

STANDARD OPERATING PROCEDURE: Procedure for Labeling Samples Collected at the GSI Land-Based RDTE Facility

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RECORD OF AMENDMENTS:

No.	Date	Type	No.	Date	Type
1			7		
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4			10		
5			11		
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STANDARD OPERATING PROCEDURE

Procedure for Labeling Samples Collected at the GSI Land-Based RDTE Facility

BACKGROUND

The [Great Ships Initiative](#) (GSI) is a collaborative effort to end the problem of ship-mediated invasive species in the Great Lakes-St. Lawrence Seaway System through independent research and demonstration of environmental technology, financial incentives and consistent basin-wide harbor monitoring. To that end, GSI has established research capabilities at three scales—bench, land-based, and shipboard. Each scale is dedicated to addressing specific evaluation objectives, with protocols as consistent with IMO and federal requirements as practicable. Developers of ballast treatment systems apply for GSI research services [online](#), and awards are offered based on an objective review process. GSI incubation/testing will allow meritorious ballast treatment systems to progress as rapidly as possible to an approval-ready and market-ready condition.

The GSI's Land-Based Research, Development and Technology Evaluation (RDTE) Facility in Superior, Wisconsin is used to conduct full-scale biological evaluations of prospective ballast treatments suitable to Seaway-sized vessels. The facility draws raw intake water and entrained organisms from Duluth-Superior Harbor at up to 680 m³/hr. After initial transport through 16 inch HDPE line to the facility, a carefully designed “Y-split” in the intake piping simultaneously channels one half of the flow (up to 340 m³/hr) to a treatment track and one half (up to 340 m³/hr) to a matched control track (figure 1). Water in the treatment track passes through the experimental ballast treatment system and into one of the 200 m³ cylindrical treatment retention tanks (test tank #1 or #2; figure 1). Water in the control track by-passes the treatment system and is channeled directly into a matched control retention tank (control tank #1 or #2; figure 1). After storage (duration dependent on test requirements), the water is discharged sequentially from the treatment and control retention tanks at up to 340 m³/hr. Depending on the test scenario, the water is either discharged to the harbor or sewer system, into an alternate retention tank, or through the treatment system again for discharge or retention.

Treatment and control intake and discharge water is sampled at pressure/flow controlled in-line sample points (SPs). Intake samples are collected concurrently on the control and treatment tracks respectively (using SP2 and SP3, figure 2). Post-treatment samples are collected from SP15 (figure 2). Discharge samples are collected from one of two discharge sample points (SP9, or SP10; figure 2), with sequential sampling of control and treatment water. At each of these SPs there are three replicate sample ports with a center-located 3.8 cm internal diameter (ID) elbow-shaped pitot tube (figure 3) connected to a 3.8 cm ID PVC transfer pipe that carries the sample water to one of six collection tubs located at a centralized sampling station (figure 2). Other SPs shown on figure 5, with one port per SP, are used for calibration testing the facility itself and not typically used for sample collection during a treatment system evaluation.

A mobile field laboratory provides bench-scale facilities to support time-sensitive assays associated with tests conducted at the GSI Land-Based RDTE Facility. The laboratory is located at the facility during testing but may be moved to other sites in the Great Lakes-St. Lawrence Seaway System to support GSI shipboard tests when required. It is climate-controlled, and has enough desk and counter space to allow for simultaneous microscopic and analytical analysis of zooplankton, phytoplankton and bacteria samples. In addition, laboratories of the University of Wisconsin-Superior's Lake Superior Research Institute (LSRI) and the University of Minnesota-Duluth's Natural Resources Research Institute provide non-time sensitive analysis of samples from the land-based tests. Since both facilities are only a few miles from the facility, samples can be easily transported for rapid analysis.

Figure 1. Simplified Schematic of the GSI Land-Based RDTE Facility.

