

**U.S. Environmental Protection Agency
Region 10**

RESPONSE TO COMMENTS

**Thompson Creek Mining Company - Thompson Creek Mine
NPDES Permit No.: ID-002540-2**

December 13, 2001

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I. INTRODUCTION

A draft National Pollutant Discharge Elimination System (NPDES) Permit for the Thompson Creek Mine, operated by the Thompson Creek Mining Company (TCMC), was issued for public notice on June 8, 2000. The Public Notice initiated a 45-day public comment period. The comment period was extended by 14 days after a request for extension from TCMC. The comment period ended on August 7, 2000.

EPA received comments from TCMC (letter from Kent Watson, TCMC to Patty McGrath, EPA, and Catherine Reno, Idaho Department of Environmental Quality, dated August 7, 2000). No other comments were received on the draft permit.

Information considered by EPA in establishing final permit conditions include comments from TCMC, information from actions by the State of Idaho, and consultation under the Endangered Species Act. The following summarizes the actions and new information that influenced finalization of the permit, the comments received, and EPA's responses to the comments.

The Fact Sheet (EPA 2000) that accompanied the draft Permit was not revised based on the comments. The Fact Sheet was not revised since it is a final document that provides a basis for the draft permit. This response to comments document provides a record of the basis for changes to the draft permit to finalize the permit.

Appendix D contains a shaded-strikeout version of the final permit that demonstrates changes between the draft permit and the final permit (additions are shaded and deletions are in strikeout).

II. ACTIONS AND NEW INFORMATION AFTER THE PUBLIC COMMENT PERIOD

A. State of Idaho Clean Water Act (CWA) 401 Certification

The State of Idaho Department of Environmental Quality (IDEQ) submitted a preliminary CWA Section 401 certification of the draft NPDES permit on April 26, 2000 (IDEQ 2000a). As discussed in the Fact Sheet accompanying the draft permit, the requirements of the preliminary certification were incorporated into the draft permit.

A final 401 certification was received by EPA on January 5, 2001 (IDEQ 2001). The stipulations of the final certification are incorporated into the final NPDES permit. Appendix B includes a copy of the CWA 401 certification cover letter. A report entitled "Evaluation of Proposed New Point Source Discharges to a Special Resource Water and Mixing Zone Determinations: Thompson Creek Mine facility, Upper Salmon River Subbasin, Idaho" (the Report) was attached to the certification. The Report provided support for the conditions in the certification.

The final 401 certification included the following requirements, which were incorporated into the final permit:

Special Resource Water conditions: IDEQ required the following conditions related to discharges to the Salmon River (which is designated as a special resource water):

- S** The permit must contain a provision that prohibits the discharge from resulting in a reduction of the ambient water quality of the Salmon River as measured below the applicable mixing zone. This was incorporated as Part I.A.3. of the final permit.

- S** Monitoring is required to determine whether there has been a reduction in ambient water quality. In the preliminary 401 certification, IDEQ specified monitoring locations, frequencies, and parameters which were included in the draft permit. The final 401 certification specified that this language be retained in the permit (see Part I.C.6. of the final permit).

Follow up sampling if criteria concentrations are exceeded: In their preliminary 401 certification, IDEQ required that ambient surface water sampling results be compared to water quality criteria and that additional sampling be conducted if chronic criteria concentrations are exceeded. IDEQ specified that the follow up sampling be conducted to determine the 4-day average concentration. The final 401 certification specified that these requirements be retained (see Part I.C.7. of the final permit). Language in part I.C.7.b.i. was added to the final permit, based on the final 401 certification requirement that 4-day average concentrations be determined at the next scheduled sampling event, unless the exceedence occurred in October (in which case the station should be promptly resampled).

Salmon River flow monitoring: IDEQ required the collection of Salmon River flow data. This is included in Part I.A.1. (Table 5) and I.C.5. of the permit.

Bioassessment Monitoring: In their preliminary certification, IDEQ required field bioassessment monitoring of benthic macroinvertebrate, fish assemblages, and periphyton assemblages. The requirements of the preliminary certification included specific monitoring locations, frequencies, measurement endpoints, data analyses, and further actions based on monitoring results. This was included in Part I.D. of the draft permit. The final certification required bioassessment monitoring of benthic macroinvertebrate, fish assemblages, and periphyton assemblages above and below the outfalls in Thompson Creek, Squaw Creek, and the Salmon River with a goal of annual trends monitoring. Rather than establishing specific monitoring requirements in the permit, the final certification stated: 1) that the specifics of the bioassessment monitoring should be established through the Interagency Task Force (IATF); 2) that the permittee must submit a revision to the Consolidated Environmental Monitoring Program Plan (bioassessment portion of the Plan) within six months of the issuance date of the permit; 3) the permittee must submit results of bioassessment monitoring within the time frame established in the Plan; and, 4) that the permittee consider recommendations in the IDEQ final certification (the Report attached to the certification

contained specific monitoring and reporting recommendations). Part I.D. of the permit was completely revised to incorporate these final certification requirements.

Selenium Bioaccumulation Study: In their preliminary certification, IDEQ required a bioaccumulation study to determine whether exposure to mercury or selenium through bioaccumulation poses a risk of adverse effects to aquatic life in Thompson Creek. The requirements of the preliminary certification specified species to be monitored, study objectives, biological screening levels, data interpretations, and further actions. This was included in Part I.E. of the draft permit. The bioaccumulation study requirements of the final certification were more general. The final certification required a selenium bioaccumulation study (not mercury), specified the goal of the study (to establish a threshold for predicting risk to Thompson Creek fish from selenosis), and required submittal of a work plan and results. The final permit (Part I.E.) was revised accordingly. The Report attached to the final certification contained specific considerations for completing the study; this is referenced in the final permit.

Mixing Zones and Dilution Ratios: The effluent limits in the draft permit were based, in part, on flow tiers, mixing zones, and dilution ratios (for outfalls 001 and 002) established in the preliminary certification. Some of these factors were revised in the final certification as follows:

- S** IDEQ authorized mixing zones for outfalls 001, 002, 004, and 005. Some of the mixing zones differed from the mixing zones in the draft certification. The mixing zones in the final certification are provided in Table C-2 of Appendix C.
- S** The draft permit contained one set of effluent limits for outfall 005. The final certification provided mixing zones for two flow tiers (for Salmon River flows of < 2000 cfs and \$2000 cfs). Therefore, effluent limits for two flow tiers were developed for outfall 005 for the final permit.
- S** The final certification provided revised dilution ratios for outfalls 001 and 002 and a new dilution ratio for the outfall 005 high flow tier. The dilution ratios are shown in Table C-1 of Appendix C. In the draft permit the dilution ratios were expressed as the effluent flow divided by the upstream flow. To be consistent with the final certification, the dilution ratios in the final permit are defined as upstream flow divided by the effluent flow. Per the final certification, the dilution ratios for outfalls 001 and 002 are expressed as a four-day average and the dilution ratio for outfall 005 as a daily average (see footnote 2 of Tables 1, 2, and 5 of the final permit).

The revised dilution ratios and mixing zones were used to develop water quality-based effluent limits (WQBELs) for the final permit. Tables 1, 2, 4, and 5 of the final permit were revised accordingly. Appendix C demonstrates the WQBEL calculations for the final permit. See Section IV. of Appendix C for a summary of the differences between the effluent limits in the draft and final permit.

Compliance Schedule: In their preliminary certification, IDEQ authorized a compliance schedule of up to five years for the selenium permit limits applicable to outfalls 001 and 002. The certification required interim milestones, during which time further analyses and practicable measures to identify and reduce discharges shall be undertaken and annual reports of progress submitted. The compliance schedule requirements were incorporated into Part I.G. of the draft permit. The compliance schedule requirements of the final certification were largely the same as the preliminary certification. The final certification specified that progress reports are due on March 31 of each year. Part I.G. of the permit was revised to incorporate the March 31 deadlines. Also, the feasibility study language in the final permit (Table 8) was revised to delete the language that was worded as a consideration (versus a requirement) in the final certification and instead the Report attached to the final certification was referenced.

Toxicity Testing: The certification specified the following whole effluent toxicity (WET) testing requirements to demonstrate compliance with the Idaho narrative water quality standards for toxicity:

- S** The preliminary and final certification required annual acute bioassays using rainbow trout (salmonid 96-hour early life stage test). The draft permit had specified sampling in June, this was revised to April based on the final certification (see final permit Part I.B.2.a. and b.).
- S** The preliminary and final certification specified chronic bioassays using fathead minnow and/or *Ceriodaphnia* annually for outfalls 001 and 002 and quarterly for outfalls 004 and 005. The final certification recommended that the outfall 001 and 002 sampling occur in April using both species (the draft permit had specified sampling in June). This was included in the final permit Part I.B.3.a. and b.
- S** The draft permit required that acute toxicity units and triggers be defined in terms of the LC_{50} . The final certification specified target endpoints of no toxicity (NOEC) of 100% effluent at 48-hours and no toxicity at 33% effluent at 96-hours for the acute testing. This resulted in a change to the definition of acute toxicity units and the toxicity triggers (see permit paragraphs I.B.2.d. and I.B.4.a.) and influenced the dilution series to be tested (paragraph I.B.5.a.i.).
- S** The draft permit required that chronic toxicity tests and triggers be defined in terms of the NOEC. The final certification specified target endpoints of both the NOEC and IC_{25} less than the dilution ratios used to calculate the effluent limits. This defined chronic toxicity and toxicity triggers (see permit paragraphs I.B.3.d. and I.B.4.b.) and influenced the dilution series to be tested (paragraph I.B.5.a.ii.) In the final permit. Based on the new dilution ratios, the chronic toxicity triggers in Table 6 of the permit were revised from those in the draft permit.
- S** The final certification required that the content of WET test reports include flows at the

time of sampling, actual instream waste concentrations, and summary statistics showing whether measured toxicity is above or below actual dilutions. This information was included in part I.B.8.c. of the final permit.

- S** The final certification required that testing programs are to include a geometric dilution series with at least 6 dilutions ranging from 100% to 0% effluent, where one dilution approximates the target concentration. This was included in part I.B.5.a. of the permit.
- S** The recommendation that toxicity test failure rates > 20% would trigger toxicity identification and reduction procedures was already embodied in the accelerated testing permit language (section I.B.6.). See also response to comment 21.
- S** The certification specified that dilution waters should have similar physical and chemical characteristics to receiving waters and preferably upstream receiving water would be used for dilution. Per the methods manuals (EPA 1993b and EPA 1994b), the permit requires that dilution water should be receiving water or lab water as appropriate as described in the methods manual (final permit paragraph I.B.5.c.iii.).

B. Endangered Species Act Consultation

As discussed in the Fact Sheet, the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) identified a number of threatened and endangered (T&E) species that may inhabit the areas affected by the discharges from the Thompson Creek Mine. In accordance with the Endangered Species Act (ESA), EPA is currently engaged in formal consultation with USFWS and NMFS (referred to collectively as the Services) regarding effects of the final NPDES permit on the T&E species.

On February 14, 2001, EPA requested initiation of formal consultation and submitted a Biological Evaluation (BE) to the Services. In the BE (EPA 2001), EPA made the following determinations:

- S** Reissuance of the NPDES permit is not likely to adversely affect the gray wolf, Ute ladies' tresses, or Canada lynx.
- S** Reissuance of the permit may adversely affect the bald eagle due to the selenium and mercury effluent limits.
- S** Reissuance of the permit may adversely affect the Sockeye salmon, chinook salmon, steelhead, and bull trout within the areas of the acute mixing zones. With the exception of selenium, outside the area of the acute mixing zones, the permitted discharges are not likely to adversely affect these fish species. The selenium effluent limits may adversely affect the fish species.

S Even though EPA has determined that the permitted discharges may be likely to adversely affect some listed species, issuance of the permit with effluent limits based on state water quality standards and monitoring, reporting, and other requirements that are more stringent than in the current permit is seen as a positive step towards maintaining the water quality of the receiving waters. The chemical, toxicity, bioassessment, and bioaccumulation monitoring required in the permit will be used to assess the potential for adverse effects and allow adjustment of future permit conditions.

Since the current consultation time line is delaying permit reissuance, EPA decided to reissue the TCM permit while consultation is pending. Once consultation is completed, EPA will modify the permit if EPA finds that the consultation demonstrates that different permit limits or conditions to protect listed species or critical habitat are warranted. A reopener to this effect has, therefore, been included in the final permit (Part V.K. of the final permit).

Two of the discharge outfalls authorized in the permit are new outfalls (outfalls 004 and 005). The Services expressed concern with issuing the permit for new outfalls 004 and 005 prior to completion of consultation. A provision has been added to the permit requiring the permittee to notify EPA at least 90 days prior to initiation of construction of diffusers for the outfalls and to provide EPA with a schedule (Part I.A.2. of the final permit).

III. COMMENTS RECEIVED ON THE DRAFT PERMIT

As discussed in Section I., TCMC submitted comments on the draft permit. In their submittal letter TCMC also requested that relevant comments that they submitted on the previous draft NPDES permit (public noticed in July 1994) be considered. Part A. of this section responds to comments on the draft permit issued in June 2000. Part B. responds to relevant comments on the June 1994 permit.

A. TCMC Comments on the June 2000 Draft Permit

Comment 1: Page 5, Section 1A, Table 1 - dilution ratios as effluent limits

TCMC commented that the use of dilution ratios as effluent limitations for outfalls 001 and 002 is inappropriate for the following reasons:

- (1) 40 CFR 122.45 explicitly requires that effluent limitations be expressed in terms of mass, except in certain limited situations, including the unfeasibility of using mass as a limitation. The Fact Sheet states that mass limits were not calculated for these outfalls since the effluent flow is dependent upon precipitation and varies with the receiving water flow. The use of dilution ratios is infeasible for these same reasons.
- (2) TCMC is unable to control storm water flows at a level sufficient to consistently comply with the dilution ratios.
- (3) The use of the 99.6th percentile dilution ratio will result in violations at least 0.4% of

the time (on average).

(4) The dilution ratios are not direct indicators of compliance with the Idaho Water Quality Standards.

TCMC recommended that the dilution ratios either be removed from the permit as effluent limitations or be utilized solely as a monitoring measure. In the same comment TCMC instead recommended that the 4B3 statistic used to calculate the dilution ratio be monitored.

Response:

reason no. 1: Mass-based limits are calculated by multiplying the concentration-based water quality-based effluent limit (WQBEL) by the effluent flow used to develop the concentration-based limit. The concentration-based limits for outfalls 001 and 002 were calculated based on a dilution ratio. Use of the effluent flow based on the dilution ratio (see Table C-1 of Appendix C) would be representative of only the time of critical dilution and would result in very stringent mass-based limits. Therefore, mass-based limits were not developed for outfalls 001 and 002.

Even though the effluent limits cannot be expressed as mass, it is still important to comply with the concept of controlling the total mass loading to the receiving water as embodied in 40 CFR 122.45(f) (see part (iii), "...permit conditions ensure that dilution will not be used as a substitute for treatment.") and the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991). Mass loading may be controlled by establishing mass-based limits, effluent flow limits, and/or dilution limits. Since the WQBELs and mixing zone determinations for outfalls 001 and 002 were based on achieving criteria at the dilution ratio, it is critical that the dilution ratio must be maintained. If the dilution ratio is not maintained, then discharge at the effluent limits would not be protective of water quality standards in the receiving water. Based on the above discussion, limitation of the dilution ratios is the appropriate mechanism for ensuring that total mass loadings from outfalls 001 and 002 are in compliance with the water quality standards used to develop the concentration-based effluent limits. 40 CFR 122.44(d)(1) requires that NPDES permits include "...any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301, 304, 306, 307, 318, and 405 of CWA necessary to: (1) Achieve water quality standards established under section 303 of the CWA...". Therefore, the dilution ratio was established as an effluent limit in the draft permit and is retained in the final permit. As discussed in Section II.A., above, the definition of the dilution ratios was revised to be consistent with the final certification.

reason no. 2: TCMC has shown an ability to control the discharge from these outfalls. For example, TCMC did not discharge from Outfall 002 in order to prevent and remedy permit limit exceedences.

reason nos. 3 and 4: The dilution ratios are direct indicators of compliance with the

dilution used to develop the mixing zones and WQBELs. As discussed under reason no. 1, limitation of the dilution ratios is needed, in addition to the concentration-based limits to ensure protection of water quality standards. The State calculated dilution ratios that correspond to the lowest ratio expected to occur in a 4-day period once every three years (the 4B3); therefore, these dilution ratios would be met 99.6% of the time (IDEQ 2001). Since the State specified the dilution ratios as a 4-day ratio, the final permit has been revised to specify that the dilution ratios for outfalls 001 and 002 be calculated based on the average dilution ratio over the last 4 days (see footnote 2 of Tables 1 and 2).

Comment 2: Page 5,6, Section 1A, Table 1 - derivation of the dilution ratios

TCMC commented that the statistical process presented in the Draft 401 certification to approximate the 4B3 dilution ratios was not sufficiently rigorous to produce the true 4B3. As a consequence of the method used to approximate the 4B3, the resultant dilution ratio that was derived from the draft 401 certification and set forth in the permit is significantly more conservative than the true and accurate 4B3 dilution ratio. TCMC provided an alternative method for determining the 4B3 and presented 4B3 values for outfalls 001 and 002 for each flow tier. TCMC suggested that the dilution ratios in the final permit be based on this alternative 4B3 derivation method.

Response:

EPA does not respond to comments to the state 401 certification. As discussed in Section II.A., above, the definition and magnitude of the dilution ratios in the final permit were based on the final 401 certification. IDEQ determined that if the conditions described in the certification are met, there is reasonable assurance that the discharges will be conducted in a manner which will not violate applicable water quality standards. Therefore, the dilution ratio as derived in the final certification is the appropriate dilution ratio for the permit.

Comment 3: Page 5 and 6, I.A., footnote 2 of Tables 1 and 2 - calculation of dilution ratio

Footnote 2 states that the dilution ratio must be calculated by dividing the maximum daily outfall flow by the flow in Thompson Creek directly upstream of the outfall location. TCMC commented that all the calculations performed in the analysis are based on average daily flow from the effluents divided by the average daily flow from the USGS gauge. Statistically you cannot calculate a dilution ratio by dividing a maximum daily flow from the outfall by a daily average flow in Thompson Creek. Therefore, footnote 2 should state that the dilution factor be calculated from the average daily flow.

Response:

Calculation of the dilution ratio has been revised to be consistent with how the dilution ratios were defined in the final 401 certification (i.e., expressed as upstream river flow divided by effluent flow and calculated as a 4-day average). Footnote 2 of Tables 1 and 2

the final permit was revised accordingly. See also Section II.A. (Mixing Zones and Dilution Ratios).

Comment 4: Page 5 and 6, I.A., Tables 1 and 2 - footnote 6

Footnote 6 states that the Thompson Creek flow must be representative of the flow directly upstream of the outfall location. TCMC would like to use the actual flow from the USGS gauge station in Thompson Creek. The permit calculations for outfalls 001 and 002 are based upon the historic data from this USGS station.

Response:

Thompson Creek flow monitoring is required in order to determine both the dilution ratio and the applicable flow tier (and therefore the applicable effluent limits). Footnote 6 requires reporting upstream flow data since both the dilution ratio and the tiers are based on flow upstream of each discharge. This is discussed in the following paragraphs.

