South Fork Flathead Watershed
Westslope Cutthroat Trout Conservation Program
Final Environmental Impact Statement

Bonneville Power Administration
July 2005

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Responsible Agency: U.S. Department of Energy (DOE), Bonneville Power Administration (BPA)

Cooperating Agencies: U.S. Department of Agriculture, Forest Service (FS) and State of Montana Fish, Wildlife, and Parks (MFWP) Department

Title of Proposed Project: South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program

State Involved: Montana

Abstract: In cooperation with MFWP, BPA is proposing to implement a conservation program to preserve the genetic purity of the westslope cutthroat trout populations in the South Fork of the Flathead River drainage. The South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program constitutes a portion of the Hungry Horse Mitigation Program. The purpose of the Hungry Horse Mitigation Program is to mitigate for the construction and operation of Hungry Horse Dam through restoring habitat, improving fish passage, protecting and recovering native fish populations, and reestablishing fish harvest opportunities. The target species for the Hungry Horse Mitigation Program are bull trout, westslope cutthroat trout, and mountain whitefish. The program is designed to preserve the genetically pure fluvial and adfluvial westslope cutthroat trout (*Oncorhynchus clarki lewisi*) populations in the South Fork drainage of the Flathead River. To accomplish the goals, MFWP is proposing to remove hybrid trout from identified lakes in the South Fork Flathead drainage on the Flathead National Forest and replace them with genetically pure native westslope cutthroat trout over the next 10-12 years. Some of these lakes occur within the Bob Marshall Wilderness and Jewel Basin Hiking Area. Currently, 21 lakes and their outflow streams with hybrid populations have been identified and are included in this proposal. Other lakes may also be included as additional information is discovered. BPA funds would be used to implement this project. These activities would occur on lands administered by the FS.

BPA described and analyzed the proposed action and alternatives in a draft environmental impact statement (DEIS) released in June 2004. BPA is considering the following alternatives:

- Alternative A: (No Action) Status Quo Management
- Alternative B: (Proposed Action) Fish Toxins-Combined Delivery and Application Methods
- Alternative C: Fish Toxins-Motorized/Mechanized Delivery and Application Methods
- Alternative D: Suppression Techniques and Genetic Swamping

This abbreviated final environmental impact statement (FEIS) contains the changes made to the DEIS, comments received on the DEIS, and BPA's written responses to the comments. The FEIS should be used as a companion to the DEIS, which contains the full text of the affected environment, environmental analysis and appendices. BPA expects to issue a Record of Decision on the proposed project in summer 2005.

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For additional copies of this document, please call 1-800-622-4520 and ask for the document by name. Or you can request additional copies by writing to:

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ATT : Public Information Center - CHDL-1

The FEIS is also on the Internet at:
http://www.efw.bpa.gov/environmental_services/Document_Library/South_Fork_Flathead/.

For additional information on DOE NEPA activities, please contact Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, EH-42, U.S. Department of Energy, 1000 Independence Avenue S.W., Washington D.C. 20585, phone: 1-800-472-2756 or visit the DOE NEPA Web site at www.eh.doe.gov/nepa.

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Summary

This is the final environmental impact statement (FEIS) for the proposed South Fork Flathead Watershed Westslope Cutthroat Trout Conservation Program. This document has been prepared as an "abbreviated" FEIS pursuant to the Council on Environmental Quality's (CEQ) National Environmental Policy Act (NEPA) regulations because there have been no substantial changes to the proposed action, alternatives, or environmental analysis presented in the Draft EIS (DEIS) (dated June 2004). Consistent with 40 C.F.R. 1503.4(c), this abbreviated FEIS provides comments received on the DEIS, agency responses to these comments, and any changes made to the DEIS. This FEIS should be used as a companion document to the DEIS, which contains the full text of the affected environment, environmental analyses, and appendices. For readers of this FEIS who do not already have a copy of the DEIS, copies may be obtained by:

- Calling BPA's document request line at 1-800-622-4520; record your name, address, and which documents you would like, or
- Accessing the DEIS on BPA's Web site at: http://www.efw.bpa.gov/environmental_services/Document_Library/South_Fork_Flathead/, or
- Writing to: Bonneville Power Administration
  PO Box 3621
  Portland, OR 97208
  ATT: Public Information Center - CHDL-1

The remainder of this summary provides an overview of the proposed action and alternatives, the lead and cooperating agencies, the comment period for the DEIS, and changes to the DEIS. Chapter 1 presents comments (copies of letters, e-mails, comment forms, and public meeting comments) on the DEIS and agency responses to these comments.

Proposed Action and Alternatives

Scope of Project

Twenty-one specific lakes and their designated stream segments are targeted for treatment. Additional information about the sites including location, size, and specifics about the methods of and procedures proposed for treatment can be found in Appendix C of the DEIS. Although there is no specific information indicating other hybrid lakes and streams are present in the South Fork, if any other lakes and streams in the South Fork Flathead are discovered at some time in the future to contain hybrid trout, these may also need to be treated (see Section 2.2 of the DEIS).

A list of lakes currently under consideration include the following:

- Black
- Blackfoot
- Clayton
- George
- Handkerchief
- Koessler
- Lena
- Lick
- Lower Big Hawk
- Lower Three Eagles (genetic analysis pending)
- Margaret
- Necklace Chain of Lakes (“Smokey Creek Lakes”) – total of four
- Pilgrim
- Pyramid
- Sunburst
- Upper Three Eagles
- Wildcat
- Woodward

The determination to treat lakes and streams other than those 21 listed above would be made only if hybridization was determined through genetic analysis.

Alternatives Under Consideration

BPA is considering the following alternatives:

- Alternative A: (No Action) Status Quo Management
- Alternative B: (Proposed Action) Fish Toxins-Combined Delivery and Application Methods
- Alternative C: Fish Toxins-Motorized/Mechanized Delivery and Application Methods
- Alternative D: Suppression Techniques and Genetic Swamping

The No Action alternative would maintain current management practices, including current fish stocking practices, angling regulations, and future fish stocking. BPA would make no effort to affect the westslope cutthroat population in the South Fork, which would provide no means to prevent hybrid trout from moving downstream to pioneer new areas. These hybrid trout would continue to compromise the genetic integrity of the genetically pure westslope cutthroat trout by interbreeding and likely creating new hybrid populations in the South Fork Flathead drainage. If Alternative A: No Action is implemented, hybridization would continue to threaten the genetic purity of the westslope cutthroat populations and could also lead to future restrictions on angling, affect angling opportunities, and management for this species. The No Action Alternative could also lead to an Endangered Species Act (ESA) listing of the westslope cutthroat trout and more severe restrictions for all activities affecting the species in the subbasin.

Alternative B would use a combination of motorized/mechanized (i.e., aircraft, motor boats) and non-motorized/non-mechanized (i.e., livestock, hiking) means to access all project sites and apply fish toxins to remove hybrid trout from the lakes and designated portions of the outflow streams, and then restock the lakes and streams with genetically pure westslope cutthroat trout.

Before re-stocking with fish, Montana Fish, Wildlife and Parks Department (MFWP) would install sentinel fish cages in each lake to determine if the water conditions are appropriate, and if so, the lake and stream would be stocked in order to establish genetically pure cutthroat populations in sufficient quantities to dominate any hybrid fish that might remain, and to re-establish the fishery. MFWP would determine future stocking amounts and frequency on a case-by-case basis.

Monitoring of the restocked fish would continue for several years to determine population viability and associated characteristics, determine program success such as presence and degree of natural reproduction, genetic purity, angling quality, and growth rates of fish.

Alternative C is similar to Alternative B in all respects, but differs in the method used to transport materials, equipment and supplies to the project sites and in the application of fish toxins to the lakes. The main difference is in the use of aircraft as the sole means of transport.

