

Development and Assessment of the TEMPEST CFD Model of the Pulsed Jet Mixing Systems

J. R. Bontha	T. E. Michener
D. S. Trent	J. M. Bates
M. D. Johnson	

March 2003

WTP
Project
Report

Prepared for Bechtel National, Inc.
under Contract 24590-101-TSA-W000-0004

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Test specification: None
Test plan: TP-RPP-WTP-051
Test exceptions: None
R&T focus area: Pretreatment
Test Scoping Statement(s): B-55

Battelle - Pacific Northwest Division
Richland, Washington 99352

Completeness of Testing

This report describes the results of work and testing specified by TP-RPP-WTP-051. The work and any associated testing followed the quality assurance requirements outlined in the Test Specification/Plan. The descriptions provided in this test report are an accurate account of both the conduct of the work and the data collected. Test plan results are reported. Also reported are any unusual or anomalous occurrences that are different from expected results. The test results and this report have been reviewed and verified.

Approved:

Gordon H. Beeman, Manager
WTP R&T Support Project

Date

Research and Technology Manager

Date

Summary

The current flow sheets of the River Protection Project Waste Treatment Plant (RPP-WTP) for the pretreatment and vitrification of the Hanford High Level Tank waste include the use of several hundreds of Pulsed Jet Mixers (PJMs) throughout the entire plant.

Battelle - Pacific Northwest Division was contracted to develop a Computational Fluid Dynamic (CFD) model of the PJM systems using our in-house TEMPEST CFD code under contract 24590-101-TSA-W000-0004 and work breakdown structure BN.03.04.02. The CFD code development activities are defined in Technical Scoping Statement B-55, which is included in Appendix C of the *Research and Technology Plan*. The CFD code is intended to be used to predict the performance of the PJM equipment and verify that the design basis requirements are satisfied.

Objectives

The objectives of the work were to develop and experimentally validate the TEMPEST CFD model of the PJM system using:

1. Small-Tank Hydrodynamic (Water) Data
2. Large-Tank Hydrodynamic (Water) Data
3. Column Simulant Settling Data
4. Large-Tank Simulant Data.

All of the objectives, except objective 4, have been met. Our inability to validate the model using the large-tank simulant data was primarily due to the asymmetries of the flow fields in the tank, which made the data insufficient to complete the validation of code.

Conduct of Test

This report summarizes the efforts relating to the development and experimental validation of the TEMPEST CFD model of the PJMs.

The code development activities included addition of various features that simulate the PJM system operation. This included: 1) Moving Liquid Surface Logic, 2) Pulse Tube Logic, 3) Pulse Cycle Logic, and 4) PJM Operation Logic.

Settling experiments were performed using a complex simulant to validate the settling-sub models with the CFD code. Small-tank hydrodynamic experiments were performed to validate the wall-turbulence subroutines and also to ensure that the pulse tube cycle and moving liquid surface logic are functioning correctly. Large-tank hydrodynamic tests were performed to validate that the TEMPEST CFD code can model the hydrodynamic flow behavior in vessels with operationing conditions similar to the WTP. Lastly, large tank simulant tests were performed to validate that the CFD code can predict the distribution of the solids (i.e., stratification, agglomeration or dead spots, etc.) under dynamic mixing conditions in vessels of dimensions and configurations similar to those used in the actual plant.

Results and Performance Against Objectives

The settling sub-model validation results indicated that the model predictions matched the experimental density profiles in the settling column for the first few hrs of the test, after which discrepancies on the order of 15% were observed. The errors are primarily due to the difficulties in precise estimation of the unhindered settling velocities¹ of the particles in the slurry tested since these particles exhibit a broad range of particle size distribution. Our earlier work with settling of actual Hanford wastes show that these models can replicate the settling behavior of complex wastes provided a reasonable estimation of the unhindered settling velocities are available.

The small-tank hydrodynamic validation results indicated an excellent match between the model predictions and the experimentally measured velocity profiles near the tank-floor and the tank-wall regions. These results suggest that the TEMPEST PJM model captures the hydrodynamic flow behavior in previously untested flow regimes.

The large-tank hydrodynamic validation results indicated that the match between the experimental velocity data and the model predictions is considered to be acceptable given the asymmetries in the flow behavior and the uncertainties in the velocity and liquid level change measurements (used to determine the drive function).

In the case of the large-tank simulant validation, the asymmetries of the flow fields in the tank, made the data insufficient to complete the validation of code. However, none of the results invalidated the code. It was not possible to repeat the large-tank simulant tests due to budgetary and schedule constraints.

Quality Requirements

This work was designated as QL-3 per the RPP-WTP Quality Assurance Program, BNFL-5193-QAP-01, Rev. 6. PNWD implemented the RPP-WTP quality requirements by performing work in accordance with the quality assurance plan, CHG-QAPjP, Rev. 0.

Issue

Since the application of the code to actual mixing vessels depends upon its established predictive capability in the presence of solids in the mixing vessels, it is strongly recommended that the large-tank simulant experiments be repeated to complete the code validation.

¹ When applying the TEMPEST CFD model to the actual Hanford type wastes, the unhindered settling velocities will be either estimated from settling data of the waste streams (if available) or from the best available knowledge of the waste properties such as PSDs, chemical composition, etc. The later approach needs to be used with caution because errors in estimating the settling velocities could result in erroneous conclusions about the PJMs performance.

Acknowledgements

The authors would like to acknowledge Carl Enderlin and Judith Bamberger for their help in conducting the large tank simulant tests and particle size distribution analysis of the simulants. In addition, we would also like to thank Mike White and Bill Combs for all their help with the small/large tank test system configuration, simulant preparation, and assistance during all phases of the testing. Finally, we wish to thank Bill Kuhn for the excellent and thorough review of this report.

Terms and Abbreviations

AC	Alternating current
AEA	Atomic Energy Agency
APEL	Advanced Product Evaluation Laboratory
BNFL	British Nuclear Fuel Limited, Inc.
BNI	Bechtel National Inc.
CFD	Computational Fluid Dynamic
DACS	Data Acquisition and Control Software
DC	Direct current
EM	Electromagnetic
HFA	Hot Film Anemometry
JPPs	Jet Pump Pairs
LDA	Laser Doppler Anemometry
LTTS	Large-Tank Test Stand
PJM	Pulsed Jet Mixer
PNWD	Battelle - Pacific Northwest Division
PIV	Particle Image Velocimetry
PVC	Polyvinyl chloride
RFD	Reverse Flow Diverter
RPP	River Protection Project
STTS	Small-Tank Test Stand
SS	Stainless steel
TEMPEST	Transient Energy Momentum and Pressure Equations Solutions in Three dimensions
WTP	Waste Treatment Plant

Unit Abbreviations

cP	centipoise
°C	degrees Centigrade
cfm	cubic feet per minute
cm	centimeter
D	diameter
ft	feet
g	gram
gal	gallon
H	height
hrs	hours
ID	internal diameter
in	inch
kg	kilogram
L	liter
μm	micrometer
m	meter
mL	milliliter
mm	millimeter
msec	millisecond
OD	outer diameter
Pa-s	pascal second
PSD	particle size distribution
psi	pounds per square inch
psig	pounds per square inch, gauge
s or sec	second
vol%	volume percent
wt%	weight percent

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1.0 Introduction

1.1 Background

The current flow sheets of the River Protection Project Waste Treatment Plant (RPP-WTP) for the pretreatment and vitrification of the Hanford High Level Tank waste include the use of several hundreds of Pulsed Jet Mixers (PJMs) throughout the entire plant.

PJMs consist of several pulse tubes, which are primarily large cylindrical tubes with one end tapered down to a nozzle with a diameter smaller than that of the tube. The other end of the pulse tube is connected to an air/vacuum line. In slurry mixing applications, several of these pulse tubes are incorporated into the mixing vessel and operated either in series or in parallel to achieve the desired mixing.

Figure 1.1 illustrates the PJM operation in a system with a single pulse tube. During the operation of the PJMs, slurry is drawn from the mixing vessel into the pulse tube by the application of a vacuum and then emptied (ejected) back into the mixing vessel under pressure. The fill/emptying constitutes one cycle of operation of the PJMs. This cycle is repeated continuously to achieve mixing of the tank contents. The refill (i.e., suction) and drive (i.e., emptying) phases of the PJMs is regulated by Jet Pump Pairs (JPPs), which are driven by compressed air.

PJM devices provide a very simple method to mix slurries using compressed air to achieve the desired operation. PJMs were chosen because they have a number of advantages over conventional agitator type mixers in highly radioactive environments. They contain no moving parts within the active cell, which means zero in-cell maintenance. With zero in-cell maintenance, operator dose is drastically reduced. Zero in-cell maintenance also means lifetime costs for PJMs are low because no spares are required, and there is no secondary waste (i.e., from contaminated equipment disposal) generated.

Despite these advantages of the PJMs over conventional mixers, the effectiveness of these units over the broad range of mixing conditions and requirements encountered throughout the RPP-WTP is not well defined. Some of the potential mixing conditions and requirements encountered in the RPP-WTP are presented below:

- Broad range of tank sizes (diameters vary from ~4.57 to 15.24 m [~15 to 50 ft], heights range between ~3.05 to 6.10 m [~10 to 20 ft]), and configurations (flat and dish bottomed)
- Significant number of internals within the tanks such as Reverse Flow Diverter (RFD) transfer pumps and charge vessels, and monitoring equipment
- Broad range of processed fluid (slurry) properties:
 - Solids loading could vary from as low as 0.5-wt% to as high as 25-wt%
 - Newtonian and non-Newtonian behavior of the slurries
 - Liquid viscosity range between ~ 1 to ~50 cP
 - Slurry viscosities range between ~1 to as high as 250 cP

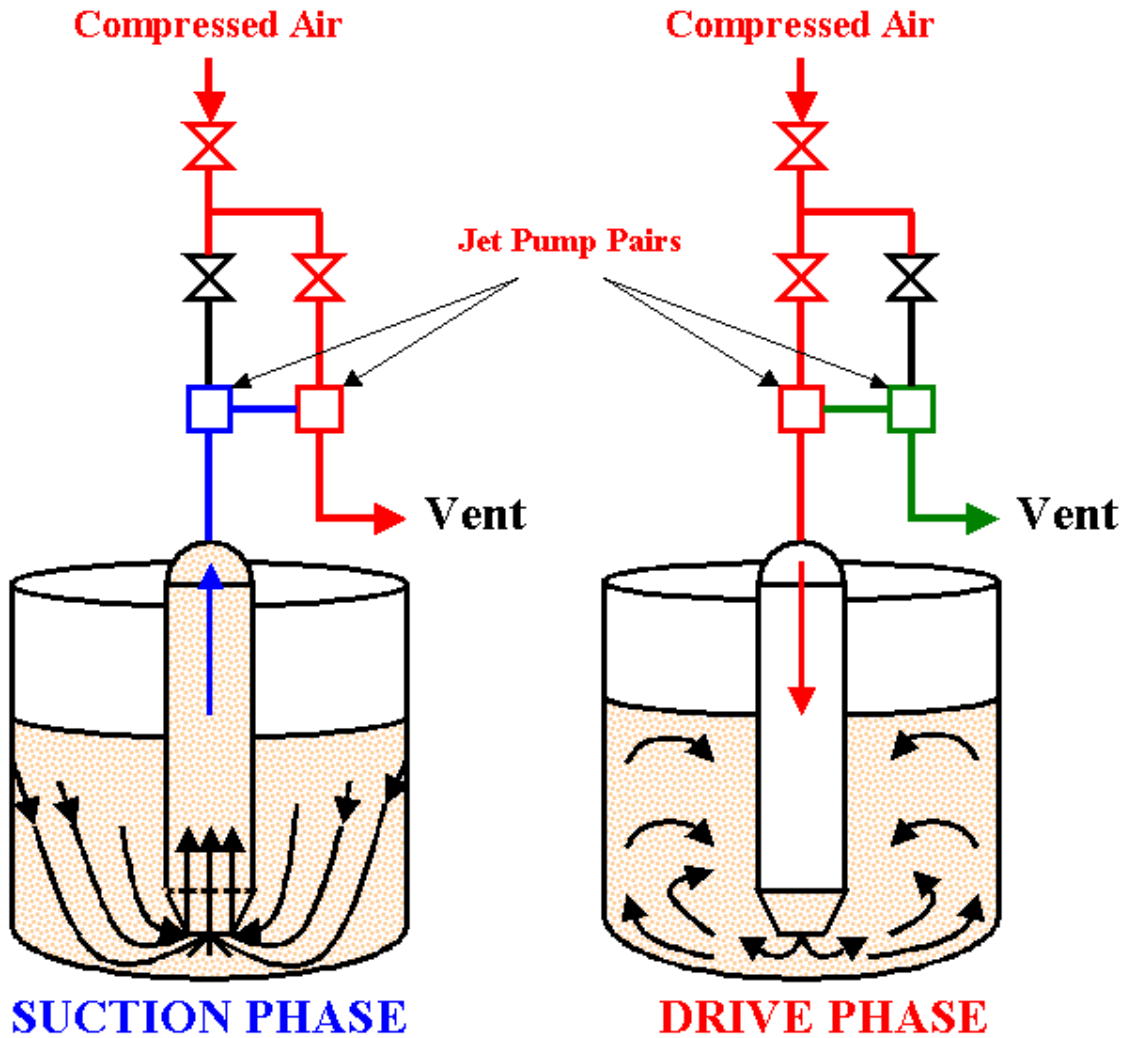


Figure 1.1. Schematic of the PJM Operation

- Particle size distribution could vary from sub-micron to mm size particles
- A broad range of supernatant (~ 1000 to $\sim 1400 \text{ kg/m}^3$) and solids (~ 1500 to $\sim 6000 \text{ kg/m}^3$) densities
- Varying mixing needs (i.e., from keeping particles suspended to complete homogeneity to rapid mixing).

Although some work done at Battelle – Pacific Northwest Division (PNWD) (see Bontha et al., 2000) did address some concerns regarding the effectiveness of the PJMs – especially at high solids loading, there are still numerous issues that need to be addressed for the successful design and operation of these systems in the RPP-WTP.

For example, it is not clear how the aspect ratio of the tanks will influence the PJM performance. Also, it is unknown at the present time what is the optimum number and size of PJMs required in some of the very large tanks associated with RPP-WTP design. Some of the main issues associated with the use of the PJMs in the RPP-WTP are:

- Effect of tank size, geometry, and aspect ratio on mixer performance
- Optimum pulse tube geometry and arrangement (i.e., size, number of pulse tubes, and their placement in the mixing vessel)
- Pulse tube operation mode (i.e., optimum sequence of operation and duration of suction, discharge, and vent phases) for homogeneity and keeping solids suspended at different solids loadings and rheological properties of slurries
- Fluid flow patterns i.e., zones of influence, dead spots, etc (particularly in the very large tank)
- Solids concentration and stratification
- Re-suspension of solids from a settled state
- Effect of internals on mixer performance.

The main difficulty in addressing the above issues experimentally is that it is impractical to test all of the above conditions within the budgets and time constraints of the RPP-WTP. Therefore, a combined experimental and modeling effort is needed.

In FY 01, PNWD was tasked to develop and validate a model of the PJM systems using our in-house TEMPEST (Transient Energy Momentum and Pressure Equations Solutions in Three dimensions) Computational Fluid Dynamic (CFD) code. TEMPEST was chosen over other commercially available CFD codes primarily because it is the only code with demonstrated ability to model the complex multiphase fluid flow behavior encountered with highly radioactive waste at the Hanford site.

The unique features that make TEMPEST attractive for modeling of the PJM systems include:

- The capability to model slurries containing a broad range of species of varying sizes and densities; the species may be in a solid phase (particles) or a gas phase (bubbles)
- The capability to model free and hindered settling of particles
- The capability to model slurries whose viscosity varies with solids concentration
- The capability to address erosion (or resuspension) of sludges.

Other CFD codes such as STAR-CD, Fluent, etc., could also be adapted to model the PJM systems. However, the major disadvantage of these other CFD codes is that none of the codes have any proven ability to model the multiphase fluid flow issues encountered with the varying types of waste streams

present at the Hanford site. In addition, these CFD codes may require unrealistic assumptions of the solid/liquid interactions; which makes them very restricted to the waste types that they can be used to model.

1.2 Goals and Objectives of the Project

Depending upon the application of the PJMs in the WTP, the RPP project requires sufficient mixing to ensure that particles are suspended in solution, mixed at a sufficient rate, or completely homogenized. Bechtel National Inc. (BNI) plans to utilize CFD models acceptability of mixing occurring with the PJMs in the RPP-WTP.

Therefore, the goal of this project was to provide BNI and the RPP-WTP a predictive tool to evaluate the various issues associated with the PJM system design and operation. The intent is that the tool be validated sufficiently to increase the confidence of the designers and operators of the PJM systems.

The objectives of the work were to develop and experimentally validate the TEMPEST CFD model of the pulsed jet mixing system using:

1. Small-Tank Hydrodynamic (Water) Data
2. Large-Tank Hydrodynamic (Water) Data
3. Column Simulant Settling Data
4. Large-Tank Simulant Data.

2.0 Model Development and Validation Approach

Depending upon the application, the RPP-WTP project requires sufficient mixing to ensure that particles are suspended in solution, mixed at a sufficient rate, or completely homogenized. The mixing, in turn, depends on the turbulent flow patterns in the tanks and the settling behavior of the solids. The actual turbulent flow behavior occurs over vast scales of length and time and must be either measured or predicted as time-averaged velocities – knowing time averaged velocities allow for the assessment of the degree of mixing and solids suspension relative to the RPP-WTP design criteria.

TEMPEST predicts the time-averaged turbulent flow patterns in these tanks, and as with any CFD code, the prediction depends on:

- An accurate description of the tank geometry (which defines the physical boundary of the flow) and the flow forced into the tank at the bottom of a pulse tube
- Sufficiently fine grid to accurately model the time-averaged turbulent behavior controlling the flow field
- Applying appropriate turbulence sub-models
- The capability of physical/rheological sub-models (i.e., settling and erosion sub-models) to mimic the physical behavior of the slurries in the turbulent flow fields
- The capability of the model to accurately represent the actual mixing phenomena in the tanks.

The overall strategy or approach designed for the development and validation of the TEMPEST model of the PJM systems was, therefore, focused on individually addressing all of the above issues in a systematic manner, which is illustrated in Figure 2.1. The approach utilizes a step-by-step process to validate the codes ability to model complex flow occurring during the mixing. For example, before the model predictive capability was tested with slurries, the flow predictions under no-solids condition were first confirmed. Also, to ensure that the model can be utilized with tanks of varying geometries, the code predictions were tested with experimental data from tanks of two sizes and geometries.

Our approach consists of two subtasks: 1) TEMPEST code modifications and 2) experimental validation. The various components of these two subtasks are discussed below.

2.1 TEMPEST Code Modifications

Adapting TEMPEST to model the PJM systems required the following modifications: 1) Moving Liquid Surface Logic, 2) Pulse Tube Logic, 3) Pulse Cycle Logic, and 4) PJM Operation Logic.

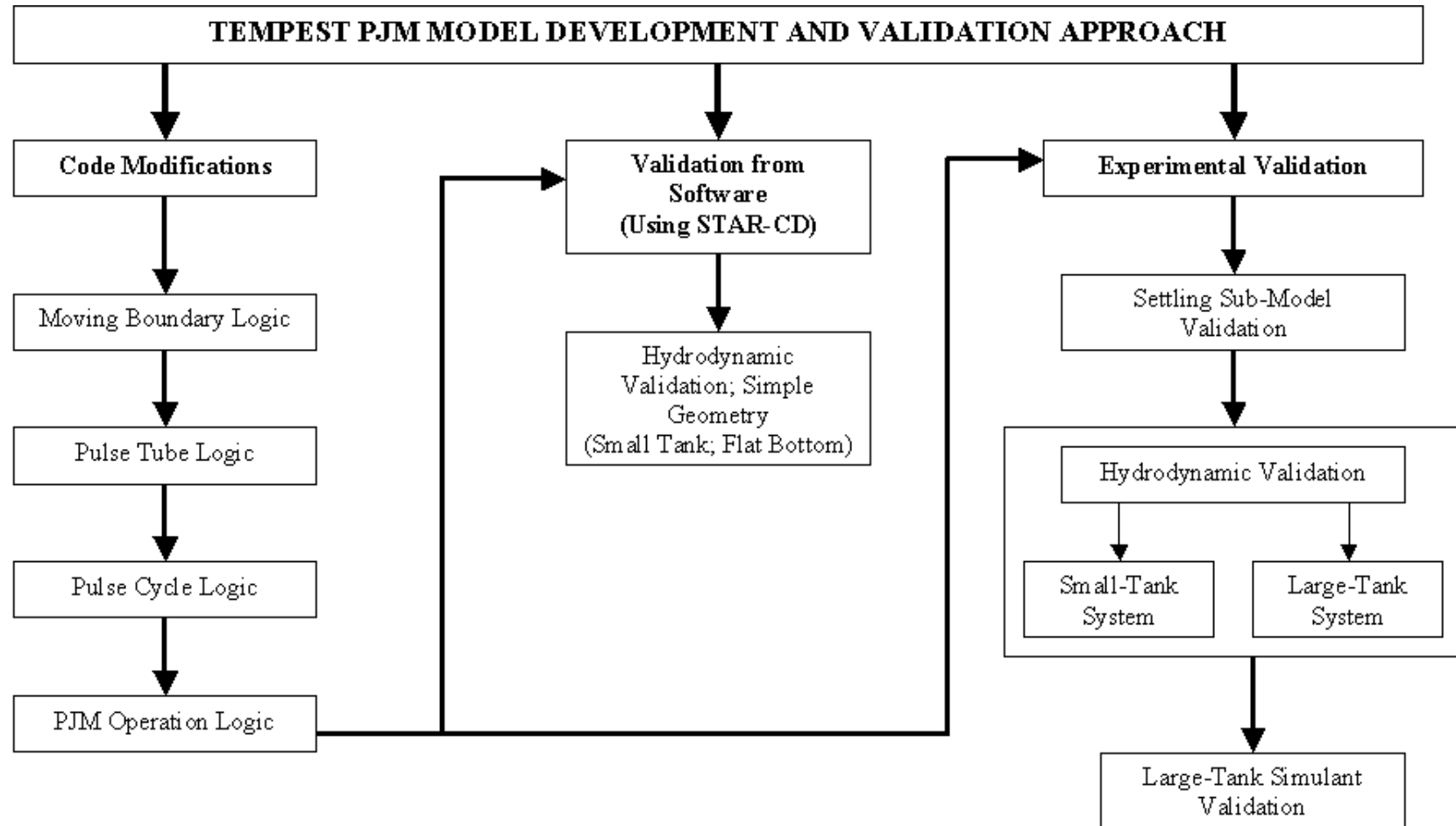


Figure 2.1. Strategy of the TEMPEST PJM Model Development and Validation

2.1.1 Moving Liquid Surface Logic

This task involved implementing a moving liquid surface logic to account for the rise and fall of the surface level during PJM operation.

2.1.2 Pulse Tube Logic

This task involved implementing suspended solids mass conservation for inflow and outflow at the pulse-tube nozzle orifice.

2.1.3 Pulse Cycle Logic

This task included implementing repetitive periodic discharge velocity logic to account for long-term pulse-tube operation.

2.1.4 PJM Operation Logic

This task involved adding to the model the capability to simulate the PJM operation under conditions where all or some of the pulse tubes are operating at any particular time.

2.2 TEMPEST Model Validation

The second part of the CFD modeling task was to validate the TEMPEST model predictions using two approaches, namely: 1) benchmarking using an independent software and 2) validation using experimental data.

2.2.1 Benchmarking TEMPEST Against Star-CD

The software benchmarking approach involved comparing TEMPEST model predictions with those of another commercially available CFD model. For this purpose, the STAR-CD model was chosen with a “no solids loading” condition because of its established ability to model flows in complex geometries. Comparative runs using TEMPEST and STAR-CD codes with a no solids loading condition were conducted with identical geometrical (Small-tank; flat-bottom, 1PJM) and mixer operation conditions. Although detailed results are not provided in this report, the comparison between the two codes showed good overall agreement, enough to establish that hydrodynamic validation with experimental data was justified.

2.2.2 Validation Using Experimental data

The experimental validation approach consisted of three major tasks: 1) Settling Sub-Model Validation, 2) Small-Tank Hydrodynamic Validation, and 3) Large-Tank Hydrodynamic and Simulant Validation.

2.2.2.1 Settling Model Validation

This task involved the validation of the settling model in the TEMPEST code using the experimental settling data generated using a simulant with a reasonably broad particle size distribution. In this regard, the AZ-101/102 simulant used in previous evaluation of the PJM systems (Bontha et al. 2000) was chosen.

2.2.2.2 Small-Tank Hydrodynamic Validation

The ability to model fluid flows in open regions using TEMPEST has been documented fairly rigorously (Eyler et al. 1993; Onishi and Recknagle 1997 and 1998). However, turbulent jets impinging on surfaces is an area where standard wall turbulence models used in TEMPEST have not been thoroughly tested. Since PJM nozzles tend to be located near the tank bottom, it was determined that validation of TEMPEST for turbulent flows near surfaces was required. The choice of using the small-tank PJM system for this purpose was driven by the need to measure the time dependent near-wall (or surface) velocities generated by a pulse tube mixer in a simple, highly controllable environment.

The primary objective of the small-tank validation was to demonstrate that the turbulence models in TEMPEST capture the near-wall fluid flow behavior. A secondary objective was to use the small-tank test data to validate the moving surface model and the pulse cycle logic in TEMPEST. The final objective of the small-tank tests was to use the validation as a means to demonstrate the applicability of the model over the broad range of tanks sizes encountered in the RPP-WTP.

For the above reasons, a small (~ 770 L, ~ 0.914 m ID x 2.29 m H [~200 gal, 3 ft ID x 7.5 ft H], dish/flat bottomed tank with one centrally located PJM) test system was designed and installed in the Advanced Process Engineering Laboratory (APEL) high-bay area. The test system was equipped with Hot Film Anemometer sensors that enable continuous measurement of the velocity during the PJM operation. Hydrodynamic (water only) tests were conducted using the flat bottom configuration.

2.2.2.3 Large-Tank Hydrodynamic and Simulant Validation

The small-tank hydrodynamic validation of the TEMPEST PJM model is primarily focused on establishing that the wall-turbulence models capture the flow behavior near the tank surfaces and the pulse cycle/moving liquid surface logic work correctly.

The true test of the TEMPEST's predictive capability is, however, determined by its ability to model the mixing processes in vessels of dimensions and configurations similar to those used in the actual plant. Of particular importance is the capability to model the flows near the tank surfaces as well as in the interior regions since the distribution of the solids (i.e., stratification, agglomeration or dead spots, etc.) within the tank is of primary importance during the operation of the plant.

Before the TEMPEST model could be tested with solids, it was deemed necessary to ensure that the model still captures the hydrodynamic fluid flow behavior in prototypical vessels and PJM systems of dimensions similar to those used in the RPP-WTP.

Therefore, the objectives of the large-tank hydrodynamic and simulant testing was to generate experimental data to validate the TEMPEST CFD model on a scale comparable to RPP-WTP vessels. For this purpose, the ~3.96-m ID x 4.57-m H (~13 ft ID x 15 ft H) tests tank contained in PNWD's 336-test facility was utilized. The test system was equipped with four prototypical pulse tubes, which were originally designed by British Nuclear Fuel Limited, Inc. (BNFL) and utilized during previous testing (Bontha et al. 2000).

Hydrodynamic tests were conducted first to ensure that the turbulence models in the TEMPEST code could accurately predict the velocity profiles in the tank. In addition, simulant tests using a fast settling simulant (~ 75 μm glass beads) were conducted to match the predicted concentration profiles with the experimental data to complete the validation of the model. The fast settling simulant was chosen because it introduces conditions where it is possible for significant solids buildup in the tank during the PJM operation and enables the modelers to test the model under conditions of solids stratification within the tank.

2.3 TEMPEST Validation Criteria

The TEMPEST model was considered validated if the predicted velocity and concentration profiles are within reasonable qualitative and quantitative agreement with the experimentally measured values in the small and large-tank systems. Typically, variations up to about 10% in computed quantities are to be expected in any CFD comparison to actual data. When discrepancies greater than approximately 10% were observed, the sources of the discrepancies were evaluated. Typically, discrepancies can arise from 1) inadequate computational grid density, 2) limitations in turbulence sub-models, 3) limitations of physical sub-models, 4) uncertainties in input parameters, 5) measurement error in experimental data sets, and 6) inaccuracies in boundary (i.e., due to asymmetries in the geometry of the system) or operating conditions (PJM nozzle velocity) provided as inputs to TEMPEST. All discrepancies were fully documented along with implications of applying the model to full-scale design conditions.

2.4 Deviations from Original Test Plan

The approach discussed above deviated slightly from the original approach discussed in the Test Plan TP-RPP-WTP-051. The deviations include the elimination of the erosion and small-tank simulant tests². These experimental subtasks were deleted (after consultation with the client) due to budget and time constraints of the project. As noted in Section 9.0, this ultimately affected our ability to understand discrepancies discovered during large-tank simulant testing.

² The erosion and small tank tests with the slurry in question would have provided important data such as cleaning radius and cloud heights as a function of the jet velocities. This information is necessary in the TEMPEST code to determine the yield strength and the settling properties of the simulant tested.

3.0 TEMPEST PJM Model Development

The Fluid and Computational Engineering staff at PNWD apply several numerical modeling tools in support of a wide range of project needs. Our in-house general purpose CFD software is the TEMPEST code. In the past 15 years, TEMPEST has been repeatedly upgraded to address many Hanford specific engineering problems. A short description of the base software, its Hanford specific enhancements, and the PJM model additions are described in this section.

3.1 TEMPEST Model

Numerical simulation is a valuable engineering tool for analyzing transport processes related to the nuclear, waste processing, and chemical processing industries and for environmental and other scientific studies. To provide a capability for three-dimensional, time-dependent, fluid dynamic, and hydrothermal analysis, researchers at the PNWD have developed the TEMPEST computer code.

TEMPEST can analyze a broad range of coupled Newtonian/Non-Newtonian fluid dynamic, heat conduction, and multi-phase mass transport systems and is being used to simulate transient turbulent flow and heat transfer in various complex, three-dimensional geometries that can be modeled using Cartesian or cylindrical/polar coordinate systems. A unique combination of code features and analysis capabilities makes TEMPEST ideal for analysis of the engineering and scientific problems associated with the challenges of Hanford clean up.

TEMPEST numerical procedures are based on semi-implicit, finite-volume methods. These procedures are used to solve the time-dependent equations governing three-dimensional mass, momentum, and energy conservation for incompressible flows. Momentum equations are solved explicitly; and the continuity and pressure solutions are obtained implicitly. The solutions to scalar equations (energy, turbulence, constituent) are also obtained implicitly; energy is solved for in coupled fluid and solid regions.

3.2 TEMPEST Features

Many useful features can be selected by the user to meet the specific needs of the analyses. A summary of TEMPEST features includes the following:

Modeling Features

- 1, 2, or 3 space dimensions
- Cartesian or cylindrical or boundary fitted (orthogonal curvilinear) coordinates
- Time-accurate with steady state reached as limit of transient
- Turbulence model ($k-\epsilon$)
- Non-Newtonian viscosity models
- Sludge erosion/deposition
- Options for incompressible, thermally expanding, and fully compressible flows
- Heat transfer in coupled fluid and solid regions

- Multiple electric fields in either fluid or solid regions (ac or dc current)
- Mass transport in flow regions (dilute gases and solids as well as dissolved species in liquids)
- Flow in porous materials (may have combined open and porous flow regions)
- Direct solution for thermal steady state
- Accelerate solutions for highly viscous flows
- Multiple flow regions (separated by solid boundary)
- Use of specified or precomputed velocity fields
- Internal heat generation specified by cell or region (constant or time dependent)
- Specify material properties by user input or select from built-in values for 18 materials
- Temperature-dependent material properties (thermal conductivity, density, specific heat, and viscosity)
- Concentration-dependent properties
- Inflow/outflow boundaries specified or computed
- Pressure boundary conditions
- Translating boundaries
- Time-dependent flow and thermal boundary conditions
- Single-cell width and zero width wall logic for internal boundaries
- Options of user-specified drag coefficient correlations for each direction of each cell
- Options for user-specified film coefficients for each direction of each cell or internally computed from flow conditions.

Numerical Solution Algorithm

- Finite-volume formulation
- Orthogonal curvilinear coordinates
- Semi-implicit solution of the momentum equations
- Fully implicit solution of scalar equations (constituent, energy, turbulence, and electric potential).

Program Control Options

- Fluid flow only
- Solids heat transfer only
- Electric fields only
- Fully coupled fluid flow, heat transfer, mass transfer, and electric fields
- Inviscid hydrodynamics
- Steady-state thermal solution at each hydrodynamic time step
- Transient heat transfer for fixed velocity field
- Transient mass transport for fixed velocity field
- Automatic time stepping (Courant, diffusion or internal wave stability control)
- Restart simulation from intermediate solutions.

Input/Output Control

- Extensive debug output following input or at intermediate stages of a solution
- Cell type/material type maps for checking problem setup
- Intermediate output including heat transfer connectors, cell continuity, density, thermal conductivity, molecular viscosity, eddy viscosity, turbulence quantities, heat flux map, numerical stability, and heat generation map
- Output arrays of primary variables in X1-X2, X1-X3, or X2-X3 planes
- Ability to specify times for array output and restart/plot file dumps
- Input/output in either the U.S. Customary System of engineering units or the International System (SI) of units
- Execution time monitoring.

Limitations Of The Current Version

- Hydrodynamic solution is explicit in time (i.e., no direct solution for steady state)
- Curvilinear coordinate computational grids must be orthogonal.

3.3 TEMPEST Applications

The versatility of the TEMPEST code accommodates extensive engineering applications and concept analyses. To date, TEMPEST applications have included the following:

- Waste Storage Tank Mixing Phenomena
 - Sludge mobilization
 - Forced mixing of particulates
 - Buoyancy-induced turnover/natural convection
- Waste Processing
 - Joule-heated glass melters
 - In-situ vitrification/heating
 - Spent fuel and nuclear waste storage systems
- Ventilation Systems
 - Room air and contaminant distribution
 - Indoor air quality
 - Exhaust plenum particulate flow
 - Cooling of electronic components
- Energy Conversion and Storage
 - Commercial hot water heater
 - Solar cavity receiver
 - Solar-heated salt pond

- Nuclear Reactors
 - Light- and heavy-water-cooled core and component design
 - Liquid-metal-cooled core and component design
 - Hydrogen transport in containment rooms
 - Safety analysis.

3.4 Hanford Specific TEMPEST Enhancements

The TEMPEST computer code has been applied to multiple efforts dealing with different stages of the Hanford cleanup process (Trent and Michener 1993; Eyer et al. 1993; Stewart et al. 1994; Antoniak and Recknagle 1995; Onishi and Trent 1998; Onishi and Recknagle 1997, 1998, and 1999; Onishi et al. 1996 and 2000). To more accurately predict the behavior of tank waste, it was necessary to add the following new models to the TEMPEST code:

- A pseudo-fluid model was incorporated into the code to address the sludge turn-over process occurring in tank 241-SY-101. Gas was building up in the sludge layer of the tank, eventually reaching a condition where the sludge density was lower than the overlying supernatant liquid density. At some point in time, the density difference would become great enough to cause large portions of the sludge layer to become mobile and rise through the supernatant layer, releasing much of the trapped gas into the dome space above the waste mixture. The TEMPEST pseudo-fluid model treats the waste as a mixture that may include multiple semi-passive dispersed species residing in a base fluid. The species may be in a solid phase (particles) or a gas phase (bubbles). In TEMPEST, a density and a settling/rise velocity correlation define each solid/gas species. The mixture assumes the particles are dispersed within each computational cell.
- Although the species are passive, they may each have a settling/rise velocity. This was addressed by adding a hindered settling/rise velocity model that takes into account hindering (as a function of particle concentration) from all of the species within the pseudo-fluid.
- The viscosity of the waste mixture will vary with the concentration of the particles. To address this, concentration dependent viscosity and non-Newtonian viscosity models were added to TEMPEST.
- Mixing of the waste in the tanks may require eroding a sludge layer with a turbulent jet. It was deemed desirable to have a predictive capability to determine the pump operational requirements necessary to erode potential sludge banks. An erosion/deposition model was added to TEMPEST to address this question.

3.5 Pulse Jet Mixer TEMPEST Enhancements

In one of the last stages of the Hanford clean up process, waste will be stored in mid-sized tanks. It is required that the waste material be maintained in a reasonably well mixed state and ready to be transferred to final processing. One method of mixing the materials in a tank is through the use of PJMs. PJMs are an attractive solution in that there are no moving parts in the tank, eliminating the possibility of mechanical breakdown. All of the Hanford specific modifications discussed are applicable to PJM simulations; however, some additional modifications to TEMPEST were required to model the following:

- The volume of waste in the tank changes as the material is alternately drawn into the pulse tube via a vacuum and then forced out with a strong pressure pulse of air. The effect is to alternatively lower and then raise the surface level of the mixture in the tank. A model was added to track the surface level change in TEMPEST.
- Logic was added that allows for specification of tables of pulse tube nozzle velocity vs. time. The tables are then individually assigned to the desired pulse tube(s). This new model is available for multiple PJMs being operated in or out of phase in time.
- The PJM model does not treat the flow within the pulse tubes; however, conservation of mass within each tube must be maintained. A new model was developed that tracks the material entering each pulse tube, assumes it becomes uniformly mixed, and then discharges fluid with the appropriate solids concentration.
- The pulse tube logic was modified to automatically repeat the velocity vs. time tables if the simulation time reaches beyond the last table time. This feature allows for the definition of cyclic table(s), reducing the input requirements significantly.

4.0 Experimental Approach

As discussed in Section 2.0, the approach for validating the TEMPEST PJM model consists of: 1) settling experiments, 2) small-tank (hydrodynamic) tests, and 3) large-tank (hydrodynamic and simulant) tests. The test systems, measurement techniques, and approaches used to determine the experimental data for validating the TEMPEST PJM model are discussed in this section.

4.1 Settling Experiments

Figure 4.1 illustrates the experimental setup used for the settling experiments. The setup consists of clear polycarbonate column of 0.102 m (4 in) ID and 1.52 m (60 in or 5 ft) H. The 0.102 m (4 in) diameter of the settling column was chosen primarily to minimize any wall effects during the settling of the particles. The columns were provided with sample ports 0.152, 0.457, and 0.762 m (6, 18, and 30 in) from the bottom through which aliquots of the settling solutions were drawn periodically for density measurements. In addition, a measuring tape was glued to the surface of the columns to enable the measurement change in the height of the clear fluid and suspended solids interface with time.

Settling experiments were performed with AZ-101/102 simulant used in FY00 testing of the PJM system (Bontha et al. 2000).

Prior to the start of the settling experiment, ~10 L of the simulant was prepared in a large 5-gal bucket, thoroughly mixed with a mechanical agitator for ~ 30 min, and then set aside for ~ 2 hrs. Just before transferring to the column, the simulant was mixed again for several minutes to homogenize the contents.

After the start of the settling experiment, the formation of the clear fluid/suspended solids interface and its movement down the column was monitored with time. Periodically, samples were drawn from the three sampling ports and the sampling time and location were recorded. The samples were stored in sealed centrifuge vials and density measurements were performed after the completion of the test.

The density of each sample was determined by calibrating the volume of a clean centrifuge vial with a known mass of deionized water (~ 5 g) and determining the mass of the slurry for the calibrated volume of sample. This was repeated three times with each sample, and the density values were averaged to determine the density of a sample at each location and time.

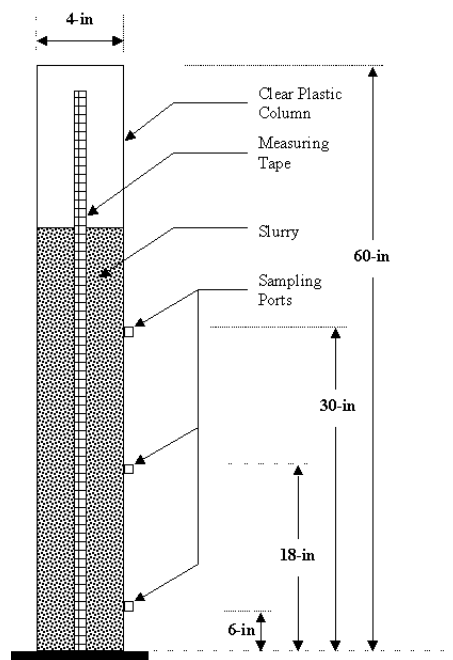


Figure 4.1. Setup Used for the Settling Experiments

4.2 Small-Tank Test Stand

The Small-Tank Test Stand (STTS) was designed by AEA to be nearly prototypic of the actual PJMs in terms of the pulse tube ID to nozzle diameter ratio. This system enables evaluating the mixers in a well-controlled environment that would provide data for validation of TEMPEST hydrodynamic predictive capability near tank surfaces. This data is intended to complement the free-field hydrodynamic measurements made in the large-scale tank.

Although the STTS experiments are at a different scale than the operational tanks, the Reynolds number (based on nozzle diameter) is similar. By focusing on the velocity field near the tank floor and sides, a measure of the TEMPEST turbulence model for flows near walls is achieved. In addition, the STTS provided validation of the moving surface model and the pulse cycle logic in the TEMPEST PJM model in a well-controlled environment.

Figure 4.2 illustrates the STTS. It consists of a ~ 0.864 m ID x 2.36 m (~ 34 in ID x 7.75 ft) dish bottom tank made of clear Plexiglas. The tank has a false (flat) insert to enable testing in the flat bottom configuration.

A single pulse tube made out of clear plastic was positioned centrally within the tank on a mounting assembly, which enables the adjustment of the pulse tube nozzle position from the bottom of the tank. The pulse tube has the dimensions of 0.254 m ID (0.279 m OD) x 1.22 m H (10 in ID [11 in OD] x 4 ft H) with lower-end tapered down to a 60-degree nozzle of $5.08\text{E-}02$ m (2 in) diameter. The upper-end of the pulse tube is flat with a $5.08\text{E-}02$ m (2 in) threaded opening in the center.

Some of the unique features and advantages of the STTS include:

- Pilot-scale configuration
 - Offers the ability to perform experiments on an energy per unit volume basis similar to the large tanks in the RPP-WTP
- Clear and transparent materials of construction of both the tank and the PJMs
 - Offers the ability to visualize the flow behavior of the fluid in the tank and inside the pulse tube during operation
- Flat and round (or dish) bottom configuration
 - Offers the capability of evaluating the effect of the tank geometry on mixer performance
- Adjustable height of the tank
 - The height ($H \sim 2.06$ m [6.75 ft]) of the tank was intentionally made significantly longer than the diameter ($D \sim 0.864$ m [~ 34 in]) – This offers the ability to study the influence of H/D on the mixer performance over a broad range of conditions (<1 to ~ 2.5)
- Adjustable pulse-tube mounting system
 - Enables quick and easy adjustment of the pulse-tube nozzle stand-off from the bottom of the tank to evaluate its impact on the mixer performance
- Single and multiple pulse tube configurations
 - Although the current system holds a single pulse tube of 0.254 m (10 in) ID and ~ 1.52 m (5 ft) H, the system was designed to incorporate pulse tubes of different sizes and more than one pulse tube

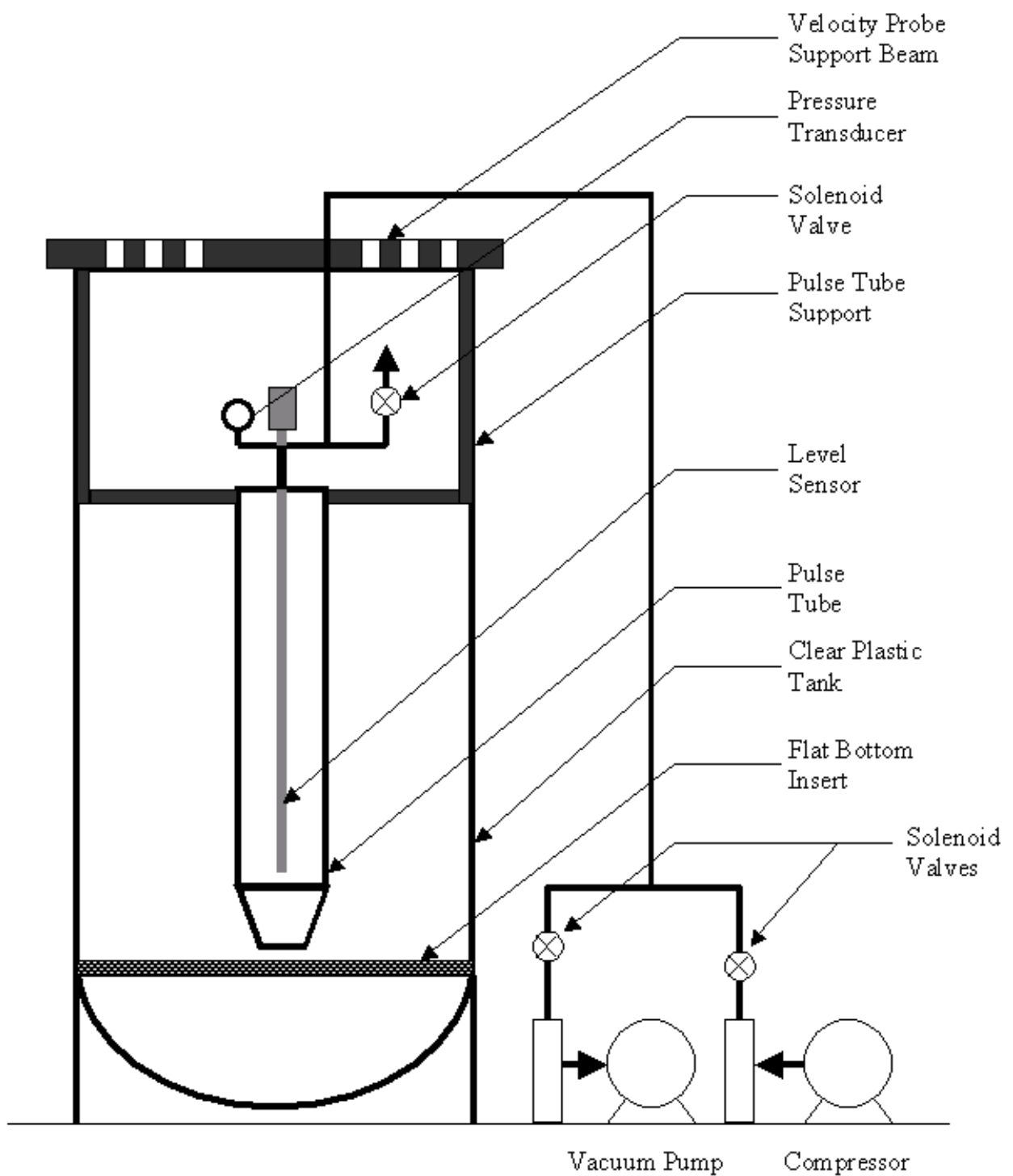


Figure 4.2. STSS Setup in the APEL Test Facility

- Simple, easy, and flexible mode of operation of the PJMs
 - The control system offers the ability of easily changing the drive, vent, and/or suction times of the PJM to rapidly evaluate the mixer performance over a broad range of operating conditions
- Testing with hazardous simulants
 - Enables testing with hazardous simulants at minimal costs as opposed to large-scale testing, which can be prohibitively expensive due to the costs associated with storage, handling, and disposal of the much larger volumes of simulants.

4.3 Large-Tank Test Stand

The Large-Tank Test Stand (LTTS) was used in previous testing to demonstrate the applicability of PJMs with Hanford type wastes (Bontha et al. 2000). The following is a detailed description of the LTTS. AutoCAD drawings of the tank, pulse tubes, and support structure with exact details are included in Appendix A.

The LTTS in which the PJM system was located is one of the three large-scale tanks available for PNWD clients to evaluate their test equipment and processes. The LTTS tank was a cylindrical steel vessel of ~3.96 m (13 ft) diameter and 4.57 m (15 ft) depth and is shown in Figure 4.3. The bottom of the tank was elliptically shaped with minimum and maximum radii of ~0.914 m (~3 ft) and 3.96 m (13 ft), respectively. A catwalk or observation bridge was present at height of 0.914 m (3 ft) from the top of the tank. The bridge contained a 0.610 m x 0.762 m (2 ft x 2.5 ft) port (covered) for the installation of test equipment. Another catwalk (not shown in the Figure 4.3) was present at an elevation of ~12.19 m (~40 ft) from the top of the tank and was used to support the air hoses to the pulsed-jet tubes. Transfer pipes (not shown in the figure) at the top and at the bottom of the tank enable the addition or removal of material to and from the tank during loading or disposal operations. The supernate tank was positioned on three load gauges, which were used to determine the weight of the tank and its contents.

The PJM system consisted of four pulse tubes each with a cylindrical section of ~3.05 m (~10 ft) length and 0.610 m (2 ft) internal diameter. Each tube is rounded at the top end with an opening for a 5.10E-02 m (2 in) pipe connection. The bottom end of the pulse tube was tapered down to a 0.102 m (4 in) nozzle. The overall height of the pulse tube was approximately 3.66 m (12 ft) and is shown in Figure 4.4.

The pulsed-jet tubes were mounted on brackets positioned on top of the supernate tank. The pulsed-jet tubes are held in place via cross beams, which traverse the diameter of the tank and are welded to the tank sides. In addition to the support beams on the top on the tank, there are two additional tie beams connecting the pulse tubes (in pairs). These beams provide additional support to the tubes and prevent their vibration during the PJM operation. These tie beams are situated at ~1.83 m (~6 ft) from the tank floor (as measured from the center). The pulsed jet tubes were positioned at the center of the four quadrants of the supernate tank at ~0.152 m (~6 in) from the bottom of the tank.



Figure 4.3. Photograph of the LTTS Tank



Figure 4.4. Photograph of the Pulse Tube Used in the LTTS

4.4 Instrumentation

Depending on the objectives and goals of the small and large-tank testing, various instruments were used to measure the key variables associated with the testing. The following is a description of the instruments used in the present testing.

4.4.1 Level Measurement

The change in the liquid level inside the small-tank pulse tube and two of the large-tank pulse tubes were measured using 1.83 m (6 ft) and 3.66 m (12 ft) Teflon coated capacitance level sensor(s), respectively. In both test stands, the level probes were positioned at the center of the pulse tube(s).

The capacitance probe used to measure the liquid level inside the pulse tube(s) has a response rate of 20 msec. However, when this signal is processed through the signal conditioner that accompanies the instrument, it is averaged. The smallest averaging time available in the instrument is 0.5 sec. This is not much smaller than the characteristic time of the drive time of the PJMs; 3.0 sec. in the STTS tests and ~10 sec. for the LTTS tests. Therefore, the rate of descent inferred from time-averaged measurement of the level during the drive phase of the pulse could be significantly smaller than the true rate. In order to overcome this difficulty, the signal from the sensor was captured before it is averaged. This enabled us to obtain level changes within the pulse tube at much improved time resolution.

4.4.2 Velocity Measurements

Due to the size differences between the STTS and LTTS and because of the different tests conducted in these systems (Hydrodynamic experiments were performed in the STTS and both hydrodynamic and simulant tests were performed in the LTTS.), the different velocity measuring instruments were used in the two test stands. The following is the description of the fluid velocity measuring equipment used in the STTS and LTTS.

4.4.3 Small-Tank Test Stand

Local velocities in the small-tank were measured using Hot Film Anemometry (HFA). HFA was chosen over other flow measuring techniques such as electromagnetic (EM) flow measurements, Particle Image Velocimetry (PIV), Laser Doppler Anemometry (LDA) because of the following reasons:

- It is less intrusive (than EM sensors).
- It is less expensive (than PIV and LDA).
- It requires no system modifications (LDA and PIV require minimization of diffraction effects from the curved tank surface.).
- It has no safety issues (LDA and PIV, which use lasers, require safety interlocks, etc.).

HFAs are calibrated based on sensing flows directed inward along the axis of the probe, and hence are most accurate in measuring velocities of fluid impinging directly on the sensor within an ~120° cone around the probe tip. Flows approaching the sensor from outside this region could result in errors in the measurement; these errors could be both positive or negative depending on how the heat transfer at the

sensor surface is effected. Our CFD model indicated that at regions very close to the tank bottom, the velocity field is parallel to the tank floor. Similar, observations were made at regions very close to the tank wall. Therefore, the HFA sensor was positioned in these flow regions where the sensor is most accurate.

Velocities within the STTS were measured using two different types of HFA probes – straight and angled. The angled probe was used for measuring flows in regions close to the tank-floor and positioned in such a manner that the probe tip was in-line with the center of the pulse tube. For near the tank-wall region, the straight probe was used, and once again, the probe tip was pointing downwards towards the approaching fluid. This enabled us to precisely measure the velocities near the floor and tank-wall regions by maximizing exposed heat transfer surface of the probe to the approaching fluid.

Velocity measurements (using a straight probe pointing downwards) were also made at a few regions with the tank interior where there is a significant concern regarding the accuracy of the probes due to the highly recirculating nature of the flow within these regions. There is no precise way to quantify the exact magnitude of the errors within this region and therefore, this data set was only used for contour map generation and not for validation of the TEMPEST model.

For all cases of velocity measurement in the small-tank, the probe was mounted at the end of an ~2.44 m (~8 ft) long, 1.27E-02 m (0.5 in) stainless steel (SS) pipe which was inserted into one of the three ports of a support beam located on top of the tank (cf. Figure 4.2). Raising or lowering the probe holder enabled the vertical adjustment of the probe location. The radial position of the probe was adjusted by changing the port in which the probe was inserted or by radial (inwards or outwards) movement of the support.

4.4.4 Large-Tank Test System

The local velocity changes in the large-tank during the PJM operation were measure using EM flow sensors. EM flow sensors were chosen for this application primarily because of the ruggedness of the probes and their applicability for measuring velocities in the presence of solids in the test system (i.e., for fluid velocity measurement during the simulant tests conducted in the LTTS).

The velocity probes were attached to the ends of 6.10 m (20 ft) long, 1.91E-02 m (0.75 in) SS pipes that were mounted either on the floor of the catwalk or on a traversing system set on top of the catwalk railing. This approach enabled us to obtain a larger sweep radius (~0.914 m [~3 ft]) for mapping the fluid velocities in the tank. The tube and the traversing system were provided with markings to locate the velocity probes at the desired vertical and horizontal positions within the tank.

4.4.5 Pulse Tube Pressure and Tank Temperature

The pressure inside the pulse tube and the tank temperature, for both the small and large tank tests, were measured using pressure transducer and Type J thermocouple.

4.4.6 Density Measurement

The density of the slurry at various locations within the large-tank was monitored continuously during the PJM operation using a MicroMotion density meter. The on-line slurry density monitoring equipment shown in Figure 4.5 consists of recirculation pump and MicroMotion sensor. Slurry from the tank enters the pump inlet through any of the three 4.57 m (15 ft) long, 2.54E-02 m (1 in) SS tubes. Opening and closing the appropriate control valves included in each line adjusted the line through which the slurry sample is collected. Each sample line had a provision so the height at which the sample is collected can be adjusted. After the sample was analyzed, it was returned back to the tank. Using this configuration, density measurements were made at various depths and lateral positions to obtain a topographical representation of the slurry concentration profiles within the tank during the mixer operation.

4.5 Accuracy of the Instruments

Table 4.1 lists the vendor provided accuracy of the various instruments used in the small and large tank testing.

Table 4.1. Accuracy of the Instruments Used in the Small and Large-tank Testing of the PJMs

Measured Variable	Sensor	Vendor/Model/Serial Number	System	Accuracy
Level	Capacitance Level Probe	DrexelBook	STTS	±0.1 in
Level	Capacitance Level Probe	DrexelBook	LTTS	±0.1 in
Velocity	HFA – Straight Probe	TSI Inc/IFA 300/1230W	STTS	±0.1 m/s
Velocity	HFA – Angled Probe	TSI Inc/IFA 300/1231W	STTS	±0.1 m/s
Velocity	EM	ValePort	LTTS (Hydrodynamic)	±0.1 m/s
Velocity	EM	Marsh-McBirney	LTTS (Simulant)	±0.1 m/s
Pressure	Pressure Transducer	Omega	STTS & LTTS	±0.1 psi
Temperature	Type J T/C	Omega	STTS & LTTS	±0.4 °C
Density	Coriolis Mass Flow Meters	MicroMotion	LTTS	±0.01 g/cm ³

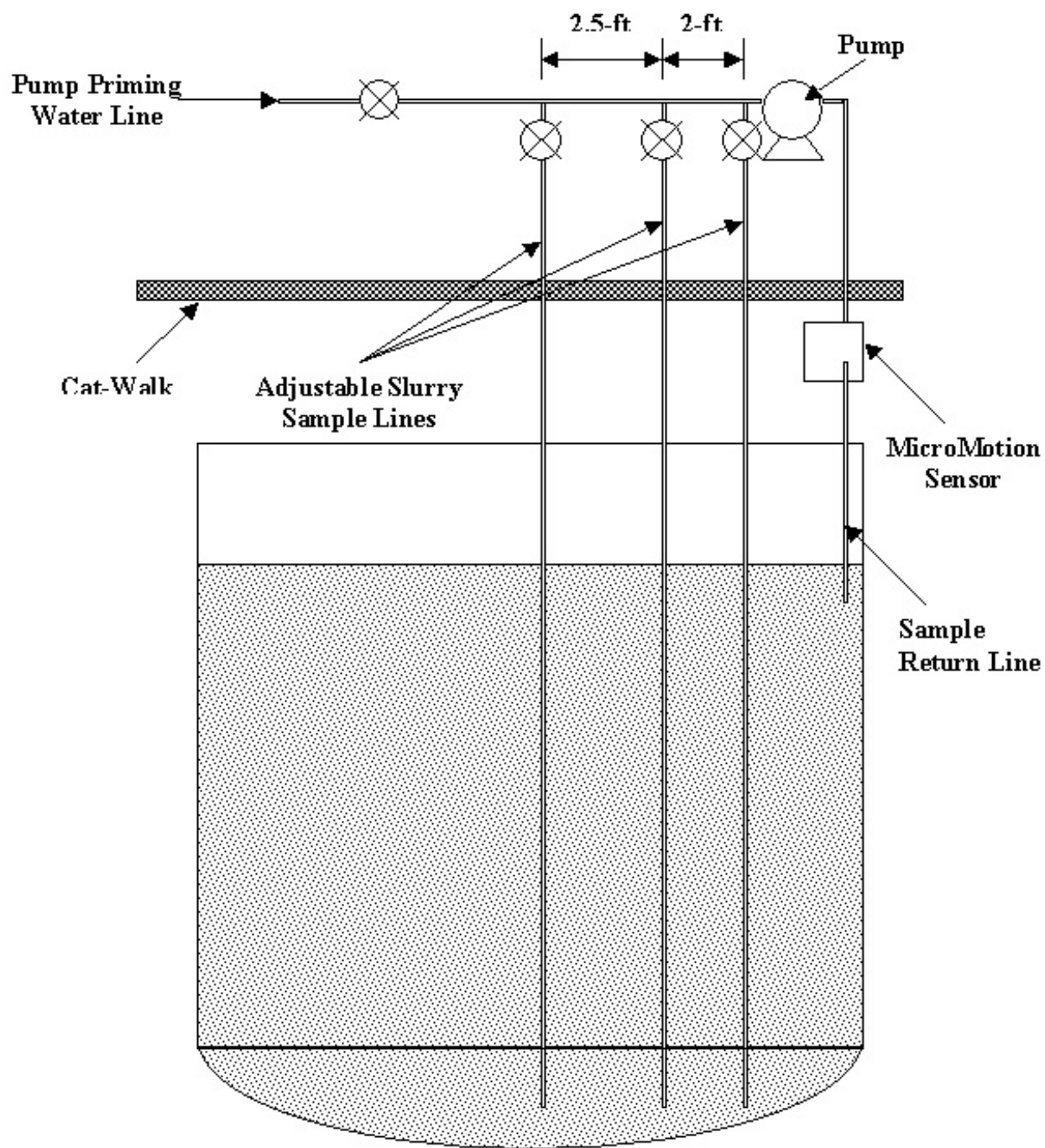


Figure 4.5. Schematic of the sampling System Used to Continuously Monitor the Density in the Tank During the Large-tank Simulant Testing

4.6 PJM Operation

4.6.1 STTS Test System

Unlike conventional PJM systems whose operation is regulated by Jet Pump Pairs (JPPs) driven by compressed air, the small-tank system utilized a combination of an air compressor and a vacuum pump to simulate the drive and suction phases of operation. These operations were controlled through a control logic program using the Strawberry Tree Data Acquisition and Control Software (DACS), which turns ON or OFF the appropriate solenoid valves at specified time intervals. The durations of each phase, the drive pressure, and the applied vacuum are all variables, which can be varied independently to simulate various operation conditions of the PJM.

4.6.2 Large-Tank Test System

The large-tank PJMs were operated using prototypical systems, i.e., using a combination of JPPs and solenoid valves to regulate the suction and discharge of the liquid to and from the pulse tubes. The JPPs were connected to the pulse tubes using 5.08E-02 m (2 in) ID, wire reinforced, polyvinyl chloride (PVC) tubing.

A compressor/accumulator combination was used to regulate the airflow to the jet pump pairs. The compressor chosen for the present study based on the requirements for the airflow to the JPPs was a Sullair 1100 compressor capable of delivering 1100 cfm at an operating pressure of 100 psig (8 bar). The accumulator was an ASME standard 1000 L (240 gal) Brunner vertical air receiver tank with pressure relief valves and timed electronic drain valve. Both the compressor and the accumulator were located outside the 336 building facilities.

The sequence of operation and cycle frequency of the PJMs and RFD sampler was controlled by PRESCON™; an Atomic Energy Agency (AEA) Technology proprietary control system. PRESCON™ monitors pressure signals using pressure transmitters, which are a part of the JPP control module.

During the initial tests with the large-tank PJM system, it was observed that operating the PJMs with the vacuum generated from the JPP resulted in significant differences in the cycle times of each pulse tube. Although this does not pose an issue with the operation of the PJMs in the actual plant, the differences in the cycle times of each pulse tube were found to be unacceptable for generating data to validate the CFD model. For this reason, the PRESCON™ operation was modified by AEA engineers to refill under gravity for pre-specified lengths of time.

Although PRESCON™ enables various combinations of pulse tube operation (i.e., all 4 at a time, 2 at a time, or 1 at a time) and cycling times, only the combination of all four PJMs at full frequency was used for both the hydrodynamic and simulant tests. This enabled us to use the 1/8th symmetry for our TEMPEST model, thus reducing the computational time by almost a factor of 10.

4.7 Data Acquisition and Analysis

All data from the experiments, which included time, level, pressure, velocity⁽³⁾, temperature, etc., were monitored continuously and recorded digitally on a computer. In addition, each data file included a header containing a brief description of the experiment and was stamped with the date the experiment was performed.

There were some differences in the manner in which the data sets were collected for the small and large-tank systems and are discussed below.

4.7.1 Small-Tank System

The HFA sensors used in the small-tank required that the probes be turned OFF before replacing the probes or making probe position adjustments. Therefore, all small-tank experiments were run in a batch mode (i.e., after velocity measurement at a particular location, the PJM and probe were turned OFF, the probe location and/or probe type changed, and the next set of data collected with the PJM and probe turned ON again).

At each velocity probe location, 23 cycles of data was collected. In order to eliminate startup transients, the first 8 cycles of data were ignored in the data analysis. The data set from 9 to 22 cycles was then used to determine the cycle-averaged profiles and to compute the standard deviations in the measurements.

4.7.2 Large-Tank System

Movement of the probe from location to location did not affect the EM and MicroMotion density sensors. Therefore, the PJMs were continuously run during the sample probe position adjustments.

During the PJM operation, an ON/OFF switch was included into the setup in order to enable the identification of the data set to be used for analysis. When the probe was to be changed, the operator turned the switch to OFF; after the probe was located in position, the operator turned the switch ON again. These operations are recorded by a series of “0”s or “1”s on the computer.

For all experiments with the large tank hydrodynamic tests, experimental data was logged for 12+ cycles after the probe had been positioned in place, and the 10 cycle data, after the indicator switch was turned ON, were used in the analysis for determining the average profiles.

For all the simulant tests, the simulant had completely settled in the tank before the start of each days run. Therefore, at the beginning of each day’s test, the MicroMotion sampler was located at one fixed position (~center tube at ~0.61 m [~2 ft] elevation from the tank floor) and mixing continued until the

3 In the case of the small-tank experiments, the voltage from the sensor rather than computed velocities were recorded; this was done primarily because the voltage to velocity conversion utilized a fourth order transfer function which slowed the data acquisition computer.

variation in the slurry density at that location was less than ~5%. After achieving a steady state⁽⁴⁾, the sampler position was changed, and the density data was collected for a minimum of 10 cycles at each location. This data was averaged to determine the average concentration profiles in the tank.

4.8 Data Storage

All data from the experiments were transferred on to zip disks and stored in duplicate. For analysis, data files were then copied into separate Excel spreadsheets and analyzed to determine the cycle-averaged level, pressure, velocity, and concentration profiles (only for the simulant tests) as a function of the cycle time.

(4) In principle, it is almost impossible to achieve a true steady state. Therefore in our experiments, steady state is defined a condition in which the density variation between two consecutive cycles is less than 5%.

5.0 Experimental Results

In this section, the results of the settling, small and large tank hydrodynamic, and large-tank simulant tests are discussed using only a partial set of data. The entire data set is included in the appendices (see Appendices B, C, D, and E, respectively, for the settling, small-tank hydrodynamic, large-tank hydrodynamic, and simulant test data).

5.1. Settling Column Tests

Settling column tests were performed with the AZ-101/102 simulant to generate two-phase settling data for the TEMPEST settling sub-model validation. The results are presented below.

Settling column tests were performed at ~ 25 wt% solids loading. The compositions of the various chemicals used to prepare the simulant are listed in Table 5.1. The particle size distribution of the AZ-101/102 simulant is shown in Figure 5.1.

Table 5.1. Composition of the AZ-101/102 Simulants Used in the Column Settling Tests

Component	Mean Diameter (μm) ^(a)	Manufacturer	Catalog Number	Amt. Taken (Kg)
Fe ₂ O ₃	22	Prince Manufacturing Co	07--5001	0.531
Fe ₂ O ₃	2-3	Prince Manufacturing Co	07--3752	0.885
Fe ₂ O ₃	0.6	Prince Manufacturing Co	07--2568	0.354
Al ₂ (OH) ₃	14	ALCOA	C-231 Granular White Hydrate	0.256
Al ₂ (OH) ₃	7.5	ALCOA	SpaceRite S-23	0.154
Al ₂ (OH) ₃	0.25	ALCOA	SpaceRite S-11	0.103
AL ₂ O ₃	52% < 44	ALCOA	HiQ-10 Alumina	0.220
Zr(OH) ₄	15	Magnesium Elecktron Inc.	FZO 922/01	0.397
NaKSiO ₄	10	Hammill & Gillespie	Spectrum A 400	0.153
		Solids		3.050
		Water Added		9.150
		Total (Solids + Water)		12.200
		Specific Gravity		1.24
(a) Manufactures specification (see Golcar et al. 2000)				

During the setting tests, samples were drawn periodically from different elevations and the densities of the samples were determined. The variations in the slurry density as a function of time at three different elevations of 0.762, 0.457, and 0.152 m (30, 18, and 6 in) are shown in Figures 5.2 to 5.4.

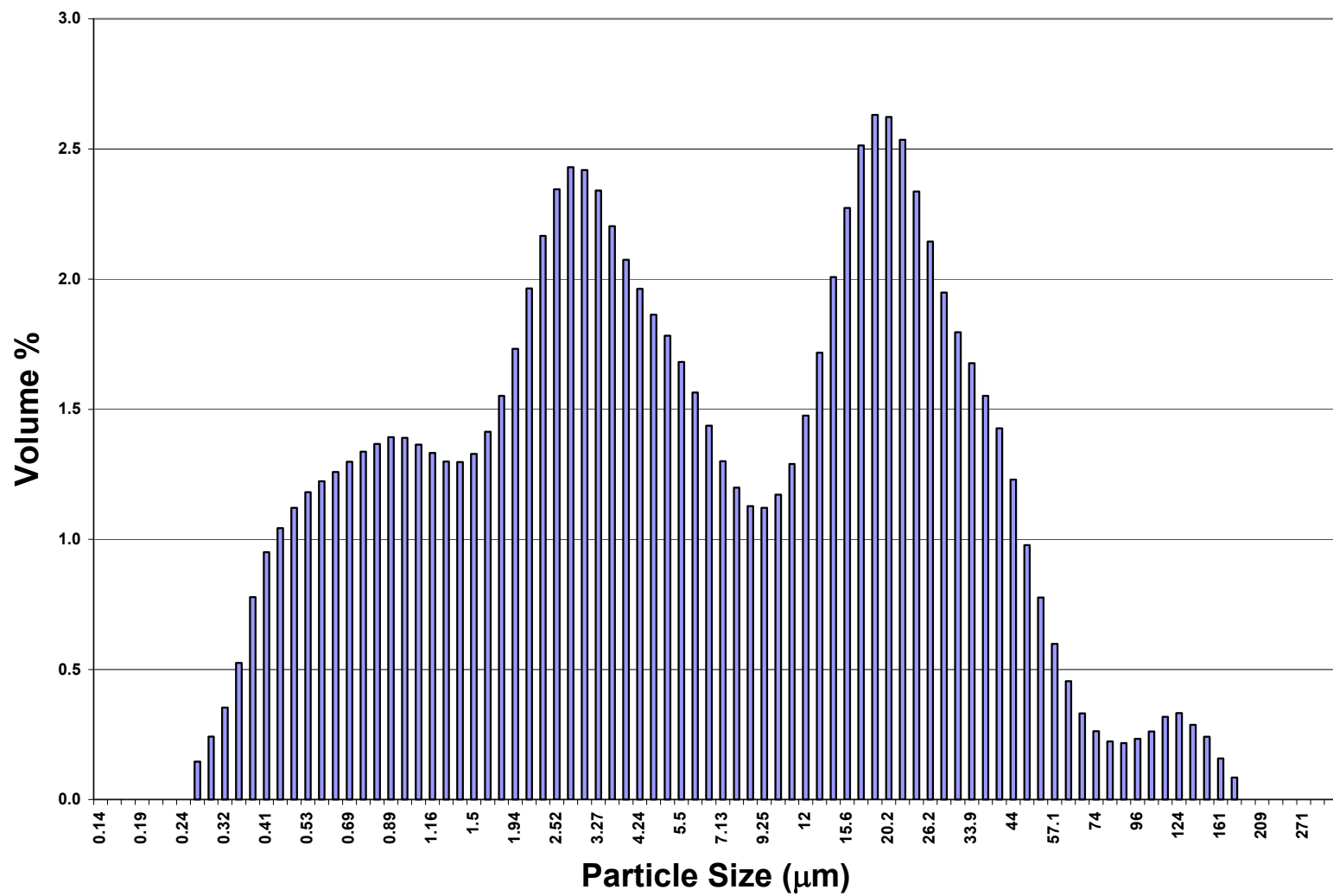


Figure 5.1. Particle Size Distribution of the AZ-101/102 Simulant Used in the Settling Column Test

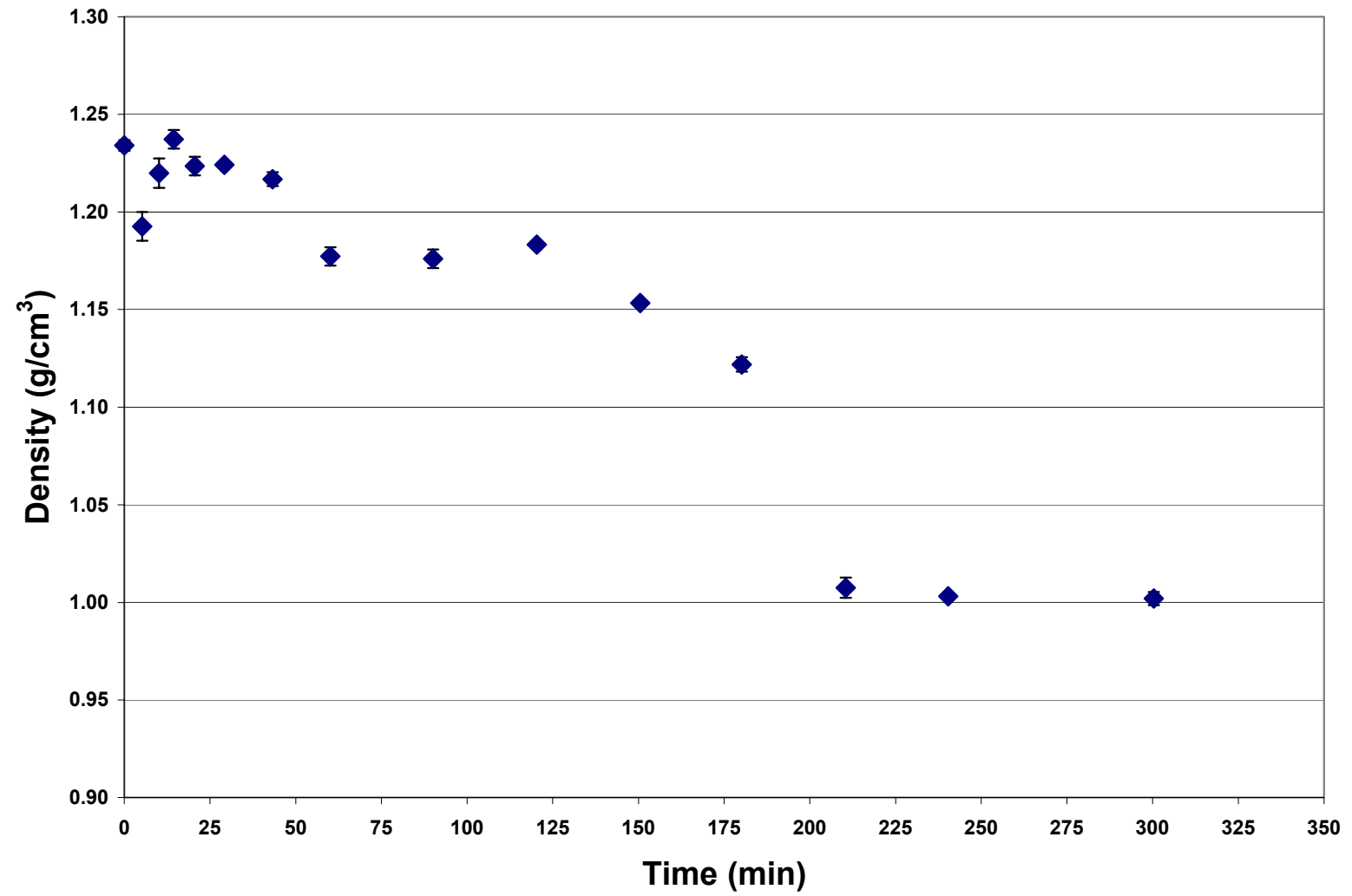


Figure 5.2. Variation in the Density of the Slurry at the Elevation of 0.762 m (30 in)

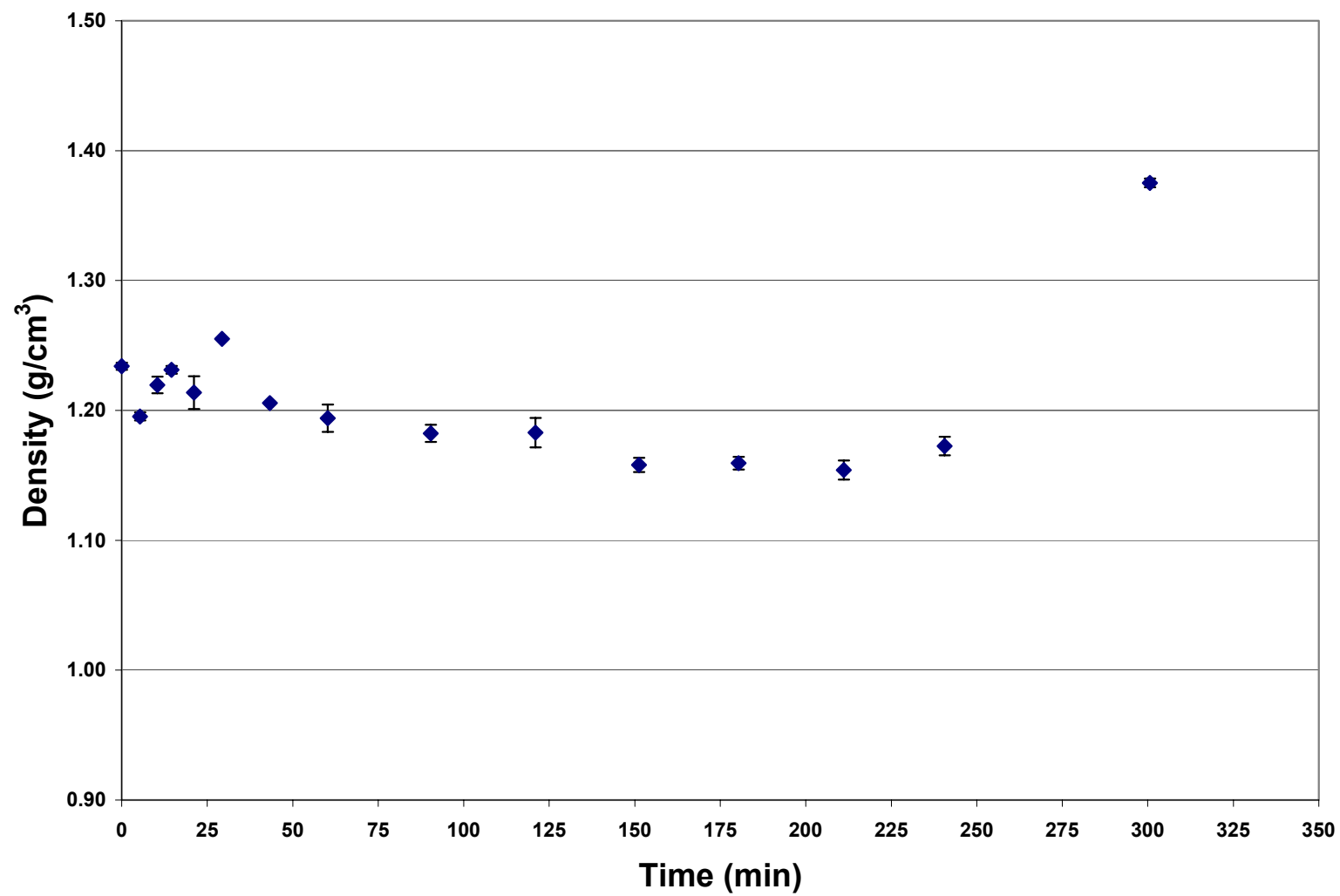


Figure 5.3. Variation in the Density of the Slurry at the Elevation of 0.457 m (18 in)

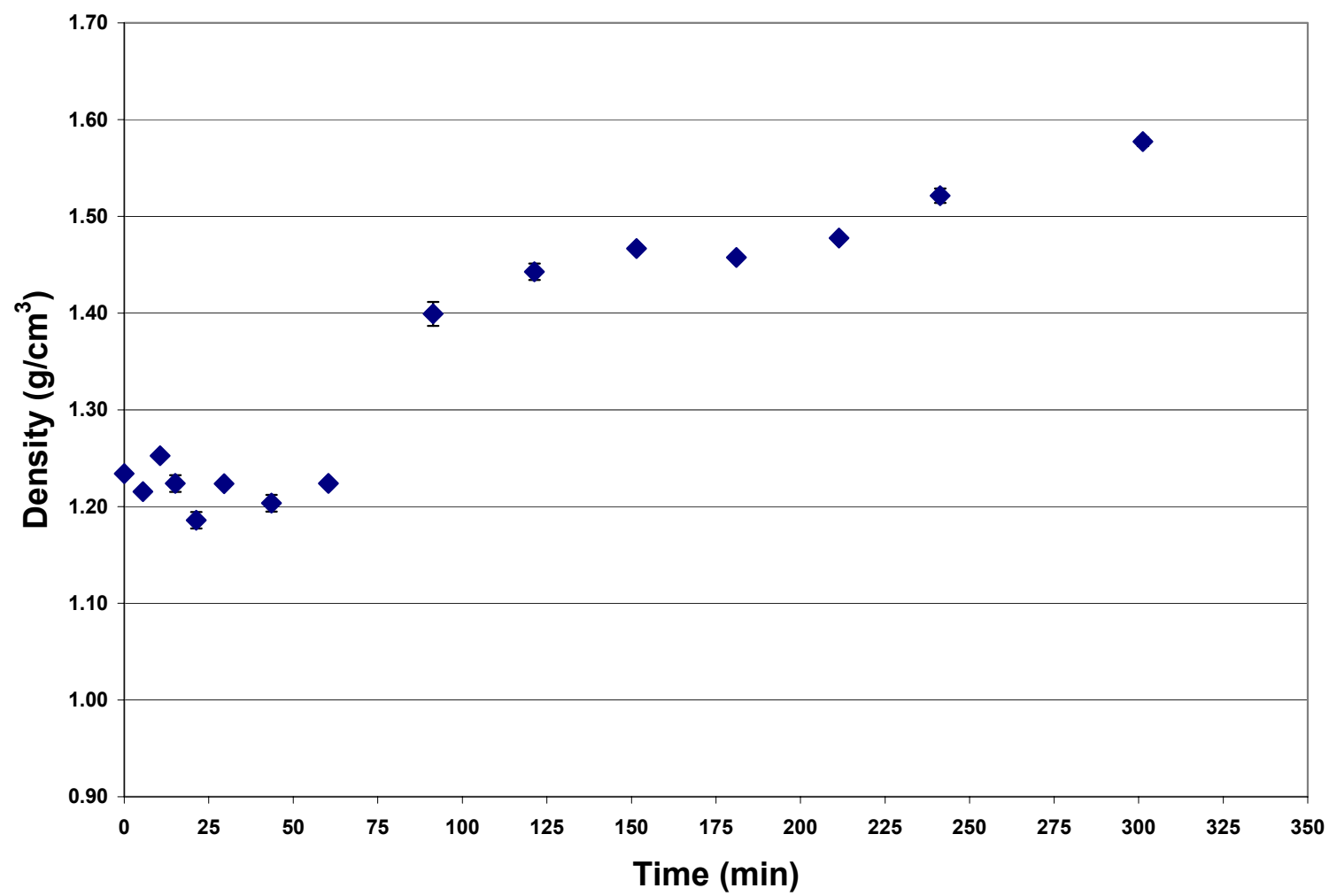


Figure 5.4. Variation in the Density of the Slurry at the Elevation of 0.152 m (6 in)

The behavior of the density profile versus time is complex, presumably due to the bimodal particle size distribution. Several interesting features can be seen from this data. For example, from Figure 5.2 it can be seen that for samples drawn from the 0.762 m (30 in) elevation and the density gradually decreases to ~ 1.00 , i.e., to the supernatant (i.e., water) density. A similar but slightly less pronounced effect is observed at the 0.457 m (18 in) elevation (Figure 5.3). However, for the densities of the samples drawn at the 0.152 m (6 in) elevation (Figure 5.4), the density initially decreases slightly and then increases again.

