Exhibit K

Fact Sheet for Revised Draft Permit

NPDES Permit Number: ID-000017-5
Public Notice Start Date: December 18, 2002
Public Hearing Date: January 29, 2003
Public Notice Expiration Date: February 16, 2003
Technical Contact: Patty McGrath, (206) 553-0979
1-800-424-4372 (within Region 10)
mcgrath.patricia@epa.gov

The U.S. Environmental Protection Agency (EPA) Proposes to Reissue a Wastewater Discharge Permit To:

Hecla Mining Company
Lucky Friday Mine and Mill
P.O. Box 31
Mullan, Idaho 83846

and

the State of Idaho Proposes to Certify the Permit

EPA proposes NPDES permit reissuance.
The EPA proposes to reissue a National Pollutant Discharge Elimination System (NPDES) permit to the Hecla Mining Company (Hecla). The revised draft permit sets conditions on the discharge of pollutants from the Lucky Friday mine and mill facilities to the South Fork Coeur d'Alene River. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged.

A draft permit, with a supporting Fact Sheet, was previously public noticed (March 28, 2001 through August 3, 2001). The EPA is reopening the public comment period for the draft permit in order to accept comments on newly modified effluent limits for cadmium, copper, lead, mercury, silver, zinc, and total suspended solids and modified whole effluent toxicity (WET) triggers. The remainder of the previously public noticed permit is not being re-public noticed. Those comments that were submitted during the previous comment period (March 28, 2001 through August 3, 2001) will be addressed through a Response To Comments document. The Response To Comments document will be provided to commenters at

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the time of permit reissuance and will address any changes to the final permit or lack thereof.

This Fact Sheet for the revised draft permit includes:

- information on public comment, public hearing, and appeal procedures
- a listing of the new revised, previously public noticed, and currently permitted effluent limitations for cadmium, copper, lead, mercury, silver, zinc, and total suspended solids and a listing of the new revised and previously public noticed WET triggers
- background information supporting the proposed cadmium, copper, lead, mercury, silver, zinc, and total suspended solids limitations and WET triggers

The State of Idaho proposes certification.
The Idaho Department of Environmental Quality (IDEQ) proposes to certify the Lucky Friday NPDES permit to Hecla under section 401 of the Clean Water Act. The state submitted draft preliminary 401 certification comments whihc were incorporated into the permit prior to this public notice.

Public comment on the draft permit.
Persons wishing to comment on the revised draft permit may do so in writing by the expiration date of the public notice. All comments must be in writing and include the commenter’s name, address, and telephone number and either be submitted by mail to Office of Water Director at U.S. EPA, Region 10, 1200 - 6th Avenue, OW-130, Seattle, WA 98101; submitted by facsimile to (206) 553-0165; or submitted via e-mail to mcgrath.patricia@epa.gov. In addition, EPA has scheduled a public hearing on January 29, 2003, beginning at 6:00 p.m. and ending when all persons have been heard, at Silver Hills Middle School Gymnasium at East Mullan Avenue in Osburn, Idaho. A sign-in process will be used for persons wishing to make a statement or submit written comments at the hearing. The public hearing is to receive oral testimony on revised draft permits to both Hecla - Lucky Friday Mine and Coeur Silver Valley - Coeur and Galena Mines.

After the comment period closes, and all comments have been considered, EPA’s regional Director for the Office of Water will make a final decision regarding permit reissuance.
The EPA will address those significant comments that are received, prior to reissuing the permit. The permit will become effective 35 days after the issuance date, unless an appeal is filed with the Environmental Appeals Board within 30 days.

Public comment on the State preliminary 401 certification
The IDEQ provides the public with the opportunity to review and comment on preliminary 401 certification decisions. Any person may request in writing, that IDEQ provide that person notice of IDEQ’s preliminary 401 certification decision, including, where

appropriate, the draft certification. Persons wishing to comment on the preliminary 401 certification should submit written comments by the public notice expiration date to the Idaho Department of Environmental Quality, Coeur d'Alene Regional Office, c/o Dave Stasney at 2110 Ironwood Parkway, Coeur d'Alene, Idaho 83814 or fax number (208)769-1404 or dstasney@deq.id.us.

Documents are available for review.
The revised draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (see address below).

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-0979 or
1-800-424-4372 (within Alaska, Idaho, Oregon, and Washington; ask to be connected to Patty McGrath)

The revised draft permit and fact sheet are also available at:

EPA Coeur d'Alene Field Office
1910 NW Boulevard
Coeur d'Alene, Idaho 83814
(208) 664-4588

Idaho Department of Environmental Quality
Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene, Idaho 83814
(208) 769-1422

Wallace Public Library
415 River Street
Wallace, Idaho
(208) 752-4571

The revised draft permit and fact sheet can also be found by visiting the Region 10 website at www.epa.gov/r10earth/water.htm.

For technical questions regarding the permit or fact sheet, contact Patty McGrath at the phone numbers or email address at the top of this fact sheet. Those with impaired hearing or speech may contact a TDD operator at 1-800-833-6384 (ask to be connected to Patty McGrath at the above phone number). Additional services can be made available to persons with disabilities by contacting Patty McGrath.

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LIST OF ACRONYMS

AML	Average Monthly Limit
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BPT	Best Practicable Control Technology
CFR	Code of Federal Regulations
cfs	cubic feet per second
CV	coefficient of variation
CWA	Clean Water Act
EPA	Environmental Protection Agency
IDEQ	Idaho Department of Environmental Quality
LTA	Long Term Average
MDL	maximum daily limit
mgd	million gallons per day
MZ	mixing zone
NPDES	National Pollutant Discharge Elimination System
NTR	National Toxics Rule
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
SFCdA	South Fork Coeur d'Alene
SSC	Site-specific critiera
s.u.	Standard units
TMDL	Total Maximum Daily Load
TSD	Technical Support Document (EPA 1991)
TSS	Total Suspended Solids
TU	Toxic Units
WET	Whole Effluent Toxicity
WLA	Wasteload Allocation

APPENDIX A - DEVELOPMENT OF EFFLUENT LIMITATIONS

This appendix discusses the basis for and the development of new effluent limits for outfalls 001, 002, and 003. New effluent limits were developed for all the metals and TSS. This section includes: discussion of the statutory and regulatory basis for effluent limits (Section I); development of technology-based effluent limits (Section II) and water quality-based effluent limits (Section III); and a summary of the effluent limits developed for the revised draft permit (Section IV).

The discussion in this appendix follows the same format as Appendix B - "Development of Effluent Limitations" of the 2001 fact sheet for the 2001 draft permit. Much of the text discussion is the same, since the basis for developing the effluent limits and the procedures for developing the effluent limits is the same. What has changed are:

(1) the procedures for developing the cadmium, lead, and zinc limits (based on TSD methodology instead of the TMDL);
(2) some of the input parameters used in the equations used to develop effluent limits (e.g., some of the effluent and receiving water flows, some of the background concentrations, etc.), based on updated data;
(3) the development of two sets of effluent limits for outfall 002 (to take into account both situations where the discharge from outfall 002 may consist of the waste streams from outfall 001 or the waste streams from outfall 003); and,
(4) the addition of a new flow tier.

I. Statutory and Regulatory Basis for Limits

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the Clean Water Act (CWA) provide the basis for the effluent limitations and other conditions in the draft permit. The EPA evaluates the discharges with respect to these sections of the CWA and the relevant National Pollutant Discharge Elimination System (NPDES) regulations to determine which conditions to include in the draft permit.

In general, the EPA first determines which technology-based limits must be incorporated into the permit. EPA then evaluates the effluent quality expected to result from these controls, to see if it could result in any exceedances of the water quality standards in the receiving water. If exceedances could occur, EPA must include water quality-based limits in the permit. The proposed permit limits will reflect whichever requirements (technology-based or water quality-based) are more stringent.

II. Technology-based Evaluation

Section 301(b) of the CWA requires technology-based controls on effluents. This section of the CWA requires that, by March 31, 1989, all permits contain effluent limitations which: (1) control toxic pollutants and nonconventional pollutants through the use of "best available technology economically achievable" (BAT), and (2) represent "best conventional pollutant control technology" (BCT) for conventional pollutants by March 31, 1989. In no case may BCT or BAT be less stringent than "best practical control technology currently achievable" (BPT), which is the minimum level of control required by section 301(b)(1)(A) of the CWA.

In many cases, BPT, BCT, and BAT limitations are based on effluent guidelines developed by EPA for specific industries. On December 3, 1982, EPA published effluent guidelines for the mining industry. These guidelines are found in 40 CFR 440. Effluent guidelines applicable to the Lucky Friday Mine are found in the Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory (Subpart J) of Part 440. The BAT(40 CFR 440.103) and BPT(40 CFR 440.102) effluent limitation guidelines that apply to the Lucky Friday discharges are shown in the following table.

Table A-1: Technology-Based Effluent Limitations for the Lucky Friday Mine

Effluent Characteristic	Effluent Limitations for Mine Drainage (applies to outfall 001 and outfall 002 when 001 discharges from 002)		Effluent Limitations for Mill Process Waters (applies to outfall 003 and outfall 002 when 003 discharges from 002)	
	daily maximum	monthly average	daily maximum	monthly average
cadmium, ug/l	100	50	100	50
copper, ug/l	300	150	300	150
lead, ug/l	600	300	600	300
mercury, ug/l	2	1	2	1
zinc, ug/l	1500	750	1000	500
TSS, mg/l	30	20	30	20
pH, su	within the range 6.0 - 9.0		within the range 6.0 - 9.0	

III. Water Quality-based Evaluation

In addition to the technology-based limits discussed above, EPA evaluated the Lucky Friday discharges to determine compliance with Section 301(b)(1)(C) of the CWA. This section requires the establishment of limitations in permits necessary to meet water quality standards by July 1, 1977.

The regulations at 40 CFR 122.44(d) implement section 301(b)(1)(C) of the CWA. These regulations require that permits include limits for all pollutants or parameters which "are or may be discharged at a level which will cause, have the "reasonable potential to cause, or contribute to an excursion above any state water quality standard", including state narrative criteria for water quality." The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation (WLA).