Alternative D proposes the combined use of two or more mechanical removal strategies to reduce hybrid trout numbers in an effort to protect downstream genetic purity of the westslope cutthroat. This alternative would rely on the use of mechanical fish collection methods as a means to suppress the hybrid trout populations by removing as many fish as possible. When population levels are adequately reduced, intensive fish stocking would commence on a “frequent or annual” basis (swamping) in an attempt to dominate the remaining hybrid trout in the lakes.

Lead and Cooperating Agencies

BPA is the lead federal agency and supervises the preparation of the EIS. The proposed activities would occur on lands administered by the U.S.D.A. Forest Service, so the Forest Service is a cooperating agency. The program is being proposed by the State of Montana Fish, Wildlife, and Parks Department.

Draft EIS Comments

The Draft EIS was distributed to agencies, tribes, groups, individuals and libraries in June 2004. A public review period was open until August 20, 2004. A public meeting was held on July 12, 2004 in Kalispell, Montana to accept public comment on the draft document. During the comment period, 40 individuals, groups or agencies submitted remarks that resulted in 560 comments. Issues raised in the comments included the following:

- Fish Restocking/Fishless Lakes
- Fisheries Genetics (WCT)
- Fish Removal, Piscicides
- Non-target Species
- Wilderness/Access Methods
- Recreation
- Socioeconomics

- Water Quality
- Necessity of Project (Government Spending/Success of Project)
- Comment on Alternatives &/or Suggestions
- Monitoring Plans
- Human Health
- Other Resource Issues/Comments

Copies of comments made on the DEIS and BPA's responses to those comments are in Chapter 1.

Changes to the Draft EIS

There are no major changes to the DEIS that was released in June 2004. The following are additions or corrections made to the DEIS in response to comments.

Chapter 1 Purpose of and Need for Action

On page 1-7, the broodstock referred to is the M012 fish.

Chapter 2 Proposed Action and Alternatives

On page 2-18 "…Appendix B gives estimates…" should read Appendix **C**.

Section 2.4.3.4 should be titled "**Summary of Transportation Methods**."

Add to Section 2.4.1.1:

Pages 2-8, 2-9, 3-11 and D-5 refer to the restocking of lakes treated with rotenone to restore angling. In the case of Tom Tom and Whale lakes, these were restocked with two-year old westslope cutthroat trout between 8 and 11 inches long. Angling was restored immediately. Although the size of these fish was not the same as those removed, angling was restored much more rapidly than stocking young of the year-sized fish. These populations have been monitored annually since 2002, and angling continues to be good. In addition to restoring the angling by stocking larger sized fish, in both cases, the natural production capability was restored. Each year since 2002, these lakes have produced wild westslope cutthroat trout that contribute to maintaining the populations.

Add to Section 2.4.1.2:

Powdered rotenone was ruled out as the primary form of rotenone due to the additional logistical and time requirements necessary to mix the material on site. Questions raised during the comment period of the DEIS made MFWP re-consider using powdered rotenone for at least a portion of the application. The rotenone label indicates that powdered form can be applied by *"…placing undiluted powder in a burlap sack and trail behind the boat…when treating deep water (20 to 25 feet) weight bag and tow at desired depth..."* On this basis, it may be beneficial in some cases to use powdered rotenone partially for application in some deep lakes. This would reduce the amount of liquid formulated rotenone necessary, which would reduce the number of transport trips, and reduce the amount of time and effort required to pump treated surface water to deep water zones. Liquid rotenone would still be the principle form of the rotenone, but powder would be used in concert for deep-water application. The powdered form typically has 7.5% active ingredient versus 5% in the liquid form.

This strategy would reduce the amount of emulsifier applied to the environment. The human health threats would be similar to the liquid formulation. Because the powdered form would be used for specific application to deep water zones, it would be transferred to permeable containers (burlap sack) and stored in plastic bags prior to the treatment, then transported to the site by helicopter. Handling on site would be reduced to fixing the sacks to a rope at the appropriate depth and placing them in the water for towing behind a boat.

The main difference in the precautionary statements for both forms of rotenone are in the type of respirator system required for applicators. A NIOSH approved respirator system with any N,R,P, or HE filter is required when using the powdered form and an OV canister with any R,P, or HE filter is required when using the liquid formulation.

Add to Section 2.4.1.3:

The following information was reported in Grisak (2003c):

Other compounds that will readily bind with antimycin to detoxify it include activated charcoal and natural substances like leafy vegetation and water plants. It does not enter ground water supplies because it binds rapidly with organic compounds in soil and in water (Romeo, 2002).

Water temperature has an influence on the efficacy of antimycin (Walker et al 1964, Gilderhaus et al. 1969, Marking and Dawson 1972). Longer exposure times are required in colder water to produce mortality in trout (Tiffan and Bergersen 1996). For this reason, antimycin will naturally detoxify quicker in warmer water than in colder water. Water treated at 39^{o}F required two to three times as much exposure time for mortality than water treated at 71^{o}F (Lee et al. 1971).

Antimycin degrades rapidly in water and detoxification under field conditions can be complete within 24 to 96 hours (Walker et al. 1964; Lennon 1970). Sunlight will also break down antimycin. Lee et al. (1971) reported that when in aqueous solution in sunlight and shade, it had a half-life of less than 20 minutes.

Marking (1973) reported that the performance of antimycin decreases dramatically when the pH of the water is over 8.5. The pH values measured from lakes in this project are fairly consistent. The mean pH value for project lakes is 6.8 and ranges from 6.2 to 7.7 (see Table 6 for listing of some values). Based on this information antimycin would be expected to perform at its most effective level under these water conditions.

Based on half life toxicity studies conducted by Marking (1973, 1975), Marking and Dawson (1972) and Berger (1966), and the measured pH values of lakes proposed in this project (range 6.2-7.7), the expected toxicity of antimycin to fish in the project lakes would last for 2-7 days. This rate would be slightly influenced by water temperature and sunlight intensity during the application. Trout are highly sensitive to antimycin. Contact time necessary to cause death ranges from 1-4 hours and the effects are irreversible (Gilderhus et al. 1969; Gilderhus 1972). Rosenlund and Stevens (1992) reported that this time is actually protracted during field applications but once exposed, trout are usually dead within 48 hours. Because fish cannot taste or smell antimycin, the compound does not repel fish like other toxicants can (Lennon 1970; Berger 1966). For this reason fish do not intentionally avoid exposure to the compound.

Appendix D of the DEIS provides information on the proper management of rotenone.

Add to Section 2.4.5:

We acknowledge that the DEIS lacks detailed information on the design and function of drip stations that would function as detoxification stations. This project will likely employ the use of two different designs of drip stations to dispense potassium permanganate for detoxification. The California 5-gallon Drip Can design was recently experimented with and found to perform nicely in administering a consistent and constant concentration of liquid. This method has been used extensively in California for numerous fish control projects. The other design is known as the Lightweight Constant-Flow Device referred to in Stefferud and Propst (1996).

The drip station, when used to dispense neutralizing agent, works by administering a constant and steady flow of liquid over a 1-4 hour period. Typically the container is 5-gallons, but can be as large as 200 gallons, depending on access to the project site. A known and pre-calculated concentration is placed in the container and administered over a known and per-calculated period of time. An attendant is required to monitor the drip station and make periodic evaluations and adjustments to the flow rate, if necessary. Typically caged fish are placed upstream of the detoxification station to make sure the treatment is successful up to that point. A second cage with fish is placed downstream of the detoxification station to measure proper neutralization.

Monitoring also includes the following:

- Setting caged fish in lakes and streams to determine the lethality and/or neutrality of treated waters, and when to restock.
- Gill netting lakes to determine fish population status.
- Visual observation of spawning redds, in part, to determine natural reproduction.
- Electrofishing surveys in streams to determine fish abundance.
- Sampling lakes with a Wisconsin net to determine plankton species and abundance.
- Angler surveys and reports to determine satisfaction.
- Sweep netting and kick netting to determine insect species and abundance.
- Visual surveys, kick netting, and electrofishing to determine amphibian presence and abundance.