The variations in the sample densities with elevation and time can be explained by the hindered settling behavior occurring in these systems. The highest velocity that an individual particle can fall at is known as its “unhindered or clear fluid settling velocity”. This is the velocity a single particle would fall through a clear liquid when only influenced by gravity. As the concentration of particles increases, the settling velocity decreases as its motion is hindered by the presence of the other particles in the liquid phase. In effect, the surrounding particles increase the effective viscosity of the fluid through which each particle falls. Also, the descending particles displace the fluid upward, such that the particles actually fall through a rising fluid. The combined effect is known as “hindered settling”.

5.2. Small-Tank Hydrodynamic Tests

Small-tank hydrodynamic experiments were performed using the flat-bottom configuration of the test system. All experiments were performed with gravity refill of the pulse tube at the end of the drive phase. The test conditions for these experiments are listed in Table 5.2.

Table 5.2. Test Conditions for the Small-tank Hydrodynamic Experiments

Parameter	Condition
Tank Configuration	Flat Bottom
Nozzle Position	0.0476 m (1.875 in) from Tank Floor
Height of Liquid in Tank	1.245 m (49 in)
Drive Time	3 sec
Refill Time	27 sec

The fluid velocities in the tank were measured at several horizontal and vertical positions within the tank. This is schematically shown in Figure 5.5. For the positions near the tank floor region, the angled HFA (Model 1231W) probe was used, and for all other locations (near the tank wall and the tank interior region), the straight HFA (Model 1230W) probe was used. At each position of the velocity probe, data was logged for 23 cycles, and the data from cycles 9-22 was averaged to determine the averaged changes in the level and velocities in the tank as a function of the cycle time.

Figure 5.6 shows a typical change in the liquid level in the pulse tube as a function of the cycle time. Figure 5.6 also shows that although the drive time was set at 3.0 secs, the level in the liquid continues to decrease after the end of pressurization and the start of the refill step. This is due to the residual momentum of the fluid accelerated in the pulse tube during the drive phase.

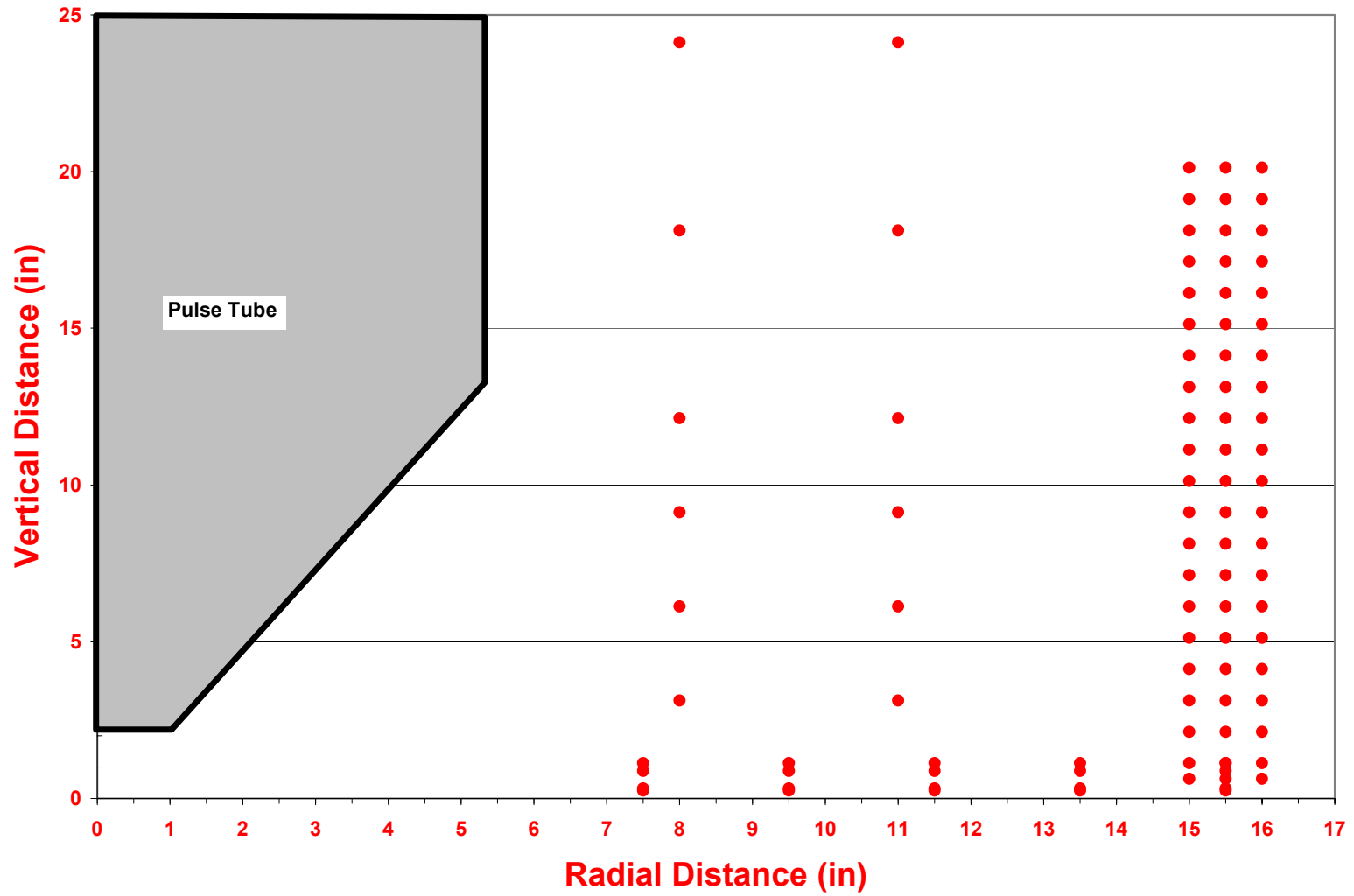


Figure 5.5. Locations Where the Velocity Measurements Were Made During the Small-tank Hydrodynamic Testing

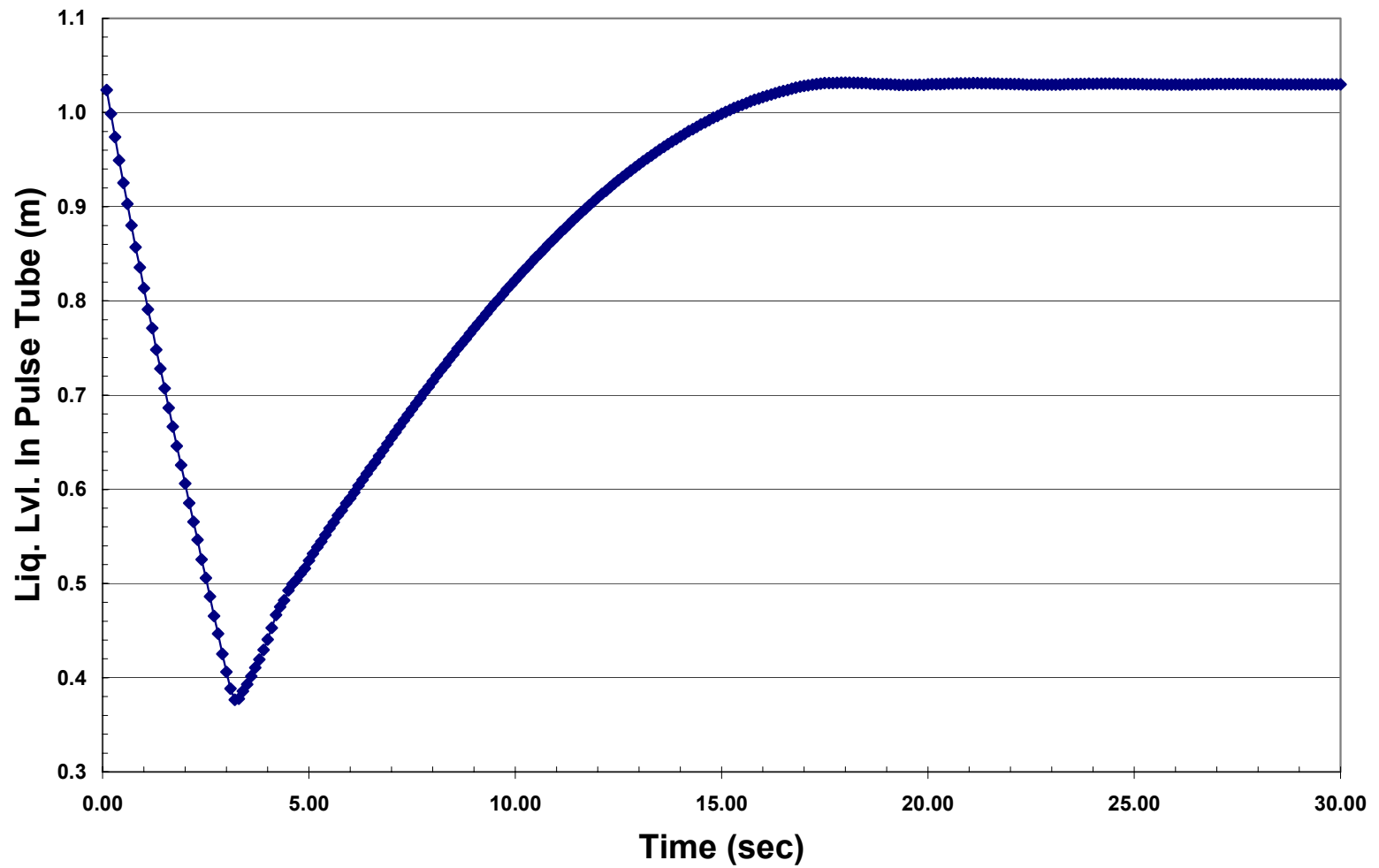


Figure 5.6. Typical Liquid Level Change in the Pulse Tube During the Small Tank Hydrodynamic Tests

Typical cycle averaged fluid velocities measured near the tank floor region at the radial position of 0.191 m (7.5 in) and three different elevations are shown as a function of the cycle time in Figure 5.7. As expected, the velocities rapidly increase during the drive phase (~ first 4 secs) and then decay rapidly back to zero during the refill phase. Also, the velocities (as expected) are greater near the floor wall region and lower at higher elevations.

Typical cycle averaged fluid velocities measured near the tank wall region at two radial positions of 0.406 m and 0.381 m (16 in and 15 in) and two different elevations are shown as a function of the cycle time in Figures 5.8 and 5.9. From these figures, it can be seen that the velocities increase rapidly during the drive phase and decay quickly to zero during the refill phase. The magnitudes of the increases decrease with increasing elevation from the tank wall. Also, the decrease in the velocity with elevation is more pronounced at positions very close to the tank wall ($R = 0.406$ m [16 in]), and as the distance from the wall increases, the convective dissipation is more predominant and the velocity magnitudes are much lower.

Contour maps of the cycle-averaged velocity flow fields in the tank at different times after the start of the pulse are shown in Figures 5.10 and 5.11. As expected, at the beginning of the pulse, fluid flow is primarily observed near the tank floor region. As time progresses, the fluid moves up the tank wall and propagates into the tank interior region. Also, it can be seen from Figure 5.11f that after about 9 seconds, there is practically no flow within the entire tank.

5.3. Large-Tank Hydrodynamic Tests

Large-tank hydrodynamic experiments were performed to determine tank velocity data for comparison with the model. The test conditions for these experiments are listed in Table 5.3. Figure 5.12 shows a typical change in the liquid level in the pulse tube as a function of the cycle time.

Table 5.3. Test Conditions for the Large-tank Hydrodynamic Experiments

Parameter	Condition
Tank Configuration	Dish Bottomed
Nozzle Position	0.152 m (6 in) from Tank Floor
Height of Liquid in Tank	0.889 m (35 in) Below the Top Rim of the Tank
Drive Time	~10.8 sec
Refill (Gravity) Time	~64.2 sec
Cycle Time	75 sec

The test was designed to create symmetry about vertical planes both passing diagonally through the pulse tubes centerlines and passing symmetrically between pairs of pulse tubes. The corresponding model could then be implemented in 3-dimensions but confined to one-eighth of the volume bounded by the planes of symmetry. This test design included attempting to: 1) operate the PJMs under gravity refill to keep the individual pulse tubes synchronized and 2) remove protrusions in the tank capable of causing asymmetries in the flow fields. However, there were certain variables beyond our control.

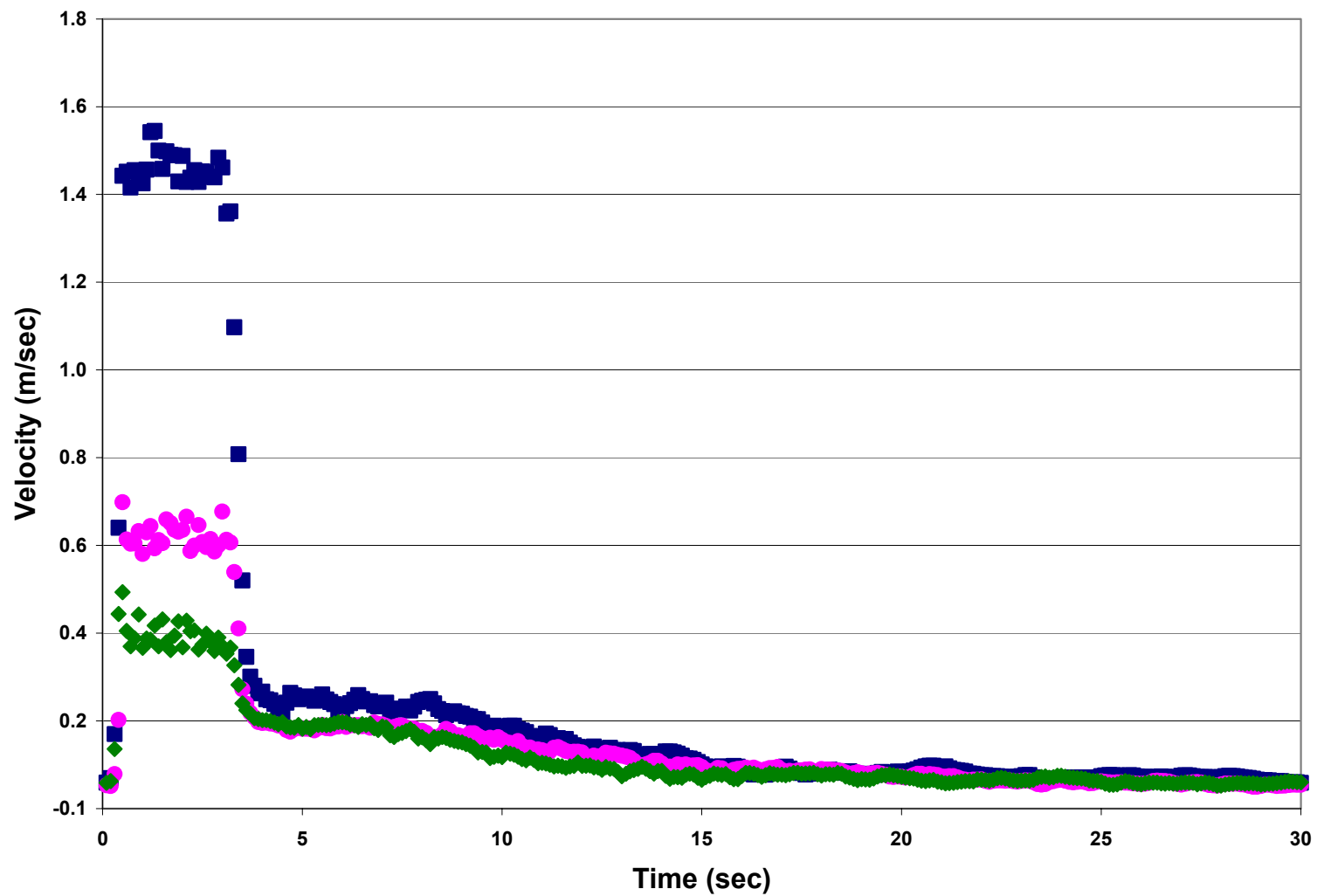


Figure 5.7. Velocity Profiles Measured Near the Tank Floor Region at the Radial Position of 0.191 m (7.5 in) and Elevations of 6.35E-02 (■), 1.59E-02 (●), and 2.22E-02 (◆) m (0.25, 0.625, and 0.875 in)

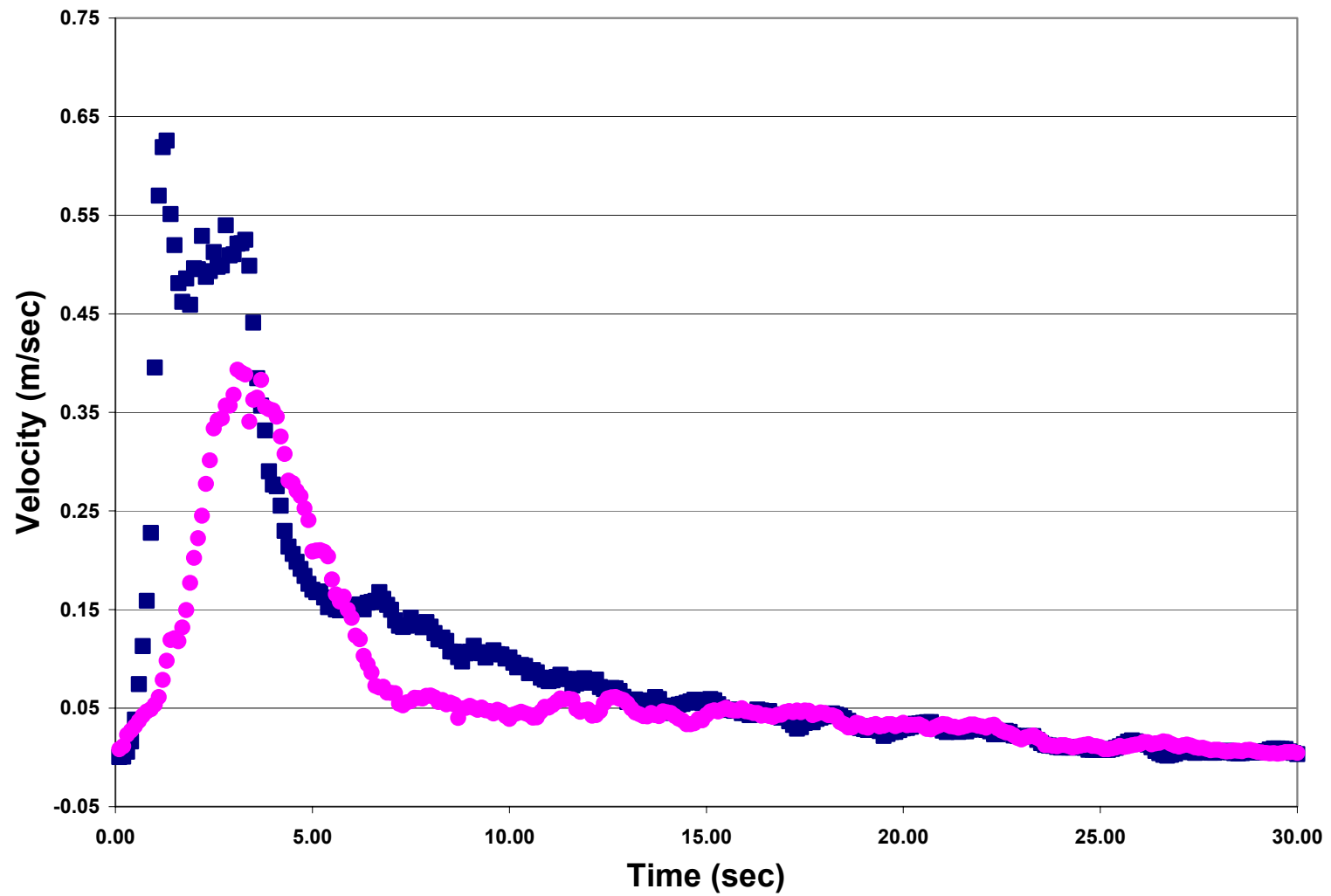


Figure 5.8. Velocity Profiles Measured Near the Tank Floor Region at the Radial Position of 0.406 m (16 in) and Elevations of 0.105 (■) and 0.308 (●) m (4.125 and 12.125 in)

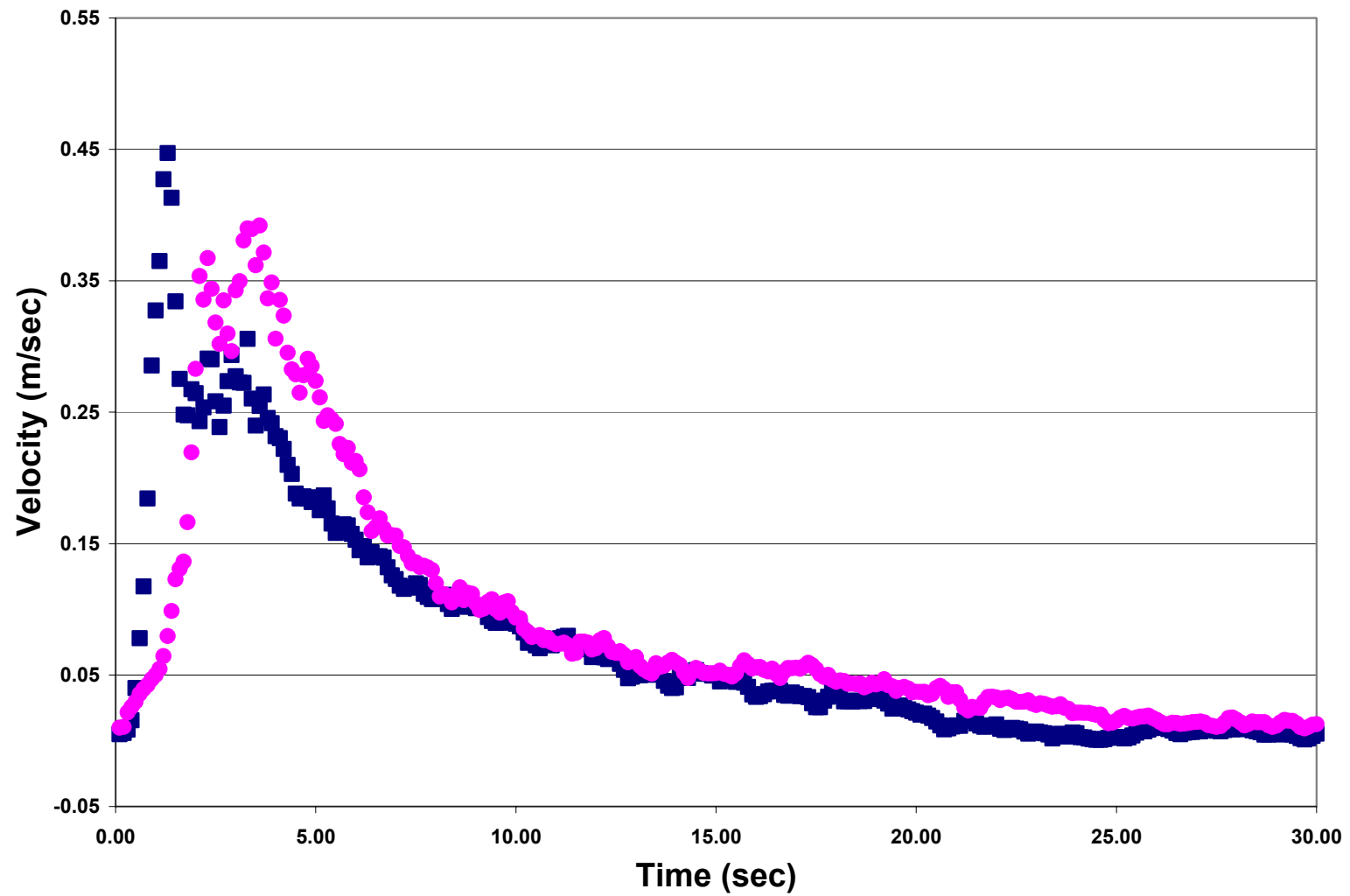


Figure 5.9. Velocity Profiles Measured Near the Tank Floor Region at the Radial Position of 0.381 m (15 in) and Elevations of 0.105 (■) and 0.308 (●) m (4.125 and 12.125 in)

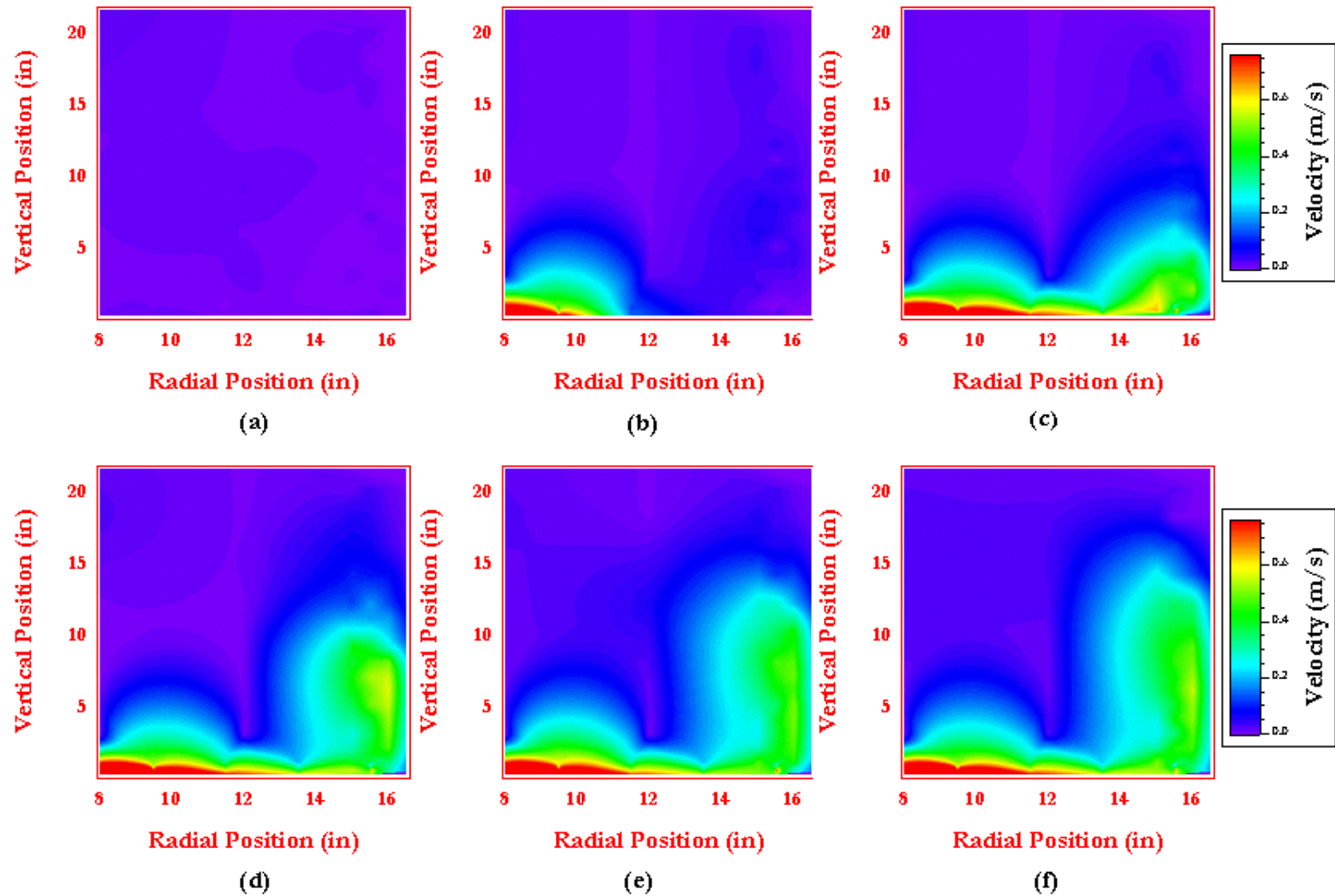


Figure 5.10. Velocity Contour Maps of the Small Tank Hydrodynamic tests at: (a) 0.1, (b) 0.5, (c) 1.0, (d) 1.5, (e) 2.0, and (f) 2.5 Seconds After the Start of the Pulse

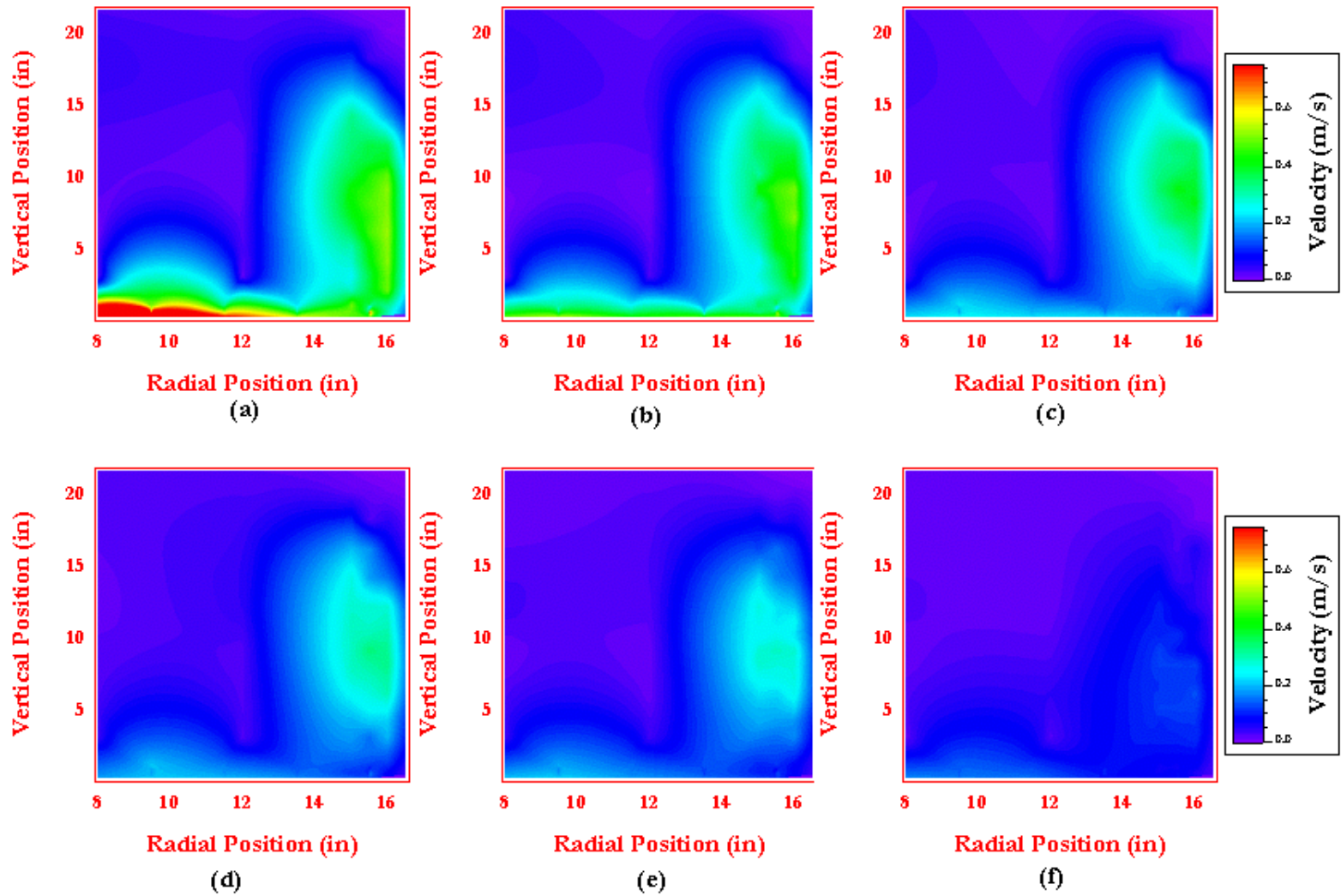


Figure 5.11. Velocity Contour Maps of the Small Tank Hydrodynamic Tests at: (A) 3.0, (b) 3.5, (c) 4.0, (d) 4.5, (e) 5.0, and (f) 9.0 Seconds After the Start of the Pulse

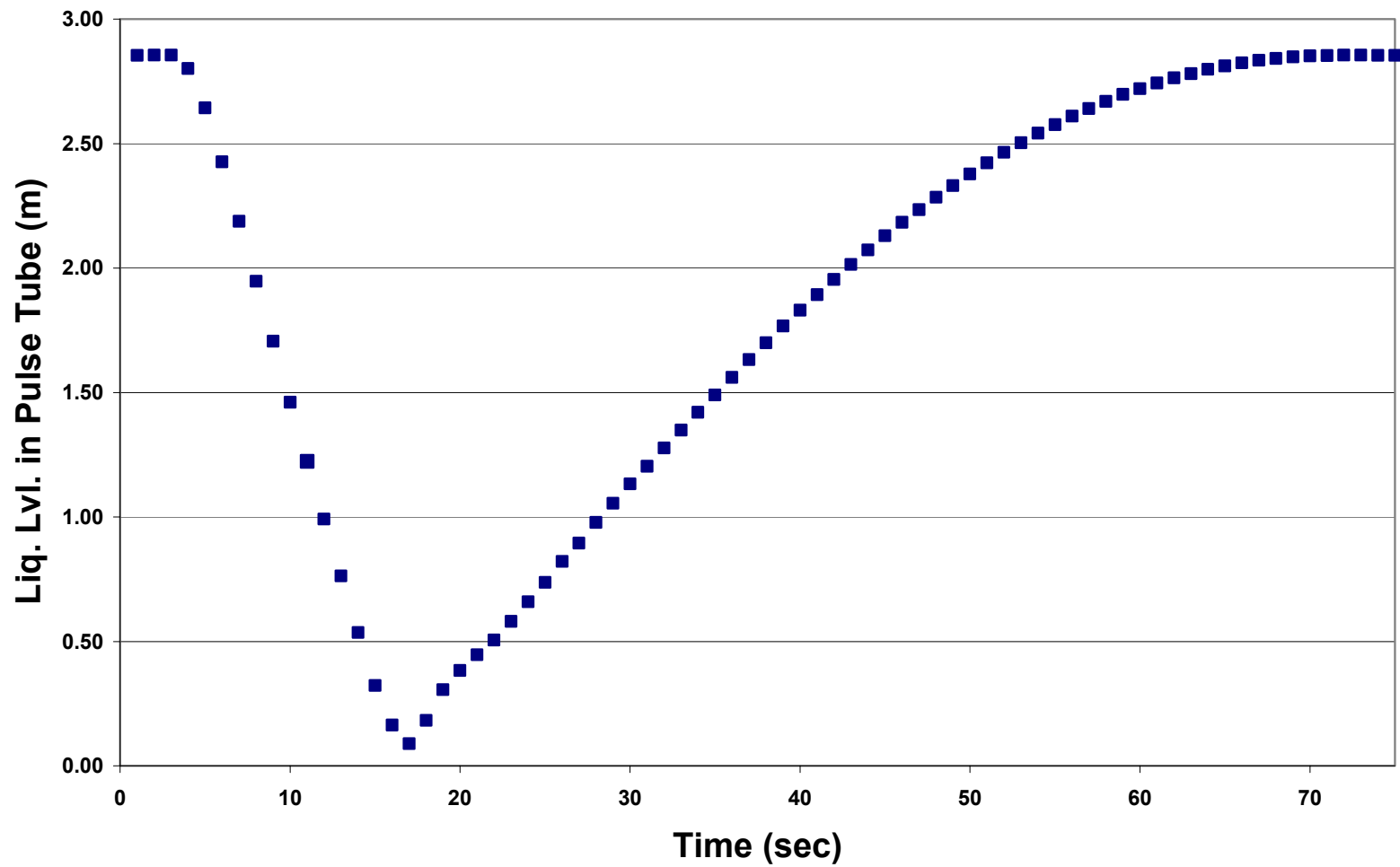


Figure 5.12. Liquid Level Change in the Pulse Tube During the Large Tank Hydrodynamic Tests

For example, since the JPPs regulating the airflow to the pulse tubes were not identical, the actual drive times were not identical. In addition, the 4 PJMs were not situated exactly in the center of each quadrant of the tank (one was closer to the wall than the others). Also, the pulse tube nozzles were not exactly at the same distance from the tank floor. Finally, there were two tie beams half way into the tank, which were used to provide additional support to the pulse tubes (These tie beams could not be removed during the testing due to structural stability concerns.).

All of the above factors contributed to asymmetries in the flow patterns within the tank as shown in Figure 5.13. This figure shows the contour maps of the max velocities for each radial position measured at two different elevations of 1.308 and 1.842 m (51.5 and 72.5 in) (as measured from the tank center). Although the peak velocity at each elevation is still located close to the center of the tank, asymmetries still exist in the fluid flow. The implications of the asymmetries in the fluid flow behavior on the TEMPEST model validation are discussed in Section 8.0.

5.4. Large-Tank Simulant Tests

Large-tank simulant tests were conducted using glass beads of a mean PSD distribution of $\sim 75 \mu\text{m}$. These particles were obtained from Potters Chemicals Co., and the PSD data of the as received particles is shown in Figure 5.14. In all experiments, the PJMs were operated with gravity refill of the pulse tube at the end of the drive phase. The test conditions for these experiments are listed in Table 5.4.

Table 5.4. Test Conditions for the Large-tank Simulant Experiments

Parameter	Condition
Tank Configuration	Dish Bottomed
Solids Loading	10 wt% (~ 4.2 vol. %)
Nozzle Position	0.152 m (6 in) from Tank Floor
Height of Liquid in Tank	0.679 m (26.75 in) below the top rim of the tank
Drive Time	~ 10.8 sec
Refill (Gravity) Time	~ 64.2 sec
Cycle Time	75 sec

The slurry in the tank was mixed continuously with the PJMs until the density (at a fixed location of the MicroMotion sensor) reaches a steady or quasi-steady state. This typically took between 45 to 60 cycles. After this, density measurements were made at several locations throughout the tank, and the cycle averaged density variation at each location was determined.

The variation in the cycle averaged density of the simulant at different vertical positions and fixed radial sampling positions of 0.222, 0.775, and 1.077 m (8.75, 30.5, and 42.4 in) are shown in Figures 5.15 to 5.17, respectively. For all three radial positions, these figures show that there is a significant concentration build up at lower elevations (i.e., near the tank floor) and the concentration decreases with increasing height. Also, it can be seen that the concentration increases as the PJMs are in the drive phase (i.e., the solids are pushed up) and before they begin to settle back during the refill phase. Finally, it is

also important to note that, there are practically no solids in regions above ~1.524 m (~5 ft) from the tank floor – the density approaches the density of the supernatant fluid, which in the present case is 1 for water.

At the time when the large-tank simulant tests were conducted, it was unknown to us that there were several protrusions along the floor of the tank. Also, one of these protrusions was right beneath one of the pulse tubes. This protrusion significantly altered the core flow upwards. Although this and the other flow obstructions along the floor of the tank were subsequently removed, and the hydrodynamic tests discussed in Section 5.3 were repeated, sufficient funding was not available to repeat the simulant mixing tests. The implications of the asymmetries in the fluid flow behavior on the TEMPEST model validation are discussed in Section 9.0.

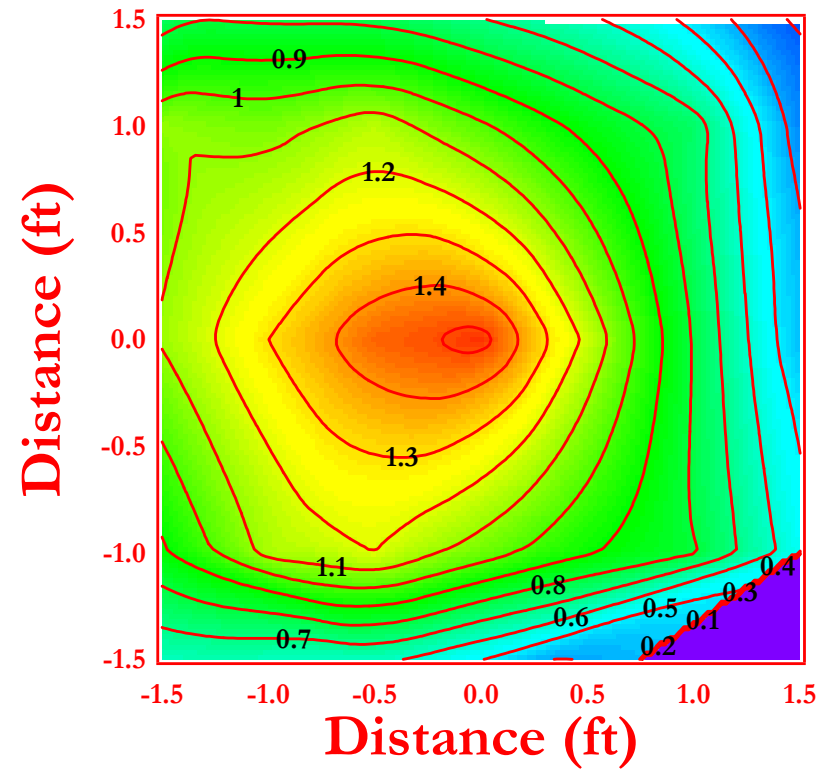
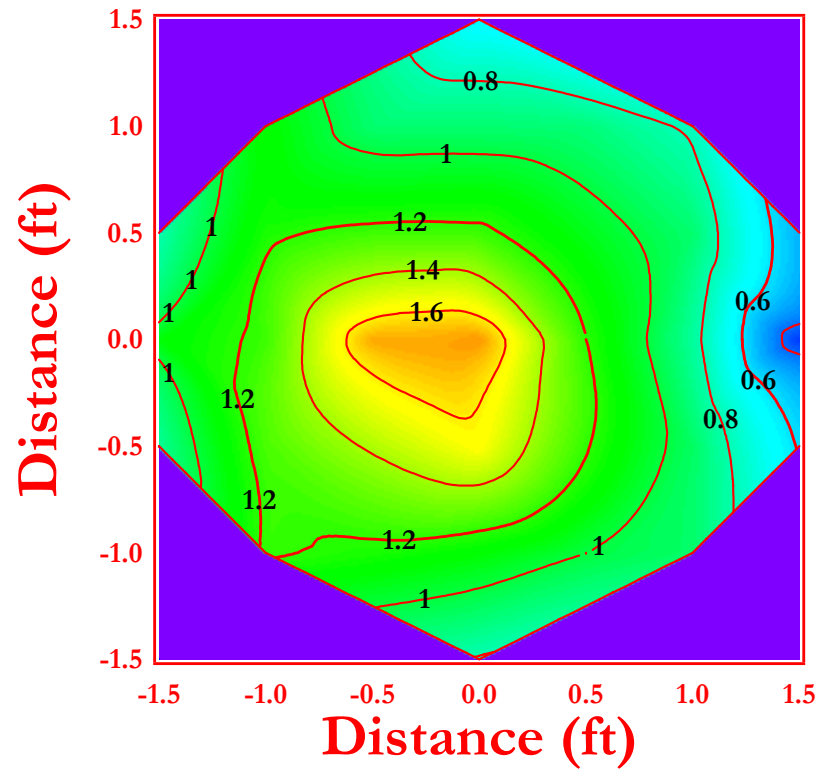


Figure 5.13. Contour Maps of the Maximum Velocities Measured in During the Large Tank Hydrodynamic Tests: (a) 1.308 m (51.5 in) Horizontal Plane and (b) 1.842 m (72.5 in) Horizontal Plane

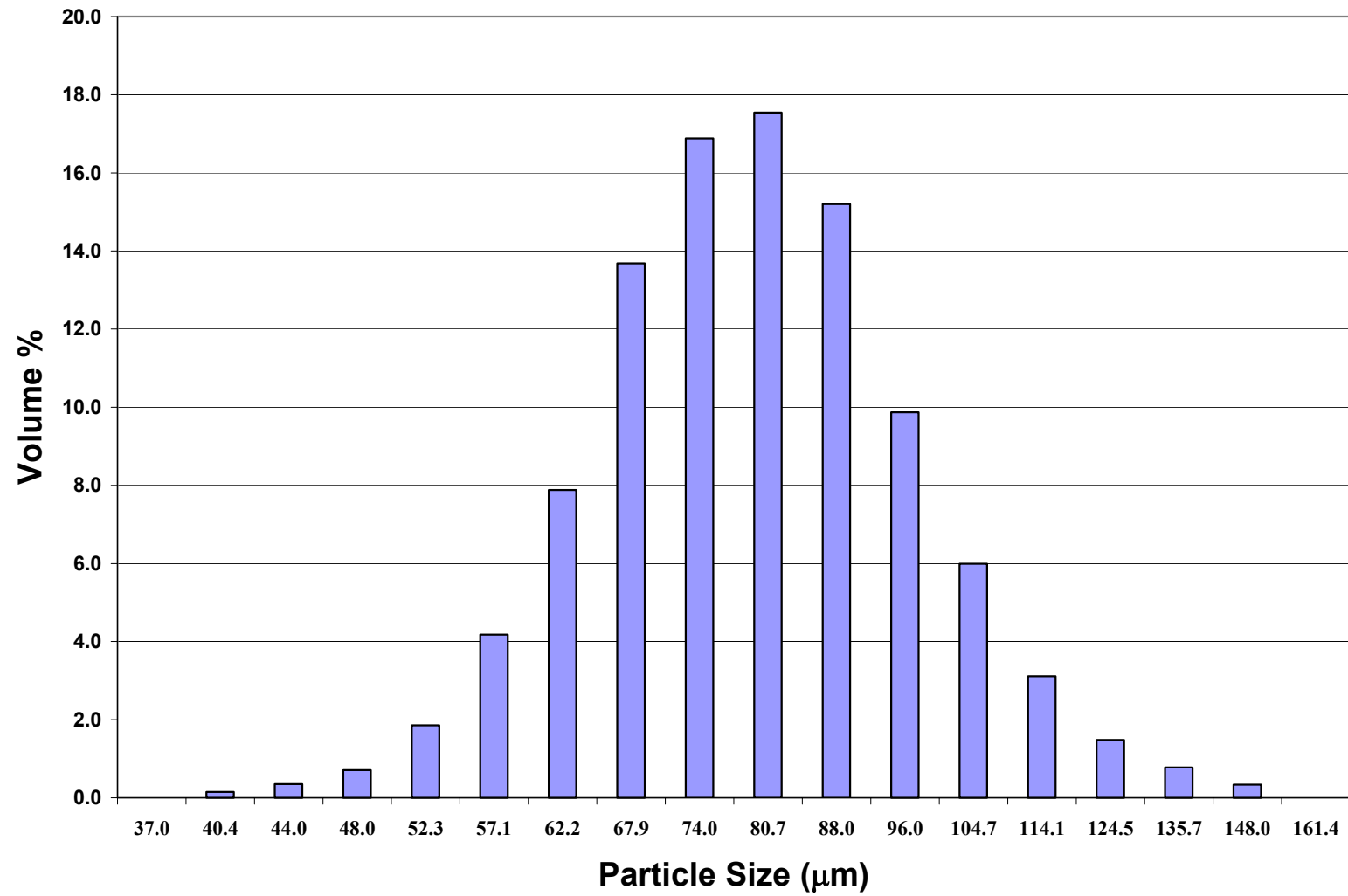


Figure 5.14. Particle Size Distribution of the Potters 2530 Glass Beads Used in the Large Tank Simulant Tests

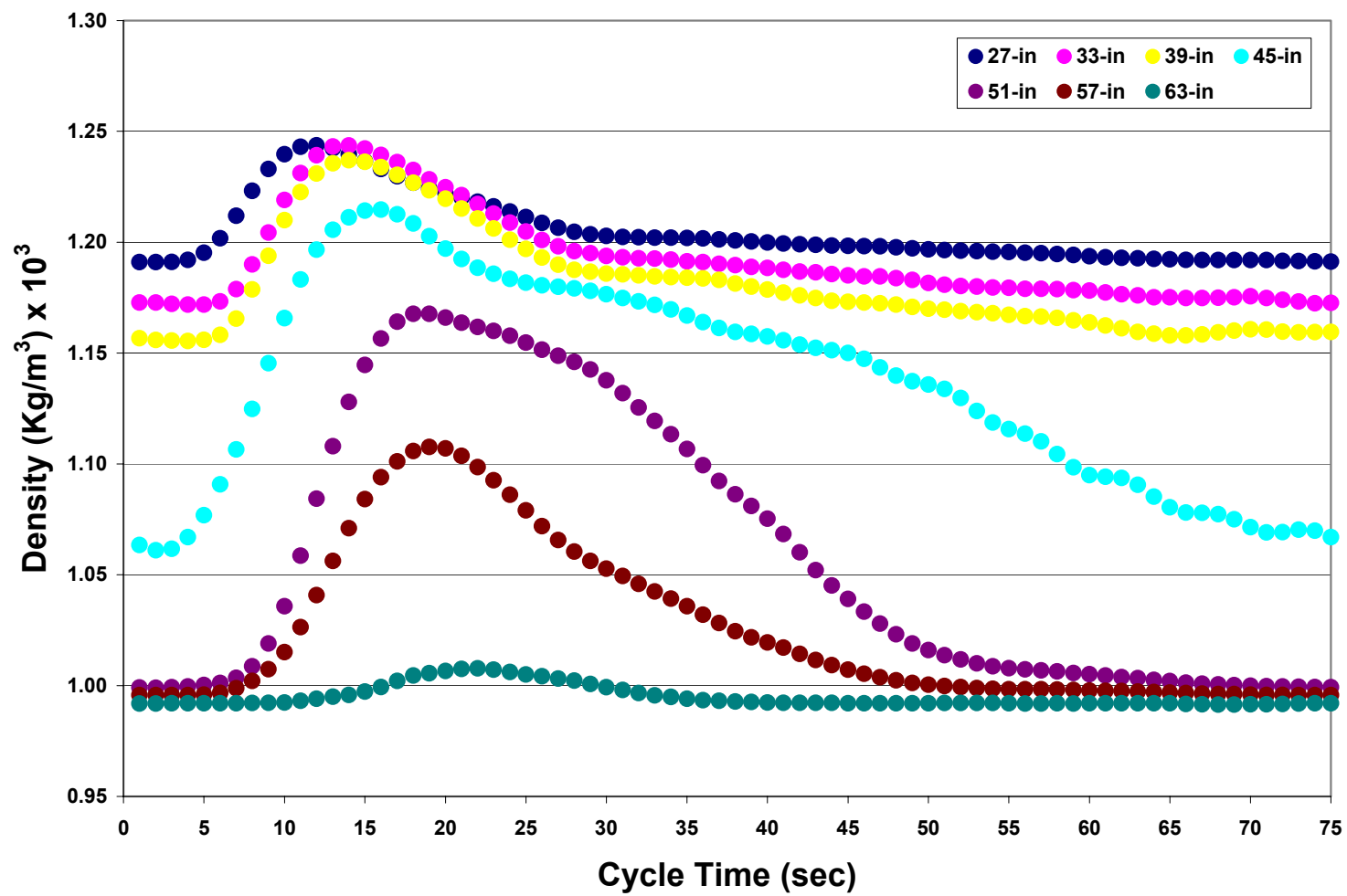


Figure 5.15. Cycle Averaged Density Profiles Measured During the Large Tank Simulant Tests at the Radial Position of 0.222 m (8.75 in)

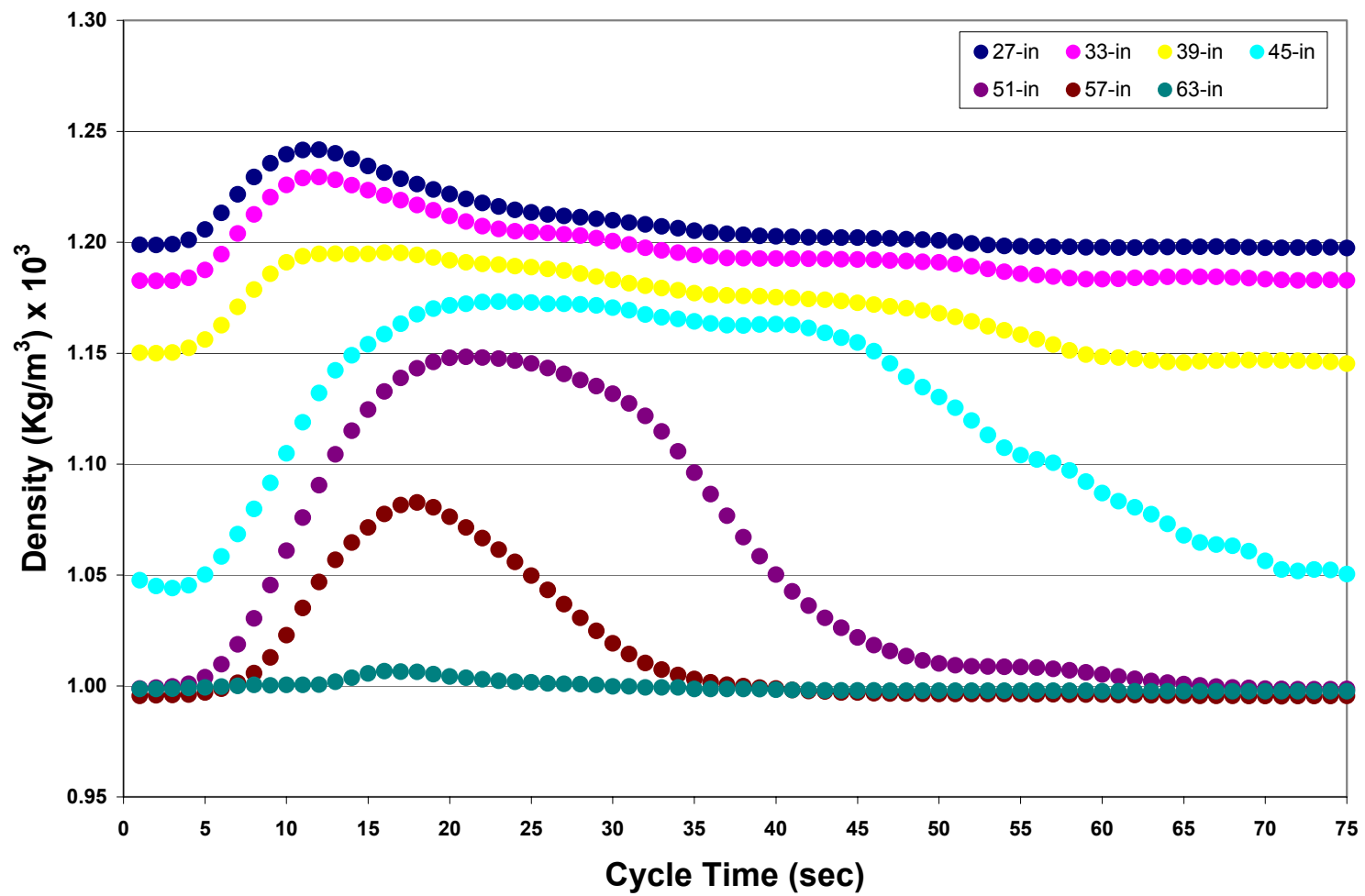


Figure 5.16. Cycle Averaged Density Profiles Measured During the Large Tank Simulant Tests at the Radial Position of 0.775 m (30.5 in)

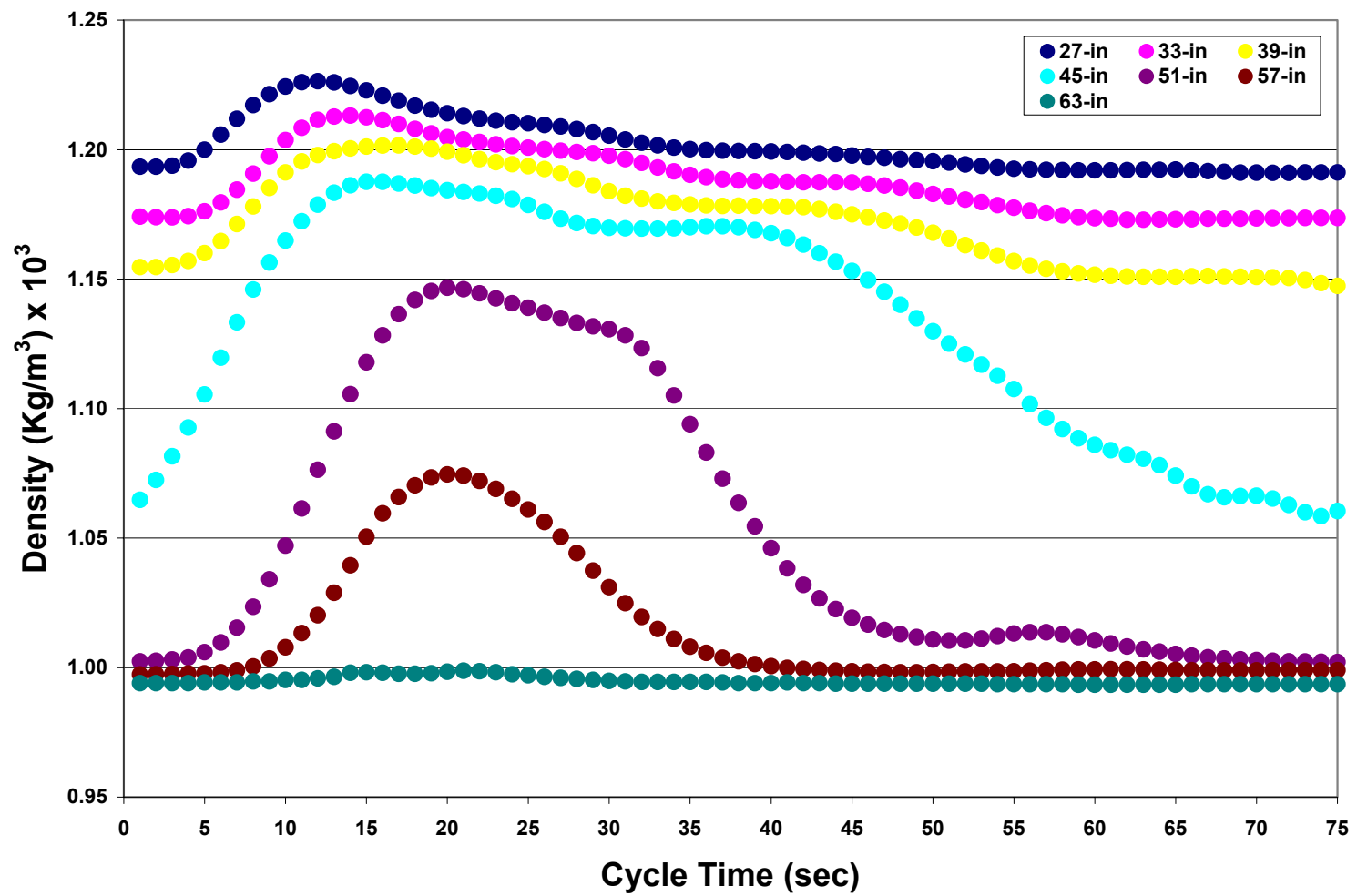


Figure 5.17. Cycle Averaged Density Profiles Measured During the Large Tank Simulant Tests at the Radial Position of 1.077 m (42.4 in)

6.0 Settling Model Validation

6.1 Overview

One of the features of TEMPEST is its capability to model the settling of multi-component species in a slurry under the static conditions or under the influence of external driving forces (e.g., as a result of mixing by pumps, agitators, or as in the present case the PJMs). These settling models have been use previously to model the mixing of the contents of Hanford tank 241-AZ-101 (Onishi and Recknagle 1997).

6.2 Objectives

The purpose of the particle settling validation simulations was to provide a qualitative and quantitative measure of accuracy of the hindered settling model incorporated into the TEMPEST code. The intent was to remove all other factors that may influence the movement of particles in the liquid.

6.3 Approach

TEMPEST utilizes traditional hindered settling models for computing the settling velocity in a slurry, which for a particle i is given by (Perry and Chilton 1973):

$$V_i = V_{i,so} \left(1 - \frac{C_i}{PF}\right)^b \quad (6.1)$$

where:

- V_i = Hindered settling velocity of the particle in a computational cell
- $V_{i,so}$ = Clear fluid settling velocity of the particle
- C_i = Total particle concentration in the computational cell
- PF = Maximum volume packing factor
- B = Exponent defaulted to 4.65 for particles obeying Stokes law (McCabe et al. 1985).

The initial boundary conditions for this problem is: @ time $t = 0$, $C_i = C_{i,o}$ (initial particle concentration of the fully mixed slurry).

6.4 Model Input Parameters

In order to use Equation 6.1 to simulate hindered settling behavior of particles in a slurry, the information regarding the maximum volume packing factor (PF) and clear fluid settling velocity ($V_{i,so}$) need to be provided as input parameters. PF is determined from experiments, and the clear fluid settling velocities are either experimentally measured or determined from stokes law given by (McCabe et al. 1985):

$$V_{i,so} = \frac{g D_p^2 (\rho_p - \rho)}{18 \mu} \quad (6.2)$$

where g is the gravitational constant, D_p is the diameter of the particle, ρ_p and ρ are the densities of the particle and the supernatant fluid, respectively, and μ is the viscosity of the supernatant.

The AZ-101/102 simulant used in the settling tests consists of several chemical species each with a broad range of particle size distribution, which varies from 0.2 to 161 μm (see Figure 5.1). In addition, the densities of these species vary from 2400 to 5200 kg/m^3 with an average solids density of $\sim 3200 \text{ kg/m}^3$. Because of the complex distribution of the species in the simulant, binning of the species is extremely critical to modeling the settling behavior of the simulant.

In the present study, the particles were binned according to the type of chemical species used in the simulant. The input parameters ($C_{i,o}$ and $V_{i,so}$) for the various species of the AZ-101/102 simulant are listed in Table 6.1. The maximum volume-packing factor (PF) as determined from the final bed volume was estimated to be 0.38⁽⁵⁾.

Table 6.1. Input Parameters for the TEMPEST Settling Model

BIN	Initial Concentration $C_{i,o}$ (kg/m^3)	Settling Velocity $V_{i,so}$ (m/s)
1	35.96	5.27E-05
2	53.94	5.01E-04
3	89.9	2.72E-05
4	40.3	6.44E-04
5	10.416	4.50E-06
6	15.624	7.40E-05
7	26.04	3.92E-04
8	22.32	4.59E-04
9	15.5	1.12E-04

In determining the settling velocities reported in Table 6.1, for each species: 1) the mean particle size was determined from its particle size distribution in water (see Appendix B), and 2) the densities were determined from the manufacturer specification sheets (Golcar et al. 2000). This information is summarized in Table 6.2.

⁽⁵⁾ The packing factor was determined from the total volume of the bed after 5 days of settling and from the estimation of the total solids and liquid in the bed. These calculations do not take into account that samples were periodically taken during the tests for density analysis.

Table 6.2. Physical properties of the Individual Species in the AZ-101/102 Simulant

Species #	Component	Manufacturer	Catalog Number	Particle Density (kg/m ³)	Particle Size Range (μm) ^a	Mean Particle Diameter (μm) ^a
1	Fe ₂ O ₃	Prince Manufacturing Co	07--2568	5000	0.27– 52.33	4.64
2	Fe ₂ O ₃	Prince Manufacturing Co	07--5001	4750	0.37– 62.23	14.77
3	Fe ₂ O ₃	Prince Manufacturing Co	07--3752	4750	0.32– 22	3.44
4	Zr(OH) ₄	Magnesium Elektron Inc	FZO 922/01	3250	0.45– 53.33	21.61
5	Al ₂ (OH) ₃	ALCOA	S-11	2420	0.27– 37	2.27
6	Al ₂ (OH) ₃	ALCOA	S-23	2420	0.37– 62.23	9.22
7	Al ₂ (OH) ₃	ALCOA	C-231	2420	0.37– 88	21.23
8	Al ₂ O ₃	ALCOA	HiQ-10	2420	0.89– 248.9	69.99
9	NaKSiO ₄	Hammill & Gillespie	A400	2610	0.45– 52.33	10.64
a. The particle size range and mean particle diameters are the volume mean diameters.						

6.5 Model Setup

In order to validate the settling models in the TEMPEST code, a two-dimensional (axisymmetric) TEMPEST model based on Equation 6.1 was formulated. Currently, the model has the capability to model nine different semi-passive species in a base liquid. In each computational cell, uniform distribution of all species was assumed.

Simulations for the settling test were performed using 20 radial nodes and 44 vertical nodes to represent the column conditions of 0.1016 m ID x 1.194 m H (4 in ID x 47 in H)⁽⁶⁾ corresponding settling test. A picture of the grid is shown in Figure 6.1.

6.6 Results and Discussion

The experimentally measured densities and model predictions for the 0.762, 0.457, and 0.152 m (30, 18, and 6 in) elevation are shown in Figure 6.2 to 6.4. The symbols represent the experimental data and the solid line represents the model predictions. The error bars on the experimental data represent 2σ : where σ is the standard deviation of the three repeat measurements of the densities of each sample.

The results in Figures 6.2 to 6.4 indicate that the model qualitatively captures the specific gravity at the three elevations. For example, the model predicts that at 0.762 m (30 in) elevation, the specific gravity initially remains constant before decreasing. At the 0.457 m (18 in) elevation, the model predicts that over the major portion of the test, the specific gravity decreases slightly and then remains constant.

(6) The over the course of the experiment, the settling column height decreased due to the withdrawal of samples for density analysis. Therefore an average height of 1.194 m (47 in) for the height of the slurry in the column was used in the simulations.

