ROUGE RIVER WATERSHED
TMDL ASSESSMENT MONITORING

QUALITY ASSURANCE PROJECT PLAN
VERSION 1.1

PREPARED FOR:

ALLIANCE OF ROUGE COMMUNITIES
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ECT PROJECT NUMBER: 15-0440

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THIS QUALITY ASSURANCE PROJECT PLAN (QAPP) WAS PREPARED ACCORDING TO GUIDANCE PROVIDED IN *GUIDANCE FOR QUALITY ASSURANCE PROJECT PLANS* (EPA QA/G-5), EPA/240/R-02/009, DECEMBER 2002 (HTTP://WWW.EPA.GOV/QUALITY/QS-DOCS/G5-FINAL.PDF) AND *EPA REQUIREMENTS FOR QUALITY ASSURANCE PROJECT PLANS* (EPA QA/R-5, EPA/240/B-01/003, U.S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF ENVIRONMENTAL INFORMATION, WASHINGTON, D.C., MARCH 2001 HTTP://WWW.EPA.GOV/QUALITY/QS-DOCS/R5-FINAL.PDF) TO ENSURE THAT ENVIRONMENTAL AND RELATED DATA COLLECTED, COMPILED, AND/OR GENERATED FOR THIS PROJECT ARE COMPLETE, ACCURATE, AND OF THE TYPE, QUANTITY, AND QUALITY REQUIRED FOR THEIR INTENDED USE. ECT, INC. WILL CONDUCT WORK IN CONFORMANCE WITH THE QUALITY ASSURANCE PROGRAM DESCRIBED IN THE PROCEDURES DETAILED IN THIS QAPP.

Acronyms and Abbreviations

AOC	Area of Concern
ARC	Alliance of Rouge Communities
BUI	Beneficial Use Impairment
CD	Compact disc
COC	Chain of Custody
DQO	Data Quality Objective
ECT	Environmental Consulting & Technology, Inc.
EPA	United States Environmental Protection Agency (also USEPA)
ft	foot/feet
GLWQA	Great Lakes Water Quality Agreement
m	meter
MDEQ	Michigan Department of Environmental Quality
mg/L	milligrams per liter
MNFI	Michigan Natural Features Inventory database
m/sec	meters per second
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity
P.E.	Professional Engineer
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	Relative percent difference
RRAC	Rouge River Advisory Council
SOP	Standard Operating Procedure
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey

SECTION A – PROJECT MANAGEMENT

A.1 Title and Approval Page

Quality Assurance Project Plan for

Rouge River Watershed
TMDL Assessment Monitoring

Prepared on Behalf of:
Alliance of Rouge Communities

Date: 7-3-17
Annette DeMaria, ECT Project Manager

Date: 7/3/2017
Meghan Price, ECT Project Quality Assurance Manager

A.2 Table of Contents

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A.3 Distribution List

This document will be distributed electronically to the following team members involved in this project from the Alliance of Rouge Communities (ARC), Environmental Consulting & Technology, Inc. (ECT), and Paragon Laboratories (Paragon). Additionally, anyone involved in the aspects of this project discussed in this document will receive a copy of the document.

Alliance of Rouge Communities

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ECT, Inc.

Name/Title	Contact E-mail
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Paragon Laboratories

Name/Title	Contact E-mail
Ethan Andresmooi Laboratory Contact	ethana@paragonlaboratories.com

A.4 Project/Task Organization

The primary objective of this project is to perform water quality monitoring and sample collection within the Rouge River to demonstrate progress toward the TMDL goals of the municipalities within the Alliance of Rouge Communities (ARC). This will be accomplished by conducting continuous flow and dissolved oxygen (DO) measurements at select locations, as well as manual sample collection for total suspended solids (TSS) and *E. coli* analysis. This document is the quality assurance project plan (QAPP) for data collection that is to occur throughout the project.

Project Objectives

This QAPP provides a description of the procedures to be followed for collecting data. This will ensure that the data collection methods are of a sufficient quality to allow for successful design. The data is expected to be scientifically valid and defensible and that uncertainty has been reduced to a practical minimum. Data and information will be collected to help quantify and qualify the existing conditions and provide a conclusion as to the effectiveness of site enhancement in achieving the project goals. This QAPP sets forth the objectives, responsibilities, protocols, procedures, and methods for collecting data on the status of the project area.

Included with this document are five appendices which include the monitoring location maps and location descriptions (Appendix A); ECT Field Forms (Appendix B), ECT SOPs for Velocity Measurement and Stream Sample Collection (Appendix C), and IDEXX 95% Confidence Limits for *E. coli* (Appendix D).

Project Organization

Michigan Department of Environmental Quality (MDEQ) is funding the project with funds provided through SAW.

The Alliance of Rouge Communities (ARC) is the fiduciary of the grant funding. As such, the ARC is responsible for keeping the project on schedule and within budget.

Environmental Consulting & Technology, Inc. (ECT) has been hired by the ARC and is designated as the technical contractor for this project. As such, ECT will be responsible for writing the QAPP, ecological data collection efforts conducted for this project as discussed in this QAPP, data evaluation and assessment, and reporting. Additionally, ECT will assist the ARC in adhering to all grant requirements.

Roles and Responsibilities

Kevin Goodwin (MDEQ) has been invited to provide unofficial review of this document. Mr. Goodwin will also be provided a copy of the final report.

Karen Mondora, the ARC Technical Committee Chair, will oversee the project.

John O'Meara, P.E., the ECT Project Director, will coordinate all consultant activities with the ARC, and all project partners to ensure that all project objectives are attained. Mr. O'Meara will assure consistency and avoid duplicative efforts among project personnel. Mr. O'Meara will prepare all progress summary memorandums and budget materials and act as the primary consultant point of contact for the ARC.

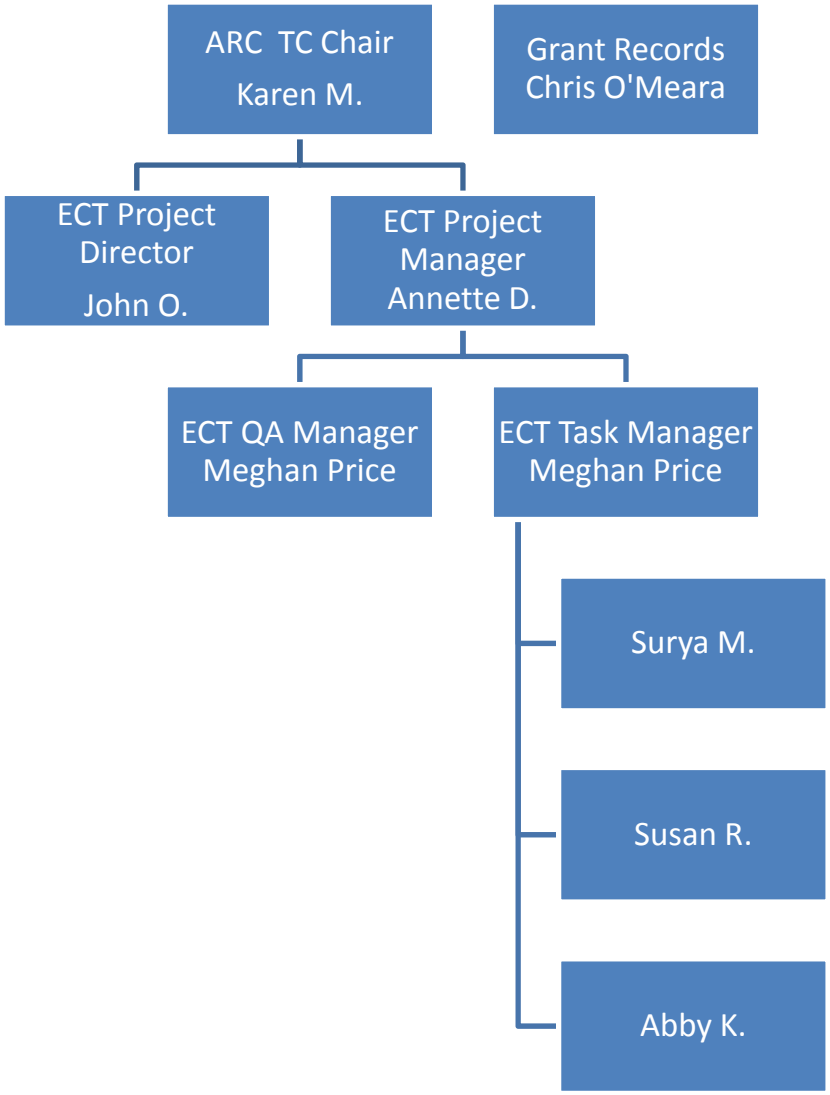
Annette DeMaria, P.E., the Project Manager, will be responsible for the day-to-day operations and management of the project. As such, Ms. DeMaria will be responsible for coordination and oversight of the field investigations, design, as well as preparation and submittal of all progress reports and the final report.

Meghan Price, the Project QA Manager is responsible for QAPP development as well as final QAPP dispersal. Ms. Price will also be responsible for any training required for field staff, laboratory coordination, and staff scheduling. Ms. Price will be available throughout the project to assist with any quality assurance reviews and/or audits.

Surya Murganantham, Susan Rusinowski, and Abby Kleinheksel of ECT will assist in data collection efforts and will provide feedback and assistance on the final report.

A project organization chart is displayed as Figure 1 – Project Organization Chart.

Figure 1 – Project Organization Chart



A.5 Problem Definition/Background

The oldest and most heavily populated and industrialized area in southeast Michigan is located within the Rouge River Watershed. The Rouge River has four main branches totaling 125 miles of main waterways primarily flowing through Wayne and Oakland counties, with some headwaters in Washtenaw County. The Rouge drains a 438 square mile area that includes more than 400 lakes and ponds, and more than 50 miles of parkland along its banks. The river winds its way through 48 communities and provides recreational opportunities for more than a million people.

The watershed is designated as an Area of Concern (AOC) under the Great Lakes Water Quality Agreement (GLWQA), and is characterized by nine beneficial use impairments (BUIs), including three associated with fish and wildlife habitat (degraded fish and wildlife populations, degradation of benthos, and loss of fish and wildlife habitat).

Additionally, the entire watershed is listed on the 303(d) list of impaired waters for not attaining water quality standards for *E. coli* as well as for biota. Many segments of the river are listed for not attaining water quality standards for DO. This monitoring effort is intended to demonstrate progress toward TMDL goals for those impaired segments with TMDLs in place as well as to get a better baseline for those that will be required to implement a TMDL.

A.6 Project/Task Description

The Alliance of Rouge Communities has a SAW grant that includes an Ecosystem Monitoring task. Under this task of the grant, the ARC will conduct monitoring to determine the current conditions of the Rouge River and its tributaries. Monitoring will include assessments for DO, *E. coli,* TSS, stream flow, and macroinvertebrates. This will be done in collaboration the U.S. Geological Survey (USGS). The objective of the Monitoring Project is to characterize the quality of surface water the Rouge River Watershed by collecting physical, hydrological, and chemical data during dry and wet weather conditions. Sampling will be conducted throughout the watersheds. The number of monitoring locations and frequency of monitoring are displayed in Appendix A.

The monitoring project will include the following components: continuous DO and flow monitoring at fixed stations and manual grab sampling on a weekly basis for 20 consecutive weeks.

The results of the study will be used for evaluating trends, analyzing the effectiveness of control measures and for decision-making. It should be noted that this monitoring effort might reveal contaminant hot spots that will require further investigation as part of ongoing Illicit Discharge Elimination Programs currently in place in the study area.

River stage will be continuously monitored using level/flow meters (by USGS) installed at selected locations. Continuous water quality measurements will be obtained through the use of monitoring probes for dissolved oxygen and temperature at selected locations (by USGS). In-situ river stage and grab samples will be collected throughout the project area independent of weather conditions and will be analyzed for *E. coli* and TSS (by ECT). In-site river stage and velocity measurements will be collected weekly at select locations by ECT.

Existing water quality data from the project area, such as found in the RREMAR, will be evaluated. As appropriate and beneficial, they will be merged with newly acquired project data as the basis for a consolidated assessment of water quality for the final project comprehensive report.

PROJECT MILESTONES

Data will be collected on a routine basis at predetermined locations. Sampling will be conducted without regard to weather conditions for 20 weeks, thus some samples are expected to be connected with wet weather and some will be associated with dry weather conditions. Sampling locations are depicted in Appendix A. The sampling can be divided

into four categories: 1) Continuous flow monitoring, 2) continuous DO monitoring, 3) manual grab sampling, and 4) in-situ flow measurements.

These tasks will be accomplished according to Table 1 – Milestone Schedule. These dates are to be considered approximate and are subject to change.

Table 1 – Milestone Schedule

Task	Projected Completion Date
Draft QAPP	04/15/2017
Weekly Data Collection	
Begin	05/01/2017
End	09/30/2017
Final Assessment Report	05/30/2018

The project milestones indicated above will be used to mark completion of the monitoring task for this project. The task summaries below provide the activities required in order to achieve the project objectives.

Task 1. Grant Reporting: This task includes the development and distribution of a sampling plan (we have opted to develop a full QAPP in order to ensure quality in the data set for future use), summary reports to ARC, and the drafting of the final project report. This task includes the following elements:

> Perform Grant Management activities as required by SAW. The ARC will provide grant management services and assure compliance with terms and conditions of the grant. Project progress will be monitored on a monthly basis and summarized to ARC as required.
>
> Prepare the QAPP – Although not required, this document is the project specific QAPP and has been prepared.
>
> Health and Safety Plan (HASP) Development – A site specific HASP will be developed for the project. Potential hazards will be identified, and steps will be outlined to reduce risk to employees and visitors to the site. The HASP will also detail steps for emergency response, including directions and a map to the nearest emergency room/urgent care.
>
> Deliverables: QAPP, HASP, summary memorandums, and final report

Task 2. Field Investigation: Locations used by the MDEQ for previous TMDL efforts will be used as the initial base map for the monitoring location selection. Additional locations have been added, moved, or removed based on comparability with other historic data and needs moving forward. The following data collection needs will be completed in order to achieve project objectives.

> Continuous flow monitoring – USGS will collect continuous flow measurements at 6 locations in the watershed. These locations are all on main branches of the river. This data will be used to characterize flow conditions as they relate to the manual sample collection events.

Continuous DO monitoring – USGS will collect continuous DO measurements in addition to flow at the 6 locations mentioned above. Included in these locations is a site on Johnson Creek, a designated coldwater stream, which currently has a TMDL in place for not attaining the water quality standard for coldwater streams (7 mg/L).

Manual in-situ flow monitoring – ECT will collect in-situ velocity and stream gauge measurements at select locations identified in Appendix A during the weekly sample collection efforts.

Manual sample collection – ECT will collect samples to be analyzed for *E. coli* and TSS at locations throughout the watershed. These samples will be collected from mid-stream approximately 2" below the surface of the stream. Bottom sediment is not to be disturbed during sample collection efforts.

Task 3. Reporting: A final assessment report will be created taking into account potential future uses of the data sets. A combination of load duration curves and modeling may be used in this assessment.

A.7 Quality Objectives & Criteria

The primary objective of this project is to evaluate stream conditions to demonstrate progress toward achieving the goals of the TMDLs. To achieve this objective, several types of data will need to be collected of an acceptable quality. Water quality and water quantity data will be collected. The site selection and methods of monitoring are discussed further in Section B.

A mixture of laboratory and field variables may affect data quality. The variables include sample matrix variability, sample collection/handling procedures and equipment, sample analysis techniques and record keeping. To control these variables, the Data Quality Objective (DQO) process is used. The DQOs for the data sets collected for this project are outlined in Table 2 – Data Quality Objectives.

Table 2 – Data Quality Objectives

Data Set	DQO
Water Chemistry	Obtain data acceptable to the State of Michigan in order to remove segments of the river from the 303(d) impaired waters list.
Water Quality	Obtain data acceptable to the State of Michigan in order to remove segments of the river from the 303(d) impaired waters list.
Water Quantity	Obtain data of acceptable quality to be used in the creation of load duration curves and model input/calibration.

DQOs developed for this project specifies discrete parameters in six areas: Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity (PARCCS). The DQOs and resulting PARCCS parameters will require that the sampling/data collection will be performed using standard methods with properly operated and calibrated equipment, and conducted by trained personnel.

A brief description of each of these parameters is presented below, along with the formulas for calculation of precision, accuracy and completeness for the scheduled analyses. Precision and completeness are expressed and evaluated quantitatively. Representativeness, accuracy, comparability and sensitivity are more subjective in nature and are addressed in both quantitative and qualitative terms. The primary QA objective is to measure the quantity of target parameters in each sample without unacceptable bias.

Precision

Precision is determined as a measurement of the closeness of individual test results under prescribed conditions, and reflects a combination of random and systematic error, as well as natural variation within a specific matrix. Only data generated within the required precision criteria will be deemed usable. However, the ECT Task Manager, prior to rejecting data as unusable, will closely evaluate the data collection process for potential interference and its effects on the results.

The precision of measured data is affected by natural variability in the sampling matrix as well as sampling factors. Field precision or the ability of the sampling team to collect two samples with a high degree of similarity, may also be assessed by the collection of field duplicate quality control (QC) samples. Field duplicate samples are collected from the same location, at the same time, using the same sampling method, and independently analyzed in the same manner. For the purposes of this project, the "same location" will be relative based on stream conditions.

Field duplicate samples will be collected for the manual grab samples (*E. coli* and TSS), and in-situ flow measurements flow. These duplicate measurements will be collected at least once per sampling team per sample collection day. The duplication of water samples is difficult due to variability found in streams. Therefore, the relative percent difference (RPD) of +/- 20% will be used for TSS. Flow measurement shall have an RPD of 10%. The *E. coli* duplicates will be compared to the acceptability criteria as established by the equipment manufacturer for the method instrumentation. The 95% confidence limits shall be used and are provided in Appendix D. Note that the samples will be run under a 1:10 dilution, therefore, all confidence limits shall be a factor of 10 higher. For example, a confidence limit for a sample run at 1:1 dilution with a result of 165 MPN, has a 95% confidence of the result being between 111.2 and 243.4 (a roughly 40% RPD). Under our dilution of 1:10, this result is 1,650 MPN with a 95% confidence that the result is between 1,112 and 2,434 MPN (still roughly 40% RPD).

Typically a matrix spike/matrix spike duplicate would be used to measure laboratory precision. This would not be appropriate for the analyses being performed for this project.

Accuracy

Accuracy measures the bias in a measurement system. Typically, a blank sample would suffice in measuring the accuracy of a given parameter (both for field measurements and laboratory measurements). Blank samples will be collected once per day by each sampling team and will be analyzed for *E. coli* and TSS.

Representativeness

Representativeness is an expression of the extent to which measured data accurately represents actual conditions. The objective of this sampling effort is to collect samples that accurately represent conditions in the field. The careful design of the sampling plan is of paramount importance in ensuring that the data are representative of prevailing conditions. The sampling plan specifies the number and location of samples to be collected and the method and equipment used to collect samples.

The key factors considered in the design of the sampling plan included: (1), providing a sufficient number of samples, and (2) sufficient spatial distribution of samples to ensure that the target area is covered.

Finally, representativeness is dependent on using appropriate sample collection, handling, and evaluation procedures. These procedures are described in Section B and in more detail in the attached SOPs in the appendices. The QA goal is to have all samples and measurements representative of the media sampled.

Representativeness of laboratory data cannot be quantified. However, adherence to the prescribed analytical methods and procedures will ensure that the laboratory data is representative.

Completeness

Every effort will be made to obtain valid data for each sampling point at each monitoring visit. Completeness will be measured by dividing the number of planned usable sample results by the total number of sample results. The completeness objective for this project is for 95% of the planned data to be usable (samples collected and analyses generated within the established control limits). Completeness is calculated as:

$$\%C = (V/T) * 100\%$$

Where:
V = Number of measurements judged valid
T = Total number of samples analyzed

Comparability

In order to maximize the degree of comparability of data generated for this project with previous sampling and analysis program results, sample collection methods will be conducted in accordance with specified standard methods and protocol. The object is to facilitate observations and conclusions that can be directly compared with historical and/or available background data.

Sensitivity

Sensitivity is a term broadly applied to the minimum detection capabilities of the specified methods of analysis and instruments used to conduct the scheduled analyses. Therefore, this will be conducted according to the methods outlined in Section B to ensure proper sensitivity to obtain accurate and repeatable results.

Table 3 – Data Quality Indicators and Assessment Methods

Measurement	Unit	Precision/Accuracy	Frequency of re-measurement	Assessment method
E. coli	CFU/100 mL	Within 95% confidence < 10 CFU/100 mL	1/team/day 1/team/day	Field duplicate analysis and Field blank analysis
TSS	mg/L	< 20% RPD < 2 mg/L	1/team/day 1/team/day	Field duplicate analysis and Field blank analysis
Velocity	ft/sec	< 10% RPD	1 per week	Field duplicate measurement

Additional information on data analysis can be found in SECTION D – DATA VALIDATION AND USABILITY.

A.8 Special Training/Certification

Only individuals trained and experienced in the use of applicable sampling equipment shall use or supervise the use of such equipment. All individuals responsible for the completion of this work have received training in the applicable sampling equipment and protocols. Additionally, all individuals involved in sampling and data collection will have received an appropriate level of health and safety training and will be provided with access to the project-specific health and safety plan ECT has prepared for the project.

A.9 Documents and Records

ECT will maintain a project file, which will act as a repository for all field logs, sampling data, and any additional information used in the completion of this project. This file will be maintained for at least seven years (unless otherwise directed by the ARC). Electronic project files will be maintained on network computers and backed up periodically. The ECT Project Manager will supervise the use of materials in the project file. If requested by the ARC, ECT will provide this information in an administrative record at a later date.

The following information will be included in the hard copy or electronic project files in the central file:

- All approved versions of the QAPP;
- Any reports and documents prepared;
- All field forms (including stream surveying, stage, velocity, in-situ DO, COCs, etc.);
- Contract and task order information;
- Results of data quality assessments and audits;
- Communications (memoranda; internal notes; telephone conversation records; letters; meeting minutes; and all written correspondence among the project team personnel, subcontractors, suppliers, or others);
- Maps, photographs, and drawings;
- Studies, reports, documents, and newspaper articles pertaining to the project;
- Laboratory reports; and
- Spreadsheet data files: physical measurements (hard copy and on CD).

ECT will prepare a data collection and analysis report that will address task and subtask milestones, deliverables, adherence to schedule, problems encountered, as well as a full analysis of the data set. Copies of formal reports generated from the data will be maintained in the project file (CD and hard copy) at ECT's Ann Arbor, Michigan office. The data reports will include a summary of the types of data collected, sampling dates, and any problems or anomalies observed during sample collection.

SECTION B – DATA GENERATION & AQCUISITION

There will be several data collection efforts associated with this project including: water quantity monitoring (USGS flow gauge stations and ECT in-situ velocity measurements) and water quality monitoring (USGS continuous DO monitoring, ECT grab samples for TSS and *E. coli*). All data will be used to establish conditions within the watershed as it pertains to the impairments as listed on the 2016 303(d) list. Each data acquisition task and data use task is outlined below.

B.1 Data Collection Process Design (Experimental Design)

Sampling will occur at monitoring sites located throughout the Rouge River Watershed, including Oakland, Washtenaw, and Wayne counties (see Appendix A). These sites will be sampled using manual sampling techniques for *E. coli* and TSS. Six of those sites will also have continuous flow, DO, and temperature data collection. Table 1 in Appendix A describes the frequency and type of samples that will be collected at each monitoring location.

Paragon Laboratories, Inc. located in Livonia, Michigan will be utilized to analyze the water samples for *E. coli* and TSS. Approximately 2,000 samples will be analyzed for each parameter. The number and type of samples are listed in Table 2 of Appendix A.

WATER QUANTITY MONITORING

Flow monitoring will be overseen by ECT.

CONTINUOUS FLOW - USGS

USGS will collect continuous flow data (recorded every 15 minutes) at 6 locations in the watershed. Five of these locations have been used historically, and one of the locations was added to provide information specific to Johnson Creek. The locations are described and shown in Appendix A.

IN-SITU FLOW - ECT

Sampling teams will take discrete flow measurements at 9 sites (as shown in Appendix A) during routine sampling. When each sample is collected, a vertical reference point will be used to measure the stream level. Velocity measurements will be taken at 20 spots across the width of the stream. All information will be recorded on data sheets for calculation of the flow rate. The flow rate will be calculated using the level data, average velocity reading and the stream bottom profile. The stream bottom profile will be determined at least twice during the data collection period.

WATER QUALITY MONITORING

Parameters of concern include *E. coli* and TSS. Therefore, these parameters will be measured using grab sampling techniques at the locations identified in Appendix A.

CONTINUOUS DO - USGS

Continuous DO will be measured at the USGS flow locations using YSI 6920 VS-2 sondes. Data will be recorded every 15 minutes.

SAMPLE COLLECTION - ECT

ECT will collect grab samples at all locations identified in Appendix A. Samples will be analyzed for *E. coli* and TSS. Samples will be collected for 20 weekly events from May through September 2017. Tables 1 and 2 in Appendix A summarize sampling locations, sample numbers, and analytical parameters.