Post treatment evaluations will involve replicating pre-treatment evaluations. This provides the most consistent methodology. Pre-treatment plankton evaluations are made by replicate vertical tows using a 5 inch Wisconsin net at 50 feet depth, or maximum lake depth, which ever is greatest. These samples are analyzed to a reasonable degree of taxonomic resolution for average number per species per liter, and by total number per species, when feasible. These evaluations have been conducted on monthly intervals, during ice off, in some lakes to capture variation in species richness and abundance in the SF drainage.

Amphibian surveys involve walking and dip netting along shorelines, and kick netting and visual observations in streams. Time has been the unit of effort. Monthly amphibian surveys have been conducted on some lakes to capture variation in richness, life stage, abundance and, most importantly, detectability.

Insect evaluations are being designed by MFWP and will begin in 2005. This survey will sample stream and lake insect communities throughout the SF drainage and will determine a baseline by which to compare future insect community status. Kick netting will be used in streams, sweep netting will be used in lakes, where possible, and a sample of lake benthos will be taken from sediments up to 50 feet depth.

There is inherent natural variation in insect, plankton and amphibian communities. Evaluations conducted before any treatment would hopefully capture this variation, and would be useful in making post treatment conclusions.

Add to Section 2.4.6:

Page 2-27 and Appendix C of the DEIS states that fish would be stocked in some of the streams to restore a viable fish population. We acknowledge that more information should have been provided in the DEIS. In 1973, the Fish and Game Commission changed the fish stocking policy by ruling that MFWP would no longer stock catchable-sized trout in streams with healthy wild trout populations. For the most part, this policy has been followed, and has been successful. In the case of this project, restocking of streams would not be for the purpose of sustaining angling, rather it would be conducted as a conservation measure to restore a viable population that could pioneer the treated segments of stream in a manner faster than would naturally occur by drift from the lakes. The intent of this stocking is to expedite the repopulation of the streams with pure westslope cutthroat trout. Stocking density would be relatively small and likely consist of a few hundred WCT yearlings.

Chapter 3 Affected Environment and Environmental Consequences

On page 3-22, Appendix A should be Appendix **D** (grizzly bear)

On page 3-30, the last sentence – change researched to research.

The water quality information on page 3-31 under soil and vegetation should be moved to Section 3.4, Water Resources.

Add to Section 3.1.2.1:

There will be some jet exhaust and exhaust from outboard motors, but these emissions are expected to be minimal resulting in short term and minor impacts to air quality.

Add to Section 3.3:

We agree that little information was provided in the DEIS about the Harlequin duck. Harlequin ducks are known to occur within the project area. These ducks are relatively uncommon sea ducks.

In spring, the birds begin their migration to inland nesting sites that are usually along smaller river tributaries. Like many other waterfowl, male Harlequin Ducks leave the breeding areas once incubation begins (usually by mid-June to early July). After leaving their mates, males migrate to specific moulting sites to undergo their postnuptial moult. Females normally join males at these sites and moult one to two months later. Migration to the traditional wintering areas, which may encompass the moulting sites, takes place in September to October. Harlequin Ducks have different feeding habits depending on the season. During spring and summer, when Harlequins occupy freshwater habitats, the birds dive to the bottom and walk against the current, prying in the bottom substrate in search of larvae of flying insects such as blackflies, caddis flies, stone flies, and midges. The absence of sufficient food is thought to limit distribution in more northerly areas. Wintering habitat consists of turbulent seas and the rocky parts of coastal areas. The birds locate their food by diving in shallow waters over wave-pounded rocks and ledges to find and pry prey from crevices. The most common food items include small crabs, amphipods, gastropods, limpets, chitons, blue mussels, and fish eggs. The Harlequin Duck has high food energy requirements, probably because of its relatively small body mass and high metabolic demands, especially in colder parts of its range. Because a small bird can store fewer reserves than a large bird, Harlequins are less suited to survive extremely cold and stormy weather. They must feed continually to maintain their metabolism.

Any impacts to this duck would be short term and minor in the form of lower food availability if aquatic insects are reduced during a treatment. The likelihood of direct exposure to a treatment will be lessened because the treatments would be applied in the fall when ducks are returning to their winter habitats on the coast. If direct exposure or oral ingestions of antimycin or rotenone-killed organisms by birds were to occur, the ducks would not be affected because in general they are not affected by fish-killing concentrations (Schnick 1974a and 1974b).

Add to Section 3.3.2.2:

Table 3-5 of the DEIS was updated to correct some errors. First, the data were collected from 29 lakes in the South Fork and not 23 as reported in the DEIS. This error was made when lakes in a chain complex were tallied together rather than tallying them separately. Next, the data were collected between 2000 and 2003 and not 2002 and 2003 as reported in the DEIS. Finally, the figures presented in the DEIS were overestimated by 11% as a result of a calculation error in converting tow depths from Imperial to metric measurements. In 2004, MFWP instituted a more comprehensive analysis of 35 lakes in the project area. That study was designed to measure seasonal variation in abundance and diversity of plankton, and also to attempt to measure spatial variation. Lakes with and without fish have been sampled.

Table 3-5. Zooplankton and planktonic insect species sampled from 29 lakes (34 samples total) in the South Fork Flathead drainage, 2000 to 2003.

Zooplankton Species	**Number of lakes present**	**Maximum per liter**	**Minimum per liter**	Mean per liter
Daphnia thorata	17	4.58	0.005	1.143
Daphnia pulex	12	3.44	0.004	1.116
Bosmina spp.	6	16.33	0.004	2.949
Holopedium gibberum	4	6.06	0.04	3.053
Cyclops spp.	13	5.22	0.003	0.777
Calanoid Diaptomus spp.	26	19.09	0.02	2.833
Calanoid Epischura spp.	2	0.71	0.02	0.365
Nauplii	13	2.69	0.006	0.434
Chaoboridae spp. (insect)	2	0.067	0.043	0.055

Add to Section 3.3.4.2:

We do not expect that retreatment would be necessary, but if after monitoring the effectiveness of the first treatment we find that retreatment is necessary, we may treat a second time. We do not expect a third treatment to be necessary, but if it were we would look at other options considered in this analysis. Caged fish in the lake and streams during the treatment would be the first method of evaluation, thereafter, we would use gill netting, visual surveys and electrofishing to detect the presence of live fish after a treatment.

If subsequent treatments are necessary, we believe the cumulative impacts would be the similar as the first treatment, just a year later in time, so it would affect different individuals and the non-target populations (plankton and aquatic insects) might be depressed from the first treatment if they have not fully recovered. We do not expect cumulative impacts to be long term, but we recognize that this action would delay the repopulation of non-target organisms by one more year. The fishery would also be impaired for one year longer. Our estimation of predicted impacts comes from the historical record of treatment of lakes and streams in Montana. Past treatments had different objectives and were carried out over a long span of time. However, we do not expect a second treatment to cause long-term impacts. See Appendix D (page D-4). The examples of lakes in the Flathead area that received second treatments that are listed in Appendix D were not implemented in the next year after the first treatment, but were done in later years (average time between treatments 19 years and range was 8-36).

We would use our post-treatment and pre-treatment data to assess what impacts might occur from the second treatment. We do not expect the impacts to be absolute or long-term based on the case histories from similar treatments.

To fully predict the outcome of second treatment would require expensive, time-consuming studies that are not part of our proposal. However, should a second treatment of a lake be needed, we would collect data through our proposed monitoring plan that could be used in future decision-making.

Add to Section 3.4:

It may be reasonable to base the chronic exposure scenario on the drinking water route of exposure only, since, as the DEIS explains, the fish targeted for removal will be killed quickly and the dead fish will be collected and disposed of (i.e., if the fish are quickly killed and disposed of, there would not appear to be much likelihood of bioconcentration and a fish consumption route of exposure). As a result, the chronic risk assessment calculation for the water column values might be based solely on the drinking water route of exposure. The reasonableness of this assumption, of course, would depend on a 100% (or close to) fish kill, dead fish collection and a short half-life for the chemicals used. Since the objective of a project such as this is generally 100% kill, limited potential for bioconcentration would seem to be a reasonable assumption.