The applicable flow tier, and therefore effluent limits, is determined based upon the flow in Thompson Creek directly upstream of the outfall (see footnote 1 of Tables 1 and 2). The upstream flow is used since this is the flow that is the basis of the effluent limit calculations. This was discussed in the Fact Sheet (see Section III. of Appendix C, particularly the mass balance equations). Since the effluent limits are based on the flow upstream of the outfall, to determine which effluent limit tier is appropriate the flow upstream of the outfall must be determined. TCMC did not comment on footnote 1.

Flow data from the USGS gauge was used to help determine the dilution ratios for outfalls 001 and 002. However, as discussed in the report attached to the 401 certification (IDEQ 2001), the dilution ratios were calculated by subtracting the effluent volumes from the USGS gage volume to obtain receiving water volume upstream of the discharges. That is because the mass balance equations that are the basis of the effluent limit calculations specify the use of upstream flow. Therefore, although the USGS gauge data was used, it does not represent the denominator in the dilution ratio used for each outfall. Upstream flow is representative of the denominator and, therefore, upstream flow is the flow that must be reported.

Based upon the above discussion, footnote 6 will not be changed. Note that footnote 6 does allow the use of flow measured at the USGS gauge, provided the effluent flow is subtracted to obtain upstream flow.

Comment 5: Pages 5 and 6, Tables 1 and 2 - mixing zones used to develop effluent limits

TCMC commented that the mixing zones proposed in the permit limit derivation process results in permit limits more restrictive than necessary to meet state water quality standards. TCMC presented a report in Attachment 2 of their comments documenting the actual size and configuration of the two mixing zones ("Mixing Zone Field Study,

Buckskin and Pat Hughes Creeks NPDES Outfalls into Thompson Creek, Thompson Creek Mine”, prepared by EnviroNet Inc., July 2000). The report was based on field mixing zone dye tracer studies conducted below outfalls 001 and 002 in April 2000. TCMC commented that the 401 Certification and permit limit derivation analysis should incorporate the results of this study. Based on the results of the field study, TCMC believes that the use of 50 to 100% of the actual Thompson Creek flow is appropriate for use as an approved mixing zone which will assure conformance with applicable IDEQ criteria and have no adverse impact on fish migration. TCMC also commented that for almost all of every year the dilution ratios are extremely conservative and therefore the final permit should acknowledge that mixing occurs in the stream, at the location of the mixing zones.

Response:

As discussed in Section II.A., the mixing zones upon which the effluent limits in the draft permit were calculated were based upon the preliminary 401 certification. The effluent limits for outfalls 001 and 002 (Tables 1 and 2, respectively) in the draft permit were based on mixing zones ranging from 12.5% to 66.7% of the stream flow.

As discussed in Section II.A., IDEQ has submitted a final 401 certification that includes authorization of mixing zones for outfalls 001 and 002. The mixing zones in the final certification range from 5% to 75% for outfalls 001 and 002 (see Table C-2 of Appendix C). IDEQ’s 401 certification provides rationale for mixing zones and includes reference to TCMC’s Mixing Zone Field Study report. IDEQ performed a biological, chemical, and physical evaluation to support the mixing zones and has certified that the mixing zones used in this permit will not result in unreasonable interference with or danger to existing uses. Therefore, the mixing zones in the final certification were used to develop the final permit limits (Appendix C describes the final permit limit calculations).

Comment 6: Pages 5 and 6, Tables 1 and 2 and page C11 of the Fact Sheet - effluent limits based on avoidance threshold concentrations

TCMC questioned why the draft permit uses different mixing zones for metals besides the fish avoidance metals. There is no indication that any of the metals except copper and zinc are of interest to fish passage at the concentrations anticipated in the effluent or in the mixing zone. Therefore, there is no basis for the draft permit to further limit the mixing zones for any metals except those that affect fish migration.

TCMC also commented that it is inappropriate to base effluent limits on meeting avoidance numbers at the edge of a mixing zone, rather than the use of chronic criteria. Neither the EPA or the State of Idaho have developed a specific, scientifically defensible methodology for determination of fish avoidance threshold values for use in a regulatory, NPDES permit, setting.

TCMC commented that allowable mixing zones for copper and zinc should be reduced to the minimum size to assure fish passage and this minimum size has been demonstrated by the field dye test to be at least 75% of more of the stream width at Outfall 001 and 50% or more at Outfall 002. The mixing zones for these two metals should be limited to 75 to 100% of the stream width and volume.

TCMC requested that the draft permit limits for other metals should be derived from a more reasonable and supportable 50 to 100% of the stream width and volume. They then suggest that the use of 75 to 100% mixing zones as these would be a reduction from the past acceptance of a 100% mixing zone and the use of 75 to 100% mixing zones for non-avoidance metals does not compromise fish passage and is consistent with applicable Idaho mixing zone criteria.

Response:

As discussed in previous comments the mixing zones for outfalls 001 and 002 were based on the preliminary 401 certification. The mixing zones in the final permit calculations were based on the final 401 certification. The final certification provides justification for the mixing zones. The state has determined that the mixing zones are consistent with Idaho water quality standards, and therefore, they are appropriate for use in calculating the final permit limits.

Contrary to the second paragraph of the comments, the effluent limits were not based on meeting avoidance thresholds at the edge of the mixing zone. They were based on meeting the acute or chronic criteria at the edge of the acute or chronic mixing zone, whichever was more stringent. This was discussed in Appendix C of the Fact Sheet and demonstrated in the example calculation in the Fact Sheet. IDEQ did consider the avoidance thresholds in determining the appropriate size of the mixing zones, but the avoidance thresholds were not the basis for the effluent limits. IDEQ responded to the concern that the mixing zones were influenced by avoidance thresholds in the Report attached to their final 401 certification.

Comment 7: Pages 5 and 6, Tables 1 and 2 - mercury effluent limits for outfalls 001 and 002

The mercury effluent limits in these tables (applicable to outfalls 001 and 002) are based on the in-stream criteria of 0.012 ug/l total mercury. TCMC recommended that permit limits be based on a value of 0.4 ug/l for the following reasons (although at the end of the comment they recommend that the permit limits be based upon USEPA approved acute and chronic water quality criteria):

- Because members of the genus *Oncorhynchus* and *Salvelinus* (game fish) have been observed in these streams, the chronic criterion must be based on the bioaccumulation of methyl mercury and the FDA action level of 1 mg/kg.

- The current chronic criterion is based on bioaccumulation of methyl mercury to the fathead minnow. Fathead minnows are not expected to occur in these streams, therefore a more appropriate criterion would be based on the bioaccumulation factors for trout. TCMC calculated a chronic criterion of 0.4 ug/l total mercury based on the bioaccumulation factors for trout presented in the EPA's ambient water quality criteria document for mercury (USEPA 1985) and an assumption that only a small fraction (probably less than 10%) of the mercury in streams would be expected to be present as methyl mercury. TCMC presented supporting rationale for this assumption.

Response:

The Clean Water Act (CWA) at Section 301(b)(1)(C) requires the establishment of limitations in permits necessary to meet state water quality standards. The NPDES regulations state that limitations must control all pollutants or pollutant 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 (40CFR122.44(1)(i)). EPA, therefore develops effluent limits based on the state water quality standard. As discussed in the Fact Sheet, the State of Idaho water quality standards specify a chronic criteria of 0.012 ug/l (total) and an acute criteria of 2.1 ug/l (dissolved) for mercury. Therefore, these are the applicable mercury criteria that were used to develop the effluent limits.

Comment 8: Pages 5, 6, 7, 8, and 9, Section I.A., Tables 1-4 - use of 5th percentile hardness

TCMC commented that the permit limits for hardness-related metals are factored from extreme values at the lowest end of the hardness database. TCMC commented that the metals limits and mixing zone analysis should be conducted using the mean or median hardness values instead of the 5th percentile. TCMC presented average hardness values for the ambient monitoring stations used to determine hardness. They supported this comment with the following reasons:

reason no. 1: TCMC commented that the draft permit is apparently based on an unwritten EPA Region 10 policy on using the lowest 5th percentile, and in some cases the absolute lowest data points, for hardness values. This is an introduction of an arbitrary safety factor that is extreme and unnecessary when compared with TSD national policy and this approach generates results which are not representative of the water quality conditions in the receiving stream. TCMC commented that the permit limits in Tables 1-4 should be based on using the national TSD guidelines for the NPDES program.

reason no. 2: The National Toxics Rule (NTR) upon which the State of Idaho water quality criteria for hardness-dependent metals are based, does not require the use of a specific percentile in determining hardness values.

Response:

reason no. 1: As discussed in the Fact Sheet, EPA followed the TSD guidance in developing the effluent limits in the draft permit. The TSD, however, is silent in regards to how hardness should be calculated to determine the criteria that are dependent upon hardness. Therefore, there are no TSD national guidelines related to hardness.

reason no. 2: The NTR, as noted in the coment, also does not specify the hardness value that should be used, except that it should be in the range of 25 to 400 mg/l CaCO₃.

In the absence of national NPDES hardness policy or guidance, EPA Region 10 uses the 5th percentile hardness value to calculate the hardness-based criteria. The 5th percentile hardness value is used because it is protective of the water quality criteria at least 95% of the time. If an average value was used, then discharge at the water quality-based effluent limits could result in excursions of the water quality criteria in the receiving water up to 50% of the time. The 5th percentile hardness value is used consistently by EPA Region 10 in NPDES permits, and while conservative, it ensures protection of water quality standards.

Comment 9: Pages 5 and 6, Section I.A., Tables 1 and 2 - 25% mixing zone

TCMC commented that the 25% mixing zone volume used for some parameters is arbitrary, too restrictive, and does not reflect the actual conditions that are reasonably expected to occur in the Thompson Creek flow regime. They commented specifically on language in the Draft 401 certification regarding the limitations of the CORMIX model used to develop the mixing zones and suggested alternative language.

Response:

EPA does not respond to comments related to the language in the 401 certification. IDEQ did provide a discussion of the CORMIX modeling in their final certification. As discussed in response to comments 5 and 6, IDEQ certified that the mixing zones will comply with Idaho Water Quality Standards therefore the mixing zones in the certification were used to determine effluent limits.

Comment 10: Page 7, Table 3 - TSS monitoring of Outfall 003

TCMC commented that TSS monitoring for Outfall 003 should be monthly or after a precipitation event that produces enough runoff to facilitate a discharge. This is because Outfall 003 is a storm water discharge point that has intermittent discharge in response to precipitation or snowmelt.

Response:

The draft permit required weekly monitoring of TSS in Outfall 003. EPA agrees that monthly monitoring is acceptable, particularly since turbidity is being monitored weekly

from February 1 through June 30. In the final permit, Table 3 has been revised to require monthly monitoring for Outfall 003 for TSS and a footnote has been added to specify that, to the extent possible, samples should be collected from the discharge of a precipitation event.

Comment 11: Page 7, Table 3 - turbidity monitoring

TCMC commented that the sample methodology for determining turbidity in the draft permit is incorrect. Instead of a “recording”, turbidity is measured in the laboratory, therefore, the sample type should be changed to “grab”.

Response:

EPA agrees, Table 3 in the final permit has been revised accordingly.

Comment 12: Pages 7, 8, and 9, Tables 4 and 5 - use of composite samples vs. grab

TCMC commented that grab samples instead of composite samples should be required for the metals and whole effluent toxicity (WET) monitoring in these tables (outfall 004 and 005). TCMC provided the following reasons:

reason no. 1: TCMC cited a portion of Appendix F of the TSD to support the use of grab samples: “Depending on the duration of a peak and the compositing period, composited samples may not be useful for examining toxicity peaks because the compositing process tends to dilute the peaks. Composite samples are usually appropriate for chronic tests where peak toxicity of short duration is of less concern. The averaging effect of compositing may be misleading when testing for acute toxicity.”

reason no. 2: TCMC cited a portion of Box F-1 of the TSD: “Grab samples are recommended for chemical analysis and for acute and chronic toxicity tests where site conditions (such as wastewaters that are known to have relatively constant composition) do not require use of continuous flow methods” and commented that discharges from TCMC have a relatively stable chemistry as measured over the past 20 years and the sources are not subject to process upset conditions.

reason no. 3: Other mitigating factors are the limited access to the monitoring stations due to seasonal weather events, lack of a local power source at the monitoring sites, and lack of security to protect the continuous sampling equipment and integrity of the sample.

Response:

reason no. 1: Appendix F of the TSD goes on to state that “Grab samples must be collected at sufficiently frequent intervals to provide a high probability of sampling daily peaks.” However, the permit requires sampling for acute WET, only on an annual basis. With this limited sample frequency, it is more important to obtain a representative sample

than to sample once without knowing whether or not that one sample event represents a peak. Grab samples can measure maximum effect only when the sample is collected during flows containing the maximum concentrations of pollutants toxic to the test organism.

reason no. 2: For outfalls 004 and 005, the draft permit specified composite samples for metals and WET and grab samples for pH and temperature. The analytical methods found in 40 CFR Part 136 are required for NPDES monitoring. These regulations do not specify sample collection methods (grab or composite), except that grab samples must be collected for certain parameters that may change during the time necessary for composting, such as pH and temperature. Therefore, grab sampling was included in the permit for these parameters. For the other parameters, the *US EPA NPDES Permit Writers Manual* (EPA-833-B-96-003) and Appendix F of the TSD recommend that composite samples be collected when the effluent being sampled varies significantly over time, e.g., as a result of flow or quality changes. Outfalls 004 and 005 are new outfalls which may consist of a combination of waste streams (including mine water, water from the tailings embankment left abutment drain, and water from the pumback system). In addition, outfall 005 may contain effluent from outfalls 001 and/or 002. Since there is no history of discharge from these outfalls and TCMC has not provided any information in their comments to support their contention that these outfalls will always be combined in a manner that reflect a stable chemistry over 24 hours, composite sampling is appropriate.

reason no. 3: EPA acknowledges that composite sampling is more operator intensive than grab sampling. However, other mine facilities that discharge wastewater in equally or more remote locations have made accommodations to collect composite samples.

Based on the above discussion and because of the desire to obtain representative samples, the final permit retains the requirements for composite sampling.

Comment 13: Fact Sheet, page 7, Table 1 - description of outfall 002 flow

TCMC commented that the flow for outfall 002 is described as continuous, when it is usually seasonal with flows ending in late summer through late winter. They suggested that the Fact Sheet language be changed to “discharge generally occurs in March-July only.”

Response:

As discussed in the Introduction in Section I., the Fact Sheet language will not be changed. EPA agrees that the discharge is seasonal. However, data reported by TCMC indicates that discharge does not generally occur only during March through July. Some years the discharge occurs only in March through July, other years there are continuous low flows during the other months.

Comment 14: Section I.A., Table 4 - chromium VI analysis

TCMC commented that due to a holding time of 24 hours, it will be impossible to conduct a valid analysis of chromium-VI (applicable to outfall 004). The best delivery that UPS and Fed-X will guarantee is two day delivery. TCMC recommended that the parameter be changed to total chromium.

Response:

Since TCMC will be unable to achieve the 24 hour holding time, where it appears in the permit, chromium-VI has been revised to chromium. This resulted in revisions to Tables 4 and 7 (see also comment 26). Note that based upon the updated effluent limit calculations for the final permit, the outfall 004 effluent limits for chromium were removed (see Appendix C, page C-3). EPA determined that data was not adequate to determine reasonable potential for outfalls 004 and 005. Therefore, the outfall 004 chromium effluent limits were removed and monitoring for chromium is now required for both outfalls 004 and 005. This resulted in changes to Tables 4 and 5 in the final permit.

Comment 15: Section I.A., Table 4 - Squaw Creek flow measurement

Footnote 5 states that the flow in Squaw Creek must be representative of the flow directly upstream of the outfall location. The permittee may measure flow directly upstream of the outfall, or measure flow at the USGS Squaw Creek gauge and subtract flow from Outfall 004 to obtain the upstream flow. TCMC would like to use the actual from the USGS station. The permit calculations for Outfall 004 are all based on historical data from this gauge.

Response:

The applicable flow tier, and therefore effluent limits, for Outfall 004 is determined based upon the flow in Squaw Creek directly upstream of the outfall (see footnote 1 of Table 4). The upstream flow is used since this is the flow that is used in the mass balance equations that are the basis of the effluent limit calculations. This was discussed in the Fact Sheet (see Fact Sheet, Section III. of Appendix C, particularly the mass balance equations). Since the effluent limits were calculated based on the flow upstream of the outfall, to determine which effluent limit tier is appropriate the flow upstream of the outfall must be determined. TCMC did not comment on footnote 1.

Flow data from the USGS gauge was used to help develop the effluent limits. The historical data from the gauge was used as the upstream flow since Outfall 004 has not discharged. Once Outfall 004 begins discharging, the flow from the USGS gauge will no longer be representative of upstream conditions. Therefore, flow upstream of the outfall must be determined. Based upon the above discussion, footnote 5 will not be changed.

Comment 16: Page 9, Section IA., Table 5 - outfall 005 mass limits

TCMC commented that the mass limits for Outfall 005 do not accommodate discharges from outfalls 001 and 002 and additional flow tiers are required for the discharges of these outfalls through Outfall 005. The mass limits are calculated based on the predicted maximum discharge of 2.7 cfs flow from the left abutment (LA), pumpback station (PBS), and mine pit water (PIT). When these sources discharge at this flow, this does not allow for any discharge from outfalls 001 and 002. TCMC requested specific flow tiers for Outfall 005, then went on to request additional flow tiers for outfalls 001 and 002. TCMC provided in Attachment 1 of their comments, tables that indicate how the dilution ratios change with each flow tier. The specific flow tiers requested include:

outfall 001: up to 20 cfs, 20 - 150 cfs, and > 150 cfs in Thompson Creek

outfall 002: up to 7 cfs, 7 - 40 cfs, and > 40 cfs in Thompson Creek

outfall 005 - when flow is only from the PBS, LA, and Pit: no flow tiers

outfall 005 - when flow is only from 001 and 002: up to 400 cfs, 400-1000 cfs, 1000-3000 cfs, and > 3000 cfs in the Salmon River

outfall 005 - when flow is from the PBS, LA, Pit, 001 and 002: up to 400 cfs, 400-1000 cfs, 1000-3000 cfs, and > 3000 cfs in the Salmon River

Response:

outfalls 001 and 002: The flow tiers for effluent limits in the draft permit (< 7 cfs and \$ 7cfs in Thompson Creek) were based upon the flow tiers in the preliminary 401 certification. These flow tiers were based on a letter from TCMC to Patty McGrath, EPA, dated February 25, 2000. In that letter, TCMC specifically requested the flow tiers for outfalls 001 and 002 that were included in the draft NPDES permit. The data presented by TCMC in this comment and in Attachment 1 is the same data that TCMC had been working with over the last year of permit development. TCMC did not present compelling evidence in their comments that additional flow tiers are needed for outfalls 001 and 002. In addition, EPA's evaluation of compliance with the draft permit effluent limits is that, based on the 001 and 002 effluent data reported on the DMRs, TCMC can achieve the effluent limits for outfalls 001 and 002 with the possible exception of selenium, for which a compliance schedule is provided. This being the case, EPA does not agree that additional flow tiers are needed for outfalls 001 and 002.