Water quality-based effluent limits were determined in two ways:

> Water quality-based effluent limits for metals were developed based upon guidance in EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991). This is discussed in Section III.A.
>
> Water quality-based effluent limits for TSS were developed based upon the draft Total Maximum Daily Load (TMDL) for suspended sediments for the South Fork Coeur d'Alene River. This is discussed in Section III.B.

A. Development of Water Quality-based Effluent Limits for Metals

For metals, EPA followed guidance in the TSD to determine whether water quality-based limits are needed and in developing the limits. The water quality-based analysis consists of four steps:

1. Determine the appropriate water quality criteria (see Section III.A.1., below)
2. Determine if there is "reasonable potential" for the discharge to exceed the criteria in the receiving water (see Section III.A.2.)
3. If there is "reasonable potential", develop a WLA (see Section III.A.3.)
4. Develop effluent limitations based on the WLA (see Section III.A.3.)

The following sections provide a detailed discussion of each of the above steps. Appendix B provides an example calculation to illustrate how these steps are implemented.

1. Water Quality Criteria

The first step in developing water quality-based limits is to determine the applicable water quality criteria. For Idaho, the State water quality standards are found at IDAPA 58, Title 1, Chapter 2 (IDAPA 58.01.02). The applicable criteria are determined based on the beneficial uses of the receiving water. The beneficial uses for the SFCdA River are as follows:

- secondary contact recreation (IDAPA 58.01.02110.09.)
- cold water biota (promulgated by EPA on July 31, 1997, 62 FR 41162)

For any given pollutant, different uses may have different criteria. To protect all beneficial uses, the permit limits are based on the most stringent of the water quality criteria applicable to those uses. The applicable criteria used to calculate effluent limits for the Lucky Friday discharges are provided in Table A-2. The criteria included in the table are only for parameters where effluent limits were recalculated in the revised draft permit. For example, the criteria for cadmium, lead, and zinc are included since new limits were developed for these parameters; while the criteria for pH is not included since the proposed pH limits are the same as those public noticed in the 2001 draft permit.

Idaho's aquatic life criteria for cadmium, copper, lead, silver, and zinc are calculated as a function of hardness measured in mg/l of calcium carbonate ($CaCO_3$). As the hardness of the receiving water increases, the toxicity decreases and the numerical value of the criteria increases. Where a mixing zone is allowed, the hardness used to calculate the criteria is the hardness in the receiving water after mixing with the effluent. Where no mixing zone is allowed, effluent hardness is used to calculate the criteria. The numerical values of the hardness-based criteria for outfalls 001, 002, and 003 are provided in Tables A-3 through A-6.

In addition to the calculation for hardness, Idaho's criteria for some metals include a "conversion factor" to convert from total recoverable to dissolved criteria. Conversion factors address the relationship between the total amount of metal in the water column (total recoverable metal) and the fraction of that metal that causes toxicity (bioavailable metal). The conversion factors are shown in italics in Table A-2.

Table A-2: Idaho Water Quality Criteria for New Effluent Limits			
Parameter	Criteria[1]	Cold Water Biota - Aquatic Life Criteria[2, 3]	
		Acute Criteria	Chronic Criteria
Dissolved Cadmium ug/l	Id CWA	$[1.136672-(\ln H)(0.041838)]\ e^{[1.128(\ln H) - 3.828]}$	$[1.101672-(\ln H)(0.041838)]e^{[0.7852(\ln H) - 3.49]}$
	Site-specific	$(0.973)e^{[(1.0166(\ln H) - 3.924]}$	$[1.101672 - (\ln H)(0.041838)]e^{[(0.7852 (\ln H) - 3.49]}$
Dissolved Copper ug/l	Id CWA	$(0.960)e^{[0.9422(\ln H)-1.464]}$	$(0.960)e^{[0.8545(\ln H)-1.465]}$
Dissolved Lead, ug/l	Id CWA	$[1.46203-(\ln H)(0.145712)]e^{[1.273(\ln H)-1.46]}$	$[1.46203-(\ln H)(0.145712)]e^{[1.273(\ln H)-4.705]}$
	Site-specific	$e^{[0.9402(\ln H) + 1.1834]}$	$e^{[0.9402(\ln H) - 0.9875]}$
Total Mercury ug/l	Id CWA	2.1	0.012
Dissolved Silver, ug/l	Id CWA	$(0.85)e^{[1.72(\ln H)-6.52]}$	no chronic value
Dissolved Zinc, ug/l	Id CWA	$(0.978)e^{[0.8473(\ln H)+0.8604]}$	$(0.986)e^{[0.8473(\ln H)+0.7614]}$
	Site-specific	$e^{[0.6624(\ln H) + 2.2235]}$	$e^{[0.6624 (\ln H) + 2.2235]}$

Footnotes:

1 - The Id CWA criteria are based on IDAPA 58.01.02210. The site-specific criteria are based on IDAPA 58.01.02284. Human health criteria is unavailable, except for mercury. The human health criteria for mercury is 0.15 ug/l for secondary contact recreation.

2 - Conversion factors are noted in italics.

3 - The aquatic life criteria for cadmium, copper, lead, silver, and zinc are a function of hardness (H). See Tables A-3 through A-6 for the numerical values.

Table A-3: Hardness-based Criteria Applicable to Outfall 001

Parameter	Flow Tier[1]	Hardness, mg/l $CaCO_3$[2]	Id CWA Criteria		Site-specific Criteria	
			acute	chronic	acute	chronic
Dissolved Cadmium, ug/l	no tiers	74	2.7	0.83	1.5	0.83
Dissolved Copper, ug/l	< 13 cfs	68	12	8.2	na	na
	13 to < 30 cfs	67	12	8.1	na	na
	30 to < 103 cfs	59	10	7.2	na	na
	103 to < 176 cfs	42	7.5	5.4	na	na
	176 cfs	26	4.8	3.6	na	na
	no mixing zone	74	13	8.8	na	na
Dissolved Lead, ug/l	no tiers	74	46	1.8	190	21
Dissolved Silver, ug/l	< 13 cfs	68	1.8	na	na	na
	13 to < 30 cfs	67	1.7	na	na	na
	30 to < 103 cfs	59	1.4	na	na	na
	103 to < 176 cfs	42	0.78	na	na	na
	176 cfs	26	0.34	na	na	na
	no mixing zone	74	2.1	na	na	na
Dissolved Zinc, ug/l	no tiers	74	89	81	160	160

Table A-3: Hardness-based Criteria Applicable to Outfall 001
na = no applicable criteria Footnotes: 1 - See pages A-14 through A-16 and Tables A-10 and A-11 for discussion of how the flow tiers were developed. See page A-17 for a discussion of why mixing zones (and therefore flow tiers) are not applicable to cadmium, lead, and zinc. 2 - Where there is no mixing zone (no flow tiers), the hardness value used to calculate the criteria is the effluent hardness (5th percentile). Where a mixing zone is allowed, the hardness value used to calculate the criteria is the downstream hardness which is the hardness calculated after the effluent is mixed with the receiving water. The hardness is calculated via the following equation: Hmixed = [(He X Qe) + MZ(Hu x Qu)]/ [Qe + MZ(Qu)] He = hardness of the effluent and Hu = hardness of the SFCdA River upstream of the outfall Qe = effluent flow and Qu = flow in the SFCdA River upstream of the outfall MZ = mixing zone volume = 0.25 (see page A-17) For outfall 001: He = 74 mg/l $CaCO_3$ (5th percentile of outfall 001 hardness data collected by Hecla from Jan. 1999 - Oct. 2000) Qe = 0.93 cfs (5th percentile of outfall 001 average daily flow data reported by Hecla on DMRs from Jan. 1996 - Sep. 2000) Hu = 65 mg/l $CaCO_3$, 65 mg/l $CaCO_3$, 57 mg/l $CaCO_3$, 41 mg/l $CaCO_3$, and 25 mg/l $CaCO_3$ for the low through the high flow tiers, respectively (5th percentile of hardness data collected by Hecla Jan. 1999 - Sept. 2000 from location AB#1, upstream of outfall 001) Qu = 7.3 cfs (1Q10) and 8.4 cfs (7Q10) for the lowest flow tier, and 13 cfs, 30 cfs, 103 cfs, and 176 cfs for each of the next higher flow tiers (see Table A-11).

Table A-4: Hardness-based Criteria Applicable to Outfall 002 When Outfall 001 is Discharging from Outfall 002

Parameter	Flow Tier[1]	Hardness, mg/l $CaCO_3$[2]	Id CWA Criteria		Site-specific Criteria	
			acute	chronic	acute	chronic

Table A-4: Hardness-based Criteria Applicable to Outfall 002 When Outfall 001 is Discharging from Outfall 002						
Dissolved Cadmium, ug/l	no tiers	74	2.7	0.83	1.5	0.83
Dissolved Copper, ug/l	< 8.6 cfs	63	11	7.6	na	na
	8.6 to < 20 cfs	61	11	7.4	na	na
	20 to < 69 cfs	58	10	7.1	na	na
	69 to < 117 cfs	42	7.5	5.4	na	na
	117 cfs	27	5.0	3.7	na	na
	no mixing zone	74	13	8.8	na	na
Dissolved Lead, ug/l	no tiers	74	46	1.8	190	21
Dissolved Silver, ug/l	< 8.6 cfs	63	1.6	na	na	na
	8.6 to < 20 cfs	61	1.5	na	na	na
	20 to < 69 cfs	58	1.4	na	na	na
	69 to < 117 cfs	42	0.78	na	na	na
	117 cfs	27	0.36	na	na	na
	no mixing zone	74	2.1	na	na	na
Dissolved Zinc, ug/l	no tiers	74	89	81	160	160

Table A-4: Hardness-based Criteria Applicable to Outfall 002 When Outfall 001 is Discharging from Outfall 002
na = no applicable criteria <u>Footnotes:</u> 1 - See footnote 1 of Table A-3. 2 - See footnote 2 of Table A-3 for discussion on how hardness is calculated. Following are the input parameters used to determine effluent hardness and to calculate downstream hardness for outfall 002 when outfall 001 is discharging through outfall 002: <u>For outfall 002 when the discharge is from outfall 001:</u> MZ = 0.25 (see page A-17) He = 74 mg/l $CaCO_3$ (see footnote 2 of Table A-3) Qe = 0.93 cfs (see footnote 2 of Table A-3) Hu = 55 mg/l $CaCO_3$, 55 mg/l $CaCO_3$, 55 mg/l $CaCO_3$, 40 mg/l $CaCO_3$, and 25 mg/l $CaCO_3$ for the low through the high flow tiers, respectively (5th percentile of hardness data collected by Hecla Jan. 1999 - Sept. 2000 from location AB#2, upstream of outfall 002) Qu = 4.9 cfs (1Q10) and 5.6 cfs (7Q10) for the lowest flow tier, and 8.6 cfs, 20 cfs, 69 cfs, and 117 cfs for each of the next higher flow tiers (see Table A-11).