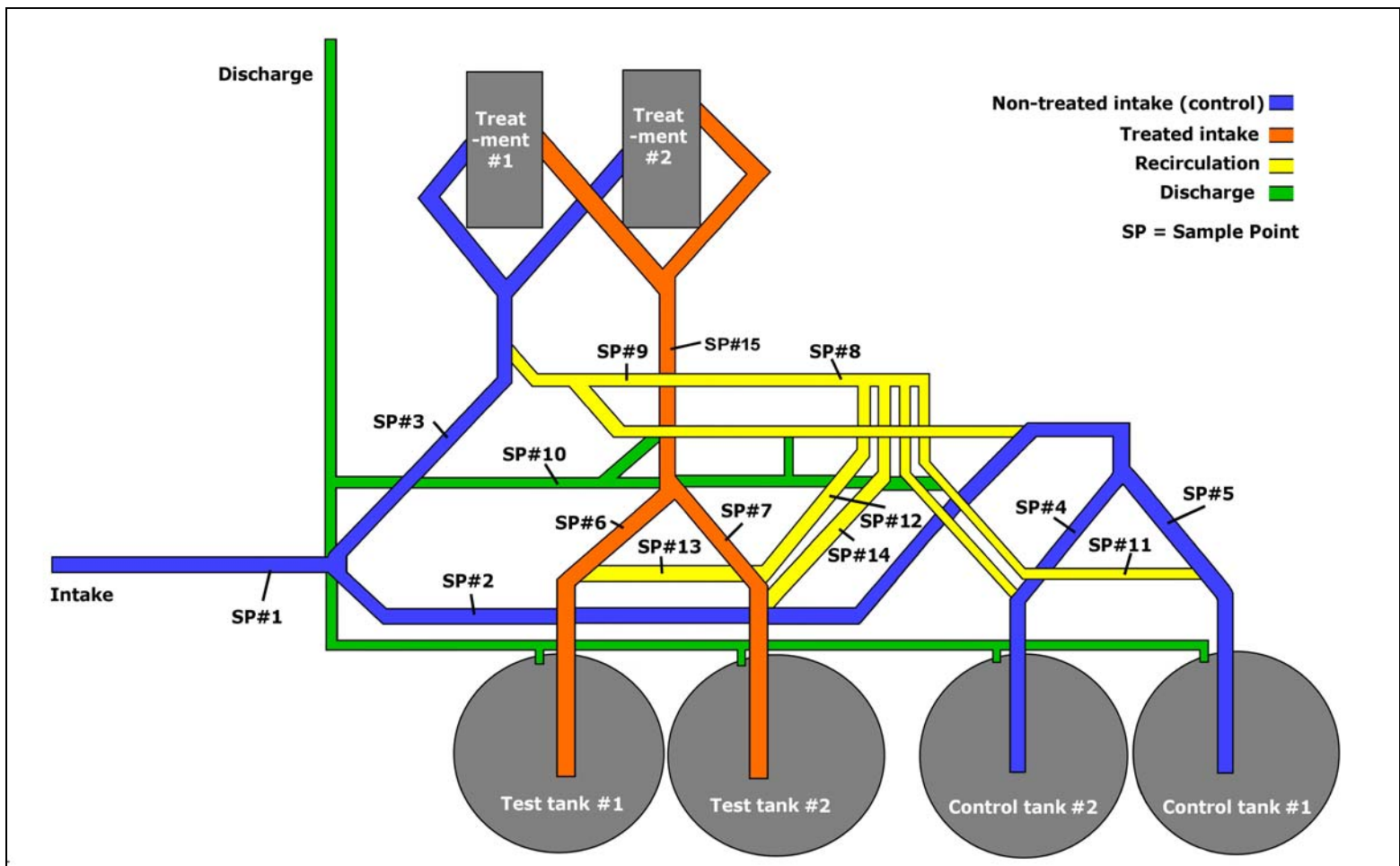


Figure 2. Schematic of the GSI Land-Based RDTE Facility Showing the Location of the Intake and Discharge Sample Points (SPs), Sample Ports, and Corresponding Sample Collection Tubes.