In addition, the final 401 certification retained the < 7 cfs and \$ 7cfs in Thompson Creek flow tiers. These tiers, therefore are not changed from the draft permit.

outfall 005: TCMC applied to discharge from outfalls 001 and 002 through outfall 005 in the February 25, 2000 letter. In their letter and application, TCMC did not request tiered

effluent limits. Therefore, effluent limits for Outfall 005 in the draft permit were developed based on a maximum effluent flow of 2.7 cfs. Mass-based limits were calculated using the maximum effluent flow since the current diffuser design submitted to EPA and IDEQ specified that flow.

Higher effluent flows may be accommodated with new diffuser designs, therefore EPA and IDEQ evaluated the tiers and dilution ratios requested in this comment. IDEQ authorized in their final 401 certification an additional flow tier for outfall 005 above Salmon River flows of 2000 cfs. The final permit, therefore, includes only this additional flow tier. Based on the data submitted by TCMC, IDEQ determined the appropriate dilution ratios are 120 at Salmon River flows of < 2000 cfs and 303 at Salmon River flows of \geq 2000 cfs. As discussed in Section II.A., the WQBELs for outfall 005 were recalculated based on the new dilution ratio. The dilution ratio for the low flow tier was the same as in the draft permit, therefore the concentration-based effluent limits for the low flow tier are the same as those in the draft permit. The calculation of the new effluent limits for the high flow tier are described in Appendix C.

Since the final effluent limits for outfall 005 are based on a dilution ratio, the mass-based limits for outfall 005 were removed and, instead, the dilution ratio was established as a limit (see also response to comment 1). In this way, mass loadings to the water body are controlled consistent with the assumptions used to develop the concentration-based effluent limits to ensure that water quality standards in the Salmon River are not exceeded and TCMC is provided the flexibility to increase the effluent flow as the Salmon River flow increases. Since the dilution ratio is applied as a permit limit, the final permit also requires monitoring of the Salmon River upstream of the outfall. Such monitoring is necessary to calculate the dilution ratio.

Table 5 of the permit was revised to incorporate the new outfall 005 flow tier, effluent limits, dilution ratio limit, and Salmon River monitoring.

Comment 17: Page 10, Section I.B. - WET requirements - sampling when there is no discharge

TCMC commented that it is possible that no discharge will occur from Outfall 005 during the months (April, June, August, and October) specified for WET testing. It would be appropriate for the permit to require WET testing only if there is a discharge during these time frames.

Response:

EPA agrees that WET testing is only required where there is a discharge from the outfall. This is true for all the WET testing, not just the outfall 005 testing. However, the testing frequency specified in the certification must be retained. Therefore, the language in the final permit was revised to allow for changes in the exact testing schedule when there is no

discharge (If there is no discharge from the outfall during the time specified for the toxicity test, then the test must be conducted in the next month that there is a discharge). See sections I.B.2.a. and I.B.3.a. of the final permit.

Comment 18: Page 10, Section I.B. - WET requirements - grab vs. composite samples

The samples used in WET testing of Outfalls 001 and 002 are to be collected as grab samples, while those collected for testing of outfalls 004 and 005 are required to be 24-hour composite samples. No specific justification for the use of composite samples is given, except that the effluent would contain “process water” (Fact Sheet). TCMC commented that these outfalls would only include site waters collected from various locations throughout the mine; there would be no treatment, hence no process water. It is not anticipated that the quality of the discharge would change within a 24 hour period, therefore, there is no need for composite sampling.

Response:

As discussed in response to comment 12, composite sampling is required since outfalls 004 and 005 are new outfalls which may consist of a combination of waste streams (including water from the tailings embankment left abutment drain and water from the pumback system, and for outfall 005 mine water and potentially outfalls 001 and 002 flows). Since there is no history of discharge from these outfalls and TCMC has not provided any information in their comments to support their contention that these outfalls will always be combined in a manner that reflect a stable chemistry over 24 hours, composite sampling is appropriate.

Comment 19: Page 10, Section I.B. - WET requirements - use of NOEC vs. IC25

TCMC commented on shortcomings with the use of the no observed effect concentration (NOEC) as the WET test endpoint.

First, NOEC values are generally determined with an alpha level of 0.05, meaning that statistical significance is determined with 95% confidence. This leaves a 5% chance of detecting a false positive. In order to decrease the incidence of false positive test results TCMC recommended that an alpha level of 0.01 be used in calculating all test statistics. The use of this alpha level will ensure significance is determined with 99% confidence.

Second, TCMC commented that the NOEC does not include a measure of the magnitude of biological impact. They recommended using the IC₂₅ (inhibition concentration at which there is predicted to be a 25% reduction in organism performance). When toxicity is detected the results of the NOEC and IC₂₅ should be similar. Substantially different values indicate the potential for the presence of a false positive toxicity results. They state that inclusion of both the NOEC and the IC₂₅ is the only method approved by the USEPA to identify false positive results (with an alpha level of 0.01).

TCMC recommended that for the results of any chronic test to be certified as toxic, both the NOEC and IC₂₅ (with 99% confidence intervals) values should fall below the allowable in-stream waste concentration.

Response:

The NOEC is generally used for determining WET reasonable potential, WET limits, and compliance with WET limits. However, the IC₂₅ may be used where the State regulatory agency specifies its use for compliance with their toxics criteria. As discussed in Section II.A., the final certification specified that the chronic toxicity test target endpoints are that both the NOEC and IC₂₅ be less than the dilution ratios used to calculate the effluent limits. Parts I.B.3.d. and I.B.4. (Table 6) of the final permit were revised accordingly.

Comment 20: Page 10, Section I.B. - WET requirements - control test for *O. mykiss*.

An additional requirement of the WET testing is that an additional control concentration, using the water in which organisms were cultured, be used in cases where the culture water and the dilution water are different. The *Oncorhynchus mykiss* are typically cultured in a variety of different waters, usually from an appropriate natural water supply. Because of the added expense and difficulty in obtaining *O. mykiss* culture water, it is inappropriate to require the use of an additional control concentration, unless it is demonstrated that organism performance suffers in the chosen dilution water.

Response:

The toxicity testing methods specified in the permit (including the *O. mykiss* method) are promulgated under 40 CFR Part 136. In Section 7, Dilution Water, of the method, EPA requires that a second set of controls, using culture water, be included in the test. Since this is a requirement of the method, it cannot be changed in the context of the NPDES permit. Such control tests are necessary to demonstrate, for one, that the organism performance doesn't suffer in the chosen dilution water.

Comment 21: Page 10, Section I.B. - WET requirements - Pattern of Toxicity

TCMC had the following comments regarding the number of WET tests required to determine toxicity.

number of tests to establish no toxicity: TCMC commented that the permit requirement that passing four accelerated tests is necessary to resume the regular testing schedule is excessive. A series of two accelerated tests in a row passing, or three passing out of five tests that do not detect excessive toxicity should be adequate to establish a pattern of no toxicity.

number of tests to establish toxicity: TCMC commented that the success of the TRE/TIE procedures is dependent upon the presence of consistent toxicity. Therefore, a pattern of

toxicity should first be established that involves the detection of unacceptable toxicity in the original WET test and a minimum of two additional accelerated WET tests. A single accelerated test failure should not be considered sufficient to establish the pattern of toxicity necessary for initiation of a TRE/TIE.

Response:

number of tests to establish no toxicity: Following national and Region 10 guidance, the permit requires that accelerated monitoring be initiated upon exceedance of the WET permit limit or trigger. The draft permit allows for the permittee to conduct an initial investigation (see Part I.B.6.d.). If the permittee demonstrates through an evaluation of facility operations that the cause of the exceedance is known (for example a facility upset or a lab error) and corrective actions have been implemented, only one accelerated test is necessary. If results of the accelerated test do not exceed the trigger, then no further accelerated testing is necessary. If the accelerated test results do exceed the trigger, then the permittee must conduct a TRE. Therefore, if TCMC pursues an initial investigation, potentially only one accelerated test is necessary to demonstrate no toxicity. A sentence has been added to Part I.B.6.a. of the final permit to clarify that only one accelerated test may be necessary and Part I.B.6.d. of the final permit is clarified to state that if toxicity does not exceed the trigger, then the permittee may return to the normal WET testing frequency.

number of tests to establish toxicity: The accelerated tests are used to establish the presence of consistent toxicity. If after, or in lieu of, an initial investigation, toxicity is detected in any of the accelerated WET tests, then the facility must begin a TRE to determine the cause of the toxicity. If toxicity is detected in any of the tests prior to the fourth one, the remaining tests do not need to be completed before starting the TRE. This scenario is comparable to the recommendation in that TSD that a TRE should be required where toxicity is present above effluent limits more than 20 percent of the time. One out of four tests (or two out of four tests if an initial investigation is performed) equates to more than 20 percent of the time. The preliminary and final 401 certifications repeated this TSD recommendation. Since the draft permit language is consistent with the TSD, the permit will not be revised to allow three of the tests to fail before initiating a TRE.

Comment 22: Page 10, Section I.B. - WET requirements - content of WET test reports

The draft permit states that the report of WET testing results must include all relevant information in Section 10 of *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA 1994). Section 10 outlines information that EPA recommends be included in a WET test report. TCMC commented that much of this information is irrelevant in terms of the actual test results and is excluded from most toxicity reports. TCMC recommended that the test reports be required to contain information necessary for interpretation of the test results and all information required by the test method, nothing more.

Response:

As stated in the comment, Part I.B.8.c. of the draft permit requires that the report of toxicity test results must include all relevant information outlined in Section 10 of the cited methods manual. The permit language already requires that all “relevant” information be included in the test results. Therefore, irrelevant information does not need to be included as suggested in the comment and no change to the permit language is needed.

Comment 23: Page 15, Section I.C.3., Table 7 - Method Detection Limits

TCMC commented that the final permit should require the use of the Minimum Level (ML) rather than the Method Detection Limits (MDL) due to the following:

reason no. 1: The MDL may be too restrictive and not representative of the type of sample matrix that occurs at the Thompson Creek Mine. The method EPA uses to determine MDLs is based on a single concentration design that has become heavily scrutinized for its inaccurate assumptions. TCMC provided information regarding why they believe EPA’s method for determining MDLs is inaccurate. They state that using EPA’s method, the analytical laboratories are able to claim MDLs that are not statistically achievable.

reason no. 2: TCMC also cited a portion of the TSD (Section 5.7.3, Detection Level Limits) that discusses the use of the ML vs. the MDL and states that “EPA is not recommending the use of the method detection level because quantitation at the detection levels is not as precise as at the minimum level”. TCMC suggested that the permit require the use of the ML rather than the MDL.

Response:

reason no. 1: Application of the MDL calculation procedure to particular methods has been subject to peer review and public comment with every MDL that EPA publishes in nearly every chemical-specific method proposed in the Federal Register since 1984. The MDL procedure, therefore, cannot be changed due to comments on this permit.

Part I.C.3. of the draft permit (Part I.C.4. of the final permit) allows the permittee to request different MDLs. EPA recognizes that some permittees may be unable to meet the specified MDLs due to matrix interferences. The NPDES regulations allow for establishment of site specific MDLs in the provisions of alternative test procedures under 40 CFR 136.4. The alternative process was developed to provide options for resolving analytical difficulties encountered that are unique to specific site wastewaters. However, any permittee must complete the EPA approval process before they can be used for compliance monitoring purposes. EPA has guidelines by which permittees may request discharge-specific MDLs: *National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-based Effluent Limitations Set Below Analytical Detection/Quantitation Levels* (OWEC, March 22, 1994) see specifically Appendix B

(Guidance for Permit Writers and the Permittee on the Development and Review of Discharge-Specific Method Detection Limits) and *Guidance on Evaluation, Resolution, and Documentation of Analytical Problems Associated with Compliance Monitoring* (EPA 821-B-93-001). TCMC has not submitted information according to these guidelines to justify changes in the MDLs. If TCMC submits information according to the guidelines and it is determined that there are matrix interferences which preclude the facility from achieving the MDL specified in the permit, the permit may be reopened and the MDLs can be modified accordingly.

reason no. 2: The section of the TSD cited concerns the approach to be used for situations where the effluent limit is below the analytical detection level (i.e., the MDL). EPA agrees that compliance with effluent limits at the MDL is not appropriate. EPA Region 10 developed guidance for establishing a concentration for determining compliance with effluent limits below analytical detection levels (EPA Region 10 1996). The inability to measure to the necessary level of detection is addressed by establishing the ML as the quantification level. The ML is used as the compliance evaluation level for Discharge Monitoring Report (DMR) data.

The section of the TSD cited and EPA guidance on the use of MLs applies to situations where the effluent limit is below the MDL. It does not apply to effluent limits that are above the detection level or to ambient monitoring. The MDLs in Table 7 apply to the receiving water monitoring and to effluent monitoring for those parameters that do not have effluent limits. The MDLs were specified in the draft permit to insure that ambient monitoring achieves MDLs at levels lower than the water quality criteria. Since use of the ML does not apply to ambient monitoring or effluent monitoring where the effluent limits are above the MDL (which is the case for this permit), the draft permit (and final permit) did not specify the use of MLs.

Note that the MDLs for cadmium, copper, lead, mercury, and zinc in Table 7 have been revised based upon the final 401 certification (see the Report attached to the certification).

Comment 24: Page 15, Section I.C. - special resource monitoring for outfall 004

TCMC commented that the special resource monitoring is not necessary for Outfall 004. Outfall 004 is a discharge to Squaw Creek, a tributary of the Salmon River. The discharge is several miles from the Salmon River and is not expected to result in a measurable change in special resource water quality. The existing Squaw Creek and Outfall 004 monitoring plan is sufficient to protect the downstream special resource waters.

Response:

The special resource water monitoring in Part I.C.5. of the draft permit (which is Part I.C.6. of the final permit) required specific monitoring of the Salmon River when there is a

discharge from either outfalls 004 or 005. This monitoring was included in the permit based on the draft 401 certification. As discussed in Section II.A., above, the final certification required that the special resource water monitoring provisions be retained in the final permit. Since this is a requirement of certification, this language will not be revised based on the comment.

Comment 25: Page 15, Section I.C. - Surface Water monitoring requirements

TCMC has an extensive ambient water quality monitoring program that is reviewed and approved annually by the Interagency Task Force (IATF). The monitoring program is described in the Consolidated Environmental Monitoring Plan. The monitoring plan includes, among other items, NPDES water discharge monitoring and surface water monitoring. TCMC commented that EPA has not demonstrated a basis for asserting authority over this site-wide monitoring program. EPA may provide comments and input to the IATF for annual revisions to the monitoring program and the EPA currently receives a copy of the monitoring data. However, the program is not currently and should not be a part of the NPDES permit. The Clean Water Act does not require redundant monitoring which is unnecessary to ensure compliance with applicable water quality standards. Inserting the plan in the NPDES permit is unnecessary and would be unduly burdensome and would not allow sufficient flexibility to adjust the plan as necessary through the IATF process.

TCMC suggested the final permit state that Thompson Creek continue to monitor ambient waters as defined in the Consolidated Monitoring Plan approved by the IATF and that the data will be provided to the EPA and IDEQ on a quarterly basis. TCMC requested replacement of Section I.C. with the language above, if Section I.C. is retained, then they suggest revising the section pursuant to comments 26 through 39, below.

Response:

EPA acknowledged the Consolidated Environmental Monitoring Plan in the Fact Sheet. Even though many of the draft permit monitoring requirements were redundant with the current Consolidated Monitoring Plan, they were included in the permit since they directly relate to evaluating impacts of the NPDES discharges. In addition, many of the monitoring requirements were specified in the State's preliminary 401 certification of the permit. Including these monitoring requirements in the permit ensures that the monitoring will be conducted as specified in the permit. It also allows TCMC certainty regarding monitoring requirements over the life of the permit. Instead of revising the permit to be consistent with the Consolidated Monitoring Program, the applicable portions of the Consolidated Monitoring Program may be revised consistent with the permit. The U.S. Forest Service, on behalf of the IATF suggested that the monitoring program be "subject to change as dictated by the final NPDES permit." (September 8, 1999 letter from Rene Mabe, U.S. Forest Service, to Kent Watson, TCMC).

CWA section 308(a) and the NPDES regulations at 40 CFR 122.44(i) provide EPA with the authority to require such monitoring. CWA section 308(a) states: “Whenever required to carry out the objective of this chapter, including but not limited to (1) developing or assisting in the development of any effluent limitation, or other limitation, prohibition or effluent standard...(A) the Administrator shall require the owner or operator of any point source to (i) establish and maintain such records, (ii) make such reports, (iii) install, use, and maintain such monitoring equipment or methods (including where appropriate, biological monitoring methods), (iv) sample such effluents, and (v) provide such other information as he may reasonably require...”

EPA’s intent through identifying sampling stations, frequencies and other requirements in the draft permit is to clearly identify the minimum monitoring requirements necessary for the NPDES permit, not to establish authority over the IATF or the Consolidated Monitoring Plan.

Based on the above discussion, the surface water monitoring section of the permit has been retained with some changes as a result of the final 401 certification and following comments. The surface water monitoring required in the final permit includes:

- S** Quarterly surface water monitoring upstream and downstream of the discharges (Part I.C.1. and 2.). This monitoring is required to determine the need for revised effluent limits in future permits. This requirements is the same as in the draft permit.
- S** A requirement that sampling be conducted to monitor the same parcel of water between the stations upstream and downstream of each outfall was added in response to comment 27.
- S** MDLs for the surface water monitoring are specified in Table 7. Some of the MDLS were revised based upon the Report attached to the final 401 certification (see response to comment 23).
- S** The requirement to monitor streamflow upstream of outfalls 001,002, and 004 was retained. This is the same requirement included in the tables of effluent limits. It is necessary to monitor streamflow in order to determine which tier of effluent limits apply and to calculate dilution ratios. Monitoring of the Salmon River streamflow was added to the permit since flow tiers and a dilution ratio limit are now applied to Outfall 005 and to be consistent with the final 401 certification (see Part I.C.5. of the final permit).
- S** The Special Resource Water Monitoring (Part I.C.6. of the final permit) and Comparison to Chronic Criteria (Part I.C.7.) provisions were retained as required in the final 401 certification (see Section II.A., above).

- S The quality assurance provision (Part I.C.8.) of the permit was retained to ensure that data of adequate quality is collected and reported.
- S The reporting requirements were retained (Parts I.C.9. and 10.) Some of the reporting deadlines were revised as discussed in response to comments 28 and 29.

Comment 26: Page 15, Section I.C.3. - MDLs for mercury and chromium

TCMC commented that the MDLs for mercury and chromium VI are unrealistic and excessive.

mercury: To obtain the MDL of 0.001 ug/l for mercury, the new 1600 series method is required. Few laboratories can achieve this kind of detection limit and it is very costly to run. This requirement is excessive, especially when mercury has not been detected on site. TCMC suggested changing the mercury MDL to 0.05 ug/l

chromium VI: Chromium VI has a detection limit of 4 ug/l and the lab has a PQL of 10 ug/l. See also comment 14. TCMC suggested that they instead analyze for total chromium with an MDL of 1 ug/l.