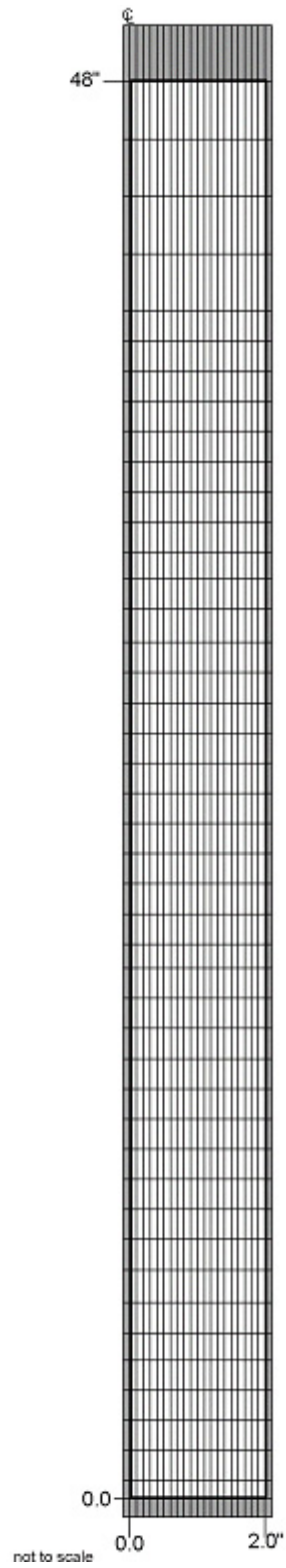


Figure 6.1. Grid Used to Model the Settling Experiments Using TEMPEST

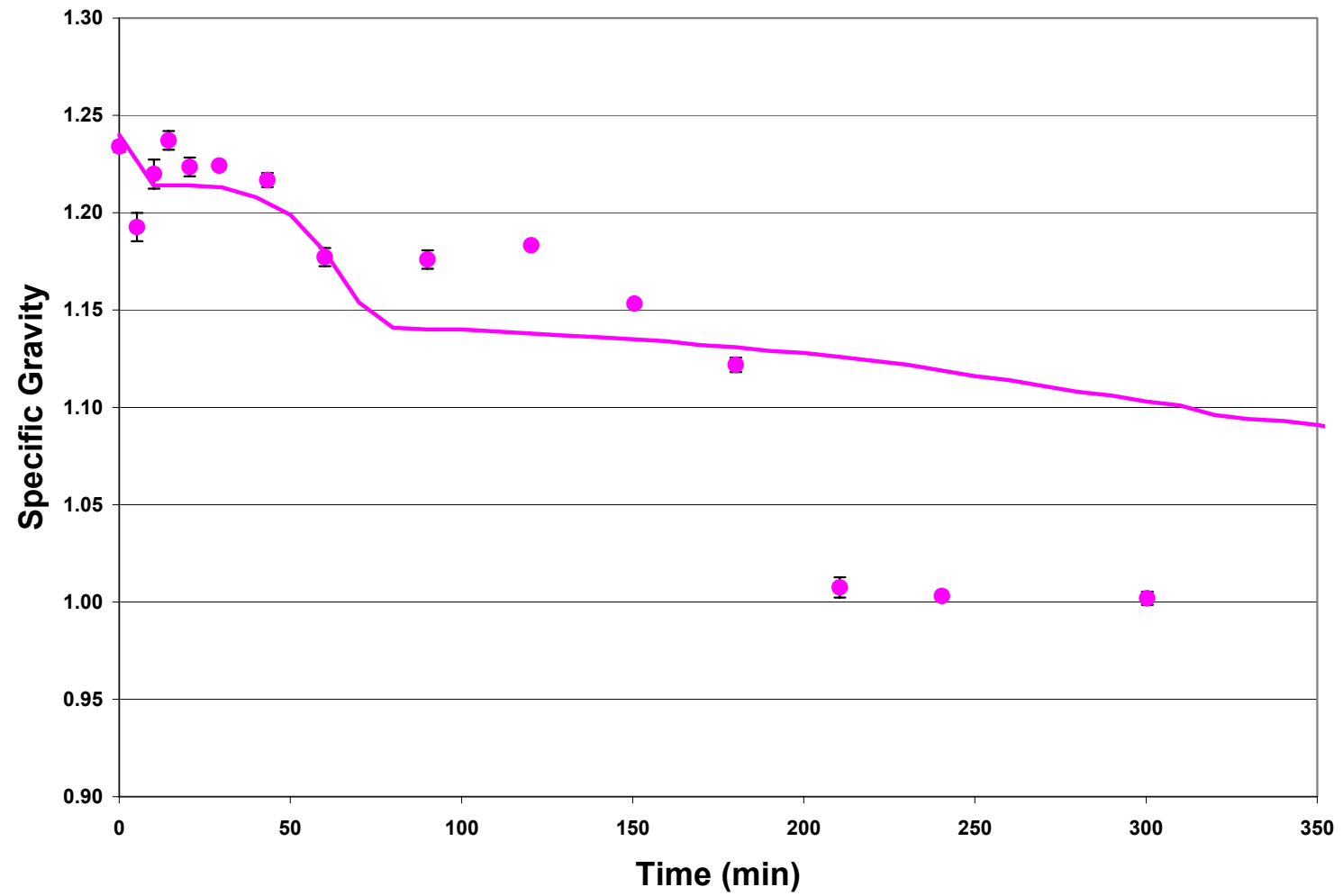


Figure 6.2. Experimentally Measured Specific Gravities (●) and Model Predictions (—) at 0.762 m (30 in) Elevation

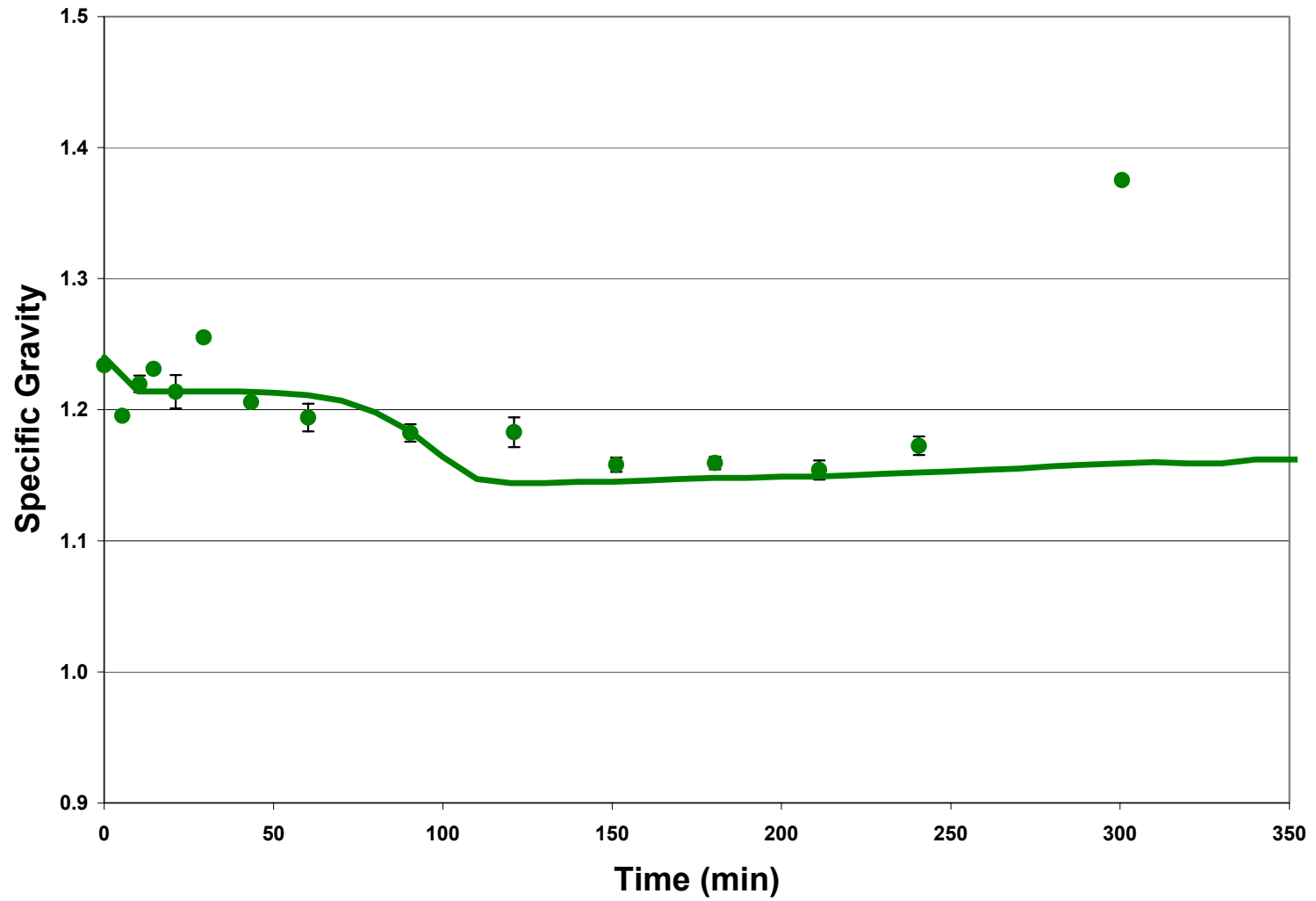


Figure 6.3. Experimentally Measured Specific Gravities (●) and Model Predictions (—) at 0.457 m (18 in) Elevation

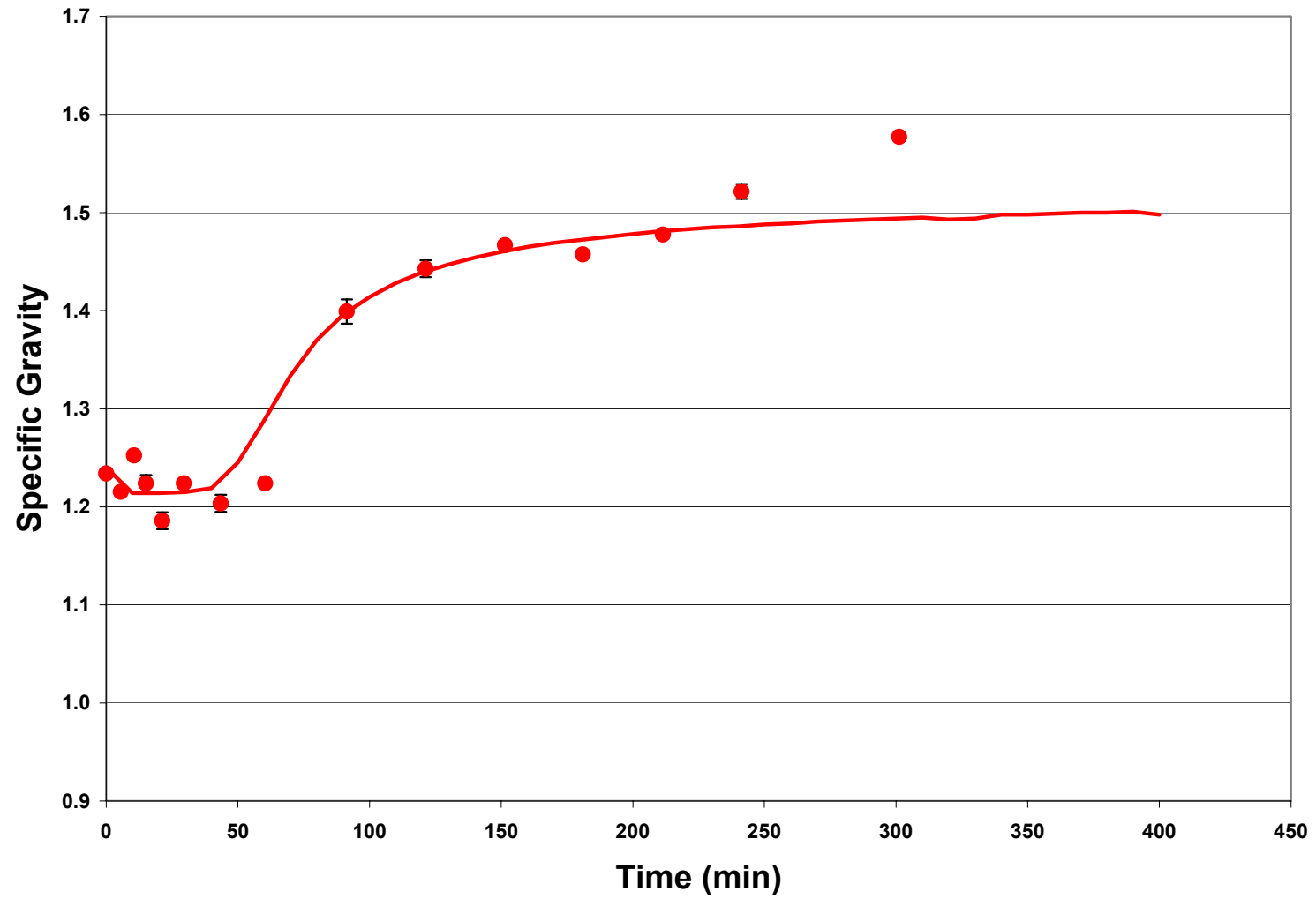


Figure 6.4. Experimentally Measured Specific Gravities (●) and Model Predictions (—) at 0.152 m (6 in) Elevation

Finally, at the 0.152 m (6 in) elevation, the model predicts that after a slight decrease, the specific gravity gradually increases.

In addition to the qualitative predictions, the match between the model predictions and the experimental specific gravities is excellent over approximately the first 250 minutes of the settling test. Only at the later durations, there seems to be a deviation from the experimental values; the deviation being the largest at the 18 in elevation. At the later durations, the errors between the model predictions and experimental data varied by a maximum difference of 12% for the 0.762 (30 in), 15% for the 0.457 m (12 in) and 5% for the 0.152 m (6 in) location.

The deviation of the model predictions from the experimental data is attributed primarily to the clear fluid settling velocity input to the model, which were determined by the mean particle size of the “as received” samples in water. There are limitations in the approach used to determining the settling velocities from the mean PSD. Most importantly, for the AZ-101/102 simulant, it has been known that significant agglomeration and deagglomeration (especially with the aluminum species) occurs during the simulant preparation (Golcar 2000). Therefore the PSD of the as received particles is not necessarily reflected in the final simulant. In addition to this, using the mean PSD does not necessarily cover the entire range of settling velocities of all the particles especially when they have such a broad distribution as listed in Table 6.2.

In addition to the difficulties in determining the clear fluid settling velocities of the individual species, there were also some experimental issues, which could cause a deviation between the model predictions and the experimental results. For instance, the height of the fluid mixture is not constant but varies with time since samples were periodically taken for density analysis. The impact of this should increase in time as the amount of material extracted increases. This is exactly the case as seen in Figure 6.2 to 6.4 where deviations of the model predictions from experimental data were observed during the later portions of the test.

Finally, the maximum packing factor could also influence the predictions. The maximum packing factor is simply an estimate. The value was determined from the final volume of the perceived bed layer (V_f) at the end of the settling test and the volume of the solids phase (V_s), given by:

$$PF = \frac{V_f}{V_s} \quad (6.3)$$

where V_s is determined from the density of the solids phase ($\rho_s = 3200 \text{ kg/m}^3$) and the total mass of the solids (m_s) initially taken (m_s from Table 5.1 equals 3.050 kg). This however does not account for the removal of the samples of analysis or take into account that the bed itself may not be fully packed throughout the perceived bed layer height.

There are ways to match the experimental data. For instance, it is possible to adjust the settling velocities of the various species until the model predicts the measured specific gravities. However, this approach was not taken since the intent was not to fit data but to predict the measured concentration variations in the tank, given the available information for the individual species.

6.7 Conclusions

The results of the settling studies indicate that the settling model is functioning correctly. The model predictions match the experimental data extremely well over the first 250 minutes of the test. Most of the deviations between the model predictions and the experimental data were observed during the later portion of the experiment. The maximum difference between the model predictions and the experimental specific gravities was ~15%.

The errors between the model predictions and experimental data are attributed primarily to the uncertainties in the parameters provided to the TEMPEST hindered settling model (clear settling velocities and maximum packing factor). Other causes were the change in the total fluid height (~ 4%) in the column over the course of the experiments due to periodic sample extraction; TEMPEST model was not setup to account for the removal of samples for analysis.

After many applications of the hindered settling model, it is believed that the settling model is correctly implemented in the TEMPEST code and the accuracy of the parameters provided to the model will determine the quality of the predictions.

7.0 Small-Tank Hydrodynamic Validation

7.1 Overview

The ability to model fluid flows in open regions using TEMPEST has been documented fairly rigorously (Eyler et al. 1993; Onishi and Recknagle 1997 and 1998). However, turbulent jets impinging on surfaces is an area where standard wall turbulence models used in TEMPEST have not been thoroughly tested. Since pulse jet mixers nozzles tend to be located near the tank bottom, it was determined that validation of TEMPEST for turbulent flows near surfaces was required. The choice of using the small-tank PJM system for this purpose was driven by our need to measure the time dependent near-wall (or surface) velocities generated by a pulse tube mixer in a simple, highly controllable environment.

7.2 Objectives

The objectives of the small-tank tests were to demonstrate that the turbulence models in TEMPEST capture the near-wall fluid flow behavior and to validate the moving surface model and the pulse cycle logic of the PJM model.

7.3 Approach

The flow field in this test was intended to be symmetric (2-dimensional) as much as possible with a well-known nozzle velocity variation with time. The velocity measurement locations were primarily focused on areas where the flow direction was expected to be parallel to the surfaces and the flow magnitudes measured by the HFA sensors are most accurate. Velocity measurements were also made at a few regions within the tank interior where there was a significant concern regarding the accuracy of the probes due to the highly recirculating nature of the flow in these regions. There is no precise way to quantify the exact magnitude of the errors within this region, and therefore, comparisons of test data with TEMPEST predictions are only presented in regions where the flow direction is well known.

7.4 Model Input Parameters

The input parameters needed for the simulations are the dimensions of the system and the nozzle velocities. The test conditions for the small-tank hydrodynamic tests have been discussed previously and listed in Table 5.2. The nozzle velocities were determined from the measured cycle-averaged level change of the liquid in the pulse tube (cf. Figure 5.6) and are presented in Figure 7.1.

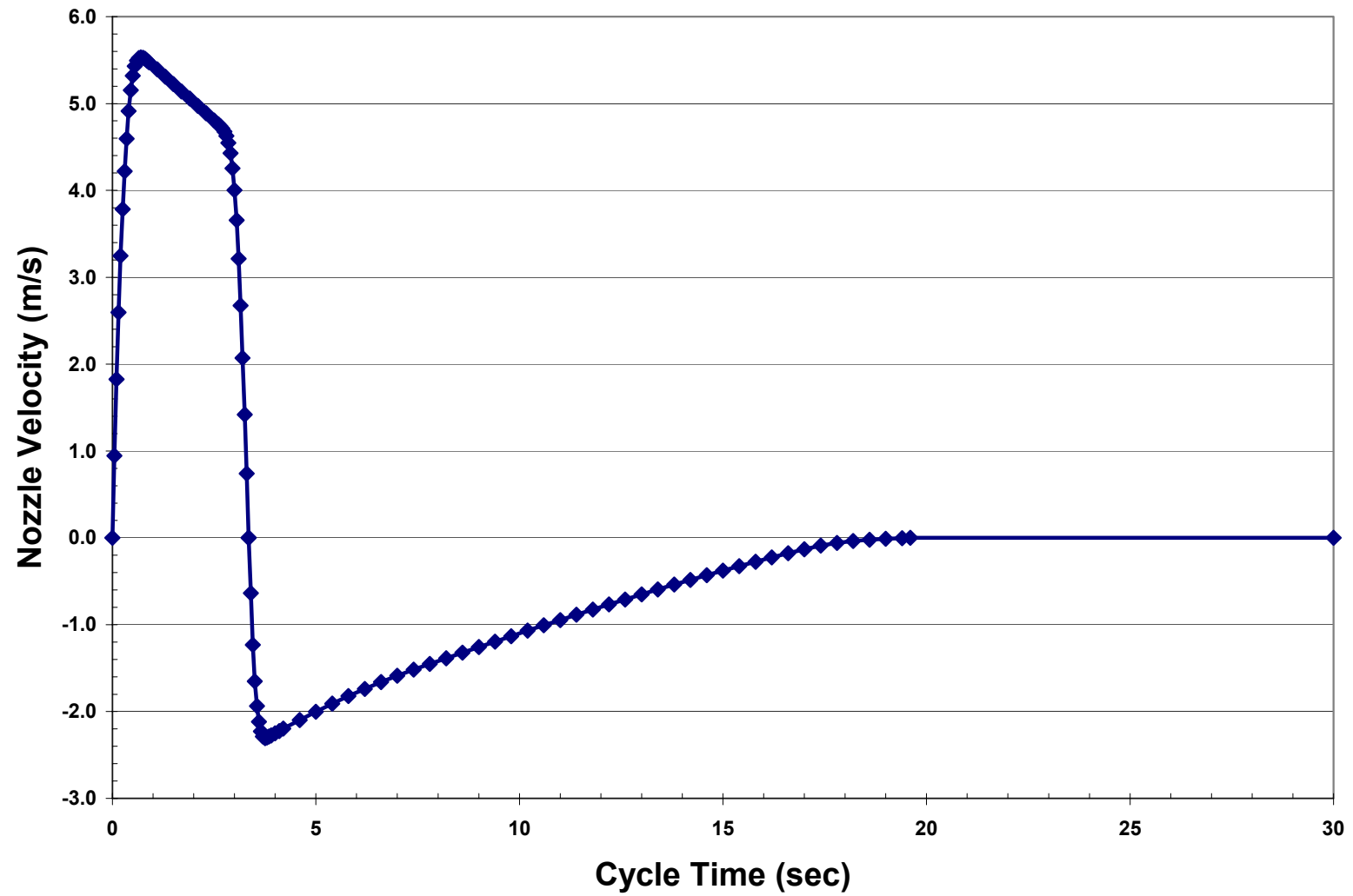


Figure 7.1. Nozzle Velocities Computed from the Liquid Level Change in the Small-Tank Pulse Tube

7.5 Model Setup

The TEMPEST 2-dimensional model was made up of 69 radial nodes and 69 vertical nodes with an initial liquid height of 1.245 m (49 in). The grid used is shown in Figure 7.2. The TEMPEST simulation using the nozzle velocity profile (shown in Figure 7.1) was repeated for several cycles until a near steady-state condition was achieved. In the simulation, the standard k- ϵ turbulence model was used.

7.6 Results and Discussion

A schematic of the measurement locations for the small-tank test is presented in Figure 7.3. The green shaded area represents the regions where the flow direction is expected to be parallel to the surfaces. The red shaded area represent the areas where the flow is turning and is expected to be extremely chaotic. The gray shaded area represents the tank interior regions where there is significant concern regarding the accuracy of measurement with the HFA probes. Therefore, only the data measurements from the green regions were compared to TEMPEST predictions. The discussion of the comparison of the data with model predictions is provided in two parts: 1) radial velocity comparisons near the tank-floor and 2) vertical velocity comparisons near the tank-wall.

7.6.1 Near-Floor Radial Velocity Comparisons

The first comparisons are located at a radial distance of 0.1905 m (7.5 in). Three vertical levels were investigated at this radial location: 0.0064, 0.0159, and 0.0222 m (0.25, 0.625, and 0.875 in) from the tank bottom. The comparisons are presented in Figure 7.4. The solid lines represent the TEMPEST predictions, and the symbols represent the experimental data. Error bars on the experimental data represent the fluctuation in the measurements over the multi-cycle averaging period. In this and all other discussions below, the error bars represent 2σ ; where σ at each time step is the standard deviation calculated from the velocity values of 12 cycles.

In Figure 7.4 at the 0.191 m (7.5 in) radial location, the TEMPEST predictions match very well with the experimental data. From 4.0 to 10.0 seconds, there are some differences between the model predictions and the experimental data. There are several factors that could contribute to these slight differences. First, the tank is not perfectly round, the diameter varies from a minimum of 0.846 m (33.3 in) to a maximum of 0.876 m (34.5 in); an average diameter of 0.864 m (34 in) was used in the simulations. This could contribute to azimuthal flow, which is not considered in our two-dimensional axisymmetric model. Second, there is some uncertainty in the probe position, which is estimated to be about $\sim \pm 1.59\text{E-}03$ m ($\sim \pm 1/16$ in). The third factor is that all cycles are not perfectly identical; in a typical 20-cycle run consisting of ~ 0.584 m (~ 23 in) of liquid in the pulse tube discharged, the average variation of the level in the pulse tube is $\sim \pm 4.57\text{E-}03$ m ($\sim \pm 0.18$ in) and the maximum is $\sim \pm 6.35\text{E-}03$ m ($\sim \pm 0.25$ in).

The comparisons at a radial location of 0.241 m (9.5 in) at the same three vertical locations are presented in Figure 7.5. The predictions once again were found to match the experimental data very well. The thickness of the high flow region is predicted to be somewhat thinner than the data, however, this is consistent with the sources of experimental error discussed above.

The comparisons at a radial location of 0.292 m (11.5 in) (again, the same three vertical locations) are presented in Figure 7.6. At this location, the measured magnitudes were over-predicted by up to 50%. It is not fully understood why the predictions were so far off when the downwind vertical velocity comparisons were very close (as will be discussed in the next section), the model matched the experimental data extremely well at a location just $5.08\text{E-}02$ m (2 in) away, and also the change in the velocity between this and the previous radial-location seemed to be too large. For example, at the $6.35\text{E-}03$ m (0.25 in) vertical position, the measured cycle-averaged maximum velocity decreases by 0.5 m/s when the probe was changed from 0.241 m (9.5 in) to the 0.292 m (11.5 in) radial position. For the same vertical location, the decrease in the measured cycle-average maximum velocity was ~ 0.05 m/s when the probe was changed from 0.191 m (7.5 in) radial position to the 0.241 m (9.5 in) radial position. It is believed that, in addition to the various issues associated with the experiments discussed above, the discrepancy is due to an asymmetry in the tank floor at that measurement location due to the non-uniformity of the tank floor.

The last comparisons were at a radial location of 0.394 m (15.5 in), (again, the same three vertical locations) is presented in Figure 7.7. The experimental data illustrate that the measured standard deviations are on the same order of magnitude as the measured velocities. Also, the velocities at the $1.59\text{E-}02$ m (0.625 in) are much higher than those at the lower elevation of $6.35\text{E-}03$ m (0.250 in) (counter intuitive). This is because the flow in this region is turning upward due to the presence of the tank-wall and is, therefore, extremely chaotic. Because of this reason and because of the possible large errors in the velocity measurements, this region was not considered useful for validation of the TEMPEST CFD model.

7.6.2 Vertical Velocity Comparisons

The comparisons of vertical velocity were made at radial positions of 0.381, 0.394, and 0.406 m (15.0, 15.5, and 16.0 in), which correspond to $5.08\text{E-}02$, $3.81\text{E-}02$, and $2.54\text{E-}02$ m (2.0, 1.5, and 1.0 in) from the tank wall. At each radial position, results are compared for every $2.54\text{E-}02$ m (1.0 in) starting with $2.86\text{E-}02$ m (1.125 in) until 0.511 m (20.125 in).

Comparisons of vertical velocity at a radial distance of 0.406 m (16.0 in), ($2.54\text{E-}02$ m [1.0 in] from the wall) for the different vertical levels are provided in Figures 7.8 through 7.23. In order to illustrate the change in the velocity magnitude with elevation, all the graphs were scaled to the maximum velocity of ~ 0.8 m/s observed in this radial location. At this radial location, Figures 7.8 to 7.19 illustrate that the model predictions match extremely well with the experimental data at all of the vertical levels with the exception of the last four levels shown in Figures 7.20 to 7.23. The differences at these levels was due to the fact that the TEMPEST model predicts that the flow at the wall travels about $5.08\text{E-}02$ m (2 in) higher than the experimental data. This prediction is well within what could be expected, considering the various issues associated with the experiments discussed above that would tend to decrease the upward flow near the tank wall.

The set of comparisons at a radial location of 0.394 m (15.5 in) ($3.81\text{E-}02$ m [1.5 in] from the tank wall) are displayed in Figures 7.24 through 7.39. The comparisons are mostly very good, although there are some differences in the comparisons for the vertical locations corresponding to $5.40\text{E-}02$ to 0.130 m (2.125 to 5.125 in) from the tank bottom. This region represents an area where the flow is very chaotic as

the direction changes from radial to vertical flow. Overall, the comparisons are believed to be very good at this radial location.

As discussed above, measurements were also taken at 0.381 m (15.0 in), (5.08E-02 m [2.0 in] from the tank wall). These results are shown in Figure 7.40 to 7.54. It can be seen from these figures that although the predictions are generally very good; the experimental measurements were generally higher than the predictions at this radial location. It is believed that this location is very near the edge of the layer of flow up the wall making the exact probe location placement extremely important, since a small variation would make a large difference near the layer edge. In addition, it is difficult for a CFD code to match data from such a region without resorting to extremely fine grid requirements.

7.6.3 Free Surface Model and PJM Logic Validation

The TEMPEST code tracks the predicted rise and fall of the free surface as a function of time. The results from the TEMPEST predictions indicated that our model worked correctly and conserved mass accurately. The majority of the velocity predictions were in very good agreement with data and the flow field predictions from cycle to cycle became very uniform after approximately 3 cycles of PJM operation, which validates the PJM logic in our model

7.7 Conclusions and Recommendations

Given the inevitable experimental errors described above, the results show that the turbulence models in TEMPEST adequately describe the near-wall fluid flow behavior in the small-tank system. In a majority of the cases where comparisons were made, the model predictions were within the 10% criteria for validation discussed in Section 2.0. For the few cases where the errors were larger than 10%, the differences are attributed to the experimental errors and slight asymmetries in the tank.

The match between the model predictions and the experimentally measured velocity profiles near the tank-floor and the tank-wall regions suggests that the TEMPEST PJM model captures the hydrodynamic flow behavior in previously untested flow regimes.

Given the success of this test, it is recommended that the small-tank test stand also be used to validate the PJM model under operating conditions where stratification and solids buildup in the vessel since these can be visually recorded.

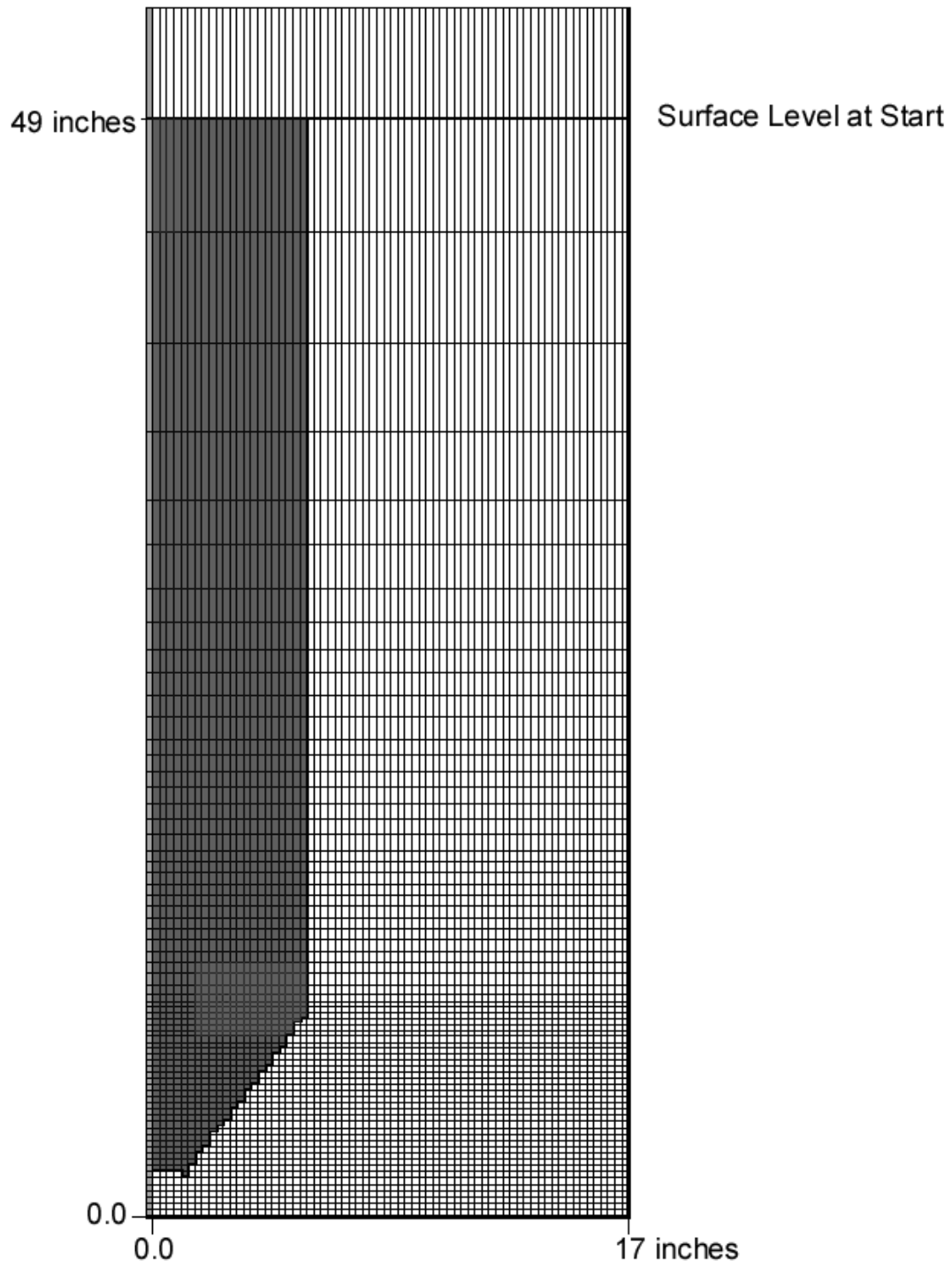


Figure 7.2. Grid Used for the TEMPEST Simulation of the Small-tank Hydrodynamic Experiments

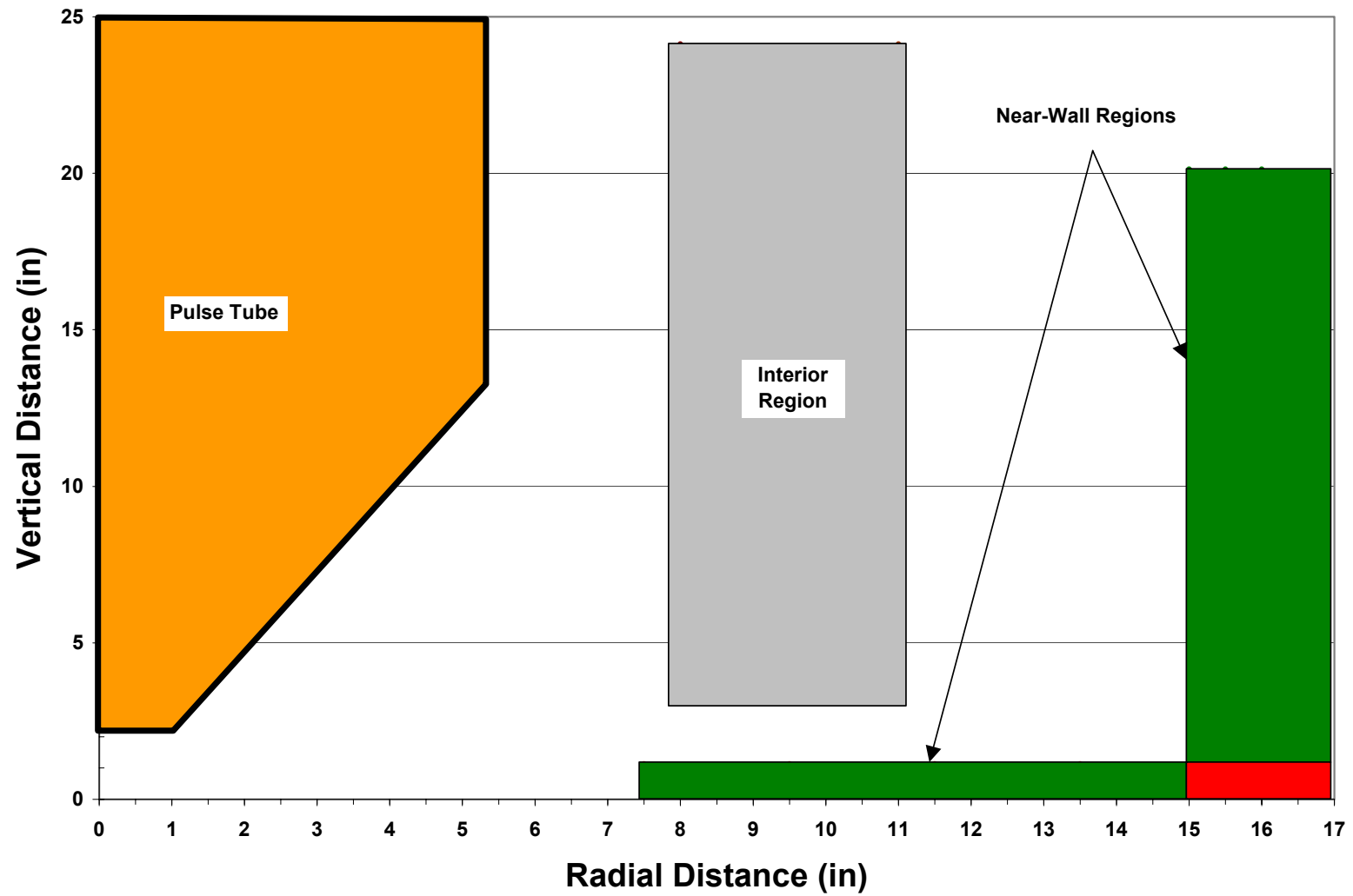


Figure 7.3. Velocity Mapping Locations in the Small-tank PJM Test Stand and Area's of Importance for the Comparison with TEMPEST Model Predictions

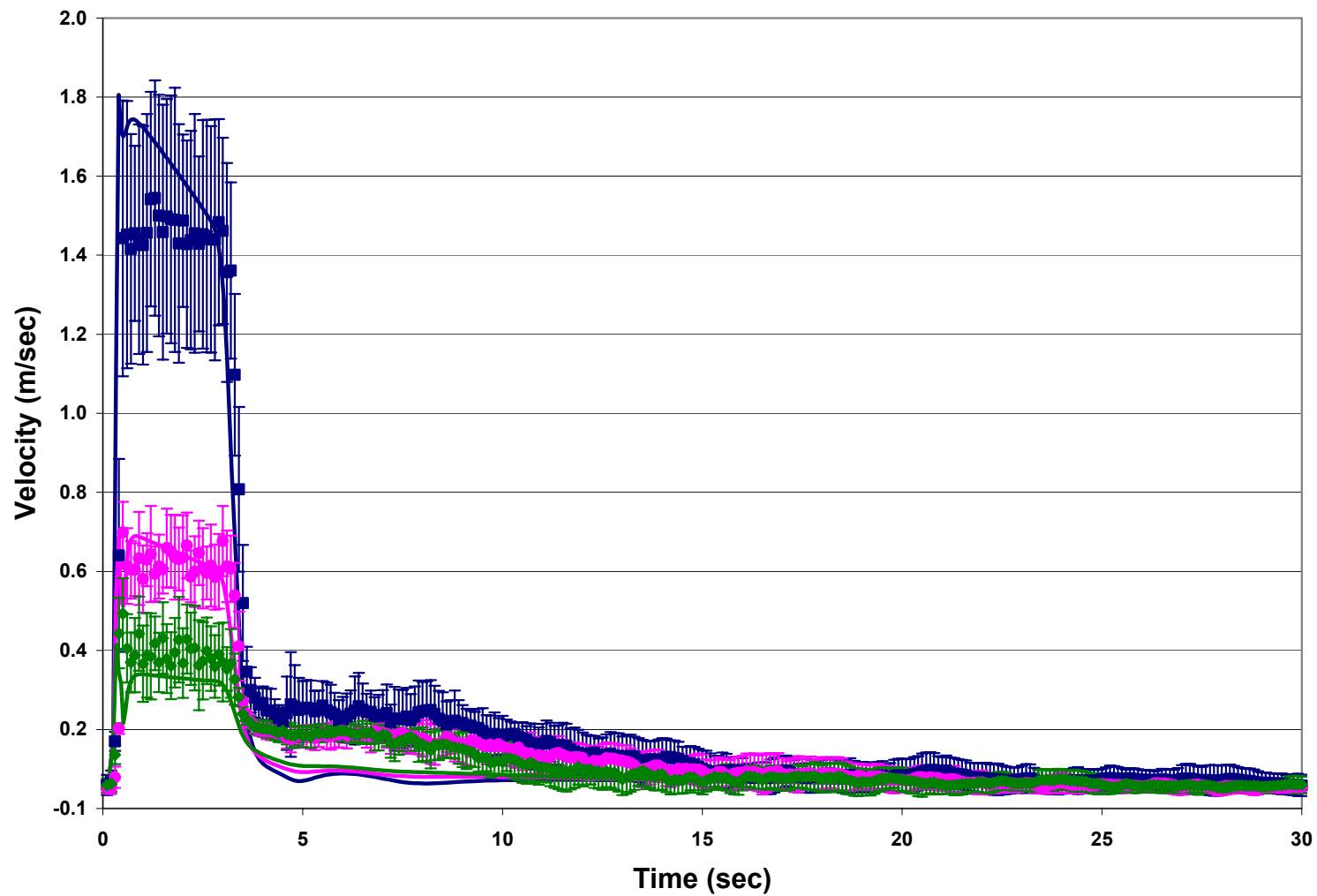


Figure 7.4. Experimentally Measured Velocities and Model Predictions at the 0.191 m (7.5 in) Radial Position and Different Elevations; ■ : —, ♦ : —, ● : —, Respectively Represent the Experimental and Model Predictions at 6.35E-03, 1.59E-02, and 2.22E-01 m (0.250, 0.625, and 0.875 in) Elevations

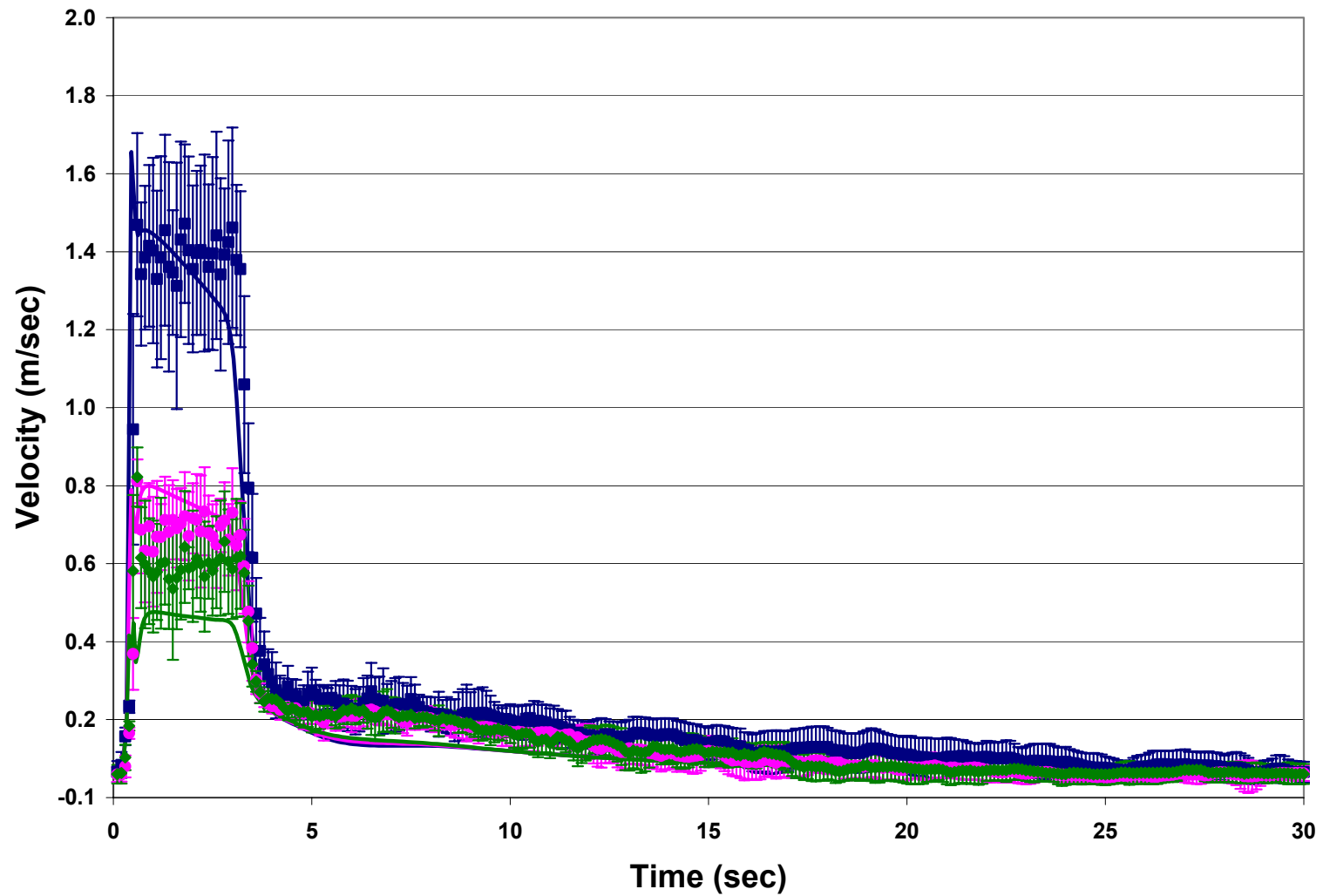


Figure 7.5. Experimentally Measured Velocities and Model Predictions at the 0.191 m (9.5 in) Radial Position and Different Elevations; ■ : —, ♦ : —, ● : —, Respectively Represent the Experimental and Model Predictions at 6.35E-03, 1.59E-02, and 2.22E-02 m (0.250, 0.625, and 0.875 in) Elevations

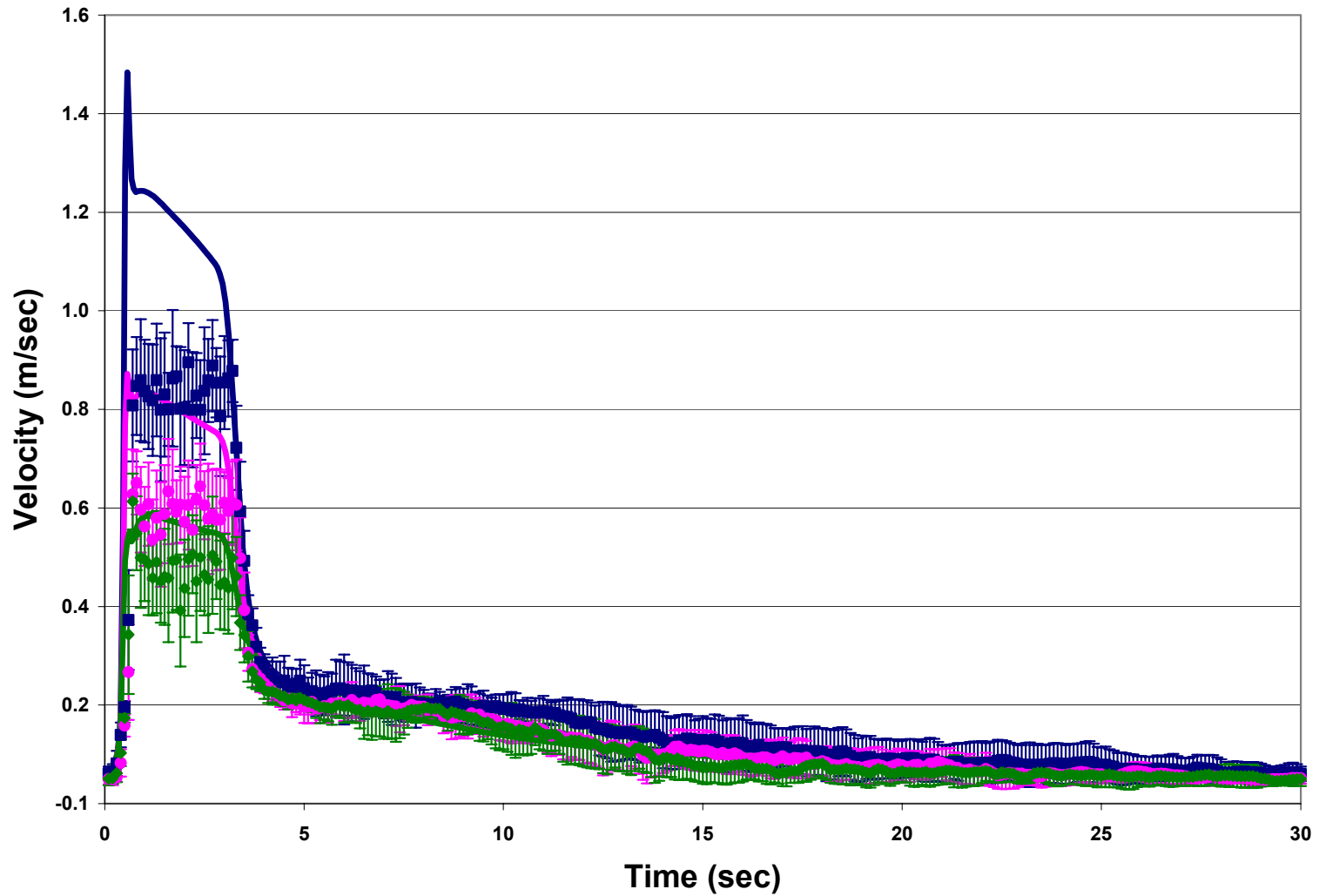


Figure 7.6. Experimentally Measured Velocities and Model Predictions at the 0.292 m (11.5 in) Radial Position and Different Elevations; ■ : —, ♦ : —, ● : —, Respectively Represent the Experimental and Model Predictions at 6.35E-03, 1.59E-02, and 2.22E-02 m (0.250, 0.625, and 0.875 in) Elevations

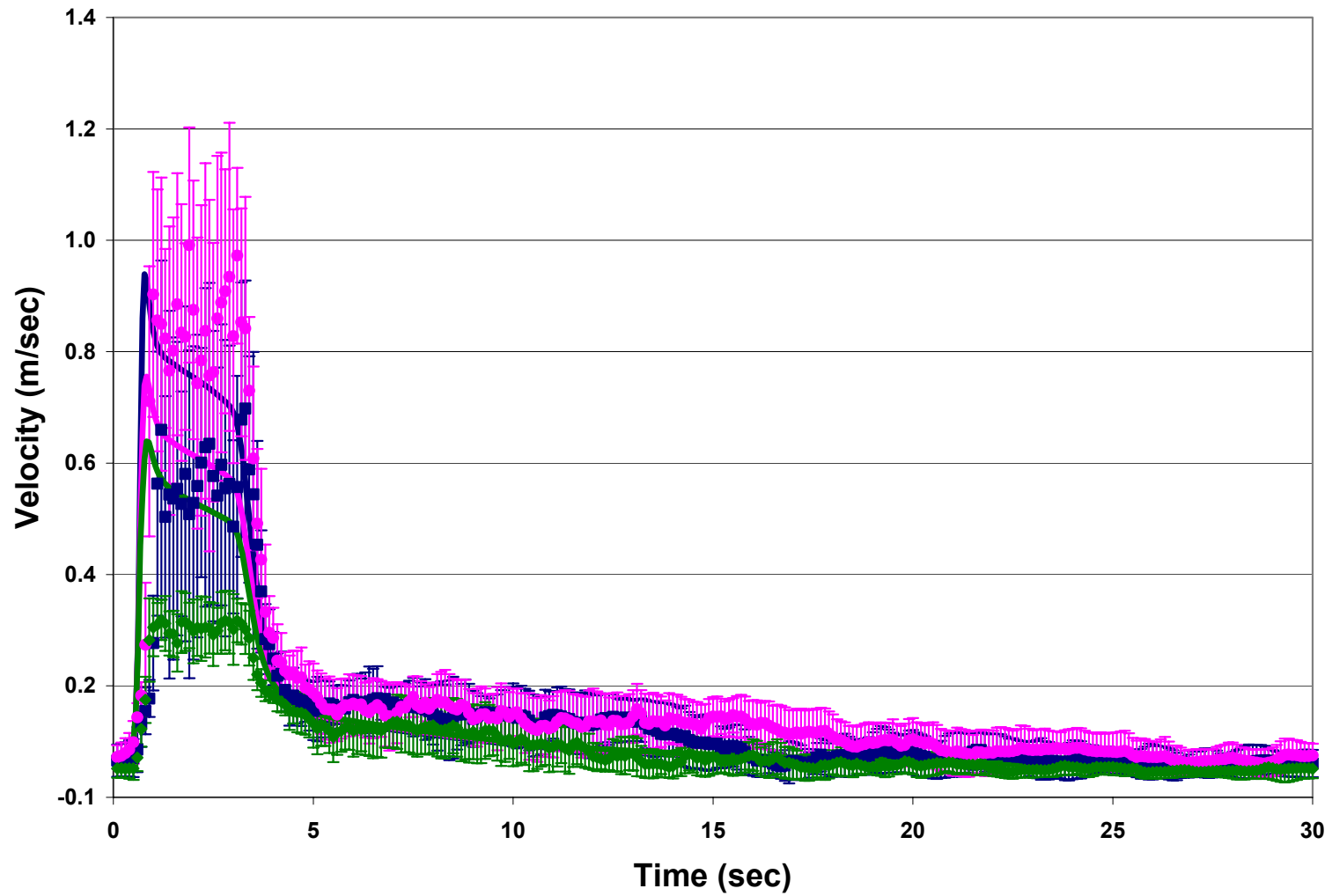


Figure 7.7. Experimentally Measured Velocities and Model Predictions at the 0.394 m (15.5 in) Radial Position and Different Elevations; ■ : —, ♦ : —, ● : —, respectively represent the Experimental and Model Predictions at 6.35E-03, 1.59E-02, and 2.22E-02 m (0.250, 0.625, and 0.875 in) Elevations

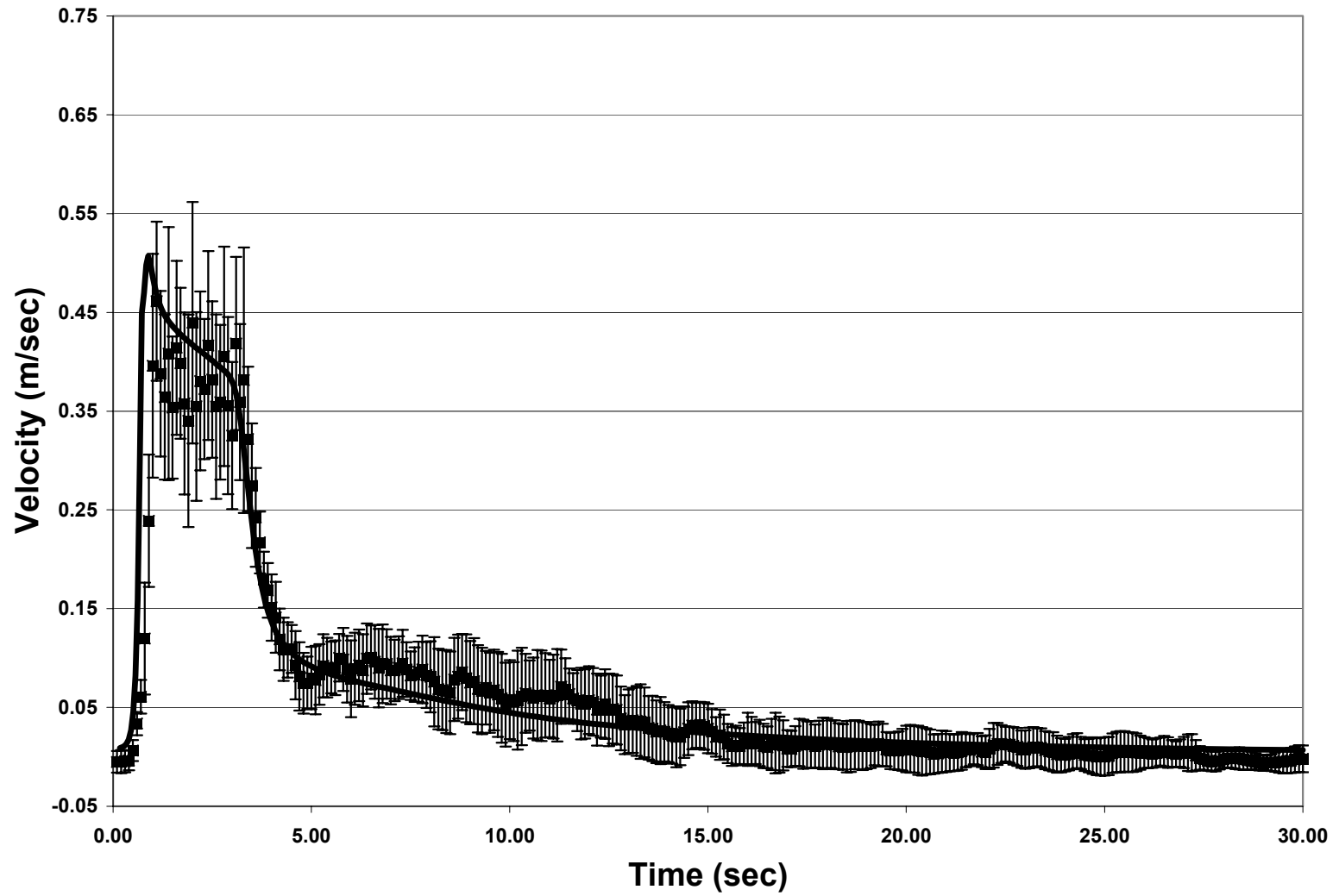


Figure 7.8. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 (16 in) Radial Position and 2.86E-02 m (1.125 in) Vertical Position

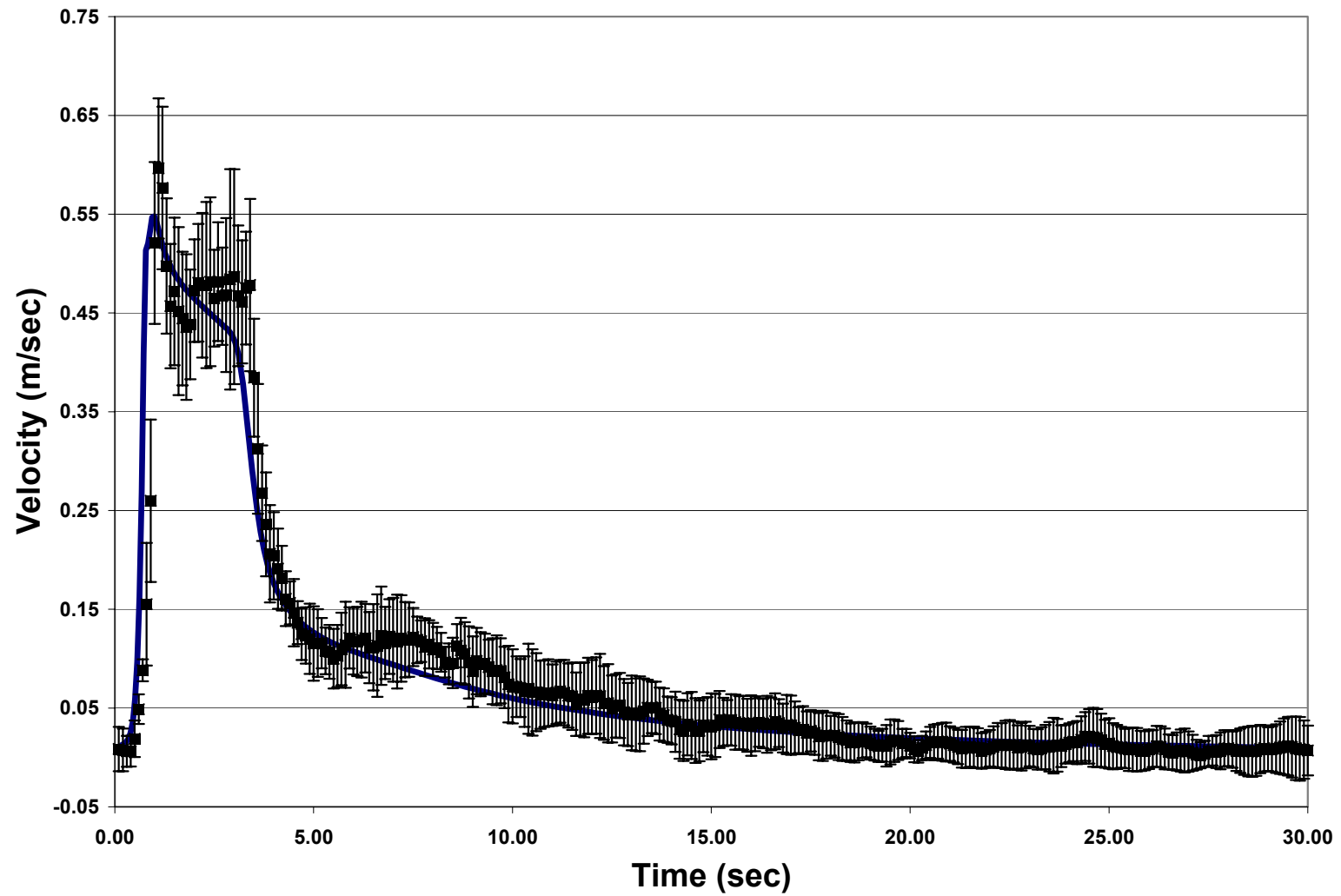


Figure 7.9. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 5.40E-02 m (2.125 in) Vertical Position

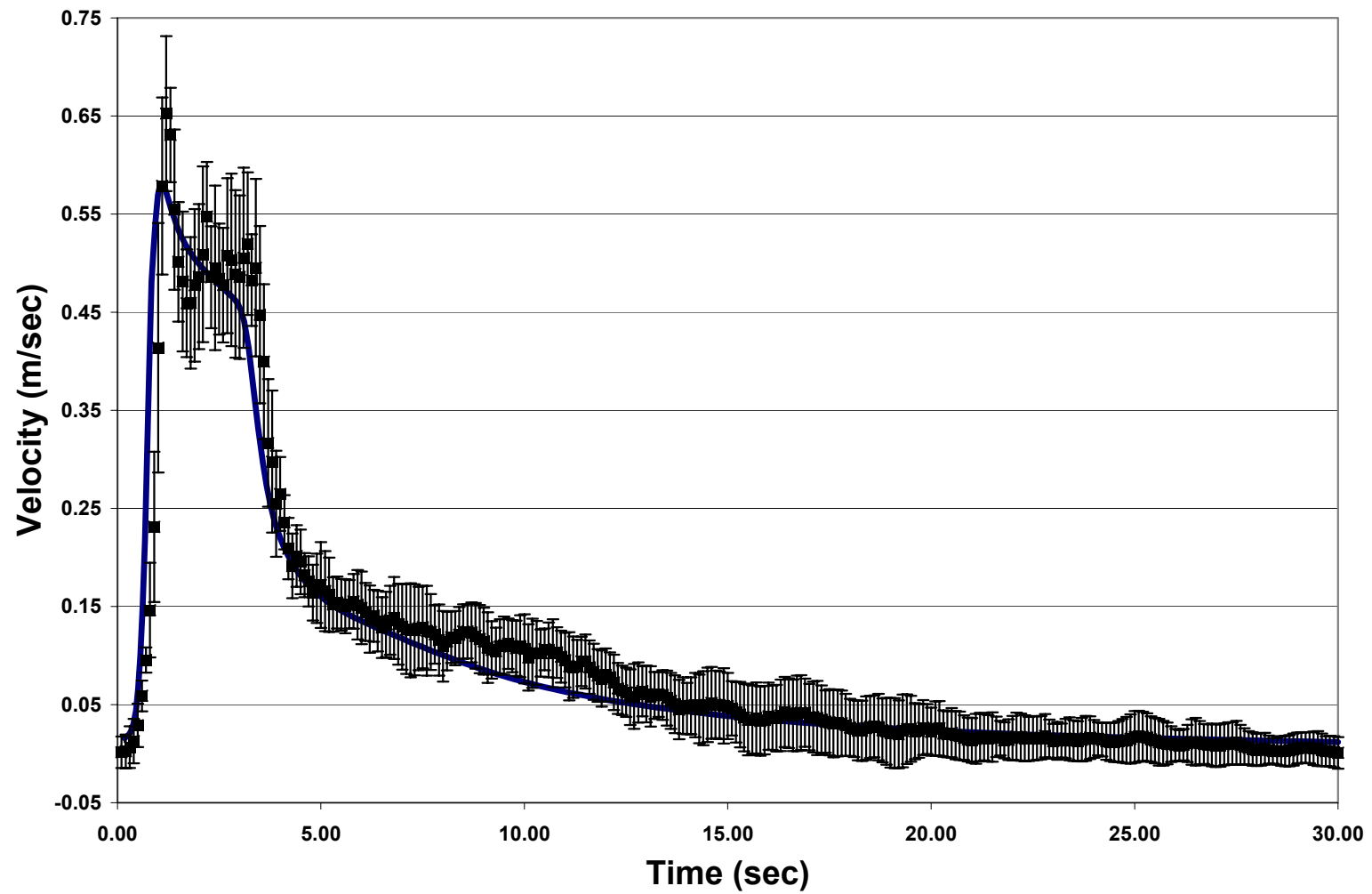


Figure 7.10. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 7.94E-02 m (3.125 in) Vertical Position

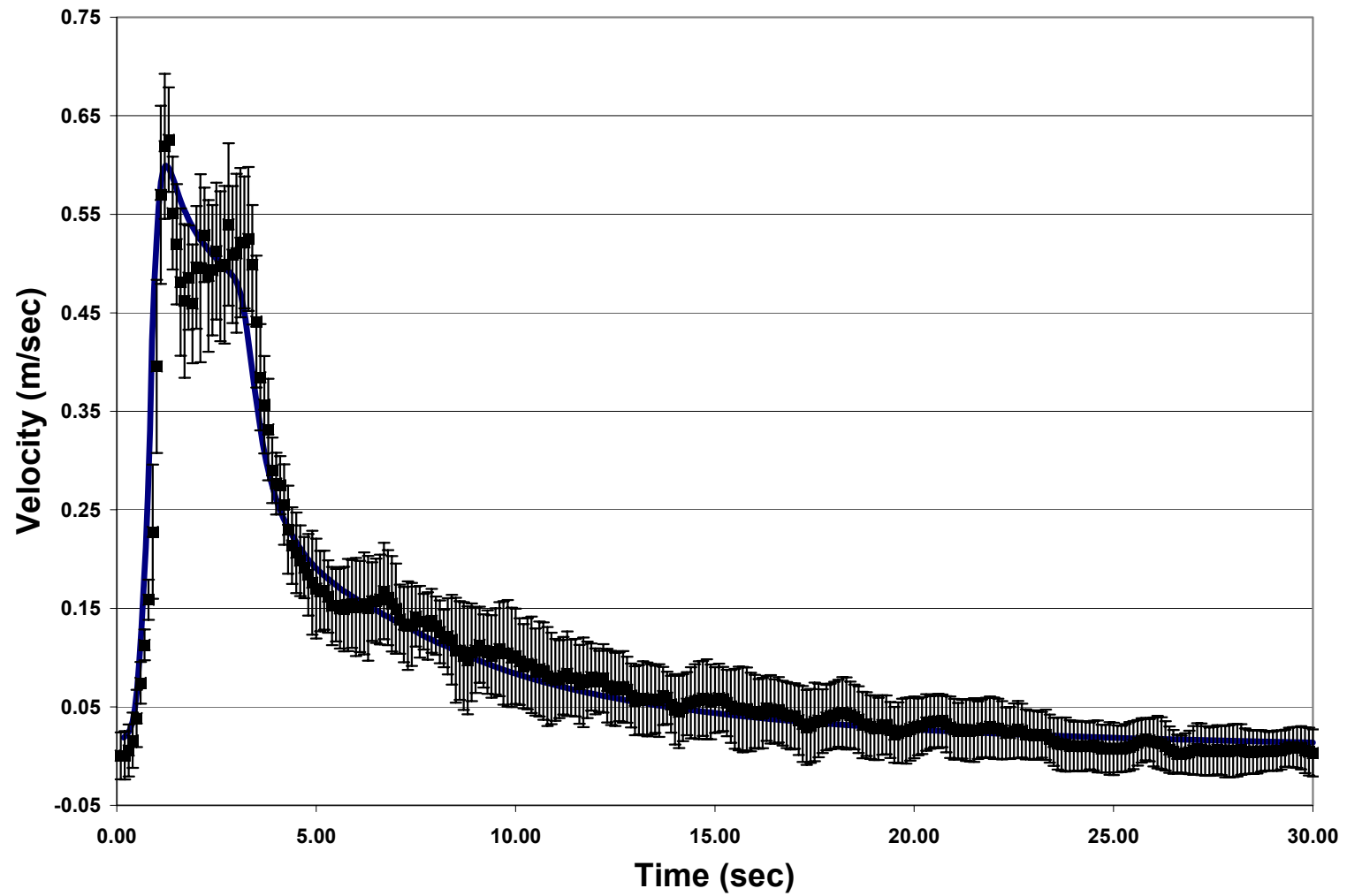


Figure 7.11. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.105 m (4.125 in) Vertical Position

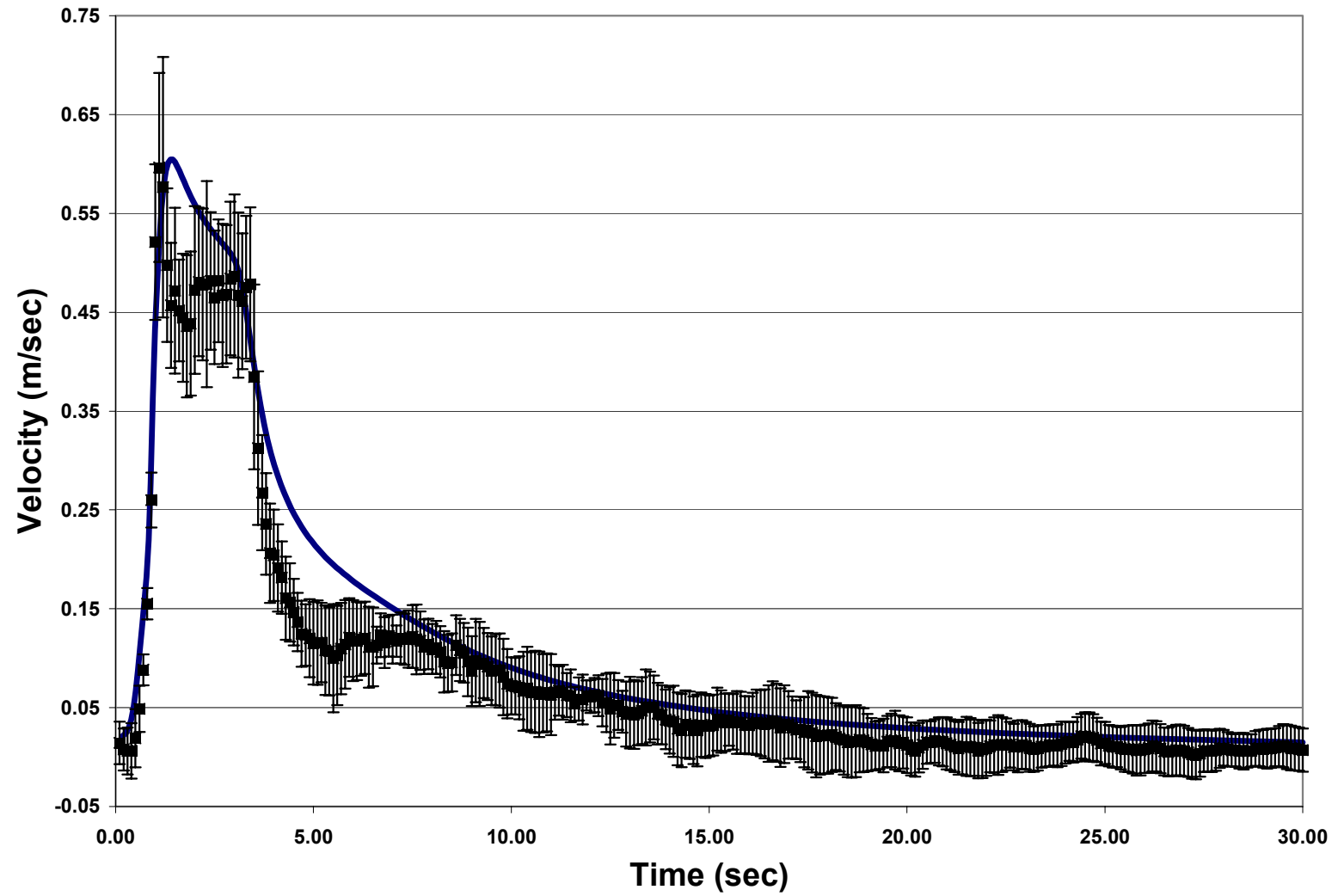


Figure 7.12. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.130 m (5.125 in) Vertical Position

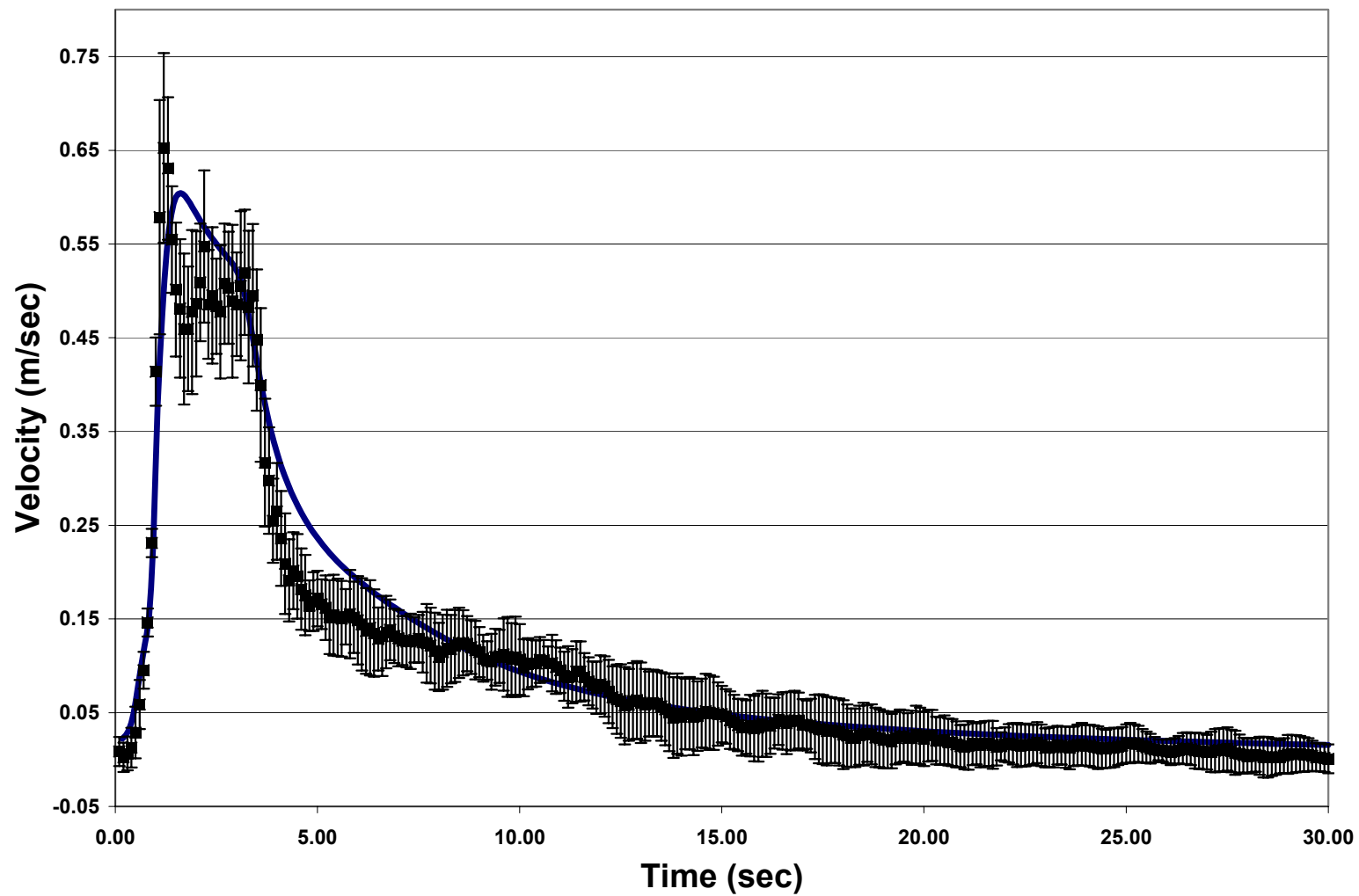


Figure 7.13. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.156 m (6.125 in) Vertical Position

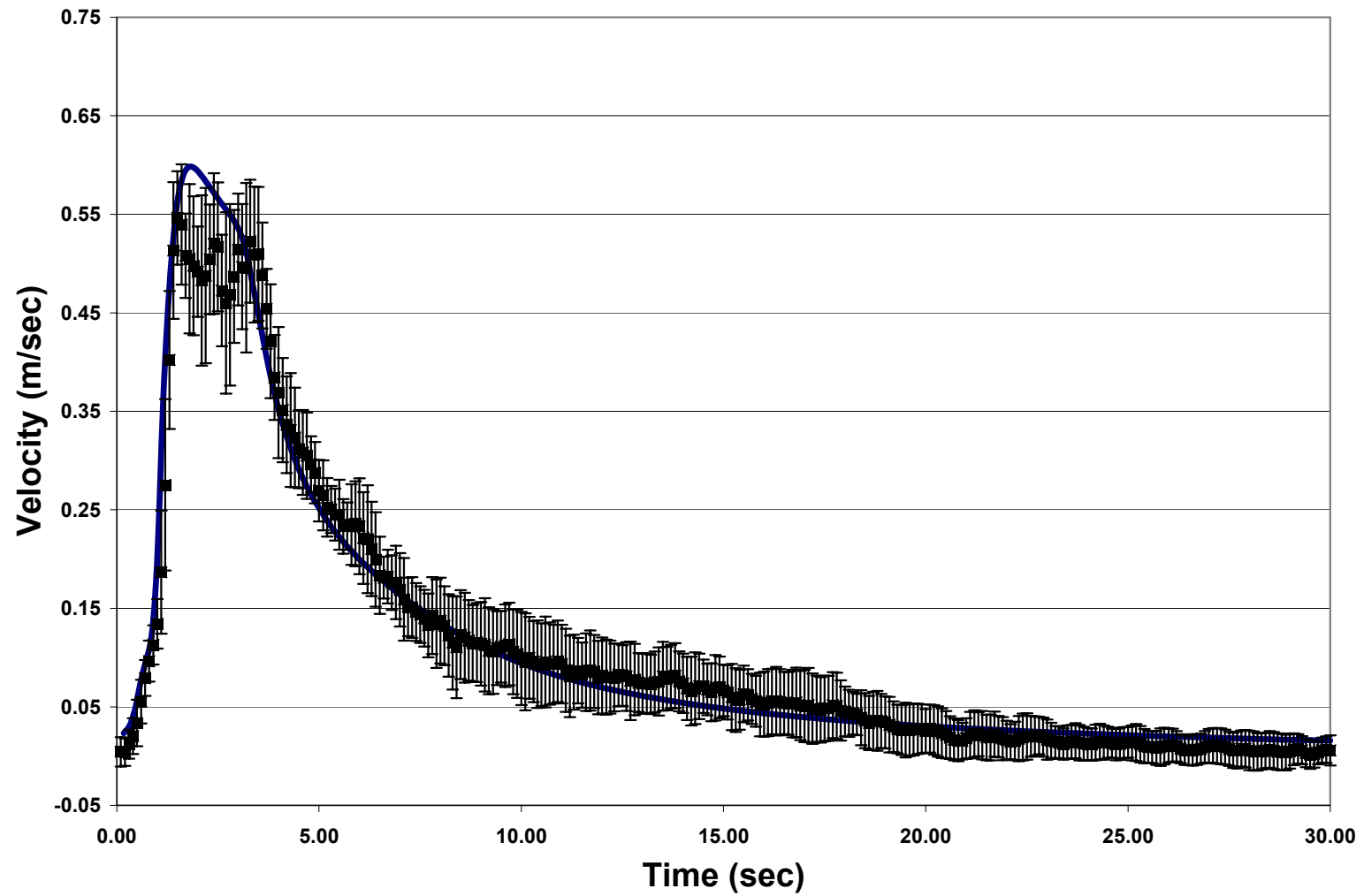


Figure 7.14. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.181 m (7.125 in) Vertical Position

