Appendix I

Phased Wasteload Allocation Strategy

Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area:

Volume II – Final Report

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Prepared for the Montana Department of Environmental Quality

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1.0 INTRODUCTION

There are nine centralized wastewater treatment systems in the Lake Helena Watershed:

- Eastgate Subdivision
- Treasure State Acres Subdivision
- Tenmile and Pleasant Valley Subdivisions
- Leisure Village Mobile Home Park
- Mountain View Academy
- Fort Harrison (closed)
- Evergreen Nursing Facility
- City of Helena WWTP
- City of East Helena WWTP
- Golden Estates Subdivision

These facilities are described in Appendix C and E. Total nitrogen and total phosphorus loads were estimated from each of these facilities and the loads were put into context with the loads from all other potential sources in the watershed. The City of Helena and East Helena comprise approximately 17 and 4 percent of the total nitrogen load, and 38 and 3 percent of the total phosphorus load, respectively, in the Prickly Pear Creek Watershed. Loads from the remaining facilities are negligible at the Prickly Pear Creek Watershed scale (i.e., each comprising less than 1 percent of the total load).

It has been estimated that it will be necessary to reduce overall TN and TP loading in the Prickly Pear Creek Watershed by 80 and 87 percent, respectively, to attain the interim nutrient targets presented in Section 3.2.3 of Volume II (i.e., TN = 0.33 mg/l, TP = 0.04 mg/l). To attain nutrient load reductions of this magnitude, it will be necessary to seek the maximum attainable nutrient load reductions from all significant point and nonpoint sources.

This document presents a phased plan to reduce nutrient loading from the City of Helena and City of East Helena wastewater treatment plants. A phased approach is proposed in recognition of the fact that both the Cities of Helena and East Helena have recently committed significant amounts of money to upgrade their facilities and, further upgrades to reduce nutrient loading may pose both financial and technical challenges. A phased approach is also necessary given uncertainty over the ability to attain the nutrient targets in Prickly Pear Creek (see Volume II, Section 3.2.3.1) and because potential nutrient limits to protect Lake Helena and Hauser Reservoir have not yet been identified. This phased plan also incorporates considerable flexibility through an adaptive management strategy presented in Section 4.0.

2.0 PROPOSED APPROACH

The proposed approach includes three phases, where nutrient discharge concentrations and loads will be reduced in steps. Phase I is voluntary. The goal of Phase I ("No Increases") is to limit TN and TP concentrations and loads to the existing levels (as calculated based on past performance of the two facilities) while further studies are conducted to:

- Better understand the impact of the wastewater discharges on Prickly Pear Creek,
- Evaluate current facility operations to optimize the level of treatment that can be attained with the current infrastructure, and conduct an alternatives analysis/feasibility study to determine the cost and technological requirements for meeting the nutrient targets
- Better understand water quality conditions and appropriate nutrient limits for Lake Helena and Hauser Reservoir

The goal of Phase II ("Optimization") is to begin to reduce nutrient concentrations and loads by optimizing the infrastructure that currently exists. The goal of Phase III ("Water Quality-Based Limits") is to implement the necessary actions to reach the level of treatment to meet the TP and TN targets for Prickly Pear Creek.

Concentration and load limits for the three phases and both facilities are presented in Table 2-1. It should be noted that the limits presented in Table 2-1 will likely be modified in the future in accordance with the adaptive management strategy outlined in Volume II, Section 3.2.3.1 and the adaptive management strategy discussed below.

Table 2-1. Tentative Concentration and Load Limits.

Phase	Target	City of Helena		City of East Helena	
		Limits	Percent Reduction from Current	Limits	Percent Reduction from Current
Phase I	TP Concentration (mg/l)	5.02	0%	3.6	0%
	TP Load (tons/yr)	22.2	0%	0.99	0%
	TN Concentration (mg/l)	7.7	0%	23.2	0%
	TN Load (tons/yr)	34.1	0%	6.41	0%
Phase II	TP Concentration (mg/l)	1.0	80%	1.0	72%
	TP Load (tons/yr)	8.57	61%	0.59	40%
	TN Concentration (mg/l)	4.0	48%	4.0	83%
	TN Load (tons/yr)	34.28	0%	2.37	63%
Phase III	TP Concentration (mg/l)	0.04	99%	0.04	99%
	TP Load (tons/yr)	0.34	98%	0.02	98%
	TN Concentration (mg/l)	0.33	96%	0.33	99%
	TN Load (tons/yr)	2.83	92%	0.19	97%