Multiple field teams of 1-2 people each will complete the sampling. Each team will retrieve sampling supplies from a centralized location and proceed to their sample stations. Sampling supplies will include: disposable sampling gloves, sample collection bottles, sampling pole or other sample collection device, cooler(s), ice, field forms (Daily conditions form, Sampling Log, Chain of Custody forms, maps, and Project contact list), weighted field tape, and velocity meter (for some sites).

B.2 Data Collection Methods

Standard procedures will be followed in order to provide confidence in the data set and to allow for repeatability in results and comparability in future monitoring efforts.

WATER QUANTITY MONITORING

CONTINUOUS FLOW - USGS

USGS will be collecting flow data following the SOPs of the agency.

IN-SITU FLOW - ECT

ECT will collect velocity and level measurement at select locations at the time of the weekly sample collection. Field personnel will use a handheld meter to capture the velocity of selected cross-sections at each of the locations. The measurements will be made at up to 20 partial sections such that no more than 5-10% of the flow passes through any one partial section. Velocity measurements will be made at 0.6-depth if the majority of partial section depths are less than 2.5 feet or at 0.2-depth and 0.8-depth if most depths are greater than 2.5 feet. Stream profile measurements will be completed twice during the project, during periods of low or normal flow (not high flow).

See the Velocity Meter SOP for more details (Appendix C).

WATER QUALITY MONITORING

CONTINUOUS DO - USGS

USGS will be collecting DO data following the SOPs of the agency and using YSI 6920 VS-2 sondes as approved by the agency.

SAMPLE COLLECTION - ECT

New disposable gloves will be worn at each site. Samples will be collected using either a sampling pole or a rope with a bottle holding mechanism. Samples will be collected from the horizontal mid-point of the stream on the upstream side of the bridge crossing, when possible. If the downstream side of the bridge crossing is used, it shall be noted on the field form for that site. Samples will be collected directly into the laboratory bottles.

B.3 Sample Handling & Custody

The water quality sampling by ECT will require chain of custody (COC) procedures. These samples will follow COC to provide documentation of the handling of each sample from time of collection through receipt by the laboratory. Due to the number of samples to be collected each day, the Task Lead will prepare ECT COC forms with all information completed except the sample time and site ID. The field team shall ensure that sample IDs and time are recorded on the COC to accompany each sample through transit from the field to the laboratory. This form is used by both the field sampler and the laboratory to verify the contents of each shipment of samples. When transferring possession of the samples, both the individual relinquishing the container(s) and the receiver are required to sign and date the chain-of-custody form. Upon receipt of the shipment by the laboratory, the contents of the cooler are checked against the completed chain-of-custody form. Any anomalies are to be immediately reported by the laboratory to the sampling

team leader for clarification/resolution. All samples will be delivered to the laboratory within the requisite hours of sample collection in order to give the laboratory enough time to begin to process the samples while maintaining the analysis specific holding time. Samples are kept in coolers with enough ice to maintain ideal sample temperature.

B.4 Analytical Methods

Water quality analyses will be conducted by Paragon. Each sample requires a separate container be used for each analysis. The following table provides a list of the parameters to be analyzed, the method used to analyze the sample, the reporting limit, the sample holding times, and the sample preservation required.

Table 4 – Laboratory Analysis Information

Parameter	Method	Reporting Limit	Sample Volume	Bottle Type	Holding Time	Preservative Required
Total Suspended Solids (TSS)	160.2	2.0 mg/L	1 L	Plastic or Glass	7 days	≤6˚C
E. coli	1604	10 – 24,192 CFU/100mL	100 mL	Plastic	6 hours	≤6˚C

All samples will be analyzed for TSS and *E. coli*. The Laboratory Manager is responsible for initiating and scheduling the laboratory analysis to ensure that all samples are processed within their holding times.

B.5 Quality Control

Secondary data used throughout the project shall come from validated studies. Any additional supplemental data will come from trusted professional organizations such as the USACE, MNFI, United States Geological Survey (USGS), etc. For the purposes of this project, a validated study is a document prepared by an individual or organization that has produced the study based on quantified information either collected by the author or cites other professional that have the same or greater credentials. Further data evaluation will not be conducted.

Quality control will be achieved for all activities primarily through the use of sampling plans, timely technical reviews, and/or other protocols. Data collection will be conducted in conformance with the applicable plans and procedures to ensure that consistent, quality data are collected.

Sampling QC excursions are evaluated by the Project Managers. Field duplicate sample results are used to assess the entire sampling process, including environmental variability; therefore the arbitrary rejection of results based on predetermined limits is not practical. The professional judgment of the Project Manager, Task Manager, and the project QA Manager will be relied upon in evaluating results. Rejecting sample results based on wide variability is a possibility. Evaluation criteria noted previously in this section and in Section A.7 will be used for data review. Paragon will provide a QA/QC report with the analytical report on the analyses performed.

Corrective action will involve identification of the cause of the failure where possible. Response actions will typically include re-analysis of questionable samples. In some cases, a site may have to be re-sampled to achieve project goals.

Data collection will be conducted in conformance with the applicable plans and procedures to ensure that consistent, quality data are collected.

Detailed laboratory QC requirements are contained within each individual method and the laboratory QA Manual.

ECOLOGICAL MONITORING

A review of measurement (DO, velocity, stage) and sample collection procedures will be conducted at the beginning of each monitoring day in order to maintain objectivity and minimize individual bias. All field forms are reviewed for completeness and accuracy prior to moving from one monitoring location to the next.

Errors are minimized by using equipment with software integrated into it that provides data form and database capabilities. Critical data is also documented in hardcopy by the team lead. At the end of the data collection for the day, the team downloads a copy of the data into a project folder, as well as a backup folder. At this point, the data is reviewed for discrepancies or errors. If observed, errors are rectified. Additionally, any errors and the actions taken to correct them are noted in the project file.

All calculations are checked twice, hard copies of all data entered electronically is reviewed for errors by comparing to field data sheets, and a qualified professional will review the data analysis methods and results after each monitoring event. All activities will follow the ECT SOPs included in Appendix C.

Additional information is also supplied in Section D.

B.6 Instrument/Equipment Testing, Inspection, and Maintenance

The ECT Field Task Manager is responsible for ensuring all equipment is operational and is available for field work. This includes ensuring there are an appropriate number of field forms, bottle labels, and COCs for sampling, and any necessary equipment is available and is operational.

It is the Field Task Manager's responsibility to make sure that the equipment has been tested prior to departing for field activities.

B.7 Instrument/Equipment Calibration and Frequency

All calibration records are maintained in the equipment case for each piece of equipment, and upon each site calibration, the date, calibration parameter, and name or initials of the personnel performing the calibration are specified on this document.

Calibration of field measurement equipment is a necessary part of any sampling effort to ensure the data obtained is of the highest quality. There is no equipment used by ECT that requires calibration.

Laboratory equipment – The laboratory will perform calibration of the instruments, as needed, by following manufacturer's instructions. Additional information can be found in the Paragon Quality Manual which shall be available upon request.

B.8 Inspection/Acceptance of Supplies & Consumables

Details for all equipment inspection (where applicable) can be found in the appropriate SOP documents, which are included in Appendix C.

The ECT Field Task Manager is responsible for ensuring all supplies are available for sampling (including coolers with ice, the sample labels, COCs, and sample bottles). The Paragon Laboratory Manager is responsible for ensuring all supplies are available for analysis.

B.9 Data Acquisition Requirements for Non-Direct Measurements

Multiple sources of secondary data are available for the Rouge River in the vicinity of the project sites. These data will be available in either hard copy or electronic format. The data will be saved in the ECT project file and will be maintained at that location on behalf of the ARC. Rainfall data may be collected from Wayne and Oakland counties, the City of Detroit, and/or locations found on www.weatherunderground.com. These locations will be verified for consistent operation and measurements.

B.10 Data Management

Data will be collected on the sample field log sheets included in the appendices. These log sheets will be maintained in the project file. Additionally, the information collected will be transferred to an electronic format to allow for data evaluation. Any data entered manually will be checked by a person other than the one originally entering the data.

ECT field crew will note all relevant sampling information in the field notes. Notes will include a description of the sampling location, and other observations made during sample collection. The field notes will be maintained in the project file (both electronic and hard copy). All field data (not including general observations) will be entered into a Microsoft Excel® spreadsheet. The final report will summarize monitoring activities and discuss any deviations from the monitoring plan. Following QA/QC review, the data and summary monitoring reports will be made available to the ARC.

The Laboratory will provide their analysis report on the samples submitted for analysis via e-mail. This report will be in both PDF and EDD (Excel) format.

SECONDARY DATA

The secondary data identified in Section B.9 will be retained in the project file. The data obtained from the USGS flow database will be copied to CD and retained in the project file.

SECTION C – ASSESSMENT AND OVERSIGHT

The purpose of data assessment is to assure that the generated data meets specified quality acceptance criteria prior to its use in characterizing site conditions. The measured data will be checked using the data quality indicators of PARCCS as discussed in A.7 Quality Objectives & Criteria.

The following types of data will be excluded from use or properly flagged prior to use in site characterization.

- Data that does not meet the prescribed limits for precision, accuracy and completeness, described in Section A.7 Quality Objectives & Criteria, and
- Data for which no result is reported.

C.1 Assessments and Response Actions

ECT will communicate with the ARC Chair and the ARC Technical Committee Chair on a regular basis. As noted elsewhere in this QAPP, data collected will be provided to the ARC along with summary reports as necessary. If data collection procedures or monitoring plans need to change or other problems arise, ECT will contact the ARC Chair and ARC Technical Committee Chair.

C.2 Reports to Management

A draft project memorandum will be submitted for review according to Table 1 – Milestone Schedule. At which point, the ARC project representatives will review and provide comments. The ECT Project Manager will address these comments within 2 weeks of receipt and will send the final memorandum to the ARC.

The final deliverable for this project is the data assessment report.

SECTION D – DATA VALIDATION AND USABILITY

D.1 Data Review, Verification, and Validation

All data will be reviewed by a second individual against original data after the data are entered into a Microsoft Excel® spreadsheet. The data will be reviewed to insure that it was entered accurately and that it was collected in conformance with the QAPP, sampling plans, and applicable standard operating procedures. Any nonconformity will be noted with the data and considered under Reconciliation with User Requirements below. Data will also be reviewed for consistency with the quality objectives and criteria in Section A.7.

D.2 Verification and Validation Methods

Duplicate review of all data will be used to ensure that data have been entered into electronic spreadsheets accurately. Once data are accurately entered into the spreadsheets, the data will be reviewed once again to assess the reasonableness of data given the collection methods, quality criteria and objectives, and expected results. Any data that appear to be inconsistent with methods, quality criteria, and/or expected results will be further investigated to determine if a correctable error was made or if the data should be eliminated from further use.

D.3 Reconciliation with User Requirements

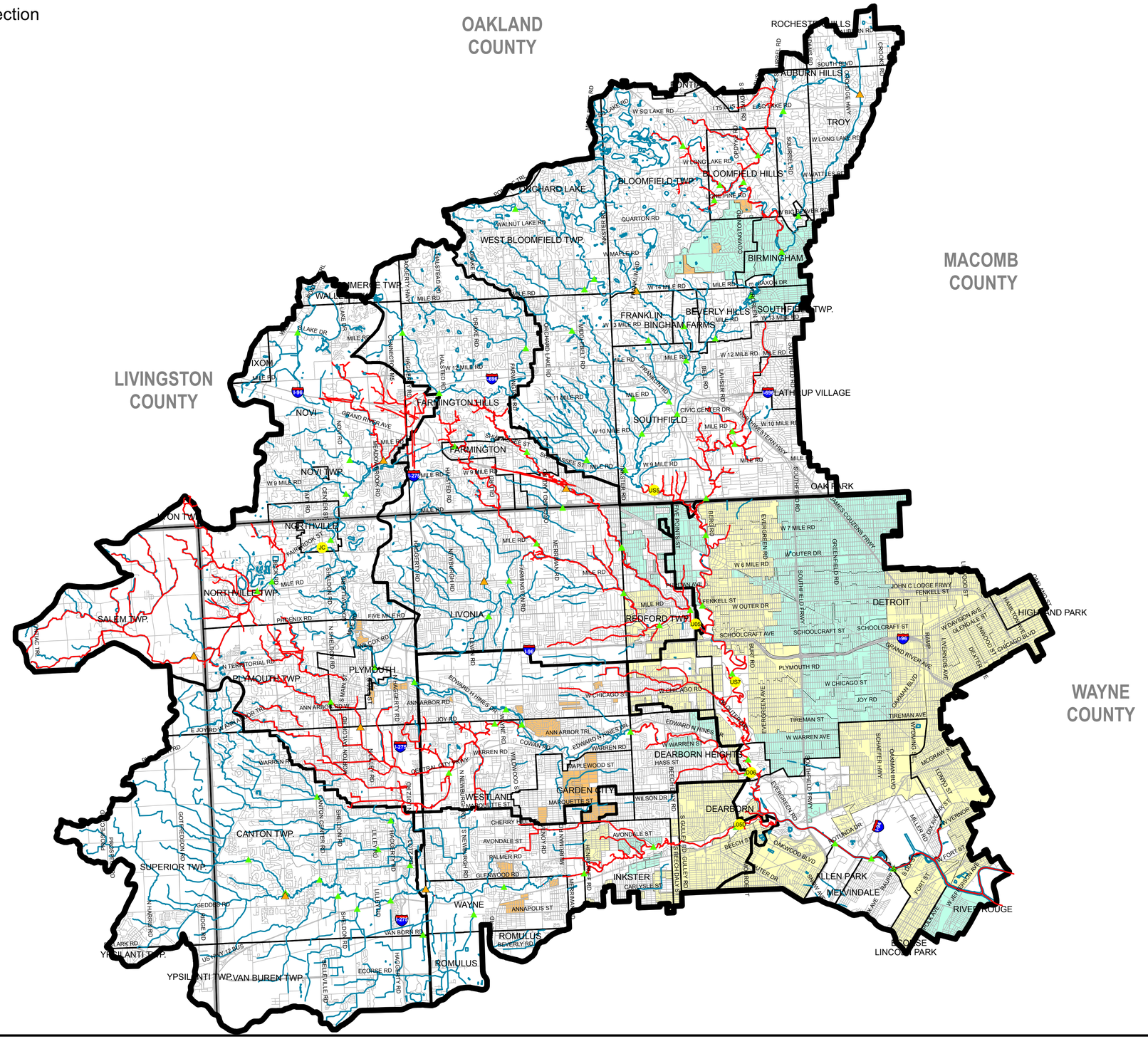
Data will be used by ECT to create an updated assessment report for the watershed. The monitoring data may also be used by the RRAC, MDEQ, EPA, NOAA, or other agencies to assess the effects of various projects and/or BMPs once implemented. The reference sampling and monitoring plans have been carefully prepared in cooperation with the MDEQ, ARC staff, as well as internal ECT staff to ensure that the data will meet the project needs. The data review and validation steps mentioned above will also provide an opportunity for the data users to verify that the data collected meet project needs.

The review of data collected shall consider the number and nature of the data collected and any deviations from the sampling plans and QAPP. If data were obtained by means other than those indicated in the plans/QAPP, the nature of the deviation will be considered and the data will be evaluated based on whether they can still meet the user requirements. If the methods used deviated significantly from the QAPP/plans, the QAPP/plans will be revised and resubmitted for approval.

Appendix A

Sample Location Lists and Map

- ECT Flow Locations & ECT Sample Collection
- USGS Flow Locations
- ECT Sample Collection
- DO Impairments
- Rouge Watershed Boundary
- Rouge River & Tributaries
- Townships & Cities
- Subwatersheds
- Rouge Watershed Roads
- County Boundaries
- CSOs Controlled by Basin
- CSO Areas Separated
- CSO Areas Remaining



Rouge River Watershed
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ECT Environmental Consulting & Technology, Inc.

TSS and *E. coli* are sampled at all sites listed in the table below.

WEDNESDAY SAMPLING						THURSDAY SAMPLING			
	Group A		**Group B**		**Group C**		**Group D**		**Group E**
	12 SITES		**22 SITES**		**17 SITES**		**15 SITES**		**24 SITES**
V	UP05		MN01		US3	V	D62		MD09
V	G72		M12		UP08	V	US9		MD06
V	G461		US8		UP15	V	G93		US10
	MN28		G42		UP16		L01		MD07
	M01	CV	US7		MN25		G200		MD03
	MN33	CV	U05		MN23	V	MD13		US2
	MN29		G43		MN24	V	MD18	CV	D06
	MN31		U02		MN16		MD19	CV	L05D
	MN30		U04		MN18		MD17		US1
	MN32		U03		H60		MD16		LW03
V	MN35		G71		M03		MD15		G97
	MN36		MN13		MN27		MD14		L06
			MN12		G46	CV	D03		LW07
		CV	US5		G19		MD11		G64
			MN14		U17		MD12		LW09
			MN15		U15				LW08
			MN17		UP04				G92
			G59						L51
			MN10						G94
			MN09						LW14
			MN08						LW12
			M15						L02
									LW13
									MD04

V = In-situ velocity measurements (ECT) CV = Continuous velocity measurements (USGS)

GROUP A ROUTE (FLOW):

https://goo.gl/maps/H7yb6vXmcG22 https://goo.gl/maps/CQHN8Kpu3q52

A1. UP05 [Flow location] [Coordinates: 42.411342, -83.392855]
Sample site located on 6Mile Rd, east of Wayne Rd.
Parking: Park on Wayne Rd Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on 6mile Rd. Upstream side of bridge.

A2. G72 [Flow location] - [Coordinates: 42.449199, -83.346448]
Site is located on Tuck Rd south of Folsom Rd. [Between Folsom & Archwood Cir]
Parking: Park on Tuck Rd north of the bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Tuck Rd. Upstream.

A3. G461 [Flow location] - [Coordinates: 42.529993, -83.305529]
Site is located on Franklin Rd, North of 14Mile Rd. [Franklin Cider Mill]
Parking: Park at Franklin cider mill parking lot. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bridge. Second footbridge from Franklin Rd. Upstream.

A4. MN28 [Coordinates: 42.545379, -83.224816]
Sample on W. Maple Rd west of Southfield Rd.
Parking: Park on Baldwin Rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from footbridge on Maple Rd. Upstream.

A5. M01 [Coordinates: 42.560498, -83.214754]
Sample located on W. Big Beaver Rd, 1mile East of Woodward Ave. [Landmark- Springdale Park]
Parking: Park West side of bridge on beaver Rd near Springdale park. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Big Beaver Rd. Upstream. **Watch out for traffic**

POSSIBLE TIMING OF BREAK— AND Meet with Lab Courier, LUNCH

A6. MN33 [Coordinates: 42.585684, -83.237233]
Sample located at E Long Lake Rd, West of Stonycroft Ln, Bloomfield hills
Parking: Park on side of road at bridge [or Stonycroft Ln]. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from culvert on E. Long lake Rd. Upstream.

A7. MN29 [Coordinates: 42.57466, -83.24546]
Sample at bridge on Tamarack way, west of Woodward Ave.
Parking: Park on the side of Tamarack way near bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from footbridge on Tamarack way. Upstream.

A8. MN31 [Coordinates: 42.573552, -83.258730]
Sample at Vaughan Rd.
Parking: Park by the side of Orchard ridge rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: 0.5 Miles east of Lahser Rd &Vaughan intersection [Residential area]. Sample from Vaughan Rd. Upstream

A9. MN30 [Coordinates: 42.56703, -83.26164]
Sample at culvert on Lone pine Rd. 0.2 mile east of Lahser Rd.

Parking: Park on Lone Pine Rd. [Residential area. Grab samples to be collected: *E. coli* and TSS
Accessibility: Small creek flowing into a culvert at Lone pine rd. Sample from the culvert. Upstream.

A10. MN32 [Coordinates: 42.589847, -83.278999]
Sample at Devon Brook Rd, 1 mile North of W. Long Lake rd.
Parking: Park on shoulder Devon Brook Rd at the culvert. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from side of culvert on Devon Brook Dr. Upstream

A11. MN35 [Flow location] - [Coordinates: 42.609323, -83.179803]
Sample site at Firefighter's Park east of Coolidge Hwy and W Square Lake Rd intersection.
Parking: Park at parking lot. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge inside the park, beside back parking lot. Upstream.

A12. MN36 [Coordinates: 42.603743, -83.222664]
Sample site at Squirrel Rd, South of E.Square Lake Rd.
Parking: Park on side of Squirrel Rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Squirrel Rd. Upstream.

GROUP B ROUTE:

https://goo.gl/maps/szUyJChQ7Z92 AND https://goo.gl/maps/kPRRqWHrmjF2 AND https://goo.gl/maps/VCxHv1MDf6y

B1. MN01 [Coordinates: 42.290580, -83.167527]
Site is located on Schaeffer Hwy, North of Intersection Melon St & Schaeffer Hwy.
Parking: Park East of bridge at gas station. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Schaeffer Rd. **Upstream** side

B2. M12 [Coordinates: 42.294618, -83.179241]
Site is located on Greenfield Rd, South of intersection Greenfield & Butler Rd.
Parking: Park near City Park at Dearborn St. and Allen Rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Greenfield Rd. **Upstream** side

B3. US8 [Coordinates: 42.301095, -83.199398]
Site is located on Rotunda Dr, East of intersection Rotunda Dr. & Republic Dr.
Parking: Park in driveway just west of bridge on upstream side Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Rotunda Dr. Upstream.

B4. G42 [Coordinates: 42.336059, -83.247163]
Site is located on Ann Arbor trail, East of Walter Cassidy dr.
Parking: Park on Walter cassidy Dr. or side of Ann Arbor trail Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Ann Arbor trail. Upstream side

B5. US7 [Coordinates: 42.371776, -83.255556]
Site is located on Plymouth Rd, East of Rouge Park Dr.
Parking: Park on driveway near bridge. [golf course sign] Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Plymouth Rd. Upstream side.

B6. U05 [Coordinates: 42.392683, -83.276665]
Sample site is located on Telegraph Rd, North of River Circle.
Parking: Park on Telegraph Rd on bridge shoulder [safety reasons] or park at "Simple self-storage" parking lot, south of bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Telegraph Rd. Upstream.

B7. G43 [Coordinates: 42.400043, -83.271583]
Site is located on Fenkell Ave, west of Virgil st.
Parking: Park on Virgil St. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Fenkell Ave. **Upstream side.**

B8. U02 [Coordinates: 42.398208, -83.278385]
Sample site located on Graham Rd west of telegraph Rd.
Parking: Park on side of Graham Road beside the bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Graham Rd. Upstream

B9. U04 [Coordinates: 42.392142, -83.295563]
Sample site located on Beech Daly rd, North of Ross dr.
Parking: Park at Ross Dr. Sidewalk access to bridge sample site. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Beech Daly Rd. Upstream [faces golf course bridge].

B10. U03 [Coordinates: 42.405507, -83.315252]
Sample site located on N. Inkster Rd, North of 5mile Rd.
Parking: Park on Meadowbrook Rd cross to sample at Upstream side of bridge Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on N. Inkster Rd.

B11. G71 [Coordinates: 42.42433, -83.31618]
Sample site located on Inkster Rd, south of W. 7Mile Rd
Parking: Park at Margareta St. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on N. Inkster Rd. Upstream [side is facing Margareta st].

POSSIBLE TIMING OF BREAK— AND Meet with Lab Courier, LUNCH

B12. MN13 [Coordinates: 42.457364, -83.317543]
Site is located on Inkster Road, Between 9mile and Spring valley dr.
Parking: Park near outfall site by the bridge Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Inkster. Upstream.

B13. MN12 [Coordinates: 42.456262, -83.313634]
Site is located at 2nd stream crossing east of Inkster on 9Mile.
Parking: Park on S. side of road. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bank on 9Mile. Upstream.

B14. US5 [Coordinates: 42.447867, -83.297672]
Site is located on Beech Road, North of Beech and Shiawassee St intersection.
Parking: Park by the bridge Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Beech Rd. Upstream.

B15. MN14 [Coordinates: 42.471354, -83.303989]
Site is located on 10 mile Rd East of Inkster.
Parking: Park at Samoset trail. Grab samples to be collected: *E. coli* and TSS
Accessibility: Downstream.

B16. MN15 [Coordinates: 42.485820, -83.308736]
Site is located on 11 mile about 0.5 mile East of Inkster Rd.
Parking: Park at Carnegie Park Apartments. Grab samples to be collected: *E. coli* and TSS
Accessibility: Upstream.

B17. MN17 [Coordinates: 42.484291, -83.288878]
Site is located on Franklin Rd west of Telegraph Rd.
Parking: Park at Lakeland center parking lot Grab samples to be collected: *E. coli* and TSS
Accessibility: When dry sample from bank. When wet sample from bridge. Upstream.

B18. G59 [Coordinates: 42.479135, -83.284474]
Site is located on Civic center drive, East of Telegraph Rd.
Parking: Park in parking lot near the bridge at civic center drive. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from Bridge. Upstream.

B19. MN10 [Coordinates: 42.471861, -83.253591]
Site is located at first stream crossing on Tamarack Trail, South of 10Mile Rd.
Parking: Park by the bridge Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Tamarack Trail. Upstream.

B20. MN09 [Coordinates: 42.466552, -83.252434]
Site is located at second stream crossing on Tamarack Trail, South of 10Mile Rd.
Parking: Park by the bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Tamarack Trail. Upstream.

B21. MN08 [Coordinates: 42.444062, -83.268736]
Site is located on Berg Rd. North of W.8 mile Rd on Berg.
Parking: Park on Berg road. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Berg Rd. Upstream.