Correction to Section 3.4.1

Replace the third and fourth paragraphs with these paragraphs:

Typical stream types found in the project area generally have gradients from 4 to 10 percent, and are characterized by straight (nonsinuous) cascading reaches with closely spaced pools. Many of the outlet streams associated with the lakes in this project have large waterfalls immediately downstream of the lakes, some reaching 200 feet tall.

Streams with gradients from 2 to 4 percent usually occupy narrow valleys with gently sloping sides…

There are no federal or Montana numeric water quality standards for rotenone or antimycin. However, the Montana Water Quality Act has narrative standards for water quality that prohibit the introduction of substances into waters that are injurious to aquatic life or that affect exiting uses. Under this project, MFWP would apply piscicide for the expressed purpose of killing unwanted fish. The Montana WQA in §75-5-308 MCA and the EPA through FIFRA acknowledge the use of pesticides under special circumstances is beneficial. FIFRA registration and label instructions reduce the potential for impacts to non-target organisms or long-term impacts and protects human health. Conditions imposed by DEQ when it issues a "308 authorization" will add an additional level of protection to non-target organisms and designated beneficial uses. The conditions may include limitations to the time of year the piscicides are applied, monitoring treated waters to ensure detoxification of the piscicides is complete, biological monitoring and ensuring that the duration of toxic conditions is as short as possible, among others.

Add to Section 3.4.3.1:

Grisak (2003c) reported that antimycin would readily bind to and be detoxified by activated charcoal and natural substances like leafy vegetation and water plants. It does not enter ground water supplies because it binds rapidly with organic compounds in soil and in water (Romeo, 2002).

Section 3.9.1 of the DEIS provides information on the proper management of rotenone.

Impacts to drinking water used by humans and livestock would be minimized by temporary closure of the project areas; and proper signing and advance notification that would allow users to find alternate sources for water if necessary. A number of other precautions will aid in the reduction or elimination of exposure to these compounds by wildlife and other aquatic life proper containment of piscicide treatments (low concentrations used for fish killing do not have harmful effects on mammals); rapid detoxification of both compounds in flowing streams and the treated lakes;

Impacts to agriculture in the project areas are expected to be slight to no effect. Recreation (swimming) use impact would also be slight because of the time of year and cold-water conditions when the treatments would be applied. Recreational fishing would be impacted until the restocking occurs.

Add to Sections 3.6.4 and 3.6.9:

We acknowledge that terms like "wilderness solitude," and "wilderness values" are difficult to define, and the meanings will vary among people. We believe it is important to recognize these differences and make some attempt to qualify the way in which they are interpreted (see addition to Section 3.7).

Add to Section 3.6.5:

The Draft Minimum Tools Analysis analysis was used in part to narrow the scope of the analysis of the DEIS. Non-motorized application of toxicant was determined to be impractical at achieving the objectives. Section 2.6 of the DEIS also provides some information on the impracticality of using non-motorized boats to implement.

Roselund and Stevens (1992) have described in detail the procedures for implementing a successful antimycin project. They reported that an outboard motor is absolutely necessary to obtain an effective mix of antimycin during a lake application. Because it is applied in such low concentrations, the compound requires thorough mixing. If an outboard motor cannot be used, they recommended not conducting the treatment.

In 1996, MFWP used a raft to apply rotenone on Devine Lake in the Bob Marshall Wilderness to remove brook trout. Devine Lake is one acre in size and has a maximum depth of 14 feet. Based on the small size and shallow depth, it was possible to apply rotenone to the lake with a small rowed craft. None of the lakes in this proposal are as small, except for some of the Necklace Lakes. Nevertheless, the several lakes that comprise the Necklace complex are proposed for treatment at the same time, using antimycin. Based on this, the complexity of this treatment warrants using the appropriate measures to ensure the toxin is thoroughly mixed within one day.

Add to Section 3.7:

We acknowledge that terms like “wilderness solitude,” and “wilderness values” are difficult to define, and the meanings will vary among people. We believe it is important to recognize these differences and make some attempt to qualify the way in which they are interpreted.

Numerous commenters recommended removing fish from lakes and not restocking them. While we recognize that some commenters wish to restore the BMWC to pre-European influence, and that others wish to observe and restore natural processes. We recognize the importance of these intangible wilderness values. This project was designed to increase naturalness by removing nonnative fish and hybrids that were introduced by man.

We also recognize that using motorized equipment in a wilderness would have a short-term impact on these intangible wilderness values. Though a wilderness user may not be at a site to see or hear motorized equipment, the mere thought of this action may have short-term impacts on the untrammeled quality of the wilderness. While we recognize this value system exists for some, it is also important to recognize the tangible values of others, which are firmly rooted in activities like angling, recreation, and outfitting, as well as the protection of native species like the westslope cutthroat trout. Depriving or impacting the latter values would have real and quantifiable impacts on established social, recreational, and economic practices. Quantifying the impacts on the intangible values and undefined wilderness quality is impossible, and we recognize that intangible values are no less important than tangible values. Upon completion of the project, protection of westslope cutthroat trout would require less human intervention and the trend toward wildness would increase.

MFWP has a history of using aircraft in the South Fork drainage since 1953. After the passing of the Wilderness Act in 1964, MFWP aircraft use in the BMWC continued, but tapered off slowly. The last known landing for fisheries work was in Big Salmon drainage in 1965. Since that time aircraft have been used to stock fish in lakes in the SF drainage. Starting in 1985 and continuing for the next 20 years, MFWP helicopter flights over the BMWC steadily increased to correct the problem of hybrid trout. Implementing genetic swamping required more frequent helicopter flights to stock pure westslope cutthroat trout. The motorized equipment component associated with this project, although controversial, was designed to eliminate the threat of hybrid trout, and ultimately reduce the number and frequency of flights necessary to conserve native fish species.

Add to Section 3.9

The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. This is appropriate, but there are a few corrections that should be made as follows:

For antimycin, the 0.5 mg/kg-day is a No Observed Effect Level (NOEL), not a Rfd. To arrive at a RD. this value will have to be adjusted downward based on appropriate uncertainty factors. EPA's Regional toxicologist (Dr. Robert Benson) recommends an overall uncertainty factor of 3,000 rather than 300 based on the following:

1) a factor of 10 based on uncertainty in the animal to human translation;

2) a factor of 10 based on intra-human variability;

3) a factor of 10 based on the subchronic/chronic uncertainty; and

4) a factor of 3 based on data limitation (i.e., one study) = 3000 as the overall uncertainty.

The RfD for antimycin, then, would be 0.0002 mg/kg-day.

For antimycin, the document notes that antimycin does not bioconcentrate, and therefore no bio-concentration factor (BCF) is used in the calculation of the human health value. The EPA suggested that there be a reference supporting this conclusion (EPA noted: There are a number of toxicants, some metals for example, that do not bioconcentrate appreciably and are said not to concentrate, but even for these, the BCF is often greater than 1).