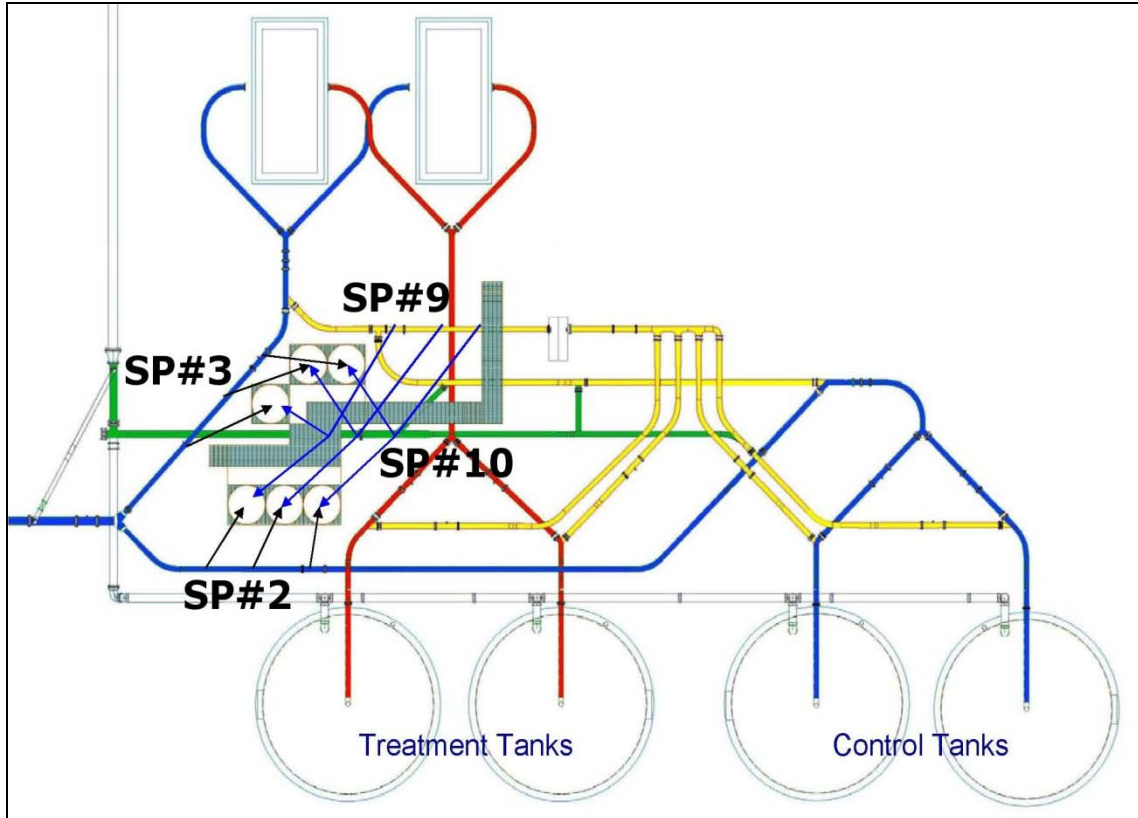
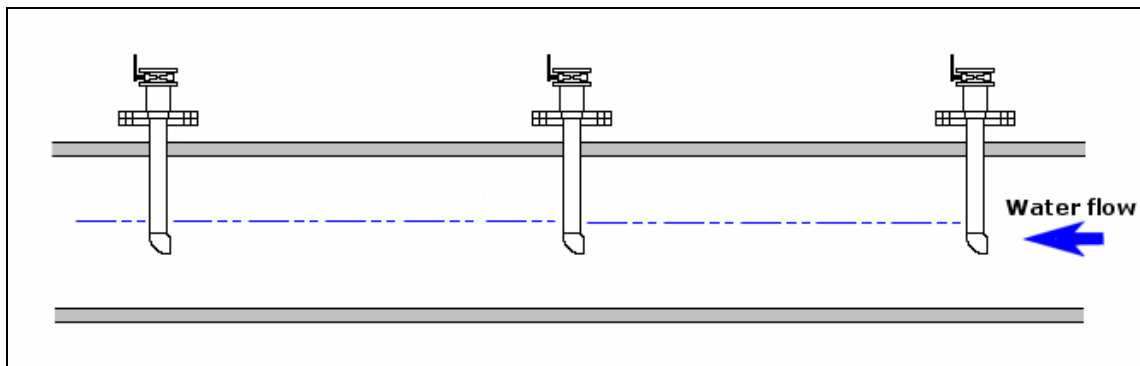


Figure 3. Schematic of a Sample Point (SP) Showing the Design of the Three Sample Port Pitots.



INTRODUCTION

This GSI Standard Operating Procedure (SOP) describes the procedure for labeling samples at the GSI RDTE facility. The purpose of this method is to ensure all samples collected at the GSI RDTE facility are labeled in a consistent and clear manner, allowing for the most accurate sample collection and analysis.

EQUIPMENT LIST

- Self Adhesive Labels
- Computer
- Printer
- Labelling Tape
- Waterproof Markers

PROCEDURE

Note: All samples will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Unique sample codes will be assigned for each type of sample and these codes will be used for the sample containers, field and laboratory data sheets, log books, chain of custody forms, and database entries.

Sample Codes

1. Core Sample ID Codes will include a minimum of seven but no more than nine (if a duplicate or replicate sample and spiked sample) portions of information, with a space holder between each portion.
 - a. **Collection Year:** The last two digits of the field season during which the samples were collected (e.g., 09 to represent all samples collected in 2009).
 - b. Two to four letter **abbreviation for treatment system or test scenario** (eg.SK, CvT, LvT).
 - c. **Collection Tub** Number:1, 2, 3, 4 5, 6 Composite Sample (1/2/3) or Stripping Tank (S).
 - d. **Control or Treatment** track:C or T, or Composite (C/T) during filling.
 - e. **Sample type:** ZP =Zooplankton, M=Microbes, PP=Phytoplankton, CH=Chemistry, and WQ= Water Quality Parameters.
 - f. **Field Duplicate or Replicate number:** IF replicate samples were collected, add FDUP or FR1, FR2, FR3, etc. if more than two.
 - g. IF sample was spiked in the field, **FSPK** is inserted into the code, after the portion corresponding to the sampling process where spiking occurred.

