Granger Drain Fecal Coliform Bacteria Total Maximum Daily Load

Submittal Report

Revised November 2001

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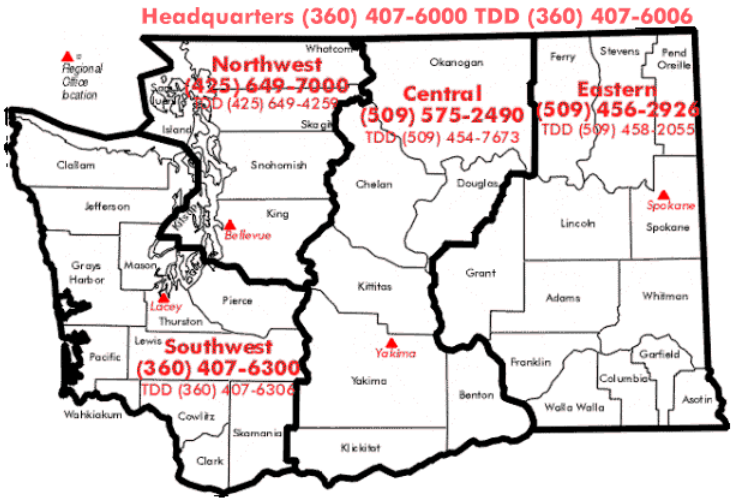

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Components of the TMDL

The Washington State Department of Ecology (Ecology) is establishing a total maximum daily load (TMDL) for the mainstem Granger Drain for fecal coliform (FC) bacteria. This TMDL will address potential impairments of beneficial uses as listed in the 1998 Section 303(d) list of the State's impaired surface waters. The five components of any TMDL as required by the Clean Water Act are defined as:

Loading Capacity: The maximum amount of FC loading that a receiving water can absorb without violating the respective State water quality standard.

Wasteload Allocation: That portion of a receiving water's loading capacity that is allocated, or attributed, to existing or potential point sources of FC pollution. The only permitted point sources presently in the Granger Drain watershed are fourteen concentrated animal feeding operations (CAFOs), which are all represented by dairies. Because the State's dairy National Pollutant Discharge Elimination System (NPDES) general permit does not allow any wastewater discharge except as a result of a greater than 25-year, 24-hour storm event, all CAFOs have wasteload allocations set to zero. There are various other dairies and feedlots within the watershed that are considered as animal feeding operations (AFOs), but they are not yet required to be permitted due to no past discharge of wastewater. All AFOs are required to have no discharges of pollution.

Load Allocation: That portion of a receiving water's loading capacity that is attributed either to one of its existing or potential non-point source of pollution or to natural background sources. As calculating these separate load allocations is exceedingly difficult due to the natural variability of FC bacteria, the TMDL will rather set load allocations for the entire mainstem Granger Drain and the two principal irrigation water supply canals that pass through the watershed. All points in such "waters of the State" will need to comply with an interim FC load allocation of 510 cfu/100 mL (commencing with the 2007 irrigation season), and a final FC load allocation of a geometric mean of 100 cfu/100 mL and a 90^{th} percentile of 200 cfu/100 mL (commencing with the 2012 irrigation season). The final FC targets are equivalent to the State Class A FC water quality standard.

Margin of Safety: The size of the margin of safety (MOS) is inversely proportional to the confidence in the data utilized in the calculations of load allocations. Three conservative assumptions were identified that each provide an inherent MOS.

Seasonal Variation: Water quality data collected in the Granger Drain watershed shows a significant pattern of seasonal variation. Although the greatest FC pollution coincides with the irrigation season (April through October); the critical condition is considered the entire year due to exceedances of the State's Class A FC water quality standard on a year-round basis.

Introduction

Section 303(d) of the federal Clean Water Act mandates that the State of Washington (State) establish Total Maximum Daily Loads (TMDLs) for surface waters that do not meet standards after application of technology-based pollution controls. The U.S. Environmental Protection Agency (EPA) has established regulations (40 CFR Part 130) and developed guidance (EPA, 1991) for setting TMDLs.

Under the Clean Water Act, every state has its own water quality standards designed to protect, restore, and preserve water quality. Water quality standards consist of designated uses, such as cold water biota and drinking water supply, and numeric standards, to achieve those uses. When a waterbody fails to meet water quality standards after application of required technology-based controls, the Clean Water Act requires that the state place the waterbody on a list of "impaired" waterbodies and to prepare an analysis called a **TMDL**.

The goal of a TMDL is to ensure that the impaired waterbody will attain water quality standards within a reasonable period of time. A TMDL includes a written, quantitative assessment of water quality problem and of the pollutant sources that cause the problem. The TMDL determines the amount of a given pollutant, called the **loading capacity**, which can be discharged to the waterbody and still meet water quality standards and, subsequently, allocates that load among the various sources. If the pollutant comes from a discrete source (referred to as a **point source**) such as an industrial facility's discharge pipe, that facility's share of the loading capacity is called a **wasteload allocation (WLA)**. If the pollution comes from a diffuse source (referred to as a **non-point source**) such as a farm, that facility's share is called a **load allocation (LA)**.

The TMDL must also consider seasonal variations and include a **margin of safety (MOS)** that takes into account any lack of knowledge about the causes of the water quality problem or its loading capacity. The sum of the individual allocations and the MOS must be equal to or less than the loading capacity.

The general purposes of this submittal document are to:

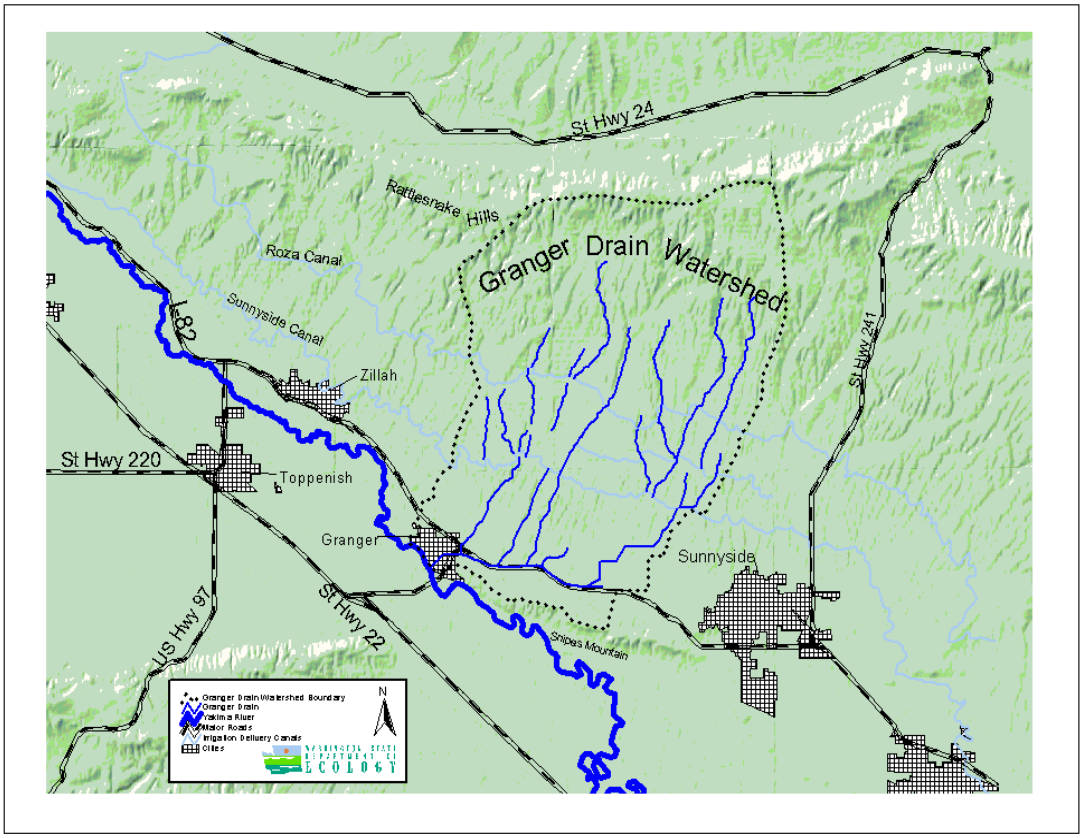
- Provide fecal coliform (FC) data from historical sampling throughout the Granger Drain watershed, especially that data collected by the Roza-Sunnyside Board of Joint Control (RSBOJC) and the United States Geological Survey (USGS);
- Provide an analysis of such data;
- Identify potential point and non-point sources of FC;
- Summarize actions recommended for meeting water quality standards and ongoing monitoring to verify whether standards are being met; and
- Fulfill requirements of the federal Clean Water Act.

A detailed implementation plan (DIP) must be developed within one year after TMDL approval by EPA and will be based on the information presented in this document.

Background

The Granger Drain watershed (Figure 1) is located in the lower Yakima River Basin and comprises approximately 18,000 acres of primarily agricultural land that is used for row crops (i.e. corn, asparagus, mint, melons, berries, flowers), permanent crops (i.e. grapes, hops and orchards), pasture/hay, and animal feeding operations (AFOs). The watershed is approximately 6.4 miles long, extending from immediately southwest of the community of Outlook westward to the town of Granger, and approximately 10.0 miles wide from the ridge of Snipes Mountain (south side) to the ridge of the Rattlesnake Hills (north side). The climate of the watershed is considered semi-arid, with an average annual rainfall of only 7 to 9 inches, which occurs principally during the months of November through March and in the form of rain. The extreme air temperatures in the area range from below zero during the winters to over 100ºF during the summers. The soils in the area are predominantly silt-loam in texture with variable depths and low in organic matter.

Figure 1. Granger Drain Watershed



During the peak growing season (April through October), the watershed is highly dependent on water diverted from the Yakima River for use as irrigation water applied to the various agricultural crops grown in the area. Such irrigation water is delivered to the Granger Drain watershed by two canals operated and maintained by Sunnyside Valley Irrigation District (SVID) and the Roza Irrigation District (RID). The diversion dams for the SVID and RID canals are located on the Yakima River at RM 103.8 and RM 127.9, respectively. The SVID canal is authorized to divert up to 1,280 cfs and serves a total of 103,570 acres throughout the Yakima River Basin. The RID is authorized to divert up to 1,200 cfs and serves a total of 72,511 acres.

Both of the irrigation water supply canals enter the watershed along its western edge and pass lengthwise through the entire watershed parallel to each other; however, the RID canal is located near the base of the Rattlesnake Mountains and north of the SVID canal. The SVID canal runs approximately half-way between the RID canal (to the north) and the mainstem Granger Drain (to the south). In addition to its diverted river water, the SVID canal also receives agricultural return flows from RID irrigated lands to the north. This additional water is suspected of being the cause for the excessive FC pollution found only in the watershed's downstream section of the SVID canal.

The mainstem Granger Drain, for purposes of the *Granger Drain Fecal Coliform Bacteria TMDL*, is described as the principal irrigation return collector drain running parallel to Interstate-82 from immediately south of the community of Outlook westward to the town of Granger. The mainstem drain then turns southwest, passes through the town and finally discharges into the Yakima River on the immediate north side of the boat ramp, which is located just to the northwest of the town's large recreational pond near the municipal wastewater treatment plant.

Historically, the excessive FC pollution within the watershed was thought connected to the numerous livestock, especially dairy cows maintained in the area. There are presently more than 40,000 dairy cows in the Granger Drain watershed. The only known point sources within the Granger Drain watershed are fourteen dairies that have been classified as concentrated animal feeding operations (CAFOs), due to past discharges of wastewater. All other sources of FC pollution within the watershed appear to be from non-point sources, which include a combination of: AFOs, manure application sites, livestock pastures, grazing lands, direct access by livestock to surface waters, failing residential on-site septic tank systems, urban runoff and wildlife.

The watershed contains a vast network of 13.8 miles of surface drains and an additional 26.9 miles of subsurface drainage, which together serve approximately 65% of the watershed's total area. Draining water from agriculture lands is necessary because it: (1) prevents groundwater levels from remaining within the plant root zones for extended periods, (2) flushes salt accumulations from the soil, and (3) aerates the soil. Draining lands promotes desirable growing conditions for crop production in areas otherwise unsuitable for agriculture (i.e., wetlands).

Applicable Water Quality Standards

Within the State, water quality standards are published pursuant to Chapter 90.48 of the Revised Code of Washington (RCW). Authority to adopt rules, regulations and standards as necessary to protect the environment is vested with Ecology. Under the federal Clean Water Act, the EPA Regional Administrator must approve the water quality standards adopted by the State (Section 303(c)(3)). Through adoption of these water quality standards, the State has designated certain characteristic uses to be protected and the standards necessary to protect these uses [Chapter 173-201A of the Washington Administrative Code (WAC)]. These standards were last adopted in November 1997.