Based on the adjustments discussed above (using the 17.5 grs consumption assumption for the rotenone "water+fish"), the EPA suggested the appropriate toxicant target concentrations and human health values would be as shown in Table 3-8:

Table 3-8. Toxicant Target Concentrations and Human Health Values

Toxicant	**Water Column Value**	**Human Health Value**	
		Water plus fish	Water only
Rotenone	50 ug/L	18 ug/L	140 ug/L
Antimycin	7.5-8.0 up/L or 4 ug/L	---	7.0 ug/L
Potassium permanganate	4.5 mg/L	---	0.8 mg/L

Based on these figures, the target concentrations for rotenone (50 ug/l) would be lower by greater magnitude than the estimated chronic "water only" human health value for rotenone (140 ug/L), more so than target concentrations and "water only" human health values for antimycin and potassium permanganate. This suggests that there may be a greater margin of safety in regard to human health risk for use of rotenone (at the proposed target concentrations) than for the other chemicals. Admittedly, this is an observation based on a limited amount of information and application of uncertainty factors, and it should also be noted that proposed target concentrations of these chemicals may be higher than shown to account for water chemistry and fresh water inputs. In any case, it is important that potential human health risks be considered along with other factors (e.g., rate of detoxification, quantity needed to kill fish, ease of bulk transport, toxicity to non-target organisms, piscicide availability, etc.,) in weighing the advantages and disadvantages of use of the chemicals.

Suggested Guidance for Application of Manganese RfD to Specific Scenarios

EPA suggested the following guidance:

In applying the reference dose (RfD) for manganese to a risk assessment, it is important that the assessor consider the ubiquitous nature of manganese, specifically that most individuals will be consuming about 2-5 mg Mn/day in their diet. This is particularly important when one is using the reference dose to determine acceptable concentrations of manganese in water and soils. Following RfD/RfC Work Group deliberations, it was decided that having a single reference dose for total oral intake of manganese is most appropriate, but that guidance should also be provided as to how this reference dose might be applied in specific situations. It is recommended that the upper end of the range recommended by the NRC (5 mg/day, described below) be considered to represent a typical human intake from total dietary sources. For determination of acceptable concentrations of manganese in water and soil, then, the risk assessor would subtract this amount from the level specified by the RfD [i.e., 10 mg/day (RID) - 5 mg/day (typical dietary intake) =5 mg/day (remaining)]. For applying this number to a non-dietary scenario, it is also recommended that a modifying factor of 3 be applied. The rationale for this modifying factor is three-fold. First, while the data described in section I.A.4 of the IRIS file suggest that there is no significant difference between absorption of manganese as a function of the form in which it is ingested (i.e., food versus water), there was some degree of increased uptake from water in fasted individuals. Second, the study by Kondakis et al. (1989) has raised concerns for possible adverse health effects associated with a lifetime ingestion of drinking water containing about 2 mg/L manganese. While no data are available to quantify total intake of manganese, one would not expect this concentration of manganese in water to be a problem based on dietary information revealing intakes ranging from 2 to 10 mg/day that are not associated with adverse health effects. Third, although toxicity has not been demonstrated, there are remaining concerns for infants fed formula which typically has a much higher concentration of manganese than does human milk (see section I.A.4 of the IRIS file for further discussion). If powdered formula is made with drinking water, the manganese in the water would represent an additional source of intake.

Using the recommended appropriation of 5 mg Mn/day for dietary contributions and a modifying factor of 3 for exposures from soil and drinking water and a body weight of 70 kg, yields a value of 0.0238 mg/kg-day.

Exposure from water + Exposure from soil = (l0-5)/(3x70) = 0.0238 mg/kg-day.

Assuming no exposure from soil and a ‘70 kg person drinking 2 L/day, the suggested advisory level is:

0.0238 mg/kg-day x 70 kg x 1 day/2 L = 0.8 mg/L

The following correction should be made:

The new fish consumption value for the Clean Water Act 304(a) criteria is 17.5 grs/day instead of 6.5 grs/day (this may be limited to 6.5 grs because that is the value in the current version of the State’s WQB-7 criteria document).

Chapter 7 References

Add the following references:

Adams, Susan B., Christopher A. Frissell, and Bruce E. Rieman. 2001. Geography of invasion in mountain streams; consequences of headwater lake fish introductions. Ecosystems 4[4] 296-307.

Fraley, J. 2001. Personal communication on the post rotenone treatment evaluation of Devine Lake. Montana Fish, Wildlife & Parks, Kalispell.

Fredenberg, W. 1993. Collection of juvenile bull trout in the Flathead River drainage, Montana. U.S. Fish and Wildlife Service, Creston Nation Fish Hatchery, Kalispell.

Hinson, D. 2000. Rotenone characterization and toxicity in aquatic systems. Unpublished paper. University of Idaho, principles of environmental toxicology, Moscow.

Knapp, Roland A., Paul Stephen Corn, and Daniel Schindler. 2001. The introduction of nonnative fish into wilderness lakes: good intentions, conflicting mandates, and unlimited consequences. Ecosystems 4[4]275-278.

Kondakis, X.G., N. Makris, M. Leotsinidis, M. Prinou and T. Papapetropoulos. 1989. Possible health effects of high manganese concentration in drinking water. Arch. Environ. Health. 44(3): 175-178.

Landers, Peter, Shannon Meyer, and Sue Matthews. 2001. The wilderness act and fish stocking: an overview of legislation, judicial interpretation, and agency implementation. Ecosystems 4[4] 287-295.

Lee, T.H., P.H. Derse, and S.D. Morton. 1971. Effects of physical and chemical conditions on the detoxification of antimycin. Transactions of the American Fisheries Society 1:13-17.

Lesser, B.R. 1970. The acute toxicities of antimycin A and juglone to selected aquatic organisms. Masters thesis. Department of Biology, University of Wisconsin, La Crosse.

Marking, L.L. 1973. Critical factors influencing the inactivation of antimycin in water. Masters thesis. University of Wisconsin, La Crosse.

Marking, L.L. 1975. Effects of pH on toxicity of antimycin to fish. Journal of Fisheries Research Board of Canada. Vol 32(6) 769-773.

Marking, L.L., and V.K. Dawson. 1972. The half-life of biological activity of antimycin determined by fish bioassay. Transactions of the American fisheries Society. 1;100-105.

Pilliod, David S. and Charles R. Peterson. 2001. Local landscape effects of introduced trout on amphibians in historically fishless watersheds. Ecosystems 4[4] 322-333.

Pister, Edwin P. 2001. Wilderness fish stocking; history and perspective. Ecosystems 4[4] 279-286.

Romeo, Nick. 2002. Aquabiotics, personal communication.

Schindler, Daniel E., Roland A. Knapp, and Peter R. Leavitt. 2001. Alteration of nutrient cycles and algal production resulting from fish introductions into mountain lakes. Ecosystems 4[4] 308-321.

Stefferud, J.A. and D.L. Propst. 1996. A lightweight constant flow device for dispensing liquid piscicides into streams in remote areas. North American Journal of Fisheries Management 16:228-230.

Appendix B Legal Chronology of Westslope Cutthroat Trout Listing Milestones

Add the following text to page B-3:

On October 25, 2004, the plaintiffs filed a notice of intent to appeal the USFWS decision to not list the WCT as a threatened species under ESA claiming that once again the USFWS failed to undertake a rational assessment of the WCT’s current status in light of the best available scientific data and prevalent hybridization with introduced rainbow trout and Yellowstone cutthroat trout.

Appendix D Technical Appendix on the Use of Piscicides

Add the following tables and text:

Although the performance benefits are listed in the DEIS for antimycin, we acknowledge that the DEIS is not clear on the performance advantages that were used to help determine where rotenone would be used (see Table D-1).

First, rotenone has performance characteristics in stream environments that can be used to the advantage of an applicator to cover longer reaches of streams in rugged remote terrain. As a result, this does not require as many drip stations to maintain lethality of stream water. In areas where downstream bull trout populations are not at risk of exposure to the fish toxin, rotenone is preferred to make advantage of this. When bull trout are at risk of exposure, antimycin would be used to reduce the impacts to them.

Second, MFWP has a long history, success with, and is experienced at using rotenone, specifically within the project area.