Table A-5: Hardness-based Criteria Applicable to Outfall 002 When Outfall 003 is Discharging from Outfall 002

Parameter	Flow Tier[1]	Hardness, mg/l $CaCO_3$ [2]	Id CWA Criteria		Site-specific Criteria	
			acute	chronic	acute	chronic
Dissolved Cadmium, ug/l	no tiers	114	4.3	1.1	2.4	1.1
Dissolved Copper, ug/l	< 8.6 cfs	73	13	8.7	na	na
	8.6 to < 20 cfs	68	12	8.2	na	na
	20 to < 69 cfs	62	11	7.5	na	na

Table A-5: Hardness-based Criteria Applicable to Outfall 002 When Outfall 003 is Discharging from Outfall 002

	69 to < 117 cfs	43	7.7	5.5	na	na
	117 cfs	27	5.0	3.7	na	na
	no mixing zone	114	19	13	na	na
Dissolved Lead, ug/l	no tiers	114	74	2.9	280	32
Dissolved Silver, ug/l	< 8.6 cfs	73	2.0	na	na	na
	8.6 to < 20 cfs	68	1.8	na	na	na
	20 to < 69 cfs	62	1.6	na	na	na
	69 to < 117 cfs	43	0.81	na	na	na
	117 cfs	27	0.36	na	na	na
	no mixing zone	114	4.3	na	na	na
Dissolved Zinc, ug/l	no tiers	114	130	120	210	210

Table A-5: Hardness-based Criteria Applicable to Outfall 002 When Outfall 003 is Discharging from Outfall 002

na = no applicable criteria

Footnotes:

1 - See footnote 1 of Table A-3.

2 - See footnote 2 of Table A-3 for discussion on how hardness is calculated.

Following are the input parameters used to determine effluent hardness and to calculate downstream hardness for outfall 002 when outfall 003 is discharging through outfall 002:

For outfall 002 when the discharge is from outfall 003:

MZ = 0.25 (see page A-17)

He = 114 mg/l $CaCO_3$ (see footnote 2 of Table A-6)

Qe = 0.62 cfs (see footnote 2 of Table A-6)

Hu = 55 mg/l $CaCO_3$, 55 mg/l $CaCO_3$, 55 mg/l $CaCO_3$, 40 mg/l $CaCO_3$, and 25 mg/l $CaCO_3$ for the low through the high flow tiers, respectively (see footnote 2 of Table A-4).

Qu = 4.9 cfs (1Q10) and 5.6 cfs (7Q10) for the lowest flow tier, and 8.6 cfs, 20 cfs, 69 cfs, and 117 cfs for each of the next higher flow tiers (see footnote 2 of Table A-4).

Table A-6: Hardness-based Criteria Applicable to Outfall 003						
Parameter	Flow Tier[1]	Hardness, mg/l $CaCO_3$[2]	Id CWA Criteria		Site-specific Criteria	
			acute	chronic	acute	chronic
Dissolved Cadmium, ug/l	no tiers	114	4.3	1.1	2.4	1.1
Dissolved Copper, ug/l	< 8 cfs	74	13	8.8	na	na
	8 to < 18 cfs	68	12	8.2	na	na
	18 to < 63 cfs	54	9.5	6.7	na	na
	63 to < 108 cfs	36	6.5	4.7	na	na
	108 cfs	22(25)[3]	4.6	3.6	na	na
	no mixing zone	114	19	13	na	na
Dissolved Lead, ug/l	no tiers	114	74	2.9	280	32
Dissolved Silver, ug/l	< 8 cfs	74	2.1	na	na	na
	8 to < 18 cfs	68	1.8	na	na	na
	18 to < 63 cfs	54	1.2	na	na	na
	63 to < 108 cfs	36	0.60	na	na	na
	108 cfs	22(25)[3]	0.32	na	na	na
	no mixing zone	114	4.3	na	na	na
Dissolved Zinc, ug/l	no tiers	114	130	120	210	210

Table A-6: Hardness-based Criteria Applicable to Outfall 003
na = no applicable criteria <u>Footnotes:</u> 1 - See footnote 1 of Table A-3. 2 - See footnote 2 of Table A-3 for discussion on how hardness is calculated. Following are the input parameters used to determine effluent hardness and to calculate downstream hardness for outfall 003: <u>For outfall 003:</u> MZ = 0.25 (see page A-17) He = 114 mg/l $CaCO_3$ (5th percentile of hardness data collected by Hecla from Jan. 1999 - Oct. 2000) Qe = 0.62 cfs (5th percentile of average daily flow data reported by Hecla on DMRs from Jan. 1997 - March 2002) Hu = 55 mg/l $CaCO_3$, 55 mg/l $CaCO_3$, 46 mg/l $CaCO_3$, 36 mg/l $CaCO_3$, and 20 mg/l $CaCO_3$ for the low through high flow tiers, respectively (5th percentile of hardness data collected by Hecla Jan. 1999 - Sept. 2000 from location AB#3) Qu = 4.5 cfs (1Q10) and 5.2 cfs (7Q10) for the lowest flow tier, and 8 cfs, 18 cfs, 63 cfs, and 108 cfs for each of the next higher flow tiers (see Table A-11). 3 - Where the hardness is less than 25 mg/l $CaCO_3$, then 25 mg/l $CaCO_3$ is used as the hardness, per the National Toxics Rule.

2. Reasonable Potential Evaluation

To determine if there is “reasonable potential” to cause or contribute to an exceedence of water quality criteria for a given pollutant (and therefore whether a water quality-based effluent limit is needed), for each pollutant present in a discharge, EPA compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is “reasonable potential”, and a limit must be included in the permit. EPA uses the recommendations in Chapter 3 of the TSD to conduct this “reasonable potential” analysis. This section discusses how reasonable potential is evaluated.

The maximum projected receiving water concentration (C_d) is determined using the following mass balance equations.

Where a mixing zone is allowed:

$$C_d = \frac{(C_e \times Q_e) + [C_u \times (Q_u \times MZ)]}{Q_e + (Q_u \times MZ)} \qquad \text{(Equation 1)}$$

Where no mixing zone is allowed, $C_d = C_e$ (Equation 2)

where, C_d = receiving water concentration downstream of the discharge (at mixing zone edge)

C_e = maximum projected effluent concentration

C_u = receiving water upstream concentration of pollutant

Q_e = effluent flow

Q_u = receiving water upstream flow

Q_d = receiving water flow downstream of the effluent discharge = $(Q_e + Q_u)$

MZ = the mixing zone fraction based on receiving water flow

For the metals of concern the aquatic life water quality criteria are expressed as dissolved. However, the NPDES regulations require that metals limits be based on total recoverable metals (40 CFR 122.45(c)). This is because changes in water chemistry as the effluent and receiving water mix could cause some of the particulate metal in the effluent to dissolve. To account for the difference between total effluent concentrations and dissolved criteria, “translators” are used in the reasonable potential (and permit limit derivation) equations. Therefore, for those metals with criteria expressed as dissolved, Equations 1 and 2 become:

where a mixing zone is allowed:

$$C_d = \frac{\text{translator} \times (C_e \times Q_e) + [C_u \times (Q_u \times MZ)]}{Q_e + (Q_u \times MZ)}$$

(Equation 3)

where no mixing zone is allowed: $C_d = \text{translator} \times C_e$

(Equation 4)

After C_d is determined, it is compared to the applicable water quality criterion. If it is greater than the criterion, a water quality-based effluent limit is developed for that parameter.

The following discusses each of the factors used in the mass balance equation to calculate C_d. Many of these same factors are used to also calculate the effluent limits in Section III.A.3.

Translator: Translators can either be site-specific numbers or default numbers. EPA guidance related to the use of translators in NPDES permits is found in *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007, June 1996). In the absence of site-specific translators, this guidance recommends the use of the water quality criteria conversion factors as the default translators. The water quality conversion factors were used as translators in the draft permit calculations.

Hecla commented on the 2001 draft permit, that the translator developed for lead in the TMDL, at a minimum, should be used instead of the default translator (Hecla 2001). EPA agreed that the translators developed in the TMDL are more representative of site-specific conditions than the default translators. The TMDL translators are therefore used in these revised draft permit calculations. Translators were developed in the TMDL for cadmium, lead, and zinc for different segments of the SFCdA River. The translators applicable to conditions downstream from the Lucky Friday Mine discharges are the SFCdA at Wallace values shown in Table 6-10 of the TMDL Technical Support Document (EPA and IDEQ 2000). These translators, expressed as total /dissolved are:

cadmium - 1.0
lead - 1.2
zinc - 1.0

The translator in the mass balance equations (equations 3, 4, 7, and 9) is expressed as dissolved/total, therefore, the translators for cadmium, lead, and zinc used in the equations are the reciprocal of the TMDL translators:

cadmium - 1.0
lead - 0.833
zinc - 1.0

Site-specific translators are not available for the other parameters (copper, mercury, and silver). Therefore, the water quality conversion factors were used as the default translators for these parameters. The water quality conversion factors are provided in italics in Table A-2.

<u>C_e (maximum projected effluent concentration</u>): The maximum projected effluent concentration is determined in two different ways. For parameters that have technology-based effluent limits (see Table A-1), the maximum daily limit is used as the projected effluent concentration. The maximum technology-based limit is used since water quality-based limits are only required if discharge at the technology-based limits have reasonable potential to exceed water quality standards in the receiving water.