Response:

mercury: The draft permit specified a mercury MDL of 0.001 ug/l for the receiving water monitoring. This MDL has been revised to 0.0005 ug/l in the final permit based on the Report attached to the final 401 certification. This MDL is required in order to monitor the receiving waters to levels below the chronic water quality criterion (0.012 ug/l). The MDLs reported by TCMC in their past mercury monitoring are greater than the chronic water quality criteria. Therefore, although mercury has not been detected in past monitoring, this does not provide proof that mercury is not present at levels greater than the chronic criterion. TCMC's recommended MDL of 0.05 ug/l would not detect possible exceedences of the criteria. The draft permit MDL of 0.001 ug/l is achievable using Method 1631, revision B. This method was promulgated by EPA as a 40 CFR 136 method on June 8, 1999 (64FR30417). The promulgation responded to comments regarding the availability and cost of Method 1631. The NPDES regulations require that 40 CFR 136 methods be used for analysis, unless an alternate test procedure has been approved. TCMC did not present supporting information to demonstrate that the MDL is not achievable, therefore the MDL will remain. TCMC may apply for alternate test procedures under 40 CFR 136.4 as discussed in response to comment 23.

chromium VI: Since TCMC will be unable to achieve the 24 hour holding time, where it appears in the permit, chromium-VI has been revised to chromium (see also comment 26). This resulted in a revision to Table 7 of the permit. EPA does not agree that it is necessary to decrease the MDL from 4 ug/l to 1 ug/l. A MDL of 4 ug/l is adequate for comparison to the chromium acute and chronic criteria.

Comment 27: Section I.C.5. - special resource monitoring

TCMC commented that the special resource monitoring requirements should be clarified. Specifically they commented on the following points:

no. 1: The permit describes an objective of detection of a 25% change in the assimilative capacity between the upstream and downstream samples, without reference to a specific direction of that change. The objective should be the detection of an increase in downstream concentration in excess of 25% of the assimilative capacity for a given parameter.

no. 2: Sample collection scheduling should facilitate the monitoring of the same parcel of water at each sample station.

no. 3: The number of samples required for standard sampling procedures should be based on the actual standard deviations and sample sizes for each parameter from actual upstream data. Enhanced sampling (i.e., eight replicates) should be required only for the parameters for which thresholds (25% increase in assimilative capacity) are exceeded during a standard sampling event.

no. 4: The text as written does not describe the conditions under which the standard (non-enhanced) sampling schedule and procedure may be resumed. Standard sampling should be resumed following two consecutive enhanced sampling events for which the 25% threshold was not exceeded for the parameter.

Response:

no. 1: EPA agrees that the direction of the 25% change should be an increase from upstream to downstream. This is the intent of the preliminary 401 certification upon which this language was based (and was retained in the final certification; see Section II.A., above). The text of Part I.C.5.b. (I.C.6.b. in the final permit) has been revised accordingly.

no. 2: It is appropriate to sample the same parcel of water. This is true for all the upstream/downstream monitoring. Therefore, this provision was added to Section I.C. (final permit Part I.C.3.).

no. 3: The need for eight replicates is not based upon the results of the comparison between upstream and downstream samples. Rather it is the required number of replicates to determine the 25% increase in assimilative capacity with the statistical errors required in the permit. The permit language states that eight replicates are necessary unless the permittee demonstrates otherwise using a statistical sample power calculation and actual sample variability. This provision is based on the preliminary 401 certification. The final certification required that this language be retained, and therefore it was not revised.

no. 4: Per the draft permit, the enhanced sampling is required four times annually. This is regardless of the results of the upstream/downstream comparison. This provision is based on the preliminary 401 certification which required such sampling four times per year. The final certification required that this language be retained, and therefore this provision was not revised.

Comment 28: Page 17, Section I.C.8. - surface water monitoring results due date

TCMC commented that it is impossible to submit the surface water monitoring results with the DMR for the month following sample collection. The DMR is due on the 10th of the following month and typically laboratory data is not received for three to four weeks after the due date of the DMR. TCMC suggested that the surface water monitoring results be submitted on a quarterly basis with each quarters data due at the end of the month following each quarter as is the requirement in the current NPDES permit.

Response:

It is acceptable to submit the results of the surface water monitoring on a quarterly basis. Part I.C.8. of the draft permit (I.C.9. of the final permit) has been revised to require the submittal of surface water monitoring results four times per year, at the end of March, June, September, and December (which represents the month following the sampling date).

Comment 29: Page 18, Section I.C.9. - Annual Water Quality Monitoring Summary Report due date

TCMC commented that it would be impossible to complete an annual report, with the vigorous reporting requirements outlined in the monitoring plan for the amount of water quality data generated each year, and have it submitted by January 10th of the following year. TCMC suggested a due date of March 31st of the following year which is consistent with the approved year 2000 monitoring plan.

Response:

Since reporting of the water quality monitoring information will occur throughout the year, it is acceptable to submit the Annual Water Quality Monitoring Summary Report by March 31st of the following year. Part I.C.9. of the draft permit (I.C.10. of the final permit) has been revised accordingly.

Comment 30: Page 18, Section I.D. - Bioassessment Program

TCMC commented that the bioassessment program is part of the currently approved monitoring plan approved by the IATF and EPA has not demonstrated a basis for asserting authority over it. EPA may provide comments and input to the IATF for annual revisions to the monitoring program and to obtain monitoring results. However, the

program is not currently and should not be a part of the NPDES permit. Inserting the plan in the permit is unnecessary, would be unduly burdensome, and does not allow sufficient flexibility to periodically adjust the plan as necessary through the IATF process. TCMC suggested that the permit require that they continue to monitor ambient waters as defined in the Consolidated Monitoring Plan approved by the IATF and that the data will be provided to EPA and IDEQ on a quarterly basis.

Response:

As discussed in response to comment 25, EPA is not asserting authority over the IATF. Bioassessment monitoring is appropriate in the permit since it directly relates to evaluating impacts of the NPDES discharges. The specific bioassessment monitoring provisions in the draft permit were based on the preliminary 401 certification. The final 401 certification also required bioassessment monitoring, therefore the requirement for bioassessment monitoring will remain in the permit. As discussed in Section II.A., above, the final certification did allow that specifics of the monitoring plan be established through the IATF. Part I.D. of the permit was revised according to language in the final 401 certification.

Comment 31: Page 18, Section I.D. - Bioassessment Program - need for Salmon River monitoring

TCMC commented that given the dilution of the 005 discharge to the Salmon River (less than 1% effluent), the potential to measure differences in the stream biotic communities is minimal.

Response:

As discussed in response to comment 30, bioassessment monitoring is required to evaluate the impacts of the NPDES discharges. The final 401 certification required bioassessment monitoring above and below the outfall to the Salmon River. Therefore, this requirement remains in the final permit. As discussed in Section II.A., the final 401 certification (and therefore, the final permit language) allows that specifics of the monitoring (e.g., the ability to measure differences) be developed through the IATF and revision to the Consolidated Environmental Monitoring Program Plan.

Comment 32: Page 18, Section I.D. - Bioassessment Program - use of Slack sampler

The draft permit requires the use of a Slack sampler for benthic macroinvertebrate monitoring. This is the type of sampler used by Idaho in the development of their sampling program for large rivers. As such, it would probably be reasonable to use in the Salmon River. However, in the smaller Thompson and Squaw Creeks it is not necessary. TCMC has over 20 years of biomonitoring data in these streams using a Hess sampler. TCMC recommends that Hess sampler continue to be used for those sites.

Response:

As discussed in Section II.A., based on the final 401 certification, specifics of the bioassessment monitoring have been removed from the permit (including the provision cited in this comment). Instead, the final permit language at Part I.D.1. references the final 401 certification for recommendations for conducting bioassessment monitoring.

Comment 33: Page 18, Section I.D. - Bioassessment Program - periphyton monitoring

TCMC commented that periphyton monitoring is not necessary for the following reasons:

- periphyton have not been sampled in the past 20 years so there is no baseline for comparison to future sampling
- For the two smaller streams, Thompson and Squaw Creeks, their higher gradient, low nutrient, high shading, and other environmental characteristics would be expected to limit periphyton populations and make sampling difficult to conduct and interpret.
- There is a long history of benthic invertebrate and fish population sampling in these streams.

Response:

Periphyton monitoring was included in the draft permit based on the preliminary 401 certification. The final 401 certification also required periphyton monitoring. Therefore, this requirement remains in the final permit. The final 401 certification did allow that specifics of the monitoring be developed through the IATF and revision to the Consolidated Environmental Monitoring Program Plan. Therefore, the specifics of the periphyton monitoring (e.g., the endpoints and data interpretation and analysis) were removed from the final permit.

Comment 34: Page 18, Section I.D. - Bioassessment Program - frequency of fish monitoring

The bioassessment program in the draft permit requires fish population sampling on a biennial basis (every two years). This is in direct conflict with the program approved by the IATF of every 3 years, again pointing to the problems of including a bioassessment program in the permit.

Response:

The frequency of fish population monitoring was based on the preliminary 401 certification. The final certification (and therefore the final permit) requires fish monitoring, but allows for specifics (e.g., frequency) to be developed through the IATF and revision to the Consolidated Environmental Monitoring Program Plan.

Comment 35: Page 18, Section I.D. - Bioassessment Program - data interpretations and further actions

As currently written, if the bioassessment program determines differences in the communities upstream and downstream of the mine outfalls, TCMC would be required to

identify and remedy the cause of these differences. TCMC commented that this requirement, as currently defined, is wholly inappropriate for inclusion as a permit requirement for the following reasons:

no. 1: This requirement assumes that any difference between the upstream and downstream site will be manifested as a decline in quality downstream. However, as the permit is worded, TCMC would be responsible for determining a cause for any decline in quality at the upstream site or improvement in quality at the downstream site and remedying the causes.

no. 2: This requirement does not take into account natural and historic differences in the communities at these sites, the potentially different habitat types, or natural fluctuations in the community composition. Of benthic macroinvertebrate community metrics calculated over the last decade of monitoring, one or more metrics at the upstream site were higher than downstream 41% of the time and lower 59% of the time. Thus, this permit requirement would result in determining causes of and remedies for what appear to be natural variations in these communities and the metrics used to measure the response of these communities.

Response:

As discussed in Section II.A., based on the final 401 certification, specifics of the bioassessment monitoring have been removed from the permit. This includes the data interpretations and further actions provision (the requirement to identify and remedy the cause of differences) cited in this comment. Instead the final permit allows that the specifics of the monitoring plan are to be developed through the IATF and revision to the Consolidated Environmental Monitoring Program Plan.

Comment 36: Page 20, Section I.E. - Bioaccumulation Study - data interpretation and further actions

The draft permit requires TCMC to conduct bioaccumulation studies of mercury and selenium in Thompson Creek and in the case of statistically elevated concentrations of either mercury or selenium downstream of the outfalls relative to the upstream values or of exceedences of any of the biological screening levels, TCMC identify and remedy the cause. As this is written, TCMC would be responsible for any exceedences of the screening levels in areas upstream of the mine outfalls. This is inappropriate as the mine has no effect on or control over conditions upstream of its discharges. Neither does this requirement take into account natural, historic, or cyclical variations in these concentrations. As currently written, these requirements are inappropriate for inclusion in the final permit.

Response:

As discussed in Section II.A., based on the final 401 certification, the bioaccumulation study requirements have been revised. The specifics of the bioaccumulation monitoring

have been removed from the permit. This includes the data interpretations and further actions provision (Part I.E.5. of the draft permit) cited in this comment. Instead the specifics of the bioaccumulation study will be developed in a work plan to be approved by IDEQ.

Comment 37: Page 20, Section I.E. - Bioaccumulation Study - need for the study

As Attachment 3 to their comments, TCMC submitted the results of a bioaccumulation study conducted on Thompson Creek in spring 2000 (Bioaccumulation Study, Results of Spring 2000 Sampling of Sediment, Benthic Macroinvertebrate, and Fish Tissue for Mercury and Selenium in Thompson Creek, Chadwick Ecological Consultants, Inc., August 2, 2000). TCMC commented that the results indicate no measurable potential for mercury bioaccumulation in Thompson Creek. In regards to selenium, the data demonstrate that there is a source of selenium upstream of the mine and the mine discharges have no measurable affect on selenium concentrations in sediment or biota in Thompson Creek. The results of this study would indicate that future bioaccumulation studies (as outlined in Section I.E.5.b. of the permit) are not necessary and that the requirements set forth in Section I.E. of the permit be deleted entirely.

Response:

The selenium and mercury bioaccumulation study requirements in the draft permit were based upon the draft 401 certification. The final certification did not require a mercury bioaccumulation study, but did require a selenium bioaccumulation study. The final permit, therefore, continues to require a selenium bioaccumulation study. As discussed in Section II.A., the requirements of the study have been revised based upon the final 401 certification.

Comment 38: Page 20, Section I.E. - Bioaccumulation Study - selenium screening level for fish

The permit contains a table that sets a whole body selenium screening level for fish at 4.0 mg/kg dry weight. TCMC commented that recent research has shown much higher selenium concentrations to not be harmful to native cutthroat trout (concentrations of 36.6 ug/g in the liver, 21.0 ug/g in the eggs, and 12.5 ug/g in the muscle). TCMC provided a reference for and summarized the results of this study. Since the data were taken from an ecosystem similar to Thompson Creek, they are more environmentally relevant and likely to be predictive of actual conditions in Thompson Creek. The selenium concentrations in trout collected from Thompson Creek this past spring were all well below these specific tissue concentrations.

Response:

Part I.E.2.b. (Table 9) of the draft permit specified selenium biological screening levels based on the preliminary 401 certification. The final certification did not require

comparison to biological screening levels, therefore this provision was removed from the final permit. The final permit references the final 401 certification for recommendations for conducting the bioaccumulation study (Part I.E.1. of the final permit). The Report attached to the final certification provides recommended selenium biological screening levels, although these levels are no longer required in the permit.

Comment 39: Page 21, Section I.E. and page 23, Section I.G. - Table 9

TCMC commented that there are two unrelated tables called Table 9 in the permit.

Response:

Table 9 in Section I.G. of the draft permit should have been labeled Table 10. However, draft permit Tables 8 and 9 have been deleted, therefore the table in Part I.G. is labeled Table 8 in the final permit.

Comment 40: Page 22, Section I.F. - Quality Assurance Plan (QAP)

TCMC commented that they should be allowed to use the IATF-approved QAP that is attached to the Consolidated Environmental Monitoring Plan. The QAP details the QA/QC procedures for surface and groundwater, sediment, and biological monitoring. The QAP will be updated annually according to the recommendations of the IATF and/or changes in monitoring requirements for the NPDES permit in response to state and federal regulatory changes. The addition of a redundant QAP requirement should therefore be removed from the permit requirements. The final permit should reference the QAP associated with the Comprehensive Monitoring Program and acknowledge that the QAP will be reviewed annually by the IATF and updated as necessary.

Response:

As discussed in the Fact Sheet, 40 CFR 122.41(e) requires permittees to properly operate and maintain their facilities, including “adequate laboratory controls and appropriate quality assurance procedures.” To implement this requirement, EPA requires permittees to develop QAPs for monitoring required in the permit. The QAP requirements in the draft permit are consistent with QAP requirements for other permittees in Region 10. TCMC may utilize the QAP for the Consolidated Monitoring Plan as long as it contains all the provisions required in Section I.F. of the permit for monitoring that is required in the permit. The last sentence of the first paragraph of Section I.F allows for this by stating that any existing QAPs may be modified for submittal. It is appropriate for EPA to include QAP requirements in the permit for monitoring that is required in the permit.

Comment 41, Page 23, Section I.G. - Selenium Schedule of Compliance - need for selenium effluent limits and compliance schedule

TCMC requested that the selenium effluent limits in the permit be modified to reflect

existing (ambient) concentrations and therefore, the compliance schedule be removed from the permit for the following reasons:

reason no. 1: There is no evidence that the current concentrations of selenium, or other compounds discharged from Outfalls 001 or 002 are having any negative effect on the aquatic biota in Thompson Creek. Twenty years of benthic macroinvertebrate and fish population monitoring have shown no significant difference in the population parameters upstream vs. downstream of the outfalls other than what appear to be natural fluctuations. There is no reasonable potential to expect that continued operation of the 001 and 002 discharges will negatively affect the aquatic biota in this system.

reason no. 2: One of the tasks listed under the schedule of compliance for selenium is the bioaccumulation study for selenium. However, as the permit is written, the results of the bioaccumulation study appear to have no bearing on the implementation of the selenium schedule of compliance. The recent bioaccumulation study (see comment 37) has shown no significant change in the concentration of selenium in sediments and biota upstream and downstream of the mine.

Response:

reason no. 1: EPA disagrees that effluent limits are not needed for selenium. As discussed in detail in the TSD, EPA follows a policy of independent applicability when evaluating discharges for reasonable potential to cause or contribute to exceedences of the numeric or narrative water quality standards. The policy requires that water quality standards be independently applied. This means that any single assessment method (chemical criteria, WET testing, biological assessment) can provide conclusive evidence that water quality standards are not attained. Under this policy as implemented by EPA, a demonstration of water quality standards nonattainment using one assessment method does not necessarily require confirmation with a second method. Additionally, the failure of a second method to confirm impact, by itself, does not negate the results of the initial assessment.

EPA's reasonable potential analysis as documented in the Fact Sheet, determined that selenium in outfalls 001 and 002 has the reasonable potential to cause, or contribute to an excursion above the state water quality criteria. The NPDES regulations at 40 CFR 122.44(d)(1) require that the permit contain effluent limits for those pollutants that demonstrate reasonable potential. Therefore, water quality-based effluent limits for selenium were developed in the draft permit. According to EPA's policy of independent applicability and 40 CFR 122.44(d), the positive results of the existing biological data do not negate the results of the chemical-based reasonable potential analysis, therefore, selenium effluent limits will be retained in the permit.

As discussed in Section II.A., for the final permit, the effluent limits were recalculated based on the new dilution ratios and mixing zones authorized in the final 401 certification.

The recalculation is provided in Appendix C. Selenium effluent limits were still required for outfall 002 and outfall 001 at the high flow tier. At low flow there was no reasonable potential for discharge from outfall 001 to cause or contribute to exceedences of the selenium water quality standards, therefore selenium effluent limits were not developed for the low flow tier. See Tables 1 and 2 of the final permit for the revised selenium effluent limits.

reason no. 2: The selenium bioaccumulation study and the compliance schedule are requirements of the 401 certification and were therefore included in the draft and final permit. The Report attached to the final 401 certification provides rationale for the bioaccumulation study and compliance schedule.

Comment 42, Page 23, Section I.G. - Selenium Schedule of Compliance - details of the tasks

The draft permit requires a source investigation to identify the origin and mechanisms liberating the selenium from the source rock that feeds into the effluents of outfalls 001 and 002. At the end of year two, a feasibility study along with design and construction documents for identifying measures to reduce selenium in outfalls 001 and 002 must be completed. According to the EPA published document FRL-6162-4 “Final Modification of the National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General permit for Industrial Activities” dated September 30, 1998, the multi-sector general permit (MSGP) includes an exemption from monitoring in the 4th year if results of the 2nd year are below certain benchmark values. The benchmark value for selenium is 0.2385 mg/l. If monitoring results for selenium do not exceed benchmark values outlined in the regulations, all tasks under Table 9 should not be required and monitoring should cease after the 4th year.