Marking and Dawson (1972) reported that the half-life of antimycin in water of pH 8.0 and temperature of 53^{o}F was 100 hours. Schnick (1974a) reported that half-life of antimycin was between 68 and 120 hours, depending on temperature and pH. These figures were reduced when antimycin was exposed to direct sunlight. Lee et al. (1971) studied the effects of pH, hardness, temperature and light intensity, and determined that pH was the most significant physical attribute that influences its persistence. Based on these studies, and the chemistry of water in the project lakes, we would expect the half-life of antimycin in lakes to be approximately 100 hours. In regard to antimycin performance in stream environments, Tiffan and Bergersen (1996) reported that antimycin is detoxified by natural processes including absorption by organic materials, oxidation, and exposure to UV light, generally within about 200 meters of stream elevation drop.

According to Gilderhus et al. (1986), the half-life of rotenone in cold water (41^{o}F) at pH 8.6 was between 3 and 7 days. Based on this information we would expect the half-life performance of rotenone in this project to be similar, but likely toward the 3-day figure.

Table D-1. Comparison of advantages and disadvantages of using rotenone and antimycin for the South Fork Flathead westslope cutthroat trout conservation program.

Method	Advantages	Disadvantages
Rotenone	-proven technique -can be contained with potassium permanganate, activated charcoal -naturally detoxifies with UV light, oxidation, dilution -maintains toxicity in streams longer than antimycin -used extensively in this area since 1948 -molecular weight is heavier than water, sinks through deep water. -fish die within 1-3 hours of exposure -minimal affects to amphibians	-liquid formulation is bulky, requires more resources to transport to remote areas -liquid form has petroleum emulsifier -fish may smell/taste it and try to avoid - fish may avoid or recover from rotenone toxicity by breathing fresh water -maintains toxicity in streams longer than antimycin -has distinctive odor -powder form generally requires mixing slurry on site
Antimycin	-proven technique -can be contained with potassium permanganate, activated charcoal -rapidly degrades with UV light, binds to organic compounds -naturally detoxifies with every 200 feet of drop in stream elevation -non-toxic until mixed, less risk of damage resulting from accidental spill -requires less volume than other piscicides -two components, inert until mixed -fish can't smell it, can't avoid it -toxic to fish in very low concentrations -does not affect amphibians at fish killing concentrations -easily packed to remote areas by mule -easily transported by livestock -nearly odorless	-limited history of use in this area -naturally detoxifies with every 200 feet of drop in stream elevation -administered in such small quantity that proper mixing is paramount. -fish die within 4-8 hours of exposure

Thermal analyses of three lakes located in project area over the past two years indicate that the lakes experience limnetic turn over at 47^{o}F, which typically occurs near October 7th. Applying these compounds slightly before this time would provide a reasonable time buffer for natural detoxification to occur in the lakes. Furthermore, the lake waters would be 13-18 degrees greater than freezing which should provide a reasonable amount of time for natural processes to reduce the toxicity of the lake water before ice formation. It is important to note that detoxification measures will be implemented on outlet streams at the designated containment zones, until caged fish survive.

Lee et al. (1971) reported that antimycin is light sensitive and its performance can be reduced by increased light intensity. MFWP evaluated the photo penetration at one lake in order to explain the best application scenario (Table D-2). A Protomatic brand photometer was used to measure light intensity at varying depths on the hour. This analysis showed that in October, sunlight first hits Wildcat Lake at 10:00. The light intensity at this point was 1100 foot candles (fc), which represented the minimum direct light intensity throughout the day. The maximum surface light intensity occurred at 13:00 hours and was 2900 fc. During this time, measurements at various water depths determined that light intensity was reduced by 50% of the surface value at 13 feet depth, and 30% at 27 feet. Linear regression was used to predict the depth at which the light intensity was similar to the minimum surface intensity, which occurred at 10:00. The equation $y=-0.02857x+53$ revealed that 24 feet of water was necessary to attenuate the intensity to 1100 fc.

Table D-2. Photometer analysis (foot candles) of Wildcat Lake, South Fork Flathead River drainage, October 5, 2004.

	Hour						
Depth (ft)	10:00	11:00	12:00	13:00	14:00	15:00	16:00
0	1100	1900	2100	2900	2500	2100	1800
13	650	900	1200	1400	1300	1300	1300
27	370	400	670	910	1100	980	810
40	190	200	260	520	480	420	340
54	100	140	130	260	240	180	210
67	41	140	130	130	100	54	90
80	29	130	130	130	110	54	44

Based on this information, it may be beneficial to apply antimycin below 24 feet, during the period of greatest light intensity, then apply to the surface region after the sun is lower in the sky and light intensity is reduced.

The ARM rule that we cited on page D-5 of the DEIS was outdated. The correct citation is obtained from the October 2003 printing of the Montana Water Quality Act and the August 2003 printing of the Montana Surface Water Quality Standards and Procedures. The correct citation refers to ARM 17.30.6.

Appendix D (page D-12) of the DEIS should be corrected to read ...Hydrogen sulfide ***is a*** deadly gas that can be formed in the collection and treatment of municipal wastewater…

The DEIS lists the elements used in deriving Clean Water Act Section 304(a) criteria as the basis for calculating the chronic exposure values for rotenone, antimycin and potassium permanganate. EPA believes this is appropriate, but has the following corrections to be made:

In regard to acute toxicity and exposure, it appears that the DIMS uses LD5O values from the literature to estimate exposure scenarios that are highly unlikely to occur, such as drinking 12,000 liters of contaminated water in one day, as the basis for dismissing concerns about acute exposures. EPA believes it is inappropriate to use a lethal dose as the basis for reaching conclusions about public health protection. Also, the extreme exposure scenario approach to presenting the LD5O information may be misleading in a public disclosure document such as an EIS. There appears to a low amount of data with which to derive safe acute exposure levels for these chemicals.

The Montana Department of Environmental Quality (DEQ) has reviewed comments submitted by the Montana Office of the EPA dated July 29, 2004, and fully concurs with those comments. The only minor exception pertains to Human Health comment 27. Montana has not adopted the new EPA fish consumption value of 17.5 g/day. The adopted fish consumption value for calculating Human Health criteria is 6.5 g/day.

For potassium permanganate, the document does not present a proposed human health water column value. Dr. Benson has calculated a value. Based on his calculation (see Section 3.9 of this document) the water column value should not exceed 0.8 mg/L.

Add this MSDS Sheet for Potassium Permanganate

MSDS Number: **P6008** * * * * * *Effective Date:* ***07/29/03*** * * * * * *Supercedes:* ***11/22/00***

MSDS *Material Safety Data Sheet*

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

POTASSIUM PERMANGANATE, VOLUMETRIC SOLUTIONS

---

1. Product Identification

Synonyms: Permanganic acid, potassium salt solution; Potassium Permanganate 0.1 Normal (N/10) Volumetric solution; Potassium Permanganate 1.0 Normal Volumetric solution; Potassium Permanganate, DILUT-IT® Analytical Concentrate
CAS No.: 7722-64-7
Molecular Weight: 158.03
Chemical Formula: $KMnO_4$ (solution)
Product Codes:
J.T. Baker: 4677, 5651
Mallinckrodt: 5387, 6139

---

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Permanganate	7722-64-7	0.3 - 8%	Yes
Water	7732-18-5	92 - 99.7%	No

---

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

The health effects from exposure to diluted forms of this chemical are not well documented. They are expected to be less severe than those for concentrated forms which are referenced in the descriptions below.