The mainstem Granger Drain is designated as a Class A waterbody. The characteristic beneficial uses and water quality standards for this classification are listed below. State law does not establish a ranking or priority among the beneficial uses, but individual waters are expected to support all uses within the classification. This TMDL is designed to address impairments of characteristic (beneficial) uses in the mainstem Granger Drain due to high FC densities. Those uses are described as follows:

> *"Characteristic uses. Characteristic uses shall include, but not be limited to, the following:*
> *(i) Water supply (domestic, industrial, agricultural).*
> *(ii) Stock watering.*
> *(iii) Fish and shellfish:*
> *Salmonid migration, rearing, spawning and harvesting.*
> *Other fish migration, rearing, spawning and harvesting.*
> *Crustaceans and other shellfish rearing, spawning and harvesting.*
> *(iv) Wildlife habitat.*
> *(v) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).*
> *(vi) Commerce and navigation."*
>
> [WAC 173-201A-030(1)] and [WAC 173-201A-030(2)]

The State water quality standards describe FC standards for the protection of characteristic uses and describe a specific standard for FC bacteria. Class A freshwaters have been assigned a FC standard to protect the characteristic uses:

> *"fecal coliform organism levels shall both not exceed a geometric mean value of 100 colonies/100 mL, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 200 colonies/100 mL"*
>
> [WAC 173-201A-030(1)(c)(I)(A)]

The State water quality standards describe the averaging periods in the calculation of the geometric mean FC criterion:

> *"In determining compliance with the fecal coliform criteria in WAC 173-201A-030, averaging of data collected beyond a thirty-day period,…shall not be permitted when such averaging would skew the data set so as to mask noncompliance periods."*
>
> [WAC 173-201A-060(3)]

The EPA (Region 10) described the proper method for calculation of a 90th percentile FC density to correspond to the State's criterion:

> A 90th percentile, for compliance with the State FC water quality standard, shall be interpreted as the single data point that represents the largest ten percent (10%) of data points after ranking all applicable data points, from largest to smallest. For example: if a sample contains 1 to 19 data points, the 90th percentile shall be the data point with the largest value; if a sample contains 20 to 29 data points, the 90th percentile shall be the data point with the second largest value; and, if a sample contains 30 to 39 data points, the 90th percentile shall be the data point with the third largest value.

The State water quality standards specifically describe the subject of implementation related to non-point sources of pollution:

> *"Activities which generate non-point source pollution shall be conducted so as to comply with the water quality standards. The primary means to be used for requiring compliance with the standards shall be through best management practices required in waste discharge permits, rules, orders, and directives issued by the department for activities which generate non-point source pollution."*
>
> [WAC 173-201A-160(3)(a)]

Water Quality and Resource Impairments

As a consequence of monitoring that indicated the State's Class A FC water quality standard had been exceeded, the mainstem Granger Drain was included on both the State's 1996 and 1998 Section 303(d) list due to monitoring data provided the USGS (1992), which is also included in the *Granger Drain Fecal Coliform Bacteria TMDL Assessment and Evaluation* (Appendix C). Table 1 presents a description of the specific listing.

Table 1. Granger Drain Description in Section 303(d) List

Stream Name	Stream Route	1998 Waterbody ID Listing	1996 Waterbody ID Listing	WRIA	Township/ Range/ Section
Granger Drain	135.707	EB21AR	WA-37-1024	#37	10N/21E/21

Appendix C also addresses the potential sources and transport mechanisms of FC pollution throughout the Granger Drain watershed, as well as the appropriate best management practices (BMPs) for mitigation of that pollution. The public has an increased health risk after contact with the receiving water (mainstem Granger Drain) since the respective Class A characteristic uses are impaired by excessive FC concentrations.

Since 1995, monitoring conducted in the watershed has also demonstrated that the SVID irrigation water supply canal, another Class A water of the State, has typically exceeded the State FC water quality standards. To address this situation, the *Granger Drain Fecal Coliform Bacteria TMDL* also applies to the SVID canal and requires compliance with the State FC water quality standards. The SVID irrigation water supply canal is defined, for compliance with this TMDL, as that portion of the Sunnyside Valley Irrigation District canal which begins just prior to crossing Beam Road (west edge of watershed) and continuing downstream till just past Maple Grove Road (east edge of watershed). Such portion of the SVID is located in WRIA #37 under Township/Range/Section: 10N/22E/15.

Seasonal Variation

FC data collected throughout the entire Granger Drain watershed show a definite pattern of seasonal variation, which can be described as a significant increase in FC densities beginning with the month of April and lasting through the month of October. This period of increased bacterial pollution coincides exactly with the watershed's agricultural irrigation season. Specifically, the RSBOJC collected data in the mainstem Granger Drain between June 1997 and March 2001. Figures 2 and 3 demonstrate the FC geometric mean and 90^{th} percentile densities pertaining to major sampling sites (#23 and #24) that were calculated from the monthly aggregated FC monitoring data. From Figures 2 and 3, it can be observed that the period of greatest FC densities begins with the month of April (month #4) and lasts through the month of October (month #10) in the mainstem Granger Drain.

Figure 2.

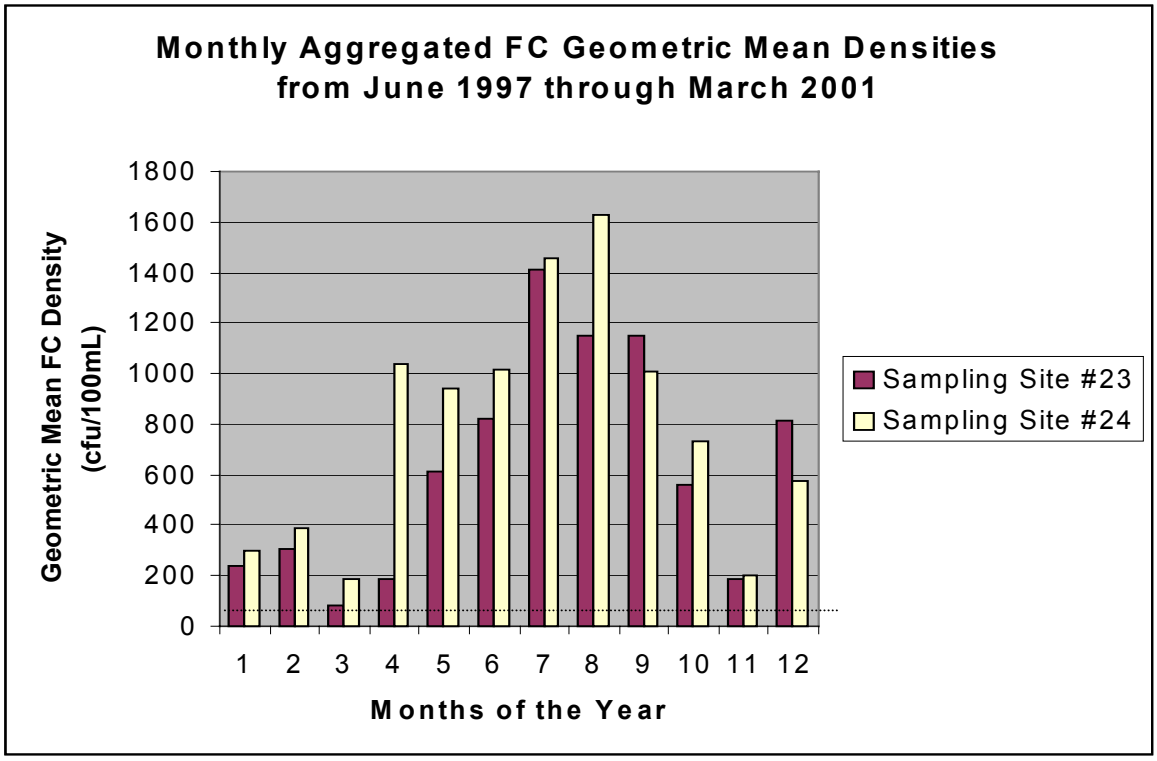
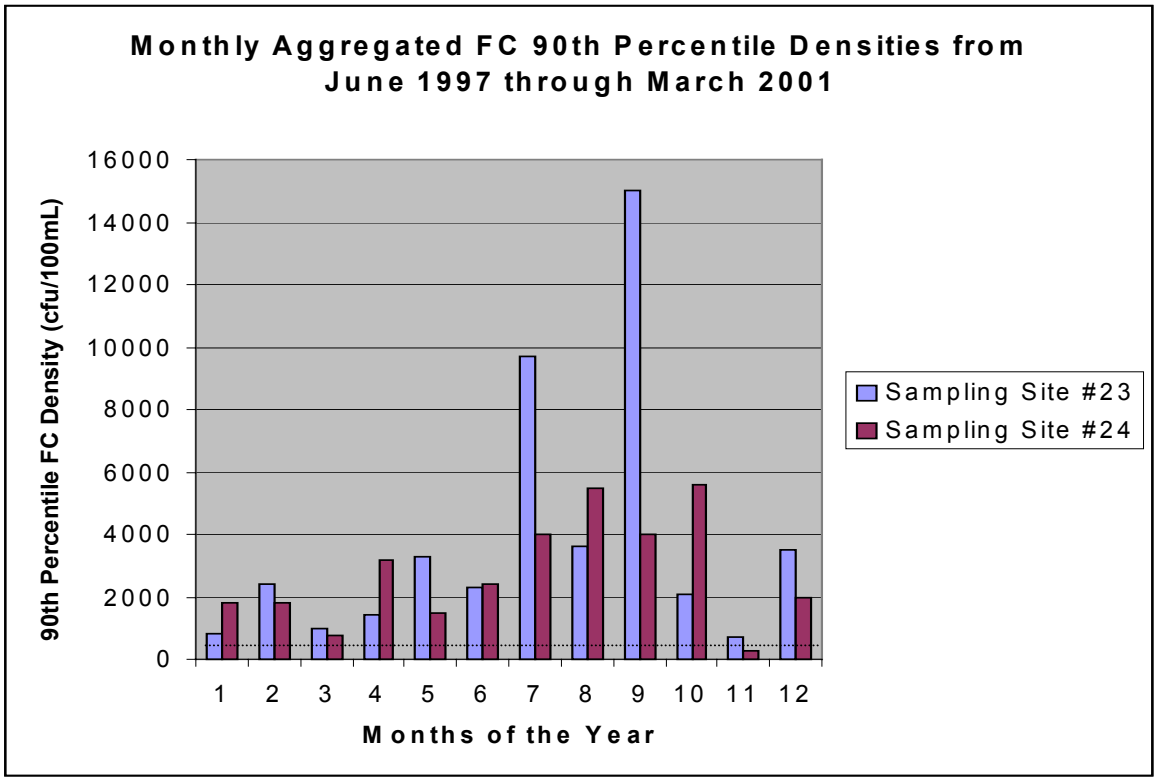


Figure 3.



A statistical analysis of the aggregated monthly water quality monitoring data, presented in Figures 1 and 2, indicated that, as a group, the irrigation months contained significantly (t-test, p = <0.00001) higher FC geometric means than the non-irrigation months. In fact, both sampling sites were observed to exceed both of the State FC water quality standards of a geometric mean of 100 cfu/100mL (the dotted line in Figure 1) and a 90th percentile of 200 cfu/100mL (the dotted line in Figure 2) throughout the entire calendar year. This demonstrates why the *Granger Drain Fecal Coliform Bacteria TMDL* is applicable to the entire year and not just to the irrigation season. The number of data points ("n") utilized in each of the aggregated months in Figures 2 and 3 are as listed in Table 2.

Table 2. Aggregated Data "n" values

	Months of the Year											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
"n" for Site #23	4	4	4	4	6	7	10	7	9	9	3	3
"n" for Site #24	5	5	5	4	10	15	13	19	12	13	3	5

Modeling Approach

Although there is seasonal variation regarding the intensity of FC pollution within the Granger Drain watershed, the Class A FC water quality standards are exceeded throughout the entire year. Therefore, the critical condition of excessive FC pollution, although predominant during the irrigation season, actually exists year-round. A statistical theory of roll-back (STR) proposed by Ott (1995) was used to estimate FC targets for the *Granger Drain Fecal Coliform Bacteria TMDL* that would allow compliance with the *Water Quality Standards for Surface Waters of the State of Washington* (Chapter 173-201A WAC). The STR relies on basic dispersion and dilution assumptions and their effect on the mean and standard deviation of sampling results at a monitoring site downstream of a source. This allows for calculating a statistical estimate of the future population of sampling results after a specific reduction factor has been applied to the existing sources of pollution. In the case of the TMDL, the STR-calculated FC target density was a geometric mean of 73.8 cfu/100 mL, which would then assure that the more difficult FC criterion of a 90th percentile of 200 cfu/100 mL would be met. The STR calculations also determined that compliance with the target geometric mean would represent a future 87% reduction in FC densities.