If 2 years of monitoring data conclude the benchmark concentrations exceed the value, then additional investigations and feasibility studies (Tasks 1 - 6 identified in Table 9) would be implemented in order to achieve effluent limitations and assess the effectiveness of BMP options in this order:

1. discharge diversions
2. sediment and erosion control
3. capping of contaminated sources
4. treatment

Federal Register dated September 29, 1995 Section VIII.G.3.a. states more “resource intensive treatment BMPs” such as chemical or physical treatment “may be necessary depending upon the type of discharge, types of concentrations of contaminants, and volume of flow.” These options would only be explored if feasibility studies concluded no other viable options are available to reach effluent limitations.

Response:

The first paragraph of the comment refers to a portion of the Modification of the Storm Water Multi-Sector General Permit (MSGP) for Industrial Activities Fact Sheet that describes a portion of the monitoring requirements for facilities covered under the MSGP. Discharges from outfalls 001 and 002 are not covered under the MSGP, therefore, the monitoring scheme and benchmark value cited does not apply.

The last paragraph refers to a portion of the Fact Sheet of MSGP. It is from a general discussion of BMPs for metal mines. EPA agrees that implementation of readily implementable BMPs is preferable to installing treatment, if BMPs consistently allow compliance with the effluent limits. TCMC may assess the effectiveness of the BMPs in the order cited in the second paragraph so long as the assessment is complete within a time frame consistent with the compliance schedule (e.g. within 5 years of the effective date of the permit). Footnote 1 of Table 8 states that “Tasks scheduled past year 2 (past task 3) are listed in anticipation of potential unknown conditions. The permittee does not need to complete these later tasks if compliance with the effluent limits is achieved sooner.” Therefore, if TCMC achieves compliance via implementing BMPs, then implementation of treatment is not necessary.

The compliance schedule and interim tasks in the draft permit were based on the preliminary 401 certification. As discussed in Section II.A., the final permit also required a compliance schedule and interim tasks. The compliance schedule in the final permit is based and the final 401 certification and therefore will not be revised based on this comment.

Comment 43, Section I.G.3. - Selenium Schedule of Compliance - Annual Report of Progress due date

To be consistent with other annual reports for the Thompson Creek Mine, TCMC requested that the progress report for selenium be due on March 31st of the following year.

Response:

The final 401 certification required that the annual progress reports be due by March 31 of each year. Part I.G.3. of the permit was revised accordingly.

Comment 44, Page 24, Section II. - Best Management Practices Plan - restrict to outfall 003

The draft permit requires the preparation and implementation of a Best Management Practices Plan (BMP Plan) for the entire Thompson Creek Mine. TCMC commented that this requirement is onerous and unnecessary and that BMPs are only appropriate for Outfall 003, which collects storm water that is not subject to effluent limitations. TCMC provided the following reasons for this comment:

- Discharges from outfalls 001, 002, 004, and 005 are subject to established numeric effluent limits.

- Under 40 CFR 122.44(k), an NPDES permit shall include BMPs when:
 1. Authorized under Section 304(e) of CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;
 2. Numeric effluent limitations are unfeasible, or
 3. The practices are necessary to achieve effluent limitations and standards or to carry out the purposes and intent of CWA.

Neither the draft permit nor Fact Sheet explain, in the context of 40 CFR 122.44(k), why BMPs are necessary for the entire Thompson Creek facility.

Response:

As stated in their comment, BMPs are appropriate to Outfall 003 and storm water sources that contribute to the outfall pursuant to 40 CFR 122.44(k)(2) . BMPs are also appropriate for the rest of the facility to achieve the effluent limitations and standards or to carry out the purposes and intent of the CWA (40 CFR 122.44(k)(3)).

The primary authority for BMP Plan requirements is Section 402(a) of the Clean Water Act. Section 402(a)(1) of the Act allows the Administrator to prescribe conditions in a permit determined necessary to carry out the provisions of the Act. BMPs are one such condition. Section 402(a)(2) authorizes EPA to include miscellaneous requirements in permits on a case-by-case basis which are considered necessary to carry out the provisions of the Act. Based upon this statutory authority, EPA promulgated regulation which provide for BMPs to be used to control or abate the discharge of pollutants when effluent limitations are infeasible or the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purpose and intent of the Act (40 CFR 122.44(k)(2) and (3)).

There is nothing in the law or regulations that limits the use of BMPs to only storm water discharges. To improve water quality, the CWA provides for water pollution controls supplemental to effluent limitations. BMPs are one such supplemental control. BMPs are also intended to complement and augment effluent limitations and incorporate pollution prevention practices. The intent is to avoid contact between pollutants and water media as a result of leaks, spills, improper waste disposal, etc. The BMP Plan is intended to

achieve the following objectives: minimizing the quantity of pollutants discharged from the facility, reducing the toxicity of discharges to the extent practicable, preventing the entry of pollutants into waste streams, as well as minimizing storm water contamination

EPA endorses pollution prevention as one of the best means of pollution control. In 1990, the Pollution Prevention Act was enacted and set forth a national policy that: "...pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner." The requirement to develop BMPs is included in permits to require facilities to begin to address pollution prevention, as well as storm water.

Rather than requiring site-specific BMPs, EPA has required the development of a BMP Plan that will allow TCMC the flexibility to address issues specific to the Thompson Creek Mine.

This regulatory basis for developing BMP Plans is presented in more detail in EPA's BMP guidance (USEPA 1993a). This guidance also provides information on how to develop BMP Plans. In summary, EPA has the authority to impose BMP requirements as an enforceable part of the permit. The requirement to develop a BMP Plan for the facility remains in the final permit.

Comment 45, Page 25, Section II. - BMP Plan - restrict to outfall 003

TCMC commented that the draft permit indicates that the entire mine site is controlled by point source discharge permits and implementation of storm water BMPs. There is no reason for a BMP storm water requirement outside of the Bruno Creek drainage and Outfall 003. Outfall 003 is the only point discharge associated with the mine that is not already permitted; therefore outfall 003 should be the only area where BMP storm water implementation is required.

Response:

As discussed in the previous comment, the use of BMPs is not restricted to storm water control. See response to the previous comment.

Comment 46: Page 27, Section II.D.4.c. Spills and Leaks

The draft permit required that the BMP Plan include a list of significant spills and leaks of toxic or hazardous pollutants that drain to a permitted outfall, etc. TCMC commented that this requirement refers to no chemical material list or reportable quantities for a potential spill or leak. TCMC recommended that the site Tier II Chemical Inventory be referenced as the material to be listed along with the corresponding reportable quantities for reporting.

Response:

EPA has defined “significant spills” as follows (60 FR 50816, September 29, 1995): “Significant spills includes, but is not limited to: releases of oil or hazardous substances in excess of quantities that are reportable under Section 311 of Clean Water Act or Section 102 of CERCLA. Significant spills may also include releases of oil or hazardous substances that are not in excess of reporting requirements and releases of materials that are not classified as oil or a hazardous substance” EPA’s guidance on developing pollution prevention plans and best management practices for storm water management (EPA 1992), which is referenced in the permit (Part II.D.), provides the rationale for listing significant spills and leaks and more information on how to do this. The permit language, therefore, was not revised.

Comment 47: Page 27, Section II.D.4.d. Risk Identification

The draft permit requires that the BMP Plan identify all activities, sites, and significant materials, which may potentially be pollutant sources. TCMC commented that a level of materiality should be defined and recommended that the site Tier II Chemical Inventory be referenced as the significant materials.

Response:

EPA has defined significant materials at 40 CFR 122.26(b)(12) in terms of storm water discharges as follows: “Significant materials includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 314 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.” Even though this definition is specific to storm water, the same definition is appropriate for dry weather discharges, spills, etc. Significant materials commonly found at mining facilities include: overburden, waste rock, sub-ore piles, tailings, petroleum-based products, solvents and detergent, manufactured products, and other water materials. (60 FR 50890, September 29, 1995).

EPA’s BMP guidance provides information on how to perform the risk identification and summary of potential pollutant sources (EPA 1992 and Section 2.3.1.3 of EPA 1993a). This guidance was referenced in the permit (Part II.D.), therefore the permit language was not revised.

Comment 48: Page 28, Section II.D.5.g., Inspections and Comprehensive Site Compliance Evaluations - record keeping

The draft permit requires that records of inspections must be maintained. TCMC commented that perpetual record keeping is onerous and open-ended. Record keeping

should be required until the filing of the annual report for that year. The annual reports must be kept on site for at least five years from the date of the permit.

Response:

The draft permit does not specify perpetual record keeping. Records must be maintained for at least five years (see Section III.F. of the permit). If the annual report includes the original inspection reports conducted over the last year, then the inspection reports do not need to be maintained separate. If, however, the inspections are summarized in the annual report, then the original full inspection reports must be maintained for at least five years.

Comment 49: Page 28, Section II.D.5.g., Inspections and Comprehensive Site Compliance Evaluations - duplication of existing plan

TCMC commented that all storage areas, containment structures and material handling areas are inspected as part of the SPCC Plan or the Pollution Prevention Plan and that this draft NPDES requirement is a duplication of an existing program.

Response:

EPA does not intend for permittees to duplicate or repeat practices more fully described in other documents. When a BMP issue is already addressed via a separate regulatory program, the BMP Plan should reference those efforts, not duplicate them. Where operating manuals, standard operating plans, or other documents have been developed to address other regulatory requirements these may be cross-referenced in the BMP Plan. Alternately existing BMP Plans may be modified to incorporate the BMP Plan requirements of the permit (see Part II.B. of the permit).

Comment 50: Page 28, Section II.5.i., Record keeping and Internal Reporting Procedures

TCMC commented that the text of this section should be expanded to include requirements for documenting only significant spills and leaks exceeding predetermined threshold quantities for toxic and hazardous pollutants on a pollutant-by-pollutant basis. The reasons for this comment include:

no. 1: All spills or leaks are already reported per the Pollution Prevention Plan.

no.2: It would be impossible to estimate the quantity or quality of storm water leaving the site as it becomes comingled with surface flows and is discharged through the existing NPDES discharge points. In addition, during a storm event, runoff is collected but for at least six months of the year the storm water is not discharged.

no. 3: Issues associated with spills and other discharges are not clarified. Small incidents with no significant impacts should not be covered under the permit. The Federal Register document dated Friday, September 29, 1995, Section XI.G.3(c) indicated “a list of

significant spills and significant leaks of toxic or hazardous pollutants” are covered under the permit.

Response:

EPA has not developed threshold concentrations that can be used to determine whether or not a spill or leak must be documented in NPDES permit BMP Plans, therefore threshold concentrations will not be included in the permit. EPA has developed guidance (EPA 1992 and EPA 1993a) that provides the rationale for and discussion of how to document spills and leaks. This guidance is referenced in the permit, therefore the permit language was not revised. Response to TCMC’s specific concerns follow:

no. 1: See response to comment 49.

no. 2: The draft permit language requires that the permittee document and incorporate into the BMP Plan a “description of the quantity and quality of storm water discharges”. Note that this is pertinent to storm water discharges, not times when the storm water is not discharged. TCMC commented that it would be impossible to estimate the storm water quality and quantity from a comingled discharged, then went on to state that during storm events runoff is collected. If runoff is indeed collected separately (e.g., prior to commingling) then it can be monitored separately. For example, for Outfall 003, the separate components may be monitored separately to estimate the storm water contribution. Estimates of storm water quantity and quality can range from sampling and chemical analysis to visual examinations during storm events. The BMP Plan has not specified such requirements, rather has allowed TCMC the flexibility to determine how to estimate storm water quality and quantity. The intent of this record keeping is to gauge the effectiveness of BMPs used to control storm water (EPA 1992).

no. 3: The citation quoted is taken out of context. The entire sentence does not state that spills and leaks are covered under the MSGP. As stated in Section I. of the Thompson Creek Mine draft permit, the permittee is authorized to discharge from outfalls 001, 002, 003, 004, and 005, within the limits and subject to the conditions set forth in the permit. The permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application. TCMC did not disclose in the permit application anticipated spills or leaks. Therefore, the discharge of pollutants associated with spills, leaks, or other incidents are not covered under the permit.

Based upon the above discussion, the language of this permit section was not revised.

Comment 51: Page 29, Section II.E., Comprehensive Site Compliance Evaluation

TCMC commented that the Comprehensive Site Compliance Evaluation should be required once a year, as opposed to twice a year as specified in the draft permit. To support this comment they cited portions of the MSGP that comprehensive site compliance evaluations be conducted no less than once per year.

Response:

The draft permit requires that comprehensive site compliance evaluations must be conducted at appropriate intervals, in no case less than twice per year. EPA revised the wording to allow for a comprehensive site compliance evaluation no less than once per year, as suggested in the comment. However, TCMC should conduct evaluations at more frequent intervals if necessary.

Comment 52: Page 29, Section II.F. Annual Report

TCMC commented that the annual report submittal requirement be removed from the permit. In no place in the regulations is an annual report submittal required. They cited a portion of the MSGP that stated that a report is not submitted but “shall be made and retained as part of the storm water pollution prevention plan...”.

Response:

EPA agrees that it is not necessary to submit the annual report, since an annual certification is required (see next comment). However, the annual report must be retained as part of the BMP Plan and made available to EPA upon request. Part II.F. of the final permit has been revised accordingly.

Comment 53: Page 30, Section II.F.2. Annual Certification

TCMC commented that the annual certification submittal requirement should be removed from the draft permit. They cite the same portion of the MSGP as in comment 51.

Response:

EPA requires permittees implementing BMP Plans to certify that the BMP Plan fulfills the requirements set forth in the permit. An annual certification is required each year after the initial certification since the BMP Plan may be revised based upon inspections and evaluations conducted over the last year. EPA’s NPDES Permit Writers Manual (EPA 1996) and EPA BMP guidance (EPA 1992) both specify that the BMP Plan be certified. The annual certification requirement, therefore, remains in the final permit.

Comment 54: Page 31, Section III.B. Reporting of Monitoring Results

The draft permit requires that the permittee must submit discharge monitoring reports (DMRs) monthly, postmarked by the 10th day of the following month. TCMC

commented that the reporting date should be changed to the 21st of the following month. Due to the remoteness of the mine site it takes at least 48 hours to get water samples to the laboratory and many times it is impossible to get laboratory data back in time to submit the DMR, postmarked by the 10th of the following month.

Response:

The draft permit language (section III.B.) requires DMRs to be submitted by the 10th day of the following month. This is the deadline that is in the current permit. For facilities in Region 10, DMR due dates range from the 10th day of the month to the 20th for facilities that have similar concerns (remote location). EPA has determined that the current reporting date can be changed to the 20th of the month to address the need for adequate time to report results. EPA has determined that this date (the 20th day of the following month) is reasonable; with adequate planning, results can be obtained in time to record them on the monthly DMR. Section III.B. of the permit has been revised accordingly.

B. TCMC Comments on the July 1994 Draft Permit

The letter submitting TCMC's comments on the June 2000 draft permit stated: "TCMC hereby adopts and incorporates by reference the comments which it submitted on August 30, 1994 concerning the July 1994 draft NPDES permit. We would request that you carefully consider those comments to the extent that any elements, rationale, or analyses pertaining to the July 1994 draft NPDES permit have been carried over into the current draft permit." Subsequent phone conversations with TCMC (Bert Doughty) clarified that EPA only respond to those comments that were relevant to the June 2000 draft permit.

The following comments were received on the July 1994 draft permit. Comments that are still considered relevant are summarized with a response provided. Many of the comments are no longer relevant. Where the comment is no longer relevant, the comment itself is summarized in less detail and only a brief response (stating that the comment is not relevant) is provided.

Comment 55: Effluent and Receiving Water Flows

TCMC submitted numerous comments related to the effluent and receiving water flows used in the July 1994 draft permit effluent limit calculations. They provided specific alternative flows.

Response:

TCMC has submitted subsequent correspondence (see references in the Fact Sheet) that include updated effluent and receiving water flows, which makes the specific flows requested in their comments on the July 1994 draft permit no longer relevant. TCMC comments related to the dilution ratios and flows in the June 2000 draft permit are summarized in comments 1, 2, 3, and 16.

Comment 56: Mixing Zones

TCMC submitted numerous comments related to the mixing zones, concluding that use of a 100% mixing zone is appropriate for all outfalls. TCMC provided diffusion modeling demonstrating where complete mixing occurs.

Response:

The July 1994 draft permit assumed a mixing zone of 25% of the stream volume. The mixing zones in the June 2000 draft permit were based on a preliminary 401 certification and range from 0% to 66.7% of the stream volume depending upon the outfall and parameter. TCMC submitted comments on the new mixing zones in the June 2000 draft permit. Since the mixing zones in the current draft permit were based on a preliminary certification and TCMC submitted comments on these new mixing zones, response to mixing zone comments on the July 1994 draft permit is not needed. See also response to comments 5 and 9.

Comment 57: Dissolved Form of Metal Parameters

TCMC commented that the metals in the effluent should be analyzed as the dissolved form and compliance based on the dissolved concentrations. The State of Idaho's water quality standards states that dissolved metals are the basis for its water quality criteria. EPA in guidance documents *Aquatic Life Metals Criteria* and *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals* (February 1994), takes the position that for the protection of aquatic life the dissolved form better measures the potential toxicity of metals in streams.

Response:

It is EPA policy that metals water quality criteria for aquatic life protection be expressed as dissolved, however, this does not apply to the expression of effluent limitations. The NPDES regulations at 40 CFR 122.45(c) require that all permit effluent limits for metals be expressed in terms of total recoverable metals (see the Fact Sheet, page C-12). This is because changes in water chemistry as the effluent and receiving water mix could cause some of the particulate (total) metal in the effluent to dissolve. In the draft permit calculations, the water quality criteria that were expressed as dissolved were converted to total recoverable effluent limits. This conversion was conducted according to EPA guidance *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 1996) as discussed in the Fact Sheet. Since the effluent limits are expressed as total recoverable or total metals, they must be monitored on that basis. Based on the above discussion, the metals effluent limits and effluent monitoring in the permit will not be changed to dissolved.

Comment 58: Seepage Monitoring

TCMC commented that seepage from outfalls 001 and 002 should not be included in the monitoring of those outfalls.

Response:

This comment is not relevant since such monitoring was not included in the June 2000 permit. However, implementation of the BMP Plan requires the prevention and minimization of the release of pollutants to waters of the US and proper operation and maintenance of water management and wastewater treatment systems. If TCMC identifies seepage to be a potential threat to water quality in the BMP Plan, then such monitoring would be appropriate.

Comment 59: Outfall 003 Turbidity Monitoring

TCMC commented that the State of Idaho water quality standards regulate turbidity changes in the receiving water, therefore the permit should require turbidity monitoring in Squaw Creek above and below the mixing zone, at stations SQ3 and SQ2.5.

Response:

EPA agrees that the Idaho water quality standards regulate turbidity changes in the receiving water. However, the receiving water for Outfall 003 is Bruno Creek primarily, then Squaw Creek. Therefore, monitoring in Bruno Creek is appropriate. The draft permit requires turbidity monitoring above Outfall 003 (at BC-1) and at Outfall 003 (which is the same as below Outfall 003 since the sediment ponds are situated in the creek). The state did not certify a mixing zone for Outfall 003, therefore monitoring at the edge of a mixing zone is not applicable.

Comment 60: Water Quality Monitoring Program Requirements

TCMC commented that the draft permit sections related to the Water Quality Monitoring Program exceed the requirements of the NPDES regulations and are unnecessary to protect water quality standards. TCMC commented that the water quality monitoring requirements be removed. The comment used the same reasons as expressed in comments on the June 2000 draft permit (see comment 25). TCMC also pointed out some typographical errors.