B22. M15 [Coordinates: 42.429135, -83.269132]
Site is located on W. Seven Mile Rd west of Seven mile and Berg Rd intersection.
Parking: Park at parking lot on Berg at North West corner of intersection. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on W. Seven Mile Rd. Upstream.

GROUP C ROUTE:

C1. US3 [Parking Coordinates: 42.465529, -83.370333]
Site is located inside Shiawasee Park, Farmington [intersection: Shiawasee Park & Power Rd]
Parking: Park at parking lot. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge 250 feet east and south of playground area. Upstream.

C2. UP08 [Coordinates: 42.467327, -83.408941]
Sample site located on Brittany Hill Dr, East of Halsted Rd & Grand River Ave intersection.
Parking: Park by bridge on Brittany Hill Dr. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Brittany Hill Dr. Upstream.

C3. UP15 [Coordinates: 42.514159, -83.436991]
Site is located on Haggerty Rd, First stream crossing, North of 13Mile Rd. [Between 13Mile and Lancaster Dr]
Parking: Park at Seely creel signboard before Lancaster & Haggerty Rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Haggerty Rd. Downstream.

C4. UP16 [Coordinates: 42.507190, -83.368318]
Sample site is located on Nottingwood St, East of Ravenwood st. [Intersection: Ravenwood St & Nottingwood St]
Parking: Park on side of the road @Nottingwood St. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Nottingwood St. Upstream.

C5. MN25 [Coordinates: 42.559470, -83.357840]
Site located on Doherty St, East of Orchard Lake Rd & Walnut Lake Rd intersection.
Parking: Park on Doherty St [residential area] Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bridge. Upstream

C6. MN23 [Coordinates: 42.535364, -83.329512]
Site located at second stream crossing [**North** stream crossing] on 10 hill Dr., North of Old Ct.
Parking: Park on 10hill Dr. [Residential area] Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bridge. Upstream.

C7. MN24 [Coordinates: 42.531156, -83.334984]
Site located on Brookridge Dr. [East of 14mile & Middlebelt Rd intersection]
Parking: Park on Brookridge Dr. [Residential area] Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bridge. Upstream

C8. MN16 [Coordinates: 42.514373, -83.342322]
Site is located on 13 mile Rd, West of Middlebelt Rd.
Parking: Park on Adat shalom Synagouge Driveway. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from footbridge. Upstream.

C9. MN18 [Coordinates: 42.509759, -83.299754]
Site is located on Cheviot Hills Ct. [west of Telegraph and 13Mile]
Parking: Residential Area; Park by the side of road. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from road. Upstream.

C10. H60 [Coordinates: 42.515456, -83.279595]
Site is located on 13 mile Rd 0.3 miles East of Telegraph.
Parking: Park at Bingham Rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bridge. Upstream.

C11. MN27 [Coordinates: 42.527673, -83.241951]
Site on Riverside Dr, East of Evergreen Rd.
Parking: Park on Riverside by the bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bridge on Riverside. Upstream.

C12. M03 [Coordinates: 42.510152, -83.262320]
Site located on Lahser road 0.5-mile North of 12 Mile.
Parking: Park at Lahser Rd near outfall site. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from bridge. Upstream.

C13. G46 [Coordinates: 42.501224, -83.278604]
Site is located on 12 mile Rd, East of Telegraph. [Between Wildbrook Dr & Streamwood Ln]
Parking: Park on Wildbrook Dr. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample from Bridge. Upstream.

POSSIBLE TIMING OF BREAK— AND Meet with Lab Courier, LUNCH

C14. G19 [Coordinates: 42.441280, -83.348802]
Sample site is located on 8Mile Rd, East of Orchard Lake Rd.
Parking: Park at ABC Supply Co., Inc. parking lot. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on 8Mile Rd. **Downstream side** [Upstream not accessible].

C15. U17 [Coordinates: 42.426543, -83.363432]
Sample site located on 7Mile Rd, West of Merriman Rd.
Parking: Park at Jehova Witness, 7 Mile Rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on 7mile Rd. Upstream.

C16. U15 [Coordinates: 42.411430, -83.379121]
Sample site located on 6Mile Rd, west of Farmington Rd. [between Whitby St & Polyanna St]
Parking: Park at Pollyanna St. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on 6mile Rd. ***Downstream*** [Upstream not accessible. Site inside woods].

C17. UP04 [Coordinates: 42.39909, -83.39064]
Sample site is located on Ellen Dr. North of 5Mile Rd.
Parking: Park on Ellen Dr near bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Ellen Dr. (fenced off). Upstream.

GROUP D ROUTE (FLOW):

https://goo.gl/maps/UPQNxhaHkcH2 and https://goo.gl/maps/U8Fv4Ju29ds

D1. D62 [Flow location] [Coordinates: 42.351646, -83.462714]
Sample site located on Joy Rd, east of Main St.
Parking: Park on road E. of bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Joy Rd. Upstream.

D2. US9 [Flow location] [Coordinates: 42.28439, -83.42732]
Sample site located at first stream crossing on Hannan Rd, North of Michigan ave
Parking: Parking on side of road, little south of the bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge crossing on Hannan Rd. Upstream.

D3. G93 [flow location] [Coordinates: 42.282302, -83.505405]
Sample site located on S. Beck Rd, South of Lindenhurst blvd.
Parking: Park at Lindenhurst blvd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge crossing on Beck Rd. Upstream.

D4. L01 [Coordinates: 42.283485, -83.505433]
Sample site located on S.Beck Rd, North of Lindenhurst blvd.
Parking: Park at Lindenhurst blvd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge crossing on Beck Rd. Upstream. sidewalk bridge access also available.

D5. G200 [Coordinates: 42.297201, -83.525834]
Sample site located on Denton Rd, between Hudson Dr & Proctor Rd.
Parking: Pull off on E. side of bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge crossing on Denton Rd. Upstream.

D6. MD13 [flow location] [Coordinates: 42.381706, -83.555045]
Sample site located on Napier Rd, 0.5 Miles North of Territorial Rd.
Parking: Park N of bridge on Napier road. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge on Napier Rd. Upstream.

D7. MD18 [flow location] [Coordinates: 42.458972, -83.454809]
Sample site is located on Meadowbrook Rd, 0.5 Mile South of 10 Mile Rd.
Parking: Park at Chattman St. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge located on Meadowbrook Rd, just south of Chattman st. Upstream.

D8. MD19 [Coordinates: 42.49526, -83.46953]
Sample site is located on 12 Mile Rd, East of Novi Rd. [Twelve oak mall drive]

Parking: Park at twelve oaks mall parking Lot at McDonald's. Walk to the culvert by 12mile Rd. Grab samples to be collected: *E. coli* and TSS
Accessibility: Creek east of McDonalds. Sample at the creek by 12mile Rd. Downstream.

D9. MD17 [Coordinates: 42.495079, -83.495920]
Sample site located on 12Mile Rd, 0.5 Mile west of Novi Rd. [nearby intersection: 12mile & Taft Rd]
Parking: Park by the side of 12 Mile Rd at the bridge. Grab samples to be collected: *E. coli* and TSS
Accessibility: Sample at bridge located on 12Mile Rd, east of the railroad. Upstream.

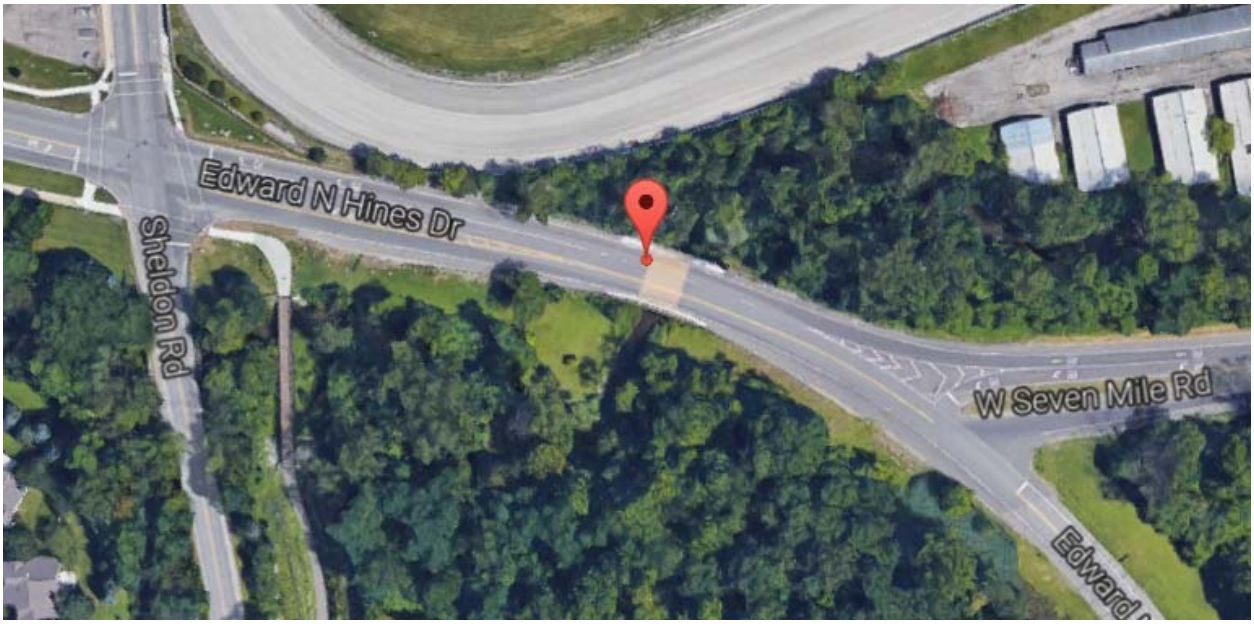
D10. MD16 [Coordinates: 42.467125, -83.466189]
Sample site located on W 10Mile Rd. 0.5 Mile east of Novi Rd.
Parking: Park by side of 10 Mile Rd at the outfall site gates. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample site is located on W 10Mile Rd west of Myrtle Ct [Between Novi Rd and Myrtle Ct]. Upstream.

D11. MD15 [Coordinates: 42.44776, -83.46918]
Sample site located on Ashbury Dr, Novi
Parking: Park on side of road by the bridge. [Residential area] Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on **Ashbury drive, North of Windmill ct**. [northern stream crossing]. Upstream.

D12. MD14 [Coordinates: 42.428915, -83.478230]
Sample site located on Beal St 0.1 miles West of Northvile Rd.
Parking: Park on River St, East of bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Beal St. Upstream.

D13. D03 [Johnson creek gauge] [Coordinates: 42.425697, -83.481137]

Sample site located on Edward Hines Dr, East of Sheldon Rd.



Parking: Park on Edward Hines Dr west of bridge. OR in parking lot on NW corner of Sheldon Rd and Hines Drive. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Edward Hines Dr. ***Downstream.***

D14. MD11 [Coordinates: 42.411955, -83.511146]
Sample site located at second stream crossing on Beck road, north of 6Mile rd. [Between Maplebrook Dr and Pine creek ct]
Parking: Park south of bridge at Maplebrook Dr. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Beck Rd. It is the second stream crossing from 6mile to beck. Upstream.

D15. MD12 [Coordinates: 42.408327, -83.519558]
Sample site located on 6Mile Rd, West of Lake view circle Rd
Parking: Park on side of the road by the bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on 6 Mile Rd. Sample at footbridge. Upstream.

GROUP E ROUTE:

https://goo.gl/maps/rubXoiSJEp22 and https://goo.gl/maps/imB7udmDSuo and https://goo.gl/maps/wyhEYkgJ6A12

E1. MD09 [Coordinates: 42.376143, -83.454400]
Sample site located on Plymouth Rd, East of Edward Hines Dr.
Parking: Park by courthouse grille east of the sample site. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Plymouth Rd. Upstream.

E2. MD06 [Coordinates: 42.359590, -83.469624]
Sample site located on S. Main St, North of Ann Arbor Rd. [Between Ann arbor Rd and Byron St]
Parking: Park at Rite aid pharmacy parking lot. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on S.Main St. Upstream.

E3. US10 [Coordinates: 42.371621, -83.445615]
Sample site located on Haggerty Rd, North of Edward Hines Dr. [Between Plymouth and Edward Hines Dr.]. Landmark: Heartland Health care center, Plymouth.
Parking: Park at Breakfast Dr south of sample site. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Haggerty Rd. Upstream.

E4. MD07 [Coordinates: 42.358457, -83.386461]
Sample site located on Wayne Rd, South of Edward Hines Dr [Between Hines Dr & Ann Arbor Trail]
Parking: Park at Parkway heights apartment parking lot, South of sample site on Wayne Rd. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Wayne Rd. Upstream.

E5. MD03 [Coordinates: 42.351892, -83.386037]
Sample site located on Wayne Rd, South of Joy Rd.
Parking: Park at 7 Eleven North of the sample site [near Joy Rd & Wayne Rd intersection] Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Wayne Rd. Upstream.

E6. US2 [Coordinates: 42.348262, -83.312538]
Sample site located on N. Inkster Rd, South of Edward Hines Dr.
Parking: Park on Clairview and cross street for Upstream. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Inkster. Upstream.

E7. D06 [USGS flow location] [Coordinates: 42.330724, -83.248019]
Sample site located on Edward N Hines Dr, North of Ford Rd.
Parking: Park on side of the road near bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Edward N Hines Dr. Upstream.

E8. L05D [USGS flow location] [Coordinates: 42.308582, -83.252712]
Sample site located on Military St, North of Michigan ave.
Parking: Park in circle drive. Residential drive. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge South of City of Dearborn Office. Upstream.

E9. US1 [Coordinates: 42.300629, -83.300559]
Site located on John Daly St, 0.5 miles north of Michigan Ave.
Parking: Park by the side of road near the bridge. [Residential area] Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on John Daly St. Upstream.

E10. LW03 [Coordinates: 42.302661, -83.305721]
Site located near Lucerne Dr, East of Inkster. [Intersection nearby: Inkster Rd & Avondale st]
Parking: Park at Lucerne Dr. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample site is at bridge between Lucerne Dr & Elm circle Dr. Access through woods east of Lucerne Dr. Upstream.

E11. G97 [Coordinates: 42.29003, -83.33915]
Site located on Henry Ruff Rd, North of Michigan Ave
Parking: Driveway south of bridge just by sherrif's dept. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Henry Ruff Rd. Upstream.

E12. L06 [Coordinates: 42.284866 , -83.383787]
Sample site located on Wayne Rd, north of Michigan Ave.
Parking: Park at Wayne city hall south of bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Wayne Rd. Upstream.

E13. LW07 [Coordinates: 42.285603, -83.407092]
Sample site located on S. Newburgh Rd, south of Glenwood Rd.
Parking: Park on Whitney Dr. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge crossing on Newburgh Rd, South of Glenwood and North of hillcrest Dr. Upstream.

E14. G64 [Coordinates: 42.27361, -83.40084]
Sample site located on Annapolis St, south of Michigan Ave. [Intersection: Annapolis and Treadwell St]
Parking: Park by side of road on Annapolis St. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge crossing on Annapolis st, East of Treadwell St. Bridge is fenced off sample from banks. Upstream.

E15. LW09 [Coordinates: 42.265233, -83.429126]
Sample site located on Van Born Rd, west of Hannan Rd.
Parking: Park on the side of Van born Rd adjacent to bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge crossing on Van born Rd. Upstream.

E16. LW08 [Coordinates: 42.278471, -83.423708]
Sample site located on Michigan Ave, east of Hannan Rd. [Between Hannan Rd and Grace ave]
Parking: Park on Grace Ave. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge crossing on Michigan Ave. Access near sidewalk. Upstream.

[If upstream is not accessible cross road and sample; Park at Pro fireworks]

E17. G92 [Coordinates: 42.279900, -83.446952]
Parking: South of bridge park at western township authority building on the East side. Sample site located on Haggerty Rd, North of Michigan Ave.
Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Haggerty Rd. Upstream.

E18. LW13 [30ft] [Coordinates: 42.308552, -83.443875]
Sample site is located on Cherry hill Dr, East of Haggerty Rd.
Parking: Park on shoulder of bridge on cherry hill. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Cherry Hill Dr. 30ft deep. Upstream.

E19. LW12 [Coordinates: 42.300940, -83.453644]
Sample site located East of S. Lilley Rd on chase Dr. [intersection: S.lilley Rd & Trent Dr]
Parking: Park on Chase Ct. Grab samples to be collected: *E. coli* & TSS
Accessibility: Access to sample site is on chase drive. Private bridge access. Upstream.

E20. L02 [Coordinates: 42.294140, -83.436054]
Sample site located at Palmer Rd, East of S. Lotz Rd
Parking: Park on side of road, east of bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge crossing on Palmer Rd. Upstream.

E21. L51 [Coordinates: 42.276348, -83.465606]
Sample site located on Michigan Ave west of Lilley Rd. [adjacent to S. Morton Taylor Rd]
Parking: Park on Morton Taylor Rd. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge crossing on Michigan Ave, next to S.Morton Taylor Rd. Access via culvert.
Sample Downstream [historic sample site].

E22. G94 **[**Coordinates: 42.281770, -83.476143]

Sample site located on S. Sheldon Rd, first stream crossing North of Michigan Ave.
Parking: Park on side of the road by the bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge crossing on Sheldon Rd [south of Dionne st.] Upstream.

E23. LW14 [Coordinates: 42.323142, -83.488192]
Site located on N. Canton center Rd, north of Ford Rd.
Parking: Park on Maben Rd. Sidewalk available for site. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on N. Canton Rd. Upstream.

E24. MD04 [Coordinates: 42.333045, -83.412775]
Sample site located on Warren Rd, 0.2 miles west of Newburgh Rd. [Landmark nearby Joe Randazzo's Fruit Market].
Parking: Park West of bridge. Grab samples to be collected: *E. coli* & TSS
Accessibility: Sample at bridge on Warren Rd. Upstream.

Sample ID	Intersection	Coordinates	Waterbody	SWMA
Main Branch				
MN01	Melon St. & Schaeffer Hwy.	42.290580, -83.167527	Main Branch	Main 3-4
M12	Greenfield Rd. & Butler Rd.	42.294618, -83.179241	Main Branch	Main 3-4
US8	Rotunda Dr. & Republic Dr.	42.301095, -83.199398	Main Branch	Main 3-4
G42	Ann Arbor Trail & Walter Cassidy Dr.	42.336059, -83.247163	Main Branch	Main 3-4
US7	Plymouth Rd. & Rouge Park Dr.	42.371776, -83.255556	Main Branch	Main 3-4
G43	Fenkell Ave. & Virgil St.	42.400043, -83.271583	Main Branch	Main 3-4
M15	West 7 Mile Rd. & Berg Rd.	42.429135, -83.269132	Main Branch	Main 3-4
MN08	Berg Rd. & West 8 Mile Rd.	42.444080, -83.268760	Evans Ditch	Main 1-2
MN09	Tamarack Trail & Hiawatha Trail	42.466608, -83.252509	Tamarack Creek	Main 1-2
MN10	Tamarack Trail & West 10 Mile Rd.	42.471861, -83.253591	Evans Ditch	Main 1-2
US5	Beech Rd. & Shiawassee St.	42.447867, -83.297672	Main Branch	Main 1-2
MN12	Inkster Rd. & West 9 Mile Rd.	42.456262, -83.313634	Main Branch tributary	Main 1-2
MN13	Inkster Rd. & Spring Valley Dr.	42.457364, -83.317543	Main Branch tributary	Main 1-2
MN14	West 10Mile Rd. & Samoset Trail	42.471354, -83.303989	Pebble Creek tributary	Main 1-2
MN15	West 11 Mile Rd.& Mel Bauman Blvd.	42.485820, -83.308736	Pebble creek	Main 1-2
MN16	West 13 Mile Rd. & Middlebelt Rd.	42.514245, -83.342398	Pebble creek	Main 1-2
MN17	West 11 Mile Rd. & Franklin Rd.	42.484291, -83.288878	Pebble Creek tributary	Main 1-2
MN18	West 13 Mile Rd. & Cheviot Hills Dr.	42.509759, -83.299754	Pebble Creek tributary	Main 1-2
G59	Civic Center Dr. & Telegraph Rd.	42.479135, -83.284474	Main Branch	Main 1-2
G46	12 Mile Rd. & Wildbrook Dr.	42.501224, -83.278604	Franklin branch	Main 1-2
H60	West 13 Mile Rd. & Bingham Rd.	42.515456, -83.279595	Franklin branch	Main 1-2
G461	West 14 Mile Rd. & Franklin Rd.	42.529993, -83.305529	Franklin branch	Main 1-2
MN23	West Maple Rd.& Middlebelt Rd.[Site at 7056 10 Hill Drive, West Bloomfield Township, MI]	42.535364, -83.329512	Franklin Branch tributary	Main 1-2
MN24	Site North of Brookridge Dr. & Cold Spring Ln.	42.531156, -83.334984	Franklin branch	Main 1-2
MN25	Walnut Lake Rd. & Doherty St.	42.559470, -83.357840	Franklin Branch tributary	Main 1-2
M03	12 Mile Rd. & Lahser Rd.	42.510152, -83.262320	Main Branch tributary	Main 1-2
MN27	Evergreen Rd. & Riverside Dr.	42.527673, -83.241951	Main Branch	Main 1-2
MN28	West Maple Rd. & Baldwin Rd.	42.545581, -83.224560	Main Branch tributary	Main 1-2

MN29	Tamarack Way & Kingswood Campus Dr.	42.574731, -83.245461	Sunken bridge drain	Main 1-2
MN30	Accesible at Lone Pine Rd. & Thetford Ln.	42.564881, -83.264538	Sunken bridge drain	Main 1-2
MN31	Vaughan Rd. & Orchard Ridge Rd.	42.573539, -83.258766	Sunken Bridge Dr. tributary	Main 1-2
MN32	Devon Brook Dr. & Telegraph Rd.	42.589847, -83.278999	Sunken Bridge Dr. tributary	Main 1-2
MN33	Stonycroft Ln. & East Long Lake Rd.	42.585555, -83.237172	Sunken Bridge Dr. tributary	Main 1-2
M01	West Big Beaver Rd. & Adams Rd. [sample at Big Beaver Rd]	42.560498, -83.214754	Main Branch	Main 1-2
MN35	Firefighters Park	42.609323, -83.179803	Main Branch	Main 1-2
MN36	Squirrel Rd. & East Square Lake Rd.	42.603743, -83.222664	Sprague Branch	Main 1-2
Lower Branch				
L05D	South Military St. & Morley Ave.	42.308582, -83.252712	Lower Branch	Lower 2
US1	John Daly St. & Lower Rouge Pkwy Dr.	42.300629, -83.300559	Lower Branch	Lower 2
LW03	Inkster Rd. & Avondale St.	42.302771, -83.305465	Perrin Drain	Lower 2
G97	Michigan Ave. & Hendry Ruff Rd.	42.290030, -83.339159	Lower Branch	Lower 2
L06	South Wayne Rd. & Michigan Ave.	42.284978, -83.383583	Lower Branch	Lower 2
G64	Annapolis St. & Treadwell St.	42.273615, -83.400887	McClaughrey Drain	Lower 2
LW07	South Newburg Rd. & Hillcrest Dr.	42.285603, -83.407092	Hunter drain	Lower 2
LW08	Michigan Ave. & Hannan Rd.	42.278955, -83.423370	Bingell drain	Lower 2
LW09	Van Born Rd. & Hannan Rd.	42.265233, -83.429126	Bingell drain	Lower 1
US9	Hannan Rd. & Michigan Ave.	42.28439, -83.42732	Lower Branch	Lower 2
G92	Michigan Ave. & Haggetry Rd.	42.279900, -83.446952	Lower Branch	Lower 1
L51	Michigan Ave. & South Morton Taylor Rd.	42.276348, -83.465606	McKinstry Drain	Lower 1
G94	Michigan Ave. & Sheldon Rd.	42.281770, -83.476143	Sines drain	Lower 1
L01	South Beck Rd. & Lindenhurst Blvd. - northern stream crossing	42.283485, -83.505433	Lower Branch	Lower 1
G93	S. Beck Rd. & Lindenhurst Blvd. - Southern stream crossing	42.282302, -83.505405	Fowler creek	Lower 1
G200	Denton Rd. & Hudson Dr.	42.297201, -83.525834	Lower Branch	Lower 1
L02	Palmer Rd. & South Lotz Rd.	42.294140, -83.436054	Fellows creek	Lower 1
LW12	Haggetry Rd. & Palmer Rd.	42.300940, -83.453644	Truesdell drain	Lower 1
LW13	Cherry Hill Rd. & North Haggetry Rd.	42.308552, -83.443875	Fellows creek	Lower 1
LW14	North Canton Center Rd. & Ford Rd.	42.323079, -83.487962	North branch fellows creek	Lower 1

Upper Branch				
U05	Telegraph Rd. & River Circle	42.392683, -83.276665	Upper Branch	Upper
U04	Beech Daly Rd. & Ross Dr.	42.392142, -83.295563	Bell Branch	Upper
U03	Inkster Rd. & Meadowbrook St.	42.405507, -83.315252	Bell Branch	Upper
UP04	5 Mile Rd.& Ellen Dr.	42.396943, -83.390460	Bell Branch	Upper
UP05	West 6 Mile Rd.& Wayne Rd.	42.411201, -83.392861	Bell Branch Trbiutary	Upper
U15	Farmington Rd.& Pollyanna	42.411557, -83.379109	Seeley Drain	Upper
U17	West 7 Mile Rd.& Osmus St.	42.426445, -83.363430	Tarabusi creek	Upper
UP08	Brittany Hill Dr. & Grand River Ave.	42.467299, -83.408839	Tarabusi creek	Upper
U02	Graham Rd. & Telegraph Rd.	42.398208, -83.278385	Upper Branch	Upper
G71	Inkster Rd. & Margareta St.	42.424304, -83.316061	Upper Branch	Upper
G19	West 8 Mile Rd. & Milburn St.	42.441280, -83.348802	Bell Branch Trbiutary	Upper
G72	Folsom Rd. & Tuck Rd.	42.449199, -83.346448	Upper Branch	Upper
UP16	Ravenwood St. & Nottingwood St.	42.507190, -83.368318	Minnow pond drain	Upper
UP15	West 13 Mile Rd. & Haggetery Rd.	42.514159, -83.436991	Seeley drain	Upper
US3	Shiawassee St. & Farmington Rd.	42.464520, -83.368684	Upper Branch	Upper
Middle Branch				
D06	Ford Rd. & Edward N Hines Dr.	42.330724, -83.248019	Middle Branch	Middle 3
US2	Inkster Rd. & Edward N Hines Dr.	42.348262, -83.312538	Middle Branch	Middle 3
MD03	Wayne Rd. & Joy Rd.	42.351892, -83.386037	Tonquish creek	Middle 3
MD04	Warren Rd. & N Newburgh Rd	42.333045, -83.412775	Willow creek	Middle 3
D62	Joy Rd. & Manton Ave.	42.351646, -83.462714	South branch Tonquish creek	Middle 1
MD06	Ann Arbor Rd. & S Main St.	42.359590, -83.469624	South branch Tonquish creek	Middle 1
MD07	Wayne Rd. & Edward Hines Dr.	42.358514, -83.386578	Middle Branch	Middle 3
US10	Edward Hines Dr. & Haggerty Rd. [West of I-275]	42.371621, -83.445615	Middle Branch	Middle 1
MD09	Plymouth Rd. & Edward Hines Dr.	42.376143, -83.454400	Middle Branch	Middle 1
D03	Edward Hines Dr. West of 7 Mile Rd.	42.425697, -83.481137	Johnson creek	Middle 1
MD11	West 6 Mile Rd. & Beck Rd.	42.411955, -83.511146	Johnson creek	Middle 1
MD12	West 6 Mile Rd. & Lake View Circle	42.408146, -83.519346	Sump drain	Middle 1
MD13	Napier Rd. & Last Dr.	42.381706, -83.555045	Johnson creek	Middle 1

MD14	S.Main St. & Beal St.	42.428915, -83.478230	Walled Lake Branch	Middle 1
MD15	Ashbury Dr. & Chase Dr.	42.447750, -83.469200	Thornton Creek	Middle 1
MD16	W 10 Mile Rd. & Myrtle Ct.	42.461387, -83.464450	Walled Lake Branch	Middle 1
MD17	12 Mile Rd. & Taft Rd.	42.495015, -83.495897	Walled Lake Branch	Middle 1
MD18	Meadowbrook Rd. & Chattman St.	42.458972, -83.454809	Ingersol Creek	Middle 1
MD19	12 Mile Rd. & Novi Rd.	42.495584, -83.469970	Bishop Creek	Middle 1

Notes:

SWMA = Stormwater Management Area

Appendix B

ECT Field Forms

Rouge River Monitoring Project **Daily Conditions Log**

Date: _____

Field Crew: _____

Weather conditions: ☐ Sunny ☐Partly Cloudy/Sunny ☐ Cloudy ☐ Rain

Temperature: _____°F Last measureable rainfall: ___/___/ 17 _____in.

