process) and/or changes to water quality standards. Any revisions to the TMDL would be subject to public comment.

9. Record of Decision (ROD)/Final TMDL Implementation Plan

The outcome of coordinated CERCLA and CWA activities is a coordinated ROD and TMDL Implementation Plan that are fully consistent and complementary. The TMDL Implementation Plan may be one component of the broader ROD document. Both the TMDL Implementation Plan and ROD are public documents that explain which cleanup alternative(s) will be used to meet specific remediation goals. Both documents are based on a common information base and technical analysis generated during the RI/FS study, taking into consideration public comments and community concerns.

10. Remedial Actions

Following a Remedial Design stage (not shown), implementation of the remedial actions specified in the ROD and TMDL Implementation Plan should begin.

11. Institutional Controls

In some cases, ‘institutional controls’ are necessary to help meet the remediation goals. An example of an institutional control would be a local zoning ordinance prohibiting excavation in potentially contaminated areas. Institutional controls must be evaluated as other remedial alternatives prior to inclusion in a ROD and implementation following Remedial Design.

12. Other NPDES Permit Actions

Throughout the RI/FS and CWA processes, other previously unpermitted point sources of pollution that need NPDES permits (e.g., unpermitted adit discharges, waste pile seeps) may be identified. Also, if the TMDL wasteload allocations are revised, the corresponding NPDES permit limitations may be modified during the five year permit term.

13. Priority Removal Actions

Throughout the RI/FS and CWA processes, it is envisioned that priority removal actions may be conducted in the CDA basin, as deemed necessary to protect the public health or welfare or the environment. To the extent practicable, such removal actions would contribute to the efficient performance of any anticipated long-term remedial actions in the CDA basin.

7.4 Preliminary Assessment of Feasibility

EPA has explored the feasibility of whether individual sources that currently exceed the wasteload allocations can achieve compliance with assigned loadings. EPA's Superfund program has evaluated the feasibility of the TMDL allocations for the Bunker Hill Central Treatment Plant (CTP) in Kellogg. On behalf of EPA, CH2M Hill has analyzed the hydraulic characteristics of the Bunker Hill mine and a number of alternatives to reduce metals loadings to the levels required in the draft TMDL, including: source control to reduce water entering the mine workings, in-mine storage of untreated and/or treated wastewater when necessary to meet TMDL allocations, and wastewater treatment using a variety of technologies. Based on the analyses completed to date, EPA is optimistic that the CTP can achieve the TMDL allocations using conventional pollution control technologies. While EPA requested comments on feasibility from other sources in the basin, no information comparable to the Bunker Hill CTP study has been received to date.

Many mining projects have historically used hydroxide precipitation to treat wastewaters for metals removal prior to discharge. For example, hydroxide precipitation is currently employed at the Bunker Hill CTP. Work to date at the CTP indicates that this technology, combined with filtration and used in conjunction with mine water storage measures, may be sufficient to meet the TMDL. Figure 7-2 shows theoretical lowest residual metal concentrations that can be achieved by hydroxide precipitation.

Sulfide precipitation, which can be used in concert with hydroxide precipitation, offers advantages due to the high reactivity of sulfides with heavy metal ions and the very low solubilities of metal sulfides over a broad pH range. As shown in Figure 7-2, metal sulfides have much lower solubilities than metal hydroxides. For example, at the Red Dog Mine in Alaska, a sulfide precipitation and filtration system has been installed to treat effluent with high metals levels to concentration ranges similar to levels specified in this TMDL. Laboratory treatability work to date at the CTP indicates that sulfide precipitation is an effective add-on to the existing hydroxide precipitation system. By bringing effluent metals concentrations lower than can be achieved by hydroxide precipitation alone, sulfide precipitation reduces the reliance on mine water storage measures to meet the effluent limits based on the TMDL.

For municipalities along the South Fork, information collected as part of the TMDL and NPDES permit development process indicates that the primary source of metals to these systems is infiltration of groundwater contaminated by tailings material to the collection systems. EPA expects that, at a minimum, a long term effort to maintain or replace portions of the sewage collection systems at these facilities will be needed to achieve the TMDL allocations. These collection system improvements will also put the facilities in a better position to operate nutrient-control technology in the future if needed. Because of the potential costs to local communities of remedies to reduce metals in the municipal discharges, variances from state water quality standards may be appropriate and necessary for these facilities (variances are discussed in further detail in the Response to Comments document for the TMDL).

EPA recognizes that abandoned mine projects present significant challenges in designing and implementing remedial/treatment measures. For many of these projects it may not be feasible or practical to design and construct an active wastewater treatment facility, especially in remote locations. In other cases, other source control measures (e.g., capping a waste pile or plugging an adit) may be feasible.