However, in order to prevent being more stringent than the requirements of the *Lower Yakima River Suspended Sediment TMDL* (LYRSS TMDL), the EPA (Region 10) suggested using the targets and timeline of that prior TMDL for determining the targets and timelines of the *Granger Drain Fecal Coliform Bacteria TMDL*. This recommendation is based on the documented strong correlation between suspended sediment concentrations and FC densities, as well as the similarity of BMPs utilized for controlling both of those pollutant parameters. All points in the mainstem Granger Drain, as well as all points in the SVID and RID irrigation water supply canals, are reasonably assured of meeting the State Class A FC water quality standard commencing with the 2012 irrigation season.

The *Granger Drain Fecal Coliform Bacteria TMDL* contains an interim 90th percentile FC target of 510 cfu/100 mL (effective commencing with the 2007 irrigation season), which corresponds to the 25 NTU interim target contained in the prior LYRSS TMDL. The final *Granger Drain Fecal Coliform Bacteria TMDL* FC target is full compliance with the State's Class A FC water quality standard (effective commencing with the 2012 irrigation season), which corresponds to the 7 mg/L TSS final target contained in the prior LYRSS TMDL. Statistical analysis of the historical FC data since 1992 has indicated that the above interim and final FC targets are projected to be achieved, from past reduction rates, two years earlier than each of the respective *Granger Drain Fecal Coliform Bacteria TMDL* target effective dates that were correlated to the LYRSS TMDL. This conservative time lag will allow time to respond to any problems that might occur associated with BMP implementation and represents an MOS.

Loading Capacity

Identification of the loading capacity is an important step in developing TMDLs. By definition, a TMDL is the sum of the individual allocations that are defined as portions of a receiving water's loading capacity assigned to specific point and non-point sources. The *Granger Drain Fecal Coliform Bacteria TMDL* will not establish a specific loading capacity per se, but rather will achieve similar results by control of point and non-point FC sources within the Granger Drain watershed. This method will correspondingly allow the mainstem Granger Drain to meet the State Class A FC standard.

The *Granger Drain Fecal Coliform Bacteria TMDL* utilizes a different measure than "*daily loads*" to fulfill the loading capacity requirements of the Clean Water Act. Instead, the TMDL is expressed in terms of FC density as allowed under EPA regulations [defined as "*other appropriate measures*" in 40 CFR §130.2(I)]. In this case, a density measure is appropriate due to the consistent relationship between the FC Class A water quality standard (in density units) and the receiving water quality for all receiving water flow rates. Therefore, the use of a flow rate to calculate *"daily loads"* is unnecessary. In addition, a loading capacity could require unnecessary TMDL and permit modifications as the agricultural land-uses change throughout the Granger Drain watershed.

As there also exists a significant relationship between FC and the water quality parameter of suspended sediment in the mainstem Granger Drain, the modeling approach identified both interim and final FC targets that correlate with the interim and final targets of the LYRSS TMDL already being implemented in the area. The *Granger Drain Fecal Coliform Bacteria TMDL* interim FC target is a 90th percentile of 510 fcu/100 mL, while the final FC target is full compliance with the State's Class A FC water quality standard (geometric mean of 100 cfu/100 mL, and a 90th percentile of 200 cfu/100 mL).

Margin of Safety

A requirement of a TMDL technical evaluation is a discussion of the margin of safety (MOS) to account for uncertainty in the calculated targets and recommendations. The MOS can be placed either implicitly in the assumptions, or explicitly as a separate load allocation or an additional target component. The *Granger Drain Fecal Coliform Bacteria TDML* contains the following MOS factors:

- Given the correlation between FC and TSS, compliance with the estimated LYRSS TMDL proposed final TSS concentration of 7 mg/L will significantly overshoot the final FC target of the *Granger Drain Fecal Coliform bacteria TMDL* (81 cfu/100 mL vs. 200 cfu/100 mL). This represents significant MOS;

- If the final TSS target or schedule in the LYRSS TMDL are accelerated and/or become more pristine, the likely sooner achievement of the *Granger Drain Fecal Coliform Bacteria TMDL* provides additional MOS; and

- The two-year lag time between the projected and actual FC target compliance dates in the *Granger Drain Fecal Coliform Bacteria TMDL* allows sufficient time for correcting any problems that might arise during BMP implementation of the TMDL. This provides additional MOS.

Wasteload and Load Allocations

Wasteload Allocations

The only point sources of FC pollution in the Granger Drain watershed are fourteen CAFOs, which are all dairies and covered under an NPDES general dairy permit. All of these CAFOs have their wasteload allocations (WLAs) set at zero due to the "no discharge" requirement of the *Washington Dairy Nutrient Management Act of 1998*, which only allows discharges in conjunction with greater than a 25-year, 24-hour storm event. Permits are not needed at this time for the remaining eight dairies and three small feedlots located in the Granger Drain watershed because they have not been found to discharge wastewater and therefore are not considered as CAFOs.

Load Allocations

The majority of FC pollution entering the mainstem Granger Drain is coming from watershed non-point sources and is transported by surface (overland) runoff and subsurface drainage that cannot be easily assigned individual load allocations. Depending on the season, non-point pollution discharges into either the mainstem Granger Drain, the SVID irrigation water supply canal, or both, during the different seasons of the year.

Therefore, the points of compliance for the *Granger Drain Fecal Coliform Bacteria TDML* are described as all points in the mainstem Granger Drain, as well as all points in the SVID and RID irrigation water supply canals. The RID irrigation water supply canal is defined, for compliance with this TMDL, as that portion of the Roza Irrigation District canal which begins just after crossing Beam Road (northwest edge of watershed) and continuing downstream till just past Scoon Road (northeast edge of watershed). Such portion of the RID is located in WRIA #37 under Township/Range/Section: 11E/22N/34.

Since the STR calculations determined the need to further reduce FC densities by 87%, all of the above points of compliance have been given the following load allocations that were calculated to coincide with the targets of the LYRSS TMDL:

- An interim load allocation of a 90th percentile of 510 cfu/100 mL commencing with the 2007 irrigation season; and
- A final load allocation of full compliance with the State Class A FC water quality standard (geometric mean of 100 cfu/100 mL, and a 90th percentile of 200 cfu/100 mL) commencing with the 2012 irrigation season.

Ecology will evaluate the progress, through analysis of continually updated water quality monitoring data, made toward the above goals of the *Granger Drain Fecal Coliform Bacteria TDML* at intervals of every two years. Each two-year evaluation will include a meeting of the Technical Advisory Workgroup in order to plan future BMP implementation and other activities. By the time the first TMDL evaluation is completed, Ecology will have already identified and initiated monitoring of the subsurface drainage outfalls to the mainstem Granger Drain. This will allow them to be evaluated for the degree of FC pollution, as soon as possible, and to identify those outfalls and sub-basins requiring special consideration for priority BMP implementation.

Summary Implementation Strategy

Introduction

Pursuant to the 1997 Memorandum of Agreement between Ecology and the EPA, a Summary Implementation Strategy (SIS) must be included in the *Granger Drain Fecal Coliform Bacteria TMDL Submittal Report* in order to receive approval. The SIS must present a clear, concise and sequential concept (i.e. vision statement) of how the mainstem Granger Drain will ultimately achieve the Class A FC water quality standard over time. A Detailed Implementation Plan (DIP) will be developed within one year after the TMDL has been approved, which will describe the specific implementation activities that need to be performed to achieve the TMDL FC targets. It is anticipated that implementation of the TMDL will, commencing with April 2012, return the mainstem Granger Drain to conditions that comply with the Class A FC water quality standard. The SIS complies with the federal mandate of the Clean Water Act, State laws to control point and non-point source pollution, and the 1997 Memorandum of Agreement between EPA and Ecology.

Overview

The mainstem Granger Drain has chronically violated the Class A FC standard of the *Water Quality Standards for Surface Waters of the State of Washington* (Chapter 173-201A WAC). The TMDL is a process to reduce the FC densities in the waterbody. A final (review) draft assessment and evaluation of the FC sources and transport mechanisms to the mainstem Granger Drain was completed July 2001 and is available for review at Ecology's Central Regional Office and at www.ecy.wa.gov/pubs/0110012.pdf on the internet.

Ecology and other agencies have historically attributed the excessive FC contamination to the manure produced by the numerous livestock and animal feeding operations (AFOs) within the watershed. Although the acreage utilized for dairies (the majority of AFOs) is estimated at only 17% of the total watershed's land area, such area sustains a population of approximately 40,000 dairy cows. However, FC pollution in the watershed was found to be extremely seasonal with the greatest bacterial densities always occurring during the agricultural irrigation season.

Data analysis in the *Granger Drain Fecal Coliform Bacteria TMDL Assessment and Evaluation* (Appendix C) has indicated that agricultural irrigation practices account for significant seasonal variation in suspended sediment pollution of the mainstem Granger Drain and downstream Yakima River. Thus, FC pollution was hypothesized to vary with suspended sediment concentrations since FC densities are known to adsorb strongly to fine sediment particles. Recent monitoring data has caused the historical view of FC pollution to be modified to the vast quantities of manure being applied to agricultural fields as fertilizer, especially to row crops (which are typically rill irrigated).

Review of the scientific literature reveals that a common occurrence is that as concentrations of livestock increase in a specific area, manure application rates also

increase in the fields immediately surrounding the livestock areas. This is in direct response to increased transportation costs related to the need to move greater amounts of manure to locations further away and the desire to maintain those costs at a minimum. In fact, the *Yakima Co-operative River Basin Study* (December 1978) indicated that: "Large scale confinement of livestock can cause problems with runoff water…[as] the trend toward large-scale confinement operations with a limited land base has led some people to view animal manure primarily as a waste material [not as a fertilizer material]."

For several years, significant efforts have been made to implement BMPs throughout the Granger Drain watershed aimed at improving manure management and reducing irrigated agriculture runoff. These efforts were made by the Natural Resources Conservation Service (NRCS), Washington State University Cooperative Extension (WSUCE), Farm Service Agency (FSA), SYCD and the RSBOJC. The implemented BMPs have included: careful management of irrigation water, polyacrylamide (PAM), sedimentation basins, and conversion from rill to sprinkler and drip irrigation. Since 1992, BMP implementation throughout the watershed has resulted in FC densities being reduced by just over 90% in the mainstem Granger Drain. However, there still needs to be an additional 87% reduction in order to comply with the Class A FC water quality standard.

Implementation Plan Development

The strategy to implement the *Granger Drain Fecal Coliform Bacteria TMDL* will be based primarily upon the existing efforts already underway throughout the Granger Drain watershed to reduce suspended sediment pollution via the LYRSS TMDL. The *Granger Drain Fecal Coliform Bacteria TMDL* implementation plan, whenever necessary, will expand upon the BMPs previously utilized for the control of overland runoff and will also include additional actions specifically designed to reduce FC pollution in subsurface drainage. The implementation plan will comply with the federal mandate of the Clean Water Act, State laws to control point and non-point source pollution, and the 1997 Memorandum of Agreement between the EPA and Ecology, which indicated that an SIS must be included in the *Granger Drain Fecal Coliform Bacteria TMDL* submittal report.

The SIS is an outline of the activities required for implementation of the TMDL. After the SIS has been developed, approved and initiated, a DIP must be developed and submitted to the EPA within one year after TMDL approval, which details the specific activities that will be performed to achieve the TMDL targets.

The following lists key milestones in the TMDL implementation effort:

August 9, 1999: Ecology initiated the TMDL process by conducting a historical data and literature review effort.

April 2000: Published and distributed first draft of TMDL assessment distributed to interested parties.

April 19, 2000: Gave TMDL presentation to the Yakima River Watershed Interagency Council whose membership represents the following:

- Benton Conservation District
- Benton County
- Bonneville Power Administration

- City of Yakima
- Kittitas County Conservation District
- Kittitas Reclamation District
- Kittitas-Yakima Resource Conservation and Economic Development
- National Marine Fisheries Service
- North Yakima Conservation District
- Roza Irrigation District
- South Yakima Conservation District
- Sunnyside Valley Irrigation District
- Tri-County Water Resource Agency
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- U.S. Department of Agriculture – NRCS
- U.S. Department of Army – Yakama Training Center
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Forest Service – Wenatchee National Forest
- U.S. Geological Survey
- Washington Department of Ecology
- Washington Department of Fish and Wildlife
- Washington Department of Transportation
- Washington State Conservation Commission
- Washington State University Cooperative Extension
- Watershed Information Center
- Yakama Nation – Water Resources
- Yakima County

November 30, 2000: Ecology holds internal agency kick-off meeting.

January 31, 2001: Preliminary technical analysis of data was completed.

February 21, 2001: Ecology publishes news release and fact sheet concerning TMDL.