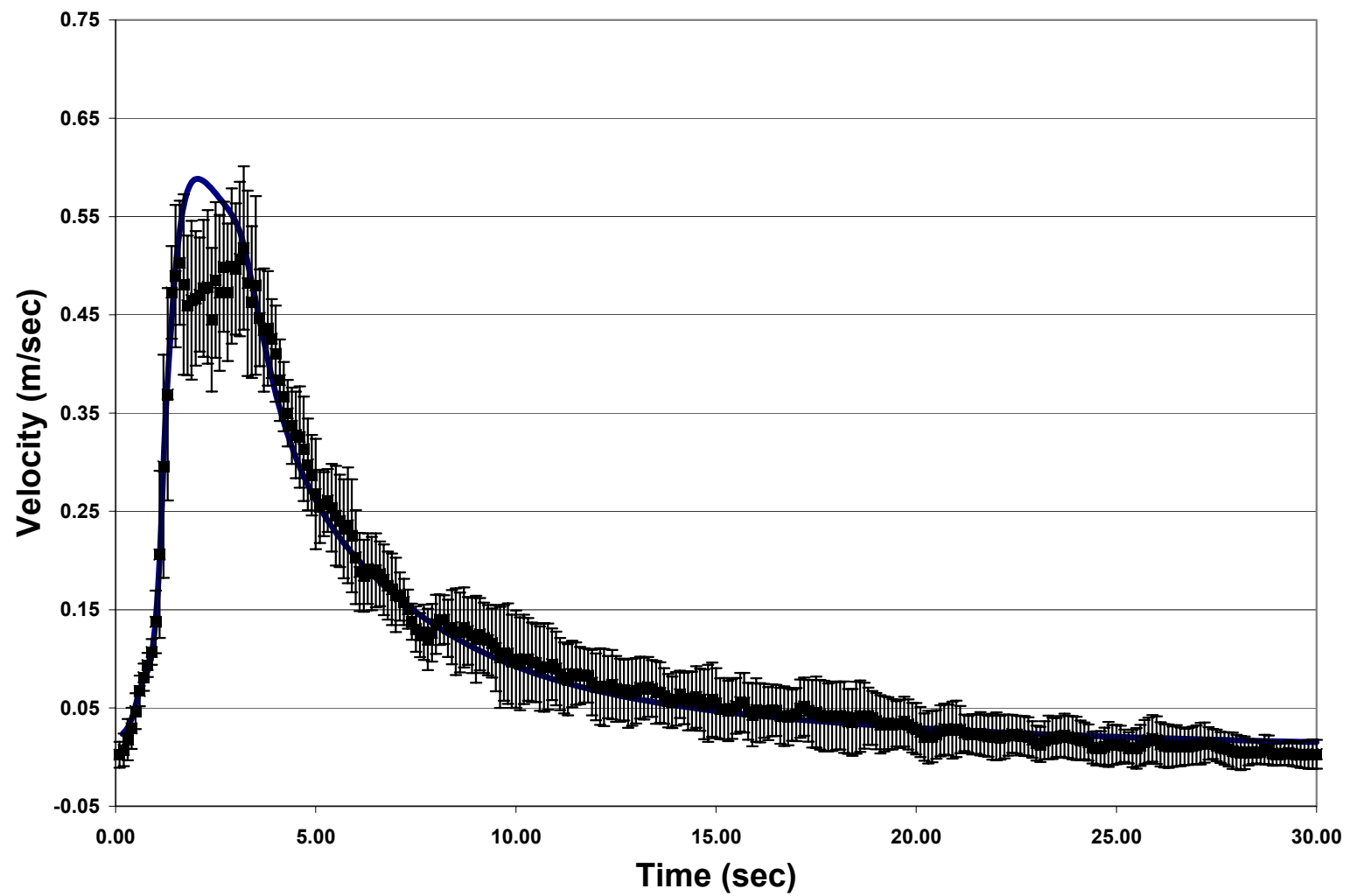


Figure 7.15. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.206 m (8.125 in) Vertical Position

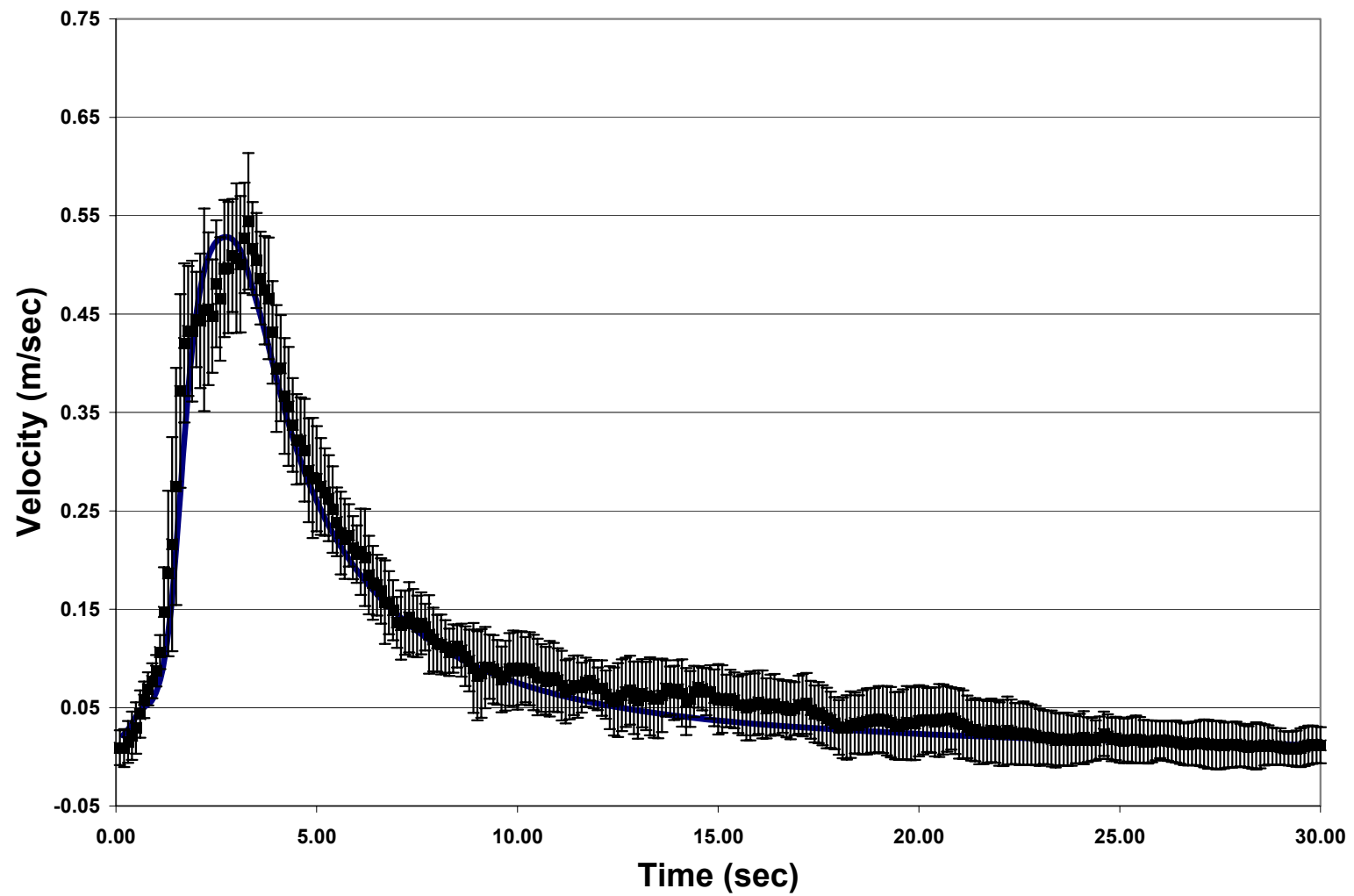


Figure 7.16. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.232 m (9.125 in) Vertical Position

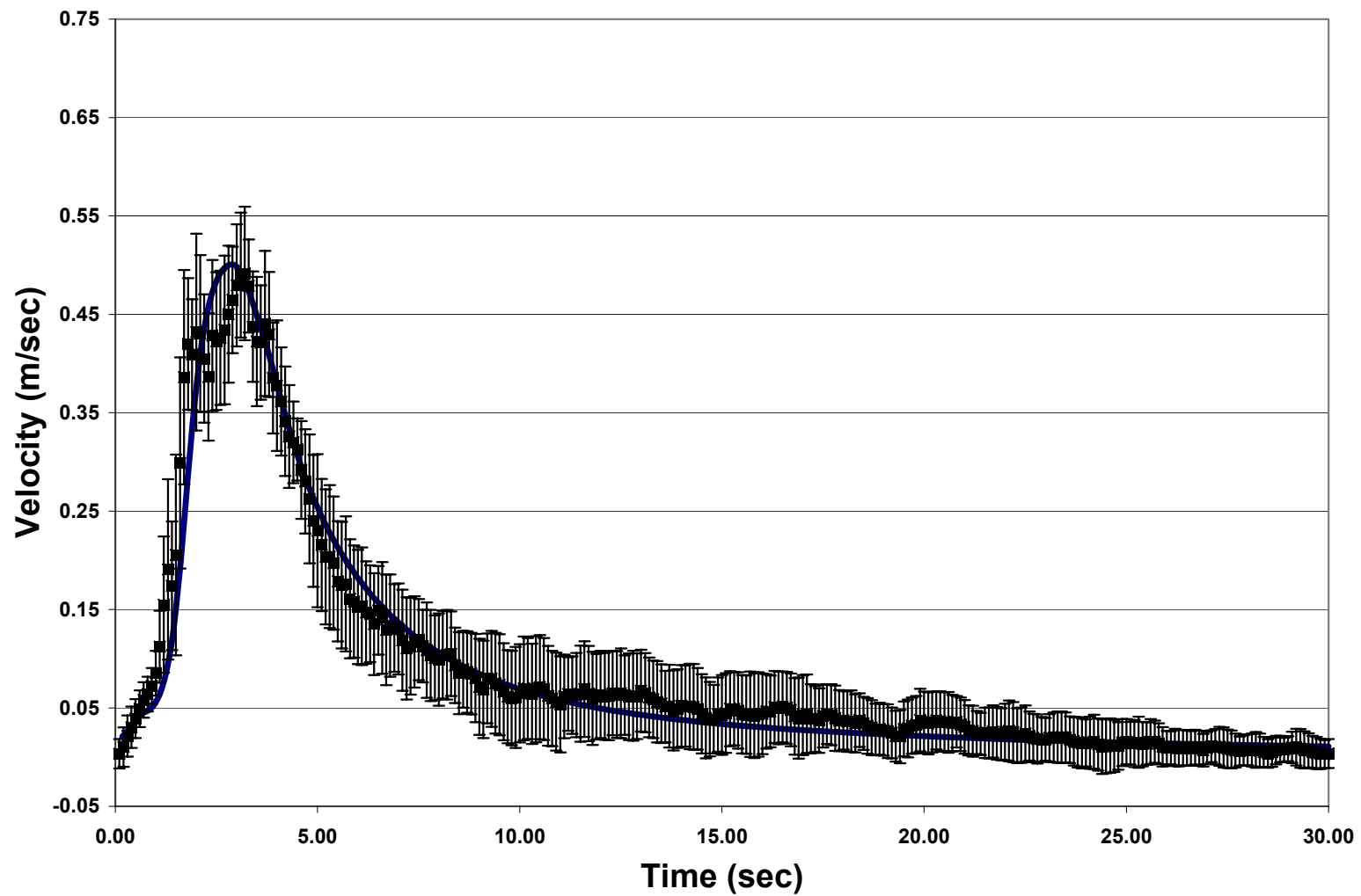


Figure 7.17. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.257 m (10.125 in) Vertical Position

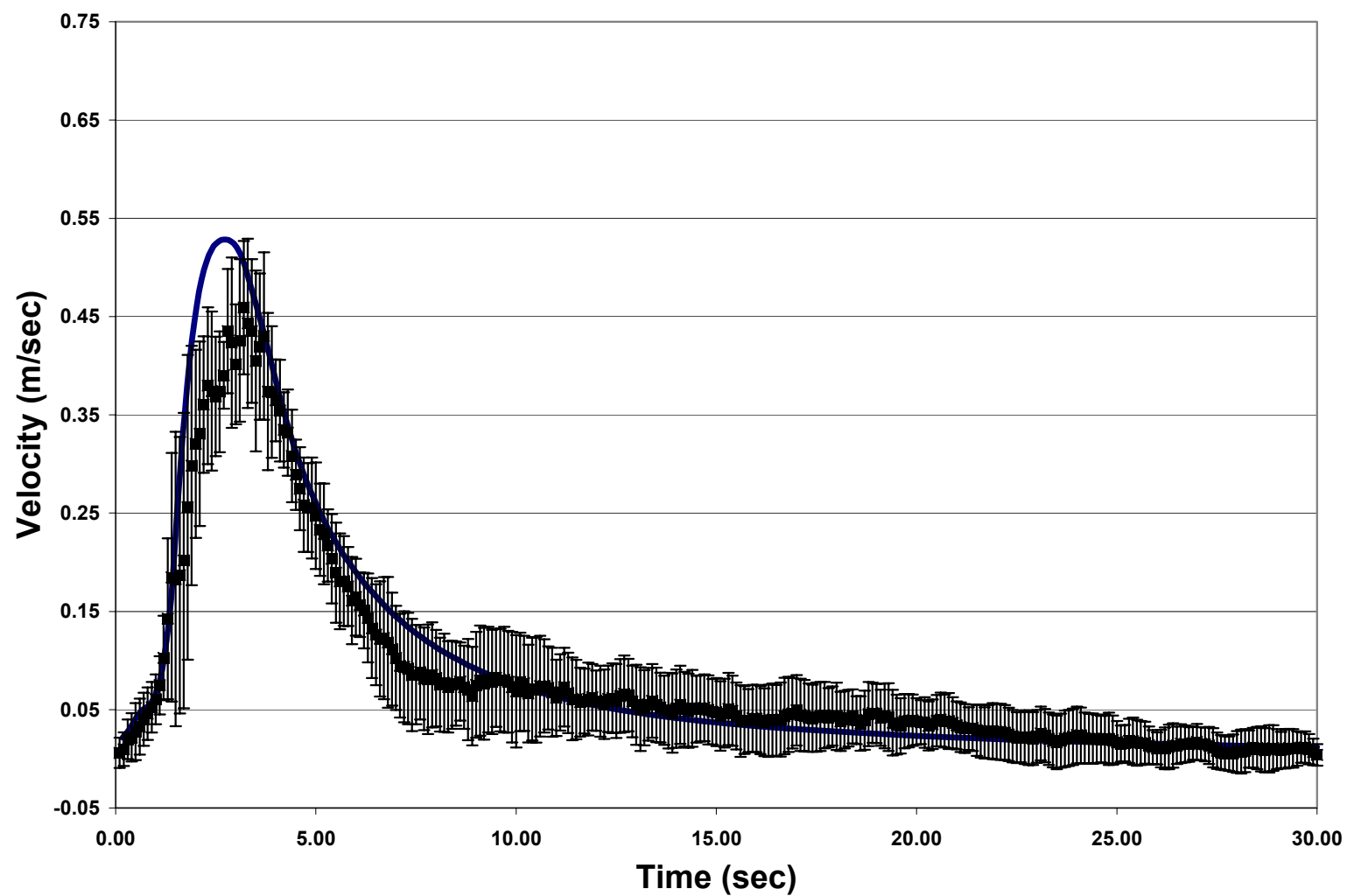


Figure 7.18. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.283 m (11.125 in) Vertical Position

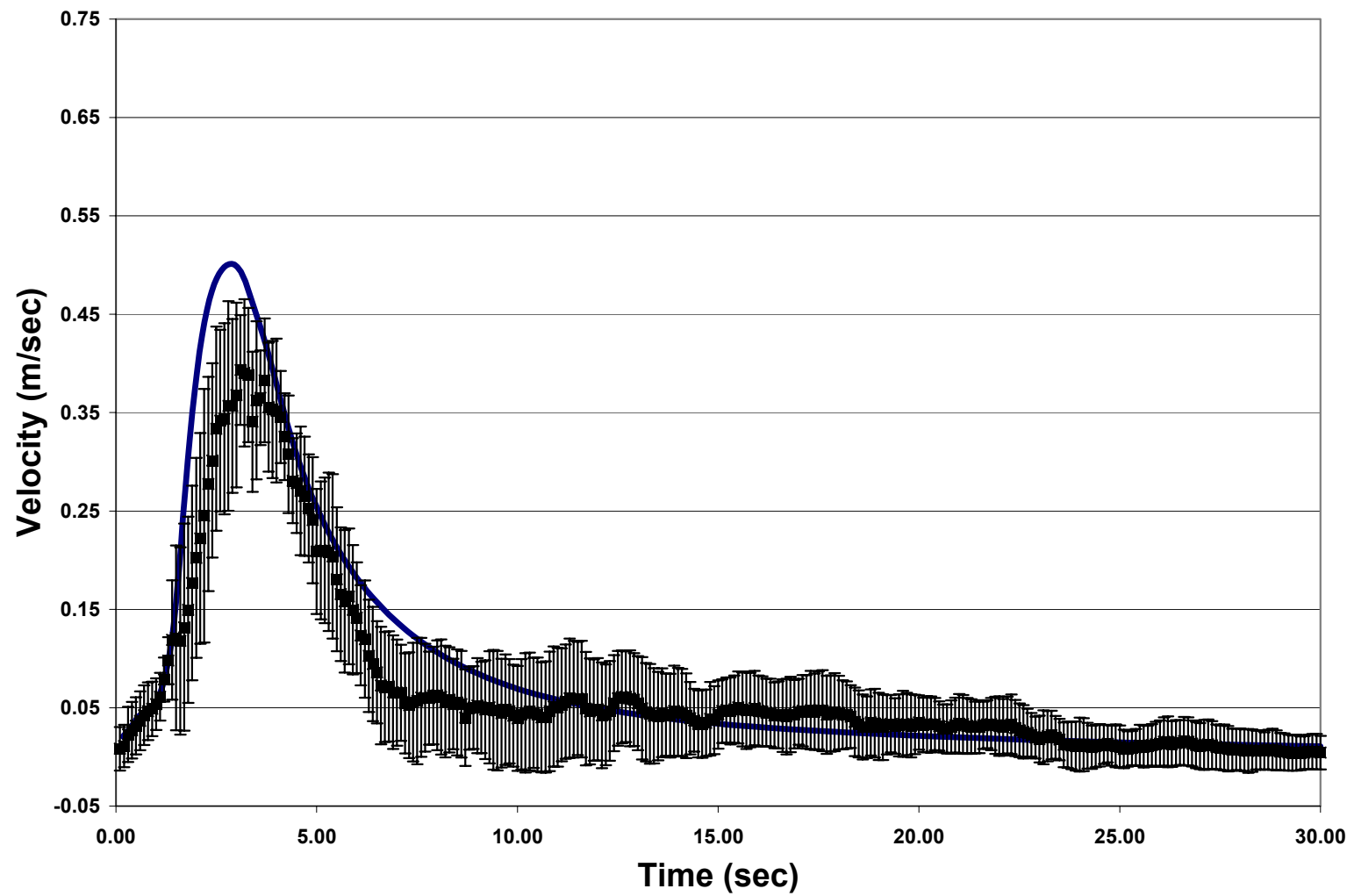


Figure 7.19. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.308 m (12.125 in) Vertical Position

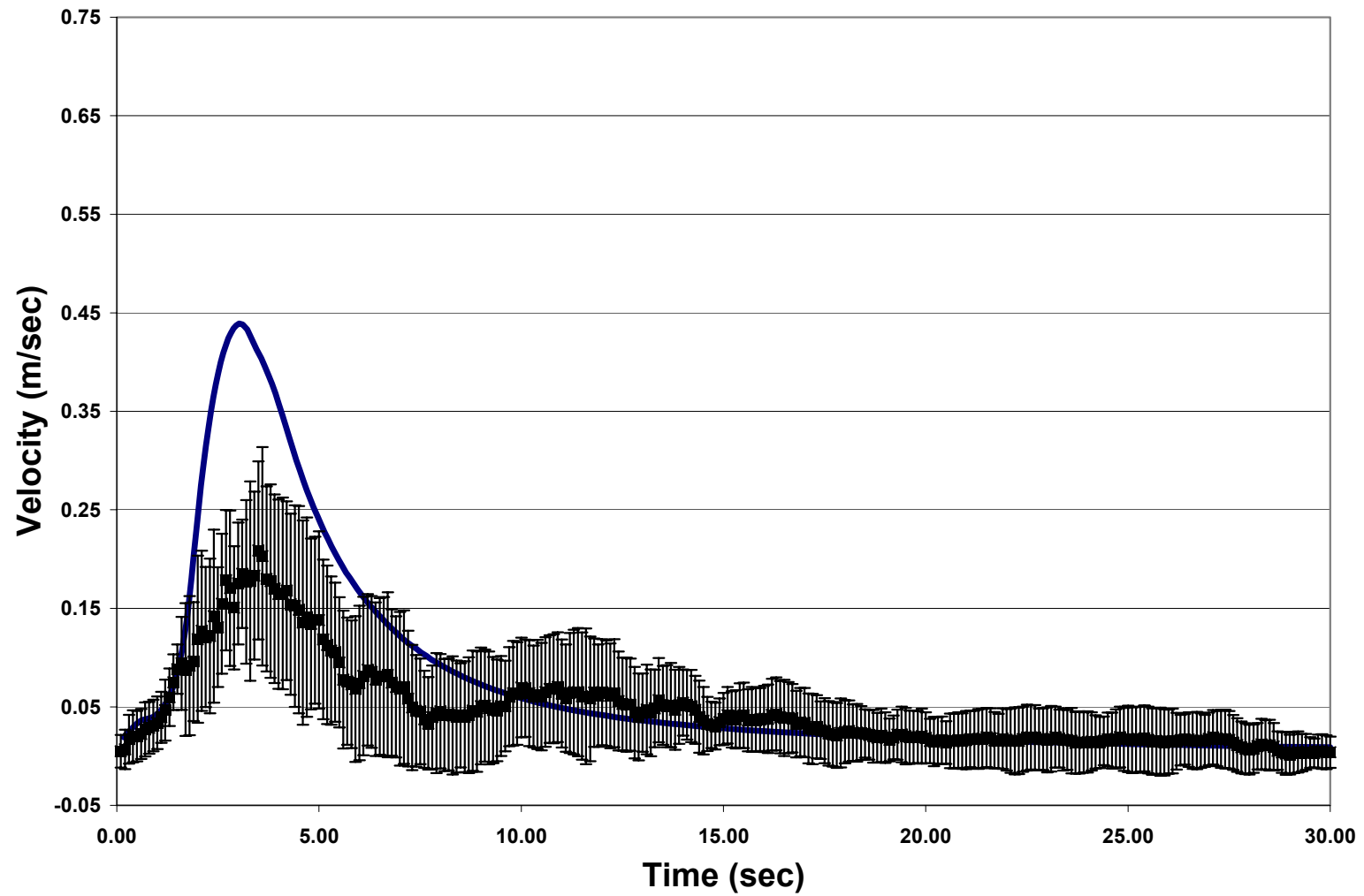


Figure 7.20. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.359 m (14.125 in) Vertical Position

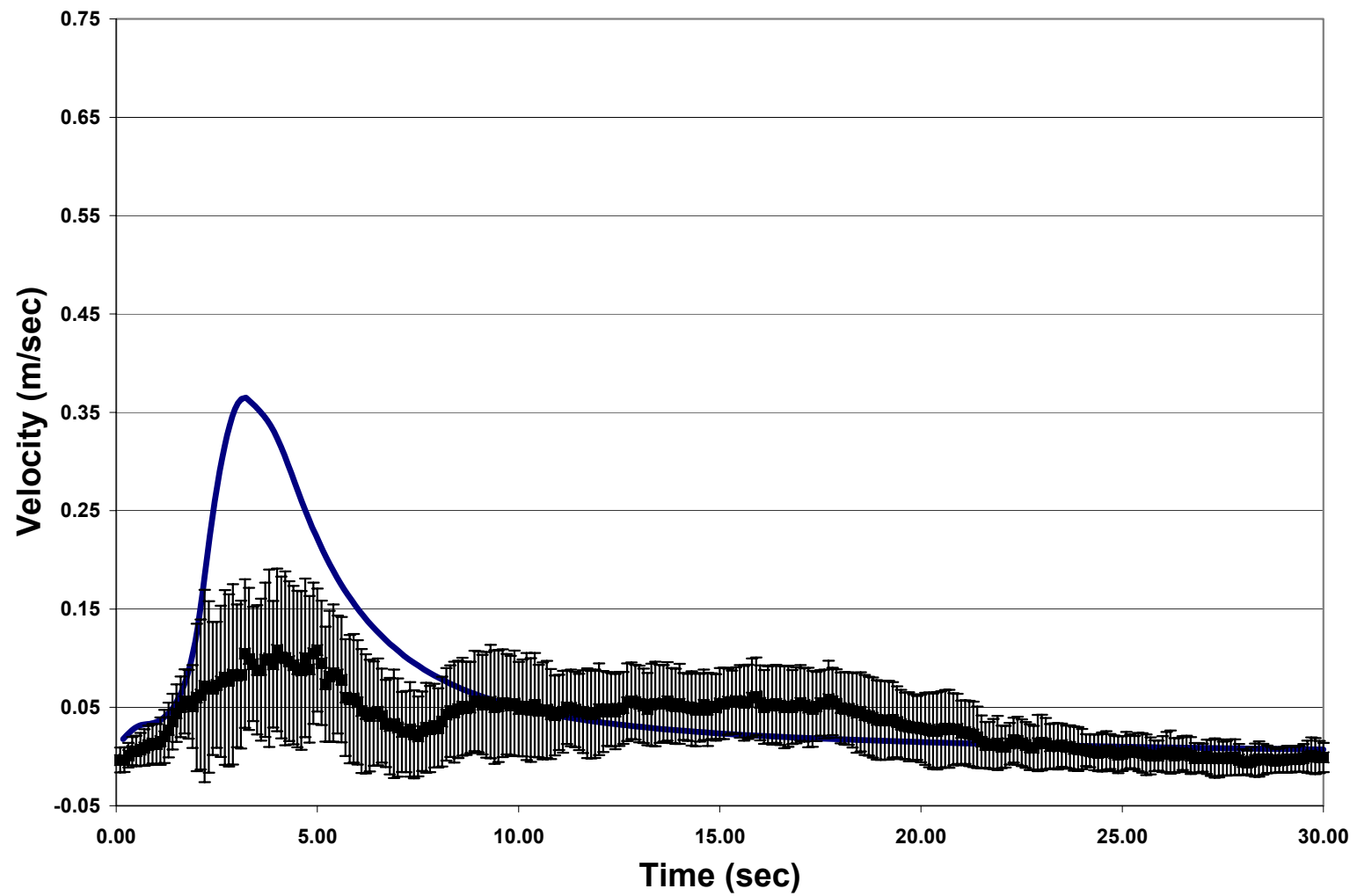


Figure 7.21. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.410 m (16.125 in) Vertical Position

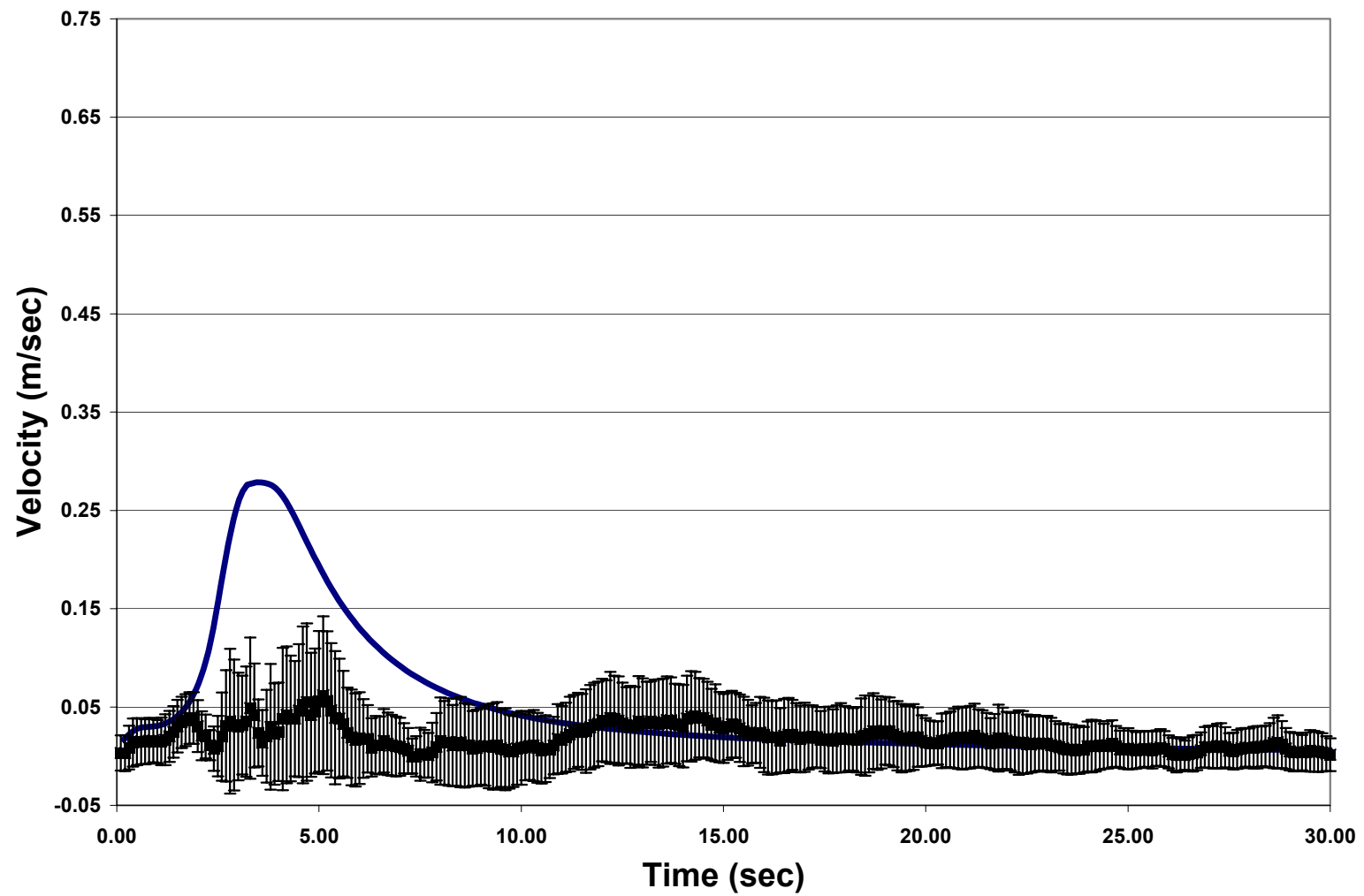


Figure 7.22. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.460 m (18.125 in) Vertical Position

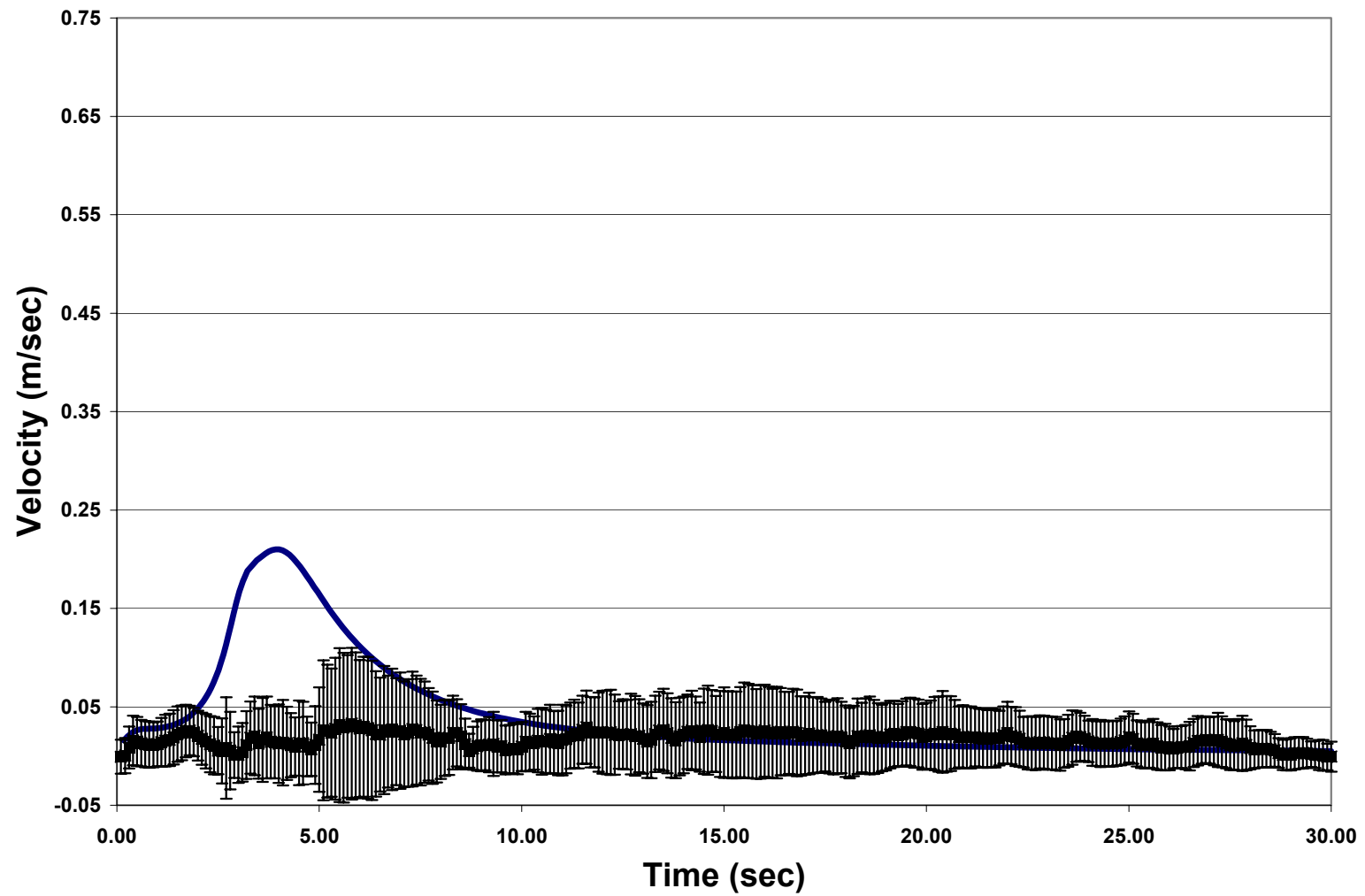


Figure 7.23. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.406 m (16 in) Radial Position and 0.511 m (20.125 in) Vertical Position

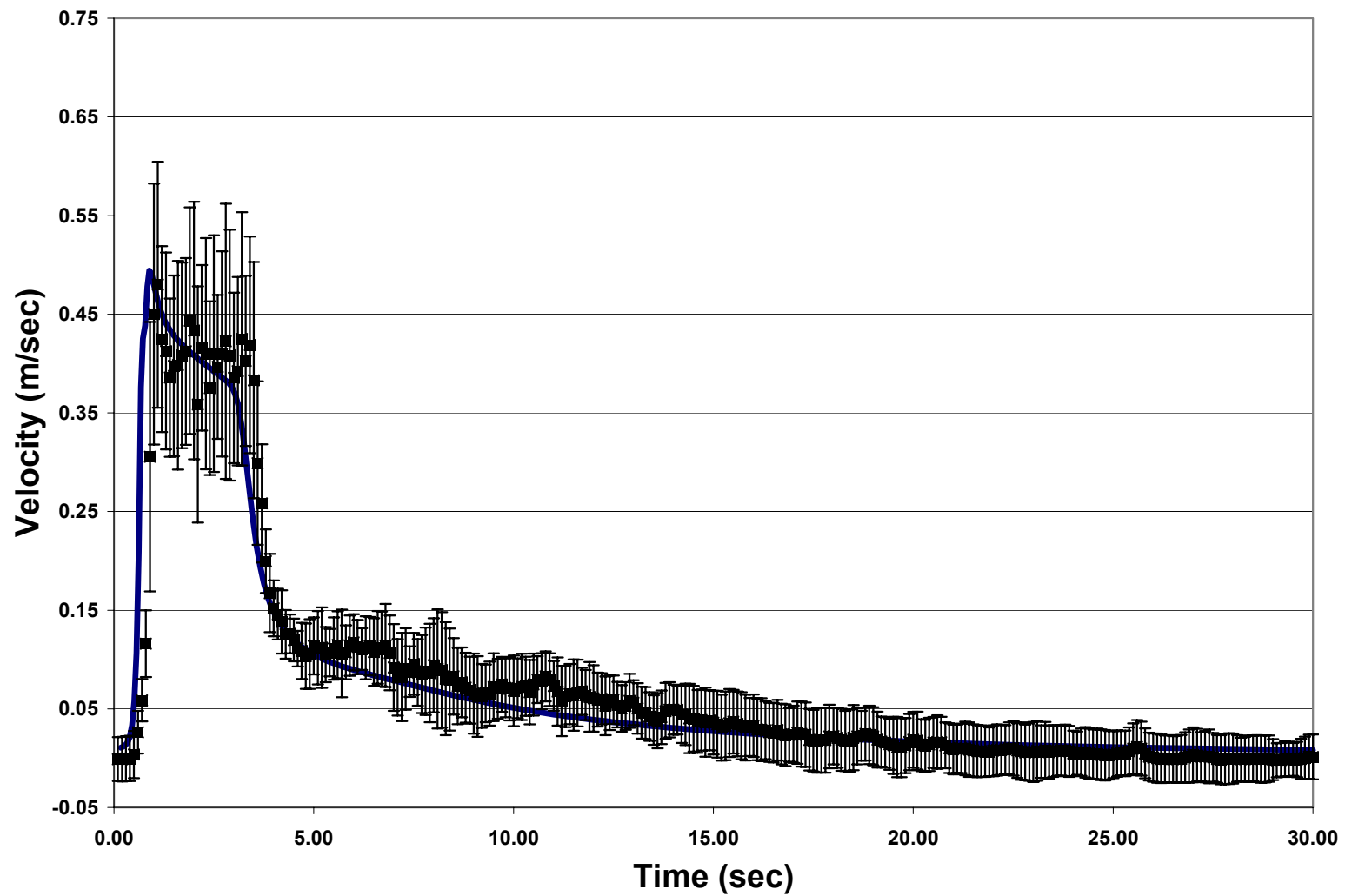


Figure 7.24. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 2.86E-02 m (1.125 in) Vertical Position

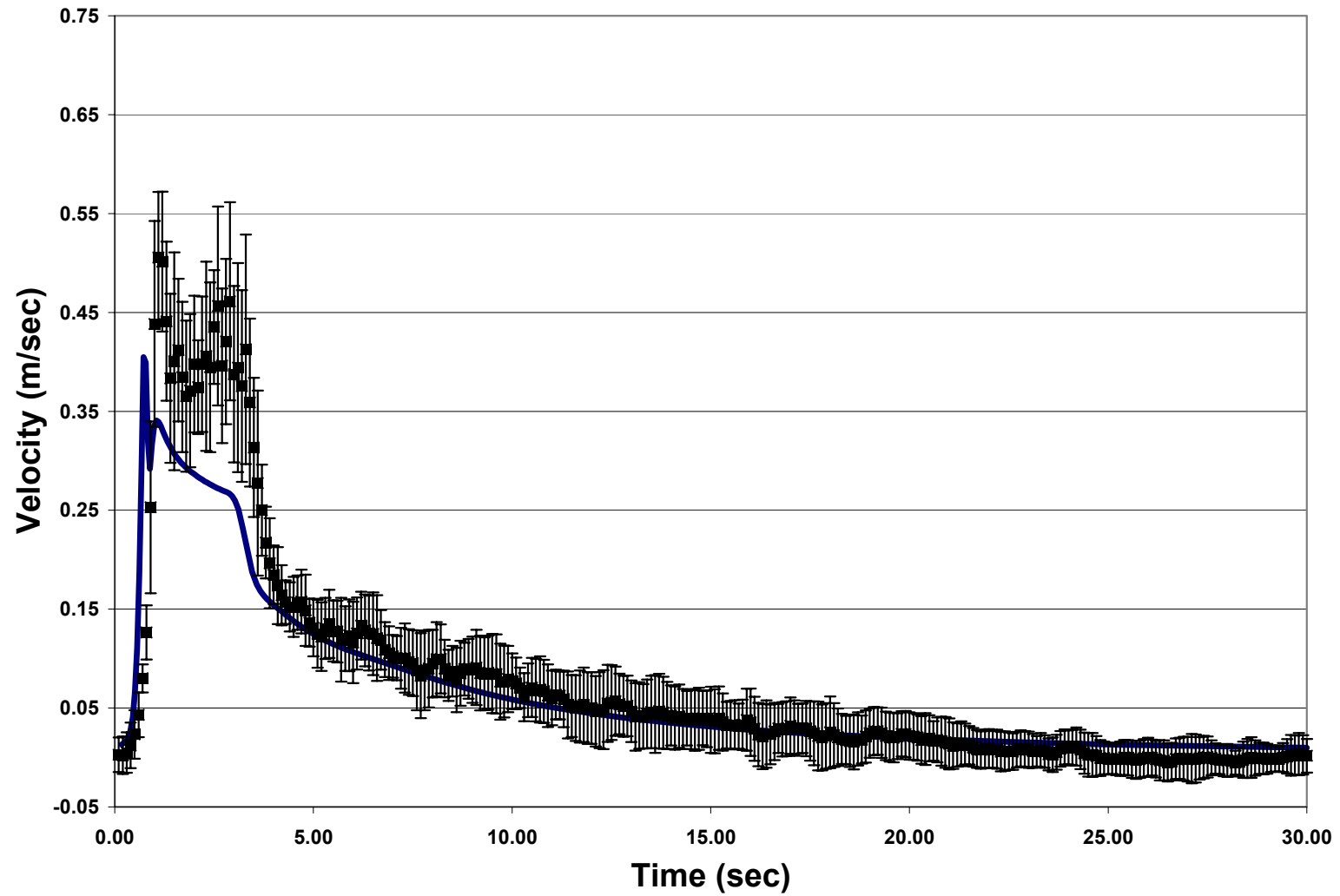


Figure 7.25. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 5.40E-02 m (2.125 in) Vertical Position

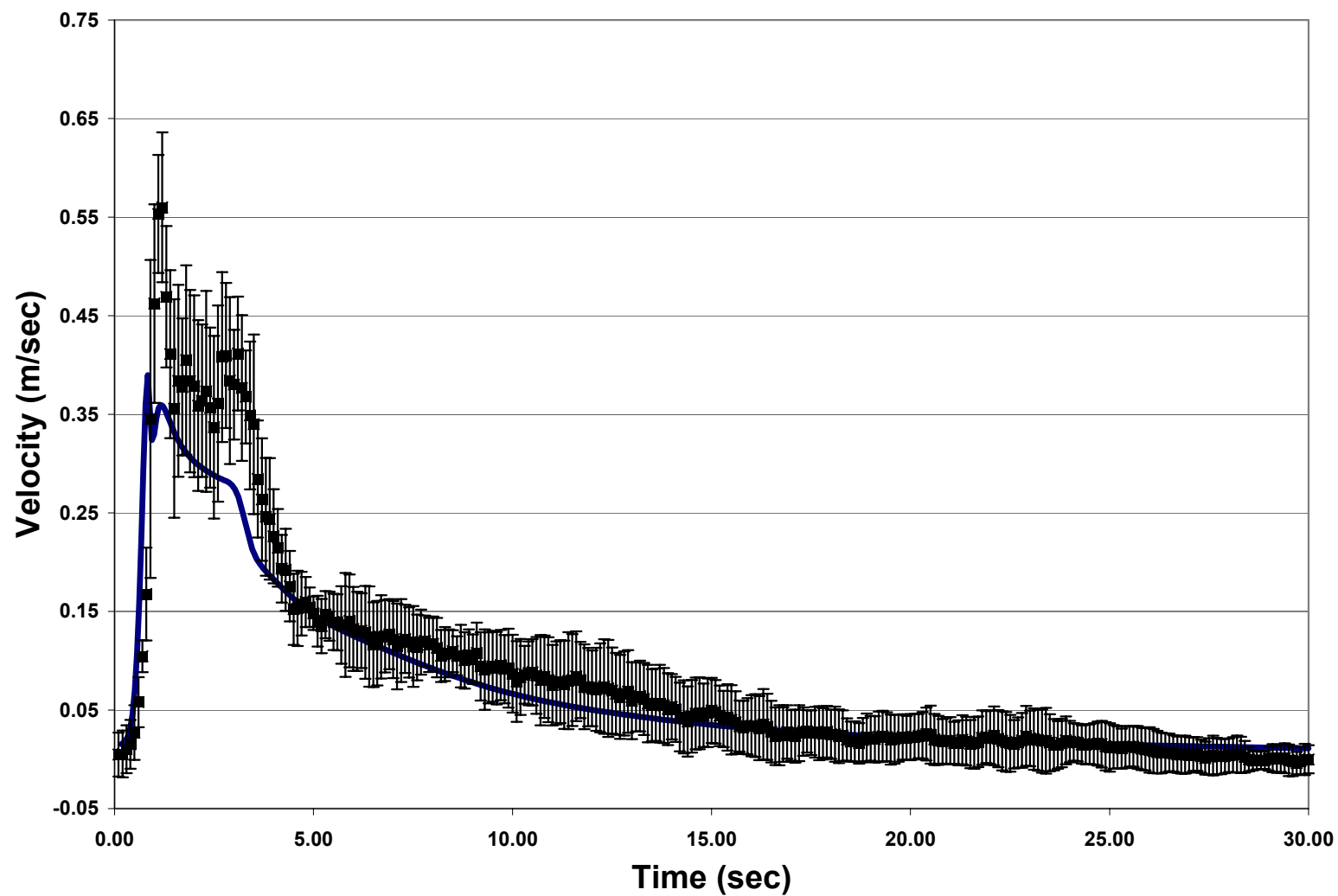


Figure 7.26. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 7.94E-02 m (3.125 in) Vertical Position

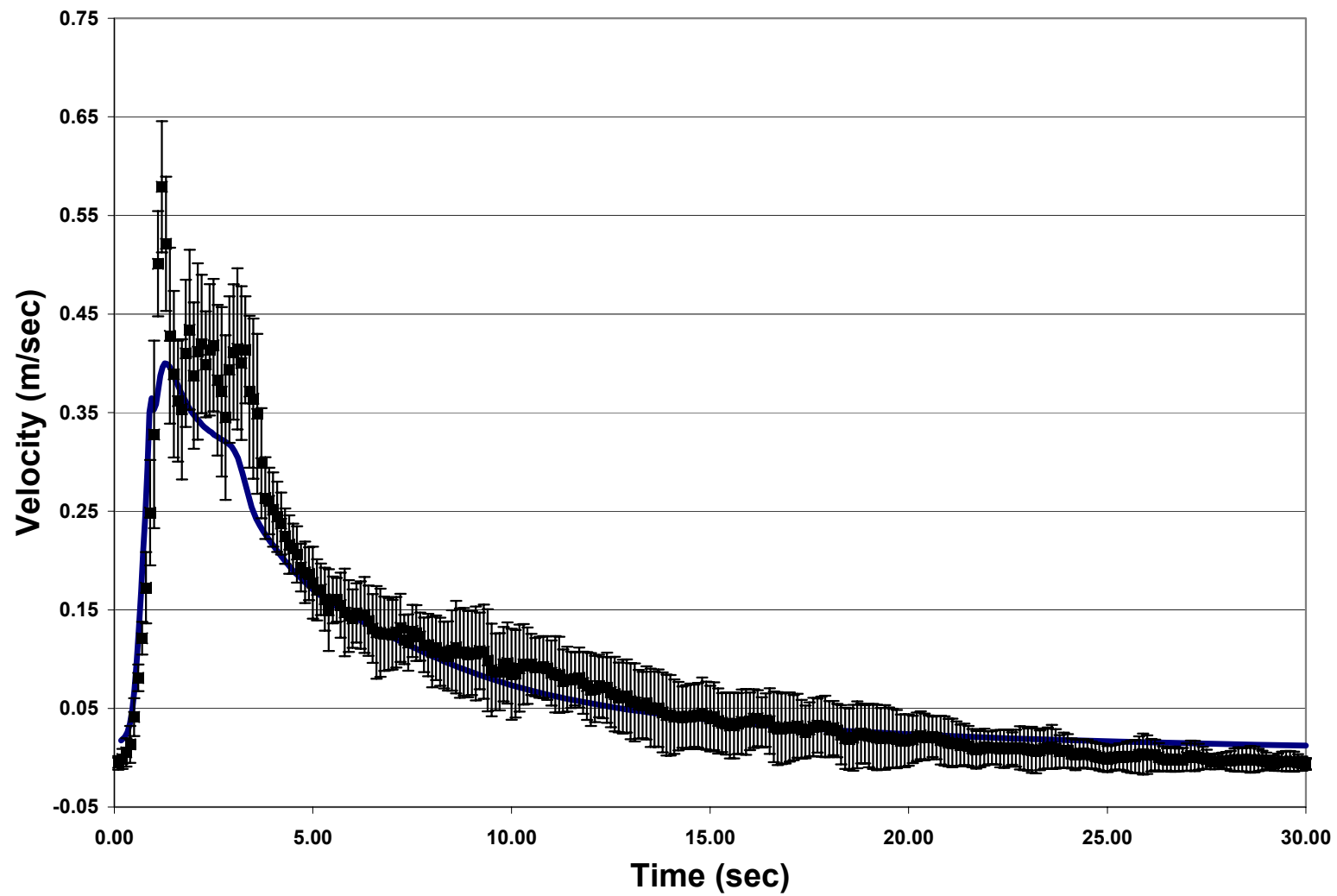


Figure 7.27. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.104 m (4.125 in) Vertical Position

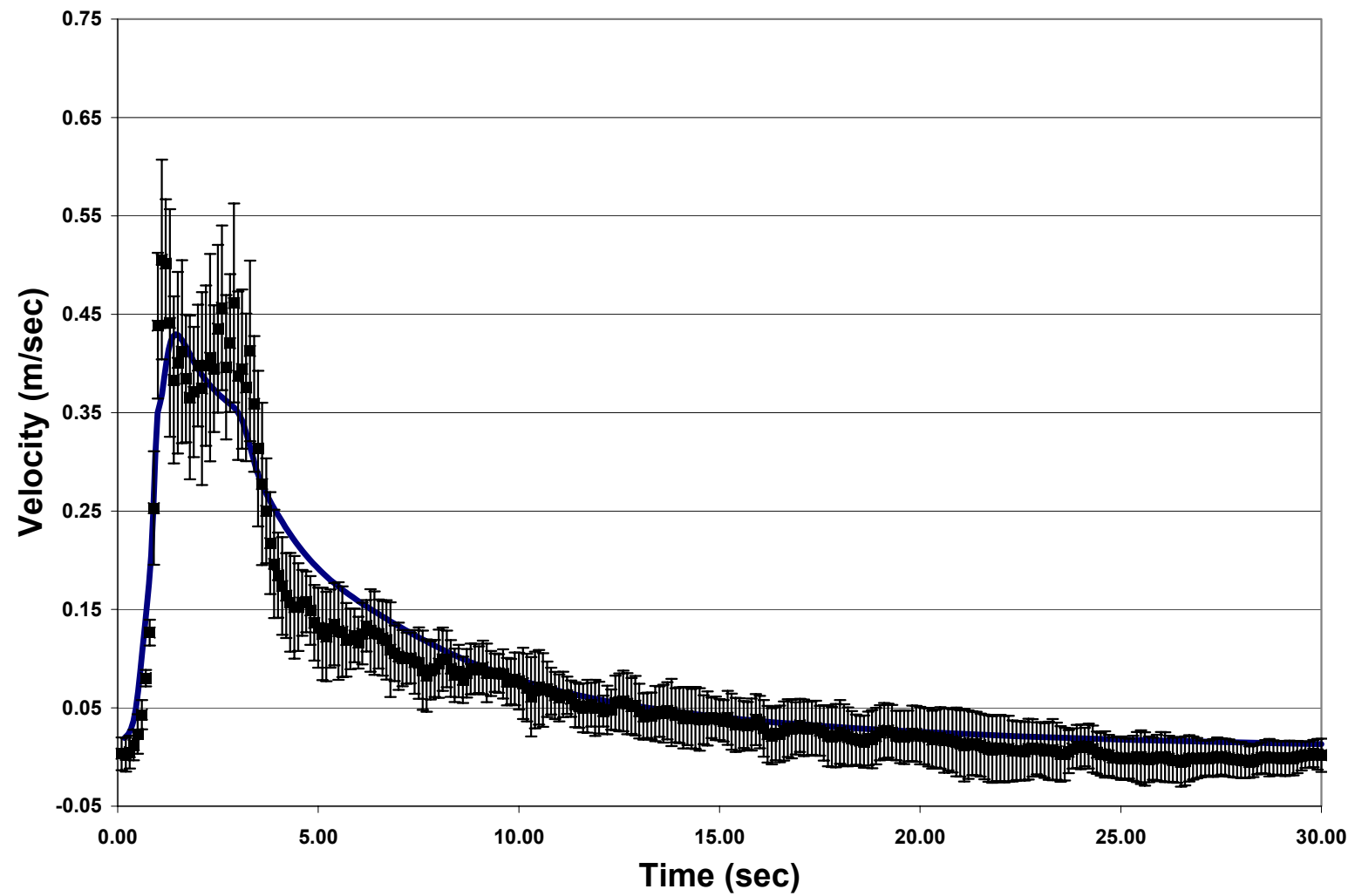


Figure 7.28. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.130 m (5.125 in) Vertical Position

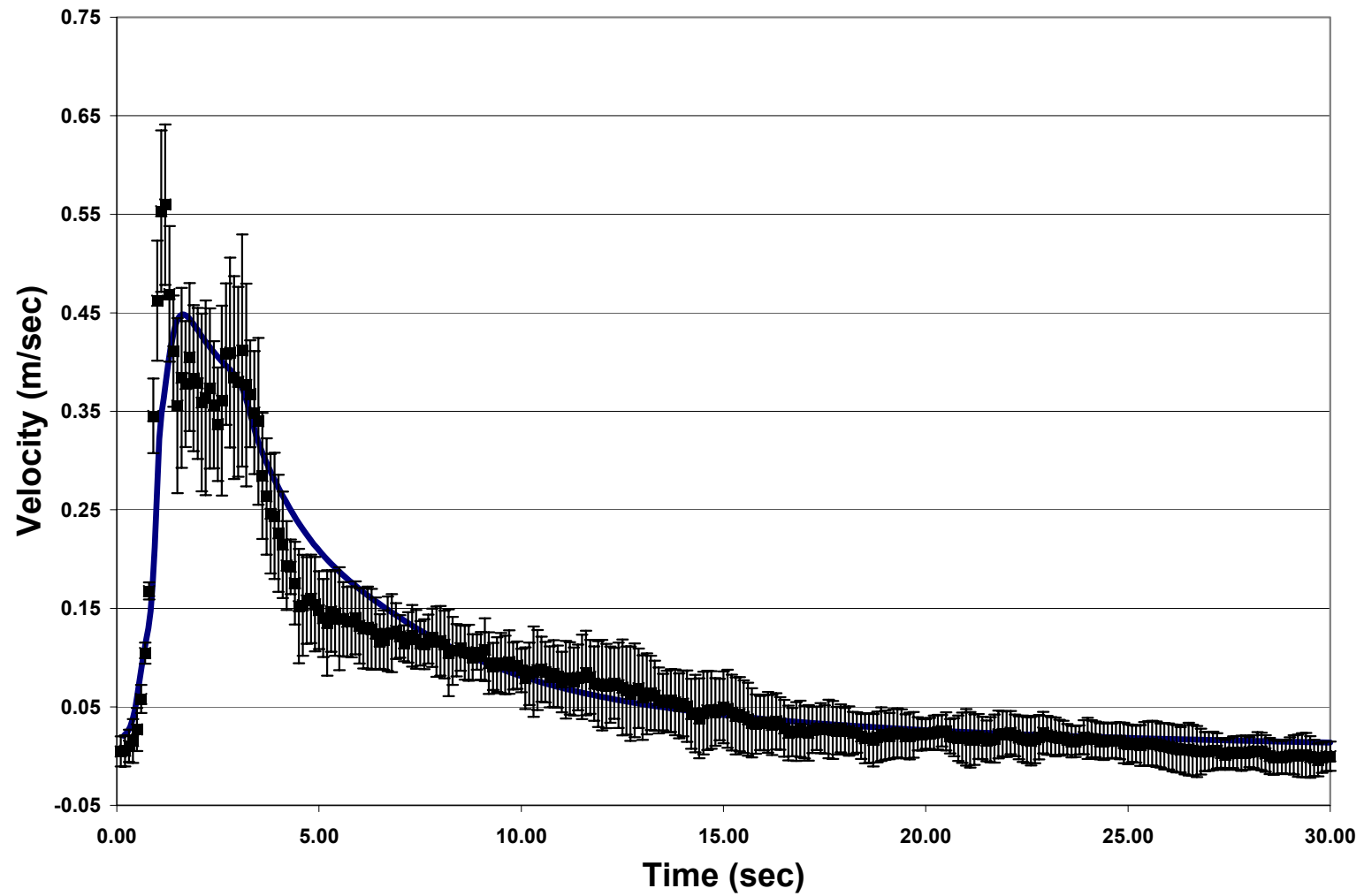


Figure 7.29. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.156 m (6.125 in) Vertical Position

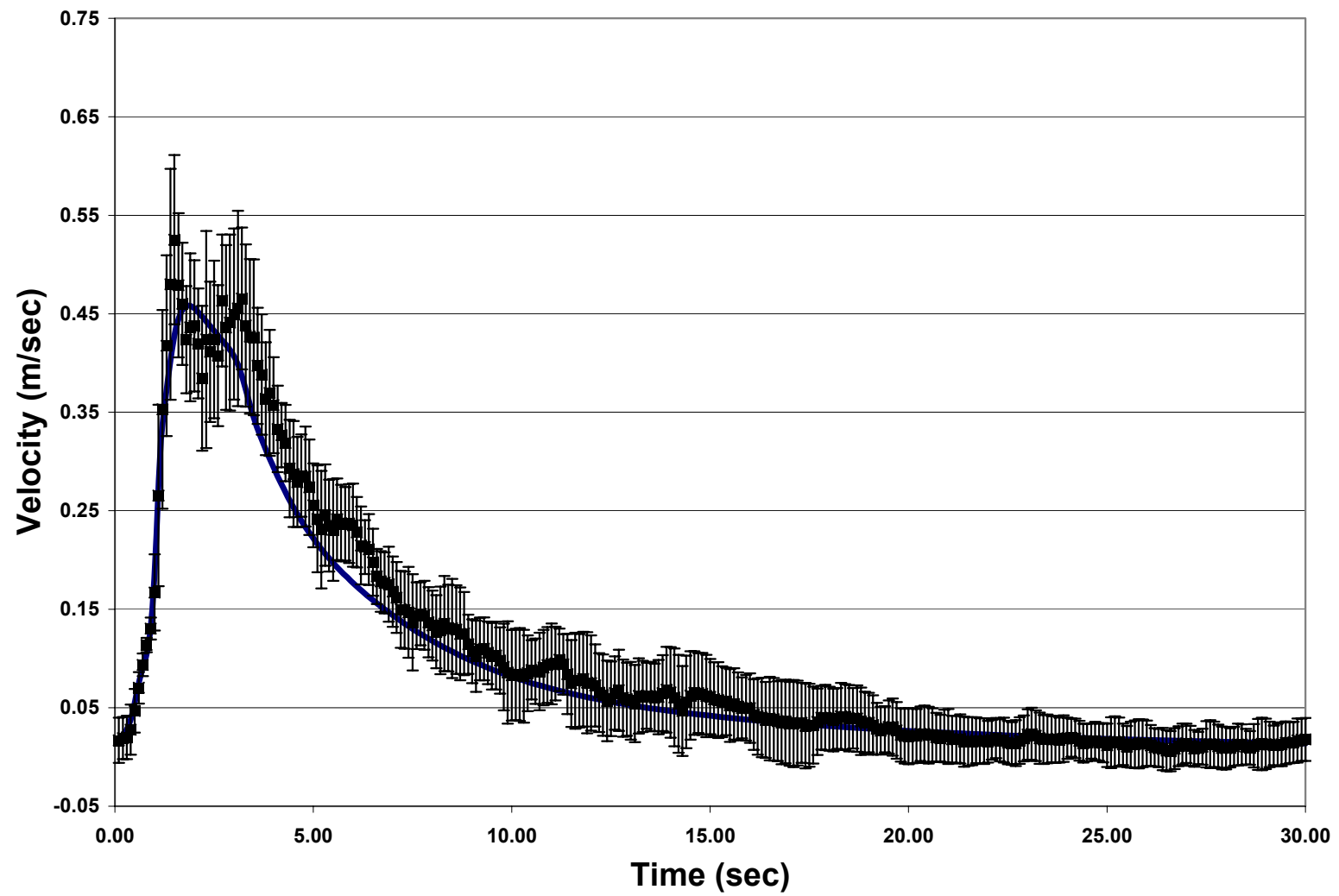


Figure 7.30. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.181 m (7.125 in) Vertical Position

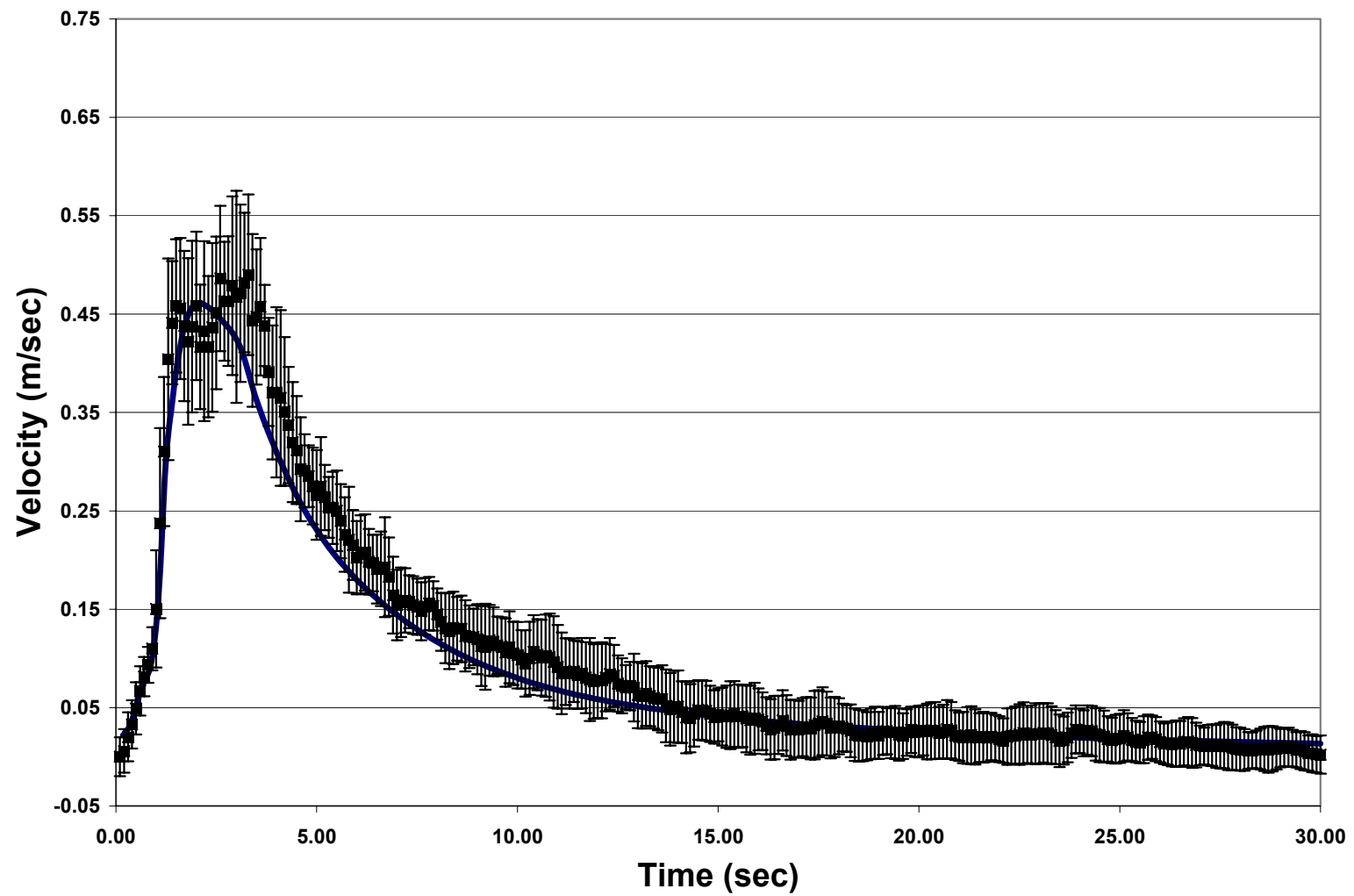


Figure 7.31. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.206 m (8.125 in) Vertical Position

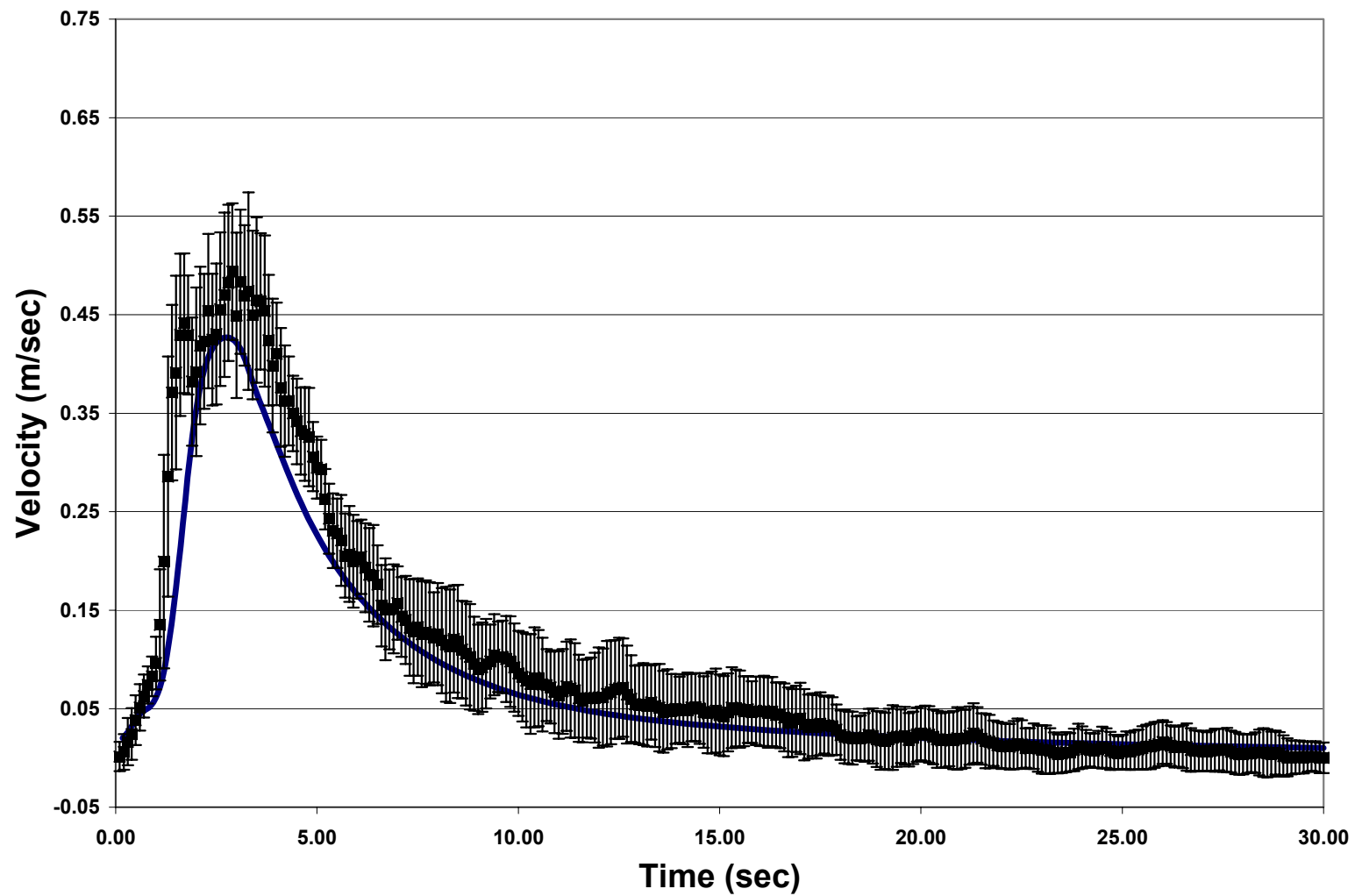


Figure 7.32. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.232 m (9.125 in) Vertical Position

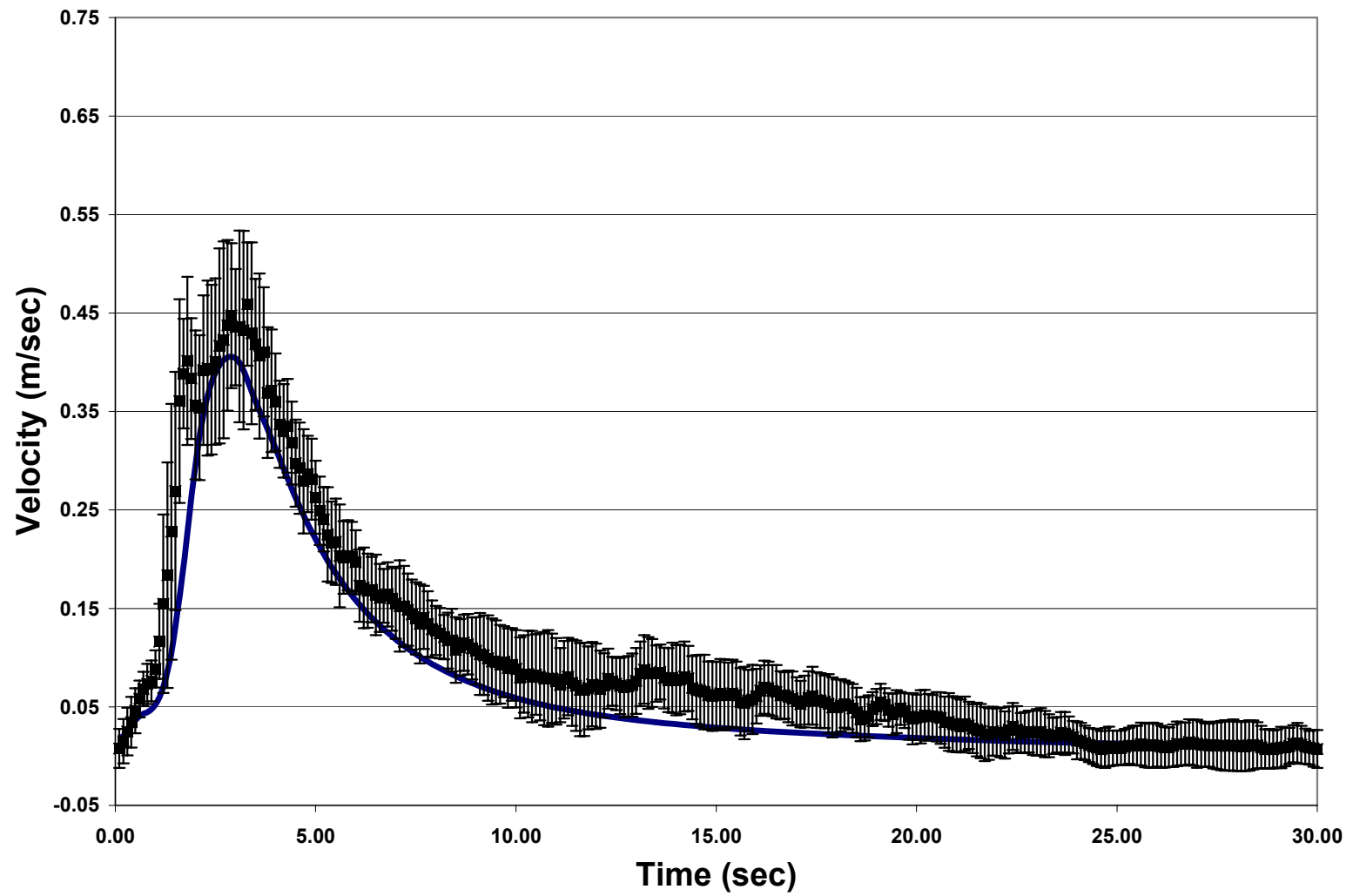


Figure 7.33. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.257 m (10.125 in) Vertical Position

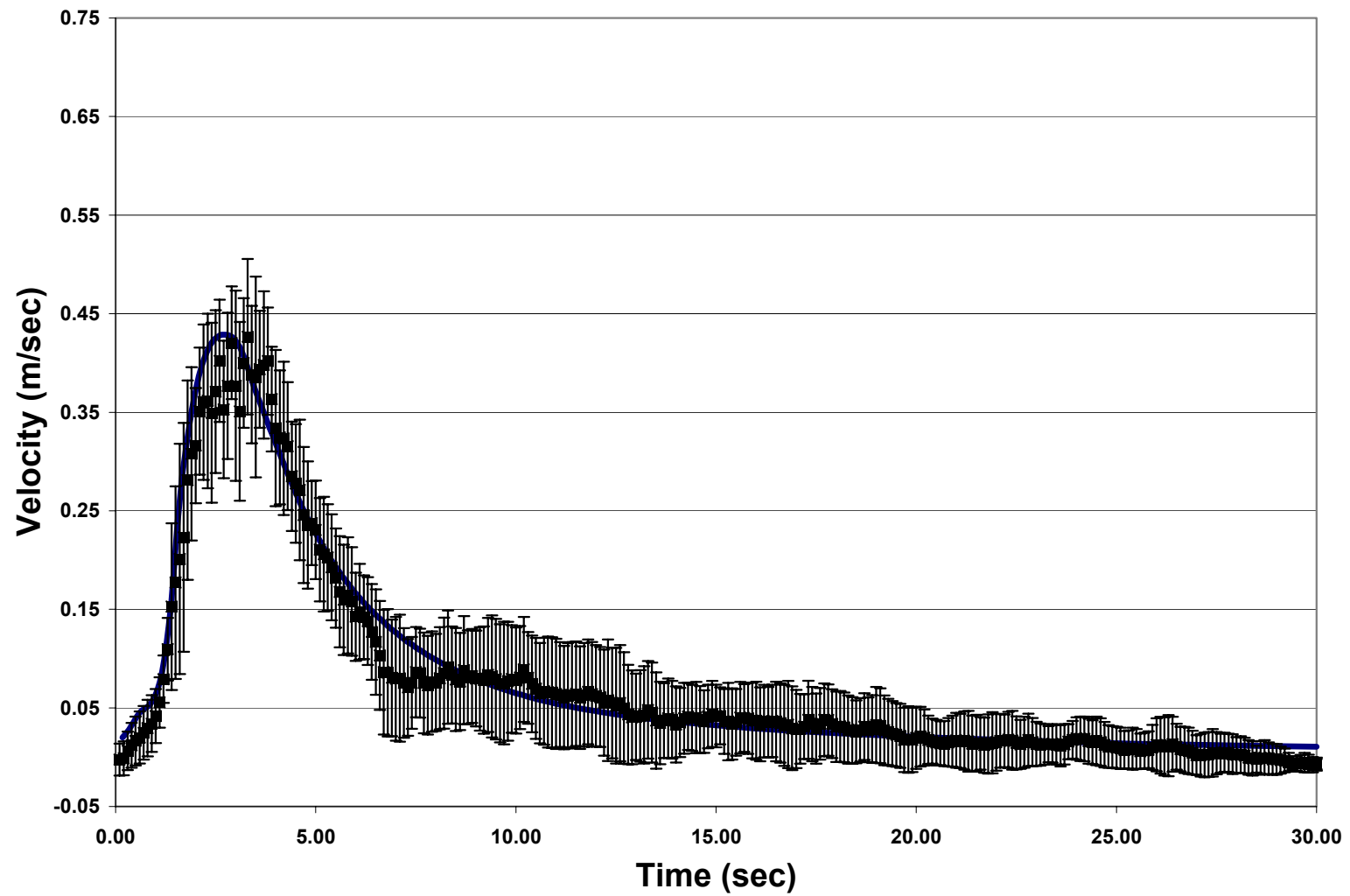


Figure 7.34. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.283 m (11.125 in) Vertical Position