For parameters that do not have technology-based effluent limits (silver), the maximum projected effluent concentration in the mass balance equation is represented by the 99th percentile of the effluent data. The 99th percentile is calculated using the statistical approach recommended in the TSD, i.e., by multiplying the maximum reported effluent concentration by a reasonable potential multiplier (RPM):

$$C_e = (\text{maximum measured effluent concentration}) \times RPM \quad \text{(Equation 5)}$$

The RPM accounts for uncertainty in the effluent data. The RPM depends upon the amount of effluent data and variability of the data as measured by the coefficient of variation (CV) of the data.

When there are not enough data to reliably determine a CV, the TSD recommends using 0.6 as the default CV. Once the CV of the data is determined, the RPM is determined using the statistical methodology discussed in Section 3.3 of the TSD.

Maximum reported effluent concentrations, CVs, and RPMs used in the reasonable potential calculations were based on data collected by Hecla (DMR data and other monitoring) and EPA (compliance inspection data) since January 1997. The last five years of data was used since it was determined to be most representative of current and future conditions. See Tables A-7, A-8, and A-9 for the specific values of the effluent concentrations, CVs, and RPMs used in the reasonable potential analysis. Some of the CVs and RPMs were different from those used in the draft permit calculations since additional effluent data is available for the last year. In addition, data for cadmium, lead, and zinc are presented and data for outfall 002 are presented; such data was not included in the 2001 fact sheet since the draft permit effluent limits for cadmium, lead, and zinc were based on the TMDL and the limits for outfall 002 were either those for outfall 001 or 003.

<u>C_u (upstream concentration of pollutant)</u>: The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge point. Where sufficient data exists, the 95th percentile of the ambient data is generally used as an estimate of worst-case. The C_u's are provided in Tables A-7, A-8, and A-9. The C_u's for copper and silver are different (decreased) from those used in the draft permit calculations. Hecla submitted data demonstrating that the copper and silver upstream data used in the draft permit calculations was incorrect due to laboratory error. Hecla collected additional copper and silver data upstream of outfalls 001 and 003 to replace the incorrect data and this new data was used in these calculations.

Table A-7: Summary of Data Used to Determine Reasonable Potential and Develop Effluent Limits for Outfall 001

Parameter[1] ug/l	Effluent Data				Receiving Water Upstream Concentration (C_u)[6]	
	Maximum Effluent Concentration[2] (total)	Coefficient of Variation (CV)[3]	Number of Samples[4]	Reasonable Potential Multiplier (RPM)[5]	total	dissolved
Cadmium	100	1.1	na	na	na	na
Copper	300	0.8	na	na	na	1.8
Lead	600	0.4	na	na	na	na
Mercury	2	0.6	na	na	0	0
Silver	2	0.4	10	2.2	na	0
Zinc	1500	1.2	na	na	na	na

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Table A-7: Summary of Data Used to Determine Reasonable Potential and Develop Effluent Limits for Outfall 001

Footnotes:

1 - Reasonable potential (RP) was determined only for parameters with recalculated effluent limits.

2 - For parameters with technology-based effluent limitation guidelines (all except silver), the maximum effluent concentration used to determine RP is the technology-based maximum daily limitation (see Table A-1 and page A-10). For silver, the maximum effluent concentration used is the maximum detected concentration based on sampling of Outfall 001 from Jan. 1997 through Jan. 2000.

3- The CV is calculated as the standard deviation of the data divided by the mean. Where the majority of the effluent data was reported at less then detection limits, effluent-specific variability cannot be determined, so a default CV of 0.6 was used. This was the case for mercury. The CVs for lead, mercury, silver, and zinc were based on sampling of Outfall 001 from Jan.1997 through Jan. 2000. For copper, data from Jan. 2000 through Jan. 2002 was used since previous data was mostly nondetect at a high detection limit. For cadmium, data from April 23, 2001 through Jan. 2002 was used since previous data was mostly nondetect at a high detection limit.

4 - The number of samples is used to develop the RPM. For parameters with technology-based effluent limitation guidelines (all except silver) the RPM is not needed, therefore the number of samples is not important ("na"). For silver, the number of samples collected since Jan. 1997 is reported.

6 - For parameters with technology-based effluent limitation guidelines the RPM is not needed (na). For silver, the RPM is based on the CV and the number of samples.

7 - The receiving water concentrations are based on samples collected by Hecla from monitoring location AB#1, upstream of outfall 001. For mercury, data from Jan. 1999 through Dec. 2000 was used and since all the data was reported at less than the detection limit, zero was used as C_u. For copper and silver, data from May 30, 2000 through Sept. 2001 were used since the previous data was incorrect (see page A-11). The copper C_u represents the 95th percentile of the data, where ½ the method detection limit was used for values reported at less than the detection limit. Since all the silver data was reported at less than method detection limits, zero was used as C_u. The C_us are

Table A-8: Summary of Data Used to Determine Reasonable Potential and Develop Effluent Limits for Outfall 002						
Parameter[1] ug/l	Effluent Data				Receiving Water Upstream Concentration (C_u)[6]	
	Maximum Effluent Concentration[2] (total)	Coefficient of Variation (CV)[3]	Number of Samples[4]	Reasonable Potential Multiplier (RPM)[5]	total	dissolved
Cadmium	100	1.1 (001) 0.5 (003)	na	na	na	na
Copper	300	0.8 (001) 1.2 (003)	na	na	na	1.5
Lead	600	0.4	na	na	na	na
Mercury	2	0.6	na	na	0	0
Silver	2	0.4	10	2.2	na	0
Zinc	1500 (001) 1000 (003)	1.2 (001) 0.4 (003)	na	na	na	na

Table A-8: Summary of Data Used to Determine Reasonable Potential and Develop Effluent Limits for Outfall 002

Footnotes:

1 - Since outfall 002 will consist of the flow of either outfall 001 or 003, Reasonable potential (RP) was determined only for parameters of concern in outfalls 001 and 003.

2 - Same as footnote 2 of Table A-7. For silver, the maximum effluent concentration used is the maximum detected concentration from outfalls 001 and 003 (see Tables A-7 and A-9).

3- The CV values represent the CV of the outfall 001 and outfall 003 values for each parameter (see Tables A-7 and A-9).

4 - Same as footnote 4 of Table A-7.

5 - Same as footnote 5 of Table A-7.

6 - The receiving water concentrations are based on samples collected by Hecla from monitoring location AB#2, upstream of outfall 002. For mercury, data from Jan. 1999 through Dec. 2000 was used and since all the data was reported at less than the detection limit, zero was used as C_u. For copper and silver, the data was determined to be incorrect, therefore the C_us from outfall 003 were used. The C_us are only reported for the form in which the criterion is expressed ("na" for other forms). C_us are not needed ("na") for cadmium, lead, and zinc since a mixing zone is not authorized for these parameters. See equation 4.

Table A-9: Summary of Data Used to Determine Reasonable Potential and Develop Effluent Limits for Outfall 003						
Parameter[1] ug/l	Effluent Data				Receiving Water Upstream Concentration (C_u)[6]	
	Maximum Effluent Concentration[2] (total)	Coefficient of Variation (CV)[3]	Number of Samples[4]	Reasonable Potential Multiplier (RPM)[5]	total	dissolved
Cadmium	100	0.5	na	na	na	na
Copper	300	1.2	na	na	na	1.5
Lead	600	0.4	na	na	na	na
Mercury	2	0.6	na	na	0	0
Silver	2	0.4	10	2.2	na	0
Zinc	1000	0.4	na	na	na	na

Footnotes:
1, 2, 3, 4, 5, and 6 - These footnotes are the same as footnotes 1, 2, 3, 4, and 5 of Table A-7.
6 - The receiving water concentrations are based on samples collected by Hecla from monitoring location AB#3, upstream of outfall 003. The rest of this footnote is the same as footnote 6 of Table A-7.

Q_u (upstream flow): The upstream flow used in the mass balance equations depends upon the criterion and flow tier that is being evaluated. The critical low flows used to evaluate compliance with the water quality criteria are:

- The 1-day, 10-year low flow (1Q10) is used for the protection of aquatic life from acute effects. It represents the lowest daily flow that is expected to occur once in 10 years.

- The 7-day, 10-year low flow (7Q10) is used for protection of aquatic life from chronic effects. It represents the lowest 7-day average flow expected to occur once in 10 years.

- The 30-day, 5-year low flow (30Q5) is used for the protection of human health uses from non-carcinogens (e.g., mercury). It represents the 30-day average flow expected to occur once in 5 years.

Long-term flow data for locations upstream of the outfalls is limited. Therefore, in the 2001 draft permit, statistical flows upstream of outfalls 001 and 002 were obtained by calculating linear regressions between the available flow data and the USGS station at Silverton (for which long term flow data is available).

In their comments on the 2001 draft permit, Hecla submitted an analysis prepared by Brown and Caldwell of low flow upstream of outfall 003 (Hecla 2001). The Brown and Caldwell analysis took into account daily discharges from outfall 003 and their effect on downstream gaged flows. In the draft permit calculations, EPA had subtracted out the maximum outfall 003 flow (instead of the daily flows) from downstream flows. The Brown and Caldwell analysis provides an improved estimate of the design flows for this location and these flows, therefore are used in the revised draft permit calculations. Hecla did not provide a revised analysis for outfall 001, therefore the outfall 001 upstream flows are the same as used in the 2001 draft permit.

The effluent limits for outfall 002 in the 2001 draft permit were the same as the limits for outfall 001 or outfall 003 (depending upon which waste stream was being discharged through outfall 002). Therefore, a separate set of effluent limits was not calculated for outfall 002, in which case SFCdA River flows upstream of outfall 002 were not needed. Hecla commented on the draft permit, that limitations developed for outfall 002 must be reflective of the discharge conditions in the receiving water at outfall 002 (Hecla 2001). EPA agreed and has therefore estimated flows upstream of outfall 002 to be used to determine effluent limits. The nearest location with available receiving water data upstream of outfall 002 is the USGS gage at Deadman Gulch. However, the period of record of the Deadman Gulch gage is insufficient to calculate the critical receiving water flows. Therefore, the flow values were estimated by performing a regression between the data at the Deadman Gulch gage and the Silverton gage (where more than 20 years of data are available).