February 22, 2001: First meeting of Technical Advisory Workgroup (TAW) held.
2nd draft of TMDL assessment distributed to workgroup members.

March 29, 2001: Second meeting held of the TAW.

April 16, 2001: 3rd draft of TMDL assessment distributed to workgroup members.

May 17, 2001: Third meeting held of the TAW.

June 17, 2001: Fourth draft of TMDL assessment distributed to workgroup members.

June 28, 2001: Fourth meeting held of the TAW.

July 17, 2001: News release published concerning the upcoming public meeting.

July 30, 2001: Published review (fifth) draft of assessment on Ecology internet site.
Newspaper display ads ordered for *Yakima-Herald Republic* and *Daily Sun News* concerning public meeting.

August 2, 2001: Public meeting held in town of Granger, which initiated the TMDL public comment period. Final (5th) draft of assessment and associated SIS distributed to interested persons that attended public meeting.

September 17, 2001: Public comment period closed.

October 18, 2001: TAW meeting prior to submittal of TMDL package to EPA for approval.

November 5, 2001: TMDL Submittal Package sent to Ecology HQ for approval.

December 1, 2001: TMDL Submittal Package projected to be sent to EPA for approval.

December 31, 2001: TMDL Submittal Package projected to be approved by the EPA.

December 31, 2002: DIP projected to be completed and submitted to EPA.

Point sources (wasteload allocations) will be addressed through reissuance or modification of National Pollutant Discharge Elimination System (NPDES) permits. The non-point sources (load allocations) will be addressed by the use of BMPs. Continued monitoring of implementation activities and water quality is essential in assessing the progress of the *Granger Drain Fecal Coliform Bacteria TMDL*.

Implementation Activities

The FC targets (interim and final) set by the *Granger Drain Fecal Coliform Bacteria TMDL* for the mainstem Granger Drain and the SVID and RID canals were based on the period of greatest seasonal FC pollution, which is the irrigation season (April through October). The NPDES permits for the watershed's permitted point source industry (dairies) throughout the watershed will be protective of the watershed since they contain a zero discharge provision. The community of Outlook is scheduled to be connected to the city of Sunnyside's wastewater treatment plant by the year 2007, emphasizing the *Declaration of Public Health Emergency* issued by the Yakima Health District on November 11, 1999.

As stated previously, the principal focus of the *Granger Drain Fecal Coliform Bacteria TMDL* will be to continue the implementation of BMPs in accordance with the LYRSS TMDL, which has been already underway in the watershed for three years. This is a very effective methodology since a significant correlation exists between suspended sediment concentrations and FC bacteria densities within the mainstem Granger Drain. The *Granger Drain Fecal Coliform Bacteria TMDL* has determined that strict compliance with the targets and timelines of the LYRSS TMDL will also result in ultimate compliance with the State's Class A FC water quality standard. The *Granger Drain Fecal Coliform Bacteria TMDL* requires evaluation, every two years, of the effectiveness of implemented BMPs in reducing FC densities during the 11-year (2002–2012) TMDL implementation plan in order to ensure adequate progress toward compliance with State Class A FC water quality standard. This strategy will allow for the development and implementation of new BMPs, as necessary, to meet the TMDL targets and timelines.

Responsible Entities, Actions and Timeline

The SYCD is will continue to promote the implementation of BMPs throughout the watershed. The RSBOJC will continue to monitor water quality throughout the watershed. Ecology will be responsible for determining compliance with the targets and goals of the *Granger Drain Fecal Coliform Bacteria TMDL*. The TAW will be responsible for evaluating the water quality monitoring data, reviewing BMP performance and determining areas of priority for BMP implementation. Table 3 presents an organization of the responsible entities, actions and timeline for the implementation of the TMDL. The information listed in Table 3 is part of the overall strategy and may change as personnel and monetary resources are better defined.

Table 3. Organization of TMDL Entities and Their Contributions

		TMDL Year											
Entity	**Contributions to be made**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
TAW	Identify future monitoring needs and funding sources, and develop strategy.	X											
TAW	Assign testing of new FC-specific BMPs including wetlands, manure spreading, and others to be determined.		X	X	X								
TAW	Complete the DIP for submittal to the EPA as a part of the TMDL		X										
TAW	Discuss results of DNA testing and subsurface drainage outfall monitoring and determine priority sub-basins.			X									
TAW	Discuss results of new FC-specific BMPs and determine appropriate locations for implementation.					X							
TAW	Determine if changes in monitoring sites, tests or frequency are needed.						X						
TAW	Review if interim FC target has been met, and if not, devise action plan.							X					
TAW	If made, implement above action plan.								X	X	X	X	
TAW	Review if final FC targets have been met, and if not, identify new timeline and BMPs needed.												X
RSBOJC	Continue to monitor water quality of the mainstem Granger Drain and the SVID and RID irrigation water supply canals.	X	X	X	X	X	X	X	X	X	X	X	X
RSBOJC	Continue application of RSBOJC water quality policy.	X	X	X	X	X	X	X	X	X	X	X	X
RSBOJC	Eliminate, as found, all sanitary outfalls to the SVID and RID canals.	X	X	X	X	X	X	X	X	X	X	X	X
RSBOJC	Monitor water quality of subsurface drainage outfalls to mainstem drain.		X	X	X	X	X	X	X	X	X	X	X
	Fund, when available, implementation of new FC-specific BMPs, BMPs related to manure												

Entity	Contributions to be made	TMDL Year											
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
SYCD	management, DNA test results, and BMPs associated with subsurface drainage.	X	X	X	X	X	X	X	X	X	X	X	X
SYCD	Extend, when needed, outreach efforts and technical assistance in Spanish and English to residents of the watershed concerning manure management.	X	X	X	X	X	X	X	X	X	X	X	X
SYCD	Design DNA testing for FC source control based upon prior results, solely dependent on grant funding.		X										
SYCD	Conduct planned DNA testing.			X	X								
Ecology	Continue dairy inspections.	X	X	X	X	X	X	X	X	X	X	X	X
Ecology	Update dairy NPDES permits, as required.	X	X	X	X	X	X	X	X	X	X	X	X
Ecology	Distribute information in Spanish and English for need to eliminate sanitary wastewater from entering the SVID and RID canals, as well as the agricultural drainage systems.	X											
Ecology	Evaluate progress in reducing FC bacteria densities in watershed.		X		X		X		X		X		X
Ecology	Evaluate if the water quality samples at points of compliance meet the interim FC target of 510 cfu/100 mL of TMDL.							X					
Ecology	Determine if the 7 mg/L TSS final target of the LYRSS TMDL is appropriate, or needs to be amended. Determine the related FC density that will be the final 90th percentile target of the TMDL.							X					
Ecology	Determine if alternate outreach efforts are needed.							X					
Ecology	Evaluate if the water quality samples at points of compliance are meeting the final FC targets of the TMDL.												X
SYCD, RSBOJC & Ecology	Continue to fund, when available, BMP implementation for controlling agricultural runoff and suspended sediment in drains according to the LYRSS TMDL.	X	X	X	X	X	X	X	X	X	X	X	X
Dairies	Continue compliance with all requirements of the Washington Nutrient Management Act of 1998.	X	X	X	X	X	X	X	X	X	X	X	X
CAFOs	Continue compliance with all requirements of their NPDES permits.	X	X	X	X	X	X	X	X	X	X	X	X
Yakima County & Ecology	Connect all of the residences within the community of Outlook to the city of Sunnyside wastewater treatment plant.						X						

The following abbreviations are used above in Table 3:

TAW =	Technical Advisory Workgroup
SYCD =	South Yakima Conservation District
SVID =	Sunnyside Valley Irrigation District
RID =	Roza Irrigation District
RSBOJC =	Roza-Sunnyside Board of Joint Control
Ecology =	Washington State Department of Ecology
TMDL =	Granger Drain Fecal Coliform Bacteria TMDL
LYRSS TMDL =	Lower Yakima River Suspended Sediment TMDL
CAFOs =	NPDES-permitted animal feeding operations
DIP =	Detailed Implementation Plan
BMP =	Best Management Practices

Targets for Estimating Compliance with Water Quality Standards

The *Granger Drain Fecal Coliform Bacteria TMDL* includes both interim and final target FC densities that pertain to all points in the mainstem Granger Drain, as well as all points in the SVID and RID irrigation water supply canals. The interim FC target is a 90th percentile density of 510 cfu/100 mL, which corresponds to the 25 NTU target contained in the LYRSS TMDL, and commences with the 2007 irrigation season. The final FC target is full compliance with the State Class A FC water quality standard, which is less stringent than a projected 90th percentile FC density of 81 cfu/100 mL that corresponds to the final 90th percentile TSS target of 7 mg/L contained within the LYRSS TMDL. The final target of the *Granger Drain Fecal Coliform Bacteria TMDL* will commence with the 2012 irrigation season.

Reasonable Assurance

The ultimate goal of the *Granger Drain Fecal Coliform Bacteria TMDL* is to meet the State's Class A FC water quality standard commencing with the 2012 irrigation season, in others words by April 2012. Ecology offers reasonable assurance that the TMDL goal will be met due to the following:

- Since 1992, past BMP implementation for mitigating the runoff of suspended sediment (in compliance with the LYRSS TMDL) from irrigated agriculture has already reduced FC densities by over 90% within the mainstem Granger Drain. Therefore, the *Granger Drain Fecal Coliform Bacteria TMDL* will require full compliance with the requirements of the LYRSS TMDL in order to assure maximum FC reduction.

- Past BMP implementation for improved manure management at dairies (in compliance with the *Washington Dairy Nutrient Management Act of 1998*) has also been responsible for significant FC reductions in the mainstem Granger Drain. Therefore, the TMDL will require full compliance with the requirements of that Act in order to assure maximum FC reduction.

- For various years, land-owners, farmers, operators and governmental agencies have all been working extremely well in cooperation to comply with the requirements of the LYRSS TMDL and the *Washington Dairy Nutrient Management Act of 1998*. Continued cooperation by those entities is expected.

- The RSBOJC implemented a water quality policy (adopted January 28, 1998) with turbidity targets that correspond to those contained in the LYRSS TMDL. The policy also contains an enforcement procedure that reduces the irrigation water supply to repeat offenders until they implement a Compliance Plan.

- The use of an interim FC target that corresponds with the 90th percentile 25 NTU interim turbidity target of the LYRSS TMDL, especially when such target date (2007) is initially projected to be met two years in advance (2005), ensures significant reasonable assurance.

- The ultimate TMDL goal of meeting the State's Class A FC water quality standard corresponds to the ultimate goal of the LYRSS TMDL (2012). Because this goal is initially projected to be met two years in advance (by 2010), represents additional reasonable assurance.

- The Granger Drain watershed has numerous smaller AFOs and "hobby farms", which undoubtedly discharge minor but varying amounts of FC pollution. Such non-point sources will be encouraged, through public outreach and technical assistance, to implement FC-reducing BMPs. The TMDL implementation plan includes a requirement for the dissemination of information in both Spanish and English to all AFOs and "hobby farms" within the watershed.

- The community of Outlook is reported to have numerous (100+) failing or non-functioning on-site septic systems. Ecology and Yakima County are committed to locate funds for sewering and connecting the community's wastewater to the city of Sunnyside POTW prior to the year 2007. Once connected, the county will become the agency responsible for the maintenance and operation of the sewer system, while the city of Sunnyside will be responsible for treating the wastewater.

- Whenever applicable BMPs are not being implemented and Ecology has reason to believe that individual sites or facilities are causing pollution in violation of RCW 90.48.080, Ecology may pursue orders, directives, permits, or civil or criminal sanctions to gain compliance with the State's water quality standards.

Adaptive Management

Every two years, the progress of the *Granger Drain Fecal Coliform Bacteria TMDL* will be evaluated by Ecology so that application of adaptive management techniques is maximized. Where planned implementation activities are not producing the required results, the source of the shortfall will be identified. If the shortfall has an apparent cause, it will be remedied through the appropriate methods and jurisdiction (e.g., dairies have implemented BMPs, whereas not all septic systems have been inspected). If the shortfall does not have an apparent cause (e.g., every required BMP has been implemented and all potential sources have been addressed), then more precise evaluations will be required to identify remaining causes/sources. Additionally, where FC sources not previously identified are discovered, they will be corrected through appropriate methods and jurisdiction.

Summary of Public Involvement

The *Granger Drain Fecal Coliform Bacteria TMDL* public comment period was open from August 2 through September 17, 2001 (45 days) and commenced with a public informational meeting that was held at the Roosevelt Elementary School on August 2, 2001, from 6-8 p.m., in the town of Granger. The public comment period allows time to solicit public input and feedback on the proposed final draft TMDL assessment and its associated SIS. Advertisements for the public meeting and commencement of the public comment period consisted of a legal ad in the *Yakima-Herald Republic* (Yakima, WA on 8/2/2001) and a display ad in the *Daily Sun News* (Sunnyside, WA on 7/31/2001). In addition, Ecology personnel participated in an hour-long radio interview in Spanish at radio station KDNA, located in the town of Granger, on August 1, 2001. Copies and affidavits for the above newspaper legal and display ads are included in Appendix A.