Inhalation:
No adverse effects expected. May cause mild irritation to the respiratory tract.
Ingestion:
Ingestion of solid or high concentrations causes severe distress of gastro-intestinal system with possible burns and edema; slow pulse; shock with fall of blood pressure. May be fatal. Ingestion of concentrations up to 1% causes burning of the throat, nausea, vomiting, and abdominal pain; 2-3% causes anemia and swelling of the throat with possible suffocation; 4-5% may cause kidney damage.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Prolonged exposure can cause dermatitis and defatting. Chronic manganese poisoning can occur after ingestion of large amounts. Affects the nervous system.
Aggravation of Pre-existing Conditions:
Persons with preexisting skin disorders may be more susceptible to these substances.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. This oxidizing material can increase the flammability of adjacent combustible materials. Contact with oxidizable substances may cause extremely violent combustion.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Protect from freezing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
5 mg/m3 Ceiling for manganese compounds as Mn

- ACGIH Threshold Limit Value (TLV):
0.2 mg/m3 (TWA) for manganese, elemental and inorganic compounds as Mn
Ventilation System:
In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.
Personal Respirators (NIOSH Approved):
Not expected to require personal respirator usage.
Skin Protection:
Gloves and lab coat, apron or coveralls.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Purple solutions.
Odor:
Odorless.
Solubility:
Miscible in water.
Density:
ca. 1.0-1.6
pH:
No information found.
% Volatiles by volume @ 21C (70F):
90 (as water)
Boiling Point:
ca. 102C (ca. 216F)
Melting Point:

-2C (28F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Toxic metal fumes may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Reducing agents, flammables, reactive organic materials, metals, sulfuric acid.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Potassium Permanganate: oral rat LD50: 1090 mg/kg. Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\--

	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Potassium Permanganate(7722-64-7)	No	No	None
Water(7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
For potassium permanganate: This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: POTASSIUM PERMANGANATE SOLUTION
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: II
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: POTASSIUM PERMANGANATE SOLUTION
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: II
Information reported for product/size: 4L

15. Regulatory Information

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  --------\Chemical Inventory Status - Part 1\-------------------
--------------
  Ingredient                         TSCA  EC   Japan  Australia

Potassium Permanganate (7722-64-7    Yes  Yes   Yes      Yes
Water (7732-18-5)                    Yes  Yes   Yes      Yes

  --------\Chemical Inventory Status - Part 2\-------------------
--------------
                                                          --
Canada--
  Ingredient                         Korea  DSL   NDSL  Phil.
  -----------------------------------------------  -----  ---   -
---  -----
Potassium Permanganate (7722-64-7)   Yes   Yes   No     Yes
Water (7732-18-5)                    Yes   Yes   No     Yes
```

```
  --------\Federal, State & International Regulations - Part 1\--
--------------
                             -SARA 302-    ------SARA 313------
Ingredient                      RQ    TPQ     List  Chemical Catg.
  -----------------------------------------  ---   -----   ----
--------------
Potassium Permanganate (7722-64-7)No No      No    Manganese co
Water (7732-18-5)                  No No      No          No

  --------\Federal, State & International Regulations - Part 2\--
--------------
                                      - RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)