Watershed(s) sampled by this team:

_____

_____

Sites visited (even if sample was not collected):

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

QA/QC samples (duplicate and blank) collected? ☐ yes ☐ no

If no, describe events preventing the sample collection and report to Task Manager: _____

_____

_____

_____

Other notable events (traffic issues, courier issues, etc.): _____

_____

_____

_____

_____

_____

_____

Team Lead (signature): _____

ECT Environmental Consulting & Technology, Inc.

1155 Brewery Park Blvd, Suite 115
Detroit, MI 48207
313-963-6600
www.ectinc.com

CHAIN OF CUSTODY RECORD

PROJECT NUMBER (INCLUDE TASK NUMBER)
15-0440 0500

PROJECT NAME/LOCATION
ARC SAW Rouge River Monitoring

SAMPLER(S) NAME (S)

PRESERVATIVES

ANALYSES REQUESTED

Item #	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	MATRIX	CONTAINERS NO.	CONTAINERS SIZE		*E. coli*	TSS								REMARKS
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								
	07/05/17			X		water	2	120 mL / 1L		X	X								

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	Report and Original COC to: Meghan Price mprice@ectinc.com
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	Laboratory: Paragon Labs
RELINQUISHED BY:	DATE:	TIME:	RECEIVED AT LAB BY:	DATE:	TIME:	Date Results Required: Standard TAT

Environmental Consulting & Technology, Inc.

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CHAIN OF CUSTODY RECORD

PROJECT NUMBER (INCLUDE TASK NUMBER)
15-0440 0500

PROJECT NAME/LOCATION
ARC SAW Rouge River Monitoring

SAMPLER(S) NAME (S)

PRESERVATIVES

ANALYSES REQUESTED

Item #	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	MATRIX	CONTAINERS NO.	CONTAINERS SIZE	*E. coli*	*TSS*	REMARKS
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	
	06/29/17			X		water	2	120 mL / 1L	X	X	

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	Report and Original COC to: Meghan Price mprice@ectinc.com
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	Laboratory: Paragon Labs
RELINQUISHED BY:	DATE:	TIME:	RECEIVED AT LAB BY:	DATE:	TIME:	Date Results Required: Standard TAT

ECT Environmental Consulting & Technology, Inc.

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313-963-6600
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CHAIN OF CUSTODY RECORD

PROJECT NUMBER (INCLUDE TASK NUMBER)
15-0440 0500

PROJECT NAME/LOCATION
ARC SAW Rouge River Monitoring

SAMPLER(S) NAME (S)

PRESERVATIVES

ANALYSES REQUESTED

Item #	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	MATRIX	CONTAINERS NO.	CONTAINERS SIZE		*E. coli*	TSS								REMARKS
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								
				X		water	2	120 mL / 1L		X	X								

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	Report and Original COC to: Meghan Price mprice@ectinc.com
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:	Laboratory: Paragon Labs
RELINQUISHED BY:	DATE:	TIME:	RECEIVED AT LAB BY:	DATE:	TIME:	Date Results Required: Standard TAT

Rouge River Monitoring Project – Sampling Log

Date: _____ **Site ID** _____

Field Crew: _____

OBSERVATIONS

Distance from Vertical Reference Point to: water surface: _____ feet bottom: _____ feet

Was there flow in the river? ☐ yes ☐ no (DO NOT SAMPLE)

Color of water (check all that apply): ☐ muddy brown ☐ black ☐ clear

☐ oily film ☐scum ☐Other (describe): _____

Is the water the same color across the width of the river? ☐ yes ☐ no

If no, then describe: _____

_____

_____

Is there any floating debris on the water? ☐ yes ☐ no

Describe: _____

Is there any debris in trees along the bank? ☐ yes ☐ no

Describe: _____

Is there a notable odor at the site? ☐ yes ☐ no

Describe: _____

Does the sample have a notable odor? ☐ yes ☐ no

Describe: _____

LABORATORY SAMPLES

Collection time of laboratory water samples _____

Where were the samples collected? ☐ mid-stream (preferred) ☐ other

If other describe (by measuring from reference point): _____

Upstream or Downstream (circle)?

Were duplicate/blank samples collected at this location (circle): ☐ yes ☐ no

Team member (signature): _____

Rouge River Monitoring Project

Velocity Measurement Log

Site ID _____ **Date:** _____

Field Crew: _____ **Meter Used:** _____

Time Started: _____ **Time Finished:** _____

Distance to water surface from Vertical Reference Point at start: _____ ft

Distance to water surface from Vertical Reference Point at end: _____ ft

Width of stream at bridge crossing (edge of water to edge of water): _____ ft

Divide river into 20 sub sections, ensuring each sub section has no more than 10% (5% ideally) of the total discharge: ☐ yes ☐ no

Observations: (Start section numbering of river sections, looking upstream on the left side)

If river depth is less than 2.5 ft, measure velocity at sixth tenths depth point. If river depth is greater than 2.5 ft, measure velocity at two tenths and eight tenths depth.

Section #	Horizontal Distance (ft)	Velocity Readings		
		0.2 Reading	0.8 Reading	0.6 reading
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Rouge Monitoring Project
Stream Profile Log

Site ID _____ **Date:** _____

Field Crew _____

Time Started: _____ **Time Finished:** _____

STREAM CHARACTERISTICS:

Set Vertical Reference Point: Yes/No Describe Location (what section number it is in): _____
_____

Distance to stream bottom from Vertical Reference Point: _____ft

Width of stream at bridge crossing (edge of water to edge of water): _____ ft

Divide river into at least 20 sub sections, ensuring each sub section has no more than 10% (5% ideally) of the total discharge: Yes/No

Mark on bridge start and stop of horizontal profile: Yes/No

Set Horizontal Reference Line: Yes/No State location (on bridge, etc.) _____
_____

Observations: (Start section numbering of river sections, looking upstream on the left side)

Stream Profile Log (continued)

Site ID _____ **Date:** _____

Horizontal Distance (ft)	From Horizontal Reference Line		
	Distance to water surface	Distance to stream bottom	Water Depth

Appendix C

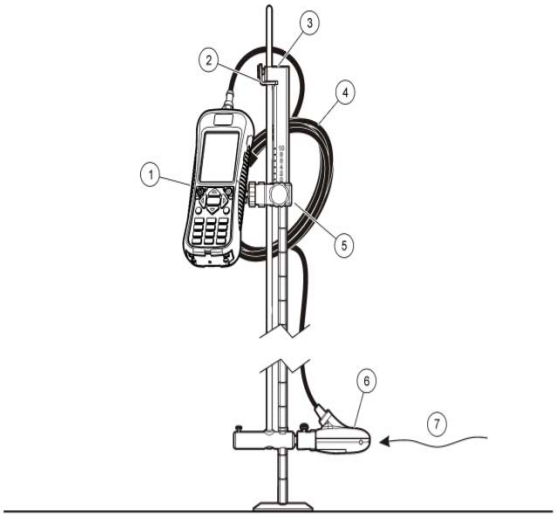
ECT Standard Operating Procedures

For
Velocity Meter

Stream Sample Collection

STANDARD OPERATING PROCEDURE

FOR MEASURING WATER VELOCITY
USING OTT MF PRO / HACH FH950 CURRENT METER



1 Portable meter	5 Adjustable mount for portable meter
2 Sensor height lock/release device	6 Sensor assembly
3 Top setting wading rod (accessory)	7 Flow direction
4 Sensor cable	8 Base

Figure 1: Fully assembled flow meter on wading rod [www.ott.com]

SECTION A – DATA GENERATION & AQCUISITION

This procedure addresses the use and maintenance of a handheld Flow Meter. [***Principle****: When the sensor is placed in flowing water, a magnetic field around the sensor creates a voltage proportional to the flow velocity. This voltage amplitude, which represents the rate of water flow around the sensor, is detected by electrodes in the sensor and processed by the sensor microprocessor. The processed signal is digitally transmitted through the sensor cable to the portable meter and the information is shown on the meter display.* ***Source:*** *OTT flowmeter manual*]

The minimum depth required to use this instrument is 3.18 cm (1.25 inch). The velocity measurement range for this meter is 0 to 6.09 m/s (0 to 20 ft./s).

A.1 Equipment List

- Velocity Meter and flow sensor
- Wading rod / Pole
- Surveyor's tape measure
- Waders
- Field forms and pen
- PFDs

A.2 Method Summary

Field personnel will use the flow meter to capture velocity of selected cross-sections of the river. The meter is designed for single person use. The assembled flow meter has a digital meter attached to the wading rod [or pole] by a meter mount and the flow sensor is located at the bottom of the wading rod [see **Fig1]**. Velocity measurements should be taken parallel to the flow of stream with the sensor facing upstream. The flow meter is digital and shows the velocity at each station. The velocity data should be logged in the field forms.

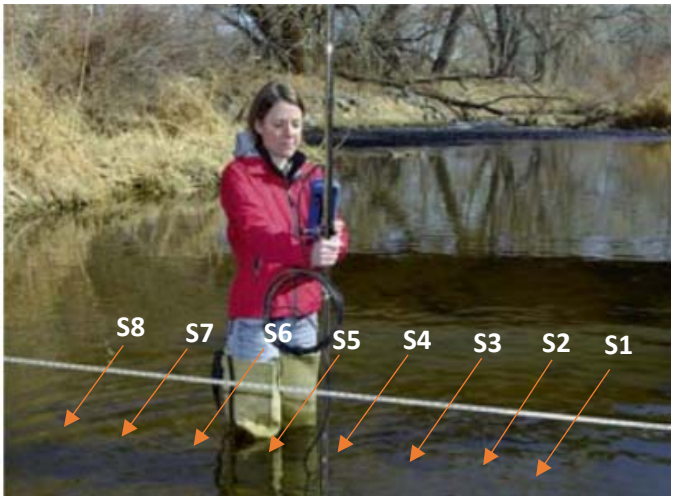


Figure 2: Data collection (NOTE: ECT personnel collecting measurements via wading in the stream MUST wear PFDs)

A.3 Procedure for Measuring stream flow with the Flow Meter

Start by dividing the stream channel into several stations to get the stream profile. **EN - ISO 748 standards** can be used for spacing the stations based on channel width. **Depth and width** should be measured for each station to give the overall stream cross-section profile. At locations with staff gage, gage height should be taken (noted). At locations without a staff gage, the vertical reference point shall be used.

Use of flow meter at each river section:

Make sure the sensor is connected properly before starting the measurement. Measurements are to be taken from the bridge.

1. Divide river section into stations.
   Before starting to measure the velocity, extend the tape measure from the Left bank end to Right bank end of the river [Extend the tape measure on the bridge]. Measure the width of the river section and note it in field form. Divide the river section into several stations such that each station contains no more than 10% of the total discharge. Measure the distance to vertical reference at the start and at the end.
   Note: The distance to vertical reference is from the Top of the bridge to the water surface.

2. Power on the Flowmeter.

   When powered on the meter runs a self-test and displays the result. Check for sensor status. If sensor status shows connected press ok and go to Main Menu.

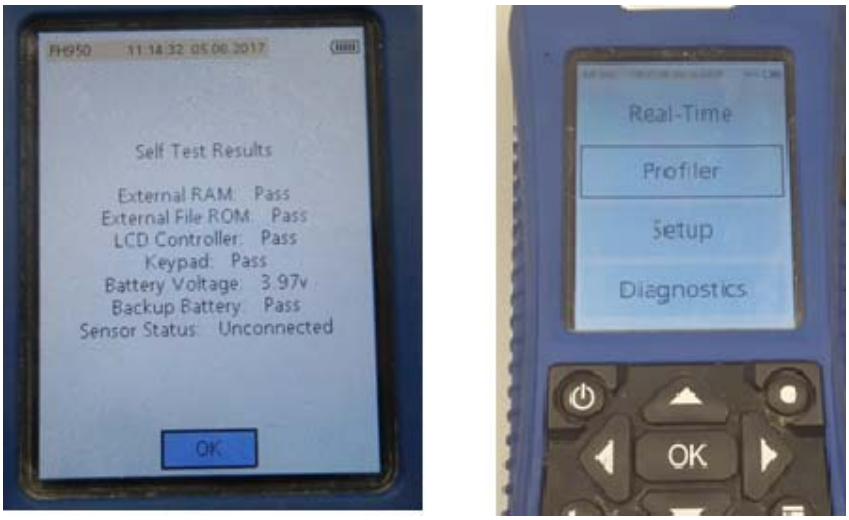


Figure 3: HACH Flow meter self-test and main menu

3. Measure velocity [Real-time]
   When measuring the velocity, ***the sensor should face upstream and parallel to the stream flow***. To measure instantaneous velocity chose option Real-Time in the menu. The Real-time screen shows a graph of Time vs Velocity. The velocity measurement takes 30 seconds to complete at one station. Based on the water depth at the station there are two options to measure velocity. Velocity measurements will be collected at the **6/10ths** point for stream depths less than 2.5 feet and at the **2/10ths and 8/10ths** point for stream depths of greater than 2.5 feet.

   Start measuring velocity from first station at the left end of the river section and move towards right. If the velocity is in negative at a station enter the velocity as 0. Write down the velocity reading at each station in the given field velocity log forms.
   Note on field forms if you are not able to measure velocity at a station [ex: debris, log jams]

4. The summary data should be recorded in field data sheets for each site.

Use of velocity log field form

The data collection is manual for this project. Field crew should fill velocity log form for each site visited.

1. Fill the basic details in the form [crew, start and end time, site id, date meter used].
2. Enter the width of the stream section measured using the tape measure.
3. Note the distance to the vertical reference point at the start and end of the velocity measurement. The flow measurements are taken from the bridge; hence the vertical reference point should be

the distance to the water surface from the bridge at the start [left bank end] and vertical reference at the end [right bank end].

4. For each station of velocity measurement, enter the horizontal distance [distance from the starting end to the point where the velocity measurement is taken].
5. If the depth at that station is less than 2.5 ft. Take one velocity measurement at six tenths depth [i.e. 0.6 reading].
6. If the depth at a station is more than 2.5 ft. Take two velocity measurements at two tenths (0.2) depths and eight tenths (0.8) depth and enter in the field form in the respective columns.

A.4 Inspection, and Maintenance

Maintenance: The sensor and meter should be maintained clean and be checked for damage before and after each use. HACH FH950 box comes with an AC wall charger. Make sure the meter is charged. Information related to the battery are provided in the meter manual. In the event of unexpected flow levels or if used in contaminated water, disconnect the sensor and soak in clean water to remove any contamination. Rinse sensor with clean water before each use.

Troubleshoot errors:

Message/Problem	Solution
Sensor is not connected	Connect a sensor and try the action again
Value is out of range	Change the measurement parameters or put in a different value, then try action again.
Sensor data is known to be not correct or not accurate	Clean the sensor and test
Display is dim or not visible	Push a key on the keypad
Data is not available or access to the data is not possible	Make sure that the USB option (main menu) is set to Mass Storage.
Meter is unresponsive	Push and hold the power button for atleast3 seconds. This de-energizes the meter. Energize the meter again.

[Source: Flowmeter manual]

A.5 Restrictions and Limitations

Safety considerations: Stream profiling and stream velocity measurement may involve hazardous conditions such as sudden increased flow, lightning, etc. During unfavorable conditions, it is highly recommended that measurement stopped or rescheduled. Precaution should be taken when operating equipment and working on, in, or around water, as well as possibly steep and unconsolidated banks.

All field crews should follow EPA, OSHA, and specific health and safety procedures and be equipped with safety equipment such as proper wading gear, personal flotation devices (PFDs), gloves, first aid kits, cellular phone, etc. Always use caution when measuring from a bridge and take appropriate actions to make the situation as safe as possible; suspend the measurement if conditions are unsafe. If measurements are to be taken by wading in the water, PFDs are required, regardless of water depth.

Limitations: The range of velocity measurement is 0 to +20 ft/s (0 to 6.09 m/s) 4. The range of depth measurement is 0 to 10 feet.

SECTION B – DATA MANAGEMENT

B.1 Making Data Usable

Field crews will complete Velocity Meter Observation Sheets for every site where velocity meter readings are collected. The field data should be converted to an electronic format that is conducive to the future use of the data. All field forms or logs should be scanned into an electronic format (pdf) and saved on the ECT server under the project file.

B.2 Quality Assurance

If data is manually entered into a database, a quality assurance check should be performed. This check should be done by someone other than the one who originally entered the data. There should be a spot in the database to note the initials of the individual that entered the data, and the initials of the individual who performed the QA check on data entry.

SECTION C – REFERENCES

https://www.hachflow.com/pdf/FH950_User_Manual.pdf

http://www.ott.com/en-us/products/download/ott-mf-pro-operating-instructions/

Rouge River Monitoring Project

Velocity Measurement Log

Site ID _____ **Date:** _____

Field Crew: _____ **Meter Used:** _____

Time Started: _____ **Time Finished:** _____

Distance to water surface from Vertical Reference Point at start: _____ ft

Distance to water surface from Vertical Reference Point at end: _____ ft

Width of stream at bridge crossing (edge of water to edge of water): _____ ft

Divide river into 20 sub sections, ensuring each sub section has no more than 10% (5% ideally) of the total discharge: ☐ yes ☐ no

Observations: (Start section numbering of river sections, looking upstream on the left side)

If river depth is less than 2.5 ft, measure velocity at sixth tenths depth point. If river depth is greater than 2.5 ft, measure velocity at two tenths and eight tenths depth.

Section #	Horizontal Distance (ft)	Velocity Readings		
		0.2 Reading	0.8 Reading	0.6 reading
1				
2				
3				
4				
5				
6				
7				
8				

SAMPLE COLLECTION AND HANDLING PROTOCOL

Standard Operating Procedure

1.0 Scope and Application

This procedure covers the collection, storage, and transport of water samples. The procedures are designed to maintain the integrity of the samples from the time they are collected to analysis at the laboratories.

2.0 Method Summary

Water quality samples are collected either by autosamplers or manual grabs. The composite autosamples develop a single flow-weighted composite of the discharge event.

Samples are distributed to laboratory bottles that have been prepared for specific parameter analyses using a churn splitter (See Sample Compositing and Splitting SOP). The distribution is based on the type of analyses to be performed (composite, parameters) and the available sample volume. The bottles are sized to provide the sample volume required by the labs to perform the specific analysis. The label on each bottle is completed to identify the date, site ID, and sample type.

The filled lab bottles are placed in coolers for transfer to the laboratories. A chain of custody (COC) form is completed for all the bottles contained in a single cooler. Each cooler and its COC form should have only those bottles that are being sent to a single lab. Custody of the samples is transferred to the laboratory upon arrival.

3.0 Safety, Restrictions and Limitations

3.1 Safety

Protective clothing including gloves needs to be worn by field crew members when handling the samples to protect them against possible contaminates in the sample or preservatives in some of the laboratory bottles. At a minimum, sampling field personnel should be equipped with eye protection and gloves at all times when handling samples. Extreme care should be taken to prevent the possibility of ingesting any sample, including touching the mouth with hands, which have been handling samples.

3.2 Restrictions

E. coli and oil & grease samples must be collected by manual grabs instead of automatic samplers.

Each lab has varying volume requirements (minimum and optimum) for samples with which to perform various analyses. Confirm with the laboratory the optimum sample volume for the analyses being performed.

Specific bottle types and preservation techniques are required by the EPA to maintain the integrity of the sample prior to analysis. Ensure that the appropriate sample bottles are available and are used during sample collection.

3.3 Limitations

Each parameter analysis has a specific time a sample can be held prior to analysis. Know and adhere to these hold times.

4.0 Sample Collection, Handling and Preservation

Covered in this SOP

5.0 Equipment and Material

The following equipment is required for the manual collection of water samples:

- High-powered lamps or flashlights
- Field forms and log book
- Safety equipment (personal and traffic)
- Maps, routes and schedules
- Field sampling plan with SOPs
- Disposable latex gloves
- Clean composite container (for composite samples only)
- Grab sample device with clean glass container and Alpha/Beta bottle (1 per sampling team)
- De-ionized water
- Propanol
- Alconox
- Cooler with ice or ice packs (1 per site)
- Laboratory bottles (have extra bottles on hand)
- Chain of Custody forms
- Deionized water
- Ziplok bags

6.0 Procedures

Samples to be analyzed for *E. coli* must be collected using a sterilized laboratory bottle. Both *E. coli* and oil & grease samples must be collected manually.

6.1 Automatic Sample Collection

Samples can be collected using the ISCO 6700 Autosampler. The autosampler can be programmed to collect composite samples of varying volume based on time or flow. The autosampler has the capacity for twenty-four 1 Liter bottles or one 2.5 gallon container. This capacity can be increased if required by swapping the bottle with another clean bottle. The programming and configuration of the autosampler is described in Automatic Sampler Configuration and Programming SOP.

The task leader will identify the required collection sequence and the QA/QC samples and will inform the sampling field staff. To simplify the procedures for the field crews, all autosampler samples will use the minimum sample volumes.

6.2 Manual Sample Collection

New, clean, latex gloves should be worn at all times when handling the sample bottles and obtaining samples in the field. Sample bottles should be organized prior to each grab according to the sampling requirements (defined for the specific round of sampling to be performed at the site.

a. Don new latex gloves
b. Attach a clean sampling bottle to the sampling device (pole, rope, etc.)