Table A-10 identifies how flows upstream of the outfalls were determined.

Table A-10: Receiving Water Flow Data

Flow Parameter	SFCdA River at Silverton (USGS #12413150)	SFCdA River at Deadman Gulch[1] (USGS #12413040)	Flow Upstream of Outfall 003[2]	Flow Upstream of Outfall 002[3]	Flow Upstream of Outfall 001[4]

Table A-10: Receiving Water Flow Data					
period of record	1967 - 1986 and 10/98 - 9/99	10/98 - 9/99	na	na	na
1Q10, cfs	27	4.9	4.5	4.9	7.3
7Q10, cfs	31	5.6	5.2	5.6	8.4
30Q5, cfs	42	7.6	7.0	7.6	11
10th percentile, cfs	48	8.6	8.0	8.6	13
50th percentile, cfs	109	20	18	20	30
90th percentile, cfs	649	117	108	117	176

Footnotes:
1 - Flow data obtained by multiplying the SFCdA at Silverton flows by 0.18. This is the ratio of (SFCdA at Deadman flow)/(SFCdA at Silverton flow) calculated from regression analysis of 10/98 - 9/99 USGS data (R-squared value of 0.97).
2 - Flow values based on analysis performed by Brown and Caldwell for Hecla (Attachment III of Hecla 2001). Brown and Caldwell calculated flow values upstream of outfall 003 by subtracting the daily outfall 003 flows from the daily Deadman Gulch gage flows (since Deadman Gulch gage is downstream of outfall 003). Critical flows were then calculated via a regression analysis between the Silverton gage and flow upstream of outfall 003. The regression ratio was 0.1669 with a R-squared value of 0.97.
3 - Same as values estimated for the Deadman Gulch gage since Deadman Gulch is upstream of outfall 002.
4 - Same flows as used in the draft permit calculations. See Table B-8 of the 2001 fact sheet.

Flow in the SFCdA River varies with precipitation and snow melt. Therefore, the reasonable potential analysis was conducted and effluent limits were developed for four separate ranges or tiers of flow in the 2001 draft permit. The flow tiers represent the 10th, 50th, and 90th percentile river flows. In their preliminary CWA 401 certification, IDEQ commented that there is a large gap in the stream water flow that occurs between the 50^{th} and 90^{th} percentiles (see Part V. of the Fact Sheet). IDEQ requested that effluent limits be developed for an additional flow tier, at the 70^{th} percentile stream flow. In response to this request, an additional flow tier was developed based on the flow halfway between the 50th and 90th percentiles. While this flow tier does not correspond exactly to the 70th percentile flow tier, it allows for two equal ranges of flow between the 50th and 90th percentiles, which evenly fills the gap between the 50th and 90th percentile flow tiers.

Based upon the above discussion and Table A-10, the flow tiers and corresponding upstream flows (Q_u) for each tier are shown in Table A-11.

Table A-11: Flow Tiers and Upstream Flows

Flow Tier (percentile of upstream flow)	Outfall 001		Outfall 002		Outfall 003	
	Flow Tier, cfs	Q_u	Flow Tier	Q_u	Flow Tier	Q_u
< 10th	< 13	7.3 cfs (acute) 8.4 cfs (chronic) 11 cfs (HH criteria)	< 8.6	4.9 cfs (acute) 5.6 cfs (chronic) 7.6 cfs (HH criteria)	< 8.0	4.5 cfs (acute) 5.2 cfs (chronic) 7.0 cfs (HH criteria)
10th to < 50th	13 to < 30	13 cfs	8.6 to < 20	8.6 cfs	8 to < 18	8.0 cfs
50th to < half-way between the 50th and 90th percentiles	30 to < 103	30 cfs	20 to < 69	20 cfs	18 to < 63	18 cfs
halfway between the 50th and 90th percentiles	103 to < 176	103 cfs	69 to < 117	69 cfs	63 to < 108	63 cfs
90th	176	176 cfs	117	117 cfs	108	108 cfs

Q_e (effluent flow): The effluent flow used in the mass balance equations is the maximum effluent flow. The maximum effluent flows reported by Hecla on DMRs since 1997 are as follows:

- Outfall 001: 1.7 mgd (2.6 cfs)
- Outfall 003: 2.275 mgd (3.5 cfs)

The effluent flow for outfall 003 is the same as used in the 2001 draft permit calculations. The effluent flow for outfall 001 has decreased since only the last five years of data was used (the draft permit calculations used data from 1996). Hecla has stated that the last five years of data are the most representative of current and future conditions.

Since outfall 002 can discharge either flows from outfall 001 or 003, the effluent flows for both outfalls were each used to calculate two separate sets of effluent limits for outfall 002. One set of limits applies to the situation where the waste streams from outfall 001 are discharged through outfall 002. The other set of limits applies to the situation where the waste streams from outfall 003 are discharged through outfall 002.

MZ (the percent mixing zone based on receiving water flow): Mixing zones are defined as a limited area or volume of water where the discharge plume is progressively diluted by the receiving water. Water quality criteria may be exceeded in the mixing zone as long as acutely toxic conditions are prevented from occurring and the applicable existing designated uses of the water body are not impaired as a result of the mixing zone. Mixing zones are allowed at the discretion of the State, based on the State water quality standards regulations.

The Idaho water quality standards at IDAPA 58.01.02060 allow for the use of mixing zones. The Idaho water quality standards recommend that the mixing zone should not be more than 25% of the volume of stream flow, therefore, mixing zone volumes of up to 25% were used to determine reasonable potential and develop effluent limits for copper, mercury, and silver. Mixing zones are not allowed where the receiving water is impaired, since there is no assimilative capacity available to allow for dilution (mixing). Since the SFCdA River below the Lucky Friday discharges is impaired for cadmium, lead, and zinc, mixing zones were not authorized for these parameters.

In accordance with state water quality standards, only IDEQ may authorize mixing zones. In their preliminary CWA 401 certification, IDEQ did not request changes to the mixing zones described in the above paragraph. However, if IDEQ authorizes different mixing zone sizes in its final 401 certification, EPA will recalculate the reasonable potential and effluent limits based on the final mixing zones.

Reasonable Potential Summary: Results of the reasonable potential analysis is provided in Tables A-12 through A-15. Based on the reasonable potential analysis, water quality-based effluent limits were developed for all the parameters. For outfall 001, the discharge of silver at flow tiers   13 cfs did not show a reasonable potential to cause or contribute to an exceedence of the silver water quality criterion. Therefore, effluent limits for silver at flow tiers   13 cfs were not developed for outfall 001. Likewise, discharge of silver from outfall 002 (when outfall 001 is discharged through outfall 002) did not show reasonable potential at flow tiers   20 cfs. Therefore, effluent limits for silver at flow tiers   20 cfs were not developed for outfall 002.

To demonstrate the reasonable potential analysis, an example of the reasonable potential determination for copper in Outfall 001 is provided in Appendix B (see Steps 1 and 2).

Table A-12: Summary of Reasonable Potential Determination for Outfall 001

Parameter	Reasonable Potential Evaluation[1]	Flow Tiers					
		no mixing zone	< 13 cfs	13 to < 30 cfs	30 to < 103 cfs	103 to <176 cfs	176 cfs
Cadmium[2]	aquatic life acute C_d, dissolved, ug/l	100	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	100	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Copper	aquatic life acute C_d, dissolved, ug/l	288	170	129	76	28	18
	aquatic life chronic C_d, dissolved, ug/l	288	160	129	76	28	18
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Lead[2]	aquatic life acute C_d, dissolved, ug/l	501	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	501	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Mercury	aquatic life acute C_d, dissolved, ug/l	1.70	0.99	0.76	0.44	0.16	0.095

Table A-12: Summary of Reasonable Potential Determination for Outfall 001

	aquatic life chronic C_d, dissolved, ug/l	2.00	1.11	0.89	0.52	0.18	0.11
	recreational C_d, total, ug/l	2.00	0.38	0.33	0.16	0.049	0.029
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Silver	aquatic life acute C_d, dissolved, ug/l	3.74	2.2	1.7	0.34	0.96	0.21
	Reasonable Potential	Yes	Yes	No	No	No	No
Zinc[2]	aquatic life acute C_d, dissolved, ug/l	1500	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	1500	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na

na = no criteria for comparison or no mixing zone available

Footnotes:
1- Reasonable Potential exists if the maximum projected receiving water concentration (C_d) exceeds the applicable criterion (see Tables A-2 and A-3 for the criteria).
2 - No mixing zone was authorized for these parameters (see page A-17)

Table A-13: Summary of Reasonable Potential Determination for Outfall 002 when Outfall 001 is Discharging through Outfall 002

Parameter	Reasonable Potential Evaluation[1]	Flow Tiers					
		no mixing zone	< 8.6 cfs	8.6 to < 20 cfs	20 to <69 cfs	69 to < 117 cfs	117 cfs

Table A-13: Summary of Reasonable Potential Determination for Outfall 002 when Outfall 001 is Discharging through Outfall 002							
Cadmium[2]	aquatic life acute C_d, dissolved, ug/l	1000	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	1000	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Copper	aquatic life acute C_d, dissolved, ug/l	288	196	158	99	39	25
	aquatic life chronic C_d, dissolved, ug/l	288	188	158	99	39	25
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Lead[2]	aquatic life acute C_d, dissolved, ug/l	501	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	501	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Mercury	aquatic life acute C_d, dissolved, ug/l	1.70	1.16	0.93	0.58	0.22	0.139
	aquatic life chronic C_d, dissolved, ug/l	2.00	1.30	1.09	0.68	0.26	0.163

Table A-13: Summary of Reasonable Potential Determination for Outfall 002 when Outfall 001 is Discharging through Outfall 002							
	recreational C_d, total, ug/l	2.00	0.51	0.46	0.23	0.073	0.043 5
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Silver	aquatic life acute C_d, dissolved, ug/l	3.74	2.54	2.05	1.28	0.49	0.305
	Reasonable Potential	Yes	Yes	Yes	No	No	No
Zinc[2]	aquatic life acute C_d, dissolved, ug/l	1500	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	1500	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na

Footnotes:
1- Reasonable Potential exists if the maximum projected receiving water concentration (C_d) exceeds the applicable criterion (see Tables A-2 and A-4 for the criteria).