Response:

Since this comment is similar to comments on the current draft permit, a separate response is not provided. See response to comment 25. The typographical errors are not relevant to language in the June 2000 draft permit.

Comment 61: Dissolved Oxygen Monitoring

TCMC commented that dissolved oxygen monitoring should be removed from the permit since all the sample points are free flowing turbulent streams and should be saturated with oxygen.

Response:

Dissolved oxygen monitoring of the receiving waters around each outfall was included in both the July 1994 and June 2000 draft permits. This monitoring is important because dissolved oxygen levels are critical to all forms of aquatic life. It is important to monitor dissolved oxygen to establish baselines for each receiving water and determine if the effluent is resulting in a change in dissolved oxygen. The tests are inexpensive and can either be taken by probe or titration and do not put an undue burden on the permittee. The Fact Sheet and response to comment 25 provide additional justification for surface water monitoring. Therefore, the dissolved oxygen monitoring requirements remain in the permit.

Comment 62: Best Management Practices (BMP) Plan

general comments: TCMC submitted general comments questioning the need for and the scope of the BMP Plan. TCMC commented that the draft permit sections related to the BMP Plan exceed the requirements of the NPDES regulations and are unnecessary to protect water quality standards. TCMC commented that they have an existing Pollution Prevention Plan the meets applicable requirements and that it should be incorporated into the permit, and the other requirements be deleted.

specific comments: TCMC also submitted comments on specific BMP Plan requirements.

Response:

The content of these comments is similar to the more recent comments submitted in response to the BMP Plan requirements in the June 2000 draft permit, therefore a separate response is not provided. See response to comments 44 and 49. TCMC also commented on specific BMP Plan requirements that were not included in the June 2000 draft permit. The specific BMP comments, therefore are not relevant.

Comment 63: Seasonal or Emergency Closure Plan

TCMC commented that the requirement to develop a seasonal or emergency closure plan be removed from the permit.

Response:

This requirement was not included in the June 2000 draft permit, therefore the comment is no longer relevant.

Comment 64: Descriptive Comments on the Fact Sheet

TCMC submitted comments on the Fact Sheet related to the descriptions of overburden disposal, tailings impoundment, outfall discharges, access road, arsenic criteria, and toxicity testing.

Response:

The Fact Sheet for the June 2000 permit was substantially different from the previous Fact Sheet. Based on the language in the current Fact Sheet, TCMC's descriptive comments on the previous Fact Sheet are no longer relevant.

Comment 65: Fact Sheet - Performance/Ambient Data

TCMC suggested specific revisions to the effluent data and ambient data presented in the July 1994 Fact Sheet.

Response:

The Fact Sheet for the June 2000 permit did not present effluent data and ambient data, except to the extent that it was used in the reasonable potential and effluent limit calculations. Also, the effluent and ambient data was updated to include monitoring through 1999. Therefore, the specific values suggested by TCMC related to the July 1994 Fact Sheet are no longer applicable.

Comment 66: Use of Average Values For Background

TCMC expressed concern with using average values that are less than detectable for background metals concentrations in the receiving streams. These numbers should be considered zero to be consistent with the procedure for calculating the average receiving stream and effluent concentrations.

Response:

In the June 2000 draft permit effluent limit calculations, EPA did not use average concentrations to calculate background (see page C-8 of the Fact Sheet). Rather, EPA used either the 95th percentile of the ambient monitoring data, the maximum of the ambient monitoring data (where sufficient data did not exist to calculate the 95th percentile), or zero (where all the data was less than the detection limit). TCMC did not comment on these background calculations, therefore they were not changed.

Coment 67: Outfall 004 Flow Tier

TCMC submitted comments requesting that effluent limits for Outfall 004 be developed based upon a flow of >112 cfs in Squaw Creek and Outfall 004 would not discharge at lower flows.

Response:

This comment was not considered relevant since TCMC has since requested different flow tiers for Outfall 004 which were utilized in the June 2000 draft permit.

Comment 68: Use Maximum Daily Limits for Outfall 004

TCMC requested that due to the limited duration of the discharge through Outfall 004, the effluent limits should be expressed only as maximum daily limits.

Response:

There is nothing in the permit that limits the duration of the discharge through Outfall 004. Since there is the potential for Outfall 004 to discharge continuously, both average monthly limits and maximum daily limits are required pursuant to 40 CFR 122.45(d)(1).

Comment 69: Recalculated Effluent Limits

TCMC recalculated the effluent limits for all outfalls and recommended that the assumptions that they used to calculate the effluent limits be used by EPA in the final permit. Following are the assumptions:

99th percentile values: TCMC commented that the draft permit does not provide justification for using the 95th percentile for some calculations and the 99th percentile for others. TCMC used the 99th percentile values in their effluent calculations.

hardness: Use average hardness

flows: For outfalls 001 and 002 use maximum flows for both the effluent and receiving water. For outfalls 004 and 005 use the maximum effluent flow and critical receiving water flow.

background: Use average values for receiving water background concentrations after removal of outliers (> 50% higher than the next highest value) and assuming zero where the average was reported at less than detectable.

mixing zones: Use 100%.

Response:

99th percentile values: The comment was not specific in exactly which calculations are of concern. TCMC suggests using the 99th percentile value for all calculations, yet other comments suggest using average values (e.g., for hardness and background). The Fact Sheet provided a detailed description and justification of the effluent limits calculations for the June 2000 draft permit. Due to the lack of specificity of the comment, no change to the effluent limit calculations were made.

hardness: See response to comment 8.

flows: See response to comment 55.

background: See response to comment 66. Also, EPA did not remove outliers unless it was the result of an identified analytical error.

mixing zones: See response to comment 56.

Comment 70: Mass-based Limits for Outfalls 004 and 005

TCMC requested mass-based limits for Outfalls 004 and 005.

Response:

This comment is no longer relevant since the June 2000 draft permit included mass-based limits for these outfalls. TCMC has since commented that mass-based limits should not apply to Outfall 005 (see comment 16).

Comment 71: Grab Sampling

TCMC commented that all effluent monitoring should be grab samples, rather than composite.

Response:

The June 2000 draft permit included composite sampling for outfalls 004 and 005 for some parameters. See response to comments 12 and 18.

Comment 72: Instream Waste Concentrations (IWCs)

TCMC suggested different instream waste concentrations (IWC) used for toxicity testing than those in the draft permit. The IWCs calculated by TCMC were based on the flow assumptions noted in comment 69 and a 100% mixing zone.

Response:

The IWCs, also called receiving water concentrations (RWC) in the June 2000 draft permit are different than those in the July 1994 draft permit since the effluent flows, receiving water flows, and mixing zones have been updated. In the June 2000 draft permit, a mixing zone of 100% was used based on the preliminary state certification. As discussed in Section II.A., the final state certification provided some revised toxicity endpoints. The final certification specified that toxicity endpoints be less than the dilution ratios used to calculate the effluent limits. This is equivalent to allowing a 100% mixing zone for WET, since the dilution ratios are a mix of the effluent and 100% of the receiving water. The RWC is calculated as 1/dilution ratio. These are the values provided in Table

6 of the final permit.

Comment 73: Arsenic Criteria and Effluent Limits

TCMC had comments related to the arsenic criteria used to develop the effluent limits. They also specifically requested a compliance schedule to achieve the effluent limits.

Response:

Since effluent limits for arsenic were not included in the June 2000 draft permit, these comments are no longer relevant.

Comment 74: Mercury Effluent Limits

The draft permit effluent limits for mercury in outfalls 001 and 002 is the limit in the current permit based on antibacksliding provisions. TCMC commented that the mercury effluent limits should instead be based on the calculated water quality-based effluent limits. Specifics were provided as to why the antibacksliding provisions do not apply.

Response:

The mercury effluent limits in the June 2000 draft permit and in the final permit are the water quality-based effluent limits, therefore this comment no longer applies.

Comment 75: Interim Minimum Levels (IMLs)

The draft permit specified analytical methods, method detection limits, and interim minimum levels to be used for effluent monitoring. TCMC suggested that the interim minimum levels (IMLs) be removed and that only the analytical methods be specified in the permit. They also suggested permit language that would allow them to develop IMLs for the site waters.

Response:

Since the effluent limits in the June 2000 draft permit exceed the method detection limits (MDLs) for EPA-approved methods, IMLs or minimum levels (MLs) were not included in the draft permit. This comment, therefore is no longer relevant.

The June 2000 draft permit does not specify analytical methods. For the effluent monitoring, the draft permit required that the permittee must use methods that can achieve a MDL less than the effluent limitation. MDLs were specified for those parameters that do not have effluent limits and for the receiving water monitoring. It is the effluent limit and the MDL that are key detection requirements, rather than the analytical method. This allows the permittee the flexibility to select an EPA-approved method that achieves the effluent limits and/or MDLs. TCMC did submit a comment on the June 2000 draft permit requesting the use of MLs rather than MDLs. See also comment 23.

Comment 76: WET Comments - Acute Instead of Chronic Tests

TCMC commented that acute instead of chronic WET testing should be performed on each outfall. They supplied the following reasons for this:

no. 1: Chronic WET testing is not needed since, based on 15 years of biological assessment data, there has been no evidence of aquatic community impairment as a result of discharges from the mine site.

no. 2: The discharges are expected to be intermittent (not lasting long enough to cause chronic response).

no. 3: The survival endpoint in acute tests is less variable than the survival or growth endpoints in chronic tests.

Response:

The July 1994 permit required chronic WET testing. The current draft permit requires both acute and chronic testing. EPA included chronic testing since existing WET data was not sufficient to determine reasonable potential. In addition, the TSD recommends that chronic tests be performed where dilution is less than 100:1 (receiving water to effluent) which is the case for outfalls 001, 002, and 004 and that acute or chronic tests be conducted when the dilution is between 100:1 and 1000:1, which is the case for outfall 005. The chronic and acute WET testing was also based upon the preliminary 401 certification, implementing the states narrative toxic criteria.

Following are responses to the specific concerns in the above comment. Based upon the above and following discussion, chronic WET testing requirements will remain in the permit.

no. 1: As discussed in the Fact Sheet accompanying the June 2000 draft permit chronic WET tests are needed to determine the need for future WET limits. This is true regardless of existing biological data. EPA recognizes that extensive biological data exists upstream and downstream of outfalls 001 and 002. However, EPA's policy of independent applicability requires independent consideration of chemical-specific, WET, and biological assessment data. Therefore, one type of information (e.g., biological assessment data) cannot be used to negate a finding based upon another type of information (e.g., a chronic WET analysis). The policy of independent applicability is also discussed in response to comment 41, above, and in detail in the TSD. Outfalls 004 and 005 have no history of discharge, therefore any existing biomonitoring data is not representative of discharge conditions.

no. 2 and 3: While the acute test endpoints may be less variable for a given set of short term tests, chronic testing should be performed when the discharges are longer in

durations since the typical chronic averaging period recommended by EPA is four days. Even though the discharges might be intermittent, there is no limitation in the permit that will ensure that this is the case.

Comment 77: WET Comments - WET Testing Frequency

TCMC commented that acute WET testing be performed on each outfall once per year. If the period of discharge exceeds 10 weeks, then a second test would be conducted.

Response:

Even though the comment suggested that acute tests be conducted up to twice a year, EPA believes that annual testing is appropriate and is consistent with the state certification. Therefore annual acute testing remains as the permit requirement. If TCMC monitors acute toxicity more frequently, then the test results must be submitted to EPA per Part III.D. of the permit.

Comment 78: WET Comments - Acute Test Species

TCMC commented that the acute tests should be conducted on two species: *Pimephales promelas* and *Ceriodaphnia dubia*

Response:

Based on the preliminary 401 certification, the June 2000 draft permit required WET testing with only one species, the rainbow trout (*Oncorhynchus mykiss*). TCMC's 1994 comment did not provide rationale for the two species selected and their comments on the 2000 permit did not suggest alternate acute test species to *O. mykiss*. WET testing with rainbow trout was specified in the final 401 certification, therefore the acute WET species was not changed.

Comment 79: WET Comment - Identify the NOEC and LC50

TCMC commented that acute testing should identify the NOEC and the LC₅₀.

Response:

The July 1994 draft permit required reporting chronic toxicity in terms of the NOEC. The June 2000 draft permit required reporting acute and chronic toxicity in terms of toxic units (TUs). The use of toxic units is consistent with the TSD and will be retained in the permit (TCMC did not comment on the use of toxic units). In the June 2000 draft permit, acute toxicity was defined in TU_a's where $TU_a = 100/LC_{50}$. Based on the final 401 certification, acute toxicity in the final permit is defined as $TU_a = 100/NOEC$ (see Part I.B.2.d.).

Comment 80: WET Comment - Test Acceptability Criteria

TCMC commented that if more than 10% of the control organisms die, then the test shall

be repeated, unless less than 10% of the organisms have died in the highest effluent treatment.

Response:

The clause that this comment applies to was not included in the June 2000 draft permit. Therefore, the comment is no longer relevant. Part I.B.5.c.ii. of the final permit requires that toxicity tests be repeated if toxicity tests do not meet test acceptability criteria as specified in the test methods manual.

Comment 81: WET Comment - Accelerated Testing

The accelerated testing language in the draft permit was vague. TCMC proposed the following language to clarify: If the NOECs are greater than the IWCs, the permittee shall continue the acute tests above. If the NOECs are below the IWCs, the permittee shall begin a series of accelerated tests. The tests will be conducted bi-weekly and consist of six tests at the most. If two consecutive tests confirm the presence of acute toxicity, the permittee shall notify EPA and EPA may reopen the permit for further testing. If two consecutive tests show no acute toxicity, the routine WET testing shall be resumed with no report to EPA required. If six tests are completed without any two consecutive tests yielding the same indication of the presence or absence of toxicity, the results will be sent to EPA.

Response:

The accelerated testing language has been significantly revised from that included in the July 1994 draft permit. The new language is more specific. TCMC submitted comments on this new language (see comment 21). Since the new comments supersede the comments on the July 1994 draft permit, this comment is no longer considered relevant.

Comment 82: WET Comment - Reduce to one species.

TCMC commented that if no acute toxicity is identified in an outfall after two years of monitoring, the testing may be reduced to use a single test species. The most sensitive species shall be used.

Response:

The June 2000 draft permit specifies only one species for acute toxicity testing. Therefore, this comment does not apply.

Comment 83: WET Comment - Report as Noncompliance

The draft permit required that WET test results which indicate NOECs at or below the IWCs must be reported under the "Notice of Noncompliance Reporting" section of the permit. TCMC commented that WET tests are intended to trigger further investigation of

the source of toxicity. They are not intended to be used as evidence of noncompliance.

Response:

The June 2000 draft permit did not include this clause, therefore the comment is no longer applicable. In the June 2000 draft permit (and the final permit), exceedence of a toxicity trigger results in further toxicity testing and, potentially a toxicity reduction evaluation.

Comment 84: Quality Assurance Project Plan (QAP)

general comment: TCMC commented that the draft permit sections related to the QAP exceed the requirements of the NPDES regulations and are unnecessary to protect water quality standards.

specific comments: TCMC requested that seven sections of the QAP requirements be deleted from the permit. TCMC provided alternate language to replace these sections.

Response:

general comment: See response to comment 40.

specific comments: The sections that TCMC commented on were not included in the June 2000 draft permit. Therefore, this comment is no longer relevant.

Comment 85: Discharge Monitoring Report (DMR) Due Date

TCMC commented that the requirement to submit DMRs by the 10th of the month following the month covered in the report does not allow sufficient time to receive and review data from commercial laboratories in order to judge the validity of the data. They requested that when there is a discharge the DMRs be submitted by the 28th of the following month.

Response:

In comments on the June 2000 draft permit, TCMC requested that DMRs be submitted by the 21st of the following month. See comment 54 and response.

APPENDIX A REFERENCES

EPA 1991. *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001, USEPA, Office of Water. Washington, D.C. March 1991

EPA 1992. *Storm Water Management For Industrial Activities - Developing Pollution Prevention Plans and Best Management Practices*. EPA 832-R-92-006. Office of Water

EPA 1993a. *Guidance Manual for Developing Best Management Practices (BMP)*. EPA 833-B-93-004. Office of Water

EPA 1993b. *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, Fourth Edition, EPA/600-4-90-027F. August 1993.

EPA 1994a. *EPA Whole Effluent Toxicity (WET) Control Policy*, EPA 833-94-002, July 1994.

EPA 1994b. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents to Freshwater Organisms*, Third Edition, EPA/600-4-91-002. July 1993.

EPA Region 10 1996. *EPA Region 10 Guidance for WQBELs Below Analytical Detection/Quantitation Level*. NPDES permits Unit, EPA Region 10. Seattle, WA. March 1996.

EPA 2000. Fact Sheet for the Thompson Creek Mine NPDES Permit, NPDES Permit No. ID-002540-2. EPA Region 10. Seattle, WA. June 8, 2000.

EPA 2001. Biological Evaluation for the NPDES Permit for the Thompson Creek Mine, NPDES Permit No. ID-002540-2. EPA Region 10. Seattle, WA. February 12, 2001.

IDEQ 2001. Certification of discharges, mixing zone determination and authorization of new discharges into special resource waters, Thompson Creek Mine, NPDES Permit No. ID-002540-2. January 2, 2001 letter and enclosures to Patty McGrath, EPA, from James S. Johnston, Idaho Department of Environmental Quality (IDEQ). Boise Idaho.

APPENDIX B

**STATE OF IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY
CLEAN WATER ACT SECTION 401 CERTIFICATION, COVER LETTER**

APPENDIX C
RECALCULATION OF WATER QUALITY-BASED EFFLUENT LIMITS
FOR THE FINAL PERMIT

Since preparation of the draft permit, the water quality-based effluent limits (WQBELs) were recalculated to take into account the following changes (the changes were a result of comments on the draft permit and the State of Idaho's final Clean Water Act Section 401 certification):

- dilution ratios for outfalls 001 and 002 were revised
- chromium effluent limits for outfall 004 and the silver effluent limits for outfalls 004 and 005 were removed
- a separate set of effluent limits was calculated for outfall 005 at high flows in the Salmon River
- some of the mixing zones were revised

The response to comments provides the basis for the above changes. This appendix describes how these changes impacted the calculation of the WQBELs from the draft to the final permit.

In determining whether WQBELs are needed and developing those limits when necessary, EPA follows guidance in the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991). The water quality-based analysis consists of four steps:

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

These steps are discussed in detail in Appendix C of the Fact Sheet (EPA 2000) that accompanied the draft permit. The following sections discuss each step in terms of how the final state certification and comments on the permit changed the information incorporated into the step and the outcome. Section IV. provides a summary of the effluent limits in the final permit. Section V. provides an example calculation to illustrate how these steps were implemented in recalculating the WQBELs in the final permit.

I. Water Quality Criteria

The first step in developing WQBELs is to determine the applicable water quality criteria. The water quality criteria used in the final permit calculations are the same as those used in the draft permit calculations. The water quality criteria are provided in Appendix C (Section III.A. and Tables C-1 through C-3) of the Fact Sheet.