The voluntary Phase I concentration limits are based on current performance. For the City of Helena, the concentrations are based on monthly averages from June 2001 through January 2005 (post upgrade). For the City of East Helena, the concentrations are based on monthly averages from March 2003 to May 2005 (post upgrade). TP and TN loads are based on concentrations multiplied by a conversion factor (1.3825) and the average observed effluent flow (3.20 million gallons per day (MGD) for City of Helena and 0.20 MGD for the City of East Helena). The Phase II concentration limits are based on the best attainable level of treatment in the literature (EPA, 1997). The Phase II load limits assume design flows of 6.2 and 0.43 MGD for Helena and East Helena, respectively. The Phase III concentration limits are the TN and TP targets presented in Section 3.2.3 of Volume II. Concentration limits for all three phases are 30-day averages.

3.0 COORDINATION AND TIMING

Point sources are regulated through the National Pollutant Discharge Elimination System (NPDES) Program. According to the Montana Water Quality Act (MCA 75-5-703 (6) (b)), after development of a TMDL and upon approval of the TMDL, MTDEQ is required to incorporate waste load allocations developed for point sources during the TMDL process into appropriate wastewater discharge permits. As shown in Figure 3-1, the proposed approach has been coordinated, in time, with point source discharge permit renewals and the rule making process for adoption of numeric standards for nutrients.

In recognition of the fact that nutrient loads need to be reduced as soon as possible, implementation of the largely non-regulatory non-point source controls is proposed as the first step in the proposed approach. Although it is proposed that non-point source controls be implemented immediately, it is acknowledged that implementing non-point source controls may be an ongoing process for many years. During the initial two to three years of the implementation phase of this approach, point source dischargers are also asked to voluntarily conduct monitoring, and optimization and feasibility studies to develop a better understanding of the fate of their discharges in the receiving water bodies and to determine the technological and financial practicality of solutions to reduce point source nutrient loading (see Figure 3-1). The point source dischargers are also asked to voluntarily maintain existing TN and TP effluent concentrations and loads (i.e., no increases) during this phase.

As a parallel effort, EPA and DEQ are committed to conducting the "supplemental study elements" presented in Volume II, Section 3.2.3.2. Additionally, DEQ will proceed with the rule making process for the adoption of numeric nutrient standards. Ultimately, these two efforts will result in the selection of "final" nutrient threshold values for the waters in the Lake Helena Watershed. Upon adoption by the Montana Board of Environmental Review, they will be officially incorporated into rule. Once this is complete, the nutrient targets (see Volume II, Section 3.2.3) and associated TMDLs in Appendix A will be revised and wastewater discharge permits will be officially renewed using the revised targets (i.e., official standards at that point in time) to develop water quality based discharge limits. Point source dischargers will be provided time to make the necessary infrastructure upgrades. During this time period, point source dischargers will be expected to meet limits based on the optimization study conducted previously.