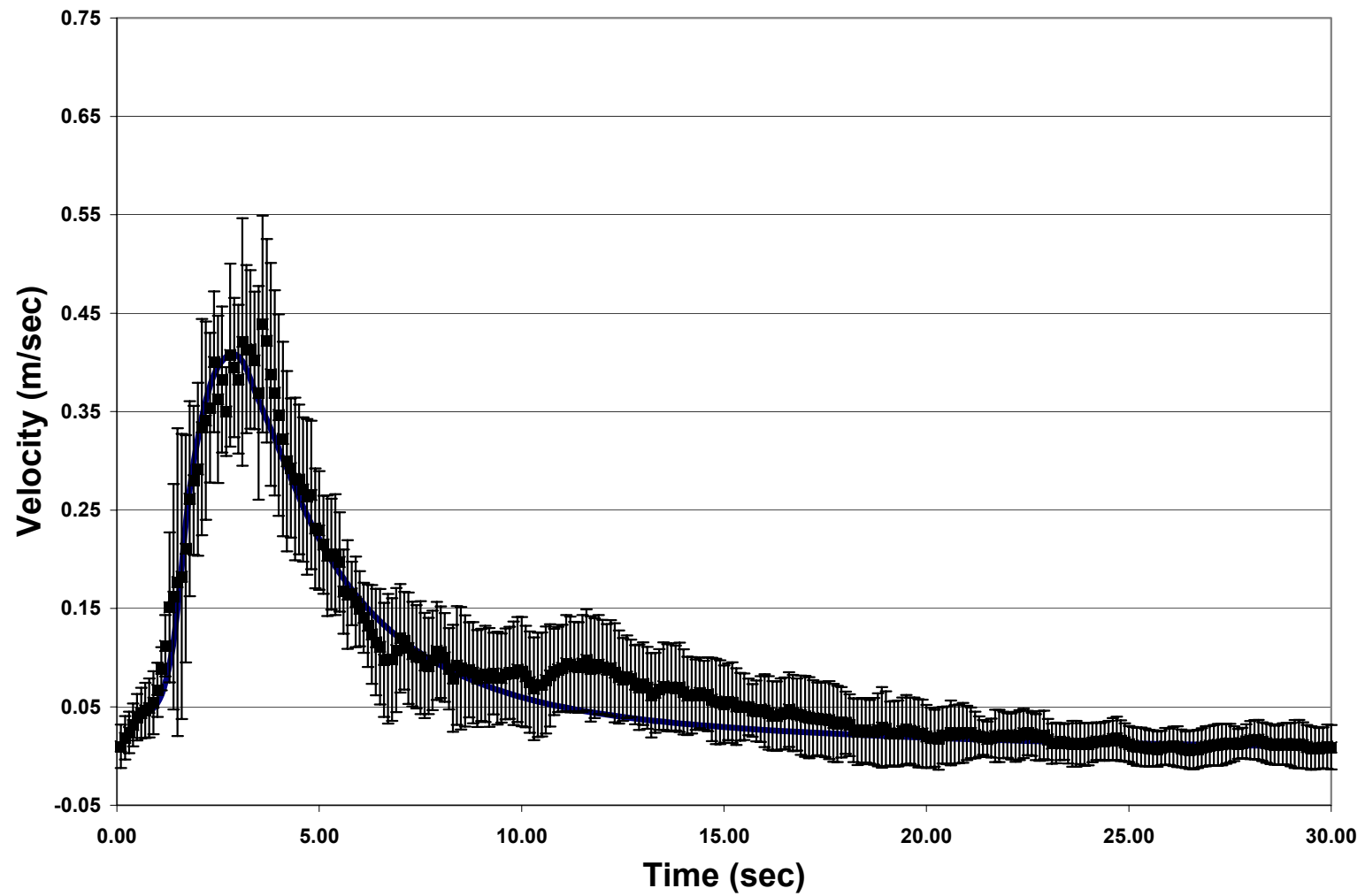


Figure 7.35. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.308 m (12.125 in) Vertical Position

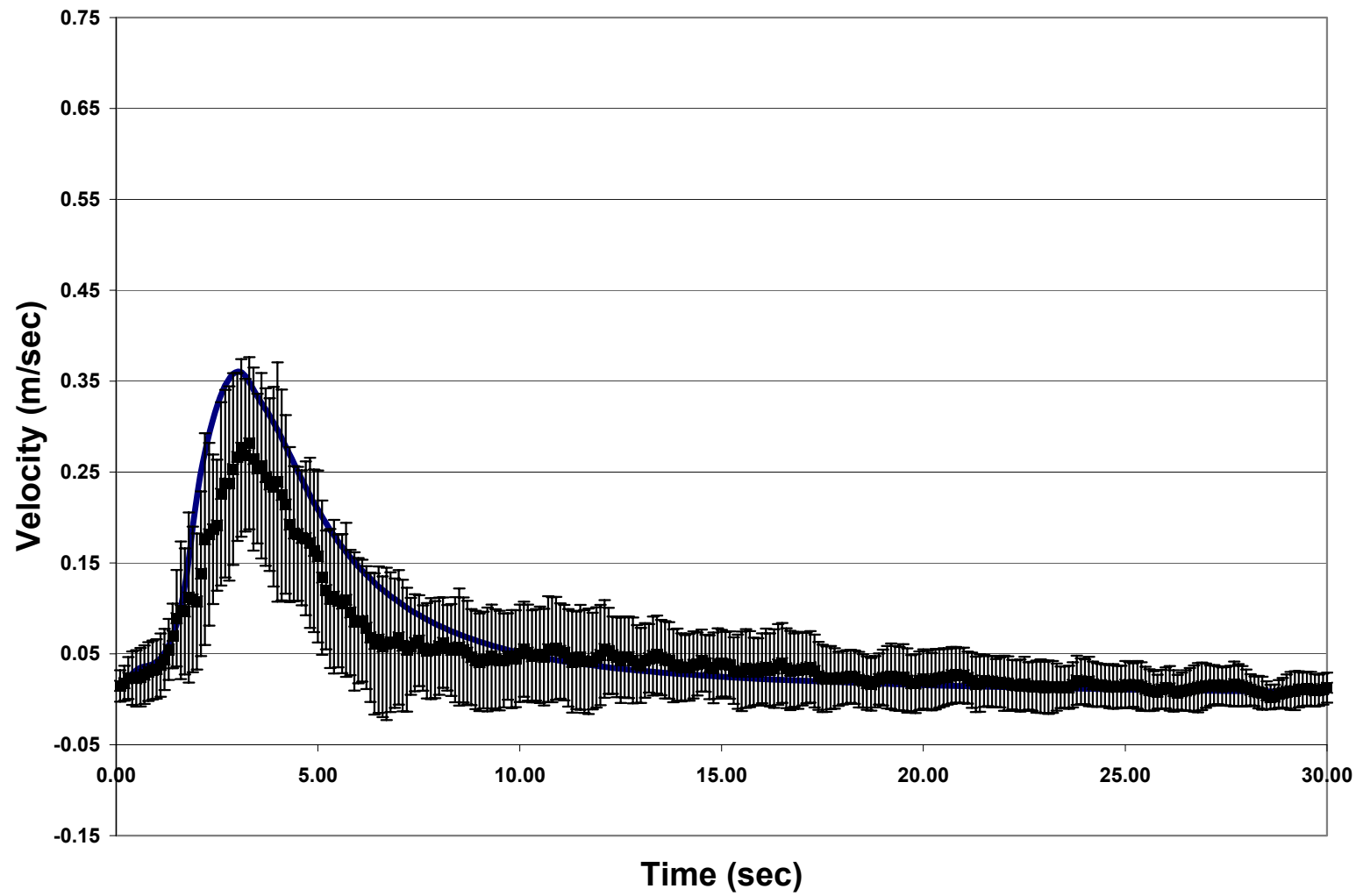


Figure 7.36. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.359 m (14.125 in) Vertical Position

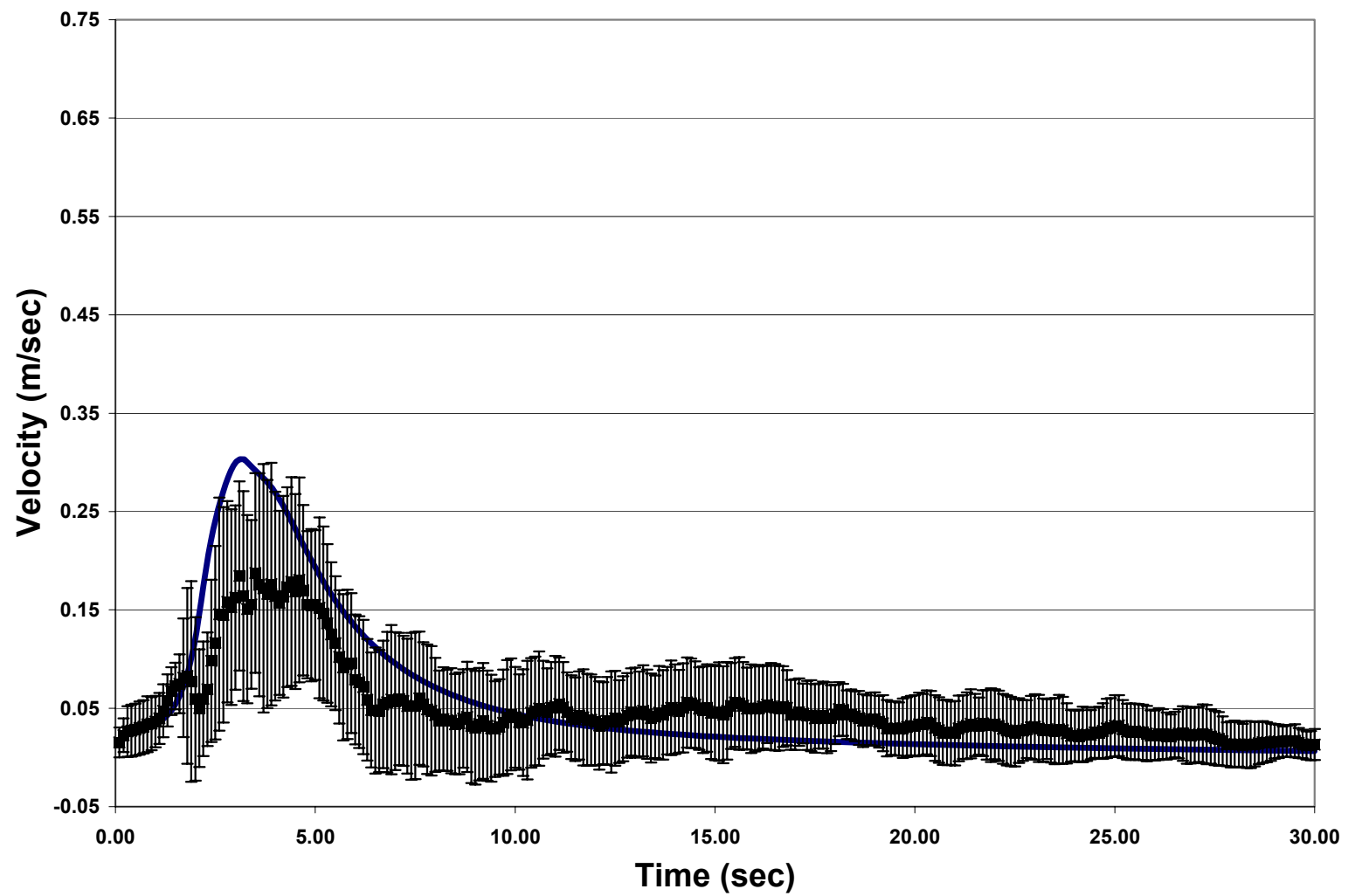


Figure 7.37. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.410 m (16.125 in) Vertical Position

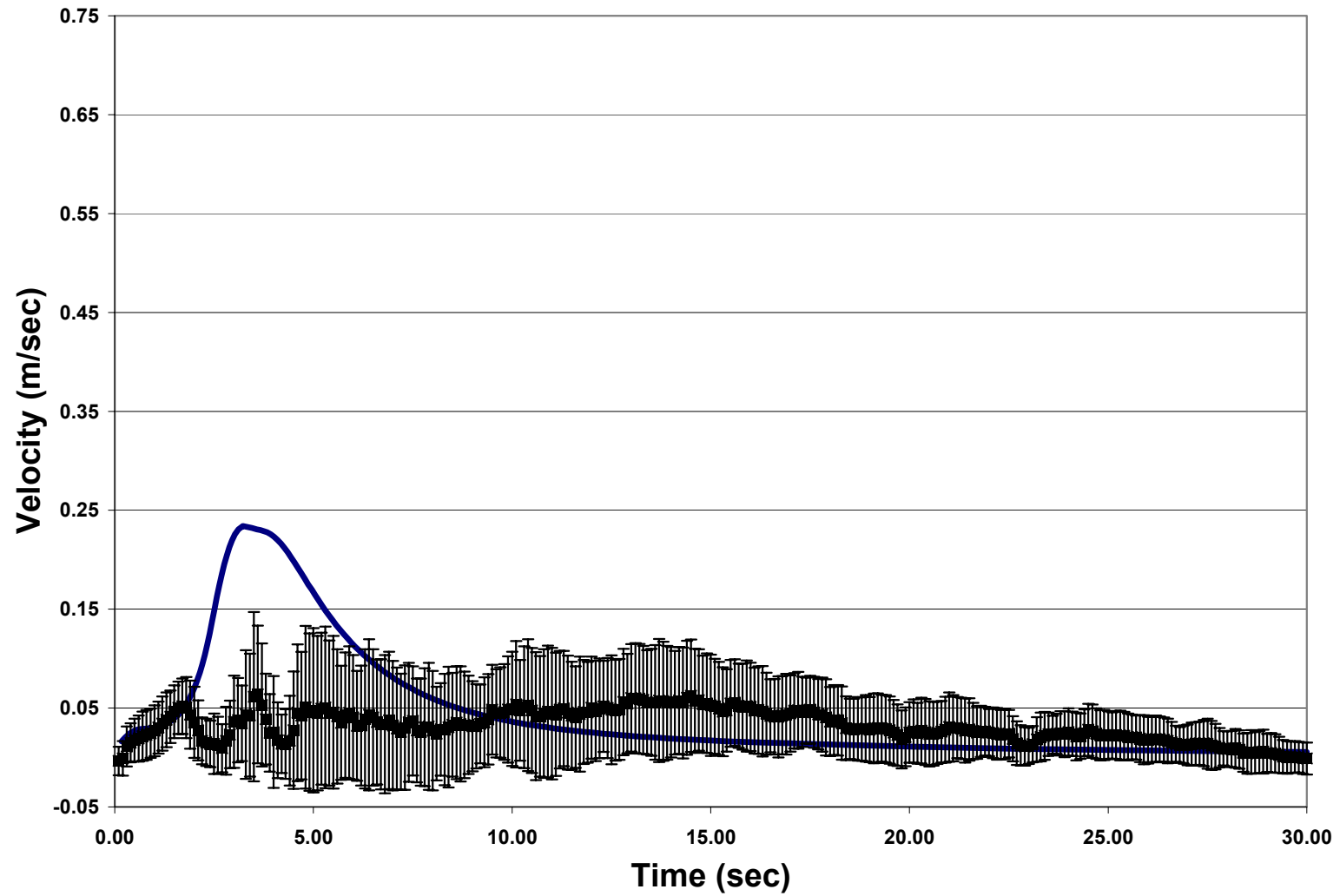


Figure 7.38. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.460 m (18.125 in) Vertical Position

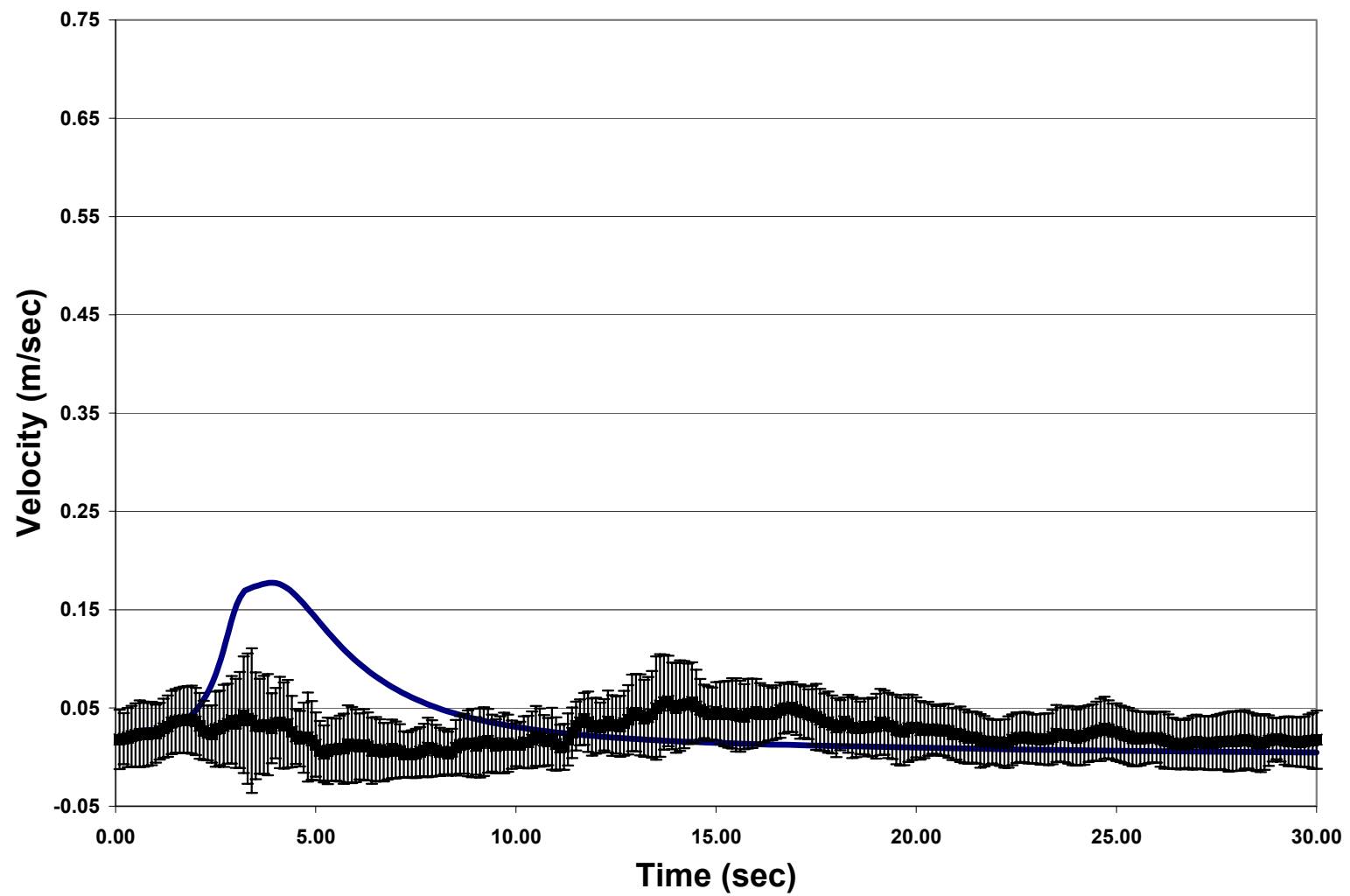


Figure 7.39. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.394 m (15.5 in) Radial Position and 0.511 m (20.125 in) Vertical Position

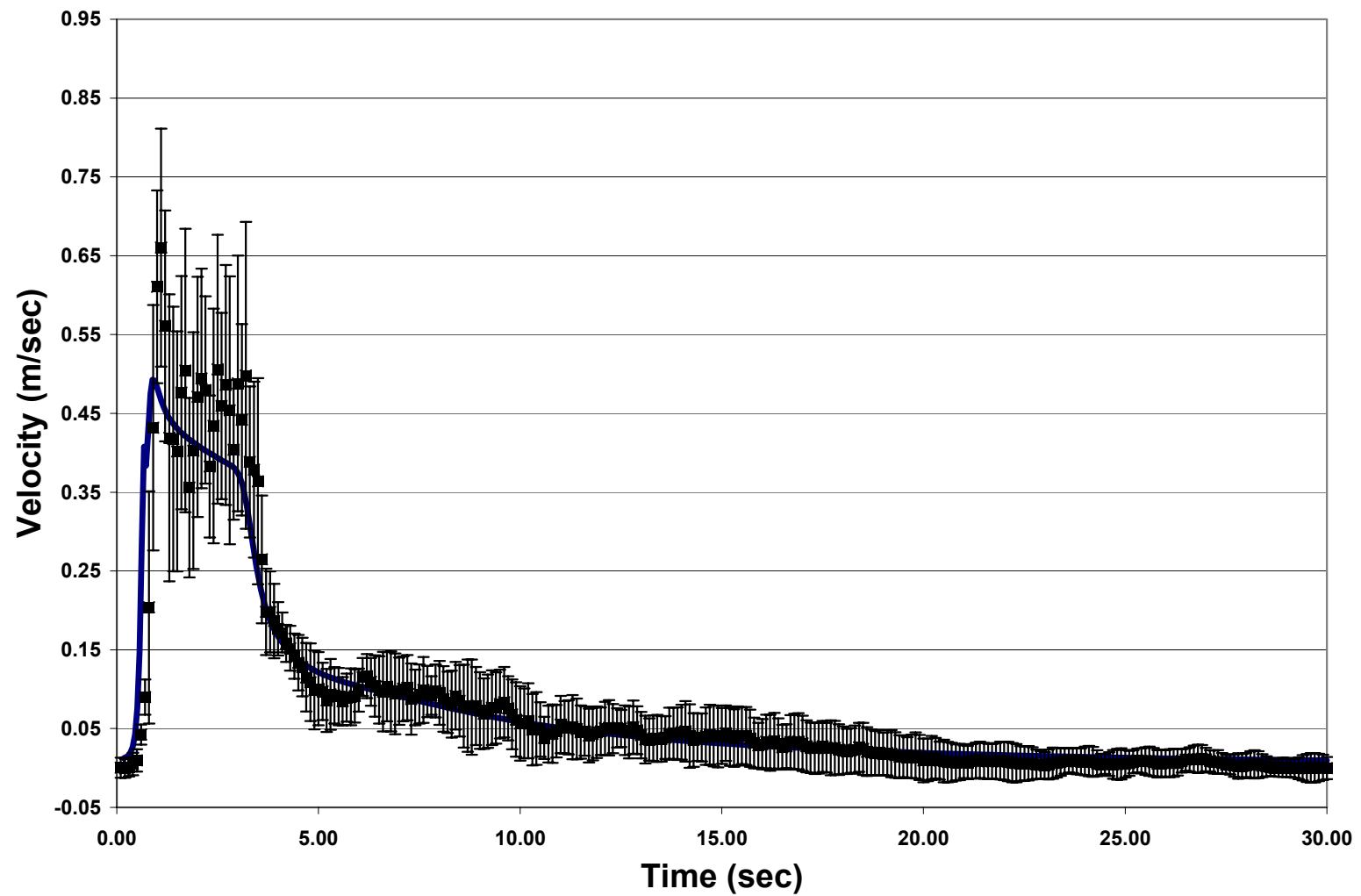


Figure 7.40. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 2.86E-02 m (1.125 in) Vertical Position

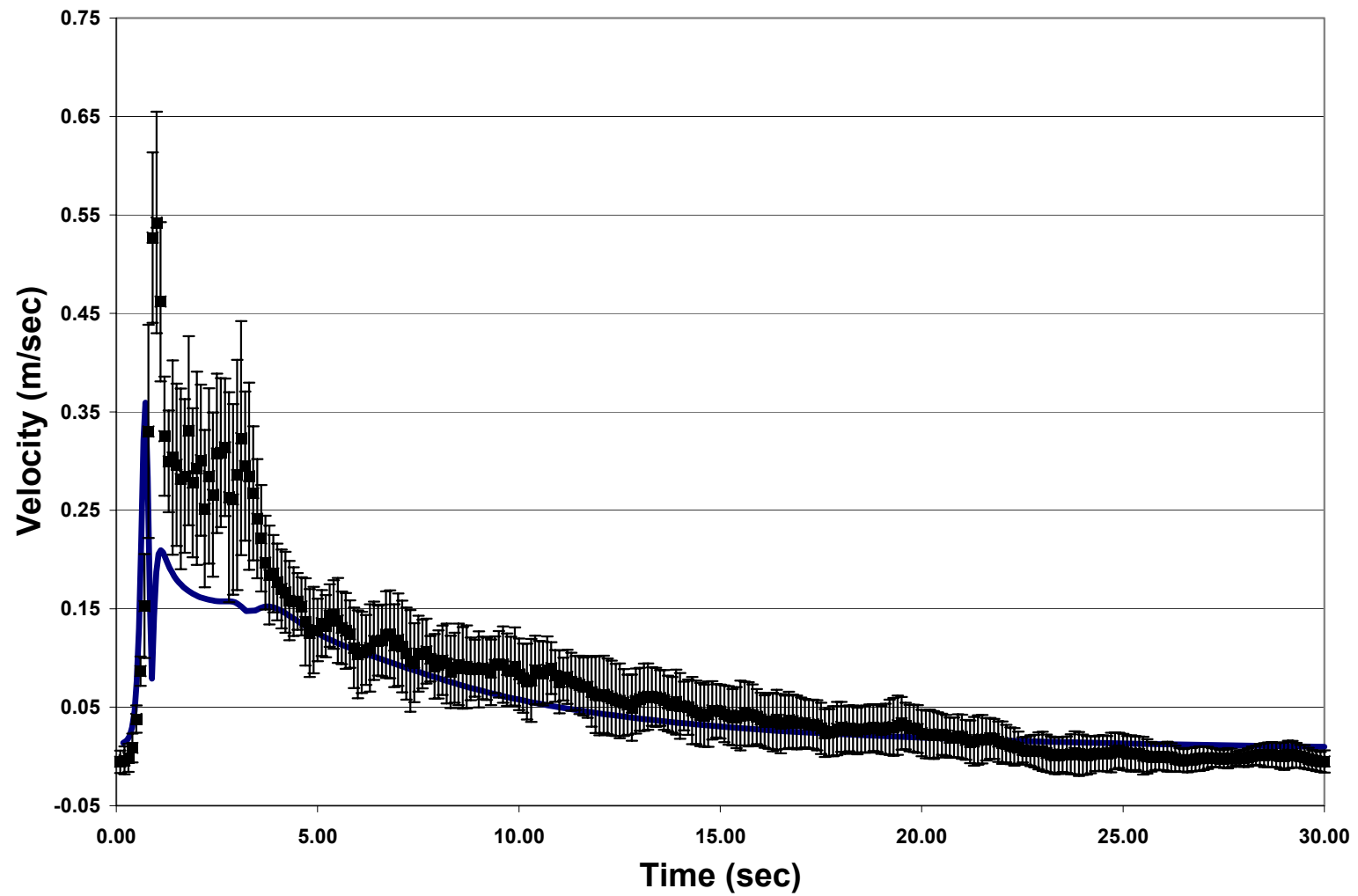


Figure 7.41. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 5.40E-02 m (2.125 in) Vertical Position

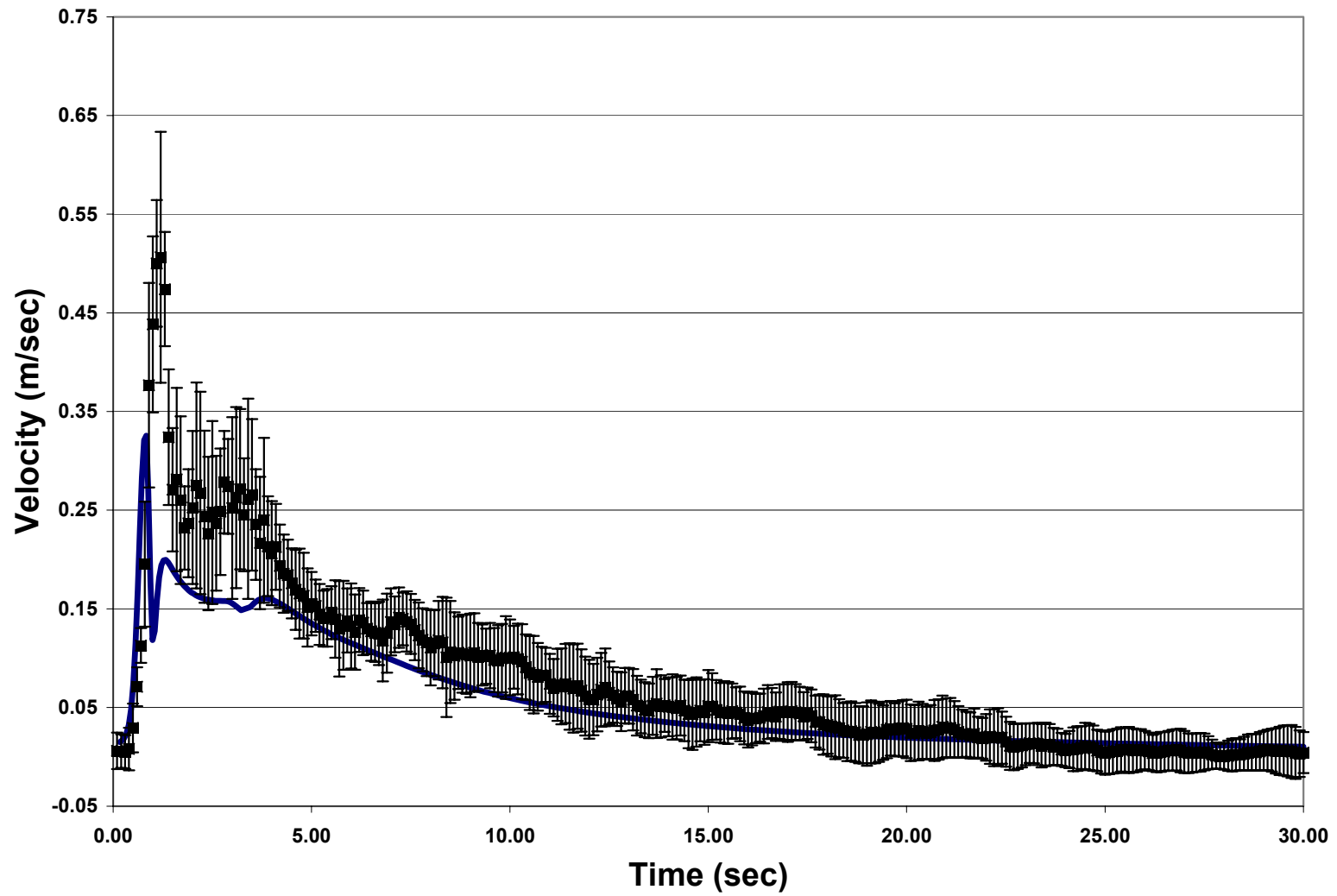


Figure 7.42. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 7.94E-02 m (3.125 in) Vertical Position

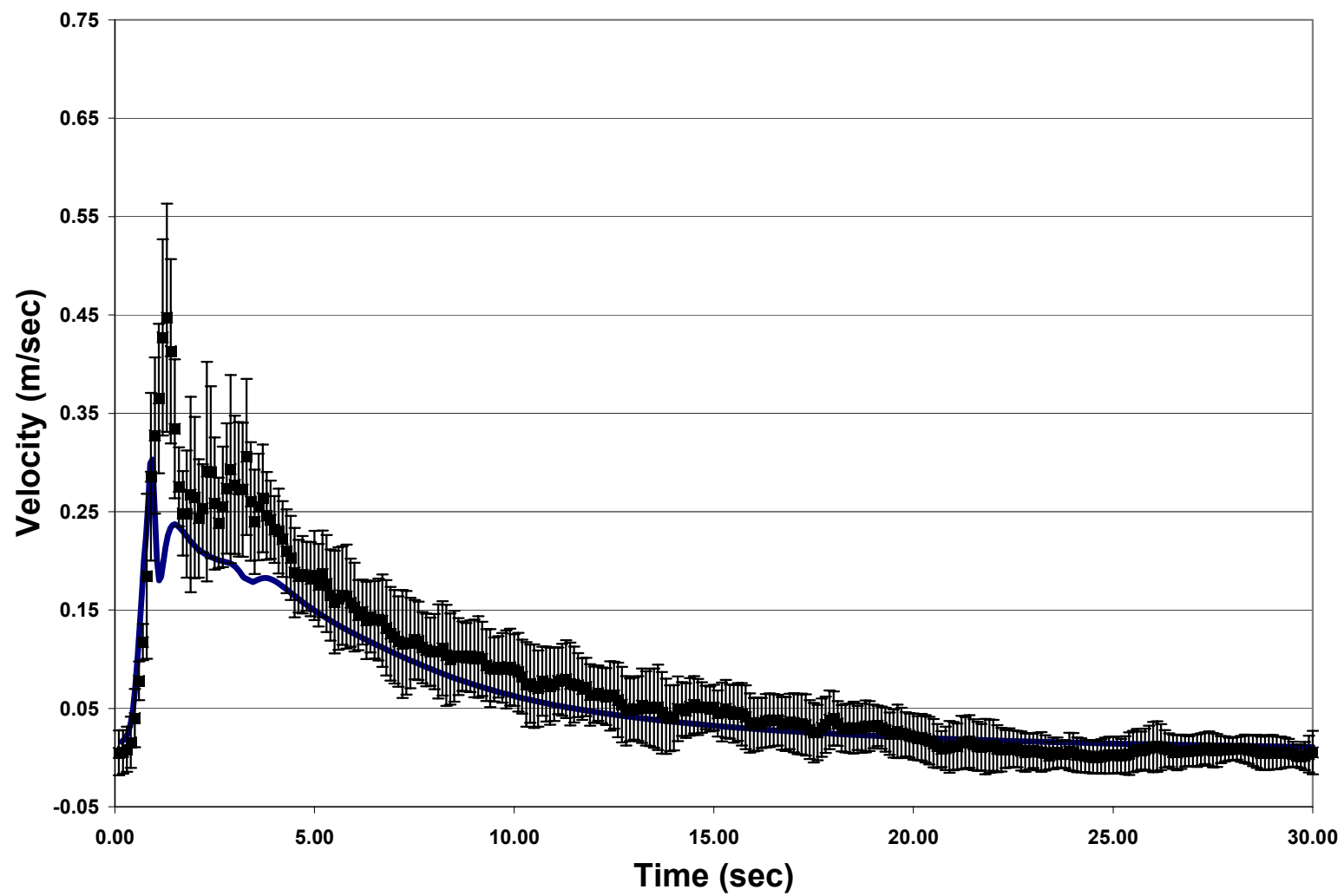


Figure 7.43. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.105 m (4.125 in) Vertical Position

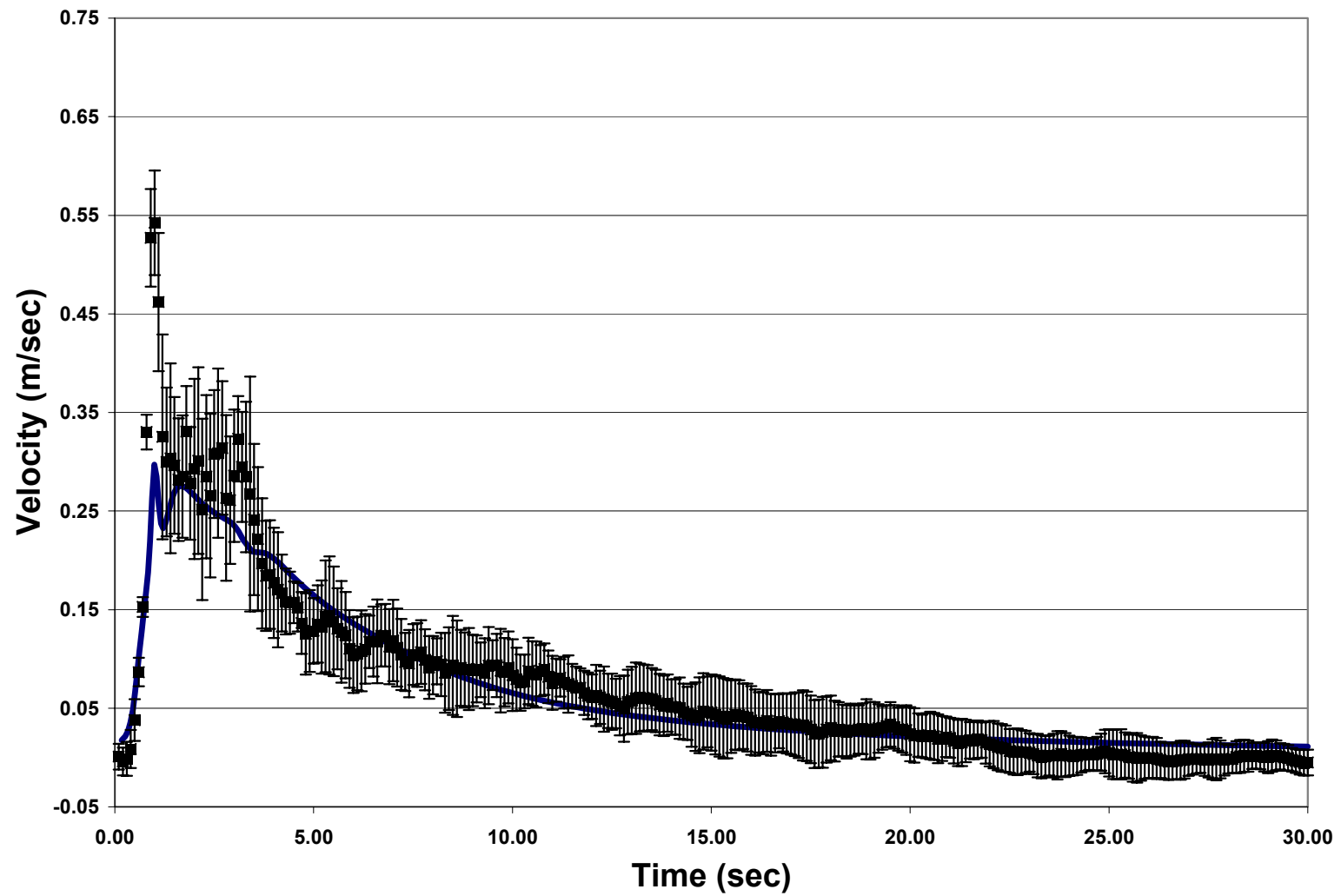


Figure 7.44. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.130 m (5.125 in) Vertical Position

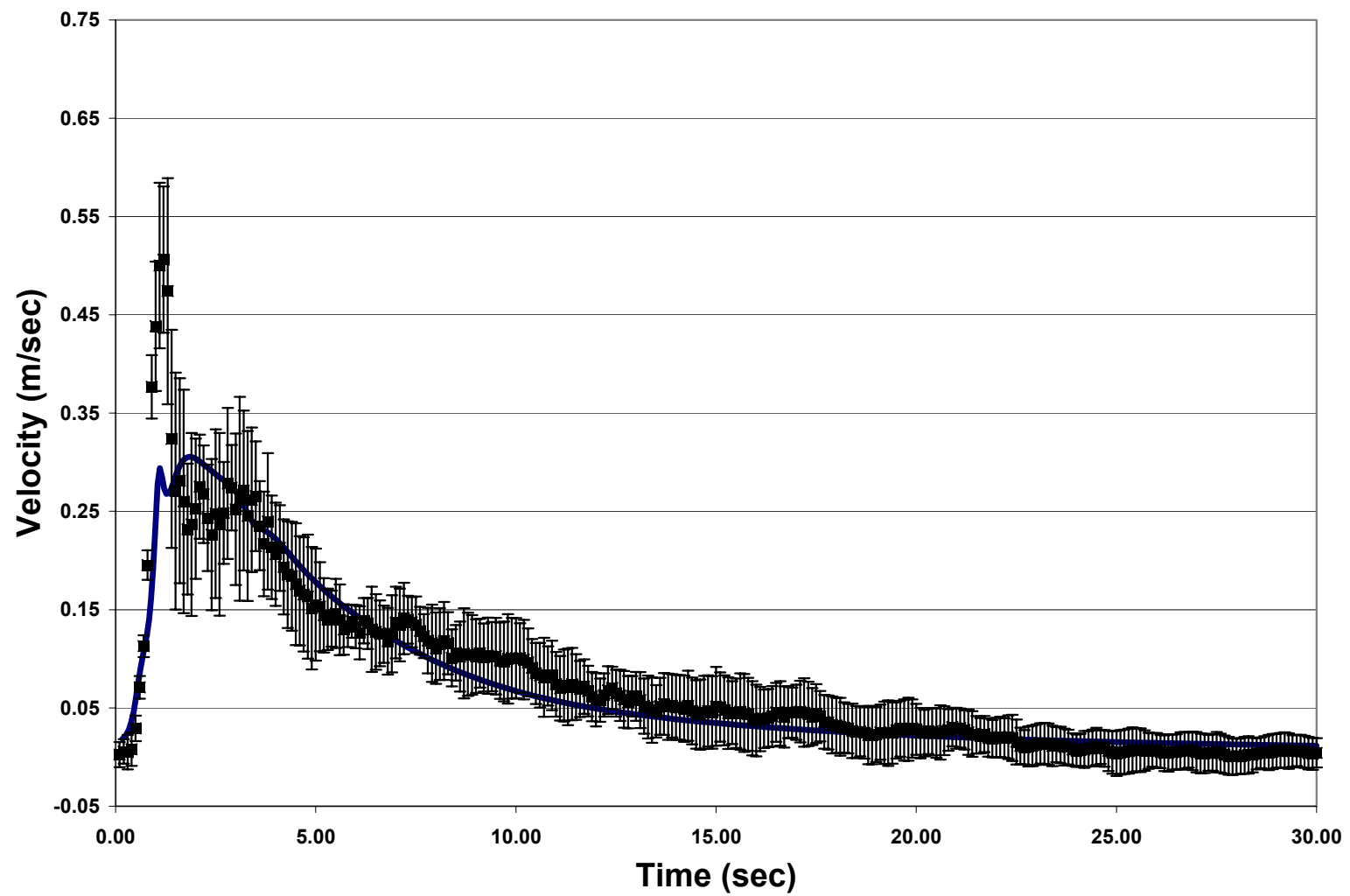


Figure 7.45. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.156 m (6.125 in) Vertical Position

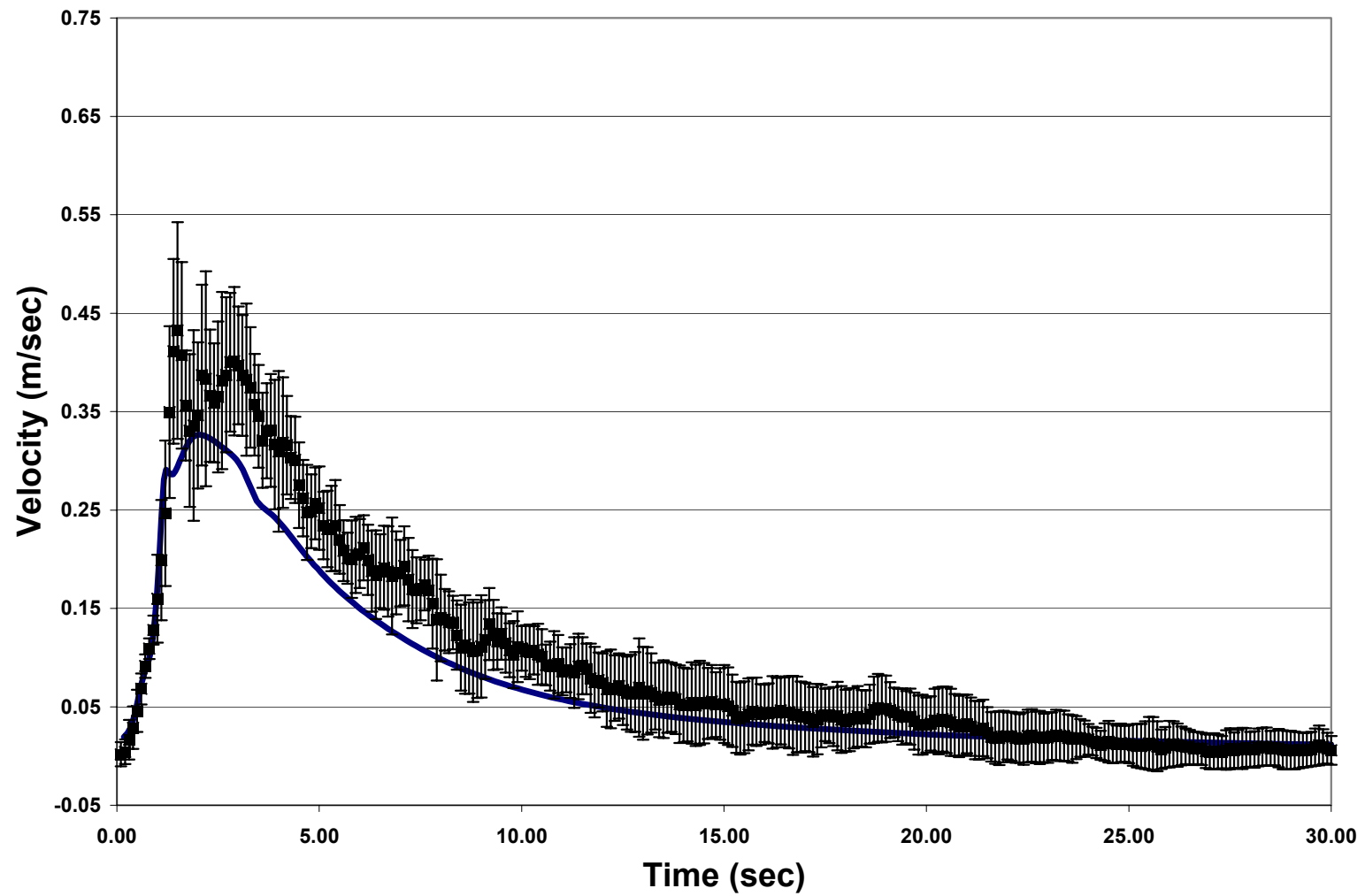


Figure 7.46. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.181 m (7.125 in) Vertical Position

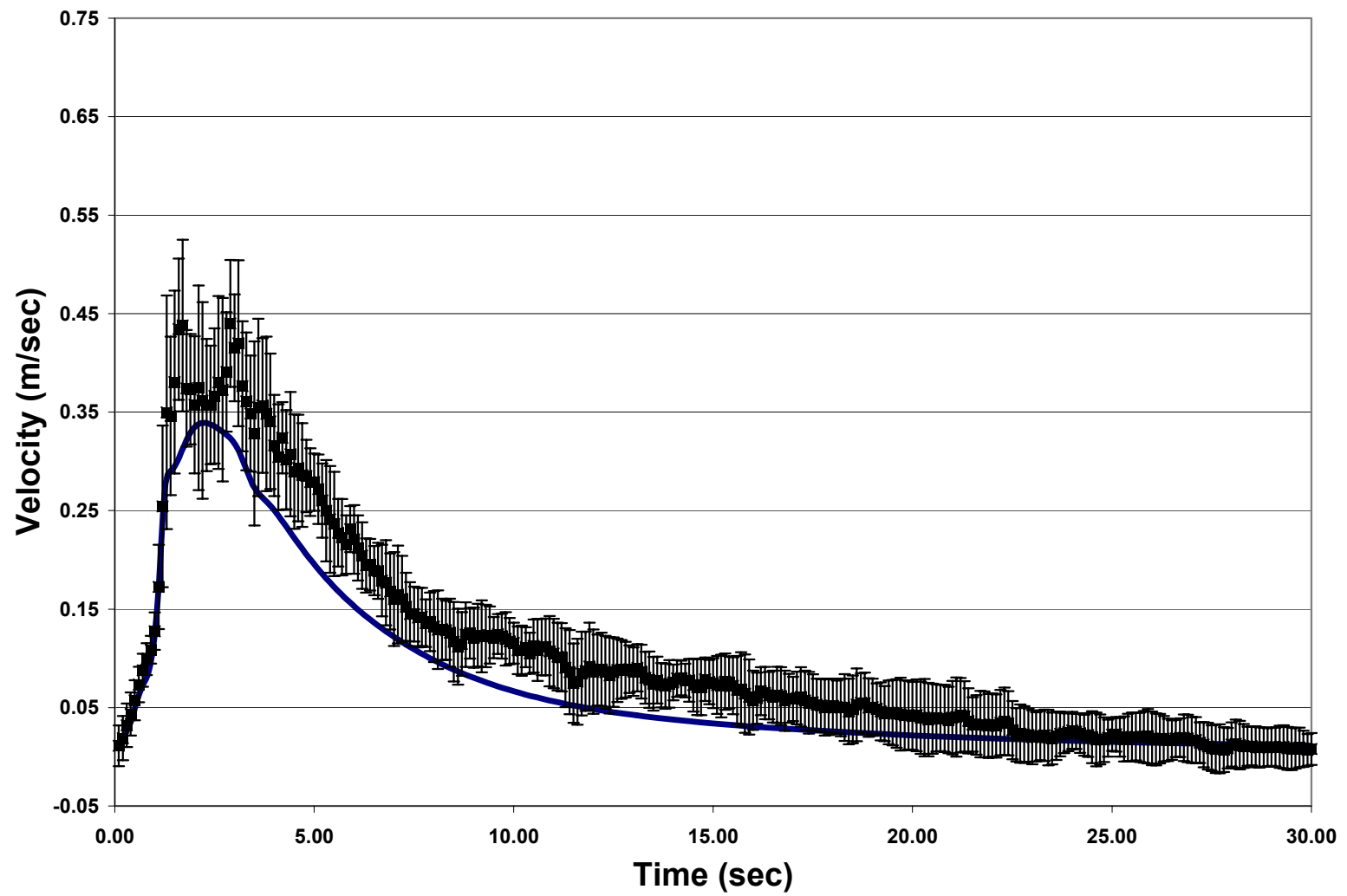


Figure 7.47. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.206 m (8.125 in) Vertical Position

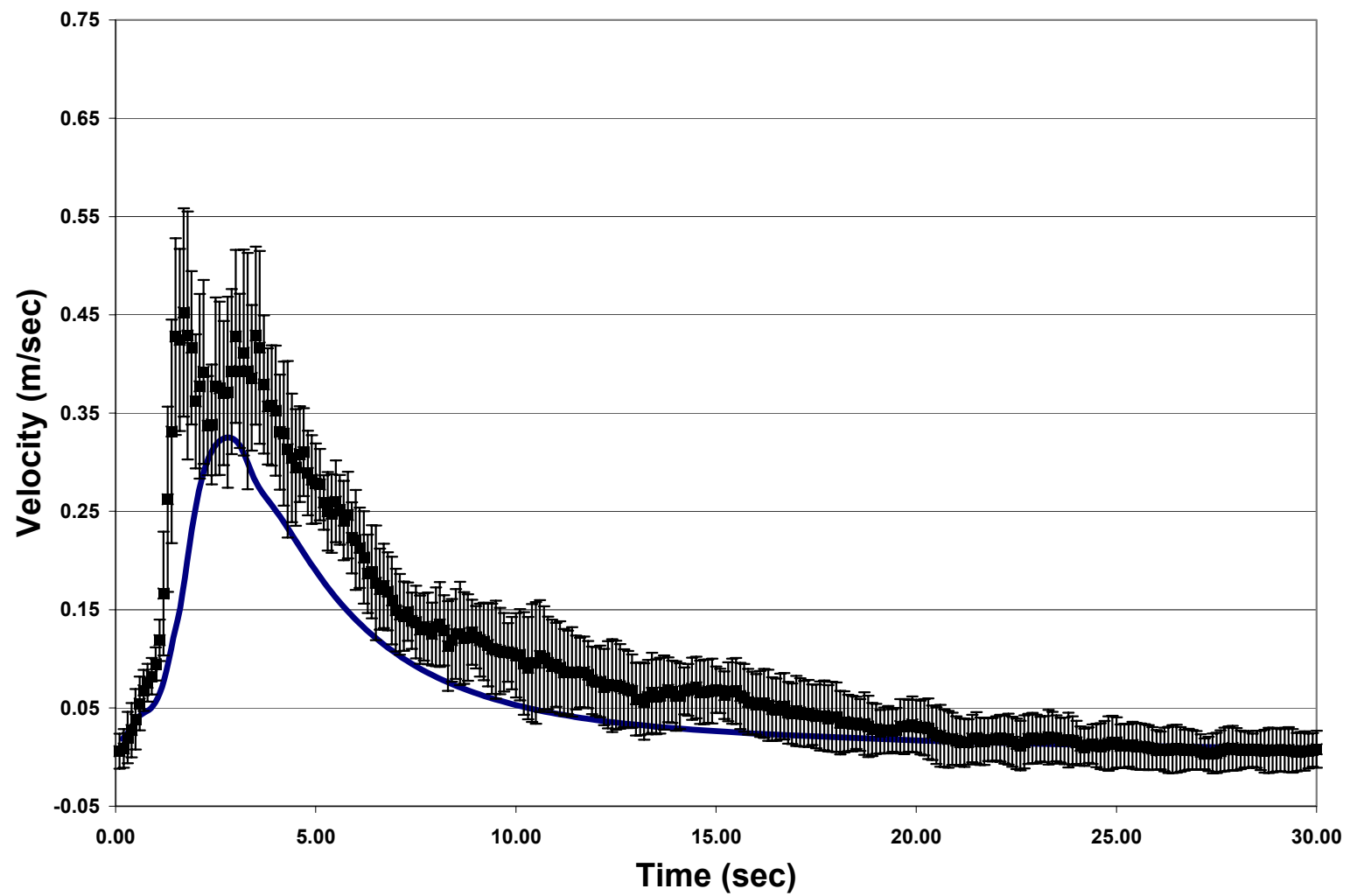


Figure 7.48. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.232 m (9.125 in) Vertical Position

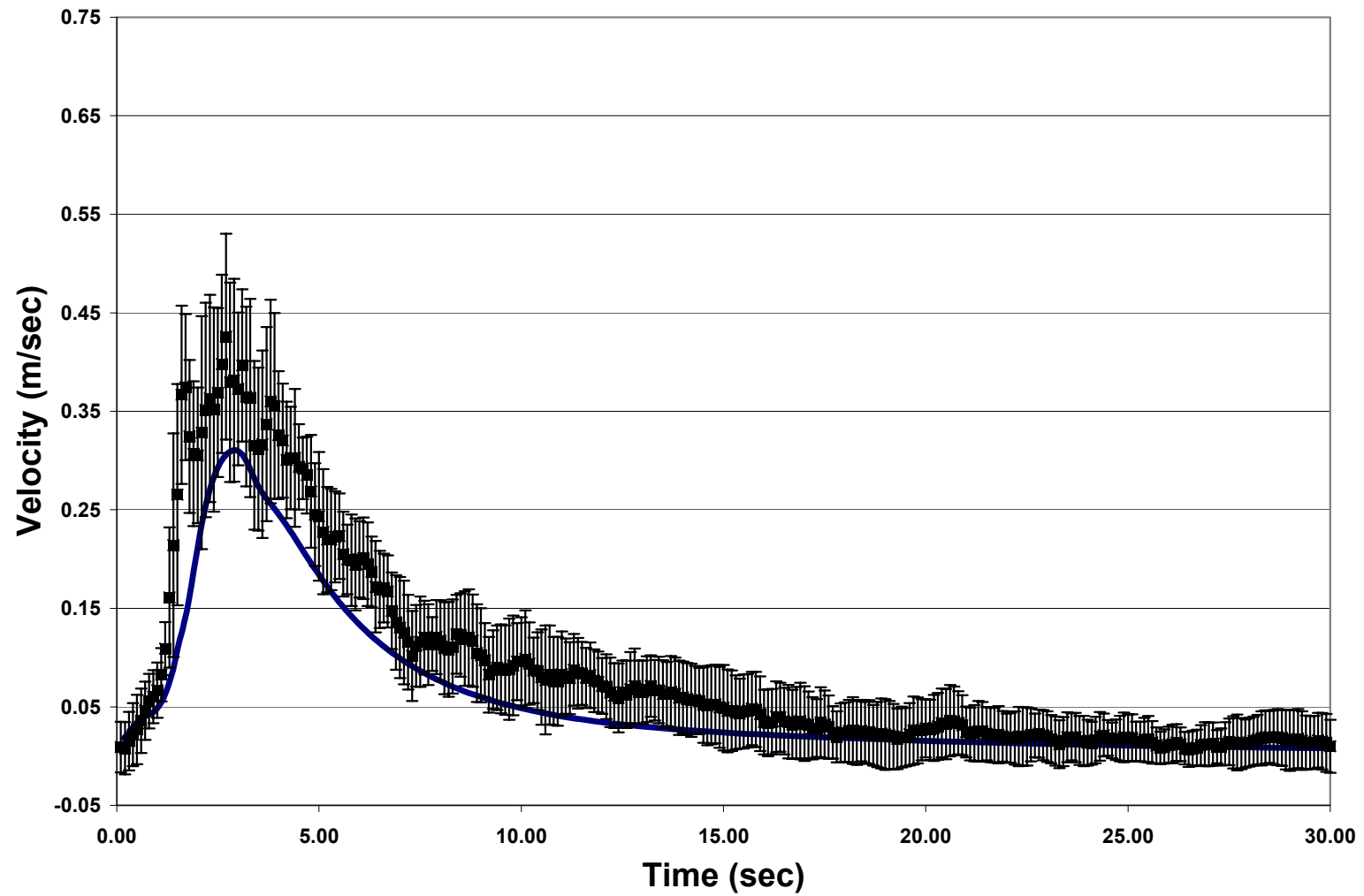


Figure 7.49. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.257 m (10.125 in) Vertical Position

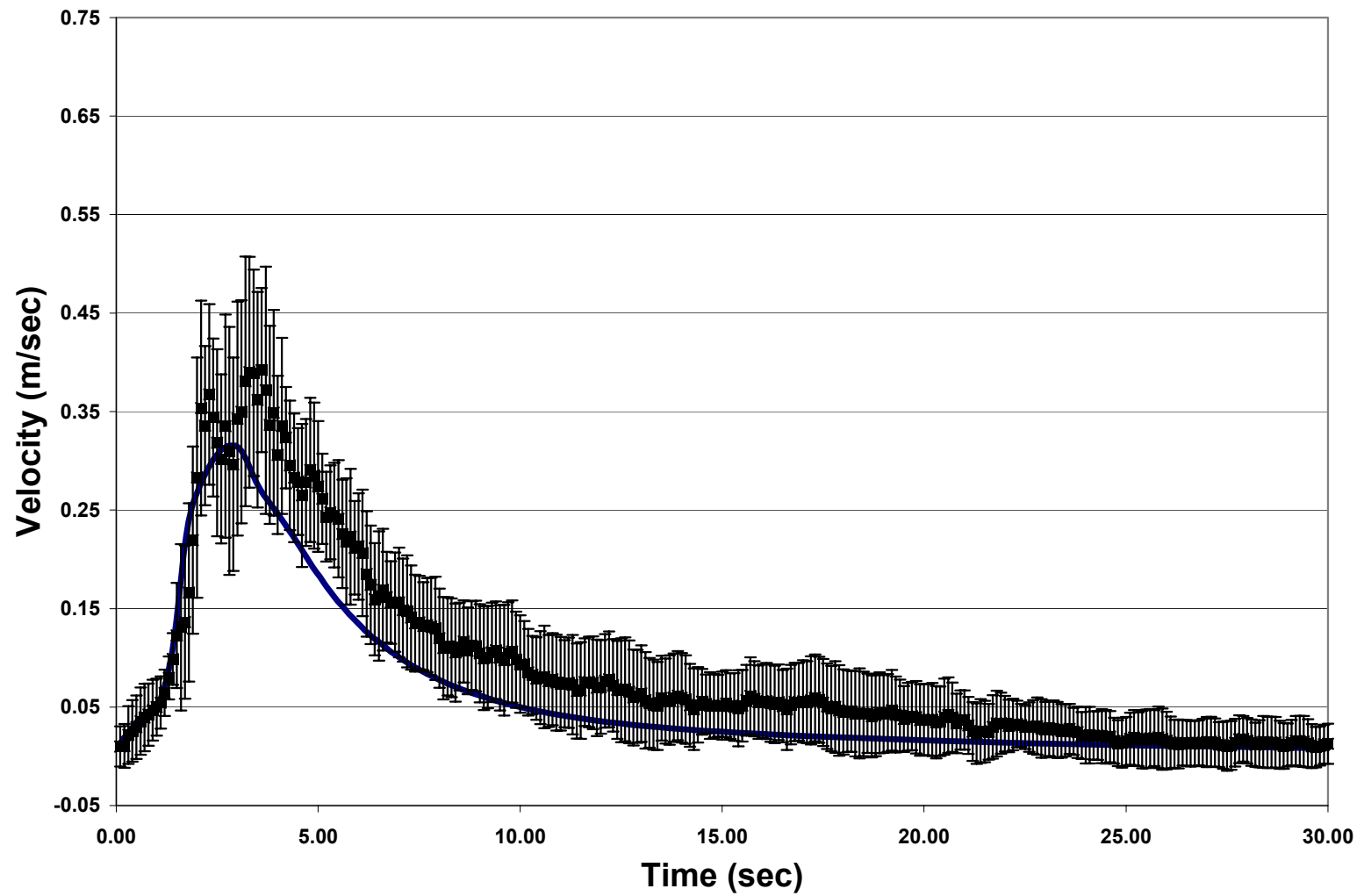


Figure 7.50. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.308 m (12.125 in) Vertical Position

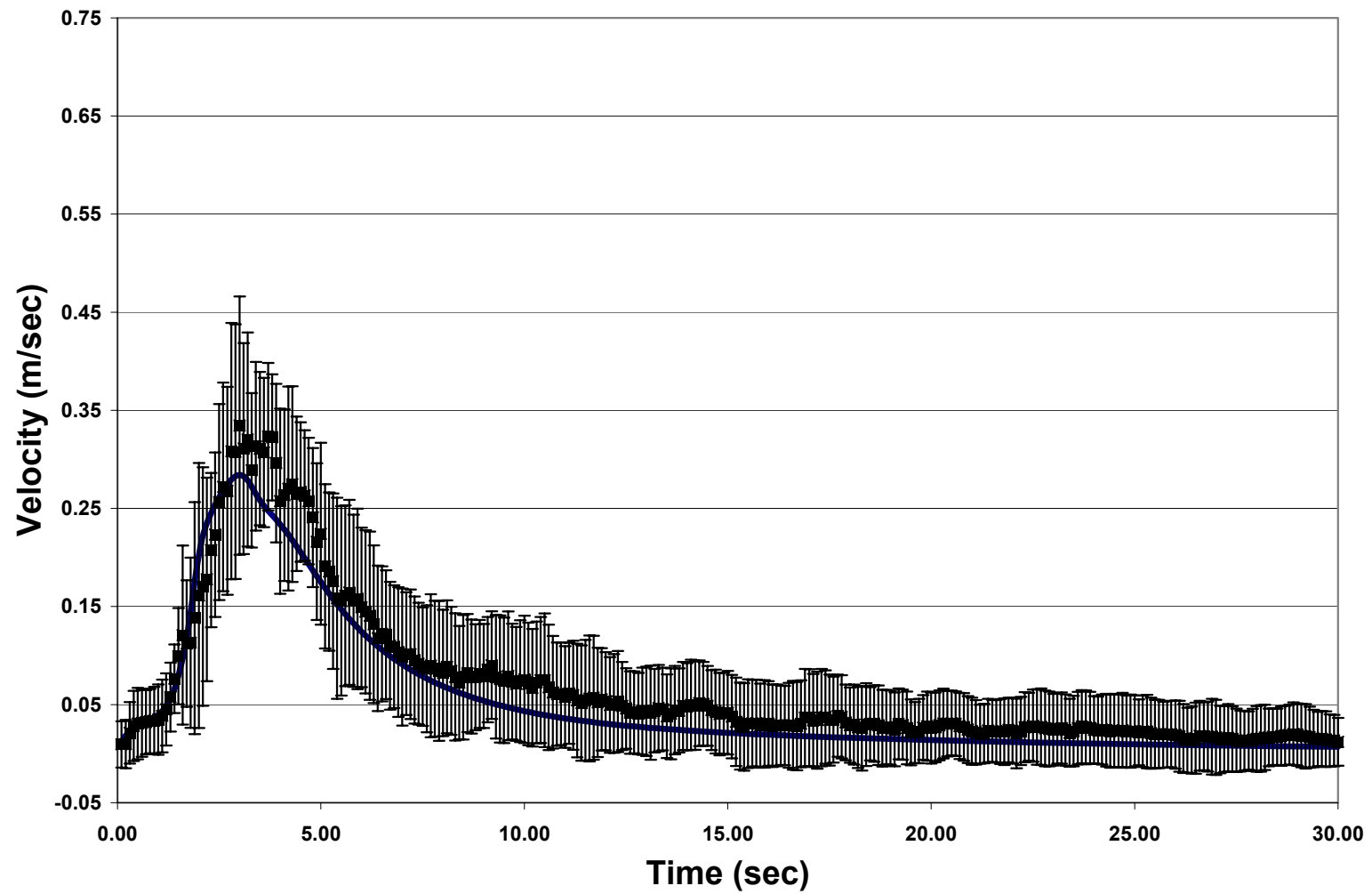


Figure 7.51. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.359 m (14.125 in) Vertical Position

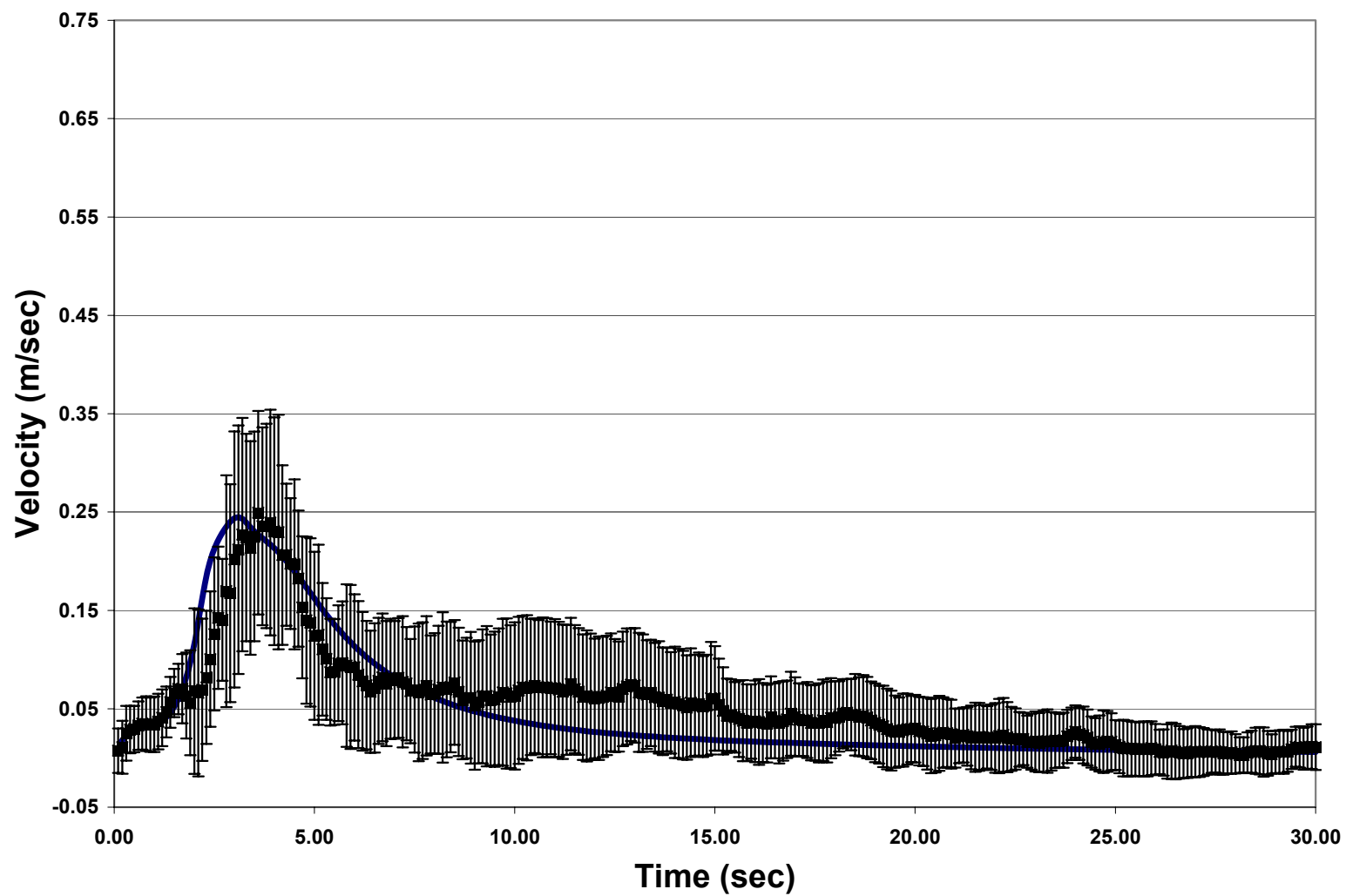


Figure 7.52. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.410 m (16.125 in) Vertical Position

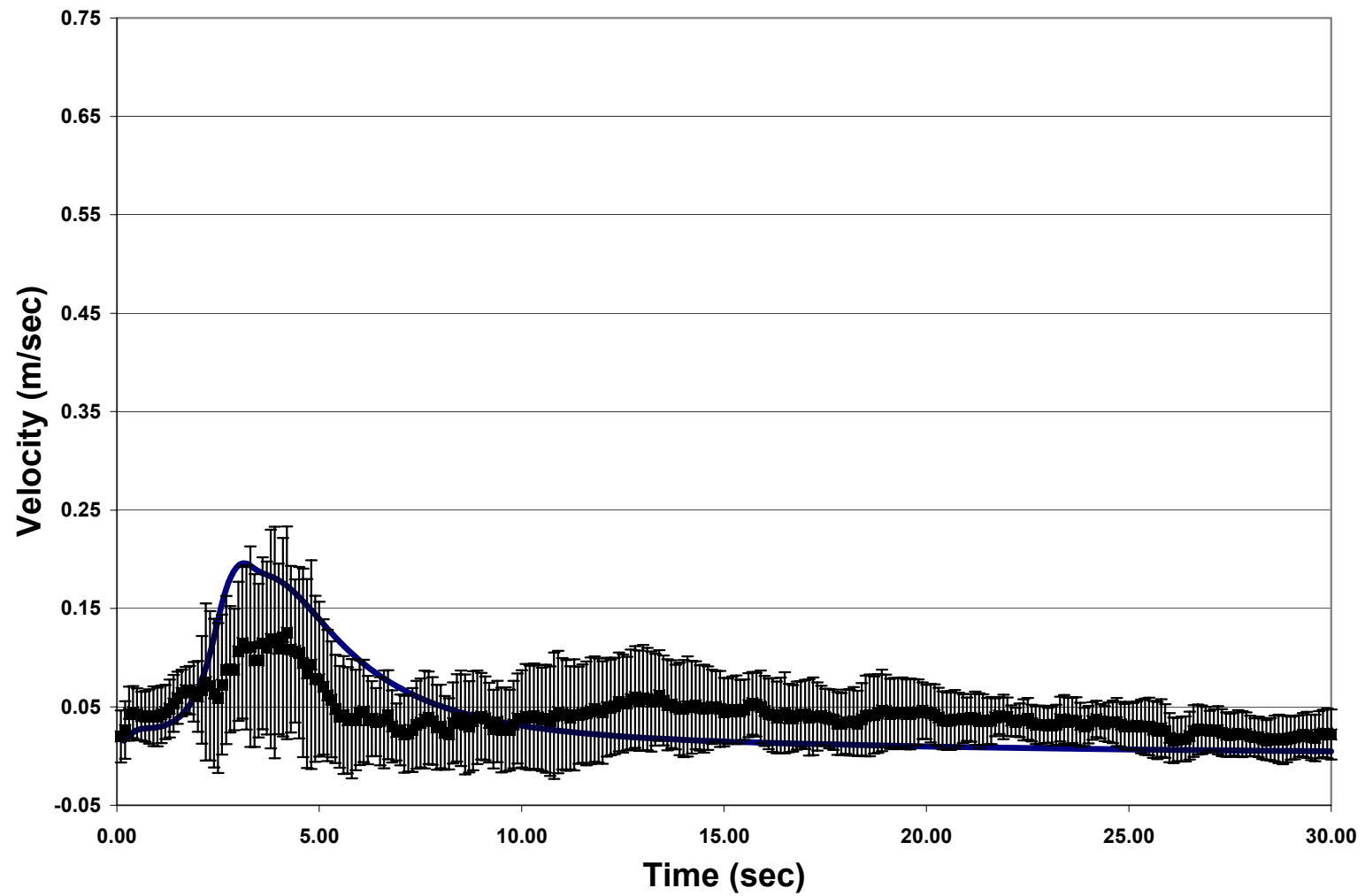


Figure 7.53. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.460 m (18.125 in) Vertical Position

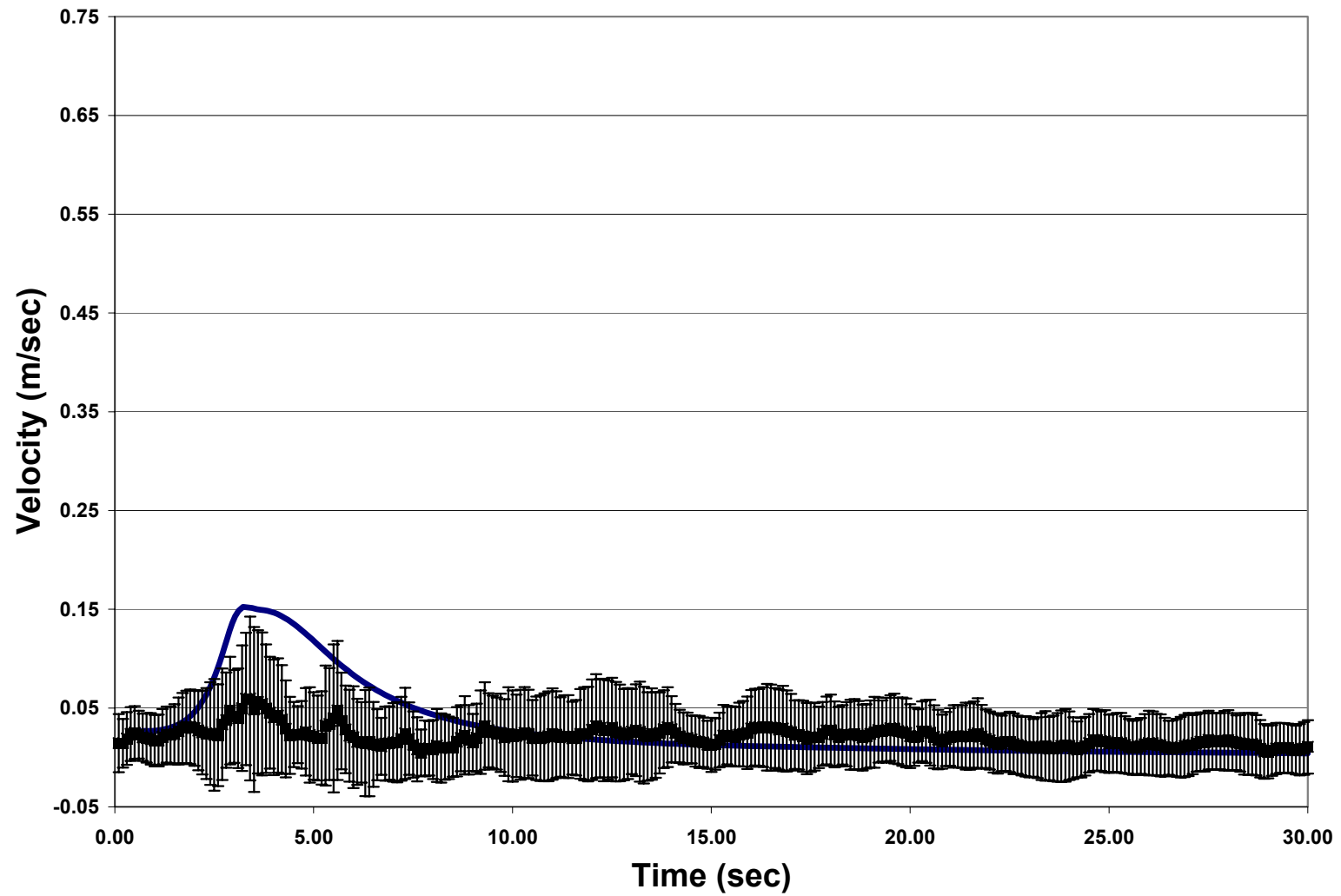


Figure 7.54. Experimentally Measured Velocities (■) and Model Predictions (—) at the 0.381 m (15 in) Radial Position and 0.511 m (20.125 in) Vertical Position

8.0 Large-Tank Hydrodynamic Validation

8.1. Overview

The small-tank hydrodynamic validation of the TEMPEST PJM model, discussed in Section 7.0, established that the wall-turbulence models capture the flow behavior near the tank surfaces and that the pulse cycle/moving liquid surface logic works correctly.