Stories related to the *Granger Drain Fecal Coliform Bacteria TMDL* have been published in the *Tri-City Herald* (2/22/2001), *Capital Press* (2/23/2001), *Daily Sun News* (5/18/2001 & 8/3/2001), *Yakima-Herald Republic* (8/2/2001& 8/3/2001), *Review & Independent* (8/8/2001), and the *Toppenish Review* (8/8/2001). An Ecology "Fact Sheet" summary was published on February 21, 2001 and distributed to interested persons, as well as being distributed at the later public meeting held on August 2, 2001. In addition, TMDL news releases were issued on both February 21, 2001 and July 17, 2001.

Ecology responded to all written public comments received during the stipulated public comment period of 45 days (August 2 through September 17, 2001). All such responses are collectively provided in the Responsiveness Summary, included as Appendix B of this submittal. Additionally, the final *Granger Drain Fecal Coliform Bacteria TMDL Assessment and Evaluation* is included as Appendix C after being modified to incorporate necessary changes as determined by the responsiveness summary.

Monitoring Strategy

Water quality monitoring is being conducted by the RSBOJC of the surface waters throughout the Granger Drain watershed. The sampling schedule during 1997–2001 was bi-weekly (every two weeks) during the irrigation season and monthly during the non-irrigation season. Such schedule will be reviewed annually so as to maximize monitoring efficiencies. All monitoring results will be utilized in the evaluation of whether or not the goals of the *Granger Drain Fecal Coliform Bacteria TMDL* are being met.

Where ambient water quality monitoring shows that adequate progress toward FC targets is not occurring, compliance water quality monitoring will occur. Compliance water quality monitoring will be coordinated to identify the specific source(s) of FC pollution. Sampling over time will be adjusted to locate the source by narrowing the geographic area where contamination is occurring and, thereby, focus in on the specific source of FC pollution. This strategy allows the implementation of appropriate BMPs in the specific areas of concern, thus maximizing the available resources.
The TMDL requires a minimal amount of additional monitoring in the mainstem Granger Drain to that currently being performed in order to determine if all points of compliance are meeting the interim and final FC targets of the TMDL. Recently, such an additional sampling site has been established by the RSBOJC downstream of the town of Granger, which should indicate if any FC pollution in the mainstem Granger Drain can be attributed to the town or other nearby sources. Preliminary monitoring results during the 2001 irrigation season have indicated no significant contribution of FC pollution from the town of Granger.

Potential Funding Sources

Ecology will provide, as available, funds and technical assistance to perform necessary water quality monitoring, BMP implementation and outreach efforts required by the *Granger Drain Fecal Coliform Bacteria TMDL*. Besides other actions, Ecology has guaranteed to do a maximum of 160 hours of English-Spanish translation/interpretation work during the first two years of TMDL implementation to specifically help with the large hispanic population located throughout the watershed.

The Centennial Clean Water Fund, Section 319 grants under the federal Clean Water Act, and State Revolving Fund (SRF) loans are available to fund activities by jurisdictions to help implementation of the TMDL. Non-governmental organizations can apply to be funded by a 319 grant to provide additional assistance. Ecology will work with the stakeholders to prepare appropriate scopes of work, to implement this TMDL, and to assist with applying for grant opportunities as they arise.

The Environmental Quality Incentives Program (EQIP) has been a federal cost share program available to all farms and has been distributed by the FSA throughout Yakima and Benton counties. Future EQIP funding may or may not be available.

The State has provided cost share assistance through the Washington Conservation Commission for dairies that are required by the *Washington Dairy Nutrient Management Act of 1998* to develop and implement farm plans.

References Cited

Ott, W.R. (1995) *Environmental Statistics and Data Analysis*. Lewis Publishers, New York, N.Y.

USEPA. (1991) *Guidance for water Quality-based Decisions: The TMDL Process*. April 1991. EPA 444/4-91-001.

USEPA. (1997) Memorandum of Agreement Between the United States Environmental Protection Agency and the Washington State Department of Ecology Regarding the Implementation of Section 303(d) of the Federal Clean Water Act.

USGS (1992) Surface Water Quality Assessment of the Yakima River Basin, Washington: Areal Distribution of Fecal Indicator Bacteria, July 1988. Water-Resources Investigations Report 91-4073. 34 pp.

Appendix A

Public Participation Materials

Affidavit of Publication

STATE OF WASHINGTON,
COUNTY OF YAKIMA SS

Thomas J. Lanctot, being first duly sworn on oath deposes and says that he is the Publisher of the **DAILY SUN NEWS,** a daily newspaper.

That said newspaper is a legal newspaper and it is now and has been for more than six months prior to the date of publications hereinafter referred to, published in the English language continually as a daily newspaper in the City of Sunnyside, Yakima County, Washington, and it is now and during all of said time printed in an office maintained at the aforesaid place of publication of said newspaper, and that the said Daily Sun News was on the 4th day of April, 1969 approved as a legal newspaper by the Superior Court of said Yakima County.

That the annexed is a true copy of a LEGAL PUBLICATION – Washington State Department of Ecology – Granger Drain Cleanup published in regular issues (and not in supplemental forms) of said newspaper once each week for a period of one consecutive issue(s), commencing on the 31st day of July, 2001 and ending on the day of July, 2001 both dates inclusive, and that such newspaper was regularly distributed to its subscribers during all of said period. That the full amount of the fee charged for the foregoing publication is the sum of $128.00 which amount has been paid in full, at the rate of $6.40 per column inch per insertion.

Thomas J. Lanctot

Subscribed and sworn to before me this 31st day of July, 2001.

Gena M. Hall

Notary Public in and for the State of Washington residing in Sunnyside.

GENA M. HALL NOTARY PUBLIC STATE OF WASHINGTON Commission Expires MARCH 22, 2003

DEPARTMENT OF ECOLOGY

Public Meeting for Fecal Coliform Bacteria Cleanup Plan (TMDL) for the Granger Drain

The state Department of Ecology has drafted a cleanup plan for Fecal Coliform Bacteria contamination in the Granger Drain and its watershed. The plan ("TMDL") details historical information and recommends actions to reduce bacterial contamination in order to meet state water quality standards and protect aquatic habitat.

We welcome your comments and participation.

Public comment period: August 2 through September 17, 2001

Public Meeting: **August 2, 2001**
Roosevelt Elementary School
1st and 2nd Grade Pod Area
405 Bailey Avenue
Granger, WA

The meeting *will start at* **6:00 p.m.**, with a **formal presentation** *from* **6:30 to 7:30 p.m.** We will be available to answer questions during the rest of the workshop.

You can also review the Water Cleanup Plan at:

- on the Internet, at http://www.ecy.wa.gov/biblio/0110019.html;
- by contacting Gregory Bohn, Dept. of Ecology, 15 W. Yakima Ave., Suite 200, Yakima, WA 980902 or email gboh461@ecy.wa.gov or phone 509/454-4174.

Please send written comments to Gregory Bohn ***by September 17, 2001***.

If you have special accommodation needs, please call Donna Lynch at (360) 407-6400 or (360) 407-6066 (TDD).

PUBLISH: DAILY SUN NEWS
July 31, 2001

AFFIDAVIT OF PUBLICATION

STATE OF WASHINGTON,)
)
COUNTY OF YAKIMA)

DIANE SIMS, being first duly sworn on oath deposes and says that she/he is the ACCOUNTING ASSISTANT of Yakima Herald-Republic, Inc., a daily newspaper. Said newspaper is a legal newspaper approved by the Superior Court of the State of Washington for Yakima County under an order made and entered on the 13th day of February, 1968, and it is now and has been for more than six months prior to the date of publication hereinafter referred to, published in the English language continually as a daily newpaper in Yakima, Yakima County, Washington. Said newspaper is now and has been during all of said time printed in an office maintained at the aforesaid place of publication of said newspaper.

That the annexed is a true copy of a:

PLAN (TMDL) GRANGER DRAIN,

it was published in regular issues (and not in supplement form) of said newspaper once each DAY and for a period of 1 DAY(S) to-wit; on

the 2nd day of AUGUST, 2001

DEPARTMENT OF ECOLOGY
Public Meeting for Fecal Coliform Bacteria Cleanup Plan (TMDL) for the Granger Drain

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Please send written comments to Gregory Bohn by September 17, 2001.

If you have special accommodation needs, please call Donna Lynch at (360) 407-6400 or (360) 407-6066 (TDD).

(09520948-0600) August 2, 2001.

and the such newspaper was regularly distributed to its subscribers during all of said period. That the full amount of the fee charged for the foregoing publication is the sum of $104.63

Diane Sims

ACCOUNTING ASSISTANT

SUBSCRIBED AND SWORN to before me this 2nd day of August, 2001

Letha A. Rust

NOTARY PUBLIC in and for the State of Washington, residing at Yakima

Appendix B

Responsiveness Summary to Public Comments

Steven E. George
Governmental Affairs Representative for the Hop Growers of Washington, and the Yakima Valley Dairy Federation

1. Comment: As it appears the Department of Ecology is not going through the traditional rule making process in forming this TMDL, and it does not appear to be voluntary. Through what mechanism will this TMDL be enforced?

   Response: A TMDL is not a rule, but a process in response to rules already made. The TMDL is a process required by the Clean Water Act. Voluntary participation in the development and implementation phases is sought, so that enforcement does not need to be used. The State of Washington is authorized by the clean Water Act for NPDES permits. The Department of Ecology has the legal authority and responsibility from the Clean Water Act to complete the TMDL process for all 303(d) listed pollutant parameters. If voluntary implementation of load allocations is not successful, Ecology will need to consider enforcement through applicable State regulations such as Chapter 173-201A WAC and Chapter 90.48 RCW.

2. Comment: There have been questions raised as to the classification of the drain. It has been suggested by some that when the Yakima River was reclassified to Class A from Class B in the mid 1980s, the drain issue was overlooked and not addressed. If this is the case, and in order for this TMDL to have credibility, Ecology needs to fully explore and disclose to the public how the drain's current classification came to be, and whether it is appropriate or not. Standards for one classification or the other is not the issue.

   Response: The Granger Drain was never specifically classified in WAC 173-201A-130. WAC 173-201A-120 explicitly states that "all other unclassified [not specifically classified by WAC 173-201A-130 or WAC 173-201A-140] surface waters within the state are hereby classified Class A". The drain issue was not overlooked, since Sulphur Creek (another drain) received special conditions and is listed in WAC 173-201A-030. Additionally, the water quality standards are very much the issue since no waterbody would even be considered for a TMDL if it had not first exceeded its applicable standards.

3. Comment: Evaluating the fecal coliform improvement every two years over the course of the project appears to be an acceptable approach regardless of the target standard. I would recommend that a review of this data be conducted by the Granger Drain FC advisory committee on a two year interval as well.
   Response: Ecology is planning to analyze such data every two years and to convene the Technical Advisory Workgroup for review of that data and for planning future actions. The Technical Advisory Workgroup is a vital part of the TMDL process and will be included to the greatest extent possible.

4. Comment: There is concern within the Dairy industry about the definition of the CAFO (Confined Animal Feeding Operations). Zero discharge from a dairy producer's total lands is discriminatory when that standard is not enforced on adjacent farmland owned by someone else. The dairy industry requests that a CAFO be that area associated with the cattle feeding and milking operations only. Additional farmland producing forage for the dairy operation should not be included in the CAFO definition.

   Response: The definition of a CAFO as specified in the TMDL document is taken from federal law (40 CFR Part 122 Appendix B). The inclusion of manure storage and land application areas has also been established in recent court cases: *Concerned Area Residents for the Environment v. Southview Farm* (34 F. 3d. 114), *Community Association for the Restoration of the Environment v. Henry Bosma Dairy* (65 F. 2d. 1129) and *Community Association for the Restoration of the Environment v. Sid Koopman Dairy et al.* (54 F. Supp. 2d. 976, 981). In addition, land application areas are specifically included as the responsibility of dairy producers who will be held liable for discharges of dairy nutrients to waters of the State (RCW 90.64.030). With regard to adjacent farmland not operated by dairies, no field regardless of agricultural use is exempt from polluting, and Ecology does not discriminate in its enforcement procedures. Non-CAFO facilities are only exempt from NPDES permitting.

5. Comment: Subsurface drainpipes have been identified as a possible source of contamination, and Ecology has questioned why this is happening. However, it appears the drains are operating as intended. Operational changes should be discussed fully with the irrigation districts and conservation districts. These drains were established for a specific purpose at a specific time. If they are now contributing to an environmental concern, it may take a detailed analysis to come up with new operational plans.