2 - No mixing zone was authorized for these parameters (see page A-17).

Table A-14: Summary of Reasonable Potential Determination for Outfall 002 when Outfall 003 is Discharging through Outfall 002							
Parameter	Reasonable Potential Evaluation[1]	Flow Tiers					
		no mixing zone	< 8.6 cfs	8.6 to < 20 cfs	20 to < 69 cfs	69 to < 117 cfs	117 cfs

Table A-14: Summary of Reasonable Potential Determination for Outfall 002 when Outfall 003 is Discharging through Outfall 002							
Cadmium[2]	aquatic life acute C_d, dissolved, ug/l	1000	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	1000	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Copper	aquatic life acute C_d, dissolved, ug/l	288	214	179	119	50	32
	aquatic life chronic C_d, dissolved, ug/l	288	206	179	119	50	32
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Lead[2]	aquatic life acute C_d, dissolved, ug/l	500	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	500	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Mercury	aquatic life acute C_d, dissolved, ug/l	1.70	1.26	1.05	0.70	0.29	0.18
	aquatic life chronic C_d, dissolved, ug/l	2.00	1.43	1.24	0.82	0.34	0.21

Table A-14: Summary of Reasonable Potential Determination for Outfall 002 when Outfall 003 is Discharging through Outfall 002							
	recreational C_d, total, ug/l	2.00	0.63	0.58	0.30	0.097	0.058
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Silver	aquatic life acute C_d, dissolved, ug/l	3.74	2.77	2.32	1.54	0.63	0.40
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Zinc[2]	aquatic life acute C_d, dissolved, ug/l	1000	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	1000	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na

Footnotes:
1- Reasonable Potential exists if the maximum projected receiving water concentration (C_d) exceeds the applicable criterion (see Tables A-2 and A-5 for the criteria).

2 - No mixing zone was authorized for these parameters (see page A-17).

Table A-15: Summary of Reasonable Potential Determination for Outfall 003							
Parameter	Reasonable Potential Evaluation[1]	Flow Tiers					
		no mixing zone	< 8.0 cfs	8.0 to < 18 cfs	18 to <63 cfs	63 to <108 cfs	108 cfs

Table A-15: Summary of Reasonable Potential Determination for Outfall 003							
Cadmium[2]	aquatic life acute C_d, dissolved, ug/l	100	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	100	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Copper	aquatic life acute C_d, dissolved, ug/l	288	218	184	127	54	34
	aquatic life chronic C_d, dissolved, ug/l	288	210	184	127	54	34
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Lead[2]	aquatic life acute C_d, dissolved, ug/l	500	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	500	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na
Mercury	aquatic life acute C_d, dissolved, ug/l	1.70	1.29	1.08	0.74	0.31	0.20
	aquatic life chronic C_d, dissolved, ug/l	2.00	1.46	1.27	0.89	0.36	0.23

Table A-15: Summary of Reasonable Potential Determination for Outfall 003							
	recreational C_d, total, ug/l	2.00	0.67	0.61	0.33	0.11	0.063
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Silver	aquatic life acute C_d, dissolved, ug/l	3.74	2.8	2.4	1.6	0.68	0.43
	Reasonable Potential	Yes	Yes	Yes	Yes	Yes	Yes
Zinc[2]	aquatic life acute C_d, dissolved, ug/l	1000	na	na	na	na	na
	aquatic life chronic C_d, dissolved, ug/l	1000	na	na	na	na	na
	Reasonable Potential	Yes	na	na	na	na	na

Footnotes:
1- Reasonable Potential exists if the maximum projected receiving water concentration (C_d) exceeds the applicable criterion (see Tables A-2 and A-6 for the criteria).

2 - No mixing zone was authorized for these parameters (see page A-17).

3. Water Quality-Based Permit Limit Derivation

Once EPA has determined that a water quality-based limit is required for a pollutant, the first step in developing the permit limit is development of a wasteload allocation (WLA) for the pollutant. A WLA is the concentration (or loading) of a pollutant that the permittee may discharge without causing or contributing to an exceedence of water quality standards in the receiving water. The WLAs are then converted to long-term average concentrations (LTAs) and compared. The most stringent LTA concentration for each parameter is converted to effluent limits. The procedures for deriving WLAs, LTA concentrations, and effluent limits are based upon guidance in the TSD. This section describes each of these steps.

Calculation of WLAs. Where the state authorizes a mixing zone for the discharge, the WLA is calculated as a mass balance, based on the available dilution, background concentration of the pollutant, and the water quality criterion. WLAs are calculated using the same mass balance equation used in the reasonable potential evaluation (see Equation 1). However, C_d becomes the criterion and C_e the WLA. Making these substitutions, Equation 1 is rearranged to solve for the WLA, becoming:

$$WLA = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e}$$ (Equation 6)

For criteria expressed as dissolved a translator is added to Equation 6 and the WLA is calculated as:

$$WLA = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e \times \text{translator}}$$ (Equation 7)

Where no mixing zone is allowed, the criterion becomes the WLA (see Equations 8 and 9). Establishing the criterion as the WLA ensures that the permittee does not contribute to an exceedence of the criteria.

no mixing zone: WLA = criterion (Equation 8)

WLA = criterion/translator (for criteria expressed as dissolved) (Equation 9)

Calculation of Long-term Average Concentrations (LTAs): As discussed above, WLAs are calculated for each parameter and each criterion (acute aquatic life, chronic aquatic life, human health). Because the different criteria apply over different time frames and may have different mixing zones, it is not possible to compare the criteria or the WLAs directly to determine which criterion results in the most stringent limits. For example, the acute criteria are applied as a one-hour average and may have a smaller (or no) mixing zone, while the chronic criteria are applied as a four-day average and may have a larger mixing zone.

To allow for comparison, the acute and chronic aquatic life criteria are statistically converted to LTA concentrations. This conversion is dependent upon the CV of the effluent data and the probability basis used. The probability basis corresponds to the percentile of the estimated concentration. EPA uses a 99th percentile for calculating a LTA, as recommended in the TSD. The following equation from Chapter 5 of the TSD is used to calculate the LTA concentrations (alternately, Table 5-1 of the TSD may be used):

$$\text{LTA} = \text{WLA} \times \exp[0.5\ {}^{2} - z\ ] \quad \text{(Equation 10)}$$

where: ^{2} = $\ln(CV^2 + 1)$ for acute aquatic life criteria
= $\ln(CV^2/4 + 1)$ for chronic aquatic life criteria
CV = coefficient of variation
z = 2.326 for 99th percentile probability basis, per the TSD

<u>Calculation of Effluent Limits:</u> The LTA concentration is calculated for each criterion and compared. The most stringent LTA concentration is then used to develop the maximum daily (MDL) and average monthly (AML) permit limits. The MDL is based on the CV of the data and the probability basis, while the AML is dependent upon these two variables and the monitoring frequency. As recommended in the TSD, EPA used a probability basis of 95 percent for the AML calculation and 99 percent for the MDL calculation. The MDL and AML are calculated using the following equations from the TSD (alternately, Table 5-2 of the TSD may be used):

$$\text{MDL or AML} = \text{LTA} \times \exp[z - 0.5\ {}^{2}] \quad \text{(Equation 11)}$$

for the MDL: ^{2} = $\ln(CV^2 + 1)$
z = 2.326 for 99th percentile probability basis, per the TSD

for the AML: ^{2} = $\ln(CV^2/n + 1)$
n = number of sampling events required per month
z = 1.645 for 95th percentile probability basis, per the TSD

For setting water quality-based limits for protection of human health uses, the TSD recommends setting the AML equal to the WLA, and then calculating the MDL (i.e., no calculation of LTAs). The human health MDL is calculated based on the ratio of the AML and MDL as expressed by Equation 11. The MDL, therefore, is based on effluent variability and the number of samples per month. AML/MDL ratios are provided in Table 5-3 of the TSD.

The water quality-based effluent limits developed for outfalls 001, 002, and 003 for each parameter that exhibited reasonable potential are shown in Tables A-16 through A-19. These tables also show intermediate calculations (i.e., WLAs, LTAs) used to derive the effluent limits. Appendix B shows an example of the permit limit calculation for copper in Outfall 001 (see Steps 3 and 4).

Table A-16: Summary of Water Quality-based Effluent Limit Derivation for Outfall 001								
Parameter[1] ug/l	Flow Tier[2]	Aquatic Life Criteria WLAs		Aquatic Life Criteria LTA Concentrations		Water Quality-based Effluent Limits		
		acute WLA	chronic WLA	acute LTA	chronic LTA	Basis[3]	maximum daily limit	avg.monthly limit
cadmium	Id CWA criteria	2.67	0.825	0.50	0.285	chronic	1.5	0.58
	ssc	1.53	0.83	0.286	0.285	chronic	1.5	0.58
lead	Id CWA criteria	55.6	2.17	24.5	1.40	chronic	3.2	1.9
	ssc	224	25.6	98.7	16.4	chronic	37	22
zinc	Id CWA criteria	88.7	81.0	15.4	26.0	acute	89	33
	ssc	160	160	27.8	51.3	acute	160	59
copper	< 13 cfs	19.7	13.9	4.91	6.10	acute	20	8.6
	13 to < 30 cfs	25.0	16.6	6.24	7.28	acute	25	11
	30 to < 103 cfs	36.5	23.9	9.10	10.5	acute	36	16
	103 to <176 cfs	66.8	42.9	16.7	18.8	acute	67	29
	176 cfs	57.6	35.3	14.4	15.5	acute	58	25
	no mixing zone	13.3	9.14	3.33	4.02	acute	13	5.8
mercury[4]	< 13 cfs	4.08	0.0217	1.31	0.0114	chronic	0.036	0.018

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Table A-16: Summary of Water Quality-based Effluent Limit Derivation for Outfall 001

	13 to < 30 cfs	5.40	0.027	1.73	0.014	chronic	0.044	0.022
	30 to < 103 cfs	9.32	0.0466	2.99	0.0246	chronic	0.077	0.038
	103 to <176 cfs	26.2	13.1	8.40	0.069	chronic	0.22	0.11
	176 cfs	43	0.215	13.8	0.113	chronic	0.35	0.18
	no mixing zone	2.40	0.120	0.771	0.00633	chronic	0.019	0.0098
silver	< 13 cfs	3.56	na	1.56	na	acute	3.6	2.1
	no mixing zone	2.42	na	1.06	na	acute	2.4	1.4

na = not applicable (no criterion for comparison)
WLA = wasteload allocation
LTA = long-term average

Footnotes:
1- Parameters which exhibited reasonable potential (see Table A-12).
2- Flow tiers do not apply to cadmium, lead, and zinc. For these parameters, effluent limits were developed based on both the Id CWA criteria and the SSC.
3- Effluent limits are based on the most stringent criteria (lowest LTA).
4 - Effluent limits for mercury were also developed based upon the recreational use criterion. These limits were less stringent than the limits based on the aquatic life criteria.