The true test of the TEMPEST's predictive capability is, however, determined by its ability to model the mixing processes in vessels of dimensions and configurations similar to those used in the actual plant. Of particular importance is its ability not only to model the flows near the tank surfaces but in the interior regions since the distribution of the solids (i.e., stratification, agglomeration or dead spots, etc.,) within the tank is of primary importance during the operation of the plant.

Before applying the TEMPEST model to tests involving solids, it is essential ensure that the model captures the hydrodynamic fluid flow behavior in vessels and PJM systems of dimensions similar to those used in the RPP-WTP.

8.2. Objectives

The objective of the large tank hydrodynamic validation was to establish that the TEMPEST PJM model could predict the fluid flow behavior in regions far away from the vessel surfaces.

8.3. Approach

Large tank experiments were conducted using the ~ 3.96 m ID x 4.57 m H (~ 13 ft ID x 15 ft H), 4 PJM test system in the 336 test facility. Large tank experiments were conducted using the ~ 13 ft ID x 15 ft H, 4 PJM test system in the 336 test facility. Time varying transients are very difficult to model and extremely time consuming since they require full 3D simulations; therefore, we attempted to make the test system as geometrically symmetric as possible. This included: 1) operating the PJMs under gravity refill to keep the cycle time constant and 2) removing protrusions in the tank that can cause asymmetries in the flow fields. However, there were certain variables beyond our control. For example, since the JPPs regulating the airflow to the pulse tubes were not identical, the drive times were not identical. In addition, the 4 PJMs were not situated exactly in the center of each quadrant of the tank (one was closer to the wall than the others). Also, the pulse tube nozzles were not exactly at the same distance from the tank floor. Finally, there were two tie beams, half way into the tank, which were used to provide additional support to the pulse tubes (These tie beams could not be removed during the testing due to structural stability concerns.).

All of the above factors contributed to asymmetries in the flow patterns within the tank as discussed in Section 5.0. Therefore, even though the velocities in the tank were mapped at several radial positions, the TEMPEST predictions are only compared against the centerline velocity data. Validation with the complete data set will require the use of a full 3D model, which was beyond the scope of the present project.

8.4. Model Input Parameters

The input parameters needed for the simulations are the dimensions of the system and the nozzle velocities. The test conditions for the small-tank hydrodynamic tests have been discussed previously and listed in Table 5.3. The nozzle velocities were determined from the measured cycle-averaged level change of the liquid in two of the pulse tubes (cf. Figure 5.12) and are presented in Figure 8.1.

8.5. Model Setup

The TEMPEST model assumed $1/8^{\text{th}}$ symmetry with one vertical plane of symmetry half way between two pulse tubes and the other vertical plane through the center of a pulse tube. The model contained 37 radial, 51 vertical, and 15 azimuthal computation cells. The elevation and plan views of the model grid are provided in Figures 8.2 and 8.3. Once again, as with the small-tank validation case, the standard k- ϵ model was used. The TEMPEST simulation using the nozzle velocity profile (shown in Figure 8.1) was repeated for several cycles until a near steady-state condition was achieved.

8.6. Results and Discussion

A comparison of the experimentally measured vertical velocities and the model predictions at the centerline as well as the elevations of 0.775, 1.31, 1.84, and 2.37 m (30.5, 51.5, 72.5, and 93.5 in) are shown in Figures 8.4 to 8.7, respectively. The solid lines represent the TEMPEST predictions and the symbols represent the experimental data.

Error bars on the experimental data represent the fluctuation in the measurements over the multi-cycle (11) averaging period. In all graphs, the error bars represent 2σ ; where σ at each time step is the standard deviation calculated from the velocity values of 11 cycles.

Because there were several factors that caused the asymmetries in the flow behavior in the tank, the average values, especially during the peak of the drive phase, are lower than they would be in a completely symmetric system. This is because the peaks in the fluid velocities at a given location in the tank do not occur at the same time during each cycle due to the unsteady state nature of the flow in the tank. Since the fully symmetric model (if working correctly) will always over predict the measured velocities, the maximum velocity measured at each time step during the 11 cycles for which the data was gathered and is presented in each graph.

Figures 8.4 to 8.7 show, that in almost all cases, the predicted peak velocities were 20% greater than the cycle average values. In addition, when the comparison is made with the maximum peak velocities observed, the predictions are within 5% of the experimental values. As expected, the model predictions are always greater than the average peak velocities since there is an azimuthal component to the velocity dissipation with the tank. This is not the case with the model in which complete symmetry is assumed.

It is important to note from Figures 8.4 to 8.7 that, even though the model over predicts the peak velocities, the model matches the experimental velocities throughout the remaining portion of the cycle.

8.7. Conclusions and Recommendations

The model acceptably matches the experimental data given the asymmetries in the flow behavior and the uncertainties in the velocity and liquid level change measurements (used to determine the drive function). Also, despite the over prediction in the peak velocities, the model matches the experimental velocities throughout the remaining portion of the cycle.

Except for the peak velocities, the model predictions were within the $\pm 10\%$ criteria discussed in Section 2.0. Although this validates the hydrodynamic model, developing and testing a full 3D model of the system (incorporating the asymmetries) would further increase the credibility of the model.

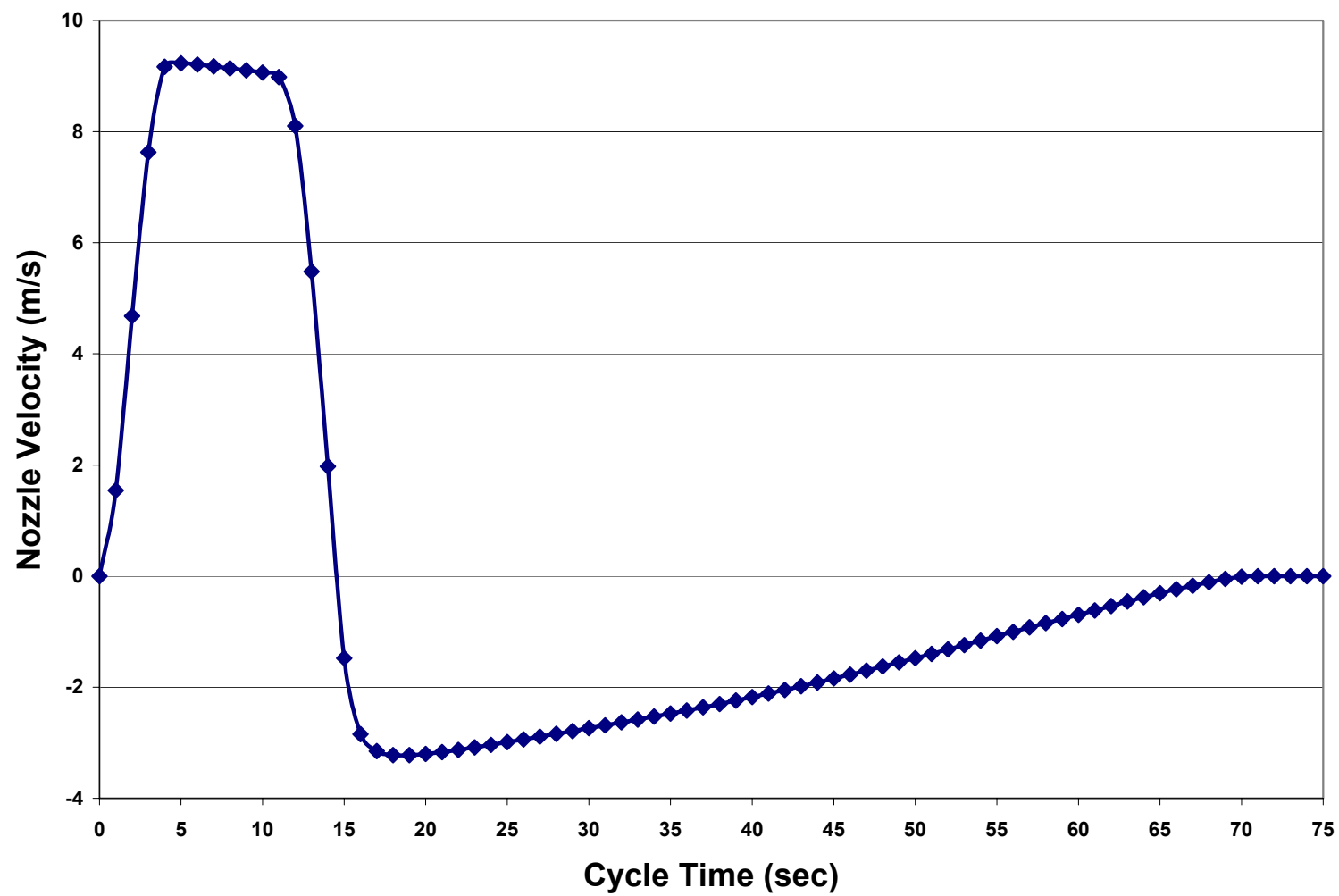


Figure 8.1. Nozzle Velocities Computed from the Time-averaged Liquid Level Change in the Large-tank Pulse Tubes

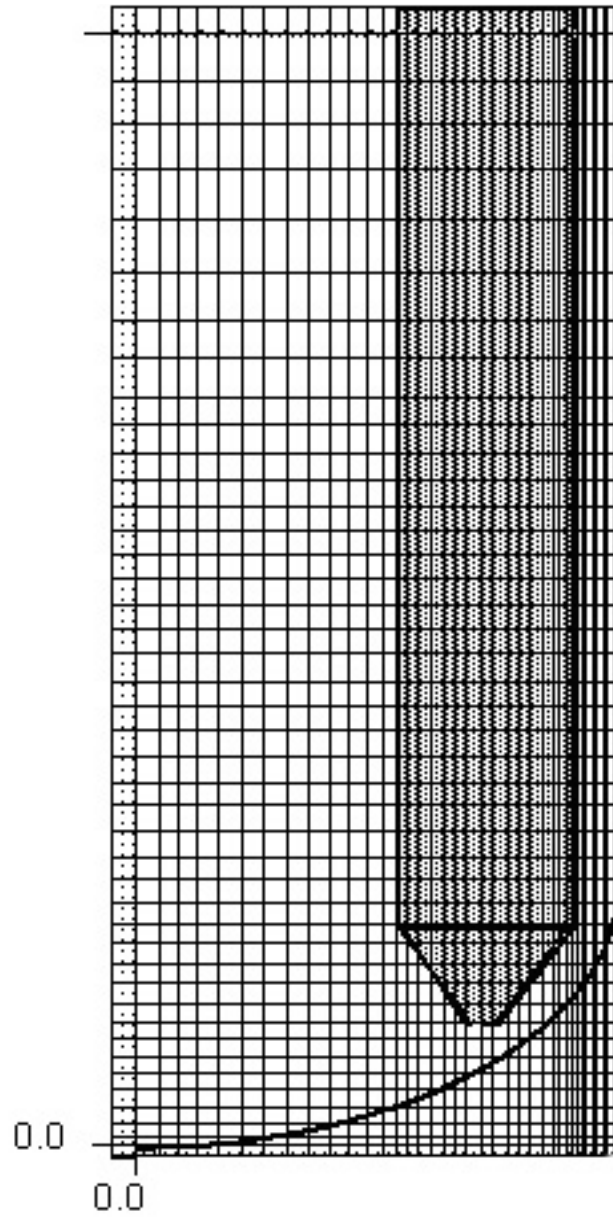


Figure 8.2. Elevation View of the Grid Used in the Large-tank Simulations

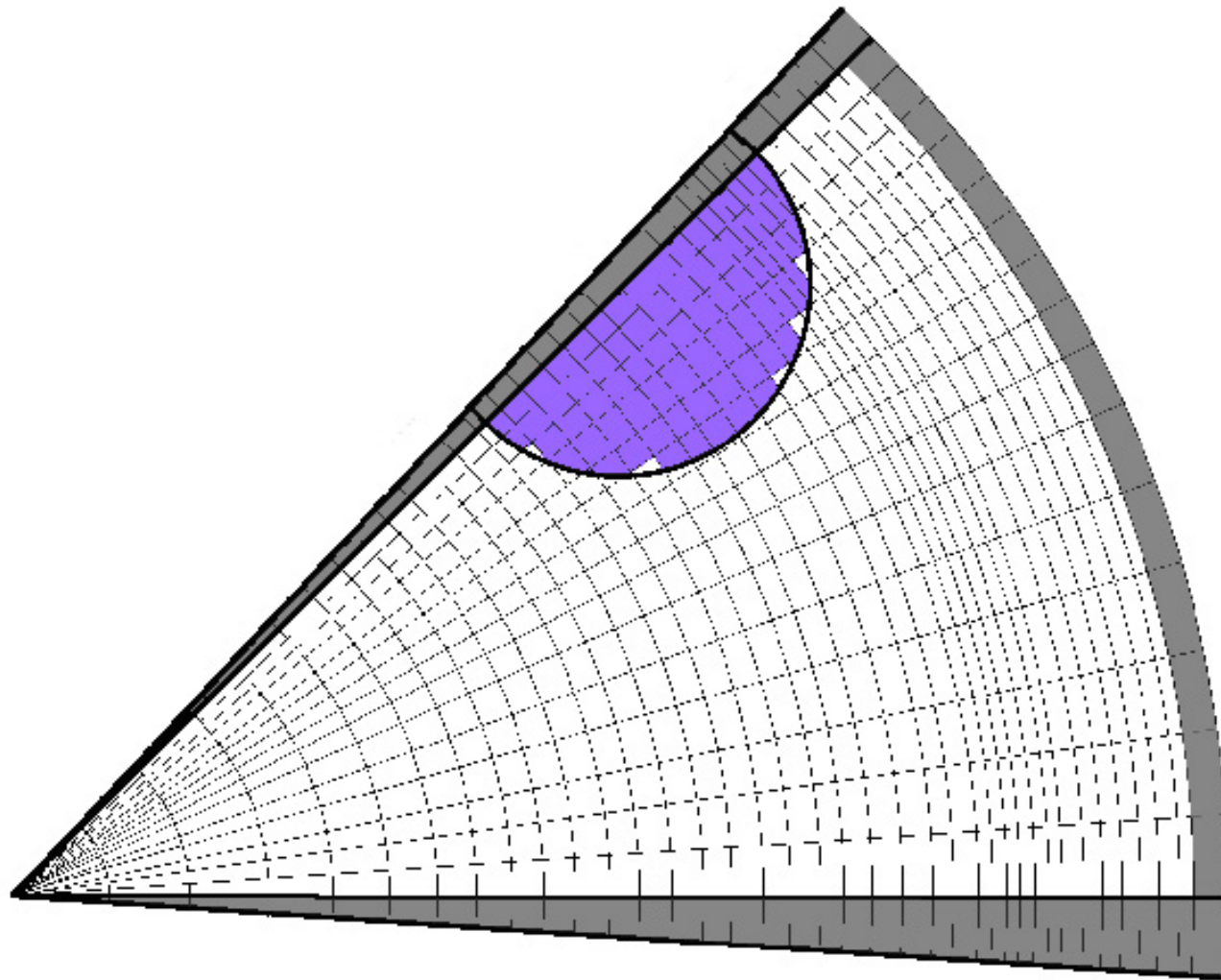


Figure 8.3. Plan View of the Grid Used in the Large-tank Simulations

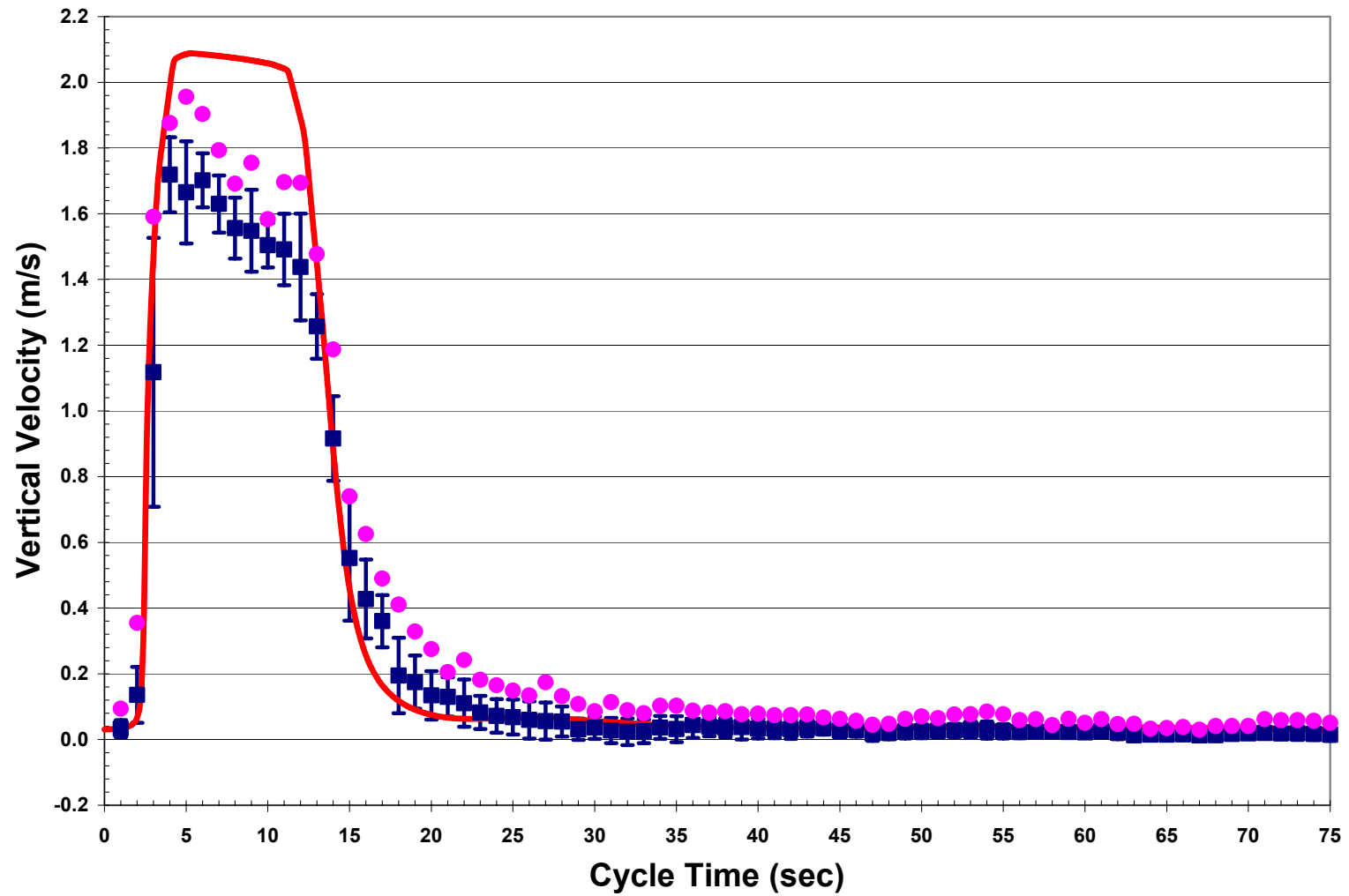


Figure 8.4. Experimentally Measured Cycle Averaged (■) and Maximum (●) Velocities and Model Predictions (—) at the Tank Centerline Radial Position and 0.775 m (30.5 in) Elevation

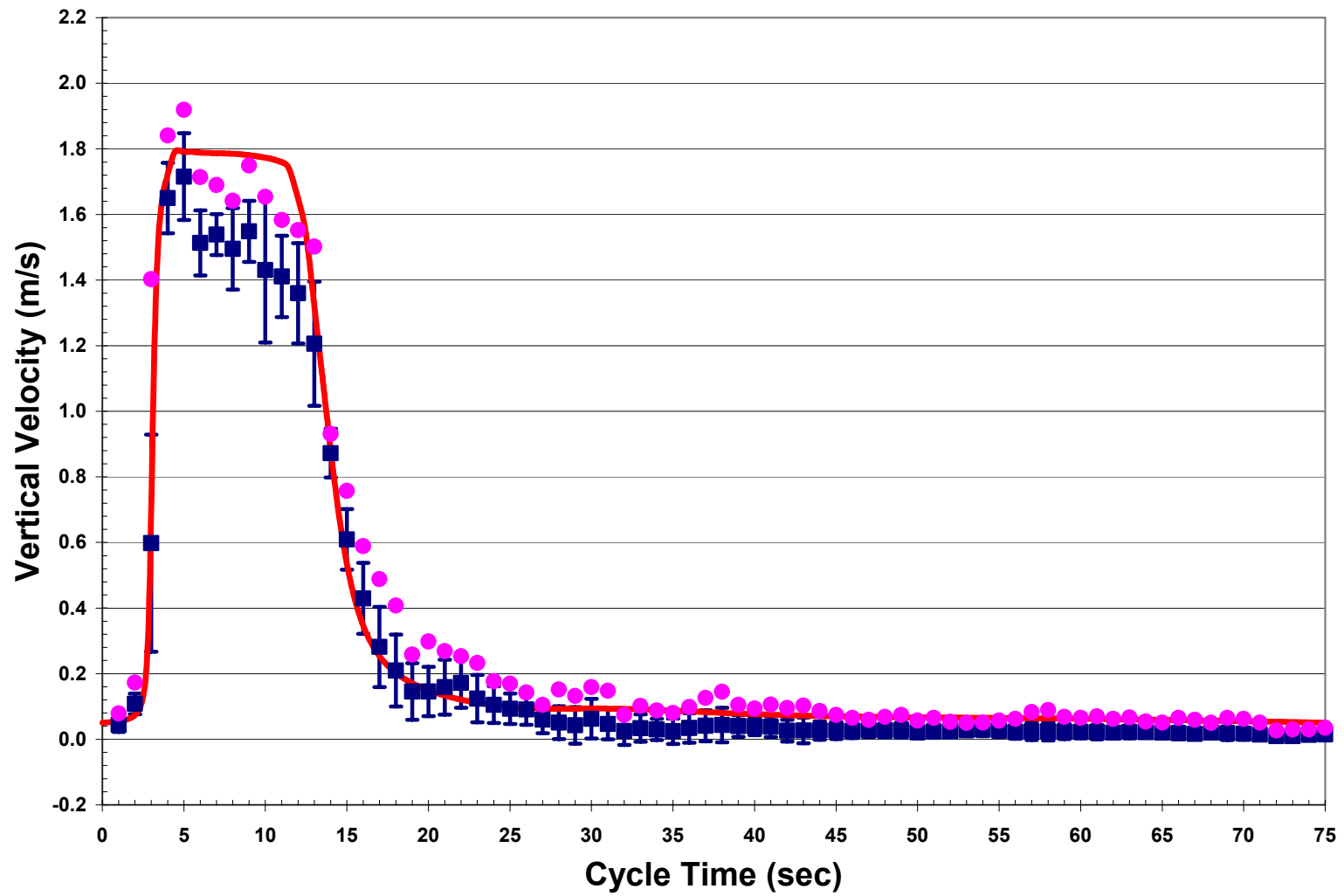


Figure 8.5. Experimentally Measured Cycle Averaged (■) and Maximum (●) Velocities and Model Predictions (—) at the Tank Centerline Radial Position and 1.308 m (51.5 in) Elevation

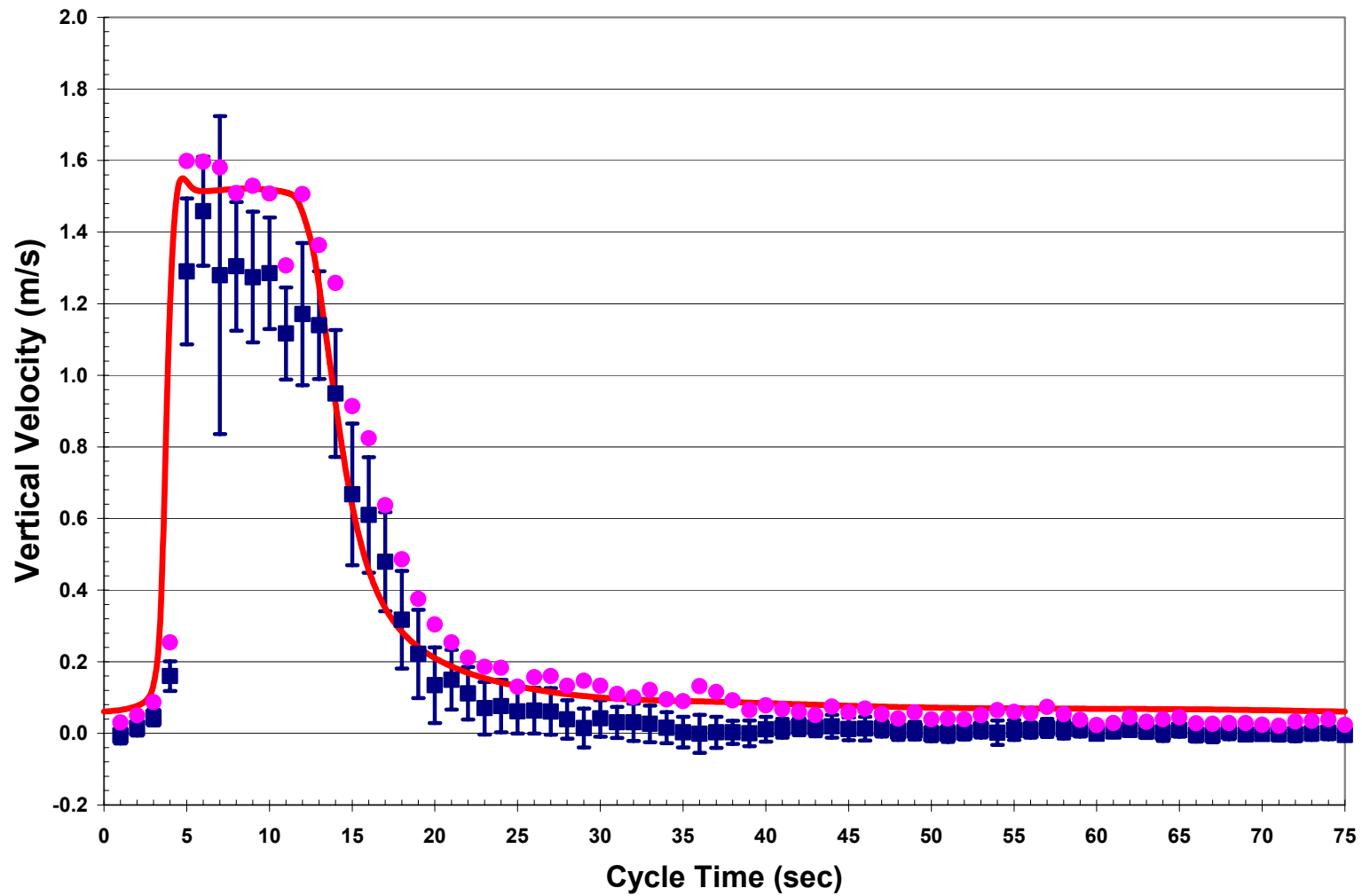


Figure 8.6. Experimentally Measured Cycle Averaged (■) and Maximum (●) Velocities and Model Predictions (—) at the Tank Centerline Radial Position and 1.842 m (72.5 in) Elevation

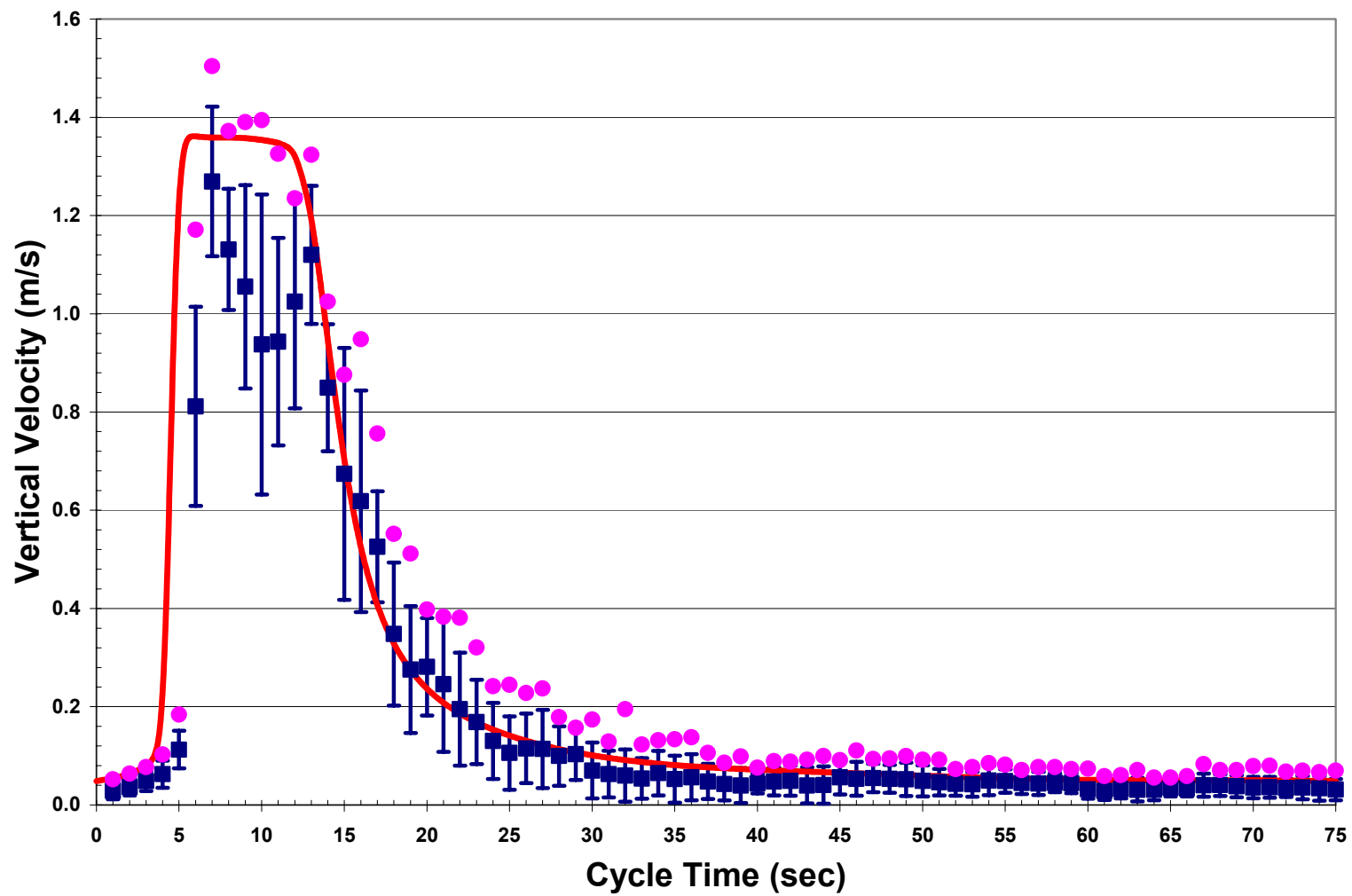


Figure 8.7. Experimentally Measured Cycle Averaged (■) and Maximum (●) Velocities and Model Predictions (—) at the Tank Centerline Radial Position and 2.37 m (93.5 in) Elevation

9.0 Large-Tank Simulant Validation

9.1 Overview

The settling model validation and the small/large-tank hydrodynamic validation of the TEMPEST PJM model have established that: 1) the pulse cycle/moving liquid surface logic works correctly, 2) the wall-turbulence models capture the flow behavior near the tank surfaces, 3) standard k-e models are sufficient to model the hydrodynamics within the interior regions of the tank, and 4) the settling sub-models capture the physics of the particle motion in a stagnant fluid.

The final test of the TEMPEST's predictive capability was to demonstrate that the model can be used to predict the distribution of the solids (i.e., stratification, agglomeration or dead spots, etc.) under dynamic mixing conditions.

9.2 Objectives

The objective of the large-tank simulant validation was to establish that the TEMPEST PJM model can be used to model the mixing processes in vessels of dimensions and configurations similar to those used in the actual plant.

9.3 Approach

Large tank simulant mixing experiments were conducted using the ~ 3.96 m ID x 4.57 m H (~ 13 ft ID x 15 ft H), 4 PJM test system in the 336 test facility using a ~ 75 μm glass beads. The ~ 75 μm volume mean diameter particle sized glass beads were chosen as the simulant for these tests because it: 1) was an extremely fast settling simulant, 2) introduces conditions where it is possible for significant solids to buildup in the tank during the PJM operation, and 3) would enable us to test the model under conditions of solids stratification within the tank.

At the time when the simulant tests were conducted, it was unknown to us that there were several protrusions along the floor of the tank. Also, one of these protrusions was right beneath one of the pulse tubes. This protrusion significantly altered the core flow upwards. Although this and the other flow obstructions along the floor of the tank were subsequently removed, and the hydrodynamic tests were repeated, sufficient funding was not available to repeat the simulant mixing tests. The following section discusses why this fact, make the present data unsuitable for the validation of the TEMPEST PJM model.

9.4 Model Input Parameters

The input parameters needed for the simulations are the dimensions of the system, nozzle velocities, the concentration, clear fluid settling velocity, and the maximum packing factor for the solids phase. The PJM operating conditions for these tests have been discussed previously and listed in Table 5.4. The total solids loading was 10-wt% (~ 4.2 volume %), which would have resulted in a slurry of density

1064 kg/m³ under fully mixed conditions. Since these glass beads have a very narrow particle size distribution (~75 µm mean PSD), the settling velocity was determined from stokes law given by:

$$V_{so} = \frac{g D_p^2 (\rho_p - \rho)}{18 \mu} \quad (9.1)$$

where:

g	=	gravitational constant	=	9.81 m/s ²
D_p	=	Volume mean particle diameter	=	7.5E-06 m
ρ_p	=	Particle Density	=	2490 kg/m ³
ρ	=	Density of the supernatant fluid	=	1000 kg/m ³ @ 20 °C
μ	=	Viscosity of the supernatant fluid	=	8.904E-04 pa-s @ 20 °C

Using the solid and liquid properties listed above, the clear fluid settling velocity for the 75 µm glass beads is estimated to be 0.005 m/s (0.5 cm/sec). The maximum packing factor from was measured to be 0.75. The nozzle velocities were determined from the measured cycle-averaged level change of the liquid in two of the pulse tubes and are presented in Figure 9.1.

9.5 Model Setup

As with the large-tank hydrodynamic system modeling, the TEMPEST model assumed 1/8th symmetry with one vertical plane of symmetry half way between two pulse tubes and the other vertical plane through the center of a pulse tube. The model contained 37 radial, 51 vertical, and 15 azimuthal computation cells. The model grid was similar to that presented in Section 8 for the large-tank hydrodynamic tests (cf. Figures 8.2 and 8.3). As with the small/large-tank hydrodynamic validation cases, the standard k-ε model was used. Finally, in all initial simulations the concentration dependent viscosity and erosion deposition sub-model were not turned on. The TEMPEST simulation using the nozzle velocity profile (shown in Figure 9.1) was repeated for several cycles until a near steady-state condition was achieved.

9.6 Results and Discussion

Density measurements were made at several radial positions and elevations within the tank. A comparison of the experimentally measured slurry densities and the model predictions at the at the radial position of 0.222 m (8.75 in) as well as the elevations of 0.686, 0.838, 0.965, 1.14, 1.30, 1.45, 1.60 m (27, 33, 39, 45, 51, 57, 63 in) are shown in Figures 9.2 to 9.8, respectively. The solid lines represent the TEMPEST predictions and the symbols represent the experimental data.

Error bars on the experimental data represent the fluctuation in the measurements over the multi-cycle averaging period. In all graphs, the error bars represent 2σ; where σ at each time step is the standard deviation calculated from the density values of 5 or more cycles.

The data in Figures 9.2 to 9.8 show that at low elevations (0.686, 0.868, and 0.965 m [27, 33, and 39 in]), the TEMPEST model predicts lower solids concentrations than those observed experimentally. At

higher elevations (1.30, 1.45, and 1.60 m [51, 57, and 63 in]) in the tank, it can be seen that TEMPEST tends to over predict the solids concentration. Similar behavior was observed at the other two radial positions where the density measurements were made.

There are several factors that can account for the differences between the model and experimental data. The most important factor is the asymmetry in the flow, which is causing a significant radial dissipation of the mixing energy. This can be understood by examining the velocity profiles in the tank measured during the hydrodynamic (water only) tests before and after the flow obstructions were removed. These profiles for two different elevations are shown in Figures 9.9 and 9.10. It can be seen that at both elevations, the maximum velocity decreases by a factor of 2 in the presence of the flow obstructions.

The other factors that can also contribute to the differences between the experimental measurements and the model predictions are: 1) solids that settle in the bottom of the tank can compact, thereby requiring energy to resuspend and 2) slurry viscosity varies with solids concentration. TEMPEST has the required sub-models to handle both these issues. However, as noted in Section 2.0, schedule and budget constraints precluded testing the erosion model in TEMPEST as part of this project. It was decided that unless hydrodynamic are accurately depicted in this system, keying in arbitrary numbers to match the experimental data would not necessarily validate the model. Therefore, all further attempts to validate the model with the simulant data were abandoned.

9.7 Conclusions and Recommendation

Because the large-scale simulant test could not be repeated after the protrusions from the floor were removed, the asymmetries of the flow fields in the tank due the resulting obstructed flow made the data insufficient to validate the TEMPEST PJM model. It was not possible to repeat the large-tank simulant tests due to budgetary and schedule constraints. Since the application of the code to actual mixing vessels depends upon its established predictive capability, it is strongly recommended that these experiments be repeated to complete the code validation. The other approach would be to model the effect of the protrusion in the tank, which would require a 3-D simulation of the entire tank instead of symmetric 1/8 segment as was done. However, such a simulation would be very time consuming and the actual flow field is probably very complicated, making the results difficult to interpret even with an accurate simulation. Hence, this approach is not recommend.

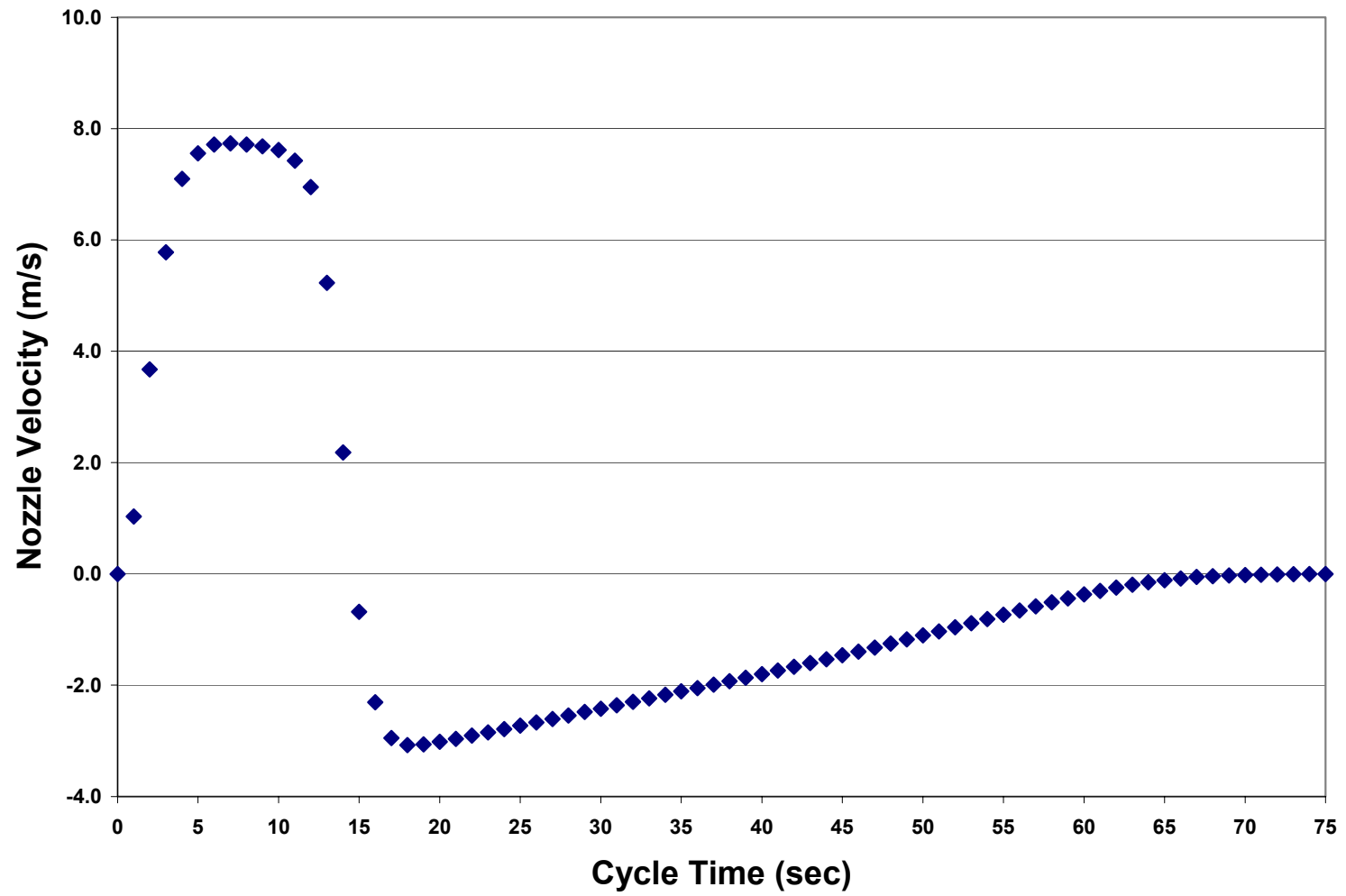


Figure 9.1. Nozzle Velocities Computed from the Cycle-averaged Liquid Level Change in the Pulse Tube During the Large-tank Simulant Testing

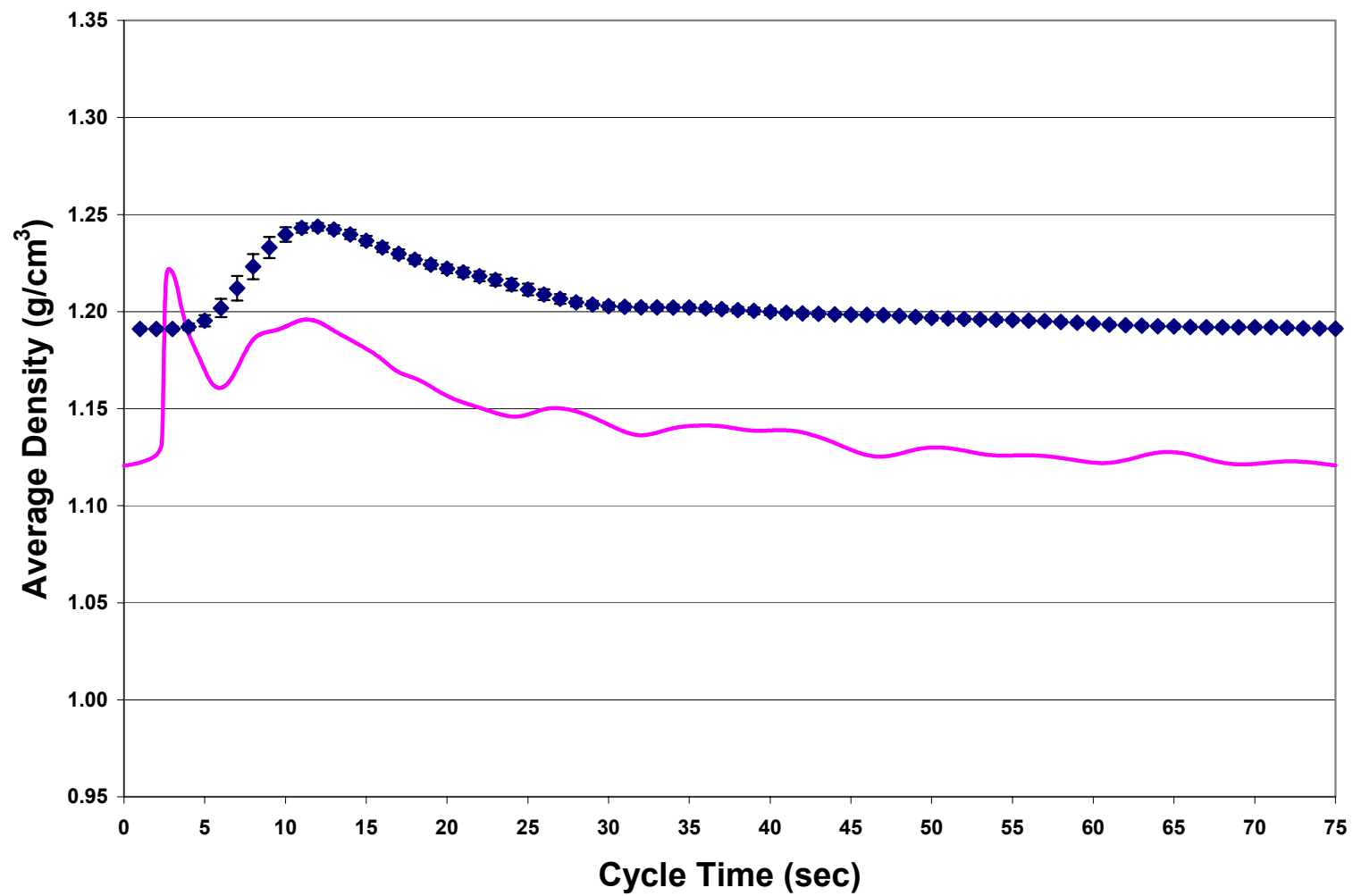


Figure 9.2. Experimentally Measured Densities (◆) and Model Predictions (—) at 0.22 m (8.75 in) Radial Position and 0.659 m (27 in) Vertical Position

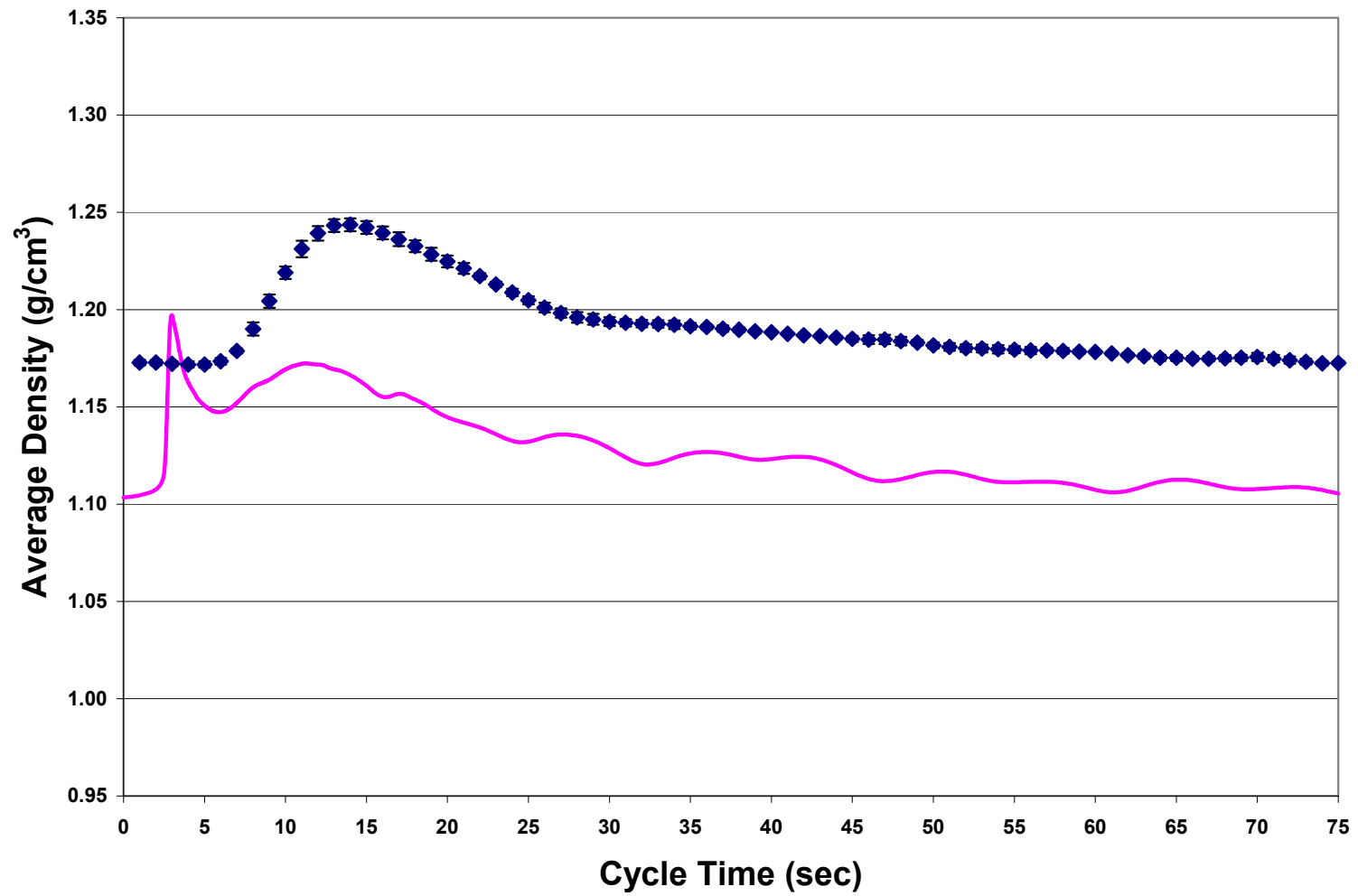


Figure 9.3. Experimentally Measured Densities (◆) and Model Predictions (—) at 0.22 m (8.75 in) Radial Position and 0.838 m (33 in) Vertical Position

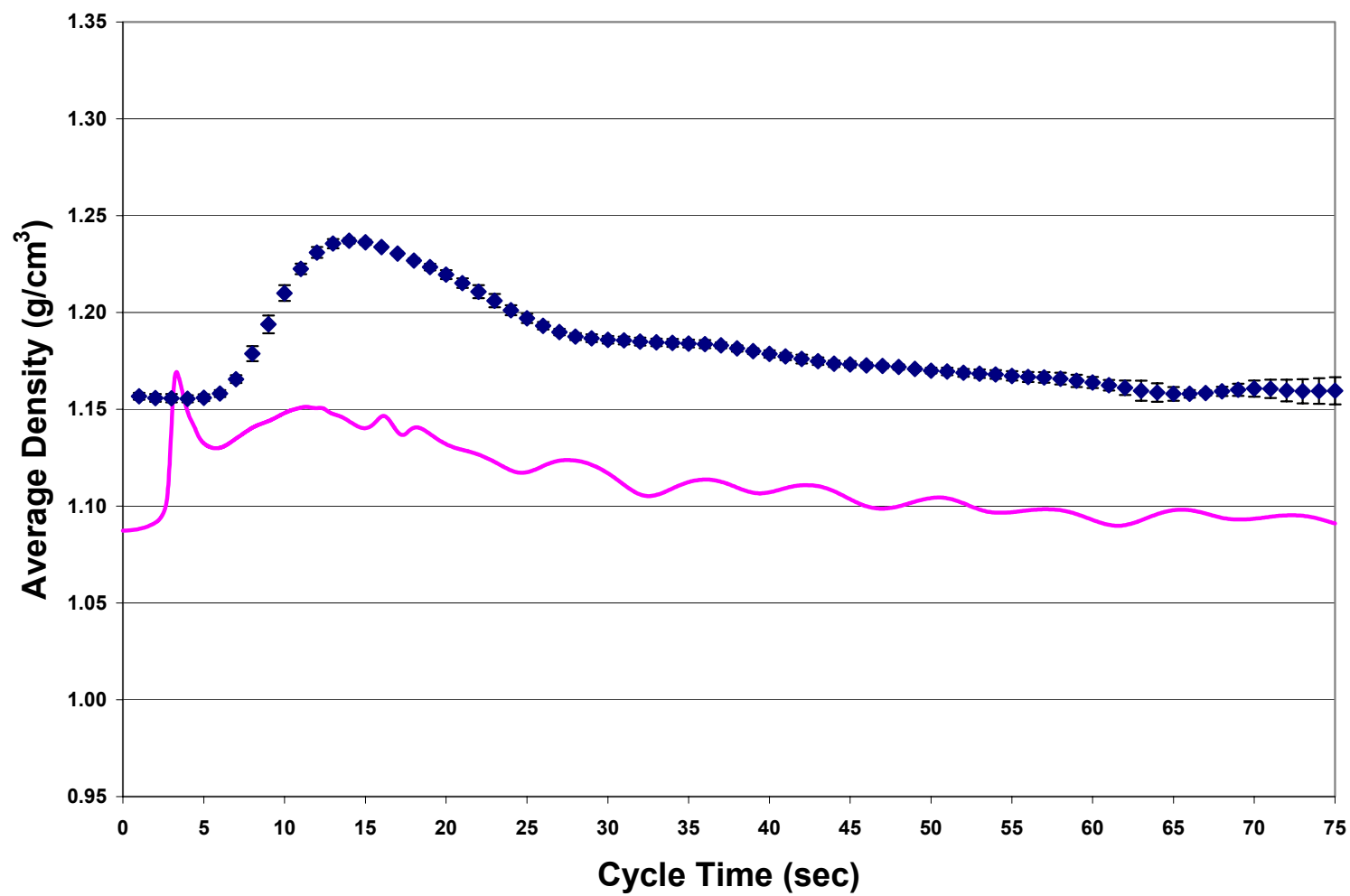


Figure 9.4. Experimentally Measured Densities (◆) and Model Predictions (—) at 0.22 m (8.75 in) Radial Position and 0.991 m (39 in) Vertical Position

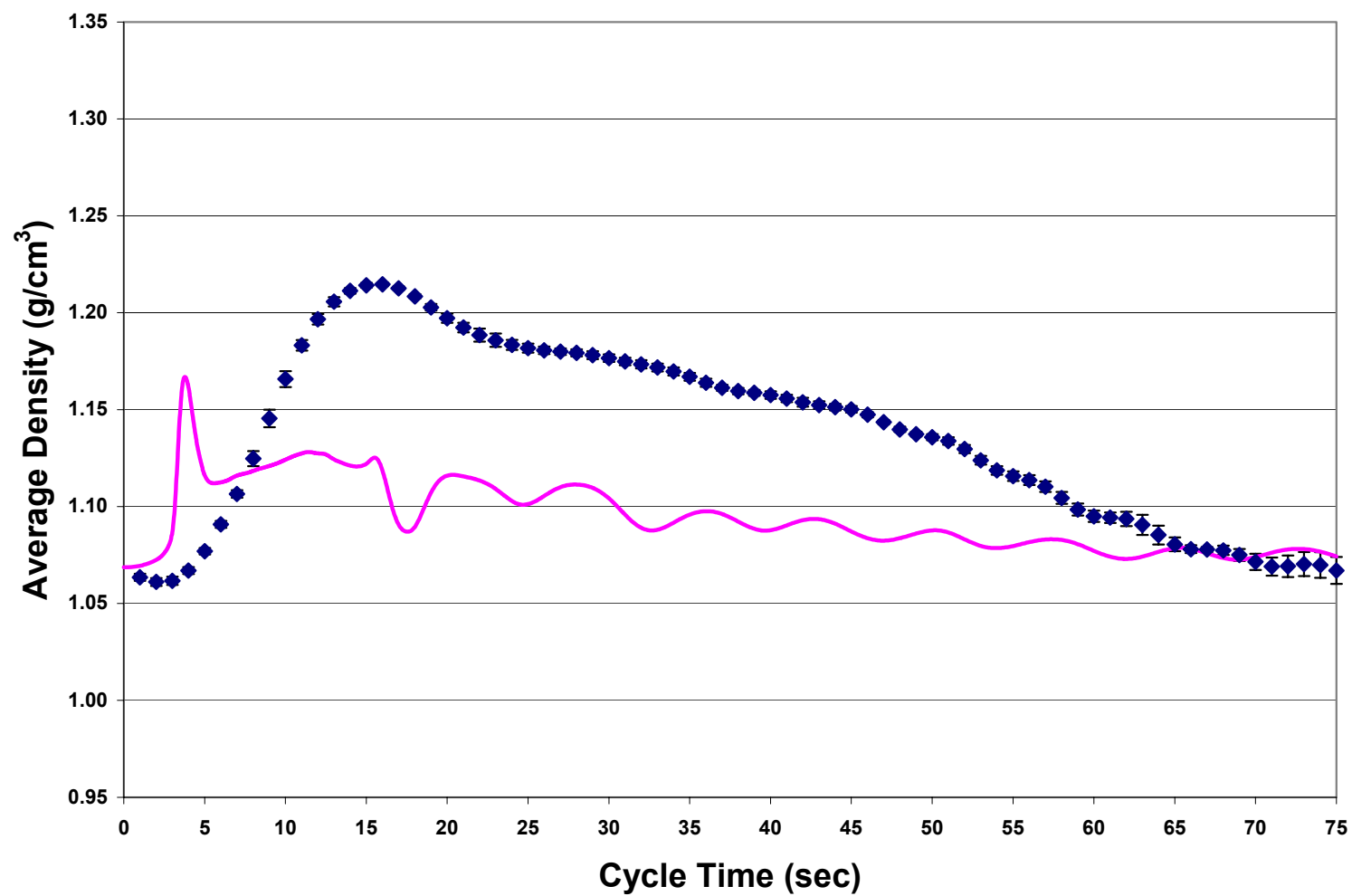


Figure 9.5. Experimentally Measured Densities (◆) and Model Predictions (—) at 0.22 m (8.75 in) Radial Position and 1.143 m (45 in) Vertical Position

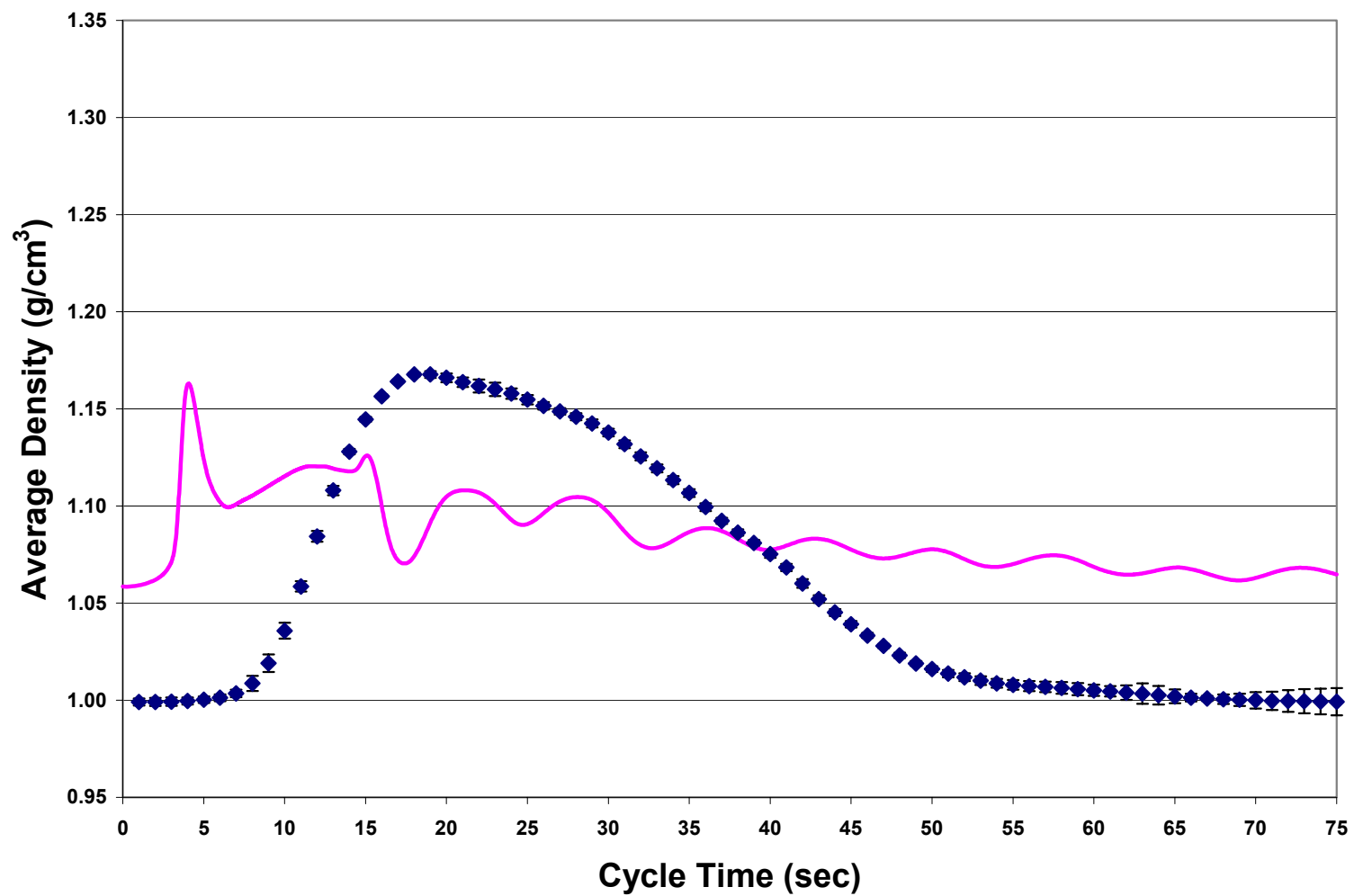


Figure 9.6. Experimentally Measured Densities (◆) and Model Predictions (—) at 0.22 m (8.75 in) Radial Position and 1.295 m (51 in) Vertical Position

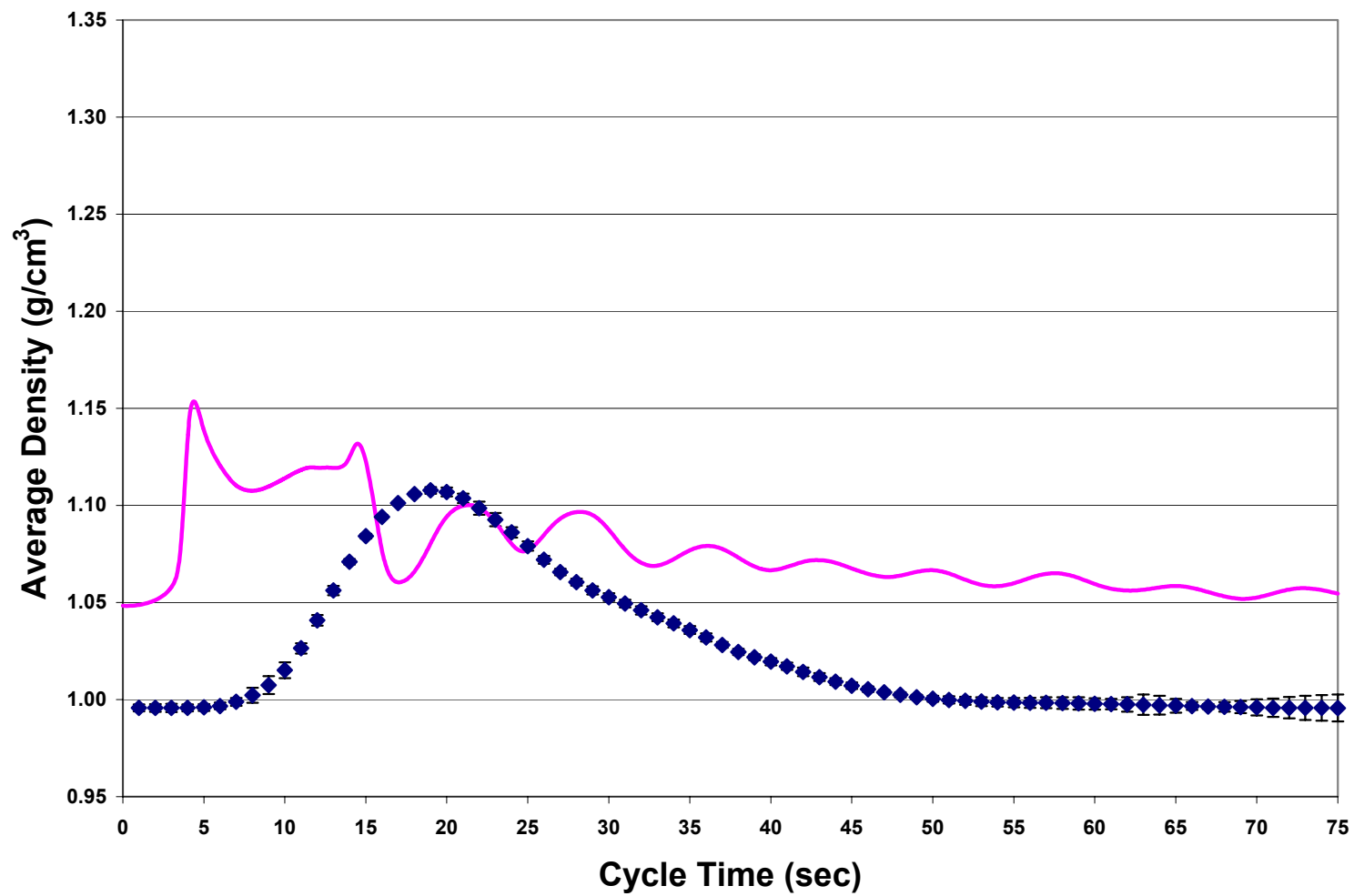


Figure 9.7. Experimentally Measured Densities (◆) and Model Predictions (—) at 0.22 m (8.75 in) Radial Position and 1.448 m (57 in) Vertical Position

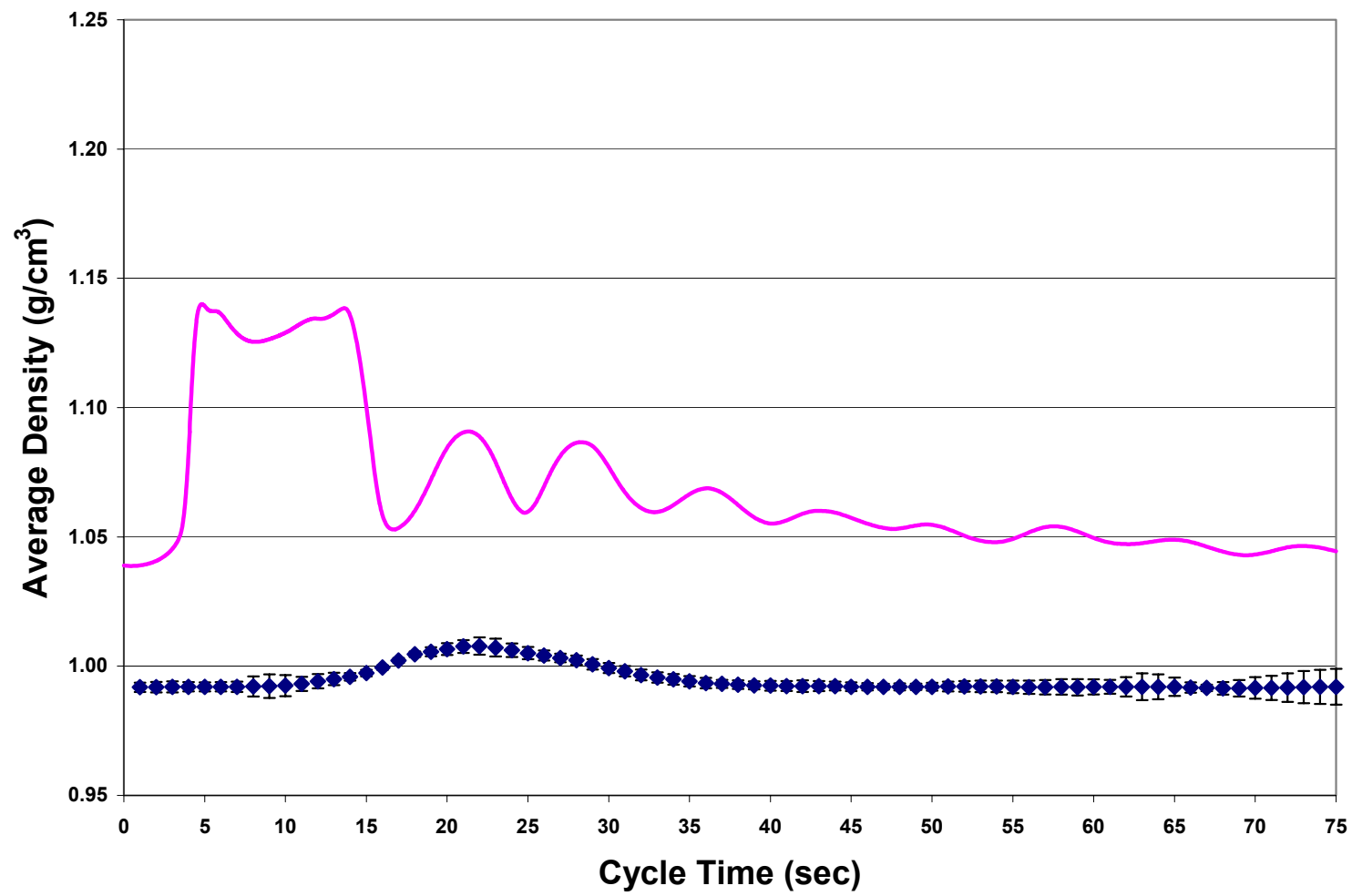


Figure 9.8. Experimentally Measured Densities (◆) and Model Predictions (—) at 0.22 m (8.75 in) Radial Position and 1.448 m (57 in) Vertical Position

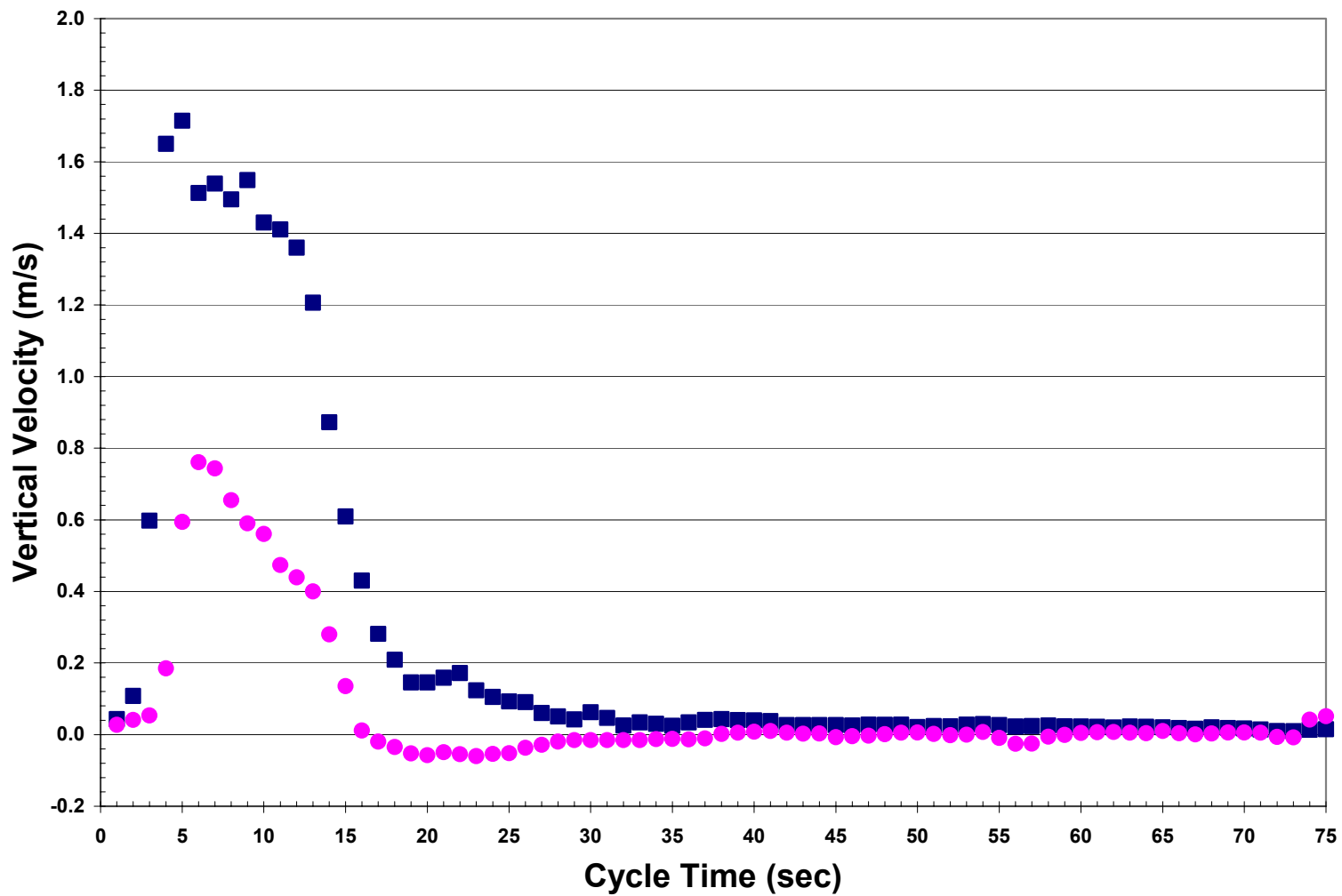


Figure 9.9. Centerline Cycle-averaged Velocity Profiles at 1.31 m (51.5 in) Radial Position Measured During the Large-tank Hydrodynamic Testing Before (●) and After (■) Flow Obstruction Removal

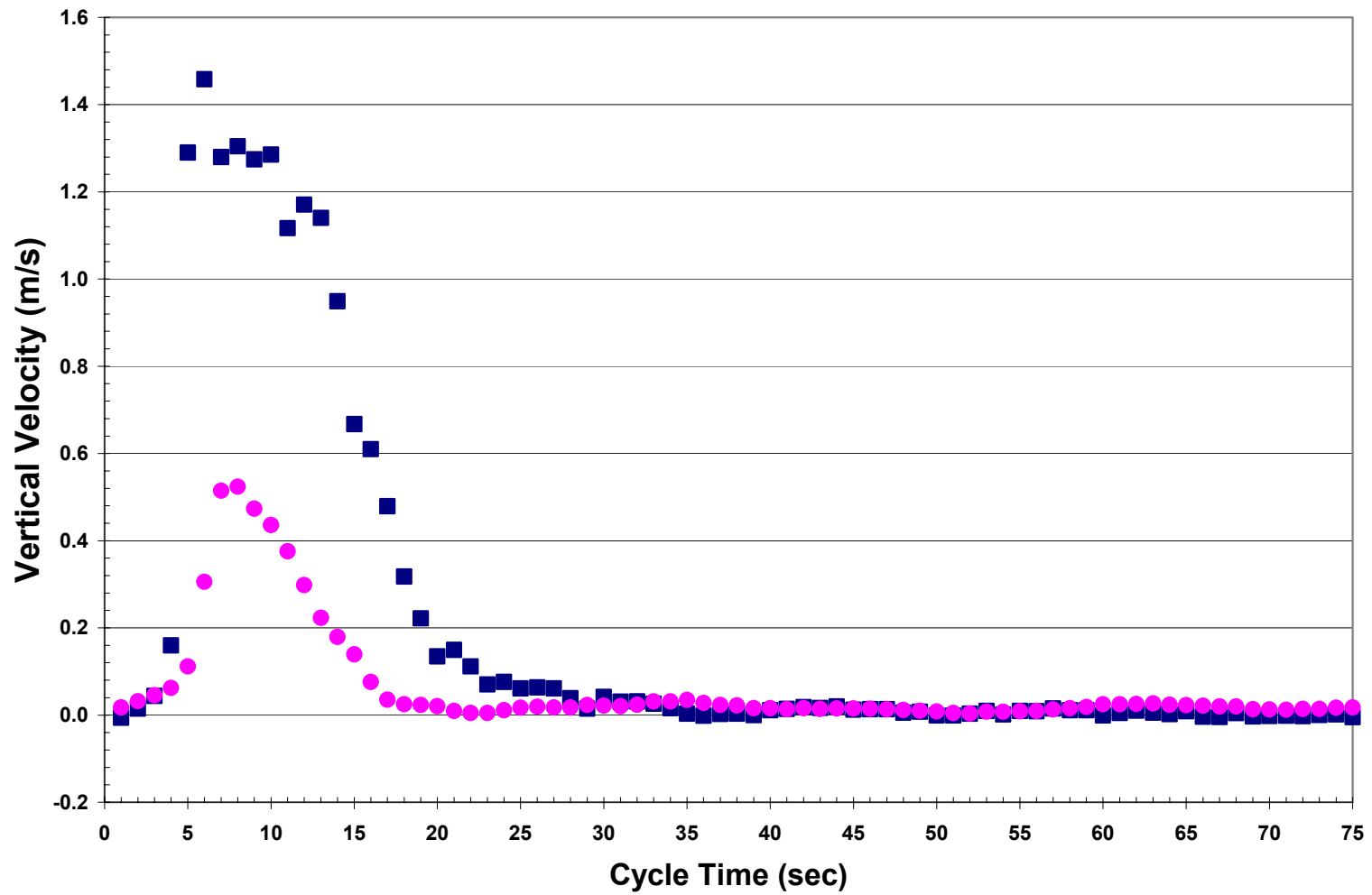


Figure 9.10. Centerline Cycle-averaged Velocity Profiles at 1.841 m (72.5 in) Radial Position Measured During the Large-tank Hydrodynamic Testing Before (●) and After (■) Flow Obstruction Removal