7.5 Other TMDL Issues

Reasonable Assurance

When wasteload allocations are established under the assumption that nonpoint source contributions will be reduced, a TMDL must provide “reasonable assurance” that nonpoint source reductions will be implemented.

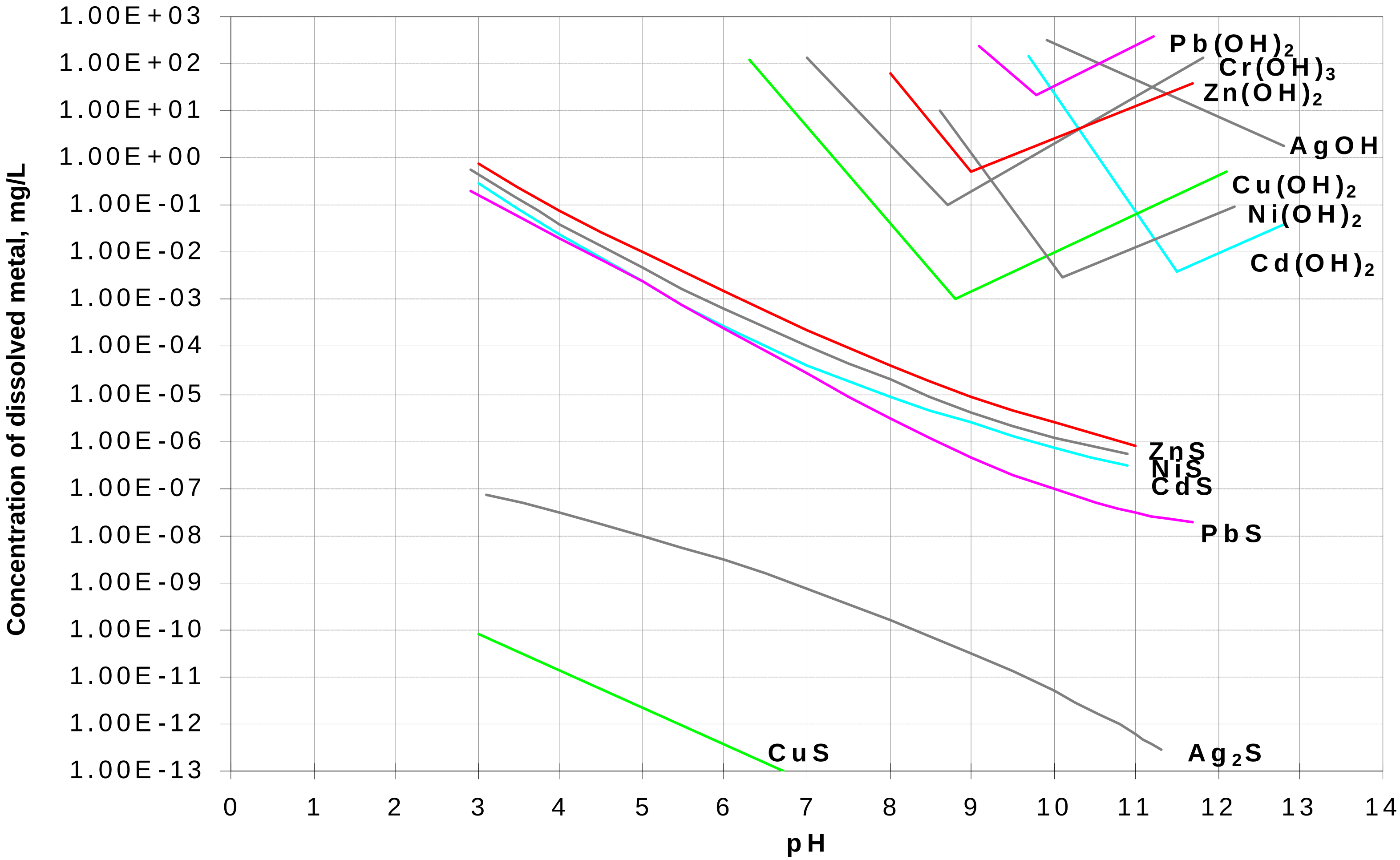

Figure 7-2 Solubility of Metal Hydroxides and Sulfides

EPA is currently conducting a Remedial Investigation/Feasibility Study (RI/FS) for the Coeur d'Alene River Basin pursuant to authorities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 et. seq. EPA has authority under CERCLA to conduct an RI/FS for an area regardless of whether releases of hazardous substances in the area are included on the National Priorities List (NPL). If releases in an area are not included on the NPL, EPA ordinarily has authority to spend up to $2 million from the Superfund trust fund to conduct discrete removal actions in that area. If releases are included on the NPL, EPA has broader authority to draw from the Superfund trust fund for financing remedial actions in that area following completion of an RI/FS. However, EPA ordinarily seeks funds from the Superfund trust fund only if potentially responsible parties are unable or unwilling to perform or finance the response actions themselves. Through litigation filed in March 1996, the U.S. Department of Justice, on behalf of EPA and other federal agencies, is seeking a declaration that several mining company defendants are liable for past and future response costs caused by releases of hazardous substances in the Coeur d'Alene Basin. EPA also retains administrative authority under CERCLA to issue orders compelling parties to undertake response actions to address releases that may present an imminent and substantial endangerment to public health, welfare, or the environment. Through removal and remedial actions funded by potentially responsible parties and the Superfund trust fund, EPA's Superfund program has been actively addressing releases of hazardous substances in the Coeur d'Alene Basin. These continuing and anticipated activities may reasonably be expected to continue in the future, resulting in substantial reduction of discharges from non-point sources into the Coeur d'Alene River and tributaries, Coeur d'Alene Lake, and Spokane River.

Anti-degradation

Idaho's water quality regulation contains anti-degradation requirements pertinent to certain waters in this basin. This regulation provides that where a waterbody exceeds the quality necessary to support designated uses, the existing quality shall be maintained and protected unless the State makes a formal finding that lowering of water quality is needed to accommodate important economic or social development.

While large portions of the CDA basin surface water network contain metals concentrations well in excess of the water quality criteria, there are also a number of waters within the CDA basin with metals concentrations well below the water quality criteria. In particular, metals levels are low within the North Fork sub-basin and numerous small tributaries to the South Fork and mainstem CDA that are not influenced by mining activity. A State of Idaho anti-degradation analysis and decision is required before activities that lower water quality (i.e., elevate metals levels in the receiving water) can proceed in these areas.

7.6 Development of Site-Specific Criteria