   Response: There have been direct discharges of wastewater from many sources that Ecology has documented. Additionally, the SYCD has indicated that contaminated water is commonly found to enter subsurface drainage through decrepit manholes and aeration vents. New operational plans are not needed for mitigating FC contamination, but rather the implementation of BMPs to prevent the entrance of polluted wastewaters.

6. Comment: Comprehensive review of potential sources of fecal coliform pollution should be a central part of the TMDL process. Ecology has been lax on including potential non-agricultural sources of contamination.

   Response: The final draft document did review all known and potential sources of fecal coliform pollution in the watershed. Such sources were listed in various sections of the document, including page ix of the Executive Summary where "hobby farms", septic tanks, wildlife and urban runoff were indicated as the non-agricultural potential sources. However, it is not known how significant all of these contributions are and we hope to determine what potential sources are present so they can be mitigated through implementation of BMPs.

The tremendous reduction in FC densities since 1992 (>90%) due to BMPs directed at dairies and agricultural runoff of suspended sediment indicates that the principal sources of FC pollution were appropriately identified, although there are other sources.

7. Comment: Sampling the full length of the drain system should be fundamental.

   Response: Ecology agrees that sampling of the entire full length of the drain system would be the best case scenario, but limited funds do not allow this. The sampling sites utilized by the RSBOJC since 1997 were selected as being representative of agricultural-affected water quality within the drain. However, the TMDL requires an additional sampling site in the mainstem drain downstream of the town of Granger, which has already been selected and monitoring started. Such additional monitoring is needed to verify if urban sources of fecal coliform pollution are present in addition to the agricultural pollution.

8. Comment: Identifying sources of contamination through DNA analysis should also be fundamental so that resources are not allocated to the wrong place.

   Response: DNA testing is already being performed. The SYCD, using EPA and Ecology funding, has already begun a DNA project for the mainstem Granger Drain. The >90% decrease in fecal coliform densities in the watershed since 1992 shows that past BMP implementation on known sources was correctly identified. Ecology does not wish to duplicate or allocate resources in the wrong place either.

9. Comment: Public outreach and education will be necessary. Ecology should secure resources for this activity and put an implementation plan together. Other sources may be able to assist Ecology through grant or cost share programs if they are established.

   Response: Ecology acknowledges that public outreach and education will be a necessary and valuable component for successful implementation of the TMDL. The draft Summary Implementation Strategy (SIS) indicates such importance and has established specific timelines and projects for disseminating information to the public. It is also hoped and desired that other sources will assist Ecology in such efforts. There are competitive grants available for this purpose that we can incorporate into the detailed implementation plan.

Board of Supervisors
South Yakima Conservation District

1. Comment: The district strongly agrees that the water quality in the Granger Drain needs additional improvement. As you know, we are actively working with growers and dairies in the watershed to help them implement BMPs and have done so for many years. The district supports other efforts that help achieve increased clean-up. Unfortunately, as far as we can see, the TMDL-setting process for fecal coliforms in Granger Drain has not aided clean-up efforts.

Response: Ecology recognizes the valuable and extensive work the SYCD has made in implementing BMPs throughout the watershed. The submitted TMDL in itself does not clean up polluted waters but establishes a process from which to develop plans to be implemented to assist cleanup. The process includes development of a Summary Implementation Strategy (SIS) that is fully developed into a Detailed Implementation Plan (DIP) after the TMDL is approved by EPA. Implementation actions are the only actions, which will aid clean-up efforts.

2. Comment: The *Lower Yakima River Suspended Sediment TMDL* set clear goals based on the best available data. The risk of DDT exposure was quite real, since people swim and fish in the Yakima River. And the TMDL found ways to minimize monitoring costs by correlating DDT to suspended sediment and thus turbidity. In contrast, the *Granger Drain Fecal Coliform Bacteria TMDL* sets goals based on outdated and inappropriate regulations, requires unnecessary monitoring, and seems to apply a command-and-control approach to a non-point problem.

   Response: The goals of the *Granger Drain Fecal Coliform Bacteria TMDL* have been clearly based on the best available data (1997 through year-2000 data collected by the RSBOJC). Even though there are no documented cases of exposure to either of these, the risk from fecal coliform (FC) contamination is just as real as DDT exposure. The *Lower Yakima River Suspended Sediment TMDL* identified ways to minimize monitoring because of a correlation between turbidity and DDT concentrations but this correlation is not as effective when compared to DDT human health criteria.

   The *Granger Drain Fecal Coliform Bacteria TMDL* does minimize monitoring costs by limiting the points of compliance to the mainstem Granger Drain and the SVID and RID irrigation canals, even though a few additional sites will be required to more adequately locate FC sources. The replacement of FC analyses, as suggested by the comment, is unwarranted as testing for FC is not as expensive as testing for DDT. The approach to be utilized by Ecology with all TMDLs is the same. The approach stipulates that if FC reductions are not produced by voluntary actions, then Ecology will have to require actions at specific sites.

3. Comment: The goal of the Granger Drain TMDL is to reach Class A standards. Class A standards were intended to assure citizens of this state that their waters are in "excellent" condition. These standards were intended to apply to waters with spawning habitat and swimming, boating and other recreational activities that may result in full immersion. None of these conditions apply to Granger Drain. The TMDL goal was set by regulatory oversight when the standards were first developed – not by sound data.

   Response: The TMDL sets goals that represent the actual classification of the affected waterbody. Since the Granger Drain is presently classified as a Class A waterbody, then that is what must be used in the TMDL. There are two additional considerations. The Granger Drain discharges directly into the Yakima River where such recreational activities occur, and Ecology cannot allow the discharge of polluted water into a recreational area. And, State regulations require that "all

activities which result in the pollution of waters from non-point sources shall be provided with all known, available, and reasonable best management practices". This last requirement is irrespective of any waterbody classification, so even if the Granger Drain were classified as a Class B waterbody (the alternative to Class A), there would still be the requirement to apply the identical BMPs to the sources of fecal coliform pollution within the watershed.

4. Comment: According to the report, no new BMPs will be needed to reach the Granger Drain TMDL goal, since suspended sediment-reducing BMPs appear to be sufficient to reduce fecals as well. Existing monitoring adequately tracks the effectiveness of BMPs, as demonstrated by the conclusions of the TMDL regarding on-site dairy practices. Existing monitoring of both turbidity and fecals also provides the data needed to evaluate the fecals/turbidity relationship. Fecals monitoring at additional sites on the sub-drains is unnecessary as long as the current rate of improvement continues.

   Response: The combination of suspended sediment and dairy BMPs were responsible for the improvement in fecal coliform bacteria densities. The TMDL document only suggested that compliance with the prior TMDL's goals would allow compliance with the goals of the Granger Drain TMDL: there is no certainty that "no new BMPs will be needed". Turbidity was previously used as a surrogate for measuring DDT and the relationship was never intended to last throughout the TMDL duration. FC, on the other hand, need no comparable surrogate testing parameter as they can be easily measured directly and relatively inexpensively. Additional monitoring sites are needed to evaluate the potential FC source of the town of Granger and other sources not originally contemplated, nor required, by the *Lower Yakima River Suspended Sediment TMDL*. Any additional monitoring for FC in the sub-basins should not be considered unnecessary, but rather necessary to determine the FC sources of highest priority, as well as the changing relationship between turbidity and FC.

5. Comment: On page 56, the report states "However, if any mainstem Granger Drain subsurface drainage outfall indicates excessive pollution, additional upstream monitoring will be required in order to identify the sources of such FC pollution and BMPs will need to be implemented to mitigate those sources." Identifying site-specific sources of pollutants is an essential approach for point sources, but seems counterproductive for non-point sources of fecals. How will Ecology possibly deal with issues like workload, fairness, and prioritizing when literally thousands of landowners may all be sources? It is especially disturbing that Ecology and EPA would prefer this approach for the Granger Drain when the past few years have seen such dramatic improvements in water quality – primarily through voluntary BMPs, cost-share programs, and locally-led enforcement.

   Response: Ecology and EPA are not advocating a dramatic command-and-control approach. The best approach is to continue voluntary implementation similar to that of the previous TMDL with additional focus on education and outreach to encourage implementation. However, Ecology may need to require BMP implementation at specific non-point sources that refuse to voluntarily implement

BMPs, especially since no locally-led enforcement organization is present in the watershed. The identification of specific sources of pollution, irrespective of whether they are point or non-point sources, is never counterproductive. This approach is another way in which Ecology is minimizing monitoring. As for prioritizing pollution control, Ecology does that every day. In fact, the TMDL process is the principal way Ecology prioritizes non-point pollution control.

6. Comment: Our perception of the risk of fecal coliforms in the Granger Drain differs from Ecology's for three reasons: (a) the relatively poor correlation of fecals to disease-causing organisms. As described beginning on page 9 of Ecology's Setting Standards for the Bacteriological Quality of Washington's Surface Water, "In 1972, the USEPA initiated a series of studies at marine and freshwater bathing beaches. These studies were conducted to try to respond to criticisms that had developed regarding their earlier swimming studies. The result suggested that FC was a poor indicator of swimming-related illness." (b) if most of the fecals in the water are from livestock, the prevalence of disease-causing organisms decreases even further; and (c) people do not swim, boat, or fish in the Granger Drain. Incidental contact does occur, but it has far less potential for exposure than full-immersion activities. Swimming in the Yakima River, which is a real concern, is more appropriately addressed through a bacterial TMDL for the lower Yakima – with data that allows a numerical evaluation of the degree of risk for various locations and accounts for the non-conservative nature of bacteria.

   Because of these reasons, the District believes that Class B standards are more appropriate to Granger Drain than Class A standards. Once Class B standards are met, we would shift our focused efforts to other, high-priority areas such as Sulphur Creek. The Granger Drain watershed would not be excluded from district activities, but would no longer be a high priority. Therefore, in the summary implementation strategy, SYCD involvement in the TMDL should not be indicated past year eight in any of the tasks, since, according to Ecology's statistical projections, Class B standards will be met in that year.
   Response: While the EPA is indeed shifting away from fecal coliform bacteria as the best indicator of disease-causing organisms, the present State of Washington water quality standards include FC. The State is considering new bacteriological standards, but it is possible that the new standards may not be adopted. The EPA studies that you refer to indicated that E. coli, a subset of FC bacteria, was the best indicator in freshwater. Therefore, testing for FC automatically includes E. coli. bacteria. In fact, in the Granger Drain watershed, bacterial testing determined that practically all of the FC found is E. coli. Thus, FC is still an excellent an indicator of disease-causing organisms for the Granger Drain TMDL.

   The most important thing to remember is that the mainstem Granger Drain is presently considered a Class A waterbody. It also discharges into the Yakima River, another Class A waterbody, whose characteristic and beneficial uses must also be protected at the point of discharge of the mainstem Granger Drain. Ecology hopes that the SYCD will continue its successful work in the Granger Drain watershed; however, Ecology also understands the need to work on higher priority issues in the future.

7. Comment: The emphasis on subsurface drains does not make sense. The major drains within the Granger Drain system may flow through surface ditches or buried pipe, or they may switch from surface to buried and back again as needed. It is inappropriate to call a drain "subsurface" simply because it enters the mainstem through a buried pipe, when it may surface higher in the system and serves essentially the same purpose as a "surface" drain. Further, these collector drains are already known and mapped. Sunnyside Valley Irrigation District has the maps. The summary implementation strategy should not identify the SYCD as the entity responsible for complete mapping of all subsurface drains and their outfalls.

   Response: There have been verified various direct discharges of manure contaminated surface water into the subsurface drainage systems, therefore it is imperative that these systems be evaluated. Ecology agrees that they essentially serve the same purpose as "surface" drains, however, they may require special BMPs. Ecology will conduct an in-field survey of the subsurface drainage systems, as soon as possible, to determine which ones should be considered as a "surface" drain, and which ones should not.

8. Comment: In the strategic implementation strategy, one responsibility listed for SYCD and Ecology is to "Install new FC-specific BMPs according to TAW recommendations and results of DNA testing." SYCD works with landowners to implement BMPs. The district does not actually "install" any BMPs. This item should also be qualified by adding "If the suspended sediment BMPs are shown to be insufficient to meet targeted goals…" It would also be helpful to emphasize the flexibility needed to assure BMPs are effective. Implementing BMPs is not a one-size-fits-all approach. The district offers a shopping list of alternatives because each site and landowner's needs vary.

   Response: Ecology has modified the summary implementation strategy (SIS) according to the suggestions above. Ecology understands that flexibility is needed, and that is why the SIS includes significant evaluation of BMP effectiveness and why the continued expertise that the SYCD has is further desired. Ecology also understands that the SYCD does not actually install BMPs, but it is one of the local agencies that has been making available funding and technical assistance for some BMP implementation.