- A clean, Alpha/Beta Bottle and manual sampling bottle will be used to retrieve the sample aliquots from the flow stream (river, overflow or discharge). *E. coli* samples are always to be collected directly into the sterile laboratory bottle.

c. Obtain the sample from the well-mixed center of flow, below the surface.
   - Do not disturb bottom sediments. If the flow is too shallow for the alpha/beta bottle to be completely submerged, collect the sample from the top portion without disturbing the bottom sediments.

d. When using the Alpha/Beta bottle, once the sample is obtained, pour off, through the sampling port in the Alpha/Beta Bottle into the laboratory bottle.

e. For composite samples – collect the sample from the stream. Pour the sample into a large glass composite bottle.
   - A large composite bottle will be dedicated for use at each site to prevent cross contamination.
   - Each large bottle shall be labeled with site identification number prior to going out into the field to ensure the same large bottle is used at each site.
   - Filled composite bottles shall be placed immediately on ice in a cooler.

f. One member of the field team should take all notes, fill out labels, etc. while the other member does all of the sampling.

g. Ice should surround all sample bottles.

6.3 Sample Handling

After the sample has been collected in either the autosampler bottles or the grab sample vessel, it must be transferred to the various laboratory bottles with a sample splitting device (See Sample Compositing and Splitting SOP). All laboratory bottles are cleaned, labeled and preservative added by the laboratory. Bottles will be stored at the central staging facility in defined bottle bins. Additional bottles for QA/QC samples will also be stored in separate bottle bins.

Sampling handling procedures include:

a. Wear clean latex gloves during all sample handling procedures.
b. Keep the sample iced or refrigerated at all times following sample collection.
c. Do not wash or rinse the laboratory bottles. They have been washed and prepared by the laboratory.
e. Do not overfill the laboratory bottles. Some have been prepared with preservatives that may be diluted and ruined if the bottles are overfilled. Use caution in handling and filling the lab bottles, to prevent acid burns. Wear gloves and eye protection.
g. Do not attempt to fill more than one laboratory bottle at a time. A clear sequence of sample transfer from collection bottle/vessel to laboratory bottle must be maintained.

6.4 Sample Compositing and Splitting

See Sample Composting and Splitting SOP for equipment and methods on how to composite and split the water samples.

6.5 Sample Labeling and Transfer

Each sample label will be completed by the sample team. Complete the sample label just prior to filling the bottle or just after. Writing on the label is easier if the label is dry. The following labeling procedures should be followed:

a. The Analysis and Preservative sections of the sample bottle label should be completed by the laboratory prior to field sample collection.

b. The samplers name or initials must be written on the label, along with the site ID, date, and time.

7.0 QA/QC

On-site QA/QC will be the responsibility of the field team manager. It shall be his or her responsibility to ensure that all field staff are trained and adequately supervised in terms of sample handling procedures. It shall also be the coordinator's responsibility to ensure that all QA/QC samples are collected per the field sampling manual.

Additional samples are required as the means to determine if contamination of the samples occurs due to improper handling. Further quality assurance reviews of field procedures will occur based on the results of QA/QC analytical results. Implications of the field blanks and concerns regarding the accuracy of split samples will be disseminated to the field crews via the event coordinator.

The QA/QC samples which must be developed by the field crews include: field duplicate samples and field/equipment blanks.

a. Field Blanks are created by filling laboratory bottles with DI water in the same manner as the sample is collected and transferred to the laboratory bottle. The purpose of a field/equipment blank is to determine if field contamination may be affecting the analytical sample results. Field blanks will utilize DI water as the sample and will be sent to the same production laboratory as receives the standard sample. One field/equipment blank should be collected for every 20 standard samples.

   For autosampler field blanks, perform the following:
   - Prepare the field blank before the event.
   - Fill a clean autosampler bottle with DI water.
   - Cap and shake the bottle.
   - Pour off into laboratory bottles.
   - Cap and label.

   For grab sample field blanks, perform the following:
   - Prepare the field blank in the field in the same manner as samples are collected.
   - Prepare the field blank prior to utilizing the manual sampling container in the river.
   - Rinse the sampling container with DI water, alconox, propyanol and DI water.
   - Fill the sampling container with the necessary volume.
   - Pour volume into laboratory bottles.
   - Cap and label.

   For *E. coli* field blanks perform the following:
   - Prepare the field blank in the field in the same manner as samples are collected.
   - Pour DI water into the *E. coli* laboratory bottle.
   - Cap and label.

b. Field Duplicates are collected to determine the variability at sampling sites. Field duplicate samples must be generated for all parameters. Field duplicates will utilize the same sample volume and will be sent to the same production laboratory as receives the standard sample. One field/equipment blank should be collected for every 10 standard samples.

   For autosampler field duplicates, perform the following:
   - Identify a location at each site where a duplicate will be collected.
   - Note location on the field form; it should vary from event to event.

- Collect sample as described in Section 6.0.
- Use the churn splitter to pour off the required amount of volume into the laboratory container.
- Perform the same step for the duplicate, using an additional laboratory container for the duplicate.

For grab sample field duplicates, perform the following:
Oil & Grease

- Identify a location at each site where a duplicate will be collected.
- Note location on the field form; it should vary from event to event.
- Collect sample as described in Section 6.0.
- Mix and pour off the required amount of volume into the laboratory container.
- Perform the same step for the duplicate, using an additional laboratory container for the duplicate.

E. coli

- Collect sample as described in Section 6.2.
- Fill two separate laboratory containers with water. Do this by either mounting the bottles side by side on the sampling device or by filling a sterilized laboratory bottle with 300mL of sample, cap that bottle, shake the sample and then pour off sample into two separate sterile laboratory bottles.

8.0 Computations, Documentation and Reporting

All field activities are recorded on site visit sheets or in site log books. The samples sent to the laboratories are documented on the COC forms.

9.0 Reference

None

QA/QC Sample Log Sheet

Date: _____ Sampler: _____

SITE	Time	QA/QC SAMPLE (duplicate and/or blank)

Special instructions (unless otherwise stated in the Quality Assurance Project Plan)

- Collect 1 duplicate sample for every 10 standard samples.
- Collect 1 blank sample for every 20 standard samples.

Appendix D

IDEXX 95% Confidence Limits

IDEXX Quanti-Tray®/2000
MPN Table (per 100mL) with 95% Confidence Limits

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
0	0	<1	0.0	3.7
0	1	1.0	0.0	3.7
0	2	2.0	0.3	5.6
0	3	3.0	0.6	7.3
0	4	4.0	1.1	8.9
0	5	5.0	1.7	10.5
0	6	6.0	2.3	12.1
0	7	7.0	2.9	13.7
0	8	8.0	3.7	15.3
0	9	9.0	4.5	15.8
0	10	10.0	5.2	16.9
0	11	11.0	5.9	18.5
0	12	12.0	6.9	20.1
0	13	13.0	7.8	21.2
0	14	14.1	8.6	21.9
0	15	15.1	9.0	23.4
0	16	16.1	9.6	24.9
0	17	17.1	10.5	25.7
0	18	18.1	11.5	26.9
0	19	19.1	12.5	28.6
0	20	20.2	13.2	29.3
0	21	21.2	13.9	30.5
0	22	22.2	14.5	31.8
0	23	23.3	15.7	33.1
0	24	24.3	16.4	34.2
0	25	25.3	17.6	35.2
0	26	26.4	18.3	36.5
0	27	27.4	19.5	37.7
0	28	28.4	19.7	38.6
0	29	29.5	21.0	39.9
0	30	30.5	21.7	41.2
0	31	31.5	22.5	42.3
0	32	32.6	23.9	43.4
0	33	33.6	24.6	44.4
0	34	34.7	25.4	45.7
0	35	35.7	26.2	46.8
0	36	36.8	27.7	48.0
0	37	37.8	28.5	49.0
0	38	38.9	29.2	50.3
0	39	40.0	30.0	51.2
0	40	41.0	30.8	52.8
0	41	42.1	31.6	53.7
0	42	43.1	33.3	54.7
0	43	44.2	34.1	56.1
0	44	45.3	34.9	57.1

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
25	0	33.6	22.0	48.9
25	1	35.0	22.9	51.2
25	2	36.4	23.8	52.6
25	3	37.9	25.5	54.0
25	4	39.3	26.5	55.9
25	5	40.8	28.3	57.3
25	6	42.2	29.3	59.0
25	7	43.7	30.3	60.7
25	8	45.2	31.3	62.5
25	9	46.7	33.3	64.2
25	10	48.2	34.4	66.0
25	11	49.7	35.4	67.3
25	12	51.2	36.5	69.0
25	13	52.7	37.6	70.7
25	14	54.3	39.7	72.4
25	15	55.8	40.9	74.0
25	16	57.3	42.0	75.9
25	17	58.9	43.1	77.6
25	18	60.5	45.5	79.5
25	19	62.0	46.7	81.2
25	20	63.6	47.8	83.0
25	21	65.2	49.0	84.6
25	22	66.8	50.2	86.2
25	23	68.4	51.5	87.4
25	24	70.0	54.0	89.5
25	25	71.7	55.3	91.6
25	26	73.3	56.6	93.9
25	27	75.0	57.8	94.6
25	28	76.6	59.1	96.1
25	29	78.3	60.4	98.6
25	30	80.0	61.7	101.0
25	31	81.7	64.6	101.6
25	32	83.3	65.9	103.6
25	33	85.1	67.3	106.2
25	34	86.8	68.6	107.3
25	35	88.5	70.0	109.1
25	36	90.2	71.4	111.4
25	37	92.0	72.8	112.8
25	38	93.7	74.2	114.9
25	39	95.5	77.4	116.4
25	40	97.3	78.9	118.3
25	41	99.1	80.3	120.4
25	42	100.9	81.8	121.9
25	43	102.7	83.2	124.2
25	44	104.5	84.7	126.0

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
0	45	46.3	35.7	58.1
0	46	47.4	37.5	59.5
0	47	48.5	38.3	60.7
0	48	49.5	39.2	61.6
1	0	1.0	0.1	5.5
1	1	2.0	0.3	5.9
1	2	3.0	0.6	7.3
1	3	4.0	1.1	8.9
1	4	5.0	1.7	10.5
1	5	6.0	2.3	12.1
1	6	7.1	3.0	13.7
1	7	8.1	3.7	15.3
1	8	9.1	4.3	16.2
1	9	10.1	5.2	17.2
1	10	11.1	6.0	18.5
1	11	12.1	6.8	20.1
1	12	13.2	7.6	21.7
1	13	14.2	8.7	22.2
1	14	15.2	9.4	23.6
1	15	16.2	9.7	25.1
1	16	17.3	10.6	26.4
1	17	18.3	11.6	27.0
1	18	19.3	12.6	28.6
1	19	20.4	13.3	30.0
1	20	21.4	14.0	30.7
1	21	22.4	14.7	32.3
1	22	23.5	15.8	33.1
1	23	24.5	17.0	34.5
1	24	25.6	17.2	35.7
1	25	26.6	18.4	37.1
1	26	27.7	19.2	38.1
1	27	28.7	20.5	39.2
1	28	29.8	21.2	40.6
1	29	30.8	22.0	41.6
1	30	31.9	22.7	42.7
1	31	32.9	23.5	44.0
1	32	34.0	24.9	44.9
1	33	35.0	25.7	46.4
1	34	36.1	26.4	47.2
1	35	37.2	27.9	48.8
1	36	38.2	28.7	49.6
1	37	39.3	29.5	51.0
1	38	40.4	30.4	52.0
1	39	41.4	31.2	53.1
1	40	42.5	32.8	54.5
1	41	43.6	33.6	55.4
1	42	44.7	34.5	56.6
1	43	45.7	35.3	58.0
1	44	46.8	36.1	58.9

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
25	45	106.3	86.2	128.0
25	46	108.2	89.8	130.2
25	47	110.0	91.3	132.1
25	48	111.9	92.9	133.7
26	0	35.5	23.2	52.0
26	1	36.9	24.9	53.7
26	2	38.4	25.9	55.4
26	3	39.9	26.9	56.5
26	4	41.4	27.9	58.6
26	5	42.8	29.7	60.1
26	6	44.3	30.7	61.8
26	7	45.9	31.8	63.5
26	8	47.4	32.8	65.4
26	9	48.9	34.9	66.6
26	10	50.4	36.0	68.5
26	11	52.0	37.1	70.4
26	12	53.5	38.2	72.2
26	13	55.1	40.4	73.7
26	14	56.7	41.5	75.7
26	15	58.2	42.7	77.6
26	16	59.8	43.8	79.2
26	17	61.4	45.0	80.8
26	18	63.0	46.2	82.7
26	19	64.7	48.6	84.2
26	20	66.3	49.8	85.4
26	21	67.9	51.1	87.3
26	22	69.6	52.3	89.5
26	23	71.2	55.0	91.6
26	24	72.9	54.8	93.9
26	25	74.6	57.5	94.6
26	26	76.3	58.8	96.2
26	27	78.0	60.1	98.6
26	28	79.7	61.5	101.0
26	29	81.4	62.8	102.2
26	30	83.1	64.1	103.6
26	31	84.9	67.1	106.2
26	32	86.6	68.5	108.0
26	33	88.4	69.9	109.4
26	34	90.1	71.3	111.8
26	35	91.9	72.7	113.5
26	36	93.7	74.1	115.1
26	37	95.5	75.6	117.5
26	38	97.3	78.9	119.2
26	39	99.2	80.4	121.2
26	40	101.0	81.9	123.1
26	41	102.9	83.4	125.0
26	42	104.7	84.9	127.1
26	43	106.6	86.4	128.9
26	44	108.5	90.1	130.6

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
1	45	47.9	37.0	60.1
1	46	49.0	38.7	61.3
1	47	50.1	39.6	62.5
1	48	51.2	40.5	63.6
2	0	2.0	0.3	7.1
2	1	3.0	0.7	7.4
2	2	4.1	1.2	9.0
2	3	5.1	1.6	10.6
2	4	6.1	2.3	12.1
2	5	7.1	3.0	13.7
2	6	8.1	3.7	15.3
2	7	9.2	4.4	16.9
2	8	10.2	5.3	17.8
2	9	11.2	6.0	18.6
2	10	12.2	6.8	20.1
2	11	13.3	7.7	21.7
2	12	14.3	8.5	22.9
2	13	15.4	9.4	24.0
2	14	16.4	9.8	25.1
2	15	17.4	10.4	26.8
2	16	18.5	11.4	27.5
2	17	19.5	12.4	28.8
2	18	20.6	13.5	30.4
2	19	21.6	14.1	31.2
2	20	22.7	14.8	32.6
2	21	23.7	16.0	33.8
2	22	24.8	17.2	35.0
2	23	25.8	17.9	36.1
2	24	26.9	18.1	37.1
2	25	27.9	19.4	38.5
2	26	29.0	20.7	39.7
2	27	30.0	21.4	40.6
2	28	31.1	22.2	42.0
2	29	32.2	23.6	43.4
2	30	33.2	24.4	44.4
2	31	34.3	25.1	45.7
2	32	35.4	25.9	46.6
2	33	36.5	26.7	48.0
2	34	37.5	28.2	48.9
2	35	38.6	29.0	50.3
2	36	39.7	29.9	51.2
2	37	40.8	30.7	52.8
2	38	41.9	31.5	53.7
2	39	43.0	32.3	54.9
2	40	44.0	34.0	56.2
2	41	45.1	34.8	57.1
2	42	46.2	35.7	58.6
2	43	47.3	36.5	59.7
2	44	48.4	37.4	60.8

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
26	45	110.4	89.5	132.4
26	46	112.3	93.2	135.0
26	47	114.2	94.8	137.0
26	48	116.2	96.4	138.7
27	0	37.4	24.5	54.5
27	1	38.9	26.2	55.9
27	2	40.4	27.3	57.4
27	3	42.0	28.3	59.7
27	4	43.5	29.3	60.8
27	5	45.0	31.2	63.0
27	6	46.5	32.3	64.7
27	7	48.1	33.3	66.1
27	8	49.6	35.4	67.8
27	9	51.2	36.5	69.7
27	10	52.8	37.6	71.7
27	11	54.4	38.8	73.4
27	12	56.0	41.0	75.0
27	13	57.6	42.2	77.2
27	14	59.2	43.3	78.6
27	15	60.8	44.5	80.6
27	16	62.4	45.7	82.3
27	17	64.1	46.9	83.7
27	18	65.7	49.4	85.3
27	19	67.4	50.7	87.3
27	20	69.1	51.9	89.5
27	21	70.8	53.2	91.6
27	22	72.5	55.9	93.9
27	23	74.2	55.8	94.6
27	24	75.9	58.5	96.2
27	25	77.6	59.9	98.6
27	26	79.4	61.2	101.0
27	27	81.1	62.6	102.5
27	28	82.9	63.9	103.8
27	29	84.6	65.3	106.2
27	30	86.4	68.4	108.3
27	31	88.2	69.8	109.6
27	32	90.0	71.2	111.8
27	33	91.9	72.7	113.8
27	34	93.7	74.1	115.4
27	35	95.5	75.6	118.0
27	36	97.4	77.1	119.8
27	37	99.3	80.5	121.8
27	38	101.2	82.0	123.7
27	39	103.1	83.5	125.9
27	40	105.0	85.1	127.6
27	41	106.9	86.6	129.4
27	42	108.8	88.2	132.0
27	43	110.8	89.8	133.7
27	44	112.7	91.4	135.3

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
2	45	49.5	38.2	61.8
2	46	50.6	40.0	63.0
2	47	51.7	40.9	64.2
2	48	52.8	41.8	65.4
3	0	3.1	0.7	8.9
3	1	4.1	1.2	9.1
3	2	5.1	1.7	10.6
3	3	6.2	2.3	12.1
3	4	7.2	3.0	13.7
3	5	8.2	3.6	15.3
3	6	9.2	4.4	16.9
3	7	10.3	5.1	18.3
3	8	11.3	6.1	18.8
3	9	12.4	6.9	20.2
3	10	13.4	7.7	21.8
3	11	14.5	8.6	23.4
3	12	15.5	9.5	24.1
3	13	16.5	10.2	25.3
3	14	17.6	10.5	26.9
3	15	18.6	11.5	28.2
3	16	19.7	12.5	29.2
3	17	20.8	13.6	30.4
3	18	21.8	14.3	31.8
3	19	22.9	15.0	32.7
3	20	23.9	15.7	34.2
3	21	25.0	16.8	35.2
3	22	26.1	18.1	36.5
3	23	27.1	18.8	37.7
3	24	28.2	19.6	39.1
3	25	29.3	20.9	40.2
3	26	30.4	21.6	41.3
3	27	31.4	22.4	42.7
3	28	32.5	23.2	43.6
3	29	33.6	24.6	44.9
3	30	34.7	25.4	46.2
3	31	35.8	26.2	47.2
3	32	36.8	27.0	48.6
3	33	37.9	27.8	49.5
3	34	39.0	29.3	51.0
3	35	40.1	30.2	52.0
3	36	41.2	31.0	53.2
3	37	42.3	31.8	54.5
3	38	43.4	32.6	55.4
3	39	44.5	34.3	57.0
3	40	45.6	35.2	58.0
3	41	46.7	36.0	59.0
3	42	47.8	36.9	60.2
3	43	48.9	37.8	61.5
3	44	50.0	38.6	62.6

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
27	45	114.7	95.2	137.8
27	46	116.7	94.6	140.1
27	47	118.7	98.5	142.1
27	48	120.7	100.2	144.2
28	0	39.5	25.9	57.0
28	1	41.0	27.7	58.8
28	2	42.6	28.7	60.7
28	3	44.1	30.6	62.5
28	4	45.7	30.8	63.8
28	5	47.3	32.8	65.9
28	6	48.8	33.9	67.5
28	7	50.4	35.0	69.1
28	8	52.0	37.1	71.0
28	9	53.6	38.2	73.0
28	10	55.2	39.4	74.4
28	11	56.9	41.7	76.4
28	12	58.5	41.7	77.9
28	13	60.2	44.1	80.0
28	14	61.8	45.3	81.5
28	15	63.5	46.5	83.4
28	16	65.2	47.7	85.3
28	17	66.9	50.3	87.3
28	18	68.6	51.6	89.5
28	19	70.3	52.8	91.6
28	20	72.0	54.1	93.9
28	21	73.7	55.5	94.6
28	22	75.5	56.8	96.2
28	23	77.3	59.6	98.6
28	24	79.0	61.0	101.0
28	25	80.8	62.4	102.8
28	26	82.6	63.7	103.9
28	27	84.4	65.1	106.2
28	28	86.3	66.5	108.8
28	29	88.1	68.0	110.3
28	30	89.9	71.1	112.2
28	31	91.8	72.6	114.7
28	32	93.7	74.1	116.4
28	33	95.6	75.6	118.3
28	34	97.5	77.1	120.4
28	35	99.4	78.6	121.9
28	36	101.3	80.1	124.2
28	37	103.3	83.7	126.0
28	38	105.2	85.3	128.5
28	39	107.2	86.9	130.6
28	40	109.2	88.5	132.4
28	41	111.2	90.1	135.0
28	42	113.2	91.7	137.0
28	43	115.2	95.6	138.7
28	44	117.3	95.0	140.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
3	45	51.2	40.5	63.8
3	46	52.3	41.4	65.0
3	47	53.4	42.2	66.1
3	48	54.5	43.1	67.3
4	0	4.1	1.7	9.5
4	1	5.2	1.8	10.8
4	2	6.2	2.4	12.2
4	3	7.2	2.9	13.7
4	4	8.3	3.6	15.3
4	5	9.3	4.5	16.9
4	6	10.4	5.2	18.5
4	7	11.4	5.9	19.5
4	8	12.5	6.9	20.5
4	9	13.5	7.8	21.8
4	10	14.6	8.7	23.4
4	11	15.6	9.6	24.6
4	12	16.7	10.3	25.7
4	13	17.8	10.9	26.9
4	14	18.8	11.6	28.6
4	15	19.9	12.6	29.3
4	16	21.0	13.7	30.7
4	17	22.0	14.8	32.2
4	18	23.1	15.1	33.1
4	19	24.2	15.8	34.5
4	20	25.3	17.0	35.7
4	21	26.3	18.3	37.1
4	22	27.4	19.0	38.1
4	23	28.5	19.8	39.2
4	24	29.6	20.5	40.6
4	25	30.7	21.9	41.8
4	26	31.8	22.6	42.8
4	27	32.8	23.4	44.2
4	28	33.9	24.9	45.6
4	29	35.0	25.7	46.5
4	30	36.1	26.5	48.0
4	31	37.2	27.3	48.8
4	32	38.3	28.1	50.3
4	33	39.4	29.7	51.2
4	34	40.5	30.5	52.8
4	35	41.6	31.3	53.7
4	36	42.8	32.2	55.2
4	37	43.9	33.0	56.2
4	38	45.0	34.7	57.4
4	39	46.1	35.6	58.6
4	40	47.2	36.4	59.8
4	41	48.3	37.3	60.9
4	42	49.5	38.2	62.5
4	43	50.6	40.0	63.5
4	44	51.7	40.9	64.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
28	45	119.3	99.0	143.0
28	46	121.4	98.4	145.4
28	47	123.5	102.5	147.9
28	48	125.6	104.2	149.8
29	0	41.7	28.1	59.8
29	1	43.2	29.1	61.4
29	2	44.8	30.2	63.4
29	3	46.4	31.3	65.4
29	4	48.0	33.3	67.2
29	5	49.6	34.4	68.5
29	6	51.2	35.5	70.7
29	7	52.8	36.6	72.3
29	8	54.5	38.8	74.1
29	9	56.1	40.0	75.9
29	10	57.8	41.2	77.8
29	11	59.5	42.4	79.5
29	12	61.2	44.8	81.4
29	13	62.9	46.0	83.3
29	14	64.6	47.3	85.3
29	15	66.3	48.6	87.3
29	16	68.0	51.2	89.5
29	17	69.8	51.1	91.6
29	18	71.5	53.8	93.9
29	19	73.3	55.1	94.6
29	20	75.1	56.5	96.2
29	21	76.9	57.8	98.6
29	22	78.7	60.7	101.0
29	23	80.5	62.1	103.3
29	24	82.4	63.5	104.7
29	25	84.2	65.0	106.4
29	26	86.1	66.4	109.0
29	27	87.9	67.8	111.1
29	28	89.8	69.3	112.8
29	29	91.7	72.6	114.9
29	30	93.7	74.1	116.9
29	31	95.6	75.6	119.2
29	32	97.5	77.2	121.2
29	33	99.5	78.7	123.1
29	34	101.5	80.3	125.0
29	35	103.5	81.8	127.3
29	36	105.5	83.4	129.1
29	37	107.5	87.1	131.7
29	38	109.5	88.8	133.7
29	39	111.6	90.4	135.3
29	40	113.7	92.1	138.1
29	41	115.7	93.8	140.4
29	42	117.8	95.5	142.2
29	43	120.0	99.6	144.2
29	44	122.1	99.0	146.3