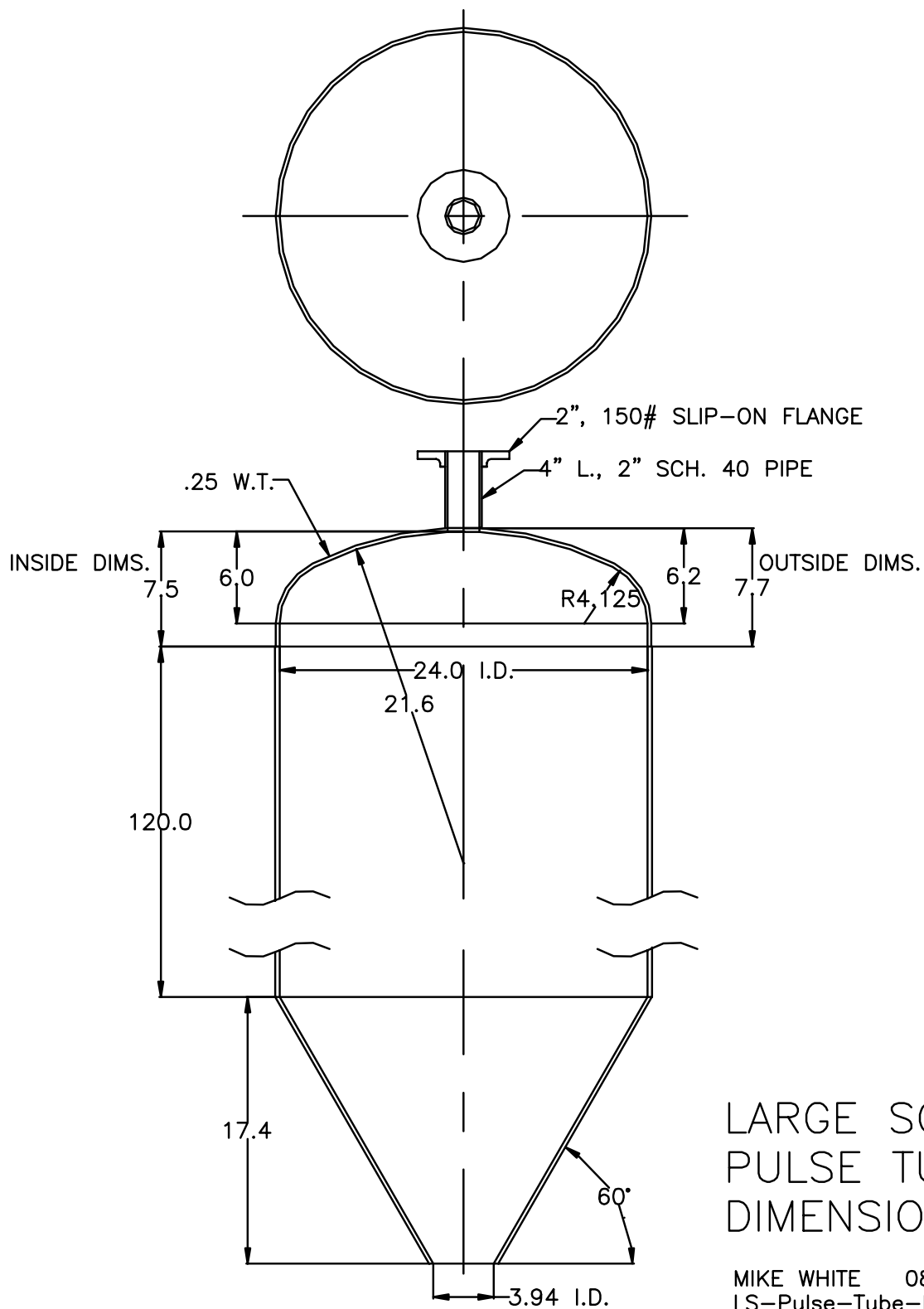
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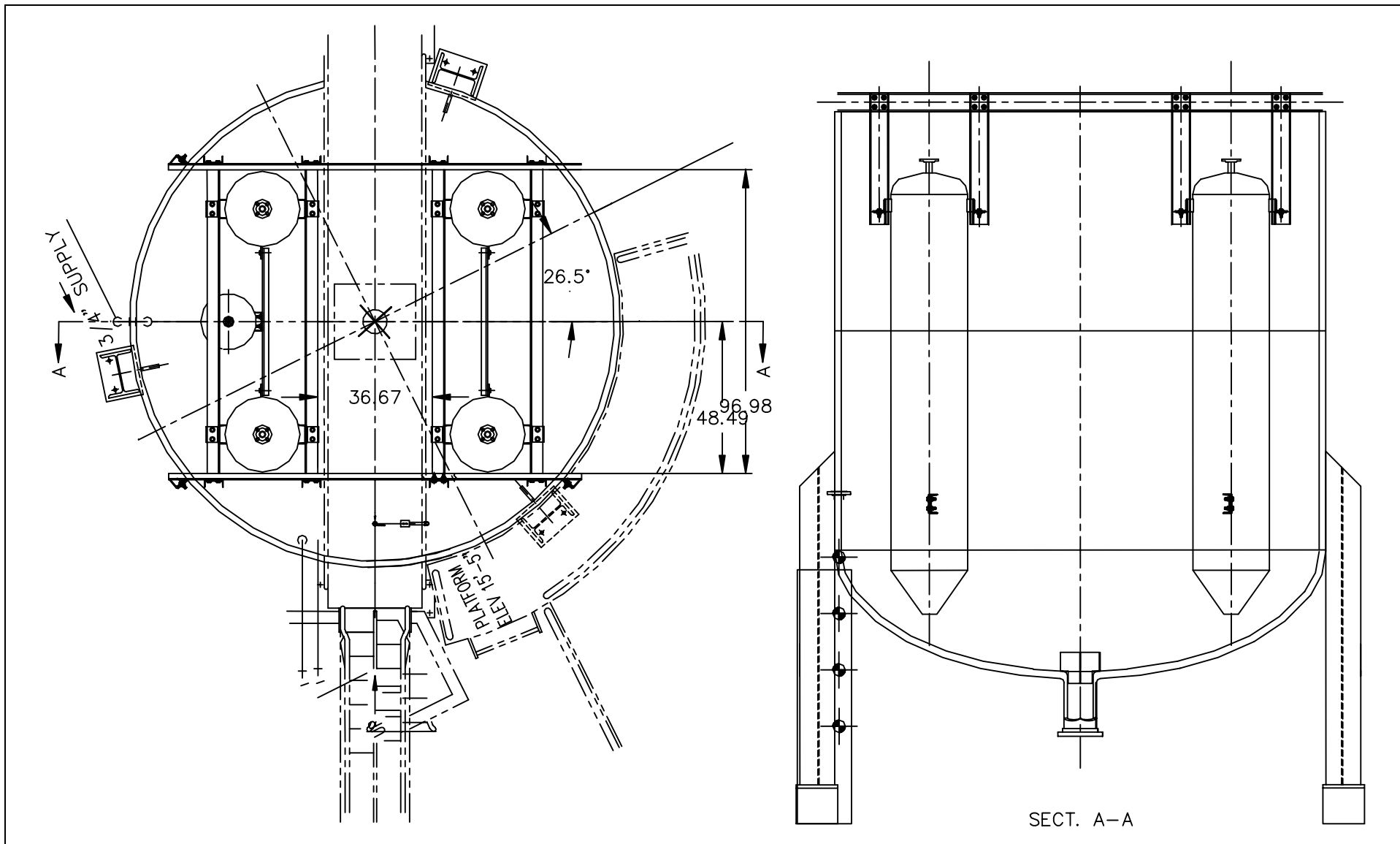
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Appendix A: Large Tank Drawings



LARGE SCALE PULSE TUBE DIMENSIONS

MIKE WHITE 08/03/01
LS-Pulse-Tube-Dims.dwg



Appendix B: Settling Test Data

Settling Column Test Density Data

Data at 0.762 m (30 in) Elevation			Data at 0.457m (18 in) Elevation			Data at 0.152 m (6 in) Elevation		
Time (min)	Density (g/mL)	StdDev (g/mL)	Time (min)	Density (g/mL)	StdDev (g/mL)	Time (min)	Density (g/mL)	StdDev (g/mL)
0.000	1.234	0.003	0.000	1.234	0.003	0.000	1.234	0.003
5.190	1.193	0.007	5.370	1.195	0.003	5.530	1.215	0.001
10.120	1.220	0.007	10.410	1.220	0.006	10.570	1.253	0.002
14.420	1.237	0.005	14.580	1.231	0.003	15.110	1.224	0.009
20.530	1.224	0.005	21.130	1.214	0.013	21.280	1.186	0.009
29.190	1.224	0.001	29.350	1.255	0.001	29.510	1.224	0.003
43.220	1.217	0.004	43.340	1.206	0.001	43.520	1.204	0.009
60.060	1.177	0.005	60.240	1.194	0.011	60.400	1.224	0.003
90.080	1.176	0.005	90.380	1.182	0.007	91.310	1.399	0.012
120.350	1.183	0.001	121.000	1.183	0.011	121.290	1.443	0.009
150.520	1.153	0.001	151.200	1.158	0.005	151.480	1.467	0.004
180.110	1.122	0.004	180.350	1.159	0.005	181.040	1.458	0.001
210.470	1.007	0.005	211.140	1.154	0.007	211.410	1.478	0.004
240.340	1.003	0.001	240.570	1.173	0.007	241.280	1.522	0.007
300.350	1.002	0.003	300.590	1.375	0.003	301.230	1.577	0.005
960.000	1.000	0.003	960.000	1.023	0.003	960.000	1.608	0.005

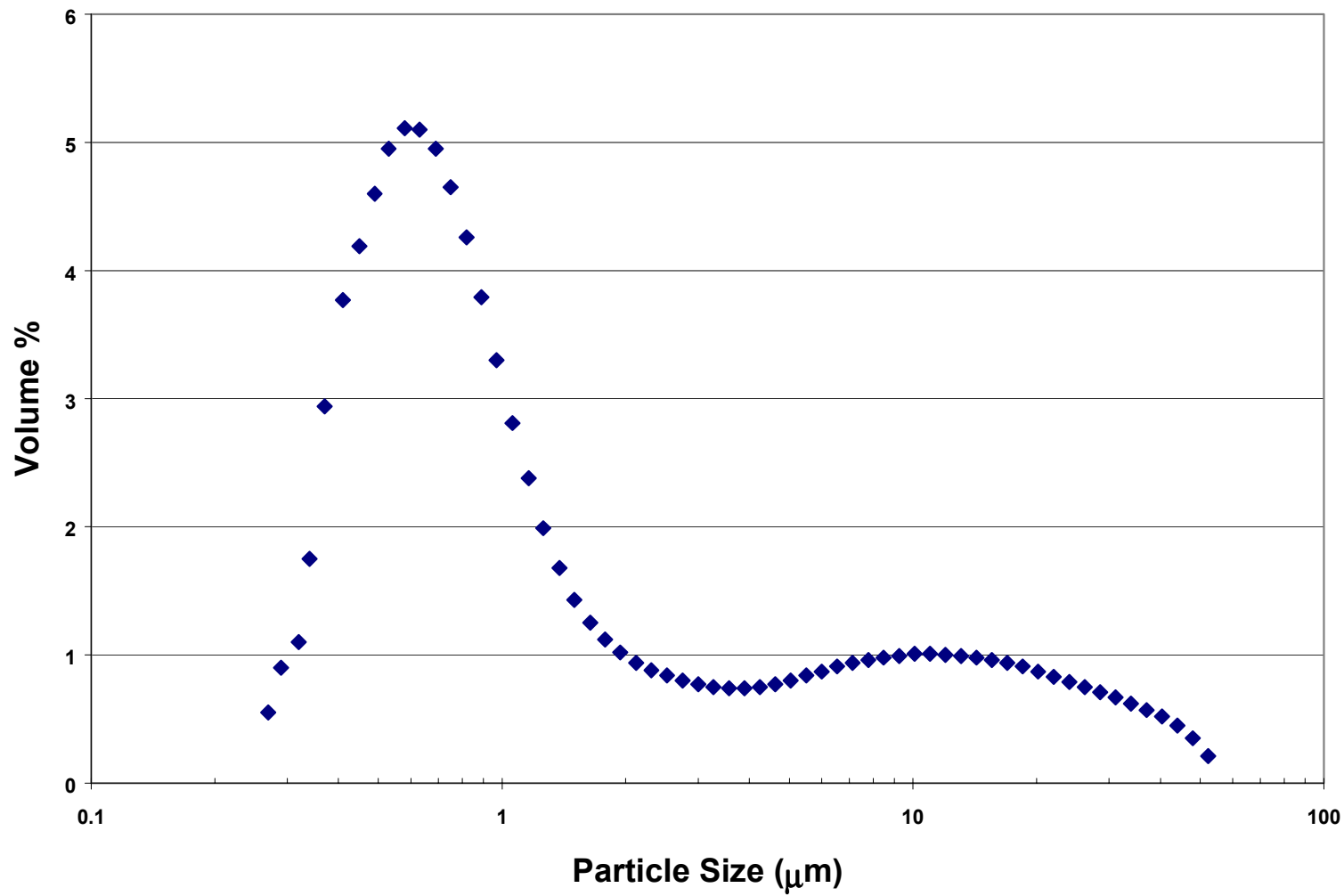


Figure B.1. Particle Size Distribution of the 07-2568 Iron Oxide Species.

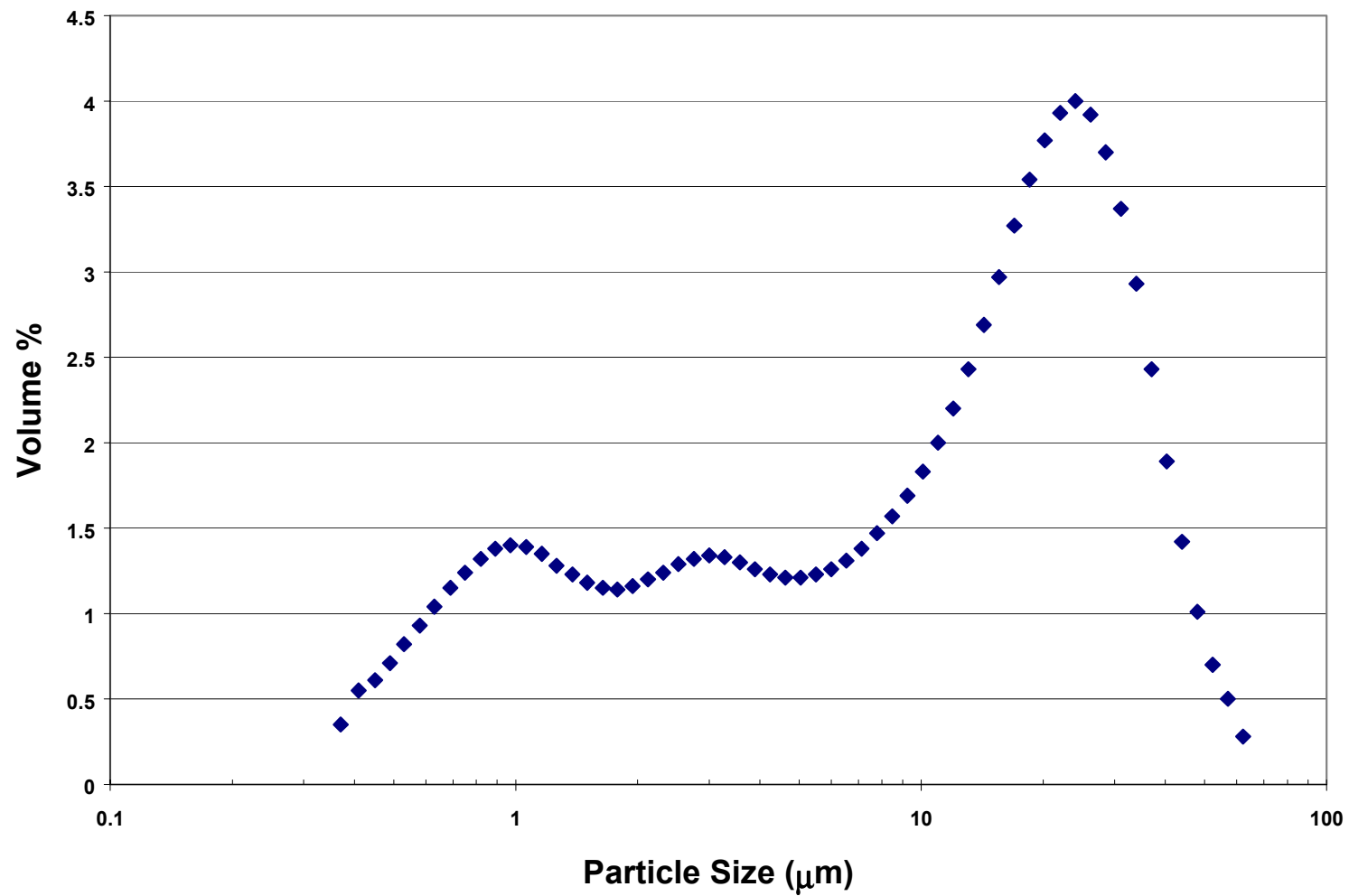


Figure B.2. Particle Size Distribution of the 07-5001 Iron Oxide Species.

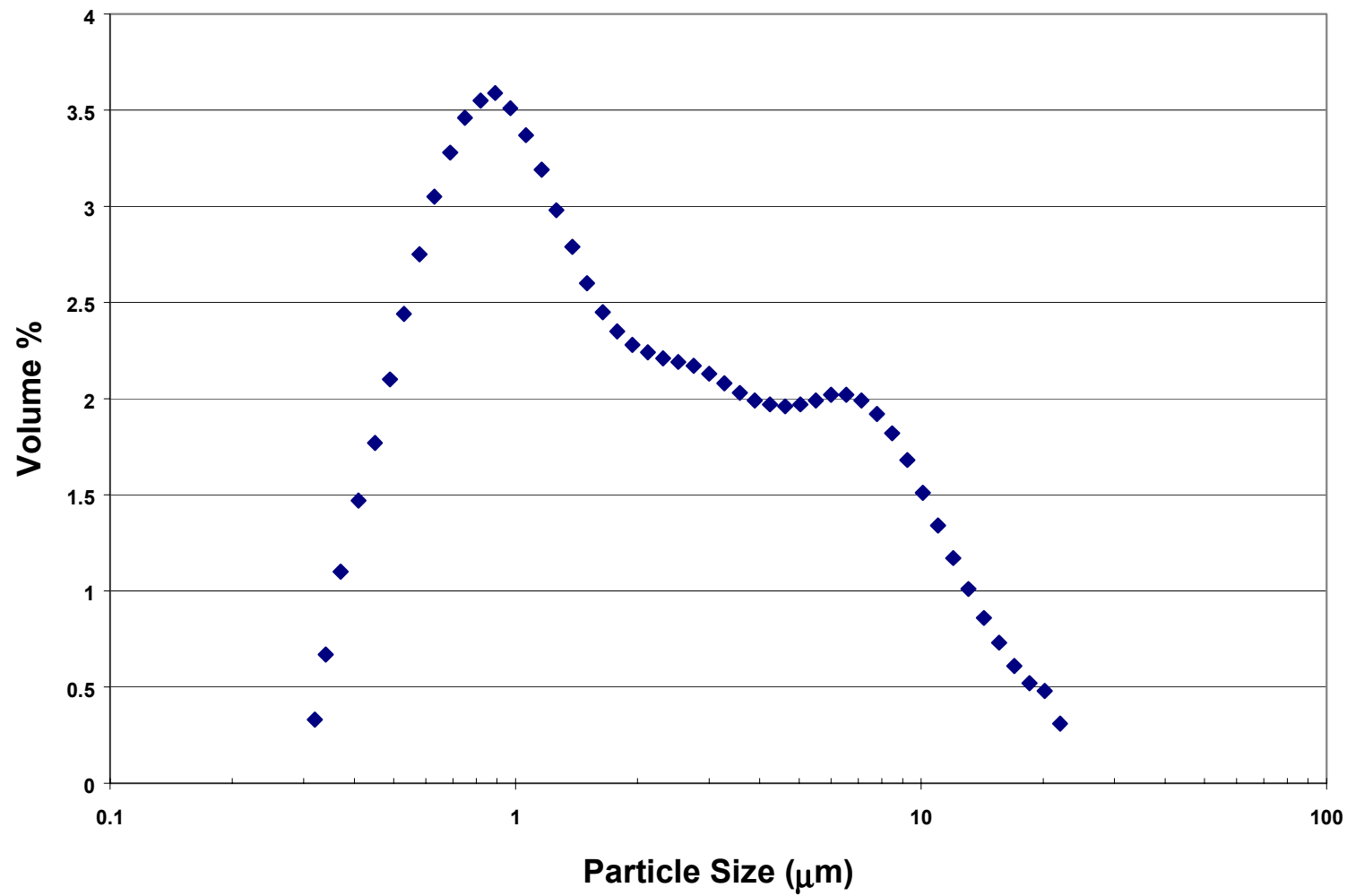


Figure B.3. Particle Size Distribution of the 07-3752 Iron Oxide Species.

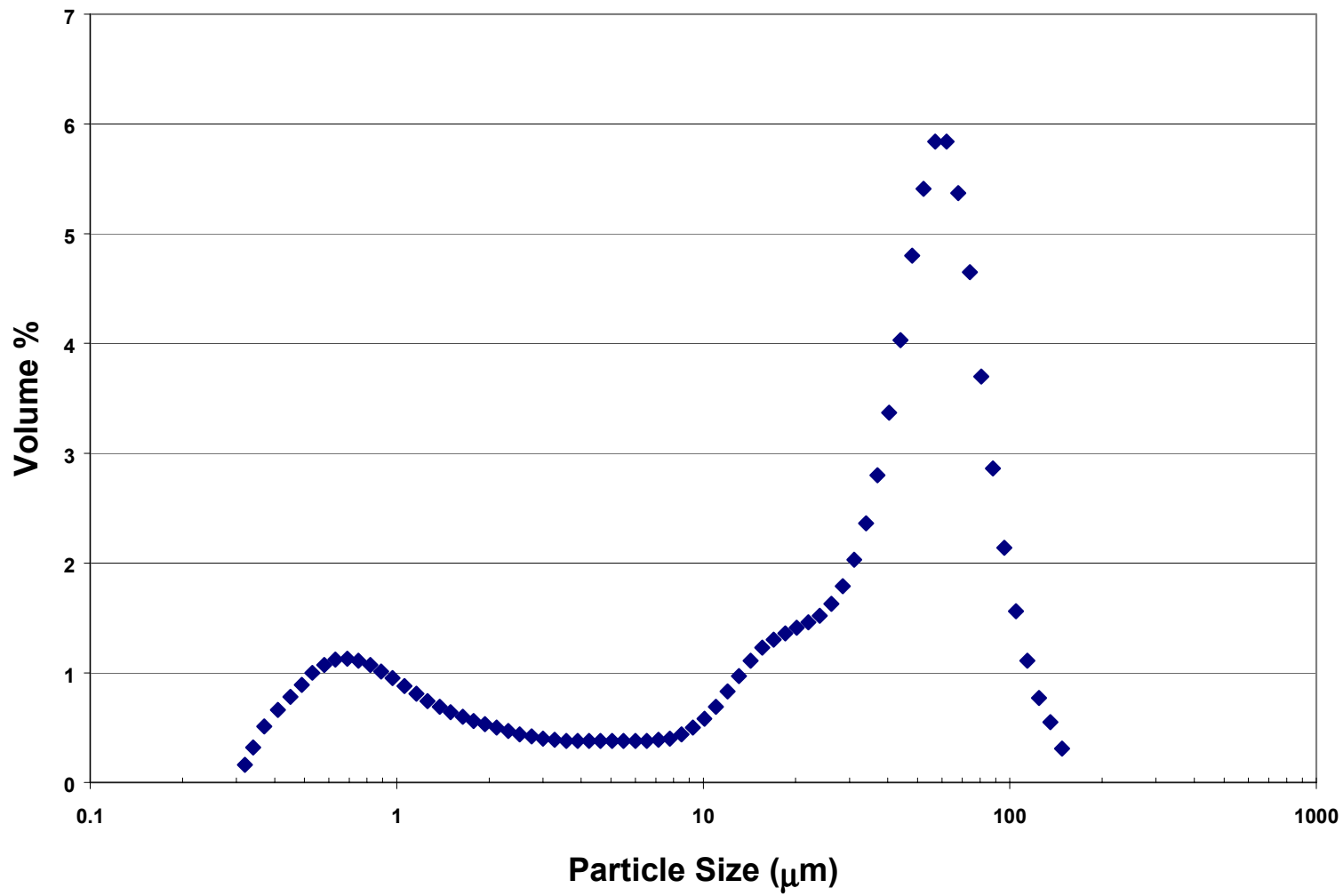


Figure B.4. Particle Size Distribution of the 07-3728 Iron Oxide Species.

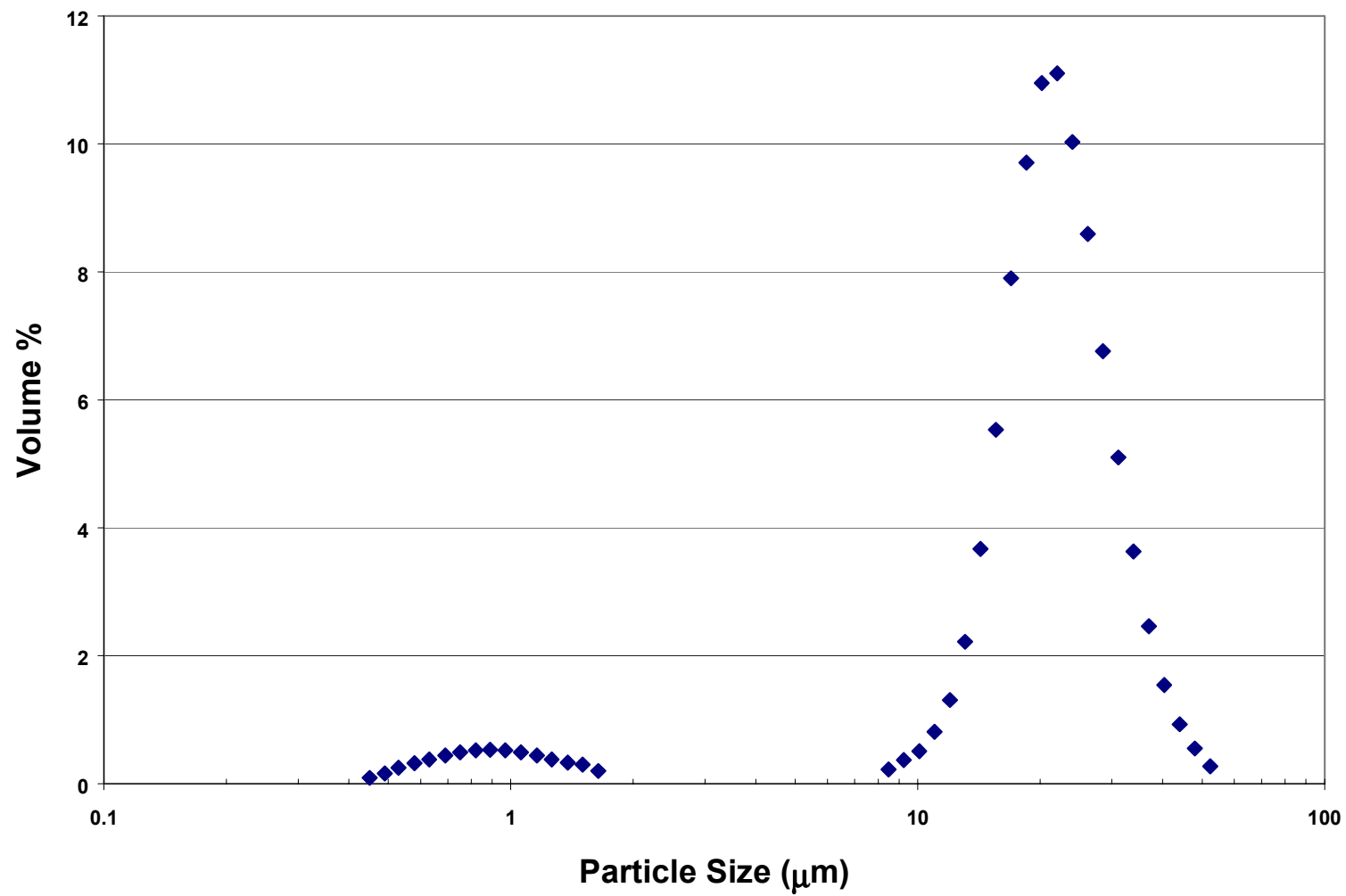
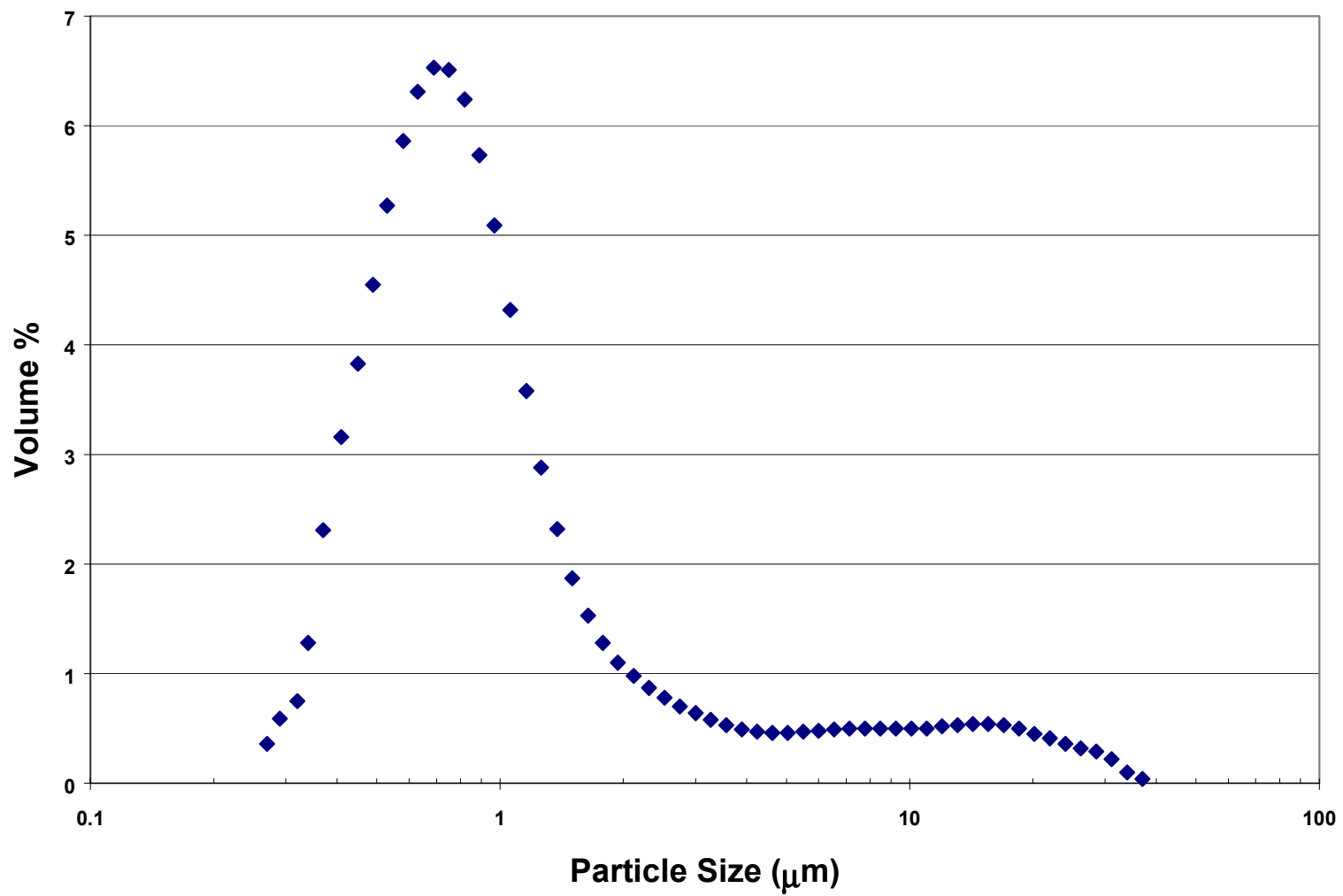


Figure B.5. Particle Size Distribution of the Zr(OH)₄ Zirconium Hydroxide Species.



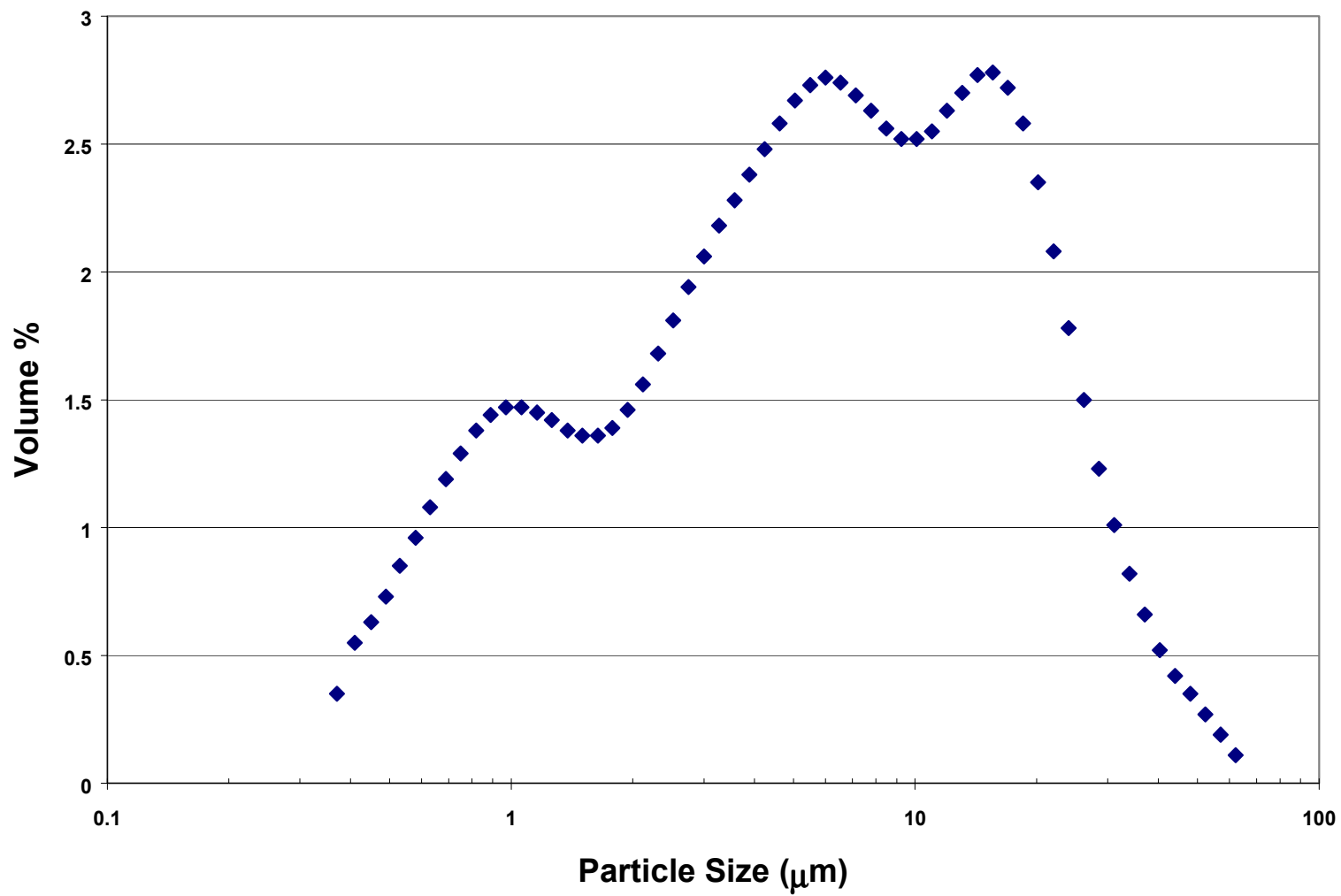


Figure B.7. Particle Size Distribution of the S-23 Aluminum Hydroxide Species.

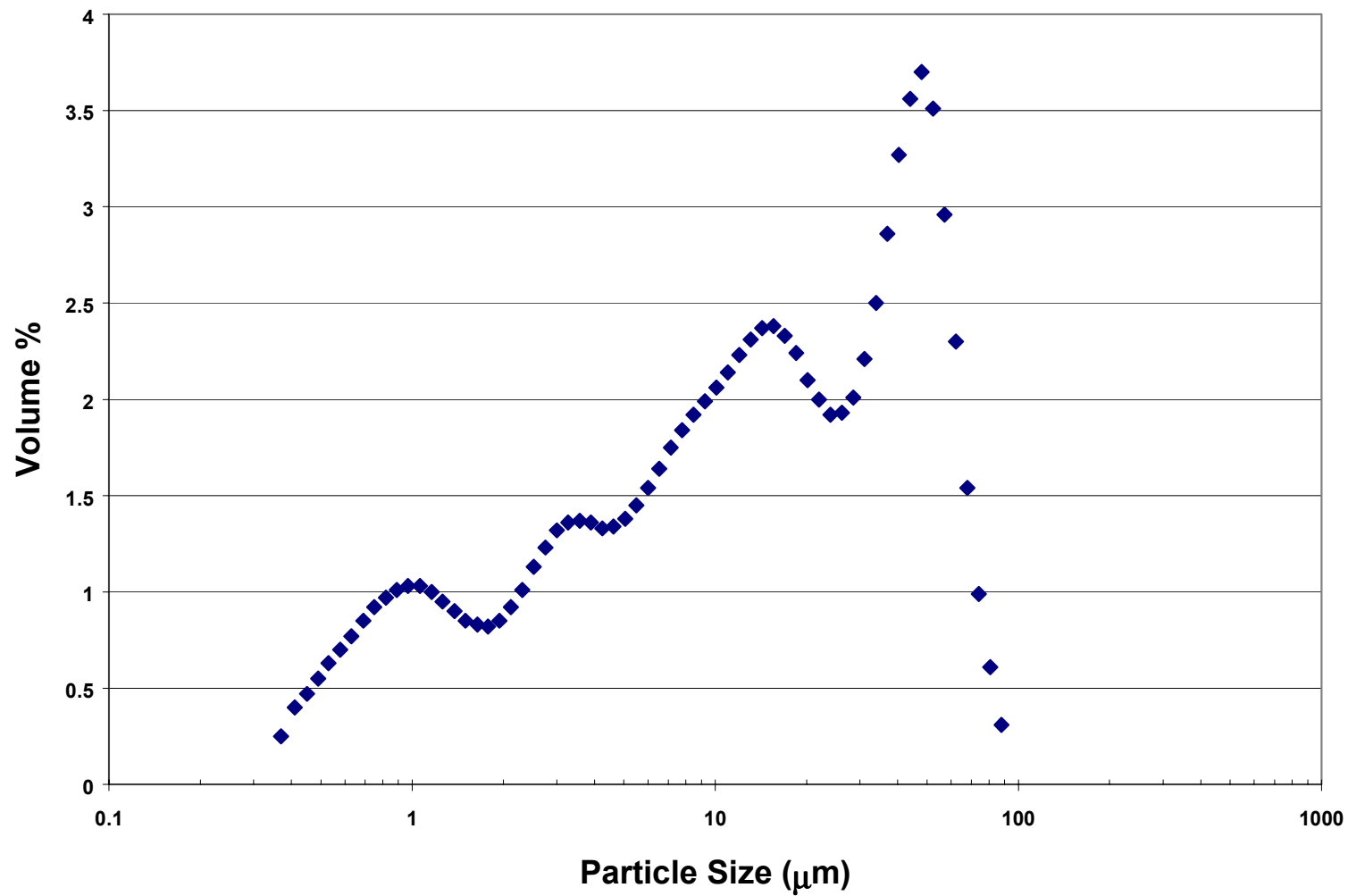


Figure B.8. Particle Size Distribution of the C-231 Aluminum Hydroxide Species.

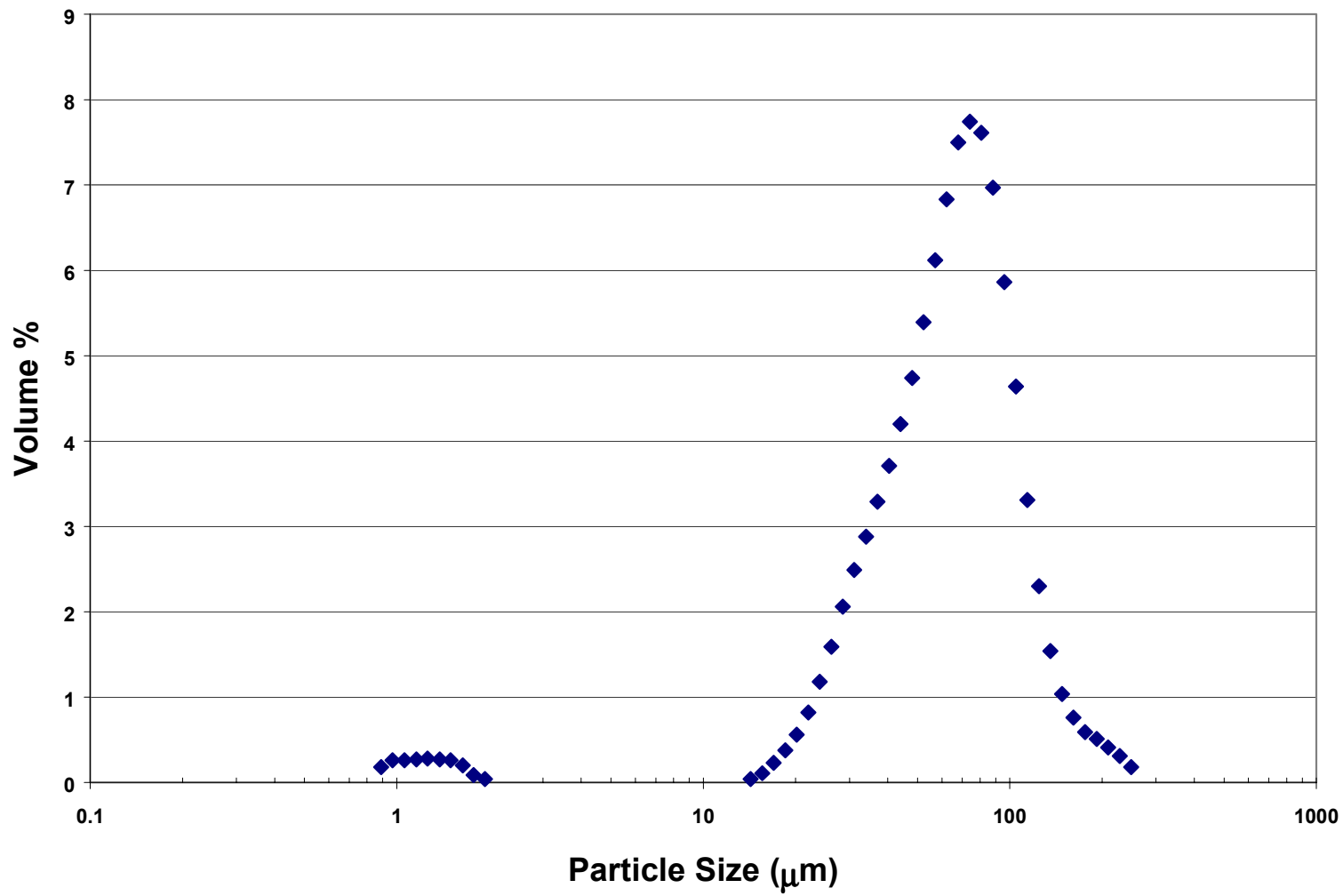


Figure B.9. Particle Size Distribution of the HiQ-10 Aluminum Oxide Species.

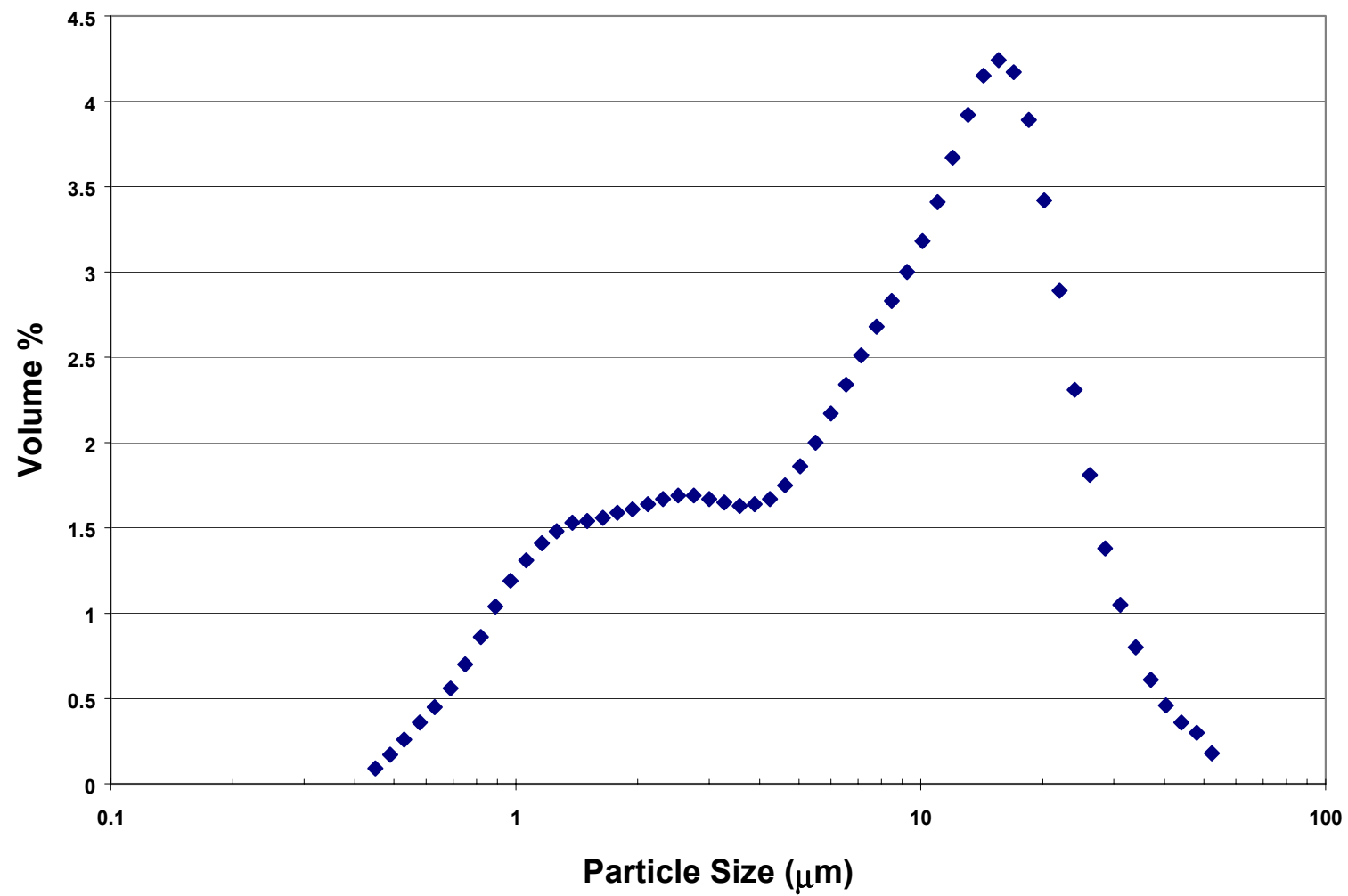


Figure B.10. Particle Size Distribution of the Nepheline Sodium Silicate.

Appendix C: Small Tank Hydrodynamic Test Data

Small-Tank Level Data

Cycle Time (sec)	Avg. Level (m)	Lvl. Std. Dev. (m)	Avg. Level (in)	Lvl. Std. Dev. (in)
0.10	1.027	0.001	40.427	0.022
0.20	1.026	0.001	40.389	0.023
0.30	1.010	0.001	39.755	0.033
0.40	0.986	0.001	38.801	0.024
0.50	0.963	0.001	37.914	0.029
0.60	0.941	0.001	37.029	0.027
0.70	0.919	0.001	36.186	0.034
0.80	0.898	0.001	35.362	0.048
0.90	0.877	0.001	34.534	0.054
1.00	0.857	0.001	33.725	0.051
1.10	0.836	0.002	32.932	0.066
1.20	0.815	0.002	32.103	0.070
1.30	0.796	0.002	31.350	0.077
1.40	0.776	0.002	30.569	0.086
1.50	0.756	0.002	29.752	0.095
1.60	0.737	0.002	29.035	0.097
1.70	0.718	0.003	28.251	0.099
1.80	0.699	0.003	27.516	0.110
1.90	0.680	0.003	26.760	0.128
2.00	0.661	0.003	26.023	0.126
2.10	0.643	0.003	25.306	0.127
2.20	0.624	0.003	24.564	0.137
2.30	0.605	0.004	23.816	0.152
2.40	0.587	0.004	23.128	0.152
2.50	0.569	0.004	22.396	0.163
2.60	0.550	0.004	21.645	0.174
2.70	0.532	0.004	20.959	0.177
2.80	0.513	0.004	20.207	0.176
2.90	0.495	0.005	19.506	0.195
3.00	0.477	0.005	18.767	0.207
3.10	0.458	0.005	18.046	0.212
3.20	0.441	0.005	17.371	0.206
3.30	0.428	0.006	16.859	0.224
3.40	0.426	0.006	16.766	0.243
3.50	0.434	0.006	17.075	0.240
3.60	0.441	0.006	17.359	0.241
3.70	0.449	0.006	17.666	0.247
3.80	0.457	0.006	18.003	0.239
3.90	0.465	0.006	18.301	0.231
4.00	0.474	0.006	18.644	0.231
4.10	0.481	0.006	18.953	0.233
4.20	0.489	0.007	19.246	0.280
4.30	0.502	0.005	19.782	0.204
4.40	0.512	0.006	20.162	0.219
4.50	0.523	0.006	20.604	0.239
4.60	0.532	0.005	20.955	0.202

Cycle Time (sec)	Avg. Level (m)	Lvl. Std. Dev. (m)	Avg. Level (in)	Lvl. Std. Dev. (in)
4.70	0.537	0.007	21.147	0.291
4.80	0.543	0.007	21.389	0.266
4.90	0.549	0.007	21.632	0.279
5.00	0.557	0.005	21.928	0.215
5.10	0.564	0.007	22.221	0.261
5.20	0.571	0.006	22.478	0.249
5.30	0.577	0.006	22.703	0.256
5.40	0.582	0.006	22.913	0.227
5.50	0.588	0.005	23.153	0.212
5.60	0.595	0.005	23.424	0.213
5.70	0.601	0.006	23.671	0.237
5.80	0.608	0.005	23.921	0.198
5.90	0.613	0.005	24.141	0.200
6.00	0.620	0.005	24.392	0.184
6.10	0.627	0.005	24.668	0.194
6.20	0.633	0.005	24.912	0.198
6.30	0.639	0.004	25.151	0.170
6.40	0.645	0.005	25.403	0.189
6.50	0.651	0.005	25.648	0.204
6.60	0.657	0.005	25.882	0.183
6.70	0.664	0.005	26.127	0.194
6.80	0.670	0.005	26.374	0.181
6.90	0.676	0.005	26.611	0.181
7.00	0.682	0.004	26.861	0.168
7.10	0.688	0.005	27.085	0.190
7.20	0.694	0.005	27.319	0.187
7.30	0.700	0.004	27.558	0.171
7.40	0.706	0.005	27.786	0.178
7.50	0.711	0.005	28.007	0.181
7.60	0.717	0.004	28.246	0.170
7.70	0.723	0.004	28.475	0.177
7.80	0.729	0.005	28.694	0.183
7.90	0.735	0.004	28.919	0.175
8.00	0.740	0.005	29.127	0.183
8.10	0.745	0.005	29.342	0.177
8.20	0.751	0.004	29.573	0.162
8.30	0.757	0.004	29.801	0.172
8.40	0.762	0.005	30.015	0.181
8.50	0.767	0.004	30.212	0.166
8.60	0.773	0.004	30.426	0.164
8.70	0.778	0.004	30.641	0.163
8.80	0.783	0.004	30.810	0.173
8.90	0.789	0.005	31.049	0.178
9.00	0.794	0.004	31.257	0.164
9.10	0.799	0.004	31.460	0.164
9.20	0.804	0.004	31.652	0.163
9.30	0.809	0.004	31.861	0.158
9.40	0.814	0.004	32.063	0.164
9.50	0.819	0.004	32.255	0.167

Cycle Time (sec)	Avg. Level (m)	Lvl. Std. Dev. (m)	Avg. Level (in)	Lvl. Std. Dev. (in)
9.60	0.824	0.004	32.436	0.153
9.70	0.829	0.004	32.627	0.154
9.80	0.834	0.004	32.824	0.144
9.90	0.839	0.004	33.013	0.153
10.00	0.843	0.004	33.196	0.149
10.10	0.848	0.004	33.376	0.146
10.20	0.852	0.004	33.554	0.154
10.30	0.857	0.004	33.727	0.148
10.40	0.861	0.004	33.908	0.141
10.50	0.866	0.004	34.089	0.155
10.60	0.870	0.004	34.261	0.149
10.70	0.874	0.004	34.423	0.143
10.80	0.879	0.004	34.591	0.138
10.90	0.883	0.004	34.767	0.139
11.00	0.887	0.004	34.929	0.143
11.10	0.891	0.004	35.087	0.144
11.20	0.895	0.003	35.240	0.136
11.30	0.899	0.003	35.402	0.136
11.40	0.903	0.003	35.560	0.136
11.50	0.907	0.003	35.714	0.131
11.60	0.911	0.004	35.868	0.141
11.70	0.915	0.003	36.011	0.129
11.80	0.918	0.003	36.146	0.128
11.90	0.922	0.003	36.290	0.122
12.00	0.926	0.003	36.440	0.120
12.10	0.929	0.003	36.575	0.130
12.20	0.933	0.003	36.716	0.125
12.30	0.936	0.003	36.843	0.115
12.40	0.939	0.003	36.976	0.114
12.50	0.943	0.003	37.113	0.117
12.60	0.946	0.003	37.237	0.118
12.70	0.949	0.003	37.364	0.116
12.80	0.952	0.003	37.482	0.111
12.90	0.955	0.003	37.598	0.108
13.00	0.958	0.003	37.719	0.102
13.10	0.961	0.003	37.839	0.106
13.20	0.964	0.003	37.958	0.112
13.30	0.967	0.003	38.065	0.105
13.40	0.969	0.003	38.166	0.102
13.50	0.972	0.002	38.277	0.098
13.60	0.975	0.003	38.376	0.100
13.70	0.978	0.002	38.487	0.096
13.80	0.980	0.002	38.586	0.097
13.90	0.982	0.002	38.679	0.094
14.00	0.985	0.002	38.775	0.093
14.10	0.987	0.002	38.867	0.091
14.20	0.990	0.002	38.961	0.091
14.30	0.992	0.002	39.054	0.092
14.40	0.994	0.002	39.133	0.087

Cycle Time (sec)	Avg. Level (m)	Lvl. Std. Dev. (m)	Avg. Level (in)	Lvl. Std. Dev. (in)
14.50	0.996	0.002	39.213	0.084
14.60	0.998	0.002	39.292	0.081
14.70	1.000	0.002	39.372	0.085
14.80	1.002	0.002	39.454	0.087
14.90	1.004	0.002	39.527	0.084
15.00	1.006	0.002	39.589	0.075
15.10	1.007	0.002	39.658	0.075
15.20	1.009	0.002	39.722	0.075
15.30	1.011	0.002	39.789	0.073
15.40	1.012	0.002	39.854	0.077
15.50	1.014	0.002	39.906	0.076
15.60	1.015	0.002	39.963	0.075
15.70	1.016	0.002	40.012	0.073
15.80	1.018	0.002	40.060	0.072
15.90	1.019	0.002	40.119	0.078
16.00	1.020	0.002	40.163	0.075
16.10	1.021	0.002	40.199	0.068
16.20	1.022	0.002	40.248	0.073
16.30	1.023	0.002	40.291	0.078
16.40	1.024	0.002	40.326	0.067
16.50	1.025	0.002	40.362	0.066
16.60	1.026	0.001	40.379	0.056
16.70	1.026	0.001	40.406	0.053
16.80	1.027	0.001	40.427	0.050
16.90	1.027	0.001	40.439	0.039
17.00	1.028	0.001	40.462	0.047
17.10	1.028	0.001	40.468	0.041
17.20	1.028	0.001	40.469	0.033
17.30	1.028	0.001	40.482	0.042
17.40	1.028	0.001	40.484	0.037
17.50	1.028	0.001	40.484	0.034
17.60	1.028	0.001	40.482	0.037
17.70	1.028	0.001	40.472	0.033
17.80	1.028	0.001	40.475	0.038
17.90	1.028	0.001	40.465	0.032
18.00	1.027	0.001	40.452	0.024
18.10	1.028	0.001	40.454	0.033
18.20	1.027	0.001	40.437	0.033
18.30	1.027	0.001	40.424	0.029
18.40	1.027	0.001	40.425	0.035
18.50	1.027	0.001	40.416	0.029
18.60	1.027	0.001	40.416	0.035
18.70	1.026	0.001	40.403	0.028
18.80	1.026	0.001	40.393	0.026
18.90	1.026	0.001	40.406	0.044
19.00	1.026	0.001	40.403	0.026
19.10	1.026	0.001	40.399	0.026
19.20	1.027	0.001	40.415	0.042
19.30	1.026	0.001	40.408	0.030

Cycle Time (sec)	Avg. Level (m)	Lvl. Std. Dev. (m)	Avg. Level (in)	Lvl. Std. Dev. (in)
19.40	1.027	0.001	40.420	0.031
19.50	1.027	0.001	40.426	0.035
19.60	1.027	0.001	40.433	0.029
19.70	1.027	0.001	40.450	0.037
19.80	1.027	0.000	40.438	0.017
19.90	1.027	0.001	40.446	0.026
20.00	1.028	0.001	40.462	0.034
20.10	1.028	0.000	40.461	0.019
20.20	1.028	0.001	40.471	0.028
20.30	1.028	0.001	40.472	0.033
20.40	1.028	0.001	40.468	0.025
20.50	1.028	0.001	40.472	0.028
20.60	1.028	0.001	40.471	0.023
20.70	1.028	0.001	40.472	0.021
20.80	1.028	0.001	40.475	0.029
20.90	1.028	0.001	40.460	0.022
21.00	1.028	0.001	40.464	0.025
21.10	1.028	0.001	40.465	0.028
21.20	1.027	0.001	40.451	0.020
21.30	1.027	0.001	40.451	0.022
21.40	1.027	0.001	40.443	0.025
21.50	1.027	0.001	40.439	0.023
21.60	1.027	0.001	40.434	0.024
21.70	1.027	0.000	40.426	0.019
21.80	1.027	0.001	40.431	0.027
21.90	1.027	0.001	40.424	0.024
22.00	1.026	0.001	40.408	0.021
22.10	1.027	0.001	40.421	0.029
22.20	1.027	0.001	40.424	0.024
22.30	1.027	0.001	40.419	0.027
22.40	1.027	0.001	40.422	0.027
22.50	1.027	0.001	40.420	0.027
22.60	1.027	0.001	40.433	0.026
22.70	1.027	0.001	40.431	0.023
22.80	1.027	0.001	40.430	0.021
22.90	1.027	0.001	40.446	0.029
23.00	1.027	0.000	40.441	0.018
23.10	1.027	0.000	40.442	0.015
23.20	1.028	0.001	40.456	0.029
23.30	1.028	0.001	40.457	0.021
23.40	1.028	0.001	40.460	0.021
23.50	1.028	0.001	40.459	0.022
23.60	1.028	0.000	40.456	0.019
23.70	1.028	0.001	40.462	0.023
23.80	1.028	0.000	40.458	0.015
23.90	1.028	0.000	40.463	0.017
24.00	1.028	0.001	40.466	0.026
24.10	1.028	0.000	40.453	0.017
24.20	1.028	0.000	40.455	0.017

Cycle Time (sec)	Avg. Level (m)	Lvl. Std. Dev. (m)	Avg. Level (in)	Lvl. Std. Dev. (in)
24.30	1.028	0.001	40.458	0.025
24.40	1.027	0.000	40.452	0.020
24.50	1.027	0.001	40.449	0.020
24.60	1.027	0.000	40.440	0.018
24.70	1.027	0.001	40.438	0.021
24.80	1.027	0.001	40.442	0.025
24.90	1.027	0.001	40.427	0.020
25.00	1.027	0.001	40.432	0.021
25.10	1.027	0.001	40.433	0.025
25.20	1.027	0.000	40.418	0.018
25.30	1.027	0.001	40.423	0.022
25.40	1.027	0.001	40.426	0.024
25.50	1.027	0.001	40.428	0.023
25.60	1.027	0.001	40.426	0.023
25.70	1.027	0.000	40.420	0.018
25.80	1.027	0.001	40.431	0.024
25.90	1.027	0.001	40.433	0.022
26.00	1.027	0.001	40.426	0.022
26.10	1.027	0.001	40.442	0.024
26.20	1.027	0.001	40.443	0.023
26.30	1.027	0.000	40.439	0.016
26.40	1.027	0.001	40.445	0.023
26.50	1.027	0.000	40.447	0.019
26.60	1.028	0.001	40.454	0.022
26.70	1.027	0.000	40.450	0.017
26.80	1.027	0.000	40.447	0.014
26.90	1.028	0.001	40.457	0.021
27.00	1.028	0.000	40.455	0.016
27.10	1.027	0.000	40.451	0.017
27.20	1.028	0.001	40.457	0.021
27.30	1.027	0.000	40.451	0.016
27.40	1.027	0.000	40.450	0.015
27.50	1.027	0.000	40.448	0.015
27.60	1.027	0.000	40.447	0.017
27.70	1.027	0.001	40.450	0.022
27.80	1.027	0.000	40.437	0.016
27.90	1.027	0.000	40.436	0.015
28.00	1.027	0.001	40.441	0.024
28.10	1.027	0.000	40.432	0.015
28.20	1.027	0.000	40.430	0.019
28.30	1.027	0.001	40.431	0.021
28.40	1.027	0.000	40.423	0.017
28.50	1.027	0.001	40.420	0.020
28.60	1.026	0.000	40.413	0.017
28.70	1.027	0.001	40.418	0.023
28.80	1.027	0.001	40.422	0.023
28.90	1.026	0.000	40.410	0.018
29.00	1.027	0.000	40.419	0.017
29.10	1.027	0.001	40.428	0.022

Cycle Time (sec)	Avg. Level (m)	Lvl. Std. Dev. (m)	Avg. Level (in)	Lvl. Std. Dev. (in)
29.20	1.027	0.001	40.423	0.020
29.30	1.027	0.001	40.425	0.021
29.40	1.027	0.000	40.425	0.019
29.50	1.027	0.000	40.425	0.017
29.60	1.027	0.000	40.423	0.019
29.70	1.027	0.000	40.417	0.015
29.80	1.027	0.001	40.425	0.022
29.90	1.027	0.000	40.425	0.019
30.00	1.027	0.000	40.415	0.017

Small-Tank Floor Velocity Data

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
0.1	0.009	0.025	0.003	0.015	0.009	0.018	0.016	0.027	0.009	0.019	0.010	0.024
0.2	0.019	0.027	0.001	0.015	0.013	0.021	0.034	0.033	0.009	0.018	0.013	0.027
0.3	0.120	0.024	0.029	0.027	0.086	0.024	0.107	0.023	0.030	0.028	0.053	0.033
0.4	0.590	0.244	0.152	0.014	0.394	0.089	0.183	0.016	0.115	0.014	0.134	0.012
0.5	1.393	0.349	0.648	0.078	0.443	0.089	0.895	0.296	0.318	0.092	0.532	0.195
0.6	1.402	0.338	0.563	0.095	0.355	0.087	1.419	0.235	0.761	0.056	0.772	0.076
0.7	1.366	0.291	0.554	0.073	0.320	0.076	1.292	0.184	0.637	0.112	0.565	0.129
0.8	1.405	0.222	0.554	0.067	0.338	0.094	1.335	0.184	0.583	0.133	0.548	0.164
0.9	1.390	0.290	0.583	0.118	0.392	0.094	1.365	0.207	0.646	0.111	0.531	0.136
1.0	1.375	0.302	0.531	0.085	0.316	0.097	1.353	0.238	0.581	0.141	0.517	0.143
1.1	1.406	0.301	0.580	0.067	0.338	0.106	1.280	0.227	0.619	0.144	0.529	0.123
1.2	1.492	0.271	0.594	0.121	0.335	0.109	1.335	0.260	0.618	0.085	0.551	0.168
1.3	1.495	0.298	0.543	0.070	0.368	0.068	1.405	0.244	0.662	0.110	0.554	0.109
1.4	1.450	0.306	0.562	0.081	0.320	0.075	1.311	0.269	0.631	0.119	0.510	0.128
1.5	1.408	0.323	0.555	0.061	0.381	0.091	1.297	0.160	0.662	0.102	0.486	0.182
1.6	1.448	0.297	0.609	0.100	0.329	0.087	1.262	0.316	0.641	0.101	0.513	0.131
1.7	1.441	0.313	0.601	0.092	0.311	0.085	1.381	0.250	0.653	0.091	0.534	0.127
1.8	1.439	0.334	0.586	0.107	0.344	0.088	1.422	0.203	0.672	0.113	0.592	0.143
1.9	1.380	0.302	0.581	0.080	0.377	0.108	1.353	0.240	0.621	0.114	0.538	0.054
2.0	1.437	0.218	0.585	0.107	0.318	0.088	1.306	0.214	0.666	0.090	0.543	0.143
2.1	1.378	0.262	0.616	0.083	0.379	0.087	1.347	0.210	0.663	0.117	0.563	0.101
2.2	1.388	0.277	0.537	0.066	0.354	0.092	1.354	0.217	0.633	0.144	0.549	0.122
2.3	1.405	0.302	0.549	0.089	0.356	0.108	1.346	0.253	0.684	0.113	0.517	0.141
2.4	1.378	0.221	0.597	0.082	0.312	0.114	1.311	0.212	0.629	0.096	0.553	0.093
2.5	1.403	0.289	0.558	0.101	0.323	0.098	1.345	0.247	0.620	0.083	0.532	0.115
2.6	1.399	0.294	0.546	0.067	0.349	0.084	1.392	0.266	0.599	0.111	0.554	0.118
2.7	1.390	0.286	0.565	0.104	0.329	0.082	1.292	0.247	0.648	0.069	0.565	0.148

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
2.8	1.389	0.305	0.536	0.083	0.309	0.079	1.343	0.170	0.660	0.098	0.606	0.129
2.9	1.434	0.261	0.550	0.094	0.340	0.079	1.374	0.261	0.611	0.092	0.555	0.134
3.0	1.412	0.236	0.627	0.089	0.321	0.100	1.412	0.257	0.681	0.114	0.536	0.128
3.1	1.306	0.277	0.563	0.090	0.303	0.055	1.329	0.193	0.597	0.115	0.565	0.151
3.2	1.311	0.223	0.557	0.084	0.317	0.087	1.305	0.200	0.623	0.086	0.570	0.136
3.3	1.047	0.205	0.489	0.082	0.277	0.065	1.009	0.227	0.543	0.122	0.526	0.111
3.4	0.758	0.209	0.361	0.088	0.232	0.023	0.745	0.165	0.427	0.078	0.403	0.091
3.5	0.470	0.147	0.222	0.031	0.190	0.018	0.565	0.164	0.333	0.084	0.292	0.057
3.6	0.296	0.063	0.189	0.032	0.174	0.012	0.422	0.091	0.252	0.037	0.248	0.027
3.7	0.250	0.057	0.168	0.018	0.166	0.017	0.326	0.085	0.218	0.025	0.221	0.029
3.8	0.230	0.050	0.158	0.017	0.156	0.018	0.292	0.085	0.203	0.021	0.197	0.027
3.9	0.213	0.042	0.147	0.013	0.154	0.017	0.267	0.064	0.191	0.021	0.206	0.028
4.0	0.217	0.042	0.145	0.013	0.152	0.019	0.247	0.076	0.185	0.019	0.203	0.031
4.1	0.199	0.056	0.146	0.020	0.152	0.022	0.225	0.072	0.185	0.018	0.202	0.030
4.2	0.197	0.055	0.144	0.021	0.149	0.021	0.214	0.049	0.175	0.026	0.193	0.019
4.3	0.189	0.038	0.143	0.014	0.146	0.023	0.214	0.042	0.178	0.025	0.181	0.026
4.4	0.178	0.033	0.140	0.019	0.142	0.024	0.235	0.053	0.176	0.024	0.171	0.022
4.5	0.170	0.036	0.139	0.023	0.147	0.021	0.214	0.040	0.178	0.031	0.180	0.024
4.6	0.191	0.093	0.129	0.027	0.137	0.025	0.210	0.043	0.179	0.025	0.174	0.026
4.7	0.214	0.133	0.126	0.033	0.135	0.032	0.194	0.035	0.170	0.033	0.168	0.031
4.8	0.208	0.105	0.131	0.024	0.134	0.024	0.194	0.044	0.165	0.039	0.170	0.040
4.9	0.199	0.081	0.136	0.024	0.141	0.020	0.214	0.059	0.170	0.030	0.170	0.039
5.0	0.203	0.069	0.132	0.028	0.132	0.026	0.225	0.059	0.166	0.027	0.158	0.041
5.1	0.205	0.070	0.132	0.029	0.136	0.018	0.214	0.039	0.161	0.035	0.162	0.037
5.2	0.203	0.071	0.132	0.031	0.131	0.028	0.203	0.036	0.151	0.042	0.159	0.033
5.3	0.196	0.052	0.128	0.030	0.140	0.021	0.203	0.031	0.143	0.046	0.162	0.024
5.4	0.202	0.047	0.134	0.028	0.140	0.023	0.205	0.027	0.159	0.032	0.165	0.019
5.5	0.210	0.062	0.140	0.020	0.141	0.023	0.206	0.033	0.158	0.027	0.161	0.025
5.6	0.199	0.070	0.133	0.033	0.140	0.015	0.200	0.049	0.161	0.039	0.158	0.031
5.7	0.193	0.070	0.133	0.034	0.141	0.017	0.191	0.047	0.158	0.032	0.166	0.036

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
5.8	0.188	0.055	0.136	0.032	0.144	0.015	0.191	0.062	0.159	0.027	0.174	0.036
5.9	0.173	0.051	0.137	0.032	0.147	0.027	0.185	0.064	0.161	0.030	0.172	0.033
6.0	0.175	0.058	0.147	0.027	0.146	0.022	0.179	0.058	0.160	0.042	0.179	0.034
6.1	0.183	0.058	0.136	0.034	0.146	0.022	0.170	0.058	0.160	0.032	0.173	0.036
6.2	0.190	0.059	0.140	0.024	0.142	0.027	0.177	0.057	0.166	0.040	0.170	0.027
6.3	0.198	0.086	0.140	0.020	0.140	0.023	0.191	0.065	0.170	0.037	0.174	0.032
6.4	0.209	0.085	0.140	0.018	0.136	0.020	0.204	0.059	0.174	0.029	0.163	0.035
6.5	0.200	0.067	0.137	0.019	0.142	0.029	0.223	0.073	0.176	0.026	0.157	0.046
6.6	0.194	0.046	0.138	0.034	0.140	0.024	0.202	0.057	0.171	0.033	0.155	0.059
6.7	0.195	0.053	0.135	0.042	0.143	0.030	0.198	0.062	0.166	0.031	0.159	0.049
6.8	0.186	0.046	0.146	0.029	0.133	0.036	0.198	0.084	0.163	0.023	0.170	0.052
6.9	0.183	0.055	0.143	0.024	0.129	0.032	0.181	0.061	0.164	0.028	0.174	0.055
7.0	0.187	0.063	0.141	0.027	0.137	0.021	0.183	0.067	0.163	0.036	0.169	0.039
7.1	0.191	0.073	0.138	0.035	0.135	0.027	0.189	0.068	0.162	0.031	0.160	0.046
7.2	0.167	0.046	0.131	0.043	0.117	0.038	0.191	0.069	0.154	0.030	0.157	0.033
7.3	0.177	0.081	0.136	0.034	0.113	0.043	0.188	0.057	0.146	0.031	0.160	0.020
7.4	0.177	0.074	0.139	0.038	0.120	0.034	0.189	0.048	0.144	0.035	0.159	0.016
7.5	0.176	0.075	0.140	0.043	0.123	0.028	0.203	0.056	0.152	0.027	0.163	0.019
7.6	0.182	0.073	0.135	0.046	0.127	0.021	0.194	0.046	0.151	0.027	0.154	0.026
7.7	0.173	0.066	0.133	0.043	0.131	0.016	0.182	0.032	0.155	0.025	0.155	0.021
7.8	0.183	0.077	0.132	0.036	0.125	0.029	0.171	0.037	0.156	0.028	0.157	0.027
7.9	0.193	0.081	0.126	0.038	0.110	0.042	0.168	0.041	0.155	0.030	0.156	0.024
8.0	0.196	0.074	0.127	0.046	0.113	0.043	0.164	0.044	0.154	0.027	0.152	0.019
8.1	0.198	0.073	0.123	0.051	0.106	0.039	0.165	0.042	0.147	0.030	0.149	0.027
8.2	0.200	0.075	0.113	0.050	0.097	0.046	0.164	0.058	0.148	0.023	0.147	0.039
8.3	0.190	0.071	0.113	0.053	0.112	0.039	0.160	0.041	0.147	0.020	0.155	0.023
8.4	0.177	0.071	0.113	0.039	0.110	0.038	0.162	0.046	0.145	0.021	0.150	0.020
8.5	0.173	0.071	0.119	0.035	0.113	0.035	0.157	0.045	0.136	0.027	0.151	0.019
8.6	0.163	0.058	0.132	0.039	0.111	0.034	0.148	0.054	0.136	0.033	0.148	0.023
8.7	0.167	0.057	0.126	0.038	0.107	0.029	0.152	0.069	0.143	0.029	0.144	0.028