9. Comment: Since high environmental and analytical variability is present in bacterial sampling, determining whether or not a specific regulatory threshold has been met can be somewhat problematic. The assessment should include, where available, measures of variability of the fecals data used by the assessment (for example, relative percent differences between field replicates, or differences in geometric means between randomly selected groups of samples from one sampling effort.) A discussion in the assessment of the implications of fecals variability would assist in future monitoring efforts.

Response: There is the potential for great environmental variability, not only from season to season, but even from hour to hour. That is why the water quality standards include both a FC geometric mean and 90th percentile component. A geometric mean is utilized to measure average bacterial density rather than the typical arithmetic average calculation, due to the logrithmic function of bacterial populations. The additional use of a 90th percentile also allows adjustment for the high environmental variability of bacterial population. Another aspect regarding the high variability of bacterial analyses, is that the geometric mean and 90th percentile values should be made on the largest number of data possible, so as to eliminate the short-term high variability of the data. The State water quality standards do not allow for any other variability of bacterial dynamics.

10. Comment: In the implementation phase of the TMDL, we hope that Ecology will use the success of the suspended sediment TMDL to build on – instead of depart from. SYCD staff will work hard to encourage landowners in the Granger Drain watershed to implement BMPs, thanks to the recently funded Ecology grant for our proposal. Our goals somewhat differ from Ecology's, but surely a great deal of work can be accomplished in the next few years.

Response: The draft TMDL document was extremely explicit to indicate that the TMDL would be, and was always planned to be, based on the success of the *Lower Yakima River Suspended Sediment TMDL* and of the progressive work the livestock industry has performed. That is why the goals of both TMDLs were calculated to coincide so well. Ecology will not depart from the previous success of the previous TMDL and looks forward in supporting the SYCD's ongoing successes to improve water quality in the mainstem Granger Drain.

Larry Gadbois
Environmental Protection Agency, Region 10

1. Comment: The text at the top of page 6 gives a good rationale for choosing fecal coliform from among the water quality parameters that are out of compliance, namely that BMPs for fecal coliform would be the same ones to address other parameters. The document states that "this cascading positive effect on other 303(d) pollutant parameters suggests that an orderly succession of TMDLs (1st = suspended sediment; 2nd = FC bacteria, etc.) …" This document would benefit with a clarifying discussion that the Lower Yakima TMDL applies to all points within all tributaries and drains of the lower Yakima. That clarification would make it more clear to the reader that the Granger Drain FC TMDL is the second TMDL to apply throughout the watershed, the first TMDL being the Lower Yakima, which is inclusive of this same Granger Drain watershed.

Response: Ecology agrees completely, and has included a short discussion on page 6 based on the above comments, which more clearly indicates that the *Granger Drain Fecal Coliform Bacteria TMDL* is the second TMDL to be implemented throughout the Granger Drain watershed.

2. Comment: The second paragraph on page 26 discusses dairy-related discharges "that do not actually enter the mainstem Granger Drain during the irrigation season, but rather that discharge directly into the SVID canal." With the monitoring and points of compliance defined elsewhere in the document, these discharges into the SVID canal will be allowed much higher discharge limits than elsewhere. The SVID discharges will benefit from dilution by flow within the SVID canal prior to sampling their effluent. However, dischargers to the mainstem Granger Drain via subsurface drainage system outfalls will have to meet the discharge standards prior to any dilution credit.

   Response: Ecology has modified the document, wherever necessary, to clarify the situation. In general, the points of compliance for the Granger Drain TMDL shall be "All points in the mainstem Granger Drain" (which includes all the sites where subsurface drainage and sub-basin tributary surface waters enter the mainstem Granger Drain) "as well as all points in the SVID and RID irrigation water supply canals" (which include all the sites where subsurface drainage and sub-basin tributary surface waters enter those canals). This new language should eliminate the differential treatment between various points of compliance.

3. Comment: Many places in the subject document state that overland runoff from agricultural fields is hypothesized to be a principal transport mechanism. Compliance monitoring, however, does not sample this source of fecal coliform pollution, except post-dilution at the downstream sampling site in the mainstem Granger Drain. Thus it is not clear that this water would have to meet water quality standards, like subsurface drainage does, at the point of discharge. Earlier drafts of this document made explicit statements that overland runoff, subsurface drainage system water, and water in the SVID and RID have been determined by Ecology to be waters of the State and subject to the Class A standards throughout. That point is not clear in this document, especially in regard to compliance points identified in this document. The final Lower Yakima TMDL evaluation report stated "the mouths of all tributaries and drains, and all points within all basin and drains will comply." A comparably clear statement needs to be added to the Granger Drain TMDL, and corresponding compliance points established. That will then achieve the desired objective implied in the statement on page 34, i.e. "in order to assure equal treatment of non-point sources throughout the entire Granger Drain watershed."

   Response: Ecology has modified the *Granger Drain Fecal Coliform Bacteria TMDL* so as to clearly indicate that the points of compliance are "all points in the mainstem Granger Drain, as well as all points in the SVID and RID irrigation water supply canals". Rather than monitor the potential of numerous discharge points of overland runoff and subsurface drainage, Ecology will monitor several points in the mainstem Granger Drain in order to track the FC pollution derived from the various sub-basins of the watershed. In this manner, the finite availability of monitoring resources can be prioritized to maximize sampling efficiency. Those sub-basins that indicate the greatest post-dilution FC densities will then be given priority status for BMP implementation. If after such BMP implementation, the FC densities are

not reduced sufficiently, then specific monitoring will be conducted back upstream the sub-basin to identify the source(s) of FC pollution for further actions.

4. Comment: There are a number of statements in the document comparable to the one on page 36 which states "in support [of] the above interim target, an analysis of the historical FC densities indicated that the FC 90th percentile densities (episodes of worst-case pollution) have always been the most difficult to control". That statement is not consistent with the following statement on the next page, namely "the greatest improvement has been with the FC 90th percentile densities, which have decreased 71% since 1995. The FC geometric means have only decreased 14% during that same time". The EPA supports the idea of an interim target which is consistent with the Lower Yakima TMDL, which also was 90th percentile-based. However, statements in this document regarding the 90th percentile being the most difficult to control should be reconsidered in light of the SVID data.

   Response: Ecology agrees and has modified the document, as the original wording was not clear enough. The wording was changed to "the FC 90th percentile densities (episodes of worst-case pollution) have always been the most difficult to control in the mainstem Granger Drain."

5. Comment: Page 50 discusses load and wasteload allocations and groups the discharges into three categories: CAFOs, which are assigned a wasteload allocation of zero; subsurface drainage systems, which are assigned interim and final load allocations; and, other types of non-point sources such as AFOs and septic tanks, which are assigned a load allocation of zero. The document identifies irrigation-induced overland runoff as a principal transport mechanism. In the categorization scheme outlined above, this runoff would be "other types of non-point sources" and assigned a load allocation of zero. This is inconsistent with the rest of the document and should be clarified.

   Response: Ecology has modified the document, whenever necessary, to indicate that overland runoff will be included with subsurface drainage systems as a transport system for excessive amounts of FC pollution, but will not be assigned a load allocation. Instead, FC pollution form these sources will be controlled through BMP implementation and monitored of "all points in the mainstem Granger Drain, as well as all points in the SVID and RID irrigation water supply canals".

6. Comment: Page 50 states "Other types of non-point sources of FC pollution such as AFOs and septic tanks, will be given a load allocation of zero because they are required to have no discharge of pollutants at any time to the waters of the State, including the mainstem Granger Drain". A reference as to why AFOs are required to have no discharge of pollutants should be provided.

   Response: Ecology agrees and has modified the document. The following reference has been included into the document: RCW 90.48.080 *"It shall be unlawful for any person to throw, drain, run, or otherwise discharge into any of the waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharged into such waters any organic or inorganic matter*

that shall cause or tend to cause pollution of such waters according to the determination of the department, as provided for in this chapter." Also refer to the additional citation in the response to comment #7, below.

7. Comment: Page 51 states that the Granger Drain watershed has numerous smaller AFOs and "hobby farms". "These non-point sources will be encouraged, through public outreach and technical assistance, to develop and implement nutrient management plans, as well as to fence stream-banks to prevent direct access by livestock to the tributaries of the mainstem Granger Drain." This statement raises two questions: First, if AFOs and hobby farms are assigned a load allocation of zero (page 50, last paragraph), what reasonable assurance is available that they will achieve a load allocation of zero? Second, I believe this is the first mention of "the tributaries of the mainstem". These should be included when the points of compliance sections are revised.

   Response: Ecology has modified the document to indicate "as well as to fence stream-banks to prevent direct access by livestock." The reasonable assurance that AFOs and "hobby farms" will achieve a load allocation of zero is through WAC 173-201A-160(3)(c): "Activities which contribute to non-point source pollution shall be conducted utilizing best management practices to prevent violation of water quality standards. When applicable best management practices are not being implemented, the department may conclude individual activities are causing pollution in violation of RCW 90.48.080. In these situations, the department may pursue orders, directives, permits, or civil or criminal sanctions to gain compliance with the standards."

   The tributaries to the mainstem Granger Drain are all required to meet water quality standards; however, the points of compliance for the TMDL will only include "all points in the mainstem Granger Drain, as well as all points in the SVID and RID irrigation water supply canals". Due to finite resources, Ecology has decided that BMP implementation throughout the watershed will assure that the mainstem Granger Drain meets water quality standards. Sporadic monitoring of the watershed's tributaries will be conducted in order to assure that sub-basins of excessive FC pollution are found and given priority for BMP implementation.

8. Comment: Page 52, Margin of Safety states "the requirement that the mainstem Granger Drain and all of its subsurface drainage outfalls meet the conservative interim and final *Granger Drain Fecal Coliform Bacteria TMDL* FC targets represents a significant MOS." There are several issues associated with this statement of margin of safety. First nowhere else in the document has the 90th percentile interim target been identified as conservative. EPA supports the its use as an interim target, but it is not a margin of safety. Secondly, the final target is the state standard, not a lower number, so there is no margin of safety in the final target.

   Response: Ecology has modified the document to eliminate the referenced MOS.

9. Comment: Page 52, Margin of Safety, second bullet which relates to evaluation of progress every two years. This is not normally considered as providing a margin of safety, and should be removed.

   Response: Ecology has modified the document to eliminate the referenced MOS.

10. Comment: Page 52, Margin of Safety, last bullet. This bullet related to assuming no die-off of bacteria is the only valid margin of safety factor in this section.

    Response: Ecology agrees and will retain the referenced MOS.

11. Comment: Page 53, last paragraph. The document discusses how the FC targets in the Granger Drain TMDL should correspond to a TSS that meets the requirements of the Lower Yakima TMDL. That is appropriate to point out, and compliance with the Lower Yakima TMDL is a requirement of this TMDL. In the event that the Lower Yakima TMDL is revised in the future, this document states "if the new final FC density is greater than 200 cfu/100 mL then a new final compliance timeline may need to be established for meeting the State's Class A FC water quality standards". Current analysis indicates that they will have a similar progress towards compliance. Changes to the *Lower Yakima River Suspended Sediment TMDL*, however, does not need to trigger a change in the Granger Drain TMDL. They are for different contaminants, and both must be met. If the targets or schedule in the Lower Yakima TMDL are accelerated and/or become more pristine, this provides additional margin of safety and a likely sooner achievement of the Granger Drain TMDL. If the targets or schedule in the Lower Yakima TMDL are delayed and/or allow more contamination, then the Granger Drain TMDL becomes more of the driver for BMPs in the watershed.

    Response: Ecology agrees and will include an additional MOS based on the above wording. In addition, all references in the TMDL document to the final FC target have been changed to clearly indicate that the final target, for the 2012 irrigation season, is complete compliance with the State Class A FC water quality standard. This is the final target, even if the *Lower Yakima River Suspended Sediment TMDL* final target is changed from 7 mg/L TSS to a less stringent value.

Onni Perala
Chief Engineer, Roza Irrigation District

1. Comment: Beginning with the executive summary, page ix, line 6: What is your definition of a hobby farm? From a regulatory standpoint, this is something that needs definition. Is a hobby farm determined by size or by the crop return or some other factor(s)?

   Response: For the purposes of the Granger Drain TMDL, "hobby" farms are those facilities, which are run on a part-time basis with off-farm income being the principal income for the owner/operator. Such farms typically have relatively few animals and very little cropland, but may have several acres of pasture. Such

facilities can have any combination of various types of animals (i.e., horses, cattle, sheep, llamas, goats). Any animal facility or farm operated commercially is not considered a "hobby" farm.