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
4	45	52.9	41.8	66.0
4	46	54.0	42.7	67.3
4	47	55.1	43.6	68.4
4	48	56.3	44.5	69.4
5	0	5.2	2.3	11.9
5	1	6.3	2.5	12.7
5	2	7.3	2.9	13.9
5	3	8.4	3.7	15.3
5	4	9.4	4.3	16.9
5	5	10.5	5.2	18.5
5	6	11.5	6.0	20.1
5	7	12.6	6.8	21.2
5	8	13.7	7.6	21.9
5	9	14.7	8.5	23.4
5	10	15.8	9.4	25.1
5	11	16.9	10.4	26.4
5	12	17.9	11.0	27.0
5	13	19.0	11.7	28.6
5	14	20.1	12.4	30.0
5	15	21.2	13.4	31.2
5	16	22.2	14.6	32.3
5	17	23.3	15.7	33.8
5	18	24.4	16.0	35.0
5	19	25.5	17.2	36.1
5	20	26.6	17.9	37.5
5	21	27.7	19.2	38.5
5	22	28.8	20.0	39.9
5	23	29.9	20.7	41.2
5	24	31.0	22.1	42.3
5	25	32.1	22.9	43.4
5	26	33.2	23.7	44.9
5	27	34.3	24.4	45.8
5	28	35.4	25.9	47.2
5	29	36.5	26.7	48.5
5	30	37.6	27.6	49.5
5	31	38.7	28.4	51.0
5	32	39.9	29.2	52.0
5	33	41.0	30.8	53.3
5	34	42.1	31.7	54.5
5	35	43.2	32.5	55.7
5	36	44.4	33.4	57.0
5	37	45.5	35.1	58.0
5	38	46.6	36.0	59.3
5	39	47.7	36.8	60.7
5	40	48.9	37.7	61.8
5	41	50.0	38.6	63.0
5	42	51.2	39.5	64.2
5	43	52.3	41.4	65.4
5	44	53.5	42.3	66.6

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
29	45	124.2	103.1	148.9
29	46	126.4	104.9	151.7
29	47	128.6	106.7	153.5
29	48	130.8	108.6	155.9
30	0	43.9	29.6	62.6
30	1	45.5	30.7	64.5
30	2	47.1	31.8	66.6
30	3	48.7	33.8	68.0
30	4	50.4	34.9	70.1
30	5	52.0	36.1	72.2
30	6	53.7	38.3	74.0
30	7	55.4	39.5	75.8
30	8	57.1	40.7	77.6
30	9	58.8	41.9	79.5
30	10	60.5	43.1	81.4
30	11	62.2	45.6	83.3
30	12	64.0	46.8	85.3
30	13	65.7	48.1	87.3
30	14	67.5	49.4	89.5
30	15	69.3	50.7	91.6
30	16	71.0	52.0	93.9
30	17	72.9	54.8	94.6
30	18	74.7	56.1	96.2
30	19	76.5	57.5	98.6
30	20	78.3	58.9	101.0
30	21	80.2	60.3	103.6
30	22	82.1	63.3	105.0
30	23	84.0	64.8	106.4
30	24	85.9	66.2	109.0
30	25	87.8	67.7	111.4
30	26	89.7	69.2	112.9
30	27	91.7	70.7	115.1
30	28	93.6	74.1	117.5
30	29	95.6	75.6	119.2
30	30	97.6	77.2	121.8
30	31	99.6	78.8	124.2
30	32	101.6	80.4	126.0
30	33	103.7	82.0	128.2
30	34	105.7	83.6	130.6
30	35	107.8	87.4	132.1
30	36	109.9	89.1	135.0
30	37	112.0	88.6	137.0
30	38	114.2	92.5	138.7
30	39	116.3	94.3	141.6
30	40	118.5	96.0	144.0
30	41	120.6	97.8	145.9
30	42	122.8	99.6	148.2
30	43	125.1	101.4	150.3
30	44	127.3	105.7	152.6

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
5	45	54.6	43.2	67.8
5	46	55.8	44.1	69.0
5	47	56.9	45.0	70.4
5	48	58.1	45.9	71.7
6	0	6.3	2.9	13.7
6	1	7.4	3.2	14.4
6	2	8.4	3.7	15.3
6	3	9.5	4.4	16.9
6	4	10.6	5.3	18.5
6	5	11.6	6.0	20.1
6	6	12.7	6.8	21.7
6	7	13.8	7.7	22.2
6	8	14.9	8.6	23.6
6	9	16.0	9.5	25.1
6	10	17.0	10.5	26.8
6	11	18.1	11.1	27.5
6	12	19.2	11.8	28.8
6	13	20.3	12.5	30.4
6	14	21.4	13.6	31.8
6	15	22.5	14.7	32.6
6	16	23.6	15.9	34.2
6	17	24.7	16.6	35.2
6	18	25.8	17.4	36.5
6	19	26.9	18.1	37.8
6	20	28.0	19.4	39.1
6	21	29.1	20.2	40.2
6	22	30.2	20.9	41.6
6	23	31.3	22.3	42.7
6	24	32.4	23.1	44.2
6	25	33.5	23.9	45.2
6	26	34.7	24.7	46.5
6	27	35.8	26.2	47.9
6	28	36.9	27.0	48.8
6	29	38.0	27.9	50.3
6	30	39.2	28.7	51.2
6	31	40.3	29.5	52.8
6	32	41.4	31.1	53.8
6	33	42.6	32.0	55.4
6	34	43.7	32.9	56.2
6	35	44.8	33.7	57.6
6	36	46.0	35.5	58.9
6	37	47.1	36.4	60.1
6	38	48.3	37.2	61.3
6	39	49.4	38.1	62.5
6	40	50.6	39.0	63.6
6	41	51.7	39.9	64.8
6	42	52.9	40.8	66.1
6	43	54.1	42.8	67.5
6	44	55.2	43.7	68.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
30	45	129.5	107.5	155.5
30	46	131.8	109.4	157.6
30	47	134.1	111.3	159.8
30	48	136.4	113.2	162.7
31	0	46.2	31.1	65.5
31	1	47.9	32.3	67.5
31	2	49.5	34.4	69.3
31	3	51.2	35.5	71.7
31	4	52.9	36.7	73.7
31	5	54.6	37.9	75.6
31	6	56.3	39.1	77.6
31	7	58.1	41.4	79.5
31	8	59.8	42.6	81.4
31	9	61.6	43.9	83.3
31	10	63.3	46.4	85.3
31	11	65.1	47.7	87.3
31	12	66.9	49.0	89.5
31	13	68.7	50.3	91.6
31	14	70.5	51.7	93.9
31	15	72.4	53.0	94.6
31	16	74.2	55.8	96.2
31	17	76.1	57.2	98.5
31	18	78.0	58.6	101.0
31	19	79.9	60.1	103.6
31	20	81.8	61.5	105.7
31	21	83.7	63.0	107.0
31	22	85.7	66.1	109.1
31	23	87.6	67.6	111.8
31	24	89.6	69.1	113.8
31	25	91.6	70.7	115.4
31	26	93.6	72.2	118.0
31	27	95.6	73.8	120.4
31	28	97.7	75.4	121.9
31	29	99.7	78.9	124.7
31	30	101.8	80.5	127.1
31	31	103.9	82.2	128.9
31	32	106.0	83.9	131.5
31	33	108.2	85.6	133.7
31	34	110.3	87.3	135.3
31	35	112.5	89.0	138.7
31	36	114.7	93.0	140.4
31	37	116.9	94.7	142.7
31	38	119.1	96.5	145.4
31	39	121.4	98.4	147.9
31	40	123.6	100.2	150.0
31	41	125.9	102.1	152.3
31	42	128.2	103.9	154.7
31	43	130.5	105.8	156.6
31	44	132.9	110.3	159.8

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
6	45	56.4	44.6	69.8
6	46	57.6	45.5	71.0
6	47	58.7	46.5	72.4
6	48	59.9	47.4	73.7
7	0	7.5	3.6	14.9
7	1	8.5	3.9	15.6
7	2	9.6	4.4	16.9
7	3	10.7	5.1	18.5
7	4	11.8	6.1	20.1
7	5	12.8	6.9	21.7
7	6	13.9	7.8	22.9
7	7	15.0	8.7	24.0
7	8	16.1	9.6	25.3
7	9	17.2	10.6	26.9
7	10	18.3	11.6	28.2
7	11	19.4	12.3	29.3
7	12	20.5	12.6	30.5
7	13	21.6	13.7	31.9
7	14	22.7	14.9	33.1
7	15	23.8	15.6	34.5
7	16	24.9	16.8	35.7
7	17	26.0	17.5	37.1
7	18	27.1	18.3	38.1
7	19	28.3	19.6	39.7
7	20	29.4	20.4	40.6
7	21	30.5	21.2	42.0
7	22	31.6	21.9	43.4
7	23	32.8	23.4	44.4
7	24	33.9	24.2	45.7
7	25	35.0	25.0	47.2
7	26	36.2	26.5	48.3
7	27	37.3	27.3	49.5
7	28	38.4	28.2	51.0
7	29	39.6	29.0	52.0
7	30	40.7	30.6	53.5
7	31	41.9	31.5	54.5
7	32	43.0	32.4	55.9
7	33	44.2	33.2	57.1
7	34	45.3	34.1	58.3
7	35	46.5	35.0	59.7
7	36	47.7	36.8	60.8
7	37	48.8	37.7	61.9
7	38	50.0	38.6	63.4
7	39	51.2	39.5	64.7
7	40	52.3	40.4	66.0
7	41	53.5	41.3	67.3
7	42	54.7	43.3	68.5
7	43	55.9	44.2	69.7
7	44	57.1	45.1	70.8

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
31	45	135.3	112.3	162.4
31	46	137.7	114.3	163.9
31	47	140.1	116.3	167.8
31	48	142.5	118.3	168.8
32	0	48.7	32.8	69.0
32	1	50.4	33.9	70.9
32	2	52.1	36.1	73.0
32	3	53.8	37.3	75.0
32	4	55.6	38.5	77.2
32	5	57.3	39.7	79.1
32	6	59.1	42.1	81.2
32	7	60.9	43.4	83.3
32	8	62.7	44.7	85.3
32	9	64.5	46.0	87.3
32	10	66.3	48.6	89.5
32	11	68.2	49.9	91.6
32	12	70.0	51.3	93.9
32	13	71.9	52.6	94.6
32	14	73.8	54.0	96.2
32	15	75.7	56.9	98.5
32	16	77.6	58.4	101.0
32	17	79.5	59.8	103.6
32	18	81.5	61.3	106.2
32	19	83.5	62.8	108.0
32	20	85.4	64.3	109.4
32	21	87.5	65.8	111.8
32	22	89.5	69.0	114.7
32	23	91.5	70.6	116.4
32	24	93.6	72.2	118.3
32	25	95.7	73.8	121.2
32	26	97.8	75.4	123.1
32	27	99.9	77.0	125.1
32	28	102.0	78.7	127.6
32	29	104.2	82.4	130.5
32	30	106.3	84.1	132.1
32	31	108.5	85.8	135.0
32	32	110.7	87.6	137.0
32	33	113.0	89.4	139.5
32	34	115.2	91.1	142.1
32	35	117.5	95.2	144.2
32	36	119.8	94.8	146.2
32	37	122.1	99.0	148.9
32	38	124.5	100.9	151.7
32	39	126.8	102.8	154.0
32	40	129.2	104.7	156.2
32	41	131.6	106.7	159.5
32	42	134.0	111.3	161.3
32	43	136.5	113.3	163.7
32	44	139.0	115.4	167.2

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
7	45	58.3	46.1	72.2
7	46	59.4	47.0	73.4
7	47	60.6	48.0	74.4
7	48	61.8	48.9	75.9
8	0	8.6	4.5	16.9
8	1	9.7	4.5	17.2
8	2	10.8	5.2	18.6
8	3	11.9	5.9	20.2
8	4	13.0	6.7	21.8
8	5	14.1	7.8	23.4
8	6	15.2	8.7	24.6
8	7	16.3	9.7	25.7
8	8	17.4	10.4	26.9
8	9	18.5	11.4	28.6
8	10	19.6	12.4	30.0
8	11	20.7	13.1	30.7
8	12	21.8	13.9	32.3
8	13	22.9	14.6	33.8
8	14	24.1	15.7	35.0
8	15	25.2	17.0	36.1
8	16	26.3	17.7	37.7
8	17	27.4	18.5	38.5
8	18	28.6	19.2	40.2
8	19	29.7	20.6	41.3
8	20	30.8	21.4	42.7
8	21	32.0	22.2	44.0
8	22	33.1	23.6	44.9
8	23	34.3	24.4	46.5
8	24	35.4	25.2	47.8
8	25	36.6	26.1	48.8
8	26	37.7	27.6	50.3
8	27	38.9	28.5	51.2
8	28	40.0	29.3	52.8
8	29	41.2	30.2	53.8
8	30	42.3	31.8	55.4
8	31	43.5	32.7	56.4
8	32	44.7	33.6	58.0
8	33	45.9	34.5	59.0
8	34	47.0	35.4	60.2
8	35	48.2	36.3	61.6
8	36	49.4	38.1	63.0
8	37	50.6	39.0	64.2
8	38	51.8	39.9	65.4
8	39	53.0	40.9	66.6
8	40	54.1	41.8	67.8
8	41	55.3	43.8	69.1
8	42	56.5	44.7	70.4
8	43	57.7	45.7	71.7
8	44	59.0	46.6	73.0

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
32	45	141.5	117.4	168.3
32	46	144.0	119.5	172.4
32	47	146.6	121.7	174.4
32	48	149.1	123.8	177.0
33	0	51.2	34.5	72.3
33	1	53.0	36.7	74.3
33	2	54.8	38.0	76.4
33	3	56.5	39.2	78.6
33	4	58.3	40.5	80.6
33	5	60.2	42.9	83.0
33	6	62.0	44.2	85.1
33	7	63.8	45.5	87.2
33	8	65.7	46.8	89.2
33	9	67.6	49.5	91.6
33	10	69.5	50.9	93.9
33	11	71.4	52.3	94.6
33	12	73.3	53.7	96.2
33	13	75.2	55.1	98.5
33	14	77.2	58.1	101.0
33	15	79.2	59.5	103.6
33	16	81.2	61.0	106.2
33	17	83.2	62.6	108.3
33	18	85.2	64.1	110.3
33	19	87.3	65.6	112.2
33	20	89.3	67.2	114.9
33	21	91.4	70.5	117.5
33	22	93.6	72.2	119.2
33	23	95.7	73.8	121.8
33	24	97.8	75.5	124.2
33	25	100.0	77.2	126.0
33	26	102.2	78.8	128.9
33	27	104.4	80.6	130.6
33	28	106.6	84.4	133.7
33	29	108.9	86.1	135.3
33	30	111.2	88.0	138.7
33	31	113.5	89.8	140.5
33	32	115.8	91.6	143.0
33	33	118.2	95.8	145.9
33	34	120.5	95.3	148.2
33	35	122.9	99.6	150.9
33	36	125.4	101.6	153.0
33	37	127.8	103.6	155.9
33	38	130.3	105.6	158.7
33	39	132.8	107.6	160.7
33	40	135.3	109.7	163.7
33	41	137.8	111.7	167.2
33	42	140.4	113.8	168.3
33	43	143.0	118.7	172.4
33	44	145.6	120.9	174.4

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
8	45	60.2	47.6	74.3
8	46	61.4	48.5	75.7
8	47	62.6	49.5	77.0
8	48	63.8	50.5	77.9
9	0	9.8	4.7	18.4
9	1	10.9	5.6	19.5
9	2	12.0	6.0	20.3
9	3	13.1	6.8	21.8
9	4	14.2	7.6	23.4
9	5	15.3	8.5	25.1
9	6	16.4	9.5	26.4
9	7	17.6	10.5	27.0
9	8	18.7	11.5	28.6
9	9	19.8	12.6	30.4
9	10	20.9	13.3	31.2
9	11	22.0	14.0	32.6
9	12	23.2	14.7	34.2
9	13	24.3	15.9	35.2
9	14	25.4	17.1	36.5
9	15	26.6	17.9	38.1
9	16	27.7	18.7	39.2
9	17	28.9	19.5	40.6
9	18	30.0	20.8	41.8
9	19	31.2	21.6	43.2
9	20	32.3	22.4	44.4
9	21	33.5	23.2	45.7
9	22	34.6	24.7	47.2
9	23	35.8	25.5	48.0
9	24	37.0	26.3	49.5
9	25	38.1	27.9	51.0
9	26	39.3	28.8	52.0
9	27	40.5	29.6	53.7
9	28	41.6	30.5	54.5
9	29	42.8	32.2	56.1
9	30	44.0	33.1	57.1
9	31	45.2	34.0	58.6
9	32	46.4	34.9	59.8
9	33	47.6	35.8	61.2
9	34	48.8	36.7	62.5
9	35	50.0	38.6	63.6
9	36	51.2	39.5	64.7
9	37	52.4	40.4	66.1
9	38	53.6	41.3	67.5
9	39	54.8	42.3	69.0
9	40	56.0	44.3	70.3
9	41	57.2	45.3	71.5
9	42	58.4	46.2	72.5
9	43	59.7	47.2	74.0
9	44	60.9	48.2	75.4

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
33	45	148.3	123.1	177.0
33	46	150.9	125.3	180.8
33	47	153.7	127.5	182.1
33	48	156.4	129.8	186.4
34	0	53.9	37.4	75.8
34	1	55.7	38.6	77.9
34	2	57.6	39.9	80.0
34	3	59.4	41.2	82.2
34	4	61.3	43.7	84.6
34	5	63.1	45.0	86.9
34	6	65.0	46.4	89.2
34	7	67.0	47.7	91.5
34	8	68.9	50.5	93.8
34	9	70.8	50.5	94.6
34	10	72.8	51.9	96.2
34	11	74.8	54.8	98.5
34	12	76.8	56.2	101.0
34	13	78.8	57.7	103.6
34	14	80.8	60.8	106.2
34	15	82.9	62.3	108.8
34	16	85.0	63.9	111.1
34	17	87.1	65.5	112.8
34	18	89.2	67.1	115.1
34	19	91.4	68.7	118.0
34	20	93.5	70.3	120.4
34	21	95.7	73.8	121.9
34	22	97.9	75.5	125.0
34	23	100.2	77.3	127.3
34	24	102.4	79.0	129.4
34	25	104.7	80.8	132.1
34	26	107.0	84.6	135.0
34	27	109.3	84.3	137.0
34	28	111.7	86.1	139.5
34	29	114.0	90.2	142.2
34	30	116.4	92.1	145.0
34	31	118.9	94.0	147.9
34	32	121.3	96.0	150.0
34	33	123.8	97.9	152.6
34	34	126.3	102.4	155.5
34	35	128.8	101.9	158.2
34	36	131.4	106.5	160.1
34	37	134.0	108.6	163.7
34	38	136.6	110.7	166.5
34	39	139.2	112.9	168.0
34	40	141.9	115.0	172.4
34	41	144.6	117.2	174.4
34	42	147.4	119.4	177.0
34	43	150.1	124.6	180.8
34	44	152.9	126.9	182.1

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
9	45	62.1	49.1	76.4
9	46	63.4	51.4	77.8
9	47	64.6	51.1	79.3
9	48	65.8	53.4	80.6
10	0	11.0	5.7	20.1
10	1	12.1	6.5	21.1
10	2	13.2	7.1	22.0
10	3	14.4	7.7	23.6
10	4	15.5	8.6	25.1
10	5	16.6	9.6	26.8
10	6	17.7	10.6	27.5
10	7	18.9	11.6	28.8
10	8	20.0	12.7	30.4
10	9	21.1	13.4	31.8
10	10	22.3	14.1	33.1
10	11	23.4	14.9	34.5
10	12	24.6	16.1	35.7
10	13	25.7	16.8	37.1
10	14	26.9	18.1	38.5
10	15	28.0	18.9	39.7
10	16	29.2	19.7	41.2
10	17	30.3	21.0	42.3
10	18	31.5	21.8	43.4
10	19	32.7	23.3	44.9
10	20	33.8	23.5	46.5
10	21	35.0	25.0	47.5
10	22	36.2	25.8	48.8
10	23	37.4	26.6	50.3
10	24	38.6	28.2	51.2
10	25	39.7	29.1	52.8
10	26	40.9	30.0	54.1
10	27	42.1	30.9	55.4
10	28	43.3	31.7	56.8
10	29	44.5	33.5	58.0
10	30	45.7	34.4	59.1
10	31	46.9	35.3	60.7
10	32	48.1	36.2	61.8
10	33	49.3	37.1	63.0
10	34	50.6	39.0	64.5
10	35	51.8	40.0	66.0
10	36	53.0	40.9	67.3
10	37	54.2	41.8	68.5
10	38	55.5	42.8	69.7
10	39	56.7	43.7	71.0
10	40	57.9	45.8	72.3
10	41	59.2	46.8	73.7
10	42	60.4	47.8	75.0
10	43	61.7	48.8	76.3
10	44	62.9	49.8	77.6

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
34	45	155.7	129.3	187.0
34	46	158.6	131.6	188.5
34	47	161.5	134.0	192.5
34	48	164.4	136.5	194.9
35	0	56.8	39.4	79.5
35	1	58.6	40.7	81.5
35	2	60.5	42.0	83.7
35	3	62.4	43.3	86.2
35	4	64.4	44.6	88.6
35	5	66.3	47.3	90.4
35	6	68.3	48.7	93.0
35	7	70.3	50.1	94.6
35	8	72.3	51.5	96.4
35	9	74.3	53.0	98.8
35	10	76.3	55.9	101.2
35	11	78.4	57.4	103.6
35	12	80.5	59.0	106.2
35	13	82.6	60.5	109.0
35	14	84.7	62.1	111.4
35	15	86.9	65.3	113.8
35	16	89.1	67.0	115.4
35	17	91.3	68.6	118.3
35	18	93.5	70.3	121.2
35	19	95.7	72.0	123.1
35	20	98.0	73.7	126.0
35	21	100.3	75.4	128.2
35	22	102.6	79.2	130.6
35	23	105.0	81.0	133.7
35	24	107.3	82.8	135.3
35	25	109.7	84.7	138.7
35	26	112.2	86.5	140.7
35	27	114.6	88.4	144.0
35	28	117.1	92.6	146.2
35	29	119.6	94.6	148.9
35	30	122.2	96.6	152.0
35	31	124.7	98.7	154.7
35	32	127.3	100.7	157.0
35	33	129.9	102.8	159.9
35	34	132.6	107.5	163.6
35	35	135.3	109.7	165.7
35	36	138.0	111.9	168.0
35	37	140.8	114.1	172.4
35	38	143.6	116.4	174.4
35	39	146.4	118.6	177.0
35	40	149.2	121.0	181.4
35	41	152.1	123.3	182.9
35	42	155.0	125.7	187.3
35	43	158.0	128.1	190.0
35	44	161.0	130.5	192.8

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
10	45	64.2	50.7	79.2
10	46	65.4	53.0	80.0
10	47	66.7	54.0	81.4
10	48	67.9	55.1	83.2
11	0	12.2	6.8	21.4
11	1	13.4	7.4	22.3
11	2	14.5	7.8	23.6
11	3	15.6	8.7	25.3
11	4	16.8	9.7	26.8
11	5	17.9	10.7	28.2
11	6	19.1	11.4	29.3
11	7	20.2	12.4	30.7
11	8	21.4	13.6	32.3
11	9	22.5	14.3	33.8
11	10	23.7	15.5	35.0
11	11	24.8	15.8	36.1
11	12	26.0	17.0	37.7
11	13	27.2	18.3	39.1
11	14	28.3	19.1	40.2
11	15	29.5	19.9	41.6
11	16	30.7	20.7	42.7
11	17	31.9	22.1	44.2
11	18	33.0	23.6	45.7
11	19	34.2	23.7	46.8
11	20	35.4	25.2	48.0
11	21	36.6	26.1	49.5
11	22	37.8	26.9	51.0
11	23	39.0	28.6	52.0
11	24	40.2	29.4	53.7
11	25	41.4	30.3	54.6
11	26	42.6	31.2	56.2
11	27	43.8	32.1	57.4
11	28	45.0	33.9	58.9
11	29	46.3	34.8	60.1
11	30	47.5	35.7	61.3
11	31	48.7	36.6	62.6
11	32	49.9	38.5	64.2
11	33	51.2	39.5	65.4
11	34	52.4	40.4	66.6
11	35	53.7	41.4	67.8
11	36	54.9	42.4	69.2
11	37	56.1	43.3	70.7
11	38	57.4	45.4	72.2
11	39	58.6	45.2	73.4
11	40	59.9	47.4	74.5
11	41	61.2	48.4	75.9
11	42	62.4	49.4	77.6
11	43	63.7	50.4	78.6
11	44	65.0	51.4	80.0

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
35	45	164.0	136.1	195.8
35	46	167.1	138.7	198.9
35	47	170.2	141.3	202.9
35	48	173.3	143.9	205.9
36	0	59.8	41.4	83.4
36	1	61.7	42.8	85.4
36	2	63.7	44.1	87.8
36	3	65.7	45.5	90.3
36	4	67.7	46.9	92.7
36	5	69.7	49.7	95.3
36	6	71.7	51.1	97.5
36	7	73.8	52.6	99.5
36	8	75.9	54.1	101.4
36	9	78.0	55.6	103.8
36	10	80.1	58.7	106.4
36	11	82.3	60.3	109.1
36	12	84.5	61.9	111.8
36	13	86.7	63.5	114.7
36	14	88.9	66.9	116.4
36	15	91.2	68.6	119.2
36	16	93.5	70.3	121.8
36	17	95.8	72.0	124.2
36	18	98.1	73.8	127.1
36	19	100.5	75.5	129.1
36	20	102.9	77.3	132.1
36	21	105.3	81.2	135.0
36	22	107.7	83.1	137.0
36	23	110.2	85.0	140.4
36	24	112.7	87.0	142.7
36	25	115.2	88.9	145.4
36	26	117.8	93.2	148.2
36	27	120.4	95.2	151.7
36	28	123.0	94.9	154.0
36	29	125.7	99.4	156.6
36	30	128.4	101.6	159.8
36	31	131.1	103.7	163.1
36	32	133.9	105.9	165.2
36	33	136.7	110.8	168.0
36	34	139.5	110.4	172.4
36	35	142.4	115.4	174.4
36	36	145.3	117.8	177.0
36	37	148.3	120.2	181.9
36	38	151.3	122.6	183.1
36	39	154.3	125.1	187.3
36	40	157.3	127.5	190.0
36	41	160.5	130.1	193.1
36	42	163.6	135.8	197.7
36	43	166.8	138.4	200.4
36	44	170.0	141.1	203.5