This TMDL is established to achieve the currently applicable water quality criteria for CDA basin waters in the Idaho water quality standards. EPA and the state of Idaho recognize that site-specific criteria (SSC) for lead, zinc and cadmium may be appropriate for the South Fork to reflect the specific characteristics of the river and the sensitivity of the resident cold water biota. In 1993, DEQ began efforts to develop SSC for the South Fork between Daisy Gulch and Canyon Creek (8 mile study section upstream of Wallace). DEQ intends to complete this work and adopt SSC for this section of the river. The SSC will be submitted to EPA for approval.

The spatial extent of an SSC is critical to its application in regulatory actions. For example, the SSC for the Wallace segment would have no practical effect on the TMDL allocations, because statewide water quality criteria would still apply in the impaired segments immediately downstream of the Wallace segment. Meeting these downstream criteria would require the same calculations and wasteload allocations in the TMDL. On the other hand, establishing an SSC for the entire South Fork mainstem from Pinehurst to the headwaters (i.e., moving the point of application of the statewide criteria to the mainstem Coeur d'Alene River) could have an effect on the TMDL allocations. This is because statewide criteria could be achieved in the mainstem Coeur d'Alene River after dilution of metals (in excess of the statewide criteria) in the South Fork by the relatively clean North Fork.

Development of SSC for the entire South Fork would require an analysis based on differences in biological community structure and water chemistry (hardness, etc) downstream of Wallace. This work has not been funded by the state or mining companies to date. Even if the testing and analyses indicate a substantially higher tolerance in resident species for dissolved metals, the regulatory relief provided by such an SSC would be limited by the available dilution from the North Fork.

The mining companies and State currently have no plans to establish SSC for cadmium. This is because the SSC work to date indicates that resident species are sensitive to cadmium concentrations in the range of the statewide criteria.

In the future, DEQ intends to adopt SSC based on biological end points that reflect the existence of a healthy, balanced biological community (full support of uses) in the South Fork. Water quality, including levels of metals, that exists when the biological endpoints are met will be used by DEQ to develop alternative SSC for lead and zinc.

8.0 DATA MANAGEMENT AND SOFTWARE APPLICATIONS

EPA directed its contractor, URSG, to incorporate the water quality and point source datasets described in Table 5-1 into a relational database (Oracle®) for use in both TMDL and RI/FS analyses. For certain large data sets (e.g., PCS, USGS flows), a subset of the data was loaded into the database. For example, three years of data for the three metals of concern was downloaded from PCS and incorporated into the database.

A number of Geographic Information System (GIS) coverages were used to generate the detailed maps of the upper basin in this report. The relational database contains the necessary location information to generate maps of station and source locations. The routines employ ARCVIEW® coding.

TMDL allocations and other measures were calculated using EXCEL® spreadsheet applications designed for the Coeur d'Alene TMDL. Copies of the spreadsheets used for the TMDL are included on diskette in the Administrative Record for the TMDL.

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