Table A-17: Summary of Water Quality-based Effluent Limit Derivation for Outfall 002 When Outfall 001 is Discharging Through Outfall 002								
Parameter[1] ug/l	Flow Tier[2]	Aquatic Life Criteria WLAs		Aquatic Life Criteria LTA Concentrations		Water Quality-based Effluent Limits		
		acute WLA	chronic WLA	acute LTA	chronic LTA	Basis[3]	maximum daily limit	avg. monthly limit
cadmium	Id CWA criteria	2.67	0.825	0.50	0.285	chronic	1.5	0.58
	ssc	1.53	0.83	0.286	0.285	chronic	1.5	0.58
lead	Id CWA criteria	55.6	2.17	24.5	1.40	chronic	3.2	1.9
	ssc	22.4	25.6	98.7	16.4	chronic	37	22
zinc	Id CWA criteria	88.7	81.0	15.4	26.0	acute	89	33
	ssc	160	160	27.8	51.3	acute	160	59
copper	< 8.6 cfs	16.1	11.4	4.02	5.02	acute	16	7.0
	8.6 to < 20 cfs	19.0	12.9	4.75	5.66	acute	19	8.3
	20 to < 69 cfs	28.0	18.7	6.99	8.22	acute	28	12
	69 to < 117 cfs	49.4	32.6	12.3	14.4	acute	49	22
	117 cfs	45.7	29.7	11.4	13.1	acute	46	20
	no mixing zone	13.3	9.14	3.33	4.02	acute	13	5.8
mercury[4]	< 8.6 cfs	3.53	0.0185	1.13	0.00974	chronic	0.030	0.015

Table A-17: Summary of Water Quality-based Effluent Limit Derivation for Outfall 002 When Outfall 001 is Discharging Through Outfall 002

	8.6 to < 20 cfs	4.38	0.0219	1.41	0.0116	chronic	0.036	0.018
	20 to < 69 cfs	7.02	0.0351	2.25	0.0185	chronic	0.058	0.029
	69 to < 117 cfs	18.3	0.0916	5.88	0.0483	chronic	0.15	0.075
	117 cfs	29.4	0.147	9.44	0.0775	chronic	0.24	0.12
	no mixing zone	2.40	0.120	0.771	0.00633	chronic	0.019	0.0098
silver	< 8.6 cfs	2.70	na	1.19	na	acute	2.7	1.6
	8.6 to < 20 cfs	3.17	na	1.39	na	acute	3.2	1.9
	no mixing zone	2.42	na	1.06	na	acute	2.4	1.4

na = not applicable (no criterion for comparison)
WLA = wasteload allocation
LTA = long-term average

Footnotes:
1- Parameters which exhibited reasonable potential (see Table A-13).
2- See footnote 2, Table A-16.
3- See footnote 3, Table A-16.
4 - See footnote 4, Table A-16.

Table A-18: Summary of Water Quality-based Effluent Limit Derivation for Outfall 002 when Outfall 003 is Discharging through Outfall 002

Parameter[1] ug/l	Flow Tier[2]	Aquatic Life Criteria WLAs	Aquatic Life Criteria LTA Concentrations	Water Quality-based Effluent Limits

Table A-18: Summary of Water Quality-based Effluent Limit Derivation for Outfall 002 when Outfall 003 is Discharging through Outfall 002

		acute WLA	chronic WLA	acute LTA	chronic LTA	Basis[3]	maximum daily limit	avg. monthly limit
cadmium	Id CWA criteria	4.27	1.14	1.59	0.66	chronic	1.8	0.96
	ssc	2.37	1.14	0.884	0.66	chronic	1.8	0.96
lead	Id CWA criteria	89.4	3.48	39.3	2.24	chronic	5.1	3.0
	ssc	336	38.4	148	24.7	chronic	56	34
zinc	Id CWA criteria	128	117	56.2	75.1	acute	130	76
	ssc	213	213	93.7	137	acute	210	130
copper	< 8.6 cfs	17.2	12.0	2.99	3.86	acute	17	6.4
	8.6 to < 20 cfs	18.9	12.8	3.29	4.10	acute	19	7.0
	20 to < 69 cfs	25.2	16.9	4.38	5.41	acute	25	9.3
	69 to < 117 cfs	39.7	26.4	6.90	8.47	acute	39	15
	117 cfs	35.2	23.1	6.12	7.41	acute	35	13
	no mixing zone	20.1	13.2	3.48	4.25	acute	20	7.4
mercury[4]	< 8.6 cfs	3.24	0.0168	1.04	0.00886	chronic	0.028	0.014
	8.6 to < 20 cfs	3.87	0.0194	1.24	0.0102	chronic	0.032	0.016
	20 to < 69 cfs	5.83	0.0291	1.87	0.0154	chronic	0.048	0.024

Table A-18: Summary of Water Quality-based Effluent Limit Derivation for Outfall 002 when Outfall 003 is Discharging through Outfall 002								
	69 to < 117 cfs	14.2	0.0711	4.57	0.0375	chronic	0.12	0.058
	117 cfs	22.5	0.12	7.21	0.0592	chronic	0.18	0.092
	no mixing zone	2.40	0.012	0.771	0.00633	chronic	0.0120	0.0098
silver	< 8.6 cfs	3.19	na	1.40	na	acute	3.2	1.9
	8.6 to < 20 cfs	3.38	na	1.48	na	acute	3.4	2.0
	20 to < 69 cfs	4.33	na	1.90	na	acute	4.3	2.6
	69 to < 117 cfs	5.64	na	2.48	na	acute	5.6	3.3
	117 cfs	3.99	na	1.76	na	acute	4.0	2.4
	no mixing zone	5.08	na	2.24	na	acute	5.1	3.0

na = not applicable (no criterion for comparison)   WLA = wasteload allocation   LTA = long-term average

Footnotes:
1- Parameters which exhibited reasonable potential (see Table A-14).
2- See footnote 2, Table A-16.
3- See footnote 3, Table A-16.
4 - See footnote 4, Table A-16.

Table A-19: Summary of Water Quality-based Effluent Limit Derivation for Outfall 003				
Parameter[1] ug/l	Flow Tier[2]	Aquatic Life Criteria WLAs	Aquatic Life Criteria LTA Concentrations	Water Quality-based Effluent Limits

Table A-19: Summary of Water Quality-based Effluent Limit Derivation for Outfall 003								
		acute WLA	chronic WLA	acute LTA	chronic LTA	Basis[3]	maximum daily limit	avg. monthly limit
cadmium	Id CWA criteria	4.27	1.14	1.59	0.66	chronic	1.8	0.96
	ssc	2.37	1.14	0.884	0.660	chronic	1.8	0.96
lead	Id CWA criteria	89.4	3.48	39.3	2.24	chronic	5.1	3.0
	ssc	336	38.4	148	24.7	chronic	56	34
zinc	Id CWA criteria	128	117	56.2	75.1	acute	130	76
	ssc	213	213	93.7	137	acute	210	130
copper	< 8.0 cfs	17.1	12.0	2.98	3.84	acute	17	6.4
	8 to < 18 cfs	18.5	12.5	3.21	4.00	acute	19	6.9
	18 to < 63 cfs	20.7	14.0	3.59	4.48	acute	21	7.7
	63 to < 108 cfs	30.2	20.1	5.24	6.46	acute	30	11
	108 cfs	29.8	19.5	5.17	6.25	acute	30	11
	no mixing zone	20.1	13.2	3.48	4.25	acute	20	7.4
mercury[4]	< 8.0 cfs	3.17	0.0165	1.02	0.00868	chronic	0.027	0.014
	8 to < 18 cfs	3.77	0.0189	1.21	0.00995	chronic	0.031	0.015
	18 to < 63 cfs	5.49	0.0274	1.76	0.0145	chronic	0.045	0.023
	63 to < 108 cfs	13.2	0.066	4.24	0.0348	chronic	0.11	0.054

Table A-19: Summary of Water Quality-based Effluent Limit Derivation for Outfall 003

	108 cfs	20.9	0.105	6.72	0.0552	chronic	0.17	0.086
	no mixing zone	2.40	0.012	0.771	0.0063	chronic	0.020	0.0098
silver	< 8.0 cfs	3.20	na	1.40	na	acute	3.2	1.9
	8 to < 18 cfs	3.29	na	1.44	na	acute	3.3	2.0
	18 to < 63 cfs	3.21	na	1.41	na	acute	3.2	1.9
	63 to < 108 cfs	3.85	na	1.69	na	acute	3.9	2.3
	108 cfs	3.26	na	1.43	na	acute	3.3	2.0
	no mixing zone	5.08	na	2.24	na	acute	5.1	3.0

na = not applicable (no criterion for comparison) WLA = wasteload allocation LTA = long-term average

Footnotes:
1- Parameters which exhibited reasonable potential (see Table A-15).
2- See footnote 2, Table A-16.
3- See footnote 3, Table A-16.
4 - See footnote 4, Table A-16.