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
11	45	66.3	52.4	81.4
11	46	67.5	54.7	83.0
11	47	68.8	55.8	83.7
11	48	70.1	56.8	85.3
12	0	13.5	7.8	23.4
12	1	14.6	8.2	24.6
12	2	15.8	8.8	25.7
12	3	16.9	9.4	27.0
12	4	18.1	10.4	28.6
12	5	19.3	11.5	30.0
12	6	20.4	12.6	31.2
12	7	21.6	13.7	32.6
12	8	22.8	14.9	34.2
12	9	23.9	15.7	35.2
12	10	25.1	15.9	36.5
12	11	26.3	17.2	38.1
12	12	27.5	18.0	39.2
12	13	28.6	19.3	40.6
12	14	29.8	20.1	42.0
12	15	31.0	21.5	43.4
12	16	32.2	22.3	44.9
12	17	33.4	23.2	46.2
12	18	34.6	24.7	47.2
12	19	35.8	24.8	48.8
12	20	37.0	26.4	50.3
12	21	38.2	27.3	51.2
12	22	39.5	28.9	52.8
12	23	40.7	29.8	54.4
12	24	41.9	30.7	55.4
12	25	43.1	31.6	57.0
12	26	44.3	32.5	58.0
12	27	45.6	33.4	59.7
12	28	46.8	35.2	60.8
12	29	48.1	36.1	62.5
12	30	49.3	37.1	63.6
12	31	50.6	38.0	64.7
12	32	51.8	40.0	66.1
12	33	53.1	40.9	67.7
12	34	54.3	41.9	69.0
12	35	55.6	42.9	70.4
12	36	56.8	43.9	71.7
12	37	58.1	44.8	73.0
12	38	59.4	47.0	74.4
12	39	60.7	48.0	75.8
12	40	62.0	49.0	77.2
12	41	63.2	50.0	78.6
12	42	64.5	51.0	79.5
12	43	65.8	52.1	81.4
12	44	67.1	53.1	82.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
36	45	173.3	143.8	206.2
36	46	176.6	146.6	210.2
36	47	179.9	149.4	213.8
36	48	183.3	152.2	217.5
37	0	62.9	43.6	87.4
37	1	65.0	45.0	89.6
37	2	67.0	46.5	92.0
37	3	69.1	47.9	95.6
37	4	71.2	50.7	98.3
37	5	73.3	52.2	100.1
37	6	75.4	53.8	102.6
37	7	77.6	55.3	104.5
37	8	79.8	56.9	107.0
37	9	82.0	60.0	109.4
37	10	84.2	61.7	112.2
37	11	86.5	63.3	114.9
37	12	88.8	65.0	117.5
37	13	91.1	66.7	120.2
37	14	93.4	70.3	121.9
37	15	95.8	72.0	125.0
37	16	98.2	73.8	127.6
37	17	100.6	75.7	130.6
37	18	103.1	77.5	133.7
37	19	105.6	79.4	135.3
37	20	108.1	83.4	138.7
37	21	110.7	83.2	142.1
37	22	113.3	87.4	144.2
37	23	115.9	89.4	147.9
37	24	118.6	91.5	150.0
37	25	121.3	93.6	152.6
37	26	124.0	95.7	155.9
37	27	126.8	97.8	159.5
37	28	129.6	102.5	162.7
37	29	132.4	104.8	164.6
37	30	135.3	107.0	168.0
37	31	138.2	109.3	172.4
37	32	141.2	111.7	174.4
37	33	144.2	114.1	177.0
37	34	147.3	116.5	181.9
37	35	150.3	118.9	184.2
37	36	153.5	124.4	187.3
37	37	156.7	127.0	191.9
37	38	159.9	129.6	194.0
37	39	163.1	132.2	198.0
37	40	166.5	134.9	200.4
37	41	169.8	137.6	205.3
37	42	173.2	140.4	209.3
37	43	176.7	146.7	212.3
37	44	180.2	149.6	215.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
12	45	68.4	54.1	83.7
12	46	69.7	56.5	85.3
12	47	71.0	57.6	86.9
12	48	72.4	58.6	87.7
13	0	14.8	8.5	25.1
13	1	16.0	9.2	26.4
13	2	17.1	9.9	27.4
13	3	18.3	10.5	28.8
13	4	19.5	11.6	30.4
13	5	20.6	12.7	31.8
13	6	21.8	13.4	33.1
13	7	23.0	14.6	34.5
13	8	24.2	15.8	35.7
13	9	25.4	16.6	37.1
13	10	26.6	17.4	38.5
13	11	27.8	18.2	39.9
13	12	29.0	19.5	41.3
13	13	30.2	20.3	42.7
13	14	31.4	21.8	44.2
13	15	32.6	22.6	45.6
13	16	33.8	23.4	46.6
13	17	35.0	25.0	48.0
13	18	36.2	25.8	49.5
13	19	37.5	26.7	51.0
13	20	38.7	27.6	52.0
13	21	39.9	28.5	53.7
13	22	41.2	30.1	54.7
13	23	42.4	31.1	56.2
13	24	43.6	32.0	57.6
13	25	44.9	32.9	58.9
13	26	46.1	34.7	60.2
13	27	47.4	35.6	61.6
13	28	48.6	36.6	63.0
13	29	49.9	37.5	64.4
13	30	51.2	38.5	66.0
13	31	52.5	39.4	67.3
13	32	53.7	41.4	68.5
13	33	55.0	42.4	69.7
13	34	56.3	43.4	71.0
13	35	57.6	44.4	72.4
13	36	58.9	45.4	74.0
13	37	60.2	46.4	75.7
13	38	61.5	48.6	76.9
13	39	62.8	49.6	77.9
13	40	64.1	50.7	79.5
13	41	65.4	51.7	81.2
13	42	66.7	52.8	82.3
13	43	68.0	53.8	83.4
13	44	69.3	54.9	85.3

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
37	45	183.7	152.5	219.3
37	46	187.3	155.5	222.7
37	47	191.0	158.5	227.0
37	48	194.7	161.6	229.7
38	0	66.3	46.0	91.7
38	1	68.4	47.5	96.2
38	2	70.6	48.9	98.5
38	3	72.7	51.9	101.0
38	4	74.9	53.4	102.9
38	5	77.1	55.0	105.7
38	6	79.4	56.6	107.7
38	7	81.6	58.2	110.3
38	8	83.9	59.8	112.8
38	9	86.2	63.2	115.4
38	10	88.6	64.9	118.3
38	11	91.0	66.6	121.0
38	12	93.4	68.4	123.1
38	13	95.8	70.2	126.0
38	14	98.3	73.9	128.9
38	15	100.8	75.8	132.1
38	16	103.4	77.7	135.0
38	17	105.9	79.7	137.0
38	18	108.6	81.6	140.4
38	19	111.2	83.6	143.0
38	20	113.9	85.6	146.2
38	21	116.6	90.0	148.9
38	22	119.4	92.1	152.3
38	23	122.2	94.3	155.5
38	24	125.0	96.5	158.7
38	25	127.9	98.7	161.3
38	26	130.8	103.5	163.9
38	27	133.8	105.9	168.0
38	28	136.8	105.6	172.4
38	29	139.9	110.7	174.4
38	30	143.0	113.1	177.0
38	31	146.2	115.6	181.9
38	32	149.4	118.1	185.4
38	33	152.6	120.7	187.3
38	34	155.9	123.3	192.2
38	35	159.2	126.0	194.9
38	36	162.6	131.8	198.9
38	37	166.1	134.6	203.5
38	38	169.6	137.5	206.2
38	39	173.2	140.4	209.3
38	40	176.8	143.3	213.8
38	41	180.4	146.3	218.1
38	42	184.2	149.3	221.8
38	43	188.0	152.3	226.4
38	44	191.8	159.2	229.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
13	45	70.7	55.9	86.7
13	46	72.0	58.4	87.4
13	47	73.3	59.4	89.5
13	48	74.7	60.5	90.8
14	0	16.1	9.3	26.8
14	1	17.3	10.3	28.2
14	2	18.5	11.0	29.2
14	3	19.7	11.7	30.7
14	4	20.9	12.4	32.3
14	5	22.1	13.6	33.7
14	6	23.3	14.8	35.0
14	7	24.5	16.0	36.1
14	8	25.7	16.8	37.7
14	9	26.9	17.6	39.1
14	10	28.1	18.4	40.6
14	11	29.3	19.7	41.8
14	12	30.5	20.6	43.4
14	13	31.7	22.0	44.4
14	14	33.0	22.9	45.8
14	15	34.2	23.7	47.2
14	16	35.4	24.6	48.8
14	17	36.7	26.1	50.3
14	18	37.9	27.0	51.2
14	19	39.1	27.9	52.8
14	20	40.4	28.8	54.5
14	21	41.6	30.5	55.4
14	22	42.9	31.4	57.1
14	23	44.2	32.4	58.6
14	24	45.4	33.3	59.8
14	25	46.7	35.1	61.3
14	26	48.0	36.1	62.5
14	27	49.3	37.0	64.0
14	28	50.5	38.0	65.4
14	29	51.8	39.0	66.6
14	30	53.1	41.0	67.9
14	31	54.4	42.0	69.6
14	32	55.7	43.0	70.9
14	33	57.0	44.0	72.3
14	34	58.3	45.0	73.7
14	35	59.6	46.0	75.0
14	36	60.9	47.0	76.4
14	37	62.3	49.3	77.8
14	38	63.6	50.3	79.5
14	39	64.9	51.4	80.8
14	40	66.3	52.4	82.1
14	41	67.6	53.5	83.3
14	42	68.9	54.5	85.3
14	43	70.3	55.6	86.3
14	44	71.6	56.7	87.4

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
38	45	195.7	162.4	234.0
38	46	199.7	165.7	238.0
38	47	203.7	169.1	243.1
38	48	207.7	172.4	245.9
39	0	70.0	48.5	98.5
39	1	72.2	50.0	101.1
39	2	74.4	53.0	103.6
39	3	76.7	54.6	106.2
39	4	78.9	56.3	108.8
39	5	81.3	57.9	111.4
39	6	83.6	59.6	113.8
39	7	86.0	61.3	115.5
39	8	88.4	63.0	119.2
39	9	90.9	66.6	121.6
39	10	93.4	68.4	124.2
39	11	95.9	70.2	127.6
39	12	98.4	72.1	130.6
39	13	101.0	74.0	133.7
39	14	103.6	75.9	135.3
39	15	106.3	77.9	138.7
39	16	109.0	82.0	142.2
39	17	111.8	84.0	145.4
39	18	114.6	86.1	148.2
39	19	117.4	88.3	151.7
39	20	120.3	92.8	154.7
39	21	123.2	95.0	158.2
39	22	126.1	94.9	160.7
39	23	129.2	99.6	163.7
39	24	132.2	102.0	168.0
39	25	135.3	104.4	172.4
39	26	138.5	106.8	174.4
39	27	141.7	109.3	177.0
39	28	145.0	114.7	181.9
39	29	148.3	117.3	185.5
39	30	151.7	120.0	187.8
39	31	155.1	122.7	192.8
39	32	158.6	125.4	196.8
39	33	162.1	128.2	200.4
39	34	165.7	131.1	203.8
39	35	169.4	134.0	208.0
39	36	173.1	140.3	212.3
39	37	176.9	143.4	215.7
39	38	180.7	146.5	219.3
39	39	184.7	149.7	223.6
39	40	188.7	152.9	228.5
39	41	192.7	156.2	233.7
39	42	196.8	159.5	236.1
39	43	201.0	166.9	242.5
39	44	205.3	170.4	245.0

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
14	45	73.0	59.2	89.5
14	46	74.4	60.3	90.7
14	47	75.7	61.4	91.6
14	48	77.1	62.5	93.8
15	0	17.5	10.1	28.6
15	1	18.7	10.8	30.0
15	2	19.9	11.9	30.9
15	3	21.1	12.6	32.6
15	4	22.3	13.7	34.1
15	5	23.5	14.9	35.2
15	6	24.7	15.7	36.5
15	7	25.9	17.0	38.1
15	8	27.2	17.8	39.7
15	9	28.4	18.6	41.2
15	10	29.6	19.4	42.3
15	11	30.9	20.8	44.0
15	12	32.1	21.6	44.9
15	13	33.3	23.1	46.5
15	14	34.6	24.0	48.0
15	15	35.8	24.9	49.5
15	16	37.1	26.4	51.0
15	17	38.4	27.3	52.0
15	18	39.6	28.2	53.7
15	19	40.9	29.1	55.2
15	20	42.2	30.9	56.2
15	21	43.4	31.8	58.0
15	22	44.7	32.8	59.0
15	23	46.0	33.7	60.7
15	24	47.3	35.6	61.8
15	25	48.6	36.5	63.5
15	26	49.9	37.5	64.7
15	27	51.2	38.5	66.1
15	28	52.5	39.5	67.8
15	29	53.8	40.5	69.0
15	30	55.1	41.4	70.4
15	31	56.4	43.5	72.0
15	32	57.8	44.6	73.4
15	33	59.1	45.6	74.7
15	34	60.4	46.6	75.9
15	35	61.8	47.7	77.6
15	36	63.1	48.7	79.2
15	37	64.5	51.0	80.6
15	38	65.8	52.1	81.5
15	39	67.2	53.1	83.3
15	40	68.5	54.2	85.1
15	41	69.9	55.3	86.2
15	42	71.3	56.4	87.3
15	43	72.6	58.9	89.5
15	44	74.0	60.0	90.5

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
39	45	209.6	174.0	251.4
39	46	214.0	177.6	254.1
39	47	218.5	181.3	260.5
39	48	223.0	185.1	264.5
40	0	73.8	51.2	103.6
40	1	76.2	52.8	106.2
40	2	78.5	56.0	109.0
40	3	80.9	57.7	111.7
40	4	83.3	59.4	114.6
40	5	85.7	61.1	117.2
40	6	88.2	62.9	120.2
40	7	90.8	66.5	123.1
40	8	93.3	66.5	125.4
40	9	95.9	70.2	128.9
40	10	98.5	72.2	132.1
40	11	101.2	74.1	135.0
40	12	103.9	76.1	137.0
40	13	106.7	78.2	140.4
40	14	109.5	80.2	144.0
40	15	112.4	84.5	147.9
40	16	115.3	86.7	150.0
40	17	118.2	88.9	154.0
40	18	121.2	91.1	156.6
40	19	124.3	95.9	159.9
40	20	127.4	95.8	163.7
40	21	130.5	98.1	168.0
40	22	133.7	103.2	172.4
40	23	137.0	105.7	174.4
40	24	140.3	108.2	177.0
40	25	143.7	110.8	181.9
40	26	147.1	113.5	186.9
40	27	150.6	119.2	190.0
40	28	154.2	119.0	193.1
40	29	157.8	124.8	197.7
40	30	161.5	127.8	200.4
40	31	165.3	130.8	205.9
40	32	169.1	133.8	209.3
40	33	173.0	136.9	213.8
40	34	177.0	140.0	219.3
40	35	181.1	143.2	222.4
40	36	185.2	146.5	227.0
40	37	189.4	153.5	230.9
40	38	193.7	157.0	235.5
40	39	198.1	160.6	242.2
40	40	202.5	164.2	244.1
40	41	207.1	167.8	251.4
40	42	211.7	175.7	254.1
40	43	216.4	175.4	260.5
40	44	221.1	183.6	264.5

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
15	45	75.4	61.1	91.6
15	46	76.8	62.3	93.8
15	47	78.2	63.4	94.6
15	48	79.6	64.5	96.1
16	0	18.9	11.3	30.4
16	1	20.1	12.4	31.8
16	2	21.3	12.7	32.6
16	3	22.6	13.9	34.5
16	4	23.8	14.6	35.8
16	5	25.0	15.9	37.1
16	6	26.2	17.2	38.5
16	7	27.5	18.0	40.2
16	8	28.7	18.8	41.6
16	9	30.0	19.6	42.7
16	10	31.2	21.0	44.4
16	11	32.5	21.9	45.7
16	12	33.7	23.4	47.2
16	13	35.0	24.3	48.8
16	14	36.3	25.2	50.3
16	15	37.5	26.8	51.2
16	16	38.8	27.7	52.8
16	17	40.1	28.6	54.5
16	18	41.4	29.5	55.9
16	19	42.7	30.4	57.1
16	20	44.0	32.2	58.6
16	21	45.3	33.2	60.1
16	22	46.6	34.1	61.5
16	23	47.9	35.1	63.0
16	24	49.2	37.0	64.2
16	25	50.5	38.0	66.0
16	26	51.8	39.0	67.3
16	27	53.2	40.0	68.5
16	28	54.5	41.0	70.3
16	29	55.8	43.1	71.7
16	30	57.2	44.1	73.0
16	31	58.5	45.2	74.4
16	32	59.9	46.2	75.9
16	33	61.2	47.3	77.6
16	34	62.6	48.3	78.9
16	35	64.0	49.4	80.0
16	36	65.3	50.4	81.4
16	37	66.7	52.8	83.3
16	38	68.1	53.9	84.8
16	39	69.5	55.0	85.9
16	40	70.9	56.1	87.3
16	41	72.3	57.2	89.5
16	42	73.7	58.3	90.3
16	43	75.1	60.9	91.6
16	44	76.5	62.0	93.8

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
40	45	226.0	187.6	270.3
40	46	231.0	191.7	274.9
40	47	236.0	195.9	281.0
40	48	241.1	200.2	285.6
41	0	78.0	54.1	109.0
41	1	80.5	55.8	111.8
41	2	83.0	57.5	114.9
41	3	85.5	60.9	118.0
41	4	88.0	62.8	121.0
41	5	90.6	64.6	124.1
41	6	93.3	66.5	126.3
41	7	95.9	68.4	130.5
41	8	98.7	72.3	133.7
41	9	101.4	74.3	136.1
41	10	104.3	76.4	139.3
41	11	107.1	78.5	142.7
41	12	110.0	80.6	146.2
41	13	113.0	82.8	149.1
41	14	116.0	87.2	152.6
41	15	119.1	89.6	156.1
41	16	122.2	91.9	159.8
41	17	125.4	94.3	163.7
41	18	128.7	94.2	168.0
41	19	132.0	99.2	172.4
41	20	135.4	101.8	174.4
41	21	138.8	107.1	177.0
41	22	142.3	107.0	181.9
41	23	145.9	109.7	187.2
41	24	149.5	115.3	190.1
41	25	153.2	118.2	194.0
41	26	157.0	121.1	198.9
41	27	160.9	124.1	203.5
41	28	164.8	130.4	206.2
41	29	168.9	133.6	212.3
41	30	173.0	133.4	215.7
41	31	177.2	140.1	221.8
41	32	181.5	143.5	226.4
41	33	185.8	147.0	229.7
41	34	190.3	150.5	235.5
41	35	194.8	154.1	240.7
41	36	199.5	161.7	243.4
41	37	204.2	165.5	251.4
41	38	209.1	169.5	254.1
41	39	214.0	173.5	260.5
41	40	219.1	177.6	266.0
41	41	224.2	186.1	270.3
41	42	229.4	186.0	277.9
41	43	234.8	194.9	282.2
41	44	240.2	194.7	290.1

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
16	45	77.9	63.2	94.6
16	46	79.3	64.3	96.1
16	47	80.8	65.5	98.4
16	48	82.2	66.6	98.9
17	0	20.3	12.1	32.2
17	1	21.6	12.9	33.7
17	2	22.8	14.0	35.0
17	3	24.1	14.8	36.5
17	4	25.3	16.1	37.7
17	5	26.6	16.9	39.2
17	6	27.8	18.2	40.6
17	7	29.1	19.0	42.0
17	8	30.3	20.4	43.4
17	9	31.6	21.3	44.9
17	10	32.9	22.2	46.5
17	11	34.1	23.7	48.0
17	12	35.4	24.6	49.5
17	13	36.7	25.5	51.0
17	14	38.0	26.4	52.0
17	15	39.3	28.0	53.7
17	16	40.6	28.9	55.4
17	17	41.9	29.9	56.4
17	18	43.2	30.8	58.0
17	19	44.5	32.6	59.7
17	20	45.9	33.6	60.8
17	21	47.2	34.6	62.5
17	22	48.5	35.5	63.6
17	23	49.8	37.5	65.4
17	24	51.2	38.5	66.6
17	25	52.5	39.5	68.4
17	26	53.9	40.5	69.7
17	27	55.2	41.5	71.0
17	28	56.6	42.6	72.4
17	29	58.0	44.7	74.0
17	30	59.3	45.8	75.7
17	31	60.7	46.8	77.2
17	32	62.1	47.9	78.6
17	33	63.5	49.0	79.8
17	34	64.9	51.3	81.4
17	35	66.3	51.1	83.3
17	36	67.7	53.5	84.6
17	37	69.1	54.6	85.4
17	38	70.5	55.8	87.3
17	39	71.9	56.9	89.4
17	40	73.3	58.0	90.3
17	41	74.8	59.1	91.6
17	42	76.2	60.3	93.9
17	43	77.6	62.9	94.6
17	44	79.1	64.1	96.1

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
41	45	245.8	204.0	294.4
41	46	251.5	208.7	302.0
41	47	257.2	213.5	306.9
41	48	263.1	218.4	314.5
42	0	82.6	57.3	115.4
42	1	85.2	59.1	118.3
42	2	87.8	60.9	121.9
42	3	90.5	62.8	125.0
42	4	93.2	66.5	128.0
42	5	96.0	68.4	131.7
42	6	98.8	70.4	135.3
42	7	101.7	72.5	138.2
42	8	104.6	74.6	142.1
42	9	107.6	78.8	145.4
42	10	110.6	81.0	148.8
42	11	113.7	83.3	151.7
42	12	116.9	85.6	155.9
42	13	120.1	87.9	159.8
42	14	123.4	92.8	163.7
42	15	126.7	95.3	168.0
42	16	130.1	95.3	172.4
42	17	133.6	97.8	174.4
42	18	137.2	103.1	177.0
42	19	140.8	105.9	182.0
42	20	144.5	108.7	187.2
42	21	148.3	111.5	192.3
42	22	152.2	114.4	195.0
42	23	156.1	120.5	200.4
42	24	160.2	123.6	205.3
42	25	164.3	126.8	209.3
42	26	168.6	130.0	213.8
42	27	172.9	133.4	219.3
42	28	177.3	136.8	222.7
42	29	181.9	140.3	228.5
42	30	186.5	147.5	234.0
42	31	191.3	151.3	238.0
42	32	196.1	155.1	243.1
42	33	201.1	159.1	251.4
42	34	206.2	163.1	254.1
42	35	211.4	167.2	260.5
42	36	216.7	175.7	268.2
42	37	222.2	175.7	270.9
42	38	227.7	184.6	279.8
42	39	233.4	189.2	283.1
42	40	239.2	193.9	290.4
42	41	245.2	198.7	296.2
42	42	251.3	208.6	303.3
42	43	257.5	208.7	310.9
42	44	263.8	219.0	315.5

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
17	45	80.5	65.3	98.6
17	46	82.0	66.5	99.0
17	47	83.5	67.7	101.0
17	48	84.9	68.8	102.5
18	0	21.8	13.4	33.9
18	1	23.1	14.2	35.7
18	2	24.3	15.4	37.1
18	3	25.6	15.7	38.4
18	4	26.9	17.1	39.8
18	5	28.1	18.4	41.3
18	6	29.4	19.2	42.7
18	7	30.7	20.7	44.2
18	8	32.0	21.6	45.7
18	9	33.3	22.4	47.2
18	10	34.6	23.3	48.8
18	11	35.9	24.9	50.3
18	12	37.2	25.8	51.2
18	13	38.5	26.7	52.8
18	14	39.8	27.6	54.5
18	15	41.1	29.3	56.1
18	16	42.4	30.3	57.4
18	17	43.8	31.2	58.9
18	18	45.1	33.0	60.2
18	19	46.5	34.0	61.8
18	20	47.8	35.0	63.4
18	21	49.2	36.0	64.7
18	22	50.5	38.0	66.1
18	23	51.9	39.0	67.8
18	24	53.2	40.0	69.1
18	25	54.6	41.1	70.7
18	26	56.0	42.1	72.2
18	27	57.4	43.1	73.7
18	28	58.8	45.3	75.1
18	29	60.2	46.4	76.6
18	30	61.6	47.5	77.9
18	31	63.0	48.6	79.5
18	32	64.4	49.7	81.4
18	33	65.8	50.8	83.0
18	34	67.2	53.2	84.2
18	35	68.6	53.0	85.3
18	36	70.1	55.4	87.3
18	37	71.5	56.6	89.2
18	38	73.0	57.7	90.0
18	39	74.4	58.9	91.6
18	40	75.9	60.0	93.9
18	41	77.3	61.2	94.6
18	42	78.8	63.9	96.1
18	43	80.3	65.1	98.6
18	44	81.8	66.3	99.2