Examples of Core Sample ID Codes:

08 SK 1 SP2 A C ZP
08 SK 1 SP2/3 A/B/C C/T M
09 CvT 3 SP9 A/B C PP
08 LvT 5 SP9 A/B C/T CH
08 LvT 4 SP9 B C WQ FR1

2. Once the sample arrives in the lab, portions of the sample may need to be analyzed for different endpoints or samples may be split and analyzed in duplicate. Additional information will be added to the Core Sample ID code in order to identify samples throughout the analysis process. For duplicate or replicate analysis in the laboratory, LDUP or LR1, LR2 , LR3 is added to the end of the sample ID.
 - a. A code for the Type of analysis being done is added to the end of core sample ID. For example when doing Microbial Analysis either HPC, ECO, or ENT is added to the end, e.g., **08 SK 1 SP2/3 A/B/C C/T M_ECO**.
 - b. If sample is filtered or diluted, the volume or concentration used is added to the Sample ID after the type of analysis. **08 SK 1 SP2/3 A/B/C C/T M_ECO_10mL**.
 - c. If pseudoreplicates are being analyzed (For example: the same volume filtered twice or three plates for one dilution) the replicate number follows the volume or concentration. i.e. **08 SK 1 SP2/3 A/B/C C/T M_HPC_10⁻¹_3**.
 - d. Spikes are labeled with the Sample ID followed by SPK in the corresponding portion of the sample ID. Sample ID would be as follows depending on when the sample was spiked.
08 SK 1 SP2/3 A/B/C C/T M SPK ECO 10mL is a sample spiked with microbes in the lab before sample analyzed.
08 SK 1 SP2/3 A/B/C C/T M ECO 10mL SPK is a sample that was collected in the field for microbial analysis (08 SK 1 SP2/3 A/B/C C/T M), and in the analysis procedure, a 10 mL portion of the sample was spiked and filtered for E. coli enumeration.
 - e. Blank samples are labeled as BLK followed by media/type, and the replicate number (a number referring to the number of blanks analyzed).
 - f. Standards are labeled STD with the concentration and replicate number following. For example: STD 5 ppm 1.

Sample Labels

1. Sample labels will be prepared and placed on collection bottles prior to sample collection.
2. Sample labels will include the core sample ID code listed above as well as the **collection date** in the following format : Month, Day, Year

Sample ID: 08 SK 1 SP2 A C ZP Collection Date: June 17, 2008

3. Labels made for the analysis process will contain the core sample ID, the Analysis ID information as directed under number 2 in the Sample code section, and analysis date. To avoid confusion, the analysis ID is printed on a second line on the label and may be color coded if desired.

Sample ID: **08 SK 1 SP9 A C M**

Analysis ID: **ECO_10mL_1**

Analysis Date: **June 17, 2008**

4. Sample codes, dates, and other collection information will be written on labeling tape with a waterproof marker, or computer printed on self adhesive labels. If printed labels are used, a piece of sealing tape will be placed over the label to secure it to the sample container and prevent water from reaching the label.

Data Sheets

1. Test information will be entered on all field and laboratory data sheets using the codes assigned above.

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

1. Conduct all quality assurance/quality control procedures according to the GSI/QAPP/1 - Quality Assurance Project Plan (QAPP) for Great Ships Initiative Bench-Scale and Land-Based Biological Tests (2009).
2. Follow all procedures outlined in this SOP. Any deviations known ahead of time must be approved by the GSI Principal Investigator or one of the two Lead On-Site Investigators. Any deviations made during the experiment must be recorded and also approved by the GSI Principal Investigator or one of the two Lead On-Site Investigators as soon as practicable.
3. Label information will be checked independently by a second individual to ensure that the same codes are not used for more than one individual sample.

DATA STORAGE AND ARCHIVING

1. Store and archive data according to GSI/QAPP/1 - Quality Assurance Project Plan (QAPP) for Great Ships Initiative Bench-Scale and Land-Based Biological Tests (2009).
2. Archive all hard- and electronic-copies of data and records generated for a period of five years.

REFERENCES AND RELATED DOCUMENTS

Cangelosi AA (2006). RDTE Facility for the Great Ships Initiative (GSI) (OAR-SG-2006-20000364). Project Proposal to the National Oceanic and Atmospheric Administration/U.S. Fish and Wildlife Service. Northeast-Midwest Institute, Washington D.C.

Great Ships Initiative website: www.greatshipsinitiative.org.

Great Ships Initiative Standard Operating Protocols: <http://www.nemw.org/GSI/protocols.htm>.

GSI/QAPP/1 - Quality Assurance Project Plan for Great Ships Initiative (GSI) Bench-Scale and Land-Based Biological Tests (2009).