II. Reasonable Potential Evaluation

As discussed in the Fact Sheet, the NPDES 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.” To determine if there is “reasonable potential” to cause or contribute to an exceedence of water quality criteria for a given pollutant, 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 TSD to conduct this “reasonable potential” analysis. The “reasonable potential” analysis for the draft permit was presented in detail in Appendix C of the Fact Sheet. This section discusses how the comments on the draft permit and final state certification changed some of the input parameters in the reasonable potential analysis.

The maximum projected receiving water concentration is determined using the following mass balance equation.

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

where,

- C_d = receiving water concentration downstream of the effluent discharge (concentration at the edge of the mixing zone)
- C_e = maximum projected effluent concentration
- C_u = receiving water upstream concentration of pollutant
- Q_e = effluent flow
- Q_u = receiving water upstream flow
- MZ = the percent mixing zone based on receiving water flow

The water quality criteria for some of the metals of concern are expressed as dissolved. Yet effluent concentrations and NPDES permit limits are expressed as total recoverable metals. 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, Equation 1 becomes:

$$C_d = \frac{\text{translator} \times (C_e \times Q_e) + [C_u \times (Q_u \times MZ)]}{Q_e + (Q_u \times MZ)} \quad (\text{Equation 2})$$

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

The following briefly describes each of the factors used in the equations 1 and 2 to calculate C_d .

For a more detailed description see Appendix C, Section III.B. of the Fact Sheet.

translator: As discussed on page C-7 of the Fact Sheet, since site-specific translators are not available, the water quality criteria conversion factors (see Table C-3 of the Fact Sheet) were used as the translator in Equation 2.

C_e (maximum projected effluent concentration): Per the TSD, the maximum projected effluent concentration in the mass balance equations is represented by the 99th percentile of the effluent data and calculated as follows:

$$C_e = (\text{maximum measured effluent concentration}) \times \text{RPM} \quad (\text{Equation 3})$$

The reasonable potential multiplier (RPM) accounts for uncertainty in the effluent data and is determined based on the coefficient of variation (CV) of the data and the number of data points. Except for chromium and silver in outfalls 004 and 005, the maximum measured effluent concentrations and RPMs used to calculate C_e in the final permit are the same as those used in the draft permit. These data are provided in Tables C-8 through C-11 of the Fact Sheet.

In the draft permit, the maximum effluent concentrations for chromium and silver in outfalls 004 and 005 were based upon chromium and silver analyses of the left abutment (LA), pumpback station (PBS), and pit (PIT) wastewaters (and outfalls 001 and 002 for outfall 005). From 39 analyses, there was only one detect of each, chromium and silver. However, many of the detection limits exceeded the chromium and silver criteria. Because the data is not adequate to determine the maximum effluent concentrations of chromium and silver for these outfalls, the reasonable potential analysis and development of effluent limits is not carried forward for these parameters. Therefore, the final permit does not include limits for these parameters. Monitoring is included in the final permit to collect data for use in determining the need for effluent limits in the future.

C_u (upstream concentration of pollutant): The upstream concentration in the mass balance equations is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge point. The C_u values used in the final permit calculations are the same as those used in the draft permit. These data are provided in Tables C-8 through C-11 of the Fact Sheet.

Q_u (upstream flow): In the draft permit, effluent limits were developed representative of both low receiving water flow conditions and high receiving water flow conditions for outfalls 001, 002, and 004. The Q_u's used for the low flow conditions are shown in Table C-5 of the Fact Sheet. The Q_u's for the high flow conditions (7 cfs in Thompson Creek for outfalls 001 and 002 and 50 cfs in Squaw Creek for outfall 004) are discussed on page C-9 of the Fact Sheet. The flow tiers for outfalls 001, 002, and 004 are the same as those in the draft permit, therefore, the Q_u's used in the final permit are the same as those in the draft.

Unlike the other outfalls, the outfall 005 effluent limits in the draft permit were not dependent

upon receiving water flow. The final State certification authorized a high flow tier for outfall 005 at 2000 cfs in the receiving water, the Salmon River (see Section II.A. of the Response to Comments and response to comment 16). Therefore, the Q_u used in the mass balance equations for outfall 005 is 2000 cfs for the high flow condition. The Q_u 's for the outfall 005 low flow condition are the same as those used in the draft permit.

Q_e (effluent flow): The effluent flows used in the draft permit calculations for outfalls 001 and 002 were based on the ratio of the effluent flow to the upstream receiving water flow (the dilution ratio). Based on comments on the draft permit and the final State certification, the dilution ratios for outfalls 001 and 002 have been revised (see Section II.A. of the Response to Comments and response to comment 2). Also, to be consistent with the State certification, the dilution ratio is now expressed as the upstream flow divided by the effluent flow (in the draft permit, the dilution ratio was expressed as the effluent flow divided by the upstream flow). The new dilution ratios are shown in Table C-1, below. These dilution ratios were used to calculate the new Q_e values shown in Table C-1.

The effluent flow for outfall 004 has not changed from the draft fact sheet.

The effluent flow for outfall 005 used in the draft permit calculations was the maximum flow of the LA, PBS, and PIT wastewaters (2.7 cfs). This same flow is applicable to outfall 005 at the low receiving water flow tier. At the new high flow tier, the effluent flow is based on a dilution ratio, since most of the flow from outfall 005 during high flow conditions could be from outfalls 001 and 002 (see Section II.A. of the Response to Comments and response to comment 1).

Table C-1: Critical Dilution Ratios (Dilution Ratio = Q_u/Q_e) and Effluent Flows			
Outfall	Receiving Water Flow Tier	Effluent Flow (Q_e)	Basis (IDEQ 2001)
001	< 7 cfs	0.0097 cfs	dilution ratio = 212 therefore $Q_e = Q_u/212 = 2.05/212 = 0.0097$ cfs
	\$ 7 cfs	0.43 cfs	dilution ratio = 16.2 therefore $Q_e = Q_u/16.2 = 7/16.2 = 0.43$ cfs
002	< 7 cfs	0.16 cfs	dilution ratio = 12.5 therefore $Q_e = Q_u/12.5 = 2.05/12.5 = 0.16$ cfs
	\$ 7 cfs	0.87 cfs	dilution ratio = 8 therefore $Q_e = Q_u/8 = 7/8 = 0.87$ cfs
004	both flow tiers	1.3 cfs	same as in draft permit (Fact Sheet Table C-6)
005	< 2000 cfs	2.7 cfs	same as in draft permit (Fact Sheet Table C-6)
	\$ 2000 cfs	6.6 cfs	dilution ratio = 303 therefore $Q_e = Q_u/303 = 2000/303 = 6.6$ cfs

MZ (the percent mixing zone based on receiving water flow): The mixing zones used in the draft permit calculations were based upon the preliminary State certification. Some of the mixing zones were revised in the final certification. The mixing zones authorized in the final certification were used in the final permit calculations see Section II.A. of the Response to Comments and response to comments 5 and 9). These mixing zones are shown in Table C-2.

Table C-2: Mixing Zones For The TCM Discharges For Aquatic Life Water Quality Criteria (IDEQ 2001)¹ (expressed as percent of receiving water flow)								
Parameter	Outfall 001 (based on Thompson Creek flow)		Outfall 002 (based on Thompson Creek flow)		Outfall 004 (based on Squaw Creek flow)		Outfall 005 ³ (based on Salmon River flow)	
	< 7 cfs	\$ 7 cfs	< 7 cfs	\$ 7 cfs	< 50 cfs	\$ 50 cfs	< 2000 cfs	\$ 2000 cfs
Arsenic	25	25	25	25	25	25	25	25
Cadmium	25	5	50	62	50	50	25	25
Copper	25	12.5	10	25	0	15	25	25
Chromium	25	25	25	25	50	25	25	25
Lead	12	15	50	60	50	50	25	25
Mercury	25	25	25	40	100	25	25	6.25
Nickel	25	25	25	25	25	25	25	25
Selenium	25	47.5	50	25	50	25	25	25
Silver	25	25	25	25	25	25	25	25
Zinc	25	15	22	75	25	20	25	25

footnote:
1 - The values in bold are those that are changed from the draft permit.

Reasonable Potential Summary: Using the above equations and data, reasonable potential was re-evaluated for all the parameters measured in outfalls 001 and 002 at all flow tiers (since the new dilution ratios affected the calculations for all parameters). A summary of the results of the reasonable potential analysis is provided in Tables C-3 and C-4. Due to the new dilution ratio, copper and selenium in outfall 001 at the low flow tier no longer exhibits reasonable potential. The other parameters in outfalls 001 and 002 that exhibited reasonable potential are the same as those that exhibited reasonable potential in the draft permit.

For outfall 004, the difference between the draft and final permit calculations is that different mixing zones were authorized for lead, mercury, and zinc at low flow and copper, lead, and zinc at high flow. Therefore, reasonable potential was re-evaluated for only these parameters with the

revised mixing zones (see Table C-5).

Except for removing chromium and silver, the other factors used to determine reasonable potential for outfall 005 at the low flow tier are the same as in the draft permit. Therefore reasonable potential was only evaluated for the new high flow condition. Cadmium, copper, lead, and mercury, exhibited reasonable potential (see Table C-6).

An example of the reasonable potential determination for cadmium in Outfall 001 is provided in Section V. to demonstrate the reasonable potential analysis.

Table C-3: Summary of Reasonable Potential (RP) Determination for Outfall 001								
Parameter, ug/l	RP for Thompson Creek Flows < 7 cfs				RP for Thompson Creek Flows \$ 7 cfs			
	Maximum Projected Receiving Water Concentration (C _d) ²			RP ³ (Yes or No)	Maximum Projected Receiving Water Concentration (C _d) ²			RP ³ (Yes or No)
	aquatic life acute	aquatic life chronic	recreation		aquatic life acute	aquatic life chronic	recreation	
Arsenic	0.59	0.57	0.51	No	1.2	1.2	0.71	No
Cadmium	2.4	1.8	na	Yes	54	52	na	Yes
Chromium ¹	0.52	0.39	na	No	4.3	4.2	na	No
Copper	7.4	5.8	na	No	95	95	na	Yes
Lead	24	19	na	Yes	150	150	na	Yes
Mercury	0.041	0.037	0.0073	Yes	0.34	0.39	0.12	Yes
Nickel	1.2	1.1	0.78	No	4.9	4.9	1.9	No
Selenium	3.3	2.8	na	No	12	12	na	Yes
Silver	0.0022	na	na	No	0.018	na	na	No
Zinc	40	32	na	No	430	430	na	Yes

na = not applicable (no criterion for comparison)

Footnotes:

1 - Chromium was assumed to be in the hexavalent form for comparison to the criteria for chromium-VI (the most stringent of the chromium criteria).

2 - The aquatic life maximum projected receiving water concentrations are expressed as dissolved for arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc. All other metal concentrations in these columns are expressed as total.

3 - Reasonable potential (RP) exists if the maximum projected receiving water concentration exceeds the criteria (see Tables C-2 and C-4 of the Fact Sheet). The maximum projected receiving water concentrations in bold are those that exceed the criteria.

Table C-4: Summary of Reasonable Potential (RP) Determination for Outfall 002								
Parameter, ug/l	RP for Thompson Creek Flows < 7 cfs				RP for Thompson Creek Flows \$ 7 cfs			
	Maximum Projected Receiving Water Concentration (C _d) ²			RP ³ (Yes or No)	Maximum Projected Receiving Water Concentration (C _d) ²			RP ³ (Yes or No)
	aquatic life acute	aquatic life chronic	recreation		aquatic life acute	aquatic life chronic	recreation	
Arsenic	1.6	1.5	0.79	No	1.7	1.7	1.1	No
Cadmium	16	12	na	Yes	16	16	na	Yes
Chromium ¹	0.87	0.84	na	No	0.90	0.90	na	No
Copper	145	127	na	Yes	96	96	na	Yes
Lead	81	65	na	Yes	87	86.5	na	Yes
Mercury	0.49	0.48	0.11	Yes	0.40	0.47	0.22	Yes
Nickel	1.8	1.7	1.1	No	2.0	2.0	1.3	No
Selenium	8.3	7.0	na	Yes	15	15	na	Yes
Zinc	480	409	na	Yes	230	240	na	Yes

na = not applicable (no criterion for comparison) footnotes: same as Table C-3 footnotes

Table C-5: Summary of Reasonable Potential (RP) Determination for Outfall 004 ¹								
Parameter, ug/l	RP for Squaw Creek Flows < 50 cfs				RP for Thompson Creek Flows \$ 50 cfs			
	Maximum Projected Receiving Water Concentration (C _d) ²			RP ³ (Yes or No)	Maximum Projected Receiving Water Concentration (C _d) ²			RP ³ (Yes or No)
	aquatic life acute	aquatic life chronic	recreation		aquatic life acute	aquatic life chronic	recreation	
Copper	nd	nd	na	nd	440	440	na	Yes
Lead	150	140	na	Yes	26	26	na	Yes
Mercury	0.41	0.44	0.37	Yes	nd	nd	nd	nd
Zinc	550	530	na	Yes	120	120	na	Yes

Table C-5: Summary of Reasonable Potential (RP) Determination for Outfall 004¹

na = not applicable (no criterion for comparison)
 nd = RP not determined since there have been no changes from the draft permit for these parameters

Footnotes:

- 1 - Reasonable potential was not determined for arsenic, cadmium, chromium, copper (low flow only), nickel, mercury (high flow only) and selenium since there have been no changes from the draft permit for these parameters (see Table C-14 of the Fact Sheet for the draft permit reasonable potential determination).
- 2 - The aquatic life maximum projected receiving water concentrations are expressed as dissolved for copper, lead, and zinc. All other concentrations in these columns are expressed as total.
- 3 - same as Table C-3 footnote 3.

Table C-6: Summary of Reasonable Potential (RP) Determination for Outfall 005¹

Parameter, ug/l	RP for Salmon River Flows \$ 2000 cfs			RP ³ (Yes or No)
	Maximum Projected Receiving Water Concentration (C _d) ²			
	aquatic life acute	aquatic life chronic	domestic or recreation	
Antimony	0.65	0.65	0.28	No
Arsenic	3.1	3.1	2.2	No
Cadmium	1.5	1.4	na	Yes
Copper	4.7	4.7	na	Yes
Lead	7.9	7.9	na	Yes
Mercury	0.085	0.10	0.0066	Yes
Nickel	3.6	3.6	1.7	No
Selenium	1.3	1.3	0.32	No
Zinc	22	22	na	No

na = not applicable (no criterion for comparison)

Footnotes:

- 1 - Reasonable potential was not determined for the low flow (< 2000 cfs) tier since there have been no changes from the draft permit this tier (see Table C-15 of the Fact Sheet for the draft permit reasonable potential determination).
- 2 - The aquatic life maximum projected receiving water concentrations are expressed as dissolved for arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc. All other metal concentrations in these columns are expressed as total.
- 3 - Reasonable potential (RP) exists if the maximum projected receiving water concentration exceeds the criteria (see Tables C-2 and C-4 of the Fact Sheet). The maximum projected receiving water concentrations in bold are those that exceed the criteria.

III. Water Quality-Based Permit Limit (WQBEL) Derivation

Once EPA has determined that a WQBEL is required for a pollutant, the first step in developing the permit limit is development of a wasteload allocation (WLA) for the pollutant. The WLAs are

then converted to long-term average (LTA) concentrations and compared. The most stringent LTA concentration for each parameter is converted to effluent limits. WLAs, LTAs, and permit limits are derived based on guidance in the TSD. The determination of WLAs, LTAs, and WQBELs for the draft permit was presented in detail in Appendix C (Section III.C.) of the Fact Sheet. This section summarizes the Fact Sheet discussion and presents tables that provide the new WLA, LTA, and WQBEL values based on changes as a result of the response to comments and 401 certification.

Calculation of WLAs: The WLA is the concentration (or loading) of a pollutant that may be discharged without causing or contributing to an exceedence of water quality standards in the receiving water. WLAs are calculated using the same mass balance equation used in the reasonable potential evaluation (equations 1 and 2). However, C_d becomes the criterion and C_e the WLA. All of the other parameters are the same as defined in the previous section. Making these substitutions, Equation 1 is rearranged to solve for the WLA, becoming:

$$WLA = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e} \quad (\text{Equation 4})$$

For metals criteria expressed as dissolved, a translator is added to Equation 2 as follows:

$$WLA = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e \times \text{translator}} \quad (\text{Equation 5})$$

Using the revised effluent flows and new mixing zones, the WLAs were calculated for the parameters that exhibited reasonable potential.

Calculation of Long-term Average (LTA) Concentrations: As discussed in the Fact Sheet, WLAs are calculated for each criterion for each parameter. To allow for comparison (i.e., to determine which criteria results in the more stringent effluent limits), the WLAs are statistically converted to LTA concentrations. The following equations from Chapter 5 of the TSD are used to calculate the LTA concentrations:

$$LTA = WLA \times \exp[0.5F^2 - zF] \quad (\text{Equation 6})$$

where:

$F^2 = \ln(CV^2 + 1)$ 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

Calculation of Effluent Limits: The LTA concentration is calculated for each criterion and compared. The most stringent LTA concentration is then used to develop the maximum daily and average monthly permit limits. The maximum daily and average monthly limits are calculated using the following equations from the TSD:

maximum daily or average monthly limit = $LTA \times \exp[zF - 0.5F^2]$ (Equation 7)
 for the maximum daily limit:

$$F^2 = \ln(CV^2 + 1)$$

$z = 2.326$ for 99th percentile probability basis, per the TSD

for the average monthly limit:

$$F^2 = \ln(CV^2/n + 1)$$

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 average monthly limit equal to the WLA, and then calculating the maximum daily limit (i.e., no calculation of LTAs). The human health maximum daily limit is calculated based on the ratio of the average monthly limit/maximum daily limit as expressed by Equation 7.

WQBEL Summary: The average monthly and maximum daily WQBELs developed for each parameter that exhibited reasonable potential are shown in Tables C-7 through C-13. These tables also show intermediate calculations (i.e., WLAs, LTAs) used to derive the effluent limits. Section V. demonstrates the permit limit calculation for cadmium in outfall 001.

Table C-7: Summary of WQBEL Derivation for Outfall 001 at Thompson Creek Flows < 7 cfs

Parameter ¹ ug/l	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentrations		Limits Based on Recreational Criteria		WQBELs		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis ²	maximum daily limit	average monthly limit
Cadmium	133	49.5	42.7	26.1	na	na	chronic	81	56
Lead	136	64.5	437	34.0	na	na	chronic	110	73
Mercury	100	0.646	32.2	0.341	41.0	60	chronic	1.1	0.73

na = not applicable (no criterion for comparison)

Footnotes:
 1 - Parameters which exhibited reasonable potential (see Table C-3).
 2 - Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses. The most stringent of these represent the final WQBEL.

Table C-8: Summary of QWBEL Derivation for Outfall 001 at Thompson Creek Flows \$ 7 cfs

Parameter ¹ ug/l	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentrations		Limits Based on Recreational Criteria		QWBELs		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis ²	maximum daily limit	average monthly limit
Cadmium	3.50	1.22	1.12	0.643	na	na	chronic	2.0	1.4
Copper	29.6	20.5	9.49	10.8	na	na	acute	30	20
Lead	131	4.78	42	2.52	na	na	chronic	7.9	5.4
Mercury	12.2	0.0608	3.91	0.0321	2.59	3.78	chronic	0.10	0.069
Selenium	167	35.9	62.2	20.9	na	na	chronic	56	41
Zinc	230	207	73.9	109	na	na	acute	230	160

na = not applicable (no criterion for comparison)

Footnotes:

1 - Parameters which exhibited reasonable potential (see Table C-3).

