COLLABORATIVE TMDL FOR *ESCHERICHIA COLI* (*E.COLI*)

BERRIEN COUNTY & CASS COUNTY, MI

I. INTRODUCTION

The *Escherichia coli* (*E.coli*) Total Maximum Daily Load (TMDL) has been established for the following surface water bodies in Berrien and Cass Counties:

- St. Joseph River –as identified in the EGLE's ***TMDL for E.coli for the St. Joseph River, Berrien County, Cass County September, 2003***

This TMDL listing addresses approximately thirty-two (32) miles of the lower St. Joseph River from the Lake Michigan confluence in Morrison Channel upstream to the Michigan/Indiana state line. The TMDL reach is on the Section 303(d) list established in September, 2003.

The affected use is for "Partial and total body contact recreation" at these locations. The impaired designated uses addressed by this TMDL are total and partial body contact recreation. The designated use rule (R 323.1100 of the Part 4 rules, WQS (Water Quality Standards), promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended) states that this water body is to be protected for total body contact recreation from May 1st to October 31st and year-round for partial body contact recreation. The target levels for these designated uses are the ambient *E. coli* standards established in Rule 62 of the WQS as follows:

R 323.1062 Microorganisms.
Rule 62. (1) All waters of the state protected for total body contact recreation shall not contain more than 130 E. coli per 100 milliliters, as a 30-day geometric mean. Compliance shall be based on the geometric mean of all individual samples taken during 5 or more sampling events representatively spread over a 30-day period. Each sampling event shall consist of 3 or more samples taken at 2 representative locations within a defined sampling area. At no time, shall the waters of the state protected for total body contact recreation contain more than a maximum of 300 E. coli per 100 milliliters. Compliance shall be based on the geometric mean of 3 or more samples taken during the same sampling event at representative locations within a defined sampling area.

Rule 62. (2) All surface waters of the state protected for partial body contact recreation shall not contain more than a maximum of 1,000 E. coli per 100 milliliters. Compliance shall be based on the geometric mean of 3 or more samples, taken during the same sampling event, at representative locations within a defined sampling area.

The target for sanitary wastewater discharges is:
Rule 62. (3) Discharges containing treated or untreated human sewage shall not contain more than 200 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 5 or more samples taken over a 30-day period, nor more than 400 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 3 or more samples taken during any period of discharge not to exceed 7 days. Other indicators of adequate disinfection may be utilized where approved by the department.

The targets for this TMDL are 300 *E. coli* per 100 milliliters (mL) expressed as a daily maximum load and concentration from May 1st to October 31st (i.e., daily target) and 130 *E. coli* per 100 mL as a 30-day geometric mean, expressed as a concentration (i.e., monthly target). An additional target is

the partial body contact standard of 1,000 *E. coli* per 100 mL as a daily maximum concentration year-round. Achievement of the total body contact daily maximum target is expected to result in attainment of the partial body contact standard.

II. PROCEDURE FOR IDENTIFYING AND PRIORITIZING BEST MANAGEMENT PRACTICES (BMPS) CURRENTLY BEING IMPLEMENTED FOR THE TMDL IN THE URBANIZED AREAS WITHIN THE JURISDICTIONAL BOUNDARY OF BERRIEN AND CASS COUNTIES. *(Q.86)*

The level of detail in identifying and prioritizing BMPs to address the *E. coli* TMDL in Berrien and Cass Counties varies with the extent of local involvement, stakeholders, and the level of involvement of local governing institutions. Implementation of a procedure to identify and prioritize BMPs will be as follows:

1. Berrien and Cass Counties will continue its involvement with the Berrien / Cass National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Group for Stormwater Management and cooperate with those municipalities and agencies developing a collaborative plan to address the regional issue of the *E. coli* TMDL in the St. Joseph River such as the Southwest Michigan Planning Commission (SWMPC).
2. Berrien and Cass Counties will also work with local & regional stakeholder groups which are involved in the ongoing work with the St. Joseph Watershed Management Plans to identify BMPs to implement within economically feasible implementation parameters.
3. Berrien and Cass Counties will review the existing Watershed Management Plan (WMP) to determine which BMPs this plan has identified to address the *E. coli* TMDL which is evaluated in the WMP.
4. Berrien and Cass Counties will review the existing *E. coli* TMDL adopted by the Michigan Department of Environment, Great Lakes and Energy (EGLE) in September, 2003 for any recommended BMPs.
5. The above mentioned TMDL document will also be used to assist in prioritizing BMPs to address the *E. coli* TMDL on the identified sub-watersheds or sections of the St. Joseph River which are in the Urbanized Area of Berrien and Cass Counties.
6. Berrien and Cass Counties will cooperate with the municipalities and others (as identified) to revise this TMDL procedure to assure it can be realistically implemented. This will be done at least once per permit cycle.
7. Once a BMP is implemented it will be reviewed at least once a permit cycle to determine effectiveness. Or, if it is an administrative BMP if updates or revisions will be necessary.
8. Criteria for review, updates, or revisions of a BMP will be completed by year three (3) of a permit cycle.
9. Any changes in identification of BMPs or prioritization of BMPs will be reported in a scheduled progress report during a permit cycle.