2. Comment: Page 1, line 3. It would seem that the 80 to 90% figure would be based on flow levels of the 1980's. With the USBR operating to meet higher target flows at Parker, and with the irrigation improvements made in the last decade, that percentage could be expected to have decreased. It might be well to check with Chris Lynch to verify this assertion.

   Response: The 80 to 90% figure was taken from a 1999 USGS report, as indicated in the TMDL document. It is used only to give a historical perspective on the degree of agricultural use of the lower Yakima River flows.

3. Comment: Page 3, figure 2. Is this the entire Granger Drain watershed that is consistently talked about throughout the report? Subsequent sections seem to address different sub-basins in the watershed. There seem to be different areas addressed in the irrigation and non-irrigation seasons. To better explain this we suggest you show on a map or combination of maps:
   a. the 62 square mile drainage area,
   b. the area contributing to the data sampling point from 1992 or areas if different in irrigation season and non-irrigation seasons,
   c. the contributing drainage area for the 1995 season, and
   d. the contributing drainage area for the 1997, 1998, 1999 and 2000 season if different from the irrigation season.

   Response: Figure 2 is a draft map that was included in the TMDL document. The final map was not yet ready at publication time, and will be included into the final report. The final map will indicate the watershed as comprising 48 square miles, rather than 62 square miles. The entire Granger Drain watershed contributes to all of the years in question, even during both the irrigation and non-irrigation seasons.

4. Comment: Pages 15, 16, 17, 27, 35, 36 and 60. The equations show coefficients for the various terms to four or five decimal places. This is what the computer generates, however, it implies an accuracy level that is not justifiable.

   Response: Since the formulas are for estimation purposes, all of the numbers and coefficients will be rounded off to two significant decimal places. Doing this will have no significant effect on the conclusions made by the report.

5. Comment: Page 16, the equation for the graph suggests that using more land for pasturing animals will reduce the concentration of FC in streams. If this be true, then pastures with streams to which cattle have access would be suggested as a non-source and would tend to reduce or dilute FC concentration. Later statements in the report conflict with this thought.

   Response: The formula does indeed imply that increasing pastures lands should result in decreased FC densities in the sub-basin surface waters. This is presumed

to be due to a buffering effect of vegetation for removing FC from overland runoff prior to that runoff entering downstream surface waters. In the case of cattle having direct access to streams, there would be no buffering effect. This direct access is a source of FC pollution from livestock and has been documented by Ecology. That is why later in the TMDL document it is specifically stated that direct access should be prevented.

6. Comment: The equation for figure 5 on page 17 has terms x, y and z. You define x and y. What is term z? Based on the narrative, we deduce that the z term is sprinkler-irrigated acreage. The graph equation as shown says that if the x and y terms were to equal zero, there would be a negative concentration of FC. Sprinkler irrigation operated correctly yields little or no return flow. There would be no return flow runoff to dilute the FC concentration. This equation is misleading, so either the term should be removed from the equation or the graph removed from the report.

   Response: The term z was unfortunately left out. Ecology will modify the figure to include the term z and its definition, which is "sprinkler irrigation acres" as you have deduced. The equation indicates that if the terms x and y were zero, there would not be a negative FC density until there were 645 acres of sprinkler irrigation. A negative FC density would not be immediately achieved, as the comment suggests. Ecology agrees that when properly operated, sprinkler irrigation yields little or no overland runoff. The equation is not misleading, as sprinkler irrigation does produce significantly less runoff thus reduced FC pollution, especially when properly operated.

7. Comment: Page 18, line 10. The report states that "the amount of rill irrigation acres supports the assumption that such irrigation method produces excessive overland runoff of both suspended sediment and adsorbed FC bacteria." Where in this report have you defined excessive runoff of both suspended sediment and adsorbed FC bacteria? We find no calculation of suspended sediment or FC bacteria loads in the entire report. We suggest you consult with someone more knowledgeable on irrigation methods, such as Bob Stevens, WSU Extension Service, when correcting this statement.

   Response: We agree that the word "excessive" should be deleted, as no other irrigation method should produce runoff when properly utilized. The TMDL document will be edited to delete the word "excessive". We will check with Dr. Stevens though, regarding your concerns with the association between FC densities and suspended sediment concentrations.

8. Comment: Page 18, line 12. The report states that "sprinkler irrigation acres probably indicated that such an irrigation method produces less overland runoff, and is typically associated with crops that act as a buffer strip to diminish sediment/FC densities in whatever runoff exists." The crop most often sprinkler irrigated is orchard, which is neither planted for nor considered a buffer strip. Even with a grass cover crop, an orchard would not necessarily be considered a buffer. However, eighty acres of orchard with a grass cover crop could be a mighty effective buffer.

We suggest you consult with someone in the valley more knowledgeable on irrigation methods and cropping patterns when you correct this statement.

Response: We agree that the word "strip" should be deleted, as a "buffer strip" is a specific BMP that is purposely planted for mitigating overland runoff. The TMDL document will be edited to delete the word "strip" with reference to orchards.

9. Comment: Page 18, line 22. The report states "FC bacteria are present in manure and that manure is produced and concentrated at dairies and feedlots." How do cattle concentrate bacteria? They produce FC bacteria in high concentrations, but do not concentrate the bacteria.

Response: The TMDL document's use of the word "concentrated" may lead to unwarranted confusion. Therefore, the above statement will be modified to "FC bacteria are present in manure, which is produced in large quantities at dairies and feedlots".

10. Comment: Page 18, line 27. The report presents no data to support the significance of dry manure placed on fields as a source of FC in the runoff. At best, this is a hypothesis supported by literature. How do you explain the early results from Bob Stevens showing no difference between runoff from land with and without manure?

Response: The comment is correct, in that it is a hypothesis supported by literature review. Experiments actually conducted in the area under controlled situations would be very beneficial and expected to be performed under the SIS, which outlines activities to be conducted in the future. Ecology communicated with Dr. Stevens after receiving the comment and was told that the "data was not finalized", although the early results are as the comment indicates. A final report will be sent to Ecology when all data analyses and conclusions have been made. Dr. Stevens also stated that no matter what the results, more studies will be needed to make verifiable conclusions.

11. Comment: Page 24, last sentence. Because the statement is based on 1995 monitoring results, would it not be more correct to say that the need for the new BMP needs to be checked with more recent data?

Response: Ecology will modify the sentence to replace the word "will" with the word "may". This small change signifies that more recent data will need to be reviewed.

12. Comment: Page 30, line 18. The report states "sampling site #24 … represents the end of purely agricultural discharges into the mainstem of the Granger Drain." This assumes that there is no contribution from Outlook. Do we know that? This seems to conflict with remarks on page 57.

Response: Ecology will modify the sentence to replace the word "purely" with the word "predominantly". The impact of FC pollution from Outlook has not been determined and will need to be addressed with further studies.

13. Comment: Page 31, line 36. We suggest that tables 28 and 29 showing total animals has an error for sub-basin 7. This in turn would suggest that the factor of 4.5 times as many dairy cows is also in error.

    Response: No error exists, although some confusion is acknowledged. We will modify the applicable section of page 31 to include a better explanation that the 4.5-as-many-dairy-cows comparison is actually between tables 18 and 29. These tables actually show the difference in animal numbers due to the fact that the northern areas of certain sub-basins discharge into the SVID canal during the irrigation season, and then into the Granger Drain during the non-irrigation season.

14. Comment: Page 35 and 59. The log FC densities vs. log TSS concentrations equation on page 35 has an R-squared value of 0.40 after removing outliers, indicating that the log TSS explains about 40% of the variability in log FC. Page 59 says that an 84% reduction in FC is still needed. It does not seem that the prospects of achieving 100cfu/100 mL are high when the *Lower Yakima River Suspended Sediment TMDL* is achieved, assuming that it will.

    Response: The *Lower Yakima River Suspended Sediment TMDL* presently requires a 7 mg/L TSS 90th percentile target to be met commencing with the 2012 irrigation season. Such TSS target correlates to a FC density of 81 cfu/100 mL. In comparison, the final 90th percentile FC target of the *Granger Drain Fecal Coliform Bacteria TMDL* is actually 200 cfu/100 mL, which correlates to a TSS concentration of 22 mg/L. Therefore, we have a high expectation that the goals of both TMDLs will be reached. However, the above equation only explains 50% of the variation in FC densities, so meeting the TMDL goals is only a projection at the present time. The TMDL document stipulates that continued evaluation of more recent data, at two-year intervals, is required to assure that the goals of the *Granger Drain Fecal Coliform Bacteria TMDL* will be met.

15. Comment: Page 35, lines 3 and 10. What were your criteria for removing outliers? These should be noted. Is there an explanation for the result? How can you assume that similar outliers will not occur in the future monitoring results? We believe that outliers should remain in the regression unless there is strong justification to exclude them.

    Response: Outliers were selected based upon general statistical practice and were considered as those points that were located more or less than 3 stadard deviations from the mean of a normalized distribution (those that occur less than 99% of the time). Outliers can be caused by a variety of abnormal circumstances in sampling conditions and/or analysis. Ecology assumes that future outliers will occur; however, we agree that leaving the outliers in the data set may be warranted, due to the extreme natural variability of FC densities. In fact, doing so results in an interim FC target (510 cfu/100 mL) that is slightly more stringent than the previous interim FC target (520 cfu/100 mL).

16. Comment: The second statement on page 56 and the first statement on page 61 do not deliver a consistent message. On page 61 you state that the significant

relationship between total phosphorus and FC is well-known and is typically associated with overland runoff. Yet on page 56, an 85% decrease in TSS with a 67% decrease in FC is asserted to be coincidental.

Response: Both statements are true and deliver a consistent message. The percent reductions in FC and TSS stated on page 56 were labeled "coincidental" since the *Granger Drain Fecal Coliform Bacteria TMDL* has yet to be initiated. However, the use of the phrase "coincidentally resulted in a 67% decrease in FC densities" may be confusing in its meaning. The TMDL document will be modified to replace the prior phrase with "helped to reduce FC densities by 67%. Regarding the statement on page 61, total phosphorus is another pollution parameter that is similarly associated (adsorbed) to suspended sediment, just like FC bacteria.

17. Comment: On page 57, upstream points on the Granger Drain were sampled twice a month from 1997 through 2000 irrigation seasons and once monthly in 2001.

Response: The TMDL document only covers up through the 2000 non-irrigation season data, so Ecology will insert the word "currently" into the affected sentences. Ecology will utilize all applicable data when it becomes available, and will note any differences in sampling procedures.

Dr. Robert Stevens
Washington State University – Cooperative Extension

1. Comment: I am concerned about the differentiation being made between surface drains and "subsurface" drains. As we have discussed in the past, I don't believe that there is a large amount of tile drainage in the watershed. Therefore, I believe what you are calling subsurface drains are simply portions of drains that are currently piped and they may not be piped in other areas of the sub-basin. I believe that the same BMPs and actions are needed on all drains whether piped or open.

Response: Ecology agrees that the majority, if not all, of the subsurface drainage in the watershed is not from tile drains, but rather from the underground piping of surface water runoff. The TMDL document has been modified to indicate such situation. However, Ecology still envisions the potential for certain specific BMPs that are typically applicable only to "subsurface" drainage. There have been situations where agricultural waste streams were directly connected to subsurface drainage and thus not visible and easily located. However, Ecology agrees that the majority of BMPs will be the same for both piped or open drainage systems.

2. Comment: You discuss the need for more monitoring to meet the TMDL for the mainstem of the Granger Drain. However, you do not talk about how this

monitoring will be accomplished. If DOE has a plan for accomplishing this monitoring, I believe it should be included in the plan (SIS).

Response: The SIS is a summary of the actual plan to implement the TMDL. The actual details of the plan have yet to be completely worked out, and will need to be finalized by the Technical Advisory Workgroup during the first year of the TMDL. A document labeled as a Detailed Implementation Plan (DIP) will be prepared that will contain all of the monitoring details. Such document will be sent to EPA within one year after TMDL approval.

3. Comment: I agree that the BMPs for sediment reduction will go a long ways towards meeting the FC goals on the Granger Drain. However, it is important that we continue to look at additional BMPs that impact FC loading so we will have alternatives to be used if sediment control does not meet the FC goals. I think that your document should place more emphasis on the need to understand the flow of FC from livestock across the landscape and into the drainage system. A better understanding of the mechanism of survival and movement would help us minimize the impact on the environment.

Response: Ecology agrees with the comment about the importance of alternative BMPs in case further sediment reductions do not meet the goals of the Granger Drain TMDL, as projected. The SIS indicates that such alternatives need to be tested and evaluated. Experiments to develop a better understanding of the details of such transport mechanisms would be very helpful and should be detailed by the TAW throughout the implementation phase of the TMDL.

Appendix C

Granger Drain Fecal Coliform Bacteria TMDL Assessment and Evaluation

May be found on Ecology's publications website at

http://www.ecy.wa.gov/biblio/0110012.html