2 - Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses. The most stringent of these represent the final QWBEL.

Table C-9: Summary of QWBEL Derivation for Outfall 002 at Thompson Creek Flows < 7 cfs

Parameter ¹ ug/l	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentrations		Limits Based on Recreational Criteria		QWBELs		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis ²	maximum daily limit	average monthly limit
Cadmium	21.1	7.51	6.79	3.96	na	na	chronic	12	8.5
Copper	32.3	24.6	10.4	12.9	na	na	acute	32	22
Lead	441	20	142	10.6	na	na	chronic	33	23
Mercury	8.33	0.0504	2.67	0.0266	2.63	3.83	chronic	0.083	0.057
Selenium	109	24.2	35.0	12.8	na	na	chronic	40	27
Zinc	282	295	90.7	156	na	na	acute	280	190

Table C-9: Summary of WQBEL Derivation for Outfall 002 at Thompson Creek Flows < 7 cfs

na = not applicable (no criterion for comparison)

Footnotes:

1 - Parameters which exhibited reasonable potential (see Table C-4).

2 - Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses. The most stringent of these represent the final WQBEL.

Table C-10: Summary of WQBEL Derivation for Outfall 002 at Thompson Creek Flows \$ 7 cfs

Parameter ¹ ug/l	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentrations		Limits Based on Recreational Criteria		WQBELs		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis ²	maximum daily limit	average monthly limit
Cadmium	15.9	4.29	5.11	2.6	na	na	chronic	8.1	5.5
Copper	37.9	25.6	12.2	13.5	na	na	acute	38	26
Lead	312	11.2	100	5.89	na	na	chronic	18	13
Mercury	10.1	0.0506	3.25	0.0267	1.36	1.98	chronic	0.083	0.057
Selenium	54.8	9.63	17.6	5.08	na	na	chronic	16	11
Zinc	438	381	141	201	na	na	acute	440	300

na = not applicable (no criterion for comparison)

Footnotes:

1 - Parameters which exhibited reasonable potential (see Table C-4).

2 - Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses. The most stringent of these represent the final WQBEL.

Table C-11: Summary of WQBEL Derivation for Outfall 004 at Squaw Creek Flows < 50 cfs

Parameter ¹ ug/l	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentrations		Limits Based on Recreational Criteria		WQBELs		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis ²	maximum daily limit	average monthly limit
Lead	809	32.1	260	16.9	na	na	chronic	53	26
Mercury	9.9	0.054	3.18	0.0285	0.82	1.65	chronic	0.089	0.044

Table C-11: Summary of WQBEL Derivation for Outfall 004 at Squaw Creek Flows < 50 cfs									
Zinc	511	488	164	257	na	na	acute	510	260
na = not applicable (no criterion for comparison)									
<u>Footnotes:</u>									
1 - Parameters which exhibited reasonable potential (see Table C-5). Other parameters either did not exhibit reasonable potential or the WQBELs have not changed from the draft permit (see Table C-20 of the Fact Sheet).									
2 - Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses. The most stringent of these represent the final WQBEL.									

Table C-12: Summary of WQBEL Derivation for Outfall 004 at Squaw Creek Flows \$ 50 cfs									
Parameter ¹ ug/l	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentrations		Limits Based on Recreational Criteria		WQBELs		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis ²	maximum daily limit	average monthly limit
Copper	74.5	49.0	23.9	25.9	na	na	acute	75	37
Lead	977	23.3	314	12.3	na	na	chronic	38	19
Zinc	701	633	252	334	na	na	acute	700	350
na = not applicable (no criterion for comparison)									
<u>Footnotes:</u>									
1 - Parameters which exhibited reasonable potential (see Table C-5). Other parameters either did not exhibit reasonable potential or the WQBELs have not changed from the draft permit (see Table C-21 of the Fact Sheet).									
2 - Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses. The most stringent of these represent the final WQBEL.									

Table C-13: Summary of WQBEL Derivation for Outfall 005 at Salmon River Flows \$ 2000 cfs ¹									
Parameter ² ug/l	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentrations		Limits Based on Recreational Criteria		WQBELs		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis ³	maximum daily limit	average monthly limit
Cadmium	56.6	18.6	18.2	9.79	na	na	chronic	31	15

Table C-13: Summary of WQBEL Derivation for Outfall 005 at Salmon River Flows \geq 2000 cfs¹

Copper	317	218	102	115	na	na	acute	320	160
Lead	1170	20.7	375	16.2	na	na	chronic	50	25
Mercury	48.9	0.239	15.4	0.126	45.6	91.5	chronic	0.36	0.20

na = not applicable (no criterion for comparison)

Footnotes:

1 - WQBELs not determined for the low flow (< 2000 cfs) tier since there have been no changes from the draft permit this tier (see Table C-22 of the Fact Sheet for the low flow tier WQBELs).

2 - Parameters which exhibited reasonable potential (see Table C-5).

3 - Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses. The most stringent of these represent the final WQBEL.

IV. Summary of Final Permit Effluent Limitations

The previous sections discussed how the WQBELs were developed for the final permit. This section discusses how the WQBELs and technology-based effluent limits become the final effluent limits. This section only discusses the metals effluent limits, since the effluent limits for TSS and pH are the same as in the draft permit.

As discussed in Appendix C, Section I of the Fact Sheet, technology-based limits are applied to each discharge and evaluated (via the reasonable potential evaluation) to determine whether these limits may result in any exceedence of water quality standards in the receiving water. The technology-based effluent limits applicable to the Thompson Creek Mine discharges were presented in Table C-1 of the Fact Sheet. If the reasonable potential analysis demonstrates that discharge at the technology-based effluent limits could result in exceedences of water quality standards, then WQBELs are developed. Following is a summary of the final permit limits for each outfall.

Outfall 001: In the draft permit, WQBELs were established for cadmium, copper, lead, mercury, and selenium for both flow tiers. For the high flow tier, a WQBEL was required for zinc. For the low flow tier, the zinc effluent limit was based on the technology-based effluent limitation guidelines. In the final permit, a WQBEL was no longer needed for selenium in the low flow tier and the copper effluent limit in the low flow tier is based on the technology-based effluent limitation guidelines. For all the metals (except for the zinc technology-based limit at low flow), the magnitude of the limits are different between the draft and the final permit due to changes in the dilution ratios and mixing zones. As in the draft permit, the dilution ratios were established as effluent limits in the final permit.

Outfall 002: In the draft permit, WQBELs were established for cadmium, copper, lead, mercury, selenium, and zinc for both flow tiers. WQBELs for these same parameters were also required in the final permit. For all the metals, the magnitude of the limits are different between the draft and the final permit due to changes in the dilution ratios and mixing zones. As in the draft permit, the dilution ratios were established as effluent limits in the final permit.

Outfall 004: Due to changes in the mixing zones, the WQBELs were revised from the draft permit for lead, mercury, and zinc at low flow and copper, lead, and zinc at high flow. A review of the chromium and silver data resulted in the removal of these effluent limits from the final permit. The effluent limits for the other parameters (cadmium, copper at low flow, and mercury at high flow) are the same as in the draft permit. As in the draft permit, the effluent limits in the final permit are expressed as both concentration and mass. Mass-based limits were calculated from the concentration-based limits and maximum effluent flow (see Equation 12 of the Fact Sheet).

Outfall 005: The effluent limits for outfall 005 at low flow are the same as those in the draft permit, except for the silver limit, which was removed. Effluent limits for the new high flow tier

were developed for the final permit. WQBELs for the high flow tier were required for cadmium, copper, lead, and mercury. Zinc did not exhibit reasonable potential, therefore the technology-based limit is applicable. The draft permit included mass-based limits for outfall 005. As discussed in the response to comments, due to the potential contribution of outfalls 001 and 002 to outfall 005, the mass-based limits were removed and, instead, the dilution ratio was established as an effluent limit (see response to comments 1 and 16).

V. Example Water Quality-based Effluent Limit (WQBEL) Calculation

This section demonstrates how the water quality-based analysis (reasonable potential determination and development of effluent limits) was performed using cadmium in outfall 001 as an example. This example calculation was also demonstrated in Appendix D of the Fact Sheet for the draft permit calculations. This section will refer to Appendix D of the Fact Sheet where the values of parameters have not changed from those used in the draft permit calculations.

Step 1: Determine the applicable water quality criteria.

Applicable water quality criteria for cadmium were provided in Table C-4 of the Fact Sheet (see also Appendix D, page D-1 of the Fact Sheet).

criteria applicable to low flow conditions (< 7 cfs in Thompson Creek) are:

aquatic life acute = 3.1 ug/l (expressed as dissolved)
aquatic life chronic = 0.91 ug/l (expressed as dissolved)

criteria applicable to high flow conditions (≥ 7 cfs in Thompson Creek) are:

aquatic life acute = 1.9 ug/l (expressed as dissolved)
aquatic life chronic = 0.66 ug/l (expressed as dissolved)

Step 2: Determine if there is reasonable potential for the discharge to exceed the criteria in the receiving water.

To determine reasonable potential, the maximum projected receiving water concentration (C_d) is compared to the applicable water quality criterion. If C_d exceeds the criterion, then reasonable potential exists and a WQBEL is established. Since the cadmium criteria is expressed as dissolved, C_d is determined via Equation 2.

$$C_d = \frac{\text{translator} \times (C_c \times Q_c) + [C_u \times (Q_u \times MZ)]}{Q_c + (Q_u \times MZ)} \quad (\text{Equation 2})$$

The parameters to substitute in the above equation are:

translator = the water quality criteria conversion factor is used as the translator. The conversion factors and translators are the same as in the draft permit calculations (see Appendix D of the Fact Sheet, pages D-1 and D-2). The conversion factors are:

low flow: acute conversion factor = 0.951
chronic conversion factor = 0.916

high flow: acute conversion factor = 0.969
chronic conversion factor = 0.934

C_e = maximum projected effluent concentration = 100 ug/l (C_e is the same as in the draft permit calculations. See Appendix D of the Fact Sheet, page D-2.)

C_u = upstream receiving water concentration = 0.07 ug/l, dissolved (the same as in the draft permit calculations. See Appendix D of the Fact Sheet, page D-2)

Q_e = effluent flow. The effluent flow values have changed due to the use of new dilution ratios. The new effluent flow values are (see Table C-1):

0.0097 cfs for low flow conditions
0.43 cfs for high flow conditions

Q_u = upstream receiving water flow (same as draft permit calculations, see Appendix D of the Fact Sheet, page D-2)

for low flow tier = 1.58 cfs for comparison to the acute aquatic life criteria
2.05 cfs for comparison to the chronic aquatic life criterion
for high flow tier = 7 cfs for all criteria

MZ = mixing zone = 0.25 for low flow (see Table C-2)
= 0.05 for high flow

Insert the above values into equation 2 and solve:

For low flow condition (< 7 cfs in Thompson Creek):

Determine the reasonable potential to exceed acute aquatic criterion:

$$C_{d, \text{acute}} = \frac{(0.951)(100)(0.0097) + (0.07)(1.58)(0.25)}{0.15 + (1.58)(0.25)} = 2.35 \text{ ug/l}$$

The maximum projected receiving water concentration does not exceed the acute aquatic life criterion (3.1 ug/l), therefore there is no reasonable potential for the effluent to cause an exceedence of the water quality standard, and a WQBEL is not required (Table C-3).

Determine the reasonable potential to exceed the chronic criterion (solve equation 2):

$$C_{d, \text{chronic}} = \frac{(0.916)(100)(0.0097) + (0.07)(2.05)(0.25)}{0.0097 + (2.05)(0.25)} = 1.77 \text{ ug/l}$$

Since the maximum projected receiving water concentration exceeds the chronic aquatic life criterion (0.91 ug/l), there is reasonable potential for the effluent to cause an exceedence of the water quality standard, and a WQBEL is required (see Table C-3).

NOTE: If reasonable potential exists to exceed either one of the cadmium criteria, a WQBEL is required.

Perform the same calculations for the high flow condition (\$ 7 cfs in Thompson Creek):

Determine the reasonable potential to exceed acute aquatic criterion:

$$C_{d, \text{acute}} = \frac{(0.969)(100)(0.43) + (0.07)(7)(0.05)}{0.43 + (7)(0.05)} = 14.3 \text{ ug/l}$$

The maximum projected receiving water concentration exceeds the acute aquatic life criterion, therefore, a WQBEL is required (see Table C-3).

Determine the reasonable potential to exceed the chronic criterion:

$$C_{d, \text{chronic}} = \frac{(0.934)(100)(0.43) + (0.07)(7)(0.05)}{0.43 + (7)(0.05)} = 51.5 \text{ ug/l}$$

The maximum projected receiving water concentration exceeds the chronic aquatic life criterion, therefore, a WQBEL is required (see Table C-3).

Step 3: Since there is reasonable potential, determine the wasteload allocations (WLAs):

Since the applicable criteria are expressed as dissolved, the WLAs for cadmium are calculated using Equation 5:

$$WLA = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e \times \text{translator}} \quad (\text{Equation 5})$$

The variables in the WLA equation have already been defined in Steps 1 and 2. Plugging these into the above equation and solving.

For low flow conditions:

Determination of WLA for protection of acute aquatic life (solve Equation 5):

$$WLA_{acute} = \frac{(3.1)[0.0097 + (1.58)(0.25)] - (0.07)(1.58)(0.25)}{0.0097 (0.951)} = 133 \text{ ug/l}$$

Determination of WLA for protection of chronic aquatic life:

$$WLA_{chronic} = \frac{(0.91)[0.0097 + (2.05)(0.25)] - (0.07)(2.05)(0.25)}{0.0097 (0.916)} = 49.5 \text{ ug/l}$$

These WLAs are shown in Table C-7.

For high flow conditions:

Determination of WLA for protection of acute aquatic life:

$$WLA_{acute} = \frac{(1.9)[0.43 + (7)(0.05)] - (0.07)(7)(0.05)}{0.43 (0.969)} = 3.50 \text{ ug/l}$$

Determination of WLA for protection of chronic aquatic life:

$$WLA_{chronic} = \frac{(0.66)[0.43 + (7)(0.05)] - (0.07)(7)(0.05)}{0.43 (0.934)} = 1.22 \text{ ug/l}$$

These WLAs are shown in Table C-8.

Step 4a: Develop Long-term Average Concentrations Based on the WLAs.

Effluent limits are developed by converting the WLAs to long-term average concentrations (LTAs). The most stringent LTA is used to develop the effluent limits. The aquatic life WLAs are converted to LTAs using Equation 6:

$$LTA = WLA \times \exp[0.5F^2 - zF] \quad (\text{Equation 6})$$

where,

$z = 2.326$ for 99th percentile probability basis (per the TSD)

$CV = 0.6$ for cadmium (see page D-4 or Table C-8 of the Fact Sheet)

for acute criteria, $F^2 = \ln(CV^2 + 1) = \ln(0.6^2 + 1) = 0.3075$

for chronic criteria, $F^2 = \ln(CV^2/4 + 1) = \ln(0.6^2/4 + 1) = 0.0862$

Plug the above values and the WLAs from step 3 into equation 6 and solve:

For low flow conditions:

$$\begin{aligned} \text{LTA}_{\text{acute}} &= (133) \times \exp [0.5(0.3075) - (2.326)(0.5545)] = 42.7 \text{ ug/l} \\ \text{LTA}_{\text{chronic}} &= (49.5) \times \exp [0.5(0.0862) - (2.326)(0.2936)] = 26.1 \text{ ug/l} \end{aligned}$$

These LTA concentrations are shown in Table C-7. Since the $\text{LTA}_{\text{chronic}}$ is more stringent than the $\text{LTA}_{\text{acute}}$, the $\text{LTA}_{\text{chronic}}$ is used to derive the WQBELs (see step 4b, below).

For high flow conditions:

$$\begin{aligned} \text{LTA}_{\text{acute}} &= (3.50) \times \exp [0.5(0.3075) - (2.326)(0.5545)] = 1.12 \text{ ug/l} \\ \text{LTA}_{\text{chronic}} &= (1.22) \times \exp [0.5(0.0862) - (2.326)(0.2936)] = 0.643 \text{ ug/l} \end{aligned}$$

These LTA concentrations are shown in Table C-8. Since the $\text{LTA}_{\text{chronic}}$ is more stringent than the $\text{LTA}_{\text{acute}}$, the $\text{LTA}_{\text{chronic}}$ is used to derive the WQBELs (see step 4b, below).

Step 4b: Develop Effluent Limits Based on the LTA.

The most stringent LTA concentration for each flow condition is converted to a maximum daily limit and average monthly limit via Equation 7:

$$\text{maximum daily, average monthly} = \text{LTA} \times \exp[zF - 0.5F^2] \quad (\text{Equation 7})$$

where, for the maximum daily limit :

$$\begin{aligned} z &= 2.326 \text{ for } 99^{\text{th}} \text{ percentile probability basis (per the TSD)} \\ F^2 &= \ln(\text{CV}^2 + 1) = \ln(0.6^2 + 1) = 0.3075 \end{aligned}$$

for the average monthly limit:

$$z = 1.645 \text{ for } 95^{\text{th}} \text{ percentile probability basis (per the TSD)}$$

$$F^2 = \ln(\text{CV}^2/n + 1) = \ln(0.6^2/1 + 1) = 0.3075$$

since n = number of samples per month = 1
(monthly monitoring for cadmium in outfall 001),

Substituting the above values and the lowest LTA concentrations from Step 4a into equation 7 and solving:

For low flow conditions:

$$\begin{aligned} \text{max. daily limit} &= (26.1) \exp [(2.326)(0.5545) - 0.5 (0.3075)] = 81 \text{ ug/l} \\ \text{avg. monthly limit} &= (26.1) \exp [(1.645)(0.5545) - 0.5 (0.3075)] = 56 \text{ ug/l} \end{aligned}$$

For high flow conditions:

$$\text{max. daily limit} = (0.643) \exp [(2.326)(0.5545) - 0.5 (0.3075)] = 2.0 \text{ ug/l}$$

$$\text{avg. monthly limit} = (0.643) \exp [(1.645)(0.5545) - 0.5 (0.3075)] = 1.4 \text{ ug/l}$$

These are the WQBELs for cadmium in the final permit (see Tables C-7 and C-8).

VI. References

EPA 1991. *Technical Support Document for Water Quality-based Toxics Control*. Office of Water Enforcement and Permits, Office of Water Regulations and Standards. Washington, D.C., March 1991. EPA/505/2-90-001.

EPA 2000. Fact Sheet for the Draft NPDES Permit for the Thompson Creek Mine, NPDES Permit No. ID-002540-2. June 8, 2000. EPA Region 10, Seattle, Washington.

IDEQ 2001. Idaho Department of Environmental Quality. January 2, 2001. Certification of Discharges, Mixing Zone Determination, and Authorization for New Discharges into Special Resource Waters, Thompson Creek Mine, NPDES Permit No. ID-002540-2.

APPENDIX D

FINAL NPDES PERMIT - SHADED/STRIKEOUT VERSION

This appendix contains a shaded-strikeout version of the final permit that demonstrates changes between the draft permit and the final permit. The additions to the permit are shaded and deletions are in strikeout.

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