III. LIST OF PRIORITIZED BMPS CURRENTLY BEING IMPLEMENTED DURING THE PERMIT CYCLE TO MAKE PROGRESS TOWARDS ACHIEVING A LOAD REDUCTION. *(Q.87)*

There are several best management practices (BMPs) available to reduce *E. coli* in waterways and surface waters of the State. They can generally be divided into two (2) groups: **source control and pre-storm pipe drainage reduction**.

As its name implies, **source control strategies** have the goal of reducing pollution at the source. They can involve both structural and non-structural BMPs and many times, they can be more cost-

effective than pre-storm drainage reduction strategies. Examples of source control strategies for *E. coli* reduction currently being implemented by Berrien and Cass Counties and which they have some control over are:

Table 1. Source Control Strategies

BMPs or Strategies currently in place	Tasks	Targeted TMDL
Illicit Discharge Elimination Program (IDEP)	Outfall sampling, source tracking, dry weather screening, video / TV of drains, smoke / dye testing	*E. coli*
Runoff reduction	Use of green infrastructure to transport stormwater, e.g., bioswales, porous paving, rain gardens, infiltration basins.	*E. coli*
***On Site Sewage Systems (OSSS) Program**	Educational programs, inspections, information for repair and replacements as administered by the County Health Department	*E. coli*
Pet waste management	Educational programs, pet waste disposal products at county parks	*E. coli*
Storm sewer maintenance / cleaning	Catchbasin cleaning, street sweeping, road kill pickup	*E. coli*
Low Impact Development (LID)	LID Ordinances, practices for new developments	*E. coli*
Wildlife / waterfowl management	Population control, especially geese, ducks at county/city parks with lake or river frontage.	*E. coli*

*For more information on OSSS go to the following website links:
http://bchdmi.org/environmental_inspections/septic
http://www.vbcassdhd.org/environmental-health/water-septic-inspection/

For more information on Beach Monitoring go to the following website links:
http://bchdmi.org/environmental_inspections/surfacewater
http://www.vbcassdhd.org/environmental-health/beach-monitoring/

The above table is also prioritized with the order they are listed. If this priority changes when the table is reviewed during the permit cycle, or before the first progress report of this permit period, then the table will be revised and an updated table with the new priority ranking will be submitted with the progress report.

The **Pre-Storm Pipe drainage reduction BMPs or Strategies** are those activities which involve the use of more structural controls to reduce bacterial loadings. This can be achieved by many methods such as intercepting a site's stormwater runoff and using physical or biological BMPs to effect pollutant removal rates. These removal rates can vary greatly depending on the literature researched but can range from 20% up to 100%, again dependent on many natural setting variables. Examples of current practices for pre-storm pipe drainage are the following listed in Table 2. Pre-Storm Pipe Drainage:

Table 2. Pre-Storm Pipe Drainage

BMPs or Strategies currently in place	Tasks	Targeted TMDL
Dry Detention Basins	UV Light exposure, settling, infiltration	*E. coli*
Wet Detention Basins	UV Light exposure, settling, biotic predation	*E. coli*
Bioswales/bioretention	UV Light exposure, settling, infiltration, drying	*E. coli*
Vegetated Filter strips	Filtration, infiltration	*E. coli*
Riparian buffers	Exclusion from stream, drains or rivers, filtration, infiltration	*E. coli*
Constructed wetlands	UV Light exposure, settling, infiltration, biotic predation	*E. coli*
Infiltration catch basins, trenches/swales	Infiltration	*E. coli*

As other BMPs or strategies are identified and implemented, or are already being implemented, they will be added to this list and reported during a scheduled progress report submitted for NPDES MS4 permit during the permit cycle.