Potassium Permanganate (7722-64-7) 100 No         No
Water (7732-18-5)                        No         No          No
Chemical Weapons Convention:  No     TSCA 12(b):  No    CDTA:  No
SARA 311/312:  Acute: Yes    Chronic: No   Fire: Yes Pressure: No
Reactivity: No          (Mixture / Liquid)
```

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **1** Other: **Oxidizer**
Label Hazard Warning:
DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION.
Label Precautions:
Store in a tightly closed container.
Do not store near combustible materials.
Keep from contact with clothing and other combustible materials.
Do not get in eyes, on skin, or on clothing.
Remove and wash contaminated clothing promptly.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash

clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Appendix G Additional Information on Non-Target Organisms

Surveys in 2004 were conducted on 86 streams in the South Fork drainage. Tailed frogs represented 91.6% of all amphibians found in stream environments. Tailed frogs were found between altitudes of 3,560 and 7,103 feet above sea level. Tailed frogs were found in 77% of the streams (n=86) that were surveyed.

Some commenters are concerned that tailed frogs may become extinct. The 2004 surveys confirm that the species is quite ubiquitous throughout the SF drainage. These findings hold true for spotted frogs and long toed salamanders surveyed in the 75 lakes in 2004 as well (see Table G-1).

Table G-1. Summary statistics of amphibian and reptile surveys at 75 lakes in the South Fork Flathead River drainage, 2002-2004.

Species	# lakes found	Rel % of all lakes surveyed	Min elev (ft)	Max elev (ft)	Total # found	Min # found	Max # found	Mean # found
Columbia spotted frog	40	53	3,464	7,208	8,700	1	1,856	217
Pacific chorus frog	2	3	3,464	3,960	2	---	---	---
Tailed frog	7	13	5,455	7,103	19	1	11	3
Western toad	5	7	5,548	7,208	10	1	4	2
Long toed salamander	26	35	3,720	7,150	850	1	328	33
Common garter snake	1	1	---	5,951	1	---	---	---
Painted turtle	1	1	---	3,464	4	---	---	---

MFWP has initiated a comprehensive survey to describe the status and distribution of amphibians in the project area. When considering these data, the MFWP laboratory investigations, the MFWP field trials using rotenone, the exhaustive literature listing the impacts of fish toxin to non-target organisms, the impacts to non-target organisms appear to be minimal and short term.

Concerning rotenone, numerous studies indicate that rotenone has temporary or minimal affects on aquatic insects and plankton. Anderson (1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not change a great deal. Despite the inherent natural fluctuations in zooplankton communities, the application of rotenone had little affect on the zooplankton community. Cook and Moore (1969) reported that the application of rotenone has little lasting effect on the non-target insect community of a stream. Kiser et al. (1963) reported that 20 of

22 zooplankton species re-established themselves to pre-treatment levels within about 4 months of a rotenone application. Cushing and Olive (1956) reported that the insects in a lake treated with rotenone exhibited only short-lived effects. Hughey (1975) concluded that 3 Missouri ponds treated with rotenone showed little short term and no long term effect on population levels of zooplankton. The effects of rotenone on plankton were consistent with the natural variability that is characteristic of plankton populations, and re-colonization was rapid and reached near pre-treatment levels within 8 months.

Both Anderson (1970) and Kiser et al. (1963) reported that most plankter species survive a rotenone treatment via their highly resilient egg structures. In addition, parthenogenesis of some female plankters occurs, causing sexual dimorphism, which greatly increases plankton density in times of population distress. Among the aforementioned studies variation in climate, physical environment, and water chemistry would likely cause subtle differences in results in other areas.

Case studies conducted on Devine Lake in the Bob Marshall Wilderness from 1994-1996 indicate that invertebrates actually increased in number and very slightly increased in diversity following a rotenone treatment (Rumsey et al. 1997). This is supported by observations made by Cushing and Olive (1956), who reported that oligochaetes (worms) increased in number after a rotenone treatment then became stable. *Gammarus* species (fresh water shrimp), a common fish food item, were detected in Devine Lake only when fish were present. Neighboring Ross Lake, in the Bob Marshall Wilderness, is fishless and was used to measure natural insect and plankton variation during the Devine Lake treatment and evaluation. *Gammarus* species were never detected in Ross Lake, although it is fishless. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time.

Seven high altitude mountain lakes in the Flathead basin have been treated with liquid formulated rotenone. Devine Lake is a 1-acre lake located in the Bob Marshall Wilderness that was treated with Prenfish rotenone in 1994 to remove an illegally introduced population of brook trout. The pre-treatment surveys were weighted heavily toward aquatic insects and although amphibians were observed, they were not quantified (J. Fraley, MFWP, personal communication, 2001). Post treatment surveys using the same protocol sampled two unidentified tadpoles in 1995, three unidentified tadpoles in 1996, eight adult spotted frogs in 2001, and in 2002 a single adult spotted frog and over 50 spotted frog tadpoles were observed. Studies continued into 2003 and 2004 with similar results. The lake was planted once with 1,140 westslope cutthroat trout fry in 1997.

The four Jewel lakes were treated with liquid formulated rotenone in 1986 to remove rainbow trout. There were no pretreatment data on file to determine the status of amphibians. East Jewel Lake was planted with 1,324 cutthroat trout between 1986 and 1988; North Jewel was planted with 6,056 cutthroat trout between 1986 and 1992; South Jewel was planted with 4,610 cutthroat trout between 1986 and 1989. West Jewel was not directly planted as fish from South and North Jewel lakes could swim into it. In 2001, a survey was conducted along the shore of each of the 4 lakes and found 26 frogs of both the spotted and tailed variety with both adults and juveniles present. A survey of the four lakes in 2002 revealed 76 spotted frog adults, 103 juveniles, over 110 tadpoles, and a single tailed frog adult. Amphibians were present at each of the four lakes.

Whale Lake was treated with Prenfish in October 2000 to remove hybrid cutthroat trout. It was planted in 2001 with 1,246 westslope cutthroat trout, 240 of which were between 4 and 11 inches in length. A survey in July 2002, approximately 21 months after the treatment, yielded 21 salamander tadpoles, many of which had not yet emerged from their gelatinous matrix. This survey was conducted on only ½ of the lake. Numerous fish were observed feeding at the surface of the lake. In September 2002, another survey found 16 salamander juveniles and a single tailed frog adult. In addition, small trout fry approximately 1-1/4 inches long were observed in the outlet stream, indicating natural reproduction had occurred. The outlet stream was dry approximately 100 yards downstream of the lake.

Tom-Tom Lake was treated with Prenfish in October 2000 to remove a population of hybrid trout. The lake was planted in 2001 with 2,000 genetically pure westslope cutthroat trout, 500 of which were 4 to 11 inches in length. The lake was surveyed in September 2001, approximately 1 year after the treatment, and surveyors netted over 25 long-toed salamanders in both larval and adult stage, over 100 juvenile spotted frogs, and 2 tailed frogs. A survey in 2002 revealed 115 spotted frog juveniles, a single adult, 2 long toed salamander juveniles, approximately 40 eggs. Five tailed frog tadpoles were found in the outlet stream.

Wheeler Creek is the outflow stream for Tom-Tom Lake. The stream was detoxified with potassium permanganate at the mouth of the lake during treatment. In July 2001, approximately 9 months after the treatment on Tom-Tom Lake, Wheeler Creek was electrofished at four different sites for 3.18 hours of total electrofishing, and 6 adult tailed frogs, 32 tailed frog tadpoles with specimens displaying developmental stages that included no legs, 2 legs, and 4 legs were collected. Many other tailed frog tadpoles were not netted due to swift flows and their ability to make a quick escape. Although not quantified, numerous stoneflies, caddis flies and dragonflies were also observed. A replicate survey in 2002 found 58 tailed frog tadpoles at the four sites during 3.37 hours of electrofishing.

These findings suggest that amphibians, specifically tailed frog tadpoles, are able to withstand a rotenone treatment in high altitude lakes in the Flathead basin (Grisak 2003c).

Concerning antimycin, it has been extensively tested to measure its effect on non-target organisms. A compendium of study results on non-target organisms was prepared by Schnick (1974a) who concluded that laboratory studies, field trials and reclamation projects revealed that vertebrates, phytoplankton or aquatic plants exposed to antimycin at fish killing concentrations demonstrated no adverse effects either short term or long term. It has been found to be non-toxic to plankton, bottom insects, water plants and amphibians and reptiles (Walker et al. 1964). Lesser (1970) reported it was not toxic to crayfish or clams, but was to freshwater shrimp. Callaham and Huish (1969) reported that zooplankton were severely depleted but began to reappear within 6-9 days and bottom insects were not affected by antimycin. Hughey (1975) concluded that 4 Missouri ponds treated with antimycin showed little short term and no long term effect on population levels of zooplankton. The effects of antimycin on plankton were consistent with the natural variability that is characteristic of plankton populations, and re-colonization was rapid and reached near pre-treatment levels within 8 months.

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Chapter 1 Draft EIS Comments and Responses

Bonneville Power Administration sent the DEIS to the public for comments on the Proposed Action and alternatives. The DEIS was distributed to agencies, groups, individuals, and libraries in June 2004. A public review period ended on August 20, 2004.

A public meeting was held in Kalispell, Montana on July 12, 2004 to review and receive comments on the Draft EIS. These comments were all captured and catalogued. This chapter contains the written comments from letters, e-mails, and comment sheets received during the comment period for the DEIS and BPA's responses to those comments. It also contains the oral comments from the public meeting in July 2004 and telephone calls received during the comment period. Letters and comment sheets were given numbers in the order they were received. Separate comments in each letter were given separate codes. For example, letter 39 might have comments 39.1, 39.2, and 39.3 identified within its text. Comments from the public meeting were also logged. BPA prepared responses to each of these individual comments.

The chapter is organized by the sequence of letters as they were received. Because we have organized comments this way and often reference responses to other comments, please use the numerical list on the back of this page for page references. BPA's responses to the comments are in a table following the copies of the comment letters.

Table 1-1. Comment Log for Draft EIS

Comment Log No.	First Name	Last Name	Affiliation	Comment Letter Page No.	Response to Comment Page No.
SFFW-001	Barbara	Burns	Bob Marshall Wilderness Ranch	1-5	1-177
SFFW-002	Paul	Stantus		1-8	1-180
SFFW-003	Doug	Glenn		1-9	1-180
SFFW-004	Kurt	Gentry	Spotted Bear Ranch	1-10	1-181
SFFW-005	Steve	Little		1-11	1-181
SFFW-006	Joe	Kuzmic		1-12	1-182
SFFW-007		N/A	Spotted Bear Ranch	1-13	1-183
SFFW-008	Earl	Applekamp		1-14	1-183
SFFW-009	Raymond	Mehring		1-15	1-184
SFFW-010	Mark	Moser		1-16	1-186
SFFW-011	John F.	Wardell	U.S. Environmental Protection Agency - Region 8	1-17	1-186
SFFW-012	R. Mark	Wilson	U.S. Dept of the Interior, Fish and Wildlife Service	1-41	1-225
SFFW-013	Doug	Bell		1-43	1-227
SFFW-014	Chuck	Roady	F. H. Stoltze Land & Lumber Co.	1-44	1-227
SFFW-015	Christian J.	Levine	Montana Dept. of Environmental Quality	1-46	1-229
SFFW-016	Warren	Illi	Public Meeting 7/12/04, Kalispell, MT	1-50	1-233
SFFW-017	Arlen	Roll	Public Meeting 7/12/04, Kalispell, MT.	1-51	1-234
SFFW-018	Tim	Taylor		1-52	1-235
SFFW-019	Shelly	Toavs		1-53	1-236
SFFW-020	Bob	Cole		1-54	1-237
SFFW-021	Joe	Fagan		1-55	1-237
SFFW-022	Joe	Moody		1-56	1-238
SFFW-023	Richard	Tagg		1-57	1-239
SFFW-024	Dennis E.	Hoffmann		1-58	1-239
SFFW-025	Lindsay M.	Arthur		1-59	1-240
SFFW-026	Keith J.	Hammer	Swan View Coalition	1-60	1-241
SFFW-027	Joe	Moody		1-61	1-243

Comment Log No.	First Name	Last Name	Affiliation	Comment Letter Page No.	Response to Comment Page No.
SFFW-028	Fred	Wallner		1-62	1-244
SFFW-029	Dave	Williams		1-63	1-245
SFFW-030	Gordon	Johnson		1-64	1-245
SFFW-031	Amy	Stix	American Wildlands	1-65	1-246
SFFW-032	Eric	Rozell		1-67	1-250
SFFW-033	Richard	Smith		1-68	1-251
SFFW-034	Arlene	Montgomery	Friends of the Wild Swam	1-69	1-251
SFFW-035	George	Nickas	Wilderness Watch	1-76	1-269
SFFW-036	George K.	Sage		1-81	1-278
SFFW-037	Dale	Luhman		1-83	1-282
SFFW-038	Ernie	Barker	Professional Wilderness Outfitters Assn.	1-165	1-354
SFFW-039	Kirk	Gentry	Spotted Bear Ranch	1-166	1-357
SFFW-040	Clint	Muhlfeld	Montana Chapter of the American Fisheries Society	1-167	1-358

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