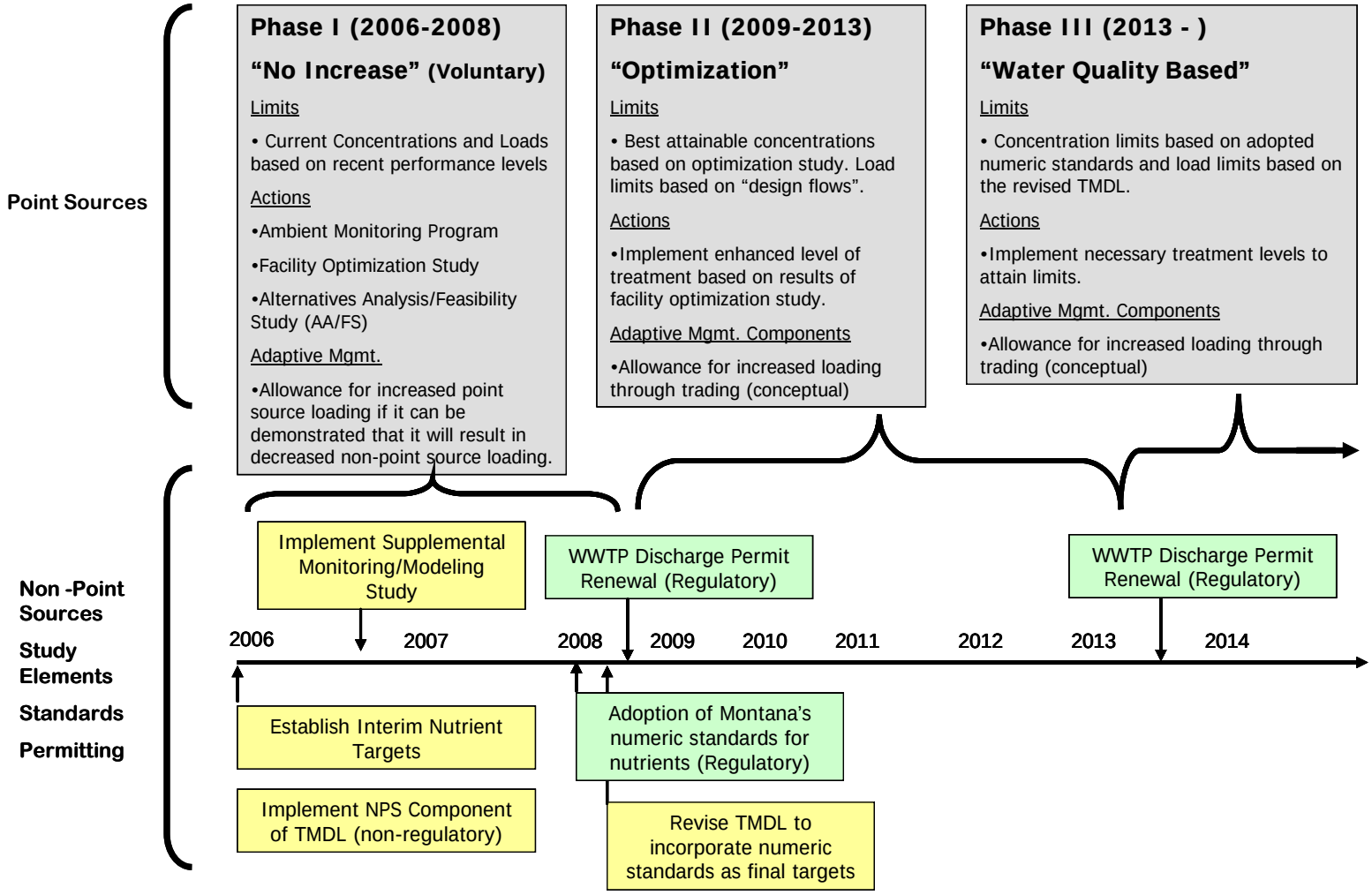

Figure 3-1. Coordinated Implementation Schedule for Point and Non-Point Source Nutrient Reduction Strategy (all dates are tentative).

4.0 ADAPTIVE MANAGEMENT

There are a number of adaptive management elements incorporated into this proposed phased wasteload allocation plan to provide a mechanism to adjust the limits and timeline based on new or improved information. For example, the Phase II concentration limits are based on treatment levels achievable with various combinations of unit operations and processes as documented in the literature (e.g., EPA, 1997). Final limits will be determined using the results of the facility optimization evaluations conducted in Phase I. The adaptive management strategy presented in Volume II, Section 3.2.3.1, addressing the nutrient targets, provides a mechanism to facilitate modification of the Phase III limits, if deemed appropriate or necessary in the future. Also, the concept of effluent trading is proposed as a means to modify the load limits in the waste load allocations, assuming that it results in an overall watershed scale nutrient load reduction. The details would have to be worked out through the MPDES permit process.

5.0 REFERENCES

EPA. 1997. Technical Guidance Manual for Developing Total Maximum Daily Loads: Book 2: Streams and Rivers: Part 1: Biochemical Oxygen Demand/Dissolved Oxygen and Nutrients/Eutrophication. EPA 823-B-97-002. Office of Water (4305). March 1997.