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
42	45	270.3	219.1	325.8
42	46	276.9	229.8	328.6
42	47	283.6	235.4	340.8
42	48	290.5	241.2	343.5
43	0	87.6	60.7	123.1
43	1	90.4	62.7	126.0
43	2	93.2	64.6	129.1
43	3	96.0	68.5	132.1
43	4	99.0	70.5	136.7
43	5	101.9	72.7	140.4
43	6	105.0	74.8	143.9
43	7	108.1	77.0	147.2
43	8	111.2	79.3	151.7
43	9	114.5	81.6	155.5
43	10	117.8	86.3	158.2
43	11	121.1	88.7	163.3
43	12	124.6	91.2	167.8
43	13	128.1	93.8	172.1
43	14	131.7	96.5	174.4
43	15	135.4	99.2	177.0
43	16	139.1	101.9	182.0
43	17	143.0	107.5	187.2
43	18	147.0	110.5	192.9
43	19	151.0	113.5	197.7
43	20	155.2	116.7	200.4
43	21	159.4	119.9	206.2
43	22	163.8	123.1	212.3
43	23	168.2	126.5	215.7
43	24	172.8	133.3	221.8
43	25	177.5	133.5	227.0
43	26	182.3	140.7	233.7
43	27	187.3	144.5	238.0
43	28	192.4	148.4	243.1
43	29	197.6	152.4	251.4
43	30	202.9	160.5	254.1
43	31	208.4	160.8	260.5
43	32	214.0	169.3	269.7
43	33	219.8	173.9	273.3
43	34	225.8	178.6	281.0
43	35	231.8	187.9	287.7
43	36	238.1	188.3	294.4
43	37	244.5	198.2	302.0
43	38	251.0	198.6	306.9
43	39	257.7	208.9	315.5
43	40	264.6	214.5	322.8
43	41	271.7	220.2	328.6
43	42	278.9	226.0	340.8
43	43	286.3	232.0	343.5
43	44	293.8	238.1	356.3

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
18	45	83.3	67.5	101.0
18	46	84.8	68.7	102.8
18	47	86.3	69.9	103.8
18	48	87.8	71.1	106.2
19	0	23.3	14.4	36.1
19	1	24.6	15.1	37.6
19	2	25.9	16.4	39.1
19	3	27.2	17.3	40.2
19	4	28.5	18.1	41.8
19	5	29.8	19.5	43.4
19	6	31.1	20.9	44.9
19	7	32.4	21.8	46.5
19	8	33.7	22.7	48.0
19	9	35.0	23.6	49.5
19	10	36.3	25.2	51.0
19	11	37.6	26.1	52.0
19	12	39.0	27.0	53.7
19	13	40.3	27.9	55.4
19	14	41.6	29.7	57.0
19	15	43.0	30.7	58.0
19	16	44.3	31.6	59.8
19	17	45.7	32.6	61.3
19	18	47.1	34.5	62.6
19	19	48.4	35.5	64.2
19	20	49.8	36.5	66.0
19	21	51.2	37.5	67.3
19	22	52.6	39.5	69.0
19	23	54.0	40.6	70.4
19	24	55.4	41.6	71.7
19	25	56.8	42.7	73.4
19	26	58.2	43.7	75.0
19	27	59.6	44.8	76.4
19	28	61.0	47.1	77.8
19	29	62.4	48.2	79.5
19	30	63.9	49.3	81.2
19	31	65.3	50.4	82.7
19	32	66.8	51.5	83.7
19	33	68.2	54.0	85.3
19	34	69.7	53.7	87.3
19	35	71.1	56.3	89.1
19	36	72.6	57.4	89.8
19	37	74.1	58.6	91.6
19	38	75.5	59.8	93.9
19	39	77.0	60.9	94.6
19	40	78.5	62.1	96.1
19	41	80.0	64.9	98.6
19	42	81.5	66.1	99.5
19	43	83.1	67.3	101.0
19	44	84.6	68.6	103.3

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
43	45	301.5	244.4	360.0
43	46	309.4	256.8	372.4
43	47	317.4	263.5	378.5
43	48	325.7	270.3	388.2
44	0	93.1	64.6	130.6
44	1	96.1	66.6	135.3
44	2	99.1	68.7	138.7
44	3	102.2	70.9	142.2
44	4	105.4	75.1	145.4
44	5	108.6	77.4	150.0
44	6	111.9	79.8	154.0
44	7	115.3	82.2	158.1
44	8	118.7	84.7	162.7
44	9	122.3	87.2	167.2
44	10	125.9	92.2	172.0
44	11	129.6	95.0	174.4
44	12	133.4	95.1	177.9
44	13	137.4	97.9	182.9
44	14	141.4	103.5	187.8
44	15	145.5	106.6	193.2
44	16	149.7	109.7	199.0
44	17	154.1	115.9	203.5
44	18	158.5	119.2	209.3
44	19	163.1	122.7	213.8
44	20	167.9	126.2	219.3
44	21	172.7	129.9	226.4
44	22	177.7	133.6	229.7
44	23	182.9	137.5	235.5
44	24	188.2	141.5	243.1
44	25	193.6	145.6	251.4
44	26	199.3	153.7	254.1
44	27	205.1	158.2	260.5
44	28	211.0	162.8	270.3
44	29	217.2	167.5	274.9
44	30	223.5	172.4	282.2
44	31	230.0	177.5	290.4
44	32	236.7	187.3	296.2
44	33	243.6	188.0	305.1
44	34	250.8	198.4	314.5
44	35	258.1	204.1	320.9
44	36	265.6	210.1	328.6
44	37	273.3	221.5	340.8
44	38	281.2	222.5	343.5
44	39	289.4	234.6	359.4
44	40	297.8	235.5	364.3
44	41	306.3	248.3	378.5
44	42	315.1	255.4	382.7
44	43	324.1	262.7	398.6
44	44	333.3	270.2	401.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
19	45	86.1	69.8	103.9
19	46	87.6	71.0	106.2
19	47	89.2	72.3	107.6
19	48	90.7	73.5	109.1
20	0	24.9	15.8	38.1
20	1	26.2	16.6	39.7
20	2	27.5	17.5	41.2
20	3	28.8	18.3	42.7
20	4	30.1	19.7	44.2
20	5	31.5	20.6	45.7
20	6	32.8	22.1	47.2
20	7	34.1	23.0	48.8
20	8	35.4	23.9	50.3
20	9	36.8	25.5	51.2
20	10	38.1	26.4	52.8
20	11	39.5	27.4	54.5
20	12	40.8	28.3	56.2
20	13	42.2	30.1	57.6
20	14	43.6	31.1	59.0
20	15	44.9	32.0	60.7
20	16	46.3	33.0	62.5
20	17	47.7	34.9	63.6
20	18	49.1	36.0	65.4
20	19	50.5	37.0	66.6
20	20	51.9	38.0	68.5
20	21	53.3	40.1	69.7
20	22	54.7	41.1	71.5
20	23	56.1	42.2	73.0
20	24	57.6	43.3	74.4
20	25	59.0	44.4	75.9
20	26	60.4	45.5	77.6
20	27	61.9	47.8	79.3
20	28	63.3	48.9	80.8
20	29	64.8	50.0	82.3
20	30	66.3	51.1	83.4
20	31	67.7	52.3	85.3
20	32	69.2	53.4	87.3
20	33	70.7	55.9	88.7
20	34	72.2	57.1	89.6
20	35	73.7	58.3	91.6
20	36	75.2	59.5	93.9
20	37	76.7	60.7	94.6
20	38	78.2	61.9	96.1
20	39	79.8	63.1	98.6
20	40	81.3	64.3	99.5
20	41	82.8	65.5	101.0
20	42	84.4	68.4	103.3
20	43	85.9	69.7	104.4
20	44	87.5	70.9	106.2

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
44	45	342.8	277.8	418.7
44	46	352.4	285.7	423.0
44	47	362.3	293.7	439.5
44	48	372.4	301.8	446.2
45	0	99.3	68.8	140.4
45	1	102.5	71.1	144.2
45	2	105.8	73.4	148.9
45	3	109.2	75.7	152.6
45	4	112.6	78.1	156.6
45	5	116.2	80.6	160.7
45	6	119.8	83.1	165.2
45	7	123.6	85.7	170.1
45	8	127.4	90.8	176.4
45	9	131.4	93.6	180.4
45	10	135.4	96.5	184.0
45	11	139.6	99.5	190.0
45	12	143.9	102.6	195.0
45	13	148.3	105.7	199.9
45	14	152.9	112.0	206.2
45	15	157.6	115.4	212.3
45	16	162.4	119.0	215.7
45	17	167.4	122.6	222.7
45	18	172.6	126.4	228.5
45	19	178.0	130.3	235.5
45	20	183.5	134.4	243.1
45	21	189.2	142.3	251.4
45	22	195.1	146.7	254.1
45	23	201.2	151.3	260.5
45	24	207.5	156.1	270.3
45	25	214.1	161.0	279.8
45	26	220.9	170.4	283.1
45	27	227.9	175.8	294.4
45	28	235.2	176.8	302.0
45	29	242.7	187.2	310.9
45	30	250.4	193.2	318.2
45	31	258.4	199.4	328.6
45	32	266.7	205.8	340.8
45	33	275.3	212.4	343.5
45	34	284.1	219.2	360.0
45	35	293.3	232.0	365.5
45	36	302.6	233.5	378.3
45	37	312.3	247.0	388.2
45	38	322.3	254.9	401.7
45	39	332.5	263.0	413.9
45	40	343.0	278.0	423.0
45	41	353.8	279.9	439.5
45	42	364.9	295.7	446.2
45	43	376.2	297.6	467.0
45	44	387.9	314.4	472.5

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
20	45	89.1	72.2	108.0
20	46	90.7	73.5	109.1
20	47	92.2	74.8	111.4
20	48	93.8	76.1	112.8
21	0	26.5	16.8	40.1
21	1	27.9	18.2	41.3
21	2	29.2	18.5	43.1
21	3	30.5	19.4	44.8
21	4	31.8	20.8	46.4
21	5	33.2	21.7	47.9
21	6	34.5	23.3	49.5
21	7	35.9	24.2	51.0
21	8	37.3	25.8	52.0
21	9	38.6	26.8	53.7
21	10	40.0	27.7	55.4
21	11	41.4	28.7	57.1
21	12	42.8	30.5	58.6
21	13	44.1	31.5	60.1
21	14	45.5	32.5	61.6
21	15	46.9	33.5	63.0
21	16	48.4	35.4	64.7
21	17	49.8	36.5	66.1
21	18	51.2	37.5	67.8
21	19	52.6	38.5	69.2
21	20	54.1	39.6	70.9
21	21	55.5	41.7	72.4
21	22	56.9	42.8	74.0
21	23	58.4	43.9	75.8
21	24	59.9	45.0	77.6
21	25	61.3	46.1	79.2
21	26	62.8	48.5	80.6
21	27	64.3	49.6	81.7
21	28	65.8	50.7	83.4
21	29	67.3	51.9	85.3
21	30	68.8	53.1	87.2
21	31	70.3	54.2	88.6
21	32	71.8	56.8	89.5
21	33	73.3	58.0	91.6
21	34	74.9	59.2	93.9
21	35	76.4	60.4	94.6
21	36	77.9	61.7	96.1
21	37	79.5	62.9	98.6
21	38	81.1	64.1	99.8
21	39	82.6	65.4	101.0
21	40	84.2	68.2	103.6
21	41	85.8	69.5	104.7
21	42	87.4	70.8	106.2
21	43	89.0	72.1	108.3
21	44	90.6	73.4	109.4

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
45	45	399.8	316.2	495.6
45	46	412.0	334.0	498.7
45	47	424.5	344.1	524.9
45	48	437.4	354.5	526.2
46	0	106.3	71.6	151.7
46	1	109.8	76.1	155.9
46	2	113.4	78.7	159.9
46	3	117.2	81.3	163.9
46	4	121.0	83.9	168.3
46	5	125.0	86.7	176.8
46	6	129.1	89.5	181.9
46	7	133.3	92.4	186.9
46	8	137.6	98.1	192.3
46	9	142.1	101.3	196.8
46	10	146.7	104.6	201.1
46	11	151.5	108.0	207.8
46	12	156.5	111.6	215.4
46	13	161.6	115.2	220.6
46	14	167.0	119.0	227.9
46	15	172.5	123.0	235.5
46	16	178.2	130.5	243.1
46	17	184.2	134.9	251.4
46	18	190.4	135.7	254.1
46	19	196.8	144.2	260.8
46	20	203.5	149.1	270.3
46	21	210.5	154.2	281.0
46	22	217.8	159.5	290.4
46	23	225.4	169.5	296.2
46	24	233.3	175.4	306.9
46	25	241.5	176.9	315.5
46	26	250.0	188.0	328.6
46	27	258.9	194.7	340.8
46	28	268.2	201.6	343.5
46	29	277.8	208.9	360.0
46	30	287.8	216.4	372.2
46	31	298.1	230.0	382.9
46	32	308.8	232.2	398.6
46	33	319.9	246.8	405.3
46	34	331.4	255.7	423.0
46	35	343.3	264.8	439.5
46	36	355.5	281.2	446.2
46	37	368.1	284.0	471.2
46	38	381.1	294.0	476.1
46	39	394.5	312.1	498.1
46	40	408.3	315.0	515.2
46	41	422.5	334.2	526.2
46	42	437.1	337.2	555.5
46	43	452.0	357.6	556.7
46	44	467.4	369.8	586.6

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
21	45	92.2	74.7	111.8
21	46	93.8	76.0	112.9
21	47	95.4	79.2	114.9
21	48	97.1	78.7	116.4
22	0	28.2	17.9	42.3
22	1	29.5	18.8	44.0
22	2	30.9	19.6	45.5
22	3	32.3	21.1	47.2
22	4	33.6	22.0	48.8
22	5	35.0	23.6	50.3
22	6	36.4	24.5	51.3
22	7	37.7	26.2	52.9
22	8	39.1	27.1	54.5
22	9	40.5	28.1	56.2
22	10	41.9	29.1	58.0
22	11	43.3	30.9	59.7
22	12	44.8	31.9	60.8
22	13	46.2	32.9	62.5
22	14	47.6	33.9	64.2
22	15	49.0	35.0	66.0
22	16	50.5	37.0	67.3
22	17	51.9	38.0	69.0
22	18	53.4	39.1	70.4
22	19	54.8	40.2	72.2
22	20	56.3	41.2	73.7
22	21	57.8	43.5	75.7
22	22	59.3	44.6	77.2
22	23	60.8	45.7	78.6
22	24	62.3	46.8	80.0
22	25	63.8	47.9	81.5
22	26	65.3	50.4	83.3
22	27	66.8	51.5	85.3
22	28	68.3	52.7	87.0
22	29	69.8	53.9	88.2
22	30	71.4	55.1	89.5
22	31	72.9	56.3	91.6
22	32	74.5	58.9	93.9
22	33	76.1	60.2	94.6
22	34	77.6	61.4	96.1
22	35	79.2	62.7	98.6
22	36	80.8	63.9	100.1
22	37	82.4	65.2	101.0
22	38	84.0	66.4	103.6
22	39	85.6	69.4	105.0
22	40	87.2	70.7	106.4
22	41	88.9	72.0	108.8
22	42	90.5	73.4	110.0
22	43	92.1	74.7	111.8
22	44	93.8	76.0	113.8

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
46	45	483.3	382.3	600.6
46	46	499.6	404.9	618.9
46	47	516.3	408.4	648.2
46	48	533.5	422.0	652.5
47	0	114.3	79.3	163.7
47	1	118.3	82.0	168.0
47	2	122.4	84.8	177.0
47	3	126.6	85.3	181.9
47	4	130.9	88.2	187.2
47	5	135.4	91.3	192.7
47	6	140.1	97.2	198.8
47	7	145.0	100.5	204.8
47	8	150.0	104.0	211.8
47	9	155.3	107.7	218.7
47	10	160.7	111.4	226.4
47	11	166.4	115.4	234.0
47	12	172.3	119.5	242.2
47	13	178.5	123.8	250.5
47	14	185.0	131.9	256.3
47	15	191.8	136.7	264.5
47	16	198.9	141.8	273.3
47	17	206.4	147.1	283.1
47	18	214.2	152.7	294.4
47	19	222.4	158.5	303.3
47	20	231.0	169.2	315.5
47	21	240.0	175.8	328.6
47	22	249.5	177.9	340.8
47	23	259.5	185.0	343.5
47	24	270.0	197.7	360.0
47	25	280.9	205.8	378.3
47	26	292.4	214.2	388.4
47	27	304.4	217.0	401.8
47	28	316.9	232.1	423.0
47	29	330.0	248.2	439.5
47	30	343.6	251.7	446.2
47	31	357.8	262.0	471.2
47	32	372.5	280.1	495.6
47	33	387.7	299.1	498.7
47	34	403.4	295.5	526.2
47	35	419.8	315.6	555.5
47	36	436.6	336.9	556.7
47	37	454.1	341.4	586.6
47	38	472.1	355.0	618.9
47	39	490.7	378.6	623.8
47	40	509.9	393.4	652.5
47	41	529.8	398.4	687.9
47	42	550.4	424.6	700.1
47	43	571.7	441.1	724.5
47	44	593.8	458.1	763.6

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
22	45	95.5	77.4	115.1
22	46	97.1	78.7	117.3
22	47	98.8	82.0	118.7
22	48	100.5	83.4	120.4
23	0	29.9	19.0	44.4
23	1	31.3	20.5	46.0
23	2	32.7	21.4	47.7
23	3	34.1	22.3	49.2
23	4	35.5	23.9	51.0
23	5	36.8	24.8	52.2
23	6	38.3	25.8	53.8
23	7	39.7	26.7	55.4
23	8	41.1	28.5	57.1
23	9	42.5	29.5	58.9
23	10	43.9	30.5	60.2
23	11	45.4	32.3	61.8
23	12	46.8	33.4	63.6
23	13	48.3	34.4	65.4
23	14	49.7	35.5	66.6
23	15	51.2	37.5	68.5
23	16	52.7	38.6	70.3
23	17	54.2	39.7	71.7
23	18	55.6	40.8	73.4
23	19	57.1	41.9	75.0
23	20	58.6	43.0	76.4
23	21	60.2	45.2	77.9
23	22	61.7	46.4	79.5
23	23	63.2	47.5	81.4
23	24	64.7	48.7	83.3
23	25	66.3	51.1	85.3
23	26	67.8	51.0	86.9
23	27	69.4	53.5	87.8
23	28	71.0	54.7	89.5
23	29	72.5	56.0	91.6
23	30	74.1	57.2	93.9
23	31	75.7	58.4	94.6
23	32	77.3	61.2	96.1
23	33	78.9	62.4	98.6
23	34	80.5	63.7	100.4
23	35	82.2	65.0	101.2
23	36	83.8	66.3	103.6
23	37	85.4	67.6	105.6
23	38	87.1	68.9	106.4
23	39	88.7	70.2	109.0
23	40	90.4	73.3	110.3
23	41	92.1	74.6	112.2
23	42	93.8	76.0	114.0
23	43	95.5	77.4	115.4
23	44	97.2	78.8	117.5

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
47	45	616.7	487.8	786.4
47	46	640.5	494.2	804.8
47	47	665.3	513.2	847.5
47	48	691.0	546.6	886.5
48	0	123.9	83.5	181.9
48	1	128.4	86.5	187.2
48	2	133.1	89.7	192.9
48	3	137.9	92.9	199.0
48	4	143.0	99.2	206.3
48	5	148.3	102.8	212.4
48	6	153.9	106.7	222.4
48	7	159.7	110.7	229.7
48	8	165.8	114.9	238.0
48	9	172.2	119.4	245.0
48	10	178.9	124.0	257.8
48	11	186.0	125.3	268.8
48	12	193.5	130.4	279.5
48	13	201.4	135.7	284.0
48	14	209.8	145.5	301.1
48	15	218.7	151.7	314.5
48	16	228.2	158.2	323.1
48	17	238.2	165.2	340.8
48	18	248.9	172.6	350.2
48	19	260.3	175.4	365.2
48	20	272.3	183.5	382.9
48	21	285.1	197.7	398.8
48	22	298.7	207.1	423.2
48	23	313.0	217.0	439.5
48	24	328.2	233.9	448.0
48	25	344.1	245.3	472.5
48	26	360.9	257.3	498.7
48	27	378.4	262.4	526.2
48	28	396.8	275.1	555.5
48	29	416.0	296.6	556.7
48	30	436.0	310.9	586.6
48	31	456.9	334.6	618.9
48	32	478.6	341.2	652.5
48	33	501.2	357.3	687.9
48	34	524.7	374.1	700.1
48	35	549.3	402.3	724.5
48	36	574.8	432.2	763.6
48	37	601.5	440.6	804.5
48	38	629.4	448.7	847.5
48	39	658.6	482.4	886.5
48	40	689.3	518.3	892.6
48	41	721.5	542.6	941.5
48	42	755.6	553.4	993.9
48	43	791.5	579.7	1048.9
48	44	829.7	623.9	1108.7

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
23	45	98.9	80.2	119.2
23	46	100.6	81.6	121.2
23	47	102.4	83.0	123.1
23	48	104.1	86.4	124.7
24	0	31.7	20.7	46.6
24	1	33.1	21.7	48.1
24	2	34.5	23.3	50.1
24	3	35.9	24.2	51.9
24	4	37.3	25.2	53.3
24	5	38.8	26.1	54.7
24	6	40.2	27.1	56.4
24	7	41.7	28.9	58.0
24	8	43.1	29.9	59.8
24	9	44.6	30.9	61.3
24	10	46.0	32.8	63.0
24	11	47.5	33.9	64.7
24	12	49.0	34.9	66.1
24	13	50.5	36.0	67.8
24	14	52.0	38.1	69.7
24	15	53.5	39.2	71.0
24	16	55.0	40.3	73.0
24	17	56.5	41.4	74.4
24	18	58.0	42.5	75.9
24	19	59.5	44.8	77.8
24	20	61.1	45.9	79.5
24	21	62.6	47.1	81.4
24	22	64.2	48.3	83.3
24	23	65.8	49.4	85.1
24	24	67.3	50.6	86.3
24	25	68.9	53.2	87.7
24	26	70.5	54.4	89.5
24	27	72.1	55.6	91.6
24	28	73.7	56.9	93.9
24	29	75.3	58.1	94.6
24	30	77.0	60.9	96.1
24	31	78.6	62.2	98.6
24	32	80.3	63.5	100.6
24	33	81.9	64.8	101.5
24	34	83.6	66.1	103.6
24	35	85.2	67.4	105.7
24	36	86.9	68.8	107.0
24	37	88.6	70.1	109.0
24	38	90.3	71.4	111.1
24	39	92.0	74.6	112.2
24	40	93.8	76.0	114.7
24	41	95.5	77.4	116.4
24	42	97.2	78.8	118.0
24	43	99.0	80.2	120.1
24	44	100.7	81.7	121.8

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
48	45	870.4	654.5	1153.8
48	46	913.9	705.0	1174.6
48	47	960.6	703.6	1245.4
48	48	1011.2	740.6	1323.5
49	0	135.5	88.7	203.4
49	1	140.8	92.1	209.3
49	2	146.4	98.7	219.3
49	3	152.3	102.6	228.4
49	4	158.5	106.8	235.5
49	5	165.0	111.2	243.4
49	6	172.0	115.9	260.5
49	7	179.3	120.8	270.3
49	8	187.2	126.1	281.0
49	9	195.6	128.0	292.9
49	10	204.6	137.9	306.9
49	11	214.3	140.2	320.9
49	12	224.7	147.0	343.5
49	13	235.9	159.0	360.0
49	14	248.1	162.3	371.9
49	15	261.3	170.9	398.5
49	16	275.5	185.7	416.8
49	17	290.9	190.4	446.1
49	18	307.6	195.3	471.2
49	19	325.5	206.6	498.1
49	20	344.8	218.9	520.7
49	21	365.4	231.9	555.5
49	22	387.3	245.9	567.0
49	23	410.6	260.6	618.9
49	24	435.2	276.2	650.0
49	25	461.1	292.7	687.9
49	26	488.4	310.0	721.5
49	27	517.2	338.4	763.6
49	28	547.5	358.2	804.5
49	29	579.4	379.1	847.2
49	30	613.1	401.2	879.2
49	31	648.8	424.5	941.5
49	32	686.7	449.3	974.4
49	33	727.0	475.7	1048.9
49	34	770.1	549.0	1094.0
49	35	816.4	550.1	1174.6
49	36	866.4	583.8	1245.4
49	37	920.8	620.5	1282.0
49	38	980.4	660.6	1410.2
49	39	1046.2	705.0	1509.0
49	40	1119.9	754.6	1614.0
49	41	1203.3	810.8	1750.7
49	42	1299.7	850.4	1896.6
49	43	1413.6	924.9	2101.6
49	44	1553.1	1016.2	2353.1

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
24	45	102.5	83.1	123.4
24	46	104.3	86.6	125.1
24	47	106.1	86.0	127.3
24	48	107.9	89.6	128.9

Positive Large Wells	Positive Small Wells	MPN	95% Confidence Lower Limit	95% Confidence Upper Limit
49	45	1732.9	1167.7	2709.5
49	46	1986.3	1222.0	3300.2
49	47	2419.6	1630.4	4716.1
49	48	>2419.6	1439.5	infinite