B. Development of Effluent Limits for TSS

The regulations at 40 CFR 122.44(d)(1)(vii)(B) require that effluent limits be consistent with the assumptions and requirements of any available WLA for the discharge in an approved TMDL. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety, that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant.

The IDEQ prepared a draft TMDL for suspended sediments in the SFCdA River (dated December 28, 2001). The draft TMDL contained WLAs for TSS for the Lucky Friday Mine outfalls 001 and 003. IDEQ has since revised the draft TMDL WLAs as the following annual loadings of TSS for outfalls 001 and 003: 45.1 tons/year for outfall 001 and 34.4 tons/year for outfall 003 (IDEQ 2002a.). The draft TMDL and subsequent revision to the WLAs did not include WLAs for outfall 002.

EPA converted the above annual WLAs from tons/year to pounds/day and applied them as average monthly limits.

Outfall 001: average monthly limit = 45.1 tons/year x (1 year/365 days) x (2000 lbs/ 1 ton)
= 247 lbs/day

Outfall 003: average monthly limit = 34.4 tons/year x (1 year/365 days) x (2000 lbs/ 1 ton)
= 188 lbs/day

The maximum daily limits were determined using Table 5-3 of EPA's TSD. Table 5-3 provides a formula for deriving maximum daily limits from average monthly limits.

maximum daily limit = (Table 5-3 multiplier) x average daily limit

The multiplier depends upon the frequency of sampling and coefficient of variation (CV) of the data. The effluent will be sampled 4 times per month. The CVs for outfalls 001 and 003 are 0.6 and 0.5, respectively. Based on these values, the Table 5-3 multipliers are 2.01 for outfall 001 and 1.84 for outfall 003.

Outfall 001: maximum daily limit = 247 lbs/day x 2.01 =496 lbs/day

Outfall 003: maximum daily limit = 188 lbs/day x 1.84 =346 lbs/day

Outfall 002 may include the discharge of either outfall 001 or outfall 003. Since the draft TMDL did not include a WLA for outfall 002, when outfall 002 is discharging the flows from outfall 001, the total TSS loading from outfall 002 plus outfall 001 cannot exceed the WLA for outfall 001. Likewise, when outfall 002 is discharging the flows from outfall 003, the total TSS loading from outfall 002 plus 003 cannot exceed the WLA for outfall 003. Effluent limits established in this way will ensure that the draft TMDL WLAs are not exceeded when there is a discharge from outfall 002. Therefore, the TSS loading limits are as shown in Table 20.

Table A-20: TSS Loading Limits

Outfall	maximum daily limit, lbs/day	average monthly limit, lbs/day

Table A-20: TSS Loading Limits		
001 - when no portion is discharged through outfall 002	496	247
001 - when all or a portion of flow is discharged through outfall 002	lbs/day from outfall 001 + lbs/day from outfall 002 must not exceed 496	lbs/day from outfall 001 + lbs/day from outfall 002 must not exceed 247
002 - when all or a portion of outfall 001 flow is discharged through outfall 002		
002 - when all or a portion of outfall 003 flow is discharged through outfall 002	lbs/day from outfall 001 + lbs/day from outfall 002 must not exceed 346	lbs/day from outfall 001 + lbs/day from outfall 002 must not exceed 188
003 - when all or a portion of flow is discharged through outfall 002		
003 - when no portion is discharged through outfall 002	346	188

The suspended solids TMDL has not been submitted to EPA or federally approved yet. Therefore, these limits will be included in the final permit only if the TMDL is approved by EPA prior to permit reissuance. If the TMDL is not approved prior to permit reissuance, then the TSS loading limits will not be included in the final permit.

IV. Summary of Revised Draft Permit Effluent Limitations and WET Triggers

A.   Summary of Revised Draft Permit Effluent Limitations

The following summarizes the final proposed effluent limits developed for each outfall.

<u>Cadmium, lead, and zinc:</u>   The technology-based effluent limits for cadmium, lead, and zinc are shown in Table A-1. The water quality-based limits are shown in Tables A-16 through A-19. Since they are more stringent, for all outfalls, the water-quality based effluent limits, are the limits in the revised draft permit. No mixing zone was authorized by IDEQ for the water quality-based

limits. Two sets of limits were developed for cadmium, lead, and zinc; one set based on the Id CWA criteria and one set based on the site-specific criteria (SSC). If EPA approves the SSC before the final permit is issued, then the limits based on the SSC will be included in the final permit. Otherwise, the limits based on the Id CWA criteria will be included in the final permit.

Copper, mercury, and silver: The water quality-based effluent limits for copper, mercury, and silver were more stringent than the technology-based effluent limits for all outfalls. Therefore, the water quality-based effluent limits are the limits in the revised draft permit. The copper, mercury, and silver water quality-based limits were initially calculated for five tiers of receiving water flow and were based upon a 25% mixing zone. The following summarizes the copper, mercury, and silver effluent limits for each outfall that are included in the revised draft permit.

> outfall 001 (Table A-16): The water quality-based effluent limits calculated for copper for the highest flow tier (> 176 cfs) are lower than those for the 103 - 176 cfs flow tier. This is because the criteria decrease as a result of the low mixed hardness at high flows has a greater influence on the magnitude of the effluent limits (as hardness decreases, the criteria decreases, and therefore the effluent limits decrease), than the influence of the receiving water flow (as receiving water flows increase, the effluent limits increase). The copper calculations are shown in Appendix B. Effluent limits for mercury for the five flow tiers were also included in the revised draft permit. Effluent limits for silver were developed for only the lowest flow tier (since there was no reasonable potential to exceed water quality standards at the higher flow tiers).

> outfall 002, when outfall 001 is discharging through outfall 002 (Table A-17): As with outfall 001, the effluent limits for copper at the fourth flow tier were higher than those at the high flow tier. Effluent limits for silver were developed for only the two lowest flow tiers (since there was no reasonable potential to exceed water quality standards at the higher flow tiers). Effluent limits for mercury for five flow tiers were included in the revised draft permit.

> outfall 002, when outfall 003 is discharging through outfall 002 (Table A-18): The calculations in Table A-18 show that the effluent limits based upon a 25% mixing zone are more stringent than the effluent limits based upon no mixing zone for copper at the two lowest flow tiers and for silver. This is because the criteria increase as a result of using effluent hardness for the no mixing zone condition has a greater influence on the magnitude of the effluent limits than the influence of allowing 25% dilution. Therefore the

revised draft permit contains copper effluent limits based on no mixing zone for the two lowest flow tiers and silver effluent limits for all flow tiers based upon no mixing zone. Since the silver effluent limits are not based on a mixing zone, they are the same for all flow tiers (not dependent upon receiving water flow). Effluent limits for mercury for five flow tiers were included in the revised draft permit.

outfall 003 (Table A-19): The copper effluent limits for the two lowest flow tiers and the silver effluent limits were based upon no mixing zone for the same reasons discussed in the previous paragraph. In addition, the copper effluent limits for the two highest flow tiers were the same, therefore they were combined into one tier in the revised draft permit. Effluent limits for mercury for five flow tiers were included in the revised draft permit.

Mass-based metals limits: The effluent limits have thus far been expressed in terms of concentration. However, with a few exceptions, the NPDES regulations (40 CFR 122.45(f)) require that water quality-based effluent limits also be expressed in terms of mass. The following equation was used to convert the cadmium, copper, lead, mercury, silver, and zinc concentration-based limits into mass-based limits:

mass limit (lb/day) = concentration limit (ug/l) x effluent flow rate x conversion factor (Equation 12)

where, conversion factor = 0.005379 (to convert units on the right side of the equation to lb/day)

effluent flow rate = maximum discharge rate in cfs (see Page A-16)

TSS: The TSS limits included in the revised draft permit are the technology-based concentration limits shown in Table A-1 and the loading limits based on the TMDL shown in Table A-20. The loading limits will only be included in the final permit is the SFCdA River suspended sediment TMDL is approved by EPA before reissuing the final permit.

B. Whole Effluent Toxicity (WET) Triggers

The 2001 draft permit included WET monitoring and established WET trigger levels for each outfall, that, if exceeded would trigger additional WET testing and, potentially, investigations to reduce toxicity. The trigger levels were calculated based on the WET criteria, receiving water flow, effluent flow, and available dilution. Some of these factors have changed from those used in the2001 draft permit. The WET trigger levels were, therefore, recalculated for the revised draft permit.

WET trigger levels are calculated using the following mass-balance equation (this is basically the same as Equation 6):

$$\text{WET toxicity trigger} = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e} \quad \text{(Equation 13)}$$

where,

- criterion = 1 TU_c for compliance with the chronic criterion (see Table B-4 of the March 28, 2001 Fact Sheet)
- Q_e = effluent flow (see page A-16)
- Q_u = upstream flow (see Table A-11)
- C_u = upstream concentration = 0 for WET (assuming no upstream toxicity)
- MZ = mixing zone = 0.25 for compliance with chronic criteria

Solving equation 13 results in the chronic trigger values in Table 21.

Table 21: WET Trigger Values

Outfall	Flow Tier	WET Trigger Value, TU_c
001	< 13 cfs	1.8
	13 to < 30 cfs	2.3
	30 to < 103 cfs	3.9
	103 to < 176 cfs	11
	176 cfs	18
002	< 8.6 cfs	1.5 (when discharge from 001) 1.4 (when discharge from 003)

Table 21: WET Trigger Values		
Outfall	Flow Tier	WET Trigger Value, TU_c
	8.6 to < 20 cfs	1.8 (when discharge from 001) 1.6 (when discharge from 003)
	20 to < 69 cfs	2.9 (when discharge from 001) 2.4 (when discharge from 003)
	69 to < 117 cfs	7.6 (when discharge from 001) 5.9 (when discharge from 003)
	117 cfs	12 (when discharge from 001) 9.4 (when discharge from 003)
003	< 8 cfs	1.4
	8 to < 18 cfs	1.6
	18 to < 63 cfs	2.3
	63 to < 108 cfs	5.5
	108 cfs	8.7