IV. MONITORING PLAN FOR ASSESSING BMP EFFECTIVENESS CURRENTLY IMPLEMENTED, OR TO BE IMPLEMENTED, IN MAKING PROGRESS TOWARDS ACHIEVING TMDL POLLUTANT LOAD REDUCTION. *(Q.88)*

It is well established by many sources that monitoring a riverine system is not an effective means to determine if best management practices are effective. There are too many variables to consider, such as weather conditions, temperature, time of year the sampling occurs, upstream conditions and the simple fact that a temporal based sampling method is just not accurate. Another factor is that sampling for E. coli does not truly provide a basis for a problem, this is just an indicator species. To be truly effective there must be a cost-effective method to determine host source. Basically, is it human or animal, if animal what animal, domestic or wild?

Modeling to determine progress toward achieving the lowering of *E. coli* levels will only be done:

1. If there is an existing model made for the reach requiring quantitative data or results.
2. If a grant is obtained to create such a model for quantitative results.
3. If it is economically feasible and sustainable.

Berrien / Cass MS4 members will take the following approach to meeting the TMDL goals. First the Counties will continue to work with other communities and entities within the St. Joseph River' s Lower Watershed to monitor the overall health of these watersheds in the Urbanized Areas.

Second, the Counties will review data collected by the Berrien County Health Department and Van Buren / Cass District Health Departments at public beaches in Berrien & Cass Counties. Each beach is sampled from three (3) separate locations at a frequency of five (5) times per month. The Counties, or members with public beaches in the Urbanized Areas, will quantify the number of swimming advisories posted during the sampling season.

Each Berrien / Cass County MS4 member will select two (2) outfalls or points of discharge within the mapped TMDL *E. coli* watershed, and collect at least two (2) monitoring grab samples during the five (5) year permit period. Table 3 includes a list of sampling points for all members, note that none of the Village of Edwardsburg points are within the TMDL watershed. The *E. coli* data will be recorded

and analyzed to attempt to equate characteristics of the drainage district with the *E. coli* levels recorded. If there is an issue with the data being high, then source tracking methods may be used to differentiate the *E. coli* as being from a human or animal source. If a selected point is found to be below the 1,000 *E. coli*/100 mL partial body contact recreation value, a new point will be identified for sampling.

Table 3. Outfall and Points of Discharge Sampling Points

Member	Outfall ID	Latitude	Longitude	Type	Receiving Water Source
Berrien County Drain Commissioner	099	42.117660	-86.421313	Outfall	Barnes & Hamilton Drain
	576	42.096084	-86.414177	Outfall	Natural Water Course
Berrien County Road Commissioner	RT1910	42.019636	-86.444909	Outfall	Big Meadow Drain
	NT1307	41.865442	-86.241773	Outfall	Dowagiac River
Cass County Road Commissioner	HT2802	41.834600	-86.185500	Outfall	Unnamed Wetland
City of Bridgman	BGC10911	41.938573	-86.56224	Outfall	Unnamed Tributary
	BGC1907	41.930747	-86.569182	Point of Discharge	Wetland
City of Buchanan	MC32	41.827814	-86.358160	Outfall	McCoy Creek
	MR6	41.82416	-86.362610	Outfall	Mill Race
City of Niles	DP1007_A	41.836976	-86.259657	Outfall	St. Joseph River
	DP1043	41.821054	-86.256286	Outfall	St. Joseph River
City of Niles School District	NPS_1	41.841291	-86.232178	Point of Discharge	St. Joseph River
	NPS_2	41.834071	-86.234464	Point of Discharge	St. Joseph River
City of St. Joseph	SJC2301	42.110910	-86.476397	Outfall	St. Joseph River
	SJC3501	42.086825	-86.477336	Outfall	St. Joseph River
Lincoln Charter Township	LIN_1	42.016275	-86.501631	Point of Discharge	Heyn & Branches (BCDC MS4)
	LIN_9	42.000568	-86.490008	Outfall	Ott Drain (BCDC)
St. Joseph Charter Township	1	42.054692	-86.471719	Point of Discharge	Eaton Park Drain (BCDC MS4) to Hickory Creek
	2	42.054799	-86.467983	Point of Discharge	Eaton Park Drain (BCDC MS4) to Hickory Creek
Village of Stevensville	OF018	42.011009	-86.531783	Outfall	Wetland
	OF020	42.010422	-86.526239	Outfall	Wetland

A sample form for reporting is on the following page; other forms may be utilized for consistency with a member's uniform data collection. Sampling criteria shall be to the same standards as performed in the 2003 TMDL study on the St. Joseph River, EPA method 1103.1, or equivalent method recommended by EGLE will be used for enumeration of *E. coli.* A County designated lab will be used for the processing of the samples taken.

Table 4. Sample Reporting Form

Member Name			**Weather Conditions**		
Date			**Storm Start Time**		
Outfall ID	**Time of Sampling**	**Flow Conditions**	**Screening Notes**		***E. Coli* Results (cfu)**