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
8.8	0.172	0.077	0.113	0.044	0.104	0.028	0.163	0.065	0.139	0.038	0.140	0.022
8.9	0.167	0.057	0.117	0.050	0.102	0.039	0.167	0.072	0.136	0.041	0.141	0.023
9.0	0.166	0.046	0.113	0.051	0.101	0.046	0.159	0.061	0.132	0.032	0.140	0.028
9.1	0.161	0.041	0.111	0.052	0.097	0.047	0.167	0.061	0.132	0.030	0.132	0.026
9.2	0.159	0.039	0.122	0.041	0.094	0.037	0.164	0.064	0.130	0.041	0.124	0.027
9.3	0.154	0.040	0.121	0.035	0.088	0.033	0.168	0.065	0.131	0.032	0.122	0.026
9.4	0.154	0.048	0.116	0.040	0.078	0.034	0.166	0.058	0.132	0.032	0.124	0.024
9.5	0.146	0.058	0.110	0.042	0.079	0.036	0.162	0.050	0.130	0.023	0.121	0.036
9.6	0.135	0.051	0.106	0.045	0.078	0.033	0.157	0.038	0.128	0.018	0.124	0.031
9.7	0.132	0.053	0.111	0.038	0.065	0.037	0.154	0.034	0.125	0.023	0.126	0.028
9.8	0.139	0.054	0.107	0.043	0.068	0.033	0.152	0.028	0.119	0.036	0.122	0.025
9.9	0.133	0.046	0.112	0.033	0.071	0.037	0.151	0.034	0.121	0.039	0.123	0.018
10.0	0.133	0.051	0.107	0.033	0.067	0.035	0.148	0.041	0.119	0.030	0.118	0.028
10.1	0.137	0.038	0.102	0.042	0.078	0.032	0.145	0.039	0.118	0.040	0.112	0.034
10.2	0.139	0.031	0.100	0.042	0.075	0.043	0.143	0.042	0.119	0.039	0.110	0.035
10.3	0.139	0.027	0.099	0.046	0.073	0.048	0.143	0.045	0.118	0.036	0.114	0.040
10.4	0.131	0.036	0.104	0.040	0.068	0.047	0.152	0.034	0.116	0.034	0.116	0.038
10.5	0.128	0.041	0.093	0.047	0.063	0.047	0.154	0.036	0.115	0.031	0.113	0.035
10.6	0.124	0.034	0.089	0.051	0.060	0.047	0.146	0.052	0.108	0.038	0.100	0.039
10.7	0.115	0.050	0.089	0.053	0.066	0.045	0.147	0.048	0.117	0.034	0.093	0.039
10.8	0.106	0.058	0.080	0.052	0.061	0.046	0.145	0.043	0.118	0.028	0.098	0.036
10.9	0.108	0.048	0.085	0.045	0.053	0.043	0.143	0.046	0.118	0.028	0.099	0.033
11.0	0.115	0.049	0.083	0.047	0.054	0.036	0.135	0.044	0.118	0.030	0.089	0.037
11.1	0.121	0.052	0.079	0.049	0.053	0.037	0.137	0.049	0.114	0.032	0.097	0.035
11.2	0.117	0.050	0.080	0.047	0.050	0.043	0.134	0.043	0.109	0.033	0.106	0.029
11.3	0.110	0.049	0.088	0.044	0.046	0.044	0.131	0.041	0.108	0.034	0.105	0.031
11.4	0.110	0.051	0.090	0.043	0.048	0.049	0.125	0.048	0.112	0.024	0.097	0.030
11.5	0.107	0.060	0.086	0.038	0.046	0.051	0.125	0.032	0.112	0.021	0.094	0.035
11.6	0.109	0.056	0.081	0.035	0.043	0.050	0.116	0.034	0.103	0.033	0.083	0.037
11.7	0.100	0.052	0.079	0.038	0.046	0.048	0.117	0.031	0.104	0.030	0.077	0.046

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
11.8	0.094	0.060	0.079	0.037	0.047	0.045	0.112	0.035	0.097	0.038	0.083	0.044
11.9	0.091	0.058	0.080	0.036	0.055	0.044	0.108	0.033	0.094	0.045	0.087	0.042
12.0	0.089	0.054	0.078	0.034	0.047	0.041	0.110	0.034	0.094	0.044	0.093	0.043
12.1	0.087	0.050	0.063	0.038	0.048	0.038	0.106	0.043	0.083	0.045	0.098	0.034
12.2	0.089	0.045	0.065	0.043	0.048	0.038	0.107	0.044	0.077	0.048	0.098	0.030
12.3	0.092	0.042	0.070	0.038	0.044	0.042	0.107	0.048	0.075	0.048	0.100	0.033
12.4	0.087	0.041	0.069	0.037	0.044	0.044	0.112	0.040	0.082	0.043	0.098	0.039
12.5	0.087	0.043	0.070	0.043	0.038	0.041	0.112	0.033	0.082	0.043	0.094	0.042
12.6	0.084	0.053	0.077	0.040	0.044	0.040	0.106	0.038	0.079	0.038	0.090	0.041
12.7	0.089	0.055	0.076	0.039	0.041	0.039	0.105	0.041	0.071	0.044	0.085	0.042
12.8	0.083	0.056	0.075	0.040	0.040	0.043	0.106	0.036	0.067	0.046	0.081	0.047
12.9	0.083	0.057	0.072	0.038	0.033	0.041	0.105	0.042	0.067	0.043	0.069	0.048
13.0	0.078	0.054	0.071	0.039	0.024	0.039	0.107	0.042	0.076	0.039	0.064	0.045
13.1	0.082	0.055	0.068	0.043	0.029	0.042	0.114	0.043	0.073	0.038	0.071	0.046
13.2	0.083	0.053	0.065	0.037	0.035	0.043	0.116	0.041	0.073	0.037	0.068	0.046
13.3	0.081	0.050	0.059	0.037	0.038	0.041	0.115	0.041	0.073	0.041	0.065	0.051
13.4	0.073	0.055	0.048	0.040	0.041	0.034	0.115	0.041	0.071	0.037	0.067	0.049
13.5	0.067	0.056	0.049	0.045	0.045	0.039	0.112	0.041	0.065	0.040	0.070	0.043
13.6	0.071	0.050	0.051	0.044	0.041	0.042	0.110	0.041	0.063	0.035	0.082	0.038
13.7	0.075	0.045	0.054	0.043	0.036	0.034	0.109	0.044	0.060	0.036	0.081	0.038
13.8	0.074	0.047	0.059	0.040	0.030	0.034	0.110	0.042	0.057	0.040	0.075	0.040
13.9	0.072	0.052	0.059	0.040	0.035	0.039	0.113	0.041	0.062	0.041	0.074	0.037
14.0	0.074	0.055	0.053	0.036	0.036	0.038	0.111	0.041	0.065	0.042	0.074	0.038
14.1	0.080	0.046	0.046	0.039	0.025	0.033	0.112	0.041	0.065	0.039	0.075	0.040
14.2	0.080	0.042	0.045	0.041	0.018	0.032	0.107	0.040	0.059	0.043	0.068	0.040
14.3	0.078	0.044	0.046	0.037	0.022	0.034	0.102	0.044	0.057	0.037	0.067	0.044
14.4	0.075	0.043	0.051	0.039	0.021	0.034	0.098	0.045	0.055	0.037	0.069	0.045
14.5	0.071	0.036	0.049	0.033	0.020	0.032	0.098	0.044	0.054	0.039	0.071	0.044
14.6	0.065	0.040	0.051	0.031	0.027	0.037	0.098	0.040	0.056	0.045	0.074	0.040
14.7	0.064	0.045	0.048	0.034	0.029	0.034	0.097	0.042	0.057	0.045	0.074	0.035

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
14.8	0.061	0.045	0.048	0.038	0.028	0.031	0.090	0.043	0.059	0.041	0.072	0.036
14.9	0.056	0.045	0.049	0.040	0.020	0.030	0.090	0.041	0.068	0.040	0.065	0.036
15.0	0.051	0.046	0.045	0.041	0.016	0.030	0.088	0.041	0.070	0.039	0.065	0.037
15.1	0.046	0.050	0.037	0.037	0.021	0.029	0.091	0.043	0.068	0.037	0.068	0.037
15.2	0.044	0.046	0.035	0.037	0.025	0.027	0.095	0.041	0.066	0.037	0.067	0.037
15.3	0.043	0.040	0.037	0.036	0.030	0.025	0.095	0.039	0.065	0.040	0.066	0.034
15.4	0.042	0.041	0.043	0.037	0.028	0.027	0.094	0.040	0.058	0.040	0.067	0.035
15.5	0.046	0.046	0.042	0.036	0.027	0.030	0.088	0.043	0.050	0.040	0.064	0.037
15.6	0.045	0.043	0.035	0.038	0.029	0.033	0.083	0.046	0.045	0.039	0.066	0.036
15.7	0.043	0.037	0.033	0.040	0.022	0.033	0.082	0.045	0.046	0.042	0.060	0.031
15.8	0.047	0.032	0.039	0.043	0.017	0.031	0.081	0.046	0.047	0.047	0.058	0.029
15.9	0.045	0.035	0.041	0.040	0.017	0.032	0.074	0.044	0.042	0.047	0.062	0.029
16.0	0.040	0.037	0.041	0.043	0.024	0.028	0.071	0.046	0.040	0.044	0.060	0.025
16.1	0.032	0.033	0.043	0.046	0.031	0.026	0.065	0.047	0.043	0.045	0.056	0.031
16.2	0.030	0.031	0.042	0.045	0.031	0.027	0.064	0.050	0.040	0.045	0.057	0.032
16.3	0.027	0.030	0.043	0.046	0.029	0.030	0.065	0.052	0.041	0.044	0.064	0.027
16.4	0.031	0.035	0.039	0.045	0.026	0.027	0.069	0.052	0.046	0.043	0.067	0.026
16.5	0.029	0.037	0.036	0.050	0.022	0.023	0.066	0.055	0.048	0.042	0.065	0.027
16.6	0.027	0.040	0.039	0.050	0.026	0.028	0.066	0.055	0.043	0.040	0.062	0.026
16.7	0.030	0.044	0.042	0.047	0.030	0.028	0.068	0.055	0.039	0.041	0.061	0.033
16.8	0.035	0.044	0.043	0.043	0.029	0.030	0.067	0.053	0.045	0.043	0.059	0.033
16.9	0.036	0.041	0.045	0.045	0.027	0.032	0.069	0.051	0.044	0.041	0.057	0.036
17.0	0.043	0.040	0.038	0.040	0.027	0.033	0.070	0.052	0.043	0.042	0.051	0.037
17.1	0.045	0.039	0.034	0.035	0.026	0.030	0.073	0.049	0.043	0.043	0.042	0.037
17.2	0.041	0.038	0.036	0.039	0.028	0.031	0.077	0.050	0.042	0.040	0.035	0.035
17.3	0.036	0.036	0.035	0.043	0.031	0.029	0.078	0.048	0.042	0.037	0.032	0.032
17.4	0.033	0.030	0.037	0.046	0.031	0.029	0.078	0.050	0.038	0.034	0.027	0.033
17.5	0.031	0.033	0.037	0.039	0.029	0.027	0.078	0.051	0.040	0.032	0.031	0.034
17.6	0.028	0.037	0.039	0.042	0.030	0.032	0.080	0.052	0.044	0.030	0.030	0.037
17.7	0.032	0.042	0.040	0.042	0.031	0.033	0.079	0.052	0.046	0.030	0.029	0.037

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
17.8	0.033	0.042	0.035	0.038	0.032	0.036	0.080	0.053	0.045	0.031	0.030	0.036
17.9	0.029	0.038	0.035	0.041	0.028	0.035	0.080	0.053	0.041	0.028	0.029	0.035
18.0	0.032	0.041	0.040	0.040	0.025	0.034	0.079	0.049	0.037	0.026	0.026	0.029
18.1	0.035	0.041	0.039	0.040	0.028	0.037	0.073	0.050	0.039	0.028	0.022	0.028
18.2	0.039	0.041	0.039	0.037	0.028	0.036	0.070	0.052	0.040	0.030	0.018	0.030
18.3	0.035	0.039	0.038	0.039	0.027	0.036	0.071	0.049	0.040	0.032	0.017	0.027
18.4	0.033	0.039	0.037	0.043	0.031	0.036	0.070	0.045	0.035	0.036	0.019	0.025
18.5	0.032	0.042	0.036	0.041	0.029	0.035	0.066	0.049	0.032	0.037	0.022	0.028
18.6	0.034	0.043	0.032	0.037	0.023	0.037	0.065	0.050	0.030	0.034	0.025	0.029
18.7	0.035	0.042	0.030	0.035	0.021	0.035	0.065	0.050	0.033	0.032	0.025	0.028
18.8	0.031	0.039	0.030	0.033	0.017	0.035	0.065	0.051	0.032	0.032	0.027	0.034
18.9	0.029	0.037	0.033	0.031	0.015	0.033	0.067	0.052	0.030	0.032	0.033	0.038
19.0	0.030	0.038	0.030	0.033	0.017	0.034	0.072	0.052	0.031	0.033	0.033	0.037
19.1	0.029	0.039	0.028	0.031	0.016	0.033	0.076	0.052	0.033	0.031	0.027	0.034
19.2	0.026	0.036	0.030	0.030	0.016	0.033	0.076	0.050	0.033	0.032	0.027	0.039
19.3	0.026	0.037	0.030	0.032	0.019	0.031	0.075	0.045	0.029	0.032	0.028	0.039
19.4	0.031	0.037	0.032	0.032	0.023	0.031	0.072	0.045	0.027	0.029	0.029	0.036
19.5	0.033	0.036	0.029	0.031	0.026	0.029	0.068	0.045	0.028	0.031	0.028	0.035
19.6	0.029	0.035	0.027	0.031	0.026	0.029	0.065	0.047	0.028	0.031	0.031	0.037
19.7	0.028	0.037	0.023	0.032	0.027	0.025	0.064	0.045	0.024	0.028	0.030	0.038
19.8	0.032	0.041	0.022	0.034	0.026	0.024	0.063	0.045	0.021	0.027	0.028	0.036
19.9	0.034	0.042	0.023	0.032	0.024	0.029	0.060	0.045	0.021	0.029	0.028	0.039
20.0	0.033	0.042	0.022	0.032	0.023	0.030	0.061	0.048	0.026	0.031	0.026	0.040
20.1	0.033	0.042	0.021	0.031	0.021	0.029	0.059	0.050	0.029	0.030	0.024	0.040
20.2	0.034	0.042	0.022	0.030	0.019	0.031	0.055	0.049	0.027	0.028	0.024	0.038
20.3	0.037	0.044	0.026	0.028	0.019	0.032	0.054	0.048	0.027	0.026	0.023	0.037
20.4	0.039	0.044	0.030	0.028	0.016	0.035	0.054	0.049	0.028	0.032	0.021	0.035
20.5	0.043	0.046	0.030	0.030	0.014	0.034	0.053	0.051	0.029	0.035	0.021	0.031
20.6	0.046	0.046	0.026	0.029	0.013	0.027	0.049	0.053	0.031	0.034	0.023	0.032
20.7	0.048	0.045	0.029	0.031	0.014	0.026	0.050	0.052	0.032	0.032	0.022	0.029

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
20.8	0.047	0.043	0.028	0.031	0.016	0.028	0.051	0.051	0.030	0.028	0.023	0.028
20.9	0.043	0.039	0.027	0.031	0.011	0.025	0.051	0.050	0.027	0.028	0.021	0.031
21.0	0.042	0.037	0.023	0.027	0.010	0.022	0.054	0.050	0.025	0.025	0.017	0.033
21.1	0.046	0.038	0.023	0.027	0.008	0.021	0.055	0.048	0.027	0.026	0.014	0.032
21.2	0.041	0.038	0.024	0.032	0.008	0.020	0.054	0.046	0.027	0.027	0.016	0.031
21.3	0.038	0.039	0.024	0.034	0.009	0.025	0.056	0.043	0.025	0.025	0.018	0.031
21.4	0.037	0.038	0.021	0.030	0.010	0.026	0.057	0.041	0.023	0.027	0.020	0.031
21.5	0.036	0.037	0.018	0.027	0.012	0.026	0.055	0.039	0.026	0.030	0.018	0.033
21.6	0.034	0.037	0.016	0.027	0.013	0.024	0.050	0.040	0.026	0.030	0.020	0.034
21.7	0.030	0.036	0.015	0.027	0.013	0.020	0.051	0.039	0.028	0.032	0.017	0.031
21.8	0.029	0.036	0.016	0.028	0.012	0.020	0.052	0.035	0.027	0.030	0.017	0.034
21.9	0.028	0.037	0.016	0.029	0.016	0.025	0.054	0.037	0.024	0.030	0.018	0.032
22.0	0.026	0.038	0.017	0.030	0.016	0.026	0.054	0.041	0.021	0.032	0.020	0.027
22.1	0.026	0.040	0.013	0.026	0.015	0.025	0.053	0.042	0.019	0.029	0.020	0.026
22.2	0.024	0.038	0.011	0.024	0.014	0.024	0.050	0.040	0.017	0.025	0.021	0.028
22.3	0.024	0.040	0.013	0.025	0.015	0.022	0.051	0.041	0.015	0.025	0.020	0.026
22.4	0.024	0.040	0.014	0.025	0.019	0.023	0.051	0.042	0.014	0.025	0.021	0.028
22.5	0.022	0.037	0.014	0.024	0.020	0.023	0.052	0.045	0.016	0.027	0.020	0.029
22.6	0.021	0.035	0.014	0.023	0.019	0.022	0.052	0.044	0.017	0.027	0.023	0.028
22.7	0.022	0.034	0.014	0.023	0.016	0.019	0.049	0.040	0.017	0.028	0.024	0.028
22.8	0.022	0.032	0.013	0.023	0.014	0.018	0.045	0.035	0.014	0.027	0.024	0.028
22.9	0.023	0.032	0.011	0.020	0.013	0.019	0.042	0.035	0.012	0.026	0.023	0.027
23.0	0.024	0.035	0.013	0.019	0.014	0.019	0.042	0.039	0.011	0.026	0.020	0.027
23.1	0.026	0.036	0.014	0.019	0.014	0.020	0.043	0.042	0.013	0.027	0.019	0.029
23.2	0.026	0.035	0.014	0.019	0.014	0.021	0.045	0.044	0.014	0.026	0.017	0.028
23.3	0.021	0.032	0.010	0.021	0.015	0.023	0.045	0.043	0.016	0.025	0.017	0.024
23.4	0.019	0.031	0.006	0.018	0.020	0.027	0.043	0.044	0.015	0.024	0.016	0.023
23.5	0.019	0.031	0.005	0.017	0.022	0.027	0.043	0.046	0.015	0.024	0.013	0.022
23.6	0.018	0.031	0.006	0.018	0.023	0.027	0.043	0.044	0.015	0.024	0.013	0.022
23.7	0.017	0.030	0.010	0.023	0.021	0.026	0.041	0.041	0.012	0.021	0.013	0.023

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
23.8	0.017	0.030	0.013	0.023	0.021	0.026	0.040	0.039	0.009	0.021	0.012	0.027
23.9	0.017	0.031	0.015	0.024	0.025	0.026	0.041	0.038	0.008	0.019	0.010	0.030
24.0	0.018	0.031	0.016	0.027	0.025	0.025	0.042	0.038	0.008	0.018	0.010	0.028
24.1	0.019	0.031	0.014	0.025	0.023	0.025	0.039	0.035	0.009	0.018	0.013	0.028
24.2	0.020	0.030	0.011	0.021	0.021	0.025	0.038	0.033	0.008	0.018	0.014	0.028
24.3	0.021	0.031	0.010	0.021	0.020	0.027	0.036	0.032	0.008	0.020	0.013	0.028
24.4	0.021	0.034	0.011	0.022	0.019	0.027	0.033	0.033	0.008	0.019	0.013	0.029
24.5	0.020	0.030	0.012	0.022	0.019	0.026	0.030	0.034	0.007	0.016	0.012	0.026
24.6	0.021	0.029	0.010	0.020	0.017	0.025	0.028	0.036	0.005	0.015	0.011	0.027
24.7	0.021	0.029	0.008	0.019	0.014	0.023	0.027	0.037	0.003	0.016	0.009	0.023
24.8	0.020	0.027	0.008	0.018	0.013	0.026	0.026	0.036	0.003	0.015	0.010	0.025
24.9	0.021	0.027	0.011	0.019	0.013	0.026	0.027	0.034	0.004	0.015	0.010	0.028
25.0	0.024	0.027	0.012	0.023	0.011	0.022	0.026	0.029	0.002	0.011	0.009	0.027
25.1	0.026	0.029	0.011	0.022	0.007	0.019	0.025	0.028	0.002	0.014	0.010	0.026
25.2	0.027	0.032	0.010	0.020	0.004	0.018	0.023	0.027	0.003	0.016	0.011	0.026
25.3	0.026	0.031	0.009	0.018	0.004	0.016	0.021	0.025	0.006	0.018	0.012	0.025
25.4	0.025	0.029	0.010	0.020	0.005	0.015	0.020	0.023	0.007	0.018	0.014	0.026
25.5	0.025	0.027	0.010	0.021	0.009	0.017	0.020	0.024	0.007	0.017	0.015	0.028
25.6	0.025	0.024	0.009	0.017	0.012	0.019	0.021	0.024	0.007	0.017	0.014	0.030
25.7	0.026	0.026	0.008	0.017	0.011	0.020	0.025	0.027	0.009	0.017	0.013	0.028
25.8	0.025	0.027	0.008	0.017	0.008	0.019	0.028	0.029	0.009	0.019	0.013	0.027
25.9	0.023	0.026	0.007	0.016	0.007	0.017	0.029	0.030	0.008	0.019	0.014	0.028
26.0	0.022	0.025	0.006	0.013	0.005	0.015	0.028	0.032	0.007	0.019	0.014	0.028
26.1	0.023	0.025	0.007	0.015	0.007	0.016	0.030	0.035	0.006	0.014	0.014	0.030
26.2	0.022	0.024	0.009	0.016	0.009	0.018	0.032	0.038	0.004	0.010	0.014	0.029
26.3	0.021	0.023	0.012	0.021	0.009	0.019	0.035	0.036	0.003	0.009	0.014	0.028
26.4	0.022	0.025	0.014	0.023	0.009	0.018	0.035	0.034	0.005	0.011	0.014	0.027
26.5	0.023	0.027	0.013	0.023	0.008	0.018	0.035	0.034	0.007	0.013	0.014	0.024
26.6	0.022	0.028	0.012	0.023	0.007	0.017	0.035	0.035	0.008	0.016	0.014	0.024
26.7	0.021	0.028	0.011	0.023	0.008	0.017	0.034	0.036	0.009	0.018	0.015	0.025

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
26.8	0.020	0.028	0.009	0.022	0.007	0.017	0.033	0.038	0.011	0.017	0.017	0.024
26.9	0.022	0.030	0.007	0.022	0.007	0.017	0.034	0.039	0.012	0.020	0.019	0.022
27.0	0.025	0.035	0.005	0.020	0.009	0.018	0.036	0.038	0.010	0.020	0.022	0.022
27.1	0.026	0.037	0.006	0.020	0.009	0.017	0.034	0.034	0.009	0.022	0.021	0.023
27.2	0.025	0.037	0.009	0.021	0.009	0.018	0.033	0.036	0.009	0.023	0.021	0.021
27.3	0.024	0.036	0.010	0.020	0.008	0.020	0.033	0.035	0.010	0.024	0.021	0.020
27.4	0.022	0.034	0.010	0.020	0.005	0.020	0.032	0.034	0.009	0.023	0.021	0.023
27.5	0.022	0.034	0.009	0.018	0.008	0.019	0.032	0.036	0.007	0.019	0.017	0.025
27.6	0.022	0.037	0.007	0.017	0.009	0.018	0.032	0.037	0.008	0.018	0.014	0.025
27.7	0.022	0.038	0.004	0.015	0.008	0.015	0.030	0.035	0.011	0.019	0.014	0.025
27.8	0.021	0.039	0.003	0.015	0.006	0.013	0.031	0.035	0.014	0.022	0.014	0.026
27.9	0.021	0.038	0.003	0.020	0.003	0.012	0.029	0.034	0.015	0.023	0.014	0.025
28.0	0.022	0.037	0.005	0.021	0.002	0.012	0.025	0.034	0.014	0.022	0.014	0.024
28.1	0.024	0.037	0.007	0.020	0.005	0.013	0.025	0.037	0.013	0.023	0.015	0.026
28.2	0.025	0.036	0.007	0.020	0.006	0.013	0.026	0.039	0.011	0.025	0.015	0.026
28.3	0.024	0.034	0.007	0.018	0.007	0.013	0.027	0.040	0.009	0.028	0.015	0.027
28.4	0.023	0.032	0.007	0.017	0.008	0.013	0.026	0.038	0.009	0.036	0.014	0.027
28.5	0.021	0.031	0.005	0.015	0.008	0.014	0.023	0.036	0.005	0.039	0.011	0.025
28.6	0.020	0.031	0.005	0.015	0.007	0.014	0.019	0.033	0.004	0.042	0.013	0.026
28.7	0.020	0.032	0.002	0.015	0.007	0.016	0.015	0.029	0.004	0.040	0.014	0.026
28.8	0.018	0.031	0.000	0.016	0.008	0.017	0.013	0.027	0.005	0.034	0.015	0.025
28.9	0.016	0.028	0.000	0.014	0.006	0.016	0.014	0.028	0.008	0.028	0.014	0.025
29.0	0.015	0.027	0.001	0.013	0.005	0.016	0.017	0.028	0.009	0.021	0.012	0.024
29.1	0.015	0.026	0.004	0.013	0.005	0.017	0.019	0.027	0.009	0.017	0.012	0.024
29.2	0.014	0.025	0.004	0.013	0.006	0.016	0.021	0.029	0.009	0.016	0.012	0.024
29.3	0.013	0.025	0.003	0.012	0.007	0.016	0.024	0.034	0.011	0.016	0.013	0.023
29.4	0.013	0.026	0.002	0.011	0.008	0.017	0.024	0.036	0.013	0.017	0.013	0.025
29.5	0.012	0.026	0.002	0.011	0.009	0.017	0.021	0.035	0.013	0.017	0.012	0.025
29.6	0.010	0.025	0.003	0.012	0.011	0.017	0.017	0.031	0.013	0.018	0.012	0.028
29.7	0.009	0.024	0.004	0.014	0.012	0.020	0.015	0.029	0.013	0.018	0.011	0.027

Cycle Time (sec)	Velocities Measured at 0.191-m (7.5-in) Radial Position						Velocities Measured at 0.241-m (9.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
29.8	0.010	0.027	0.005	0.016	0.011	0.022	0.015	0.029	0.013	0.020	0.010	0.025
29.9	0.010	0.028	0.004	0.016	0.011	0.022	0.015	0.027	0.013	0.020	0.011	0.027
30.0	0.008	0.027	0.004	0.016	0.010	0.021	0.016	0.027	0.012	0.020	0.011	0.026

Small-Tank Floor Velocity Data, contd.

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
0.1	0.011	0.014	0.000	0.011	0.000	0.013	0.008	0.021	0.005	0.017	0.006	0.016
0.2	0.015	0.015	-0.001	0.012	0.001	0.011	0.008	0.022	0.004	0.019	0.004	0.016
0.3	0.032	0.026	0.003	0.008	0.012	0.018	0.011	0.023	0.004	0.013	0.003	0.013
0.4	0.089	0.025	0.033	0.028	0.053	0.027	0.023	0.028	0.006	0.014	0.006	0.016
0.5	0.146	0.013	0.108	0.022	0.124	0.009	0.049	0.037	0.051	0.019	0.055	0.020
0.6	0.323	0.101	0.217	0.097	0.293	0.120	0.103	0.014	0.098	0.023	0.106	0.026
0.7	0.758	0.114	0.578	0.091	0.563	0.056	0.138	0.016	0.181	0.050	0.201	0.063
0.8	0.797	0.099	0.601	0.064	0.499	0.075	0.254	0.096	0.313	0.044	0.327	0.055
0.9	0.809	0.123	0.547	0.087	0.449	0.102	0.489	0.137	0.324	0.034	0.341	0.037
1.0	0.787	0.104	0.512	0.080	0.445	0.084	0.608	0.061	0.305	0.052	0.318	0.031
1.1	0.776	0.107	0.558	0.084	0.437	0.104	0.627	0.093	0.289	0.044	0.296	0.036
1.2	0.768	0.113	0.486	0.081	0.408	0.076	0.621	0.110	0.285	0.048	0.270	0.030
1.3	0.809	0.114	0.529	0.097	0.440	0.104	0.619	0.077	0.287	0.037	0.273	0.061
1.4	0.749	0.145	0.496	0.106	0.401	0.084	0.595	0.072	0.294	0.053	0.254	0.035
1.5	0.780	0.126	0.537	0.099	0.410	0.097	0.623	0.086	0.286	0.039	0.274	0.059
1.6	0.750	0.074	0.583	0.107	0.408	0.130	0.573	0.123	0.299	0.032	0.281	0.055
1.7	0.813	0.139	0.558	0.110	0.443	0.106	0.552	0.108	0.281	0.063	0.256	0.045
1.8	0.817	0.061	0.542	0.064	0.445	0.102	0.539	0.110	0.293	0.044	0.268	0.049
1.9	0.751	0.126	0.557	0.077	0.342	0.114	0.504	0.130	0.311	0.050	0.288	0.049
2.0	0.754	0.117	0.522	0.091	0.387	0.099	0.584	0.119	0.261	0.044	0.270	0.050
2.1	0.846	0.079	0.556	0.090	0.446	0.115	0.576	0.087	0.277	0.053	0.279	0.063
2.2	0.749	0.117	0.505	0.073	0.456	0.079	0.598	0.124	0.289	0.048	0.270	0.062
2.3	0.778	0.086	0.567	0.070	0.401	0.123	0.535	0.135	0.305	0.023	0.277	0.045
2.4	0.749	0.101	0.594	0.086	0.450	0.109	0.641	0.055	0.317	0.056	0.263	0.046
2.5	0.788	0.129	0.555	0.069	0.414	0.082	0.601	0.118	0.278	0.071	0.257	0.054
2.6	0.809	0.084	0.528	0.112	0.405	0.108	0.567	0.129	0.299	0.051	0.260	0.055
2.7	0.839	0.093	0.536	0.091	0.454	0.119	0.616	0.094	0.321	0.045	0.260	0.050

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
2.8	0.804	0.070	0.526	0.103	0.441	0.076	0.602	0.122	0.284	0.054	0.257	0.051
2.9	0.736	0.121	0.526	0.101	0.394	0.090	0.570	0.120	0.315	0.062	0.254	0.047
3.0	0.804	0.094	0.561	0.062	0.400	0.097	0.584	0.082	0.324	0.051	0.272	0.044
3.1	0.813	0.077	0.543	0.067	0.388	0.093	0.577	0.090	0.290	0.041	0.263	0.055
3.2	0.828	0.063	0.559	0.085	0.449	0.104	0.586	0.078	0.304	0.054	0.250	0.054
3.3	0.672	0.086	0.556	0.092	0.411	0.080	0.562	0.087	0.274	0.039	0.257	0.045
3.4	0.543	0.101	0.448	0.082	0.317	0.056	0.580	0.055	0.252	0.048	0.228	0.042
3.5	0.442	0.061	0.342	0.077	0.292	0.055	0.489	0.072	0.196	0.020	0.205	0.044
3.6	0.334	0.039	0.256	0.036	0.249	0.051	0.378	0.058	0.170	0.018	0.191	0.029
3.7	0.312	0.035	0.223	0.025	0.218	0.033	0.298	0.058	0.168	0.013	0.166	0.017
3.8	0.268	0.039	0.213	0.025	0.202	0.020	0.260	0.030	0.157	0.014	0.158	0.017
3.9	0.237	0.029	0.204	0.028	0.195	0.017	0.243	0.019	0.152	0.010	0.150	0.014
4.0	0.227	0.025	0.194	0.021	0.180	0.018	0.231	0.030	0.150	0.011	0.148	0.014
4.1	0.213	0.026	0.187	0.024	0.177	0.023	0.203	0.033	0.146	0.016	0.137	0.024
4.2	0.208	0.039	0.179	0.021	0.177	0.027	0.196	0.028	0.145	0.013	0.129	0.029
4.3	0.199	0.039	0.173	0.020	0.174	0.019	0.194	0.031	0.138	0.013	0.134	0.014
4.4	0.196	0.042	0.167	0.021	0.169	0.018	0.181	0.026	0.136	0.009	0.137	0.017
4.5	0.199	0.050	0.159	0.019	0.167	0.020	0.173	0.024	0.133	0.016	0.137	0.015
4.6	0.189	0.036	0.162	0.020	0.161	0.020	0.168	0.029	0.132	0.017	0.132	0.015
4.7	0.187	0.038	0.153	0.028	0.164	0.016	0.167	0.028	0.129	0.019	0.129	0.014
4.8	0.193	0.030	0.152	0.016	0.160	0.015	0.164	0.034	0.122	0.025	0.123	0.024
4.9	0.200	0.042	0.152	0.021	0.164	0.015	0.158	0.023	0.114	0.032	0.125	0.032
5.0	0.184	0.046	0.147	0.033	0.160	0.016	0.153	0.019	0.112	0.038	0.119	0.034
5.1	0.172	0.034	0.146	0.033	0.156	0.020	0.155	0.027	0.115	0.028	0.127	0.019
5.2	0.178	0.037	0.156	0.026	0.154	0.019	0.150	0.028	0.112	0.028	0.130	0.018
5.3	0.174	0.046	0.144	0.030	0.150	0.026	0.151	0.034	0.102	0.044	0.132	0.016
5.4	0.173	0.039	0.144	0.024	0.146	0.033	0.140	0.038	0.099	0.037	0.131	0.014
5.5	0.169	0.040	0.148	0.027	0.146	0.025	0.143	0.034	0.106	0.041	0.126	0.025
5.6	0.175	0.042	0.146	0.031	0.144	0.027	0.130	0.038	0.103	0.046	0.126	0.027
5.7	0.178	0.035	0.153	0.021	0.142	0.032	0.133	0.043	0.099	0.051	0.125	0.024

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
5.8	0.183	0.059	0.152	0.027	0.149	0.021	0.133	0.042	0.094	0.051	0.124	0.038
5.9	0.184	0.055	0.155	0.028	0.149	0.026	0.130	0.040	0.105	0.040	0.121	0.040
6.0	0.181	0.071	0.149	0.031	0.147	0.032	0.124	0.047	0.104	0.039	0.113	0.038
6.1	0.178	0.059	0.153	0.029	0.149	0.033	0.118	0.050	0.103	0.048	0.113	0.026
6.2	0.180	0.052	0.160	0.036	0.145	0.029	0.118	0.056	0.102	0.056	0.114	0.026
6.3	0.175	0.050	0.154	0.026	0.140	0.026	0.120	0.050	0.098	0.058	0.111	0.033
6.4	0.178	0.041	0.150	0.033	0.140	0.037	0.129	0.055	0.104	0.050	0.119	0.019
6.5	0.176	0.054	0.155	0.019	0.134	0.052	0.133	0.049	0.110	0.042	0.121	0.017
6.6	0.175	0.040	0.154	0.019	0.138	0.050	0.124	0.045	0.099	0.046	0.115	0.021
6.7	0.179	0.033	0.152	0.025	0.134	0.055	0.119	0.045	0.084	0.053	0.110	0.026
6.8	0.176	0.032	0.160	0.021	0.137	0.051	0.129	0.037	0.088	0.046	0.111	0.031
6.9	0.164	0.037	0.161	0.020	0.135	0.048	0.132	0.030	0.097	0.034	0.100	0.036
7.0	0.163	0.040	0.150	0.022	0.132	0.051	0.134	0.033	0.102	0.037	0.112	0.030
7.1	0.167	0.051	0.150	0.022	0.138	0.055	0.120	0.035	0.122	0.021	0.114	0.028
7.2	0.162	0.052	0.148	0.024	0.133	0.051	0.114	0.039	0.124	0.017	0.108	0.026
7.3	0.166	0.039	0.147	0.040	0.130	0.054	0.106	0.043	0.123	0.020	0.105	0.034
7.4	0.156	0.037	0.142	0.047	0.132	0.049	0.110	0.037	0.123	0.015	0.107	0.036
7.5	0.155	0.039	0.143	0.033	0.134	0.043	0.114	0.036	0.125	0.018	0.106	0.034
7.6	0.155	0.036	0.145	0.027	0.138	0.034	0.121	0.036	0.124	0.019	0.108	0.031
7.7	0.156	0.036	0.150	0.019	0.141	0.024	0.124	0.041	0.120	0.026	0.112	0.023
7.8	0.149	0.045	0.147	0.022	0.140	0.026	0.120	0.045	0.120	0.023	0.102	0.033
7.9	0.154	0.032	0.147	0.019	0.141	0.020	0.118	0.050	0.120	0.022	0.094	0.042
8.0	0.153	0.028	0.147	0.020	0.144	0.024	0.122	0.049	0.118	0.023	0.098	0.042
8.1	0.152	0.022	0.140	0.031	0.145	0.020	0.125	0.047	0.117	0.031	0.098	0.047
8.2	0.151	0.021	0.141	0.023	0.142	0.016	0.124	0.035	0.113	0.032	0.097	0.039
8.3	0.152	0.030	0.139	0.026	0.143	0.023	0.126	0.040	0.109	0.030	0.091	0.041
8.4	0.159	0.018	0.137	0.022	0.142	0.027	0.124	0.044	0.103	0.035	0.097	0.027
8.5	0.150	0.018	0.128	0.035	0.135	0.025	0.112	0.050	0.110	0.022	0.102	0.022
8.6	0.155	0.016	0.130	0.035	0.130	0.032	0.116	0.036	0.106	0.040	0.097	0.028
8.7	0.156	0.026	0.124	0.044	0.136	0.027	0.104	0.051	0.104	0.048	0.091	0.034

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
8.8	0.157	0.030	0.127	0.044	0.134	0.024	0.096	0.058	0.101	0.046	0.083	0.043
8.9	0.153	0.031	0.128	0.044	0.131	0.040	0.094	0.056	0.097	0.045	0.092	0.032
9.0	0.150	0.033	0.128	0.040	0.129	0.037	0.093	0.055	0.096	0.040	0.096	0.031
9.1	0.146	0.046	0.126	0.044	0.126	0.035	0.087	0.054	0.092	0.037	0.089	0.030
9.2	0.145	0.042	0.133	0.038	0.124	0.030	0.101	0.044	0.087	0.039	0.092	0.035
9.3	0.144	0.033	0.128	0.037	0.124	0.030	0.103	0.040	0.090	0.038	0.085	0.038
9.4	0.146	0.027	0.130	0.030	0.118	0.041	0.099	0.045	0.084	0.041	0.084	0.046
9.5	0.148	0.031	0.122	0.036	0.114	0.038	0.100	0.048	0.084	0.041	0.086	0.045
9.6	0.142	0.028	0.123	0.028	0.116	0.035	0.102	0.039	0.083	0.046	0.086	0.039
9.7	0.146	0.019	0.121	0.026	0.111	0.041	0.087	0.040	0.089	0.045	0.080	0.040
9.8	0.148	0.024	0.119	0.029	0.105	0.043	0.091	0.043	0.088	0.040	0.079	0.040
9.9	0.145	0.027	0.111	0.032	0.104	0.046	0.084	0.051	0.086	0.041	0.074	0.044
10.0	0.142	0.030	0.110	0.033	0.107	0.047	0.088	0.056	0.092	0.039	0.071	0.050
10.1	0.143	0.029	0.112	0.037	0.103	0.048	0.092	0.050	0.090	0.043	0.066	0.053
10.2	0.139	0.037	0.110	0.038	0.102	0.053	0.095	0.047	0.080	0.046	0.063	0.053
10.3	0.137	0.037	0.107	0.030	0.096	0.053	0.091	0.053	0.078	0.049	0.063	0.050
10.4	0.141	0.019	0.107	0.030	0.100	0.050	0.090	0.057	0.078	0.044	0.067	0.050
10.5	0.138	0.021	0.104	0.032	0.098	0.050	0.091	0.053	0.074	0.046	0.055	0.052
10.6	0.136	0.028	0.104	0.032	0.095	0.047	0.091	0.052	0.075	0.042	0.049	0.049
10.7	0.135	0.023	0.104	0.023	0.093	0.043	0.093	0.049	0.072	0.040	0.042	0.052
10.8	0.134	0.030	0.097	0.022	0.104	0.036	0.089	0.048	0.069	0.045	0.051	0.049
10.9	0.136	0.027	0.102	0.022	0.097	0.037	0.080	0.049	0.071	0.048	0.059	0.046
11.0	0.137	0.032	0.099	0.025	0.092	0.035	0.078	0.048	0.067	0.050	0.059	0.046
11.1	0.136	0.024	0.091	0.037	0.090	0.039	0.078	0.047	0.062	0.051	0.057	0.044
11.2	0.132	0.023	0.088	0.041	0.092	0.036	0.083	0.039	0.054	0.048	0.059	0.045
11.3	0.134	0.024	0.090	0.038	0.090	0.032	0.083	0.049	0.055	0.043	0.057	0.043
11.4	0.129	0.032	0.088	0.039	0.085	0.034	0.080	0.050	0.066	0.038	0.055	0.040
11.5	0.127	0.032	0.084	0.045	0.076	0.041	0.077	0.050	0.064	0.044	0.047	0.039
11.6	0.126	0.039	0.080	0.043	0.075	0.046	0.077	0.057	0.059	0.049	0.046	0.044
11.7	0.122	0.039	0.085	0.040	0.078	0.047	0.077	0.056	0.059	0.048	0.046	0.040

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
11.8	0.115	0.046	0.083	0.043	0.078	0.047	0.079	0.055	0.062	0.047	0.044	0.040
11.9	0.113	0.049	0.083	0.044	0.078	0.050	0.073	0.053	0.064	0.046	0.043	0.038
12.0	0.113	0.046	0.078	0.046	0.074	0.048	0.067	0.046	0.061	0.041	0.048	0.036
12.1	0.116	0.044	0.078	0.045	0.074	0.050	0.065	0.053	0.062	0.040	0.051	0.040
12.2	0.115	0.040	0.074	0.044	0.070	0.048	0.067	0.054	0.062	0.040	0.055	0.042
12.3	0.105	0.045	0.071	0.045	0.072	0.050	0.071	0.048	0.053	0.043	0.060	0.046
12.4	0.102	0.054	0.067	0.045	0.066	0.047	0.077	0.046	0.053	0.041	0.060	0.043
12.5	0.101	0.055	0.060	0.052	0.060	0.049	0.075	0.044	0.055	0.040	0.057	0.037
12.6	0.098	0.056	0.063	0.051	0.060	0.051	0.061	0.043	0.049	0.038	0.054	0.035
12.7	0.096	0.060	0.068	0.051	0.064	0.045	0.048	0.045	0.051	0.036	0.051	0.038
12.8	0.095	0.057	0.068	0.048	0.065	0.042	0.055	0.049	0.053	0.041	0.050	0.038
12.9	0.092	0.056	0.062	0.045	0.061	0.045	0.065	0.049	0.049	0.044	0.047	0.039
13.0	0.093	0.054	0.060	0.045	0.060	0.043	0.066	0.051	0.048	0.043	0.043	0.038
13.1	0.095	0.055	0.058	0.042	0.054	0.043	0.068	0.050	0.045	0.038	0.046	0.036
13.2	0.094	0.053	0.063	0.037	0.053	0.046	0.065	0.048	0.045	0.043	0.046	0.041
13.3	0.090	0.051	0.066	0.045	0.061	0.045	0.057	0.045	0.042	0.045	0.043	0.041
13.4	0.086	0.052	0.058	0.047	0.064	0.043	0.054	0.053	0.044	0.043	0.042	0.045
13.5	0.085	0.051	0.047	0.049	0.059	0.044	0.049	0.056	0.044	0.045	0.049	0.045
13.6	0.087	0.050	0.042	0.051	0.056	0.044	0.042	0.054	0.035	0.045	0.044	0.042
13.7	0.087	0.051	0.045	0.043	0.049	0.045	0.039	0.049	0.032	0.043	0.042	0.041
13.8	0.089	0.050	0.048	0.043	0.040	0.048	0.049	0.043	0.027	0.041	0.042	0.044
13.9	0.084	0.053	0.049	0.043	0.037	0.041	0.048	0.044	0.026	0.038	0.035	0.041
14.0	0.079	0.057	0.050	0.038	0.042	0.037	0.045	0.042	0.028	0.034	0.034	0.041
14.1	0.072	0.055	0.051	0.034	0.043	0.040	0.041	0.042	0.028	0.033	0.034	0.041
14.2	0.072	0.052	0.058	0.032	0.041	0.037	0.041	0.042	0.026	0.037	0.036	0.036
14.3	0.073	0.053	0.065	0.034	0.037	0.038	0.043	0.038	0.025	0.039	0.036	0.033
14.4	0.078	0.051	0.066	0.035	0.036	0.038	0.041	0.037	0.026	0.036	0.033	0.038
14.5	0.078	0.052	0.061	0.037	0.036	0.038	0.039	0.037	0.025	0.036	0.031	0.038
14.6	0.082	0.049	0.056	0.036	0.034	0.034	0.045	0.042	0.029	0.035	0.030	0.039
14.7	0.081	0.046	0.059	0.040	0.031	0.033	0.049	0.047	0.030	0.027	0.029	0.036

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
14.8	0.075	0.044	0.058	0.041	0.026	0.031	0.050	0.048	0.030	0.034	0.031	0.028
14.9	0.078	0.044	0.056	0.037	0.027	0.032	0.056	0.048	0.025	0.031	0.033	0.028
15.0	0.079	0.048	0.057	0.042	0.023	0.032	0.055	0.047	0.025	0.031	0.035	0.032
15.1	0.074	0.050	0.057	0.041	0.023	0.033	0.048	0.046	0.024	0.036	0.031	0.035
15.2	0.074	0.048	0.055	0.040	0.026	0.033	0.043	0.046	0.023	0.039	0.028	0.035
15.3	0.080	0.051	0.051	0.036	0.024	0.032	0.042	0.051	0.021	0.037	0.028	0.036
15.4	0.076	0.053	0.050	0.035	0.022	0.030	0.042	0.049	0.024	0.037	0.027	0.033
15.5	0.067	0.052	0.053	0.035	0.023	0.034	0.042	0.049	0.025	0.037	0.030	0.033
15.6	0.068	0.055	0.049	0.039	0.026	0.038	0.046	0.046	0.027	0.033	0.032	0.032
15.7	0.072	0.051	0.049	0.040	0.026	0.035	0.048	0.048	0.026	0.034	0.028	0.030
15.8	0.073	0.047	0.052	0.036	0.028	0.035	0.048	0.049	0.027	0.038	0.027	0.030
15.9	0.073	0.050	0.048	0.034	0.029	0.036	0.043	0.044	0.027	0.040	0.028	0.031
16.0	0.073	0.056	0.043	0.034	0.029	0.034	0.037	0.039	0.032	0.039	0.028	0.032
16.1	0.067	0.053	0.041	0.033	0.030	0.031	0.046	0.040	0.030	0.039	0.029	0.035
16.2	0.066	0.049	0.042	0.037	0.027	0.027	0.053	0.049	0.021	0.038	0.030	0.035
16.3	0.065	0.046	0.041	0.033	0.022	0.024	0.049	0.048	0.019	0.035	0.031	0.033
16.4	0.069	0.046	0.042	0.031	0.021	0.026	0.051	0.044	0.024	0.039	0.028	0.028
16.5	0.062	0.049	0.044	0.031	0.021	0.025	0.047	0.041	0.024	0.038	0.025	0.026
16.6	0.063	0.049	0.043	0.037	0.021	0.031	0.047	0.046	0.024	0.038	0.027	0.033
16.7	0.063	0.045	0.040	0.039	0.018	0.028	0.045	0.042	0.022	0.034	0.027	0.034
16.8	0.063	0.040	0.037	0.037	0.013	0.020	0.043	0.041	0.015	0.031	0.025	0.031
16.9	0.064	0.039	0.042	0.038	0.010	0.019	0.045	0.042	0.019	0.032	0.025	0.026
17.0	0.064	0.038	0.046	0.038	0.013	0.027	0.041	0.041	0.023	0.034	0.021	0.025
17.1	0.064	0.039	0.041	0.034	0.012	0.027	0.036	0.039	0.020	0.034	0.018	0.021
17.2	0.057	0.044	0.039	0.036	0.017	0.025	0.039	0.039	0.017	0.030	0.020	0.021
17.3	0.058	0.048	0.043	0.036	0.016	0.024	0.037	0.040	0.015	0.025	0.023	0.023
17.4	0.058	0.049	0.042	0.041	0.017	0.025	0.039	0.041	0.016	0.025	0.022	0.019
17.5	0.059	0.049	0.041	0.040	0.023	0.028	0.040	0.040	0.016	0.027	0.018	0.020
17.6	0.053	0.048	0.043	0.034	0.027	0.032	0.037	0.039	0.015	0.026	0.016	0.019
17.7	0.054	0.048	0.035	0.031	0.029	0.030	0.035	0.041	0.014	0.025	0.014	0.018

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
17.8	0.057	0.050	0.030	0.029	0.030	0.029	0.036	0.040	0.015	0.030	0.017	0.019
17.9	0.056	0.047	0.033	0.028	0.030	0.023	0.033	0.038	0.017	0.031	0.022	0.018
18.0	0.054	0.049	0.036	0.029	0.032	0.029	0.030	0.039	0.014	0.029	0.027	0.023
18.1	0.048	0.053	0.034	0.033	0.026	0.028	0.027	0.038	0.013	0.027	0.024	0.023
18.2	0.048	0.053	0.030	0.035	0.018	0.026	0.024	0.037	0.012	0.022	0.019	0.021
18.3	0.049	0.050	0.027	0.033	0.019	0.029	0.025	0.038	0.012	0.023	0.019	0.019
18.4	0.055	0.049	0.027	0.032	0.018	0.028	0.026	0.037	0.016	0.024	0.017	0.020
18.5	0.056	0.049	0.028	0.029	0.019	0.030	0.024	0.034	0.011	0.021	0.011	0.018
18.6	0.053	0.048	0.030	0.031	0.022	0.032	0.019	0.028	0.009	0.021	0.011	0.016
18.7	0.046	0.047	0.026	0.036	0.019	0.032	0.022	0.027	0.011	0.024	0.012	0.019
18.8	0.042	0.047	0.025	0.036	0.020	0.032	0.026	0.032	0.012	0.024	0.015	0.021
18.9	0.038	0.044	0.024	0.036	0.018	0.027	0.030	0.036	0.010	0.022	0.019	0.023
19.0	0.042	0.046	0.022	0.034	0.016	0.029	0.029	0.032	0.005	0.019	0.016	0.021
19.1	0.043	0.043	0.024	0.035	0.013	0.030	0.032	0.037	0.001	0.018	0.013	0.018
19.2	0.044	0.043	0.027	0.036	0.011	0.029	0.030	0.037	0.002	0.018	0.013	0.020
19.3	0.040	0.042	0.028	0.036	0.017	0.029	0.026	0.033	0.003	0.016	0.012	0.023
19.4	0.040	0.040	0.029	0.037	0.020	0.027	0.023	0.035	0.006	0.016	0.010	0.024
19.5	0.040	0.039	0.026	0.033	0.019	0.027	0.022	0.033	0.007	0.016	0.011	0.024
19.6	0.041	0.040	0.023	0.029	0.016	0.026	0.023	0.037	0.006	0.016	0.012	0.021
19.7	0.041	0.039	0.024	0.030	0.011	0.025	0.026	0.039	0.005	0.016	0.009	0.020
19.8	0.041	0.040	0.027	0.030	0.010	0.020	0.023	0.035	0.008	0.017	0.006	0.022
19.9	0.038	0.040	0.030	0.032	0.014	0.021	0.020	0.029	0.009	0.019	0.007	0.020
20.0	0.040	0.038	0.028	0.033	0.016	0.022	0.018	0.028	0.008	0.018	0.006	0.017
20.1	0.042	0.038	0.024	0.032	0.013	0.020	0.021	0.033	0.006	0.016	0.007	0.014
20.2	0.043	0.039	0.025	0.030	0.014	0.027	0.022	0.030	0.005	0.016	0.007	0.017
20.3	0.042	0.038	0.028	0.029	0.013	0.028	0.021	0.028	0.004	0.014	0.004	0.016
20.4	0.039	0.039	0.029	0.027	0.012	0.027	0.021	0.027	0.004	0.013	0.003	0.013
20.5	0.035	0.040	0.024	0.025	0.013	0.025	0.022	0.027	0.004	0.012	-0.001	0.010
20.6	0.038	0.043	0.025	0.027	0.015	0.028	0.022	0.028	0.004	0.010	-0.004	0.010
20.7	0.039	0.044	0.031	0.030	0.011	0.027	0.022	0.026	0.002	0.010	-0.005	0.011

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
20.8	0.039	0.043	0.032	0.027	0.012	0.025	0.020	0.024	-0.001	0.009	-0.004	0.009
20.9	0.035	0.040	0.035	0.026	0.014	0.026	0.022	0.024	-0.002	0.009	-0.004	0.009
21.0	0.032	0.037	0.033	0.028	0.015	0.026	0.021	0.026	-0.002	0.011	-0.004	0.011
21.1	0.031	0.036	0.030	0.032	0.017	0.026	0.022	0.026	-0.001	0.012	-0.004	0.016
21.2	0.033	0.036	0.028	0.034	0.017	0.028	0.024	0.029	0.002	0.011	-0.002	0.016
21.3	0.035	0.035	0.023	0.030	0.016	0.033	0.023	0.028	0.003	0.011	0.001	0.017
21.4	0.035	0.038	0.022	0.031	0.015	0.031	0.022	0.027	0.003	0.013	0.003	0.015
21.5	0.031	0.040	0.017	0.027	0.013	0.030	0.020	0.025	0.002	0.011	0.003	0.015
21.6	0.031	0.042	0.018	0.028	0.012	0.028	0.019	0.024	0.001	0.012	0.002	0.014
21.7	0.031	0.044	0.019	0.032	0.012	0.026	0.022	0.024	0.002	0.013	-0.001	0.009
21.8	0.031	0.044	0.016	0.028	0.014	0.029	0.022	0.023	0.002	0.013	-0.001	0.009
21.9	0.031	0.043	0.015	0.026	0.014	0.027	0.018	0.020	-0.001	0.012	0.000	0.011
22.0	0.033	0.044	0.015	0.028	0.015	0.023	0.016	0.024	0.002	0.016	0.002	0.012
22.1	0.032	0.041	0.020	0.033	0.016	0.020	0.015	0.023	0.004	0.017	0.002	0.014
22.2	0.031	0.043	0.016	0.030	0.014	0.019	0.014	0.020	0.006	0.015	0.003	0.014
22.3	0.034	0.042	0.011	0.027	0.009	0.017	0.015	0.020	0.006	0.016	0.002	0.012
22.4	0.037	0.042	0.008	0.027	0.010	0.018	0.017	0.020	0.005	0.017	0.001	0.010
22.5	0.038	0.040	0.008	0.029	0.011	0.018	0.021	0.025	0.006	0.016	0.001	0.012
22.6	0.037	0.039	0.010	0.030	0.012	0.017	0.019	0.022	0.008	0.016	0.000	0.011
22.7	0.034	0.039	0.012	0.032	0.012	0.018	0.019	0.026	0.009	0.015	-0.001	0.012
22.8	0.033	0.039	0.011	0.030	0.010	0.017	0.018	0.028	0.010	0.016	-0.002	0.015
22.9	0.030	0.039	0.011	0.027	0.006	0.015	0.015	0.026	0.010	0.018	-0.002	0.015
23.0	0.028	0.040	0.011	0.023	0.004	0.014	0.013	0.027	0.010	0.018	-0.001	0.017
23.1	0.029	0.045	0.008	0.021	0.003	0.012	0.010	0.025	0.010	0.018	-0.001	0.016
23.2	0.029	0.045	0.008	0.020	0.005	0.013	0.008	0.020	0.006	0.018	-0.001	0.012
23.3	0.027	0.041	0.009	0.019	0.011	0.016	0.009	0.018	0.004	0.016	-0.001	0.011
23.4	0.029	0.043	0.004	0.018	0.013	0.016	0.010	0.018	0.005	0.015	-0.001	0.010
23.5	0.029	0.041	0.005	0.023	0.013	0.018	0.011	0.018	0.007	0.014	-0.001	0.011
23.6	0.029	0.040	0.010	0.026	0.012	0.019	0.010	0.017	0.007	0.016	0.000	0.012
23.7	0.031	0.039	0.012	0.027	0.011	0.022	0.012	0.020	0.007	0.014	0.002	0.013

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
23.8	0.032	0.040	0.011	0.022	0.008	0.022	0.012	0.021	0.013	0.015	0.005	0.013
23.9	0.031	0.041	0.009	0.021	0.006	0.021	0.011	0.025	0.011	0.016	0.004	0.012
24.0	0.031	0.041	0.008	0.021	0.005	0.019	0.012	0.027	0.008	0.017	0.003	0.010
24.1	0.030	0.039	0.008	0.022	0.008	0.019	0.010	0.027	0.006	0.018	0.000	0.009
24.2	0.031	0.041	0.010	0.022	0.010	0.020	0.011	0.026	0.007	0.017	0.000	0.010
24.3	0.031	0.039	0.011	0.022	0.008	0.019	0.015	0.026	0.007	0.016	0.001	0.011
24.4	0.033	0.039	0.013	0.022	0.007	0.019	0.014	0.018	0.007	0.016	0.002	0.012
24.5	0.033	0.039	0.014	0.021	0.006	0.019	0.015	0.016	0.009	0.017	0.002	0.011
24.6	0.034	0.041	0.013	0.020	0.007	0.022	0.017	0.021	0.010	0.017	0.002	0.009
24.7	0.035	0.042	0.011	0.020	0.009	0.023	0.016	0.020	0.009	0.017	0.000	0.007
24.8	0.032	0.039	0.009	0.020	0.008	0.022	0.013	0.020	0.010	0.018	-0.001	0.009
24.9	0.028	0.037	0.010	0.019	0.006	0.023	0.013	0.023	0.008	0.016	-0.001	0.011
25.0	0.027	0.036	0.009	0.018	0.006	0.022	0.013	0.025	0.006	0.015	-0.001	0.010
25.1	0.029	0.037	0.007	0.014	0.008	0.025	0.015	0.026	0.005	0.014	-0.001	0.009
25.2	0.026	0.034	0.006	0.011	0.009	0.026	0.015	0.024	0.005	0.015	-0.005	0.007
25.3	0.025	0.033	0.005	0.010	0.007	0.024	0.014	0.023	0.005	0.015	-0.004	0.007
25.4	0.021	0.032	0.005	0.011	0.006	0.023	0.014	0.023	0.006	0.017	-0.001	0.010
25.5	0.021	0.033	0.009	0.016	0.005	0.024	0.016	0.026	0.007	0.017	0.000	0.011
25.6	0.020	0.032	0.012	0.017	0.004	0.025	0.017	0.026	0.007	0.017	0.001	0.012
25.7	0.020	0.030	0.014	0.017	0.003	0.025	0.015	0.025	0.005	0.016	0.000	0.012
25.8	0.021	0.029	0.016	0.018	0.005	0.025	0.016	0.023	0.005	0.016	-0.001	0.012
25.9	0.019	0.027	0.016	0.019	0.006	0.022	0.019	0.023	0.005	0.017	-0.002	0.011
26.0	0.019	0.027	0.015	0.019	0.006	0.019	0.023	0.023	0.007	0.019	-0.002	0.011
26.1	0.019	0.027	0.014	0.019	0.004	0.018	0.024	0.023	0.007	0.020	-0.002	0.011
26.2	0.018	0.027	0.011	0.020	0.002	0.018	0.022	0.022	0.006	0.019	-0.003	0.011
26.3	0.019	0.026	0.010	0.019	0.004	0.018	0.019	0.019	0.006	0.016	-0.003	0.011
26.4	0.021	0.026	0.010	0.019	0.006	0.018	0.017	0.018	0.007	0.015	-0.001	0.012
26.5	0.020	0.025	0.011	0.019	0.007	0.019	0.018	0.020	0.007	0.014	0.002	0.014
26.6	0.018	0.027	0.010	0.019	0.005	0.020	0.017	0.019	0.005	0.014	0.004	0.014
26.7	0.019	0.030	0.009	0.019	0.005	0.020	0.015	0.015	0.002	0.017	0.004	0.015

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
26.8	0.020	0.031	0.007	0.017	0.004	0.019	0.012	0.013	-0.002	0.025	0.002	0.015
26.9	0.018	0.029	0.007	0.017	0.003	0.017	0.012	0.017	-0.008	0.031	0.000	0.014
27.0	0.015	0.027	0.007	0.018	0.003	0.018	0.011	0.019	-0.011	0.038	-0.002	0.013
27.1	0.016	0.027	0.005	0.017	0.004	0.018	0.010	0.021	-0.013	0.043	-0.003	0.012
27.2	0.017	0.026	0.003	0.014	0.004	0.018	0.011	0.023	-0.015	0.048	-0.003	0.012
27.3	0.020	0.025	0.001	0.014	0.005	0.017	0.009	0.017	-0.015	0.049	-0.002	0.012
27.4	0.023	0.026	0.001	0.015	0.006	0.020	0.006	0.013	-0.013	0.043	-0.002	0.013
27.5	0.022	0.027	0.002	0.017	0.007	0.021	0.006	0.011	-0.009	0.034	-0.002	0.014
27.6	0.021	0.027	0.002	0.016	0.008	0.022	0.006	0.012	-0.005	0.027	0.000	0.013
27.7	0.021	0.028	0.004	0.017	0.009	0.020	0.005	0.013	-0.003	0.021	0.001	0.012
27.8	0.019	0.029	0.005	0.018	0.006	0.019	0.005	0.013	0.001	0.017	0.001	0.012
27.9	0.016	0.028	0.005	0.015	0.005	0.019	0.004	0.012	0.003	0.015	0.000	0.012
28.0	0.013	0.026	0.003	0.012	0.007	0.022	0.004	0.014	0.004	0.014	-0.001	0.012
28.1	0.012	0.023	0.002	0.012	0.007	0.022	0.006	0.016	0.004	0.014	-0.001	0.011
28.2	0.012	0.022	0.001	0.012	0.007	0.023	0.008	0.017	0.005	0.015	-0.002	0.010
28.3	0.013	0.022	0.001	0.010	0.006	0.023	0.010	0.019	0.005	0.016	-0.003	0.009
28.4	0.014	0.021	0.001	0.010	0.006	0.022	0.010	0.020	0.004	0.017	-0.003	0.008
28.5	0.014	0.021	0.002	0.011	0.005	0.023	0.010	0.020	0.003	0.019	-0.003	0.010
28.6	0.015	0.020	0.002	0.012	0.005	0.023	0.009	0.021	0.003	0.019	-0.003	0.010
28.7	0.014	0.019	0.002	0.013	0.006	0.023	0.009	0.023	0.003	0.018	-0.005	0.009
28.8	0.013	0.021	0.000	0.013	0.006	0.024	0.009	0.025	0.003	0.017	-0.006	0.012
28.9	0.013	0.021	-0.001	0.013	0.004	0.022	0.010	0.028	0.002	0.017	-0.007	0.016
29.0	0.012	0.020	-0.001	0.012	0.001	0.017	0.011	0.028	0.003	0.016	-0.007	0.018
29.1	0.010	0.019	-0.002	0.011	0.000	0.013	0.010	0.025	0.003	0.016	-0.008	0.019
29.2	0.009	0.017	-0.001	0.012	-0.001	0.013	0.009	0.024	0.004	0.016	-0.009	0.019
29.3	0.009	0.015	0.000	0.012	-0.004	0.010	0.007	0.021	0.006	0.015	-0.009	0.017
29.4	0.010	0.016	0.000	0.012	-0.004	0.009	0.005	0.019	0.006	0.015	-0.009	0.015
29.5	0.010	0.017	-0.001	0.012	-0.004	0.009	0.005	0.019	0.006	0.015	-0.007	0.011
29.6	0.012	0.017	0.000	0.010	-0.003	0.010	0.007	0.020	0.006	0.014	-0.006	0.009
29.7	0.013	0.019	0.001	0.010	-0.002	0.012	0.007	0.020	0.008	0.013	-0.004	0.009

Cycle Time (sec)	Velocities Measured at 0.292-m (11.5-in) Radial Position						Velocities Measured at 0.343-m (13.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
29.8	0.014	0.019	0.002	0.011	-0.001	0.013	0.007	0.019	0.007	0.014	-0.003	0.010
29.9	0.013	0.018	0.002	0.011	-0.001	0.013	0.008	0.020	0.007	0.014	0.000	0.012
30.0	0.010	0.015	0.001	0.011	0.000	0.014	0.008	0.021	0.005	0.015	0.002	0.014

Small-Tank Floor Velocity Data, contd.

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
0.1	0.016	0.029	0.022	0.021	0.002	0.017
0.2	0.017	0.030	0.025	0.023	0.002	0.016
0.3	0.018	0.031	0.030	0.027	0.002	0.017
0.4	0.020	0.033	0.036	0.030	0.002	0.018
0.5	0.021	0.034	0.049	0.038	0.002	0.021
0.6	0.036	0.040	0.093	0.025	0.021	0.024
0.7	0.082	0.042	0.133	0.024	0.072	0.031
0.8	0.105	0.042	0.224	0.111	0.125	0.042
0.9	0.127	0.033	0.661	0.242	0.232	0.075
1.0	0.227	0.085	0.853	0.220	0.255	0.052
1.1	0.513	0.237	0.806	0.235	0.260	0.039
1.2	0.610	0.304	0.799	0.263	0.268	0.036
1.3	0.453	0.217	0.774	0.161	0.262	0.049
1.4	0.493	0.330	0.716	0.259	0.244	0.040
1.5	0.486	0.289	0.752	0.239	0.243	0.042
1.6	0.504	0.263	0.835	0.235	0.227	0.052
1.7	0.476	0.202	0.784	0.230	0.265	0.056
1.8	0.531	0.301	0.777	0.167	0.265	0.052
1.9	0.458	0.295	0.941	0.211	0.259	0.041
2.0	0.478	0.281	0.825	0.232	0.248	0.058
2.1	0.509	0.272	0.694	0.261	0.254	0.051
2.2	0.551	0.206	0.734	0.279	0.253	0.058
2.3	0.578	0.286	0.787	0.301	0.255	0.054
2.4	0.585	0.289	0.707	0.316	0.254	0.046
2.5	0.527	0.261	0.713	0.232	0.242	0.056
2.6	0.492	0.230	0.810	0.292	0.249	0.041
2.7	0.547	0.252	0.838	0.269	0.263	0.055

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
2.8	0.505	0.266	0.858	0.219	0.267	0.054
2.9	0.512	0.249	0.884	0.277	0.264	0.056
3.0	0.436	0.155	0.778	0.228	0.251	0.064
3.1	0.507	0.200	0.922	0.158	0.267	0.039
3.2	0.628	0.246	0.803	0.204	0.261	0.037
3.3	0.648	0.230	0.792	0.236	0.252	0.045
3.4	0.538	0.203	0.680	0.133	0.236	0.049
3.5	0.494	0.256	0.558	0.165	0.201	0.040
3.6	0.404	0.186	0.441	0.134	0.170	0.028
3.7	0.320	0.110	0.376	0.163	0.155	0.025
3.8	0.234	0.063	0.282	0.121	0.141	0.019
3.9	0.225	0.063	0.245	0.066	0.137	0.011
4.0	0.199	0.047	0.236	0.054	0.133	0.014
4.1	0.168	0.040	0.195	0.066	0.125	0.021
4.2	0.172	0.040	0.192	0.053	0.121	0.019
4.3	0.143	0.038	0.177	0.034	0.116	0.020
4.4	0.129	0.051	0.170	0.034	0.105	0.035
4.5	0.132	0.050	0.174	0.040	0.104	0.021
4.6	0.126	0.044	0.164	0.049	0.102	0.035
4.7	0.121	0.043	0.166	0.054	0.101	0.038
4.8	0.123	0.038	0.147	0.041	0.098	0.036
4.9	0.115	0.045	0.143	0.051	0.091	0.033
5.0	0.105	0.052	0.137	0.053	0.082	0.043
5.1	0.108	0.058	0.130	0.048	0.073	0.046
5.2	0.110	0.053	0.118	0.054	0.081	0.038
5.3	0.112	0.047	0.108	0.055	0.076	0.034
5.4	0.119	0.039	0.107	0.059	0.070	0.040
5.5	0.116	0.034	0.107	0.054	0.058	0.045
5.6	0.112	0.039	0.098	0.048	0.066	0.039
5.7	0.112	0.040	0.109	0.054	0.069	0.038

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
5.8	0.109	0.041	0.115	0.048	0.075	0.040
5.9	0.121	0.039	0.115	0.056	0.075	0.040
6.0	0.125	0.045	0.118	0.051	0.069	0.047
6.1	0.121	0.050	0.115	0.054	0.074	0.046
6.2	0.117	0.046	0.117	0.051	0.071	0.039
6.3	0.120	0.055	0.106	0.049	0.072	0.046
6.4	0.122	0.063	0.103	0.056	0.077	0.052
6.5	0.125	0.056	0.110	0.054	0.072	0.052
6.6	0.128	0.057	0.115	0.047	0.072	0.049
6.7	0.124	0.034	0.109	0.050	0.070	0.049
6.8	0.126	0.022	0.097	0.056	0.076	0.036
6.9	0.117	0.029	0.095	0.061	0.080	0.041
7.0	0.120	0.032	0.094	0.058	0.085	0.045
7.1	0.112	0.037	0.102	0.055	0.086	0.049
7.2	0.116	0.041	0.113	0.042	0.082	0.051
7.3	0.112	0.042	0.111	0.042	0.080	0.049
7.4	0.115	0.044	0.121	0.028	0.079	0.049
7.5	0.112	0.053	0.131	0.036	0.074	0.047
7.6	0.112	0.038	0.115	0.052	0.070	0.047
7.7	0.110	0.046	0.111	0.048	0.074	0.046
7.8	0.108	0.054	0.120	0.033	0.077	0.050
7.9	0.105	0.048	0.109	0.039	0.077	0.051
8.0	0.099	0.054	0.117	0.039	0.079	0.049
8.1	0.095	0.061	0.125	0.046	0.073	0.049
8.2	0.091	0.068	0.120	0.055	0.070	0.050
8.3	0.086	0.066	0.121	0.058	0.071	0.052
8.4	0.088	0.072	0.114	0.057	0.074	0.050
8.5	0.093	0.073	0.110	0.053	0.079	0.050
8.6	0.098	0.063	0.108	0.052	0.075	0.052
8.7	0.099	0.055	0.116	0.046	0.063	0.048

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
8.8	0.105	0.057	0.113	0.048	0.065	0.046
8.9	0.100	0.054	0.101	0.044	0.063	0.050
9.0	0.091	0.050	0.090	0.047	0.068	0.049
9.1	0.096	0.041	0.093	0.052	0.060	0.049
9.2	0.099	0.033	0.099	0.051	0.063	0.052
9.3	0.103	0.029	0.099	0.046	0.070	0.051
9.4	0.102	0.026	0.092	0.042	0.070	0.046
9.5	0.100	0.034	0.094	0.042	0.069	0.043
9.6	0.096	0.039	0.091	0.057	0.060	0.045
9.7	0.100	0.042	0.105	0.049	0.051	0.045
9.8	0.102	0.046	0.103	0.046	0.051	0.037
9.9	0.097	0.052	0.094	0.044	0.054	0.035
10.0	0.098	0.057	0.100	0.045	0.046	0.040
10.1	0.093	0.055	0.103	0.043	0.050	0.043
10.2	0.096	0.054	0.092	0.044	0.055	0.043
10.3	0.095	0.050	0.083	0.054	0.051	0.043
10.4	0.088	0.054	0.077	0.060	0.042	0.045
10.5	0.079	0.056	0.073	0.056	0.044	0.047
10.6	0.076	0.052	0.071	0.057	0.044	0.043
10.7	0.079	0.052	0.078	0.056	0.047	0.041
10.8	0.093	0.050	0.078	0.051	0.043	0.035
10.9	0.096	0.045	0.073	0.050	0.039	0.043
11.0	0.098	0.043	0.077	0.055	0.041	0.045
11.1	0.097	0.050	0.086	0.053	0.046	0.040
11.2	0.095	0.053	0.092	0.048	0.044	0.032
11.3	0.092	0.053	0.091	0.051	0.038	0.041
11.4	0.091	0.053	0.088	0.054	0.034	0.042
11.5	0.085	0.053	0.084	0.052	0.046	0.041
11.6	0.083	0.055	0.083	0.052	0.049	0.039
11.7	0.081	0.054	0.077	0.055	0.042	0.037

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
11.8	0.084	0.058	0.078	0.053	0.038	0.035
11.9	0.079	0.059	0.086	0.056	0.033	0.032
12.0	0.081	0.053	0.086	0.059	0.023	0.024
12.1	0.083	0.050	0.085	0.055	0.021	0.025
12.2	0.090	0.047	0.088	0.049	0.019	0.019
12.3	0.092	0.044	0.080	0.055	0.017	0.021
12.4	0.090	0.046	0.080	0.049	0.019	0.020
12.5	0.094	0.040	0.087	0.050	0.026	0.029
12.6	0.088	0.040	0.087	0.051	0.024	0.028
12.7	0.087	0.038	0.081	0.051	0.025	0.034
12.8	0.093	0.035	0.082	0.050	0.024	0.033
12.9	0.088	0.037	0.085	0.051	0.028	0.030
13.0	0.086	0.038	0.095	0.047	0.029	0.031
13.1	0.089	0.038	0.108	0.046	0.022	0.034
13.2	0.088	0.039	0.101	0.042	0.015	0.027
13.3	0.082	0.044	0.084	0.052	0.010	0.025
13.4	0.074	0.048	0.082	0.054	0.010	0.026
13.5	0.072	0.050	0.087	0.051	0.010	0.026
13.6	0.069	0.052	0.086	0.048	0.010	0.023
13.7	0.064	0.055	0.086	0.045	0.009	0.017
13.8	0.063	0.057	0.079	0.045	0.007	0.021
13.9	0.064	0.054	0.092	0.045	0.004	0.019
14.0	0.064	0.052	0.090	0.045	0.006	0.023
14.1	0.061	0.051	0.090	0.045	0.012	0.023
14.2	0.058	0.052	0.085	0.045	0.013	0.025
14.3	0.060	0.055	0.083	0.043	0.024	0.031
14.4	0.053	0.050	0.083	0.042	0.029	0.031
14.5	0.049	0.049	0.081	0.040	0.027	0.032
14.6	0.048	0.046	0.080	0.042	0.020	0.031
14.7	0.048	0.048	0.073	0.043	0.021	0.033

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
14.8	0.048	0.050	0.082	0.036	0.016	0.029
14.9	0.045	0.048	0.092	0.035	0.019	0.030
15.0	0.045	0.045	0.095	0.035	0.023	0.032
15.1	0.046	0.043	0.094	0.037	0.021	0.028
15.2	0.040	0.037	0.095	0.032	0.014	0.019
15.3	0.038	0.035	0.090	0.032	0.014	0.021
15.4	0.042	0.034	0.093	0.033	0.015	0.024
15.5	0.042	0.037	0.097	0.031	0.016	0.028
15.6	0.040	0.041	0.095	0.037	0.016	0.025
15.7	0.037	0.043	0.095	0.039	0.019	0.029
15.8	0.031	0.041	0.090	0.040	0.021	0.027
15.9	0.024	0.035	0.083	0.040	0.024	0.025
16.0	0.021	0.032	0.081	0.043	0.026	0.028
16.1	0.016	0.029	0.080	0.043	0.022	0.029
16.2	0.016	0.030	0.084	0.036	0.014	0.026
16.3	0.015	0.026	0.083	0.040	0.016	0.029
16.4	0.015	0.021	0.079	0.044	0.015	0.030
16.5	0.011	0.020	0.075	0.040	0.019	0.030
16.6	0.008	0.022	0.072	0.045	0.023	0.031
16.7	0.006	0.022	0.067	0.047	0.017	0.031
16.8	0.007	0.028	0.066	0.046	0.012	0.028
16.9	0.013	0.038	0.063	0.044	0.012	0.028
17.0	0.015	0.034	0.064	0.042	0.010	0.028
17.1	0.014	0.033	0.066	0.042	0.008	0.026
17.2	0.013	0.031	0.064	0.044	0.004	0.021
17.3	0.009	0.028	0.066	0.040	0.004	0.024
17.4	0.008	0.023	0.068	0.041	0.002	0.023
17.5	0.014	0.022	0.066	0.041	0.002	0.020
17.6	0.021	0.026	0.066	0.043	0.001	0.015
17.7	0.026	0.030	0.069	0.042	0.007	0.023

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
17.8	0.021	0.031	0.069	0.040	0.008	0.027
17.9	0.017	0.030	0.064	0.040	0.007	0.023
18.0	0.019	0.032	0.058	0.040	0.009	0.018
18.1	0.024	0.036	0.054	0.036	0.012	0.023
18.2	0.025	0.037	0.052	0.034	0.013	0.026
18.3	0.026	0.038	0.049	0.036	0.011	0.023
18.4	0.022	0.036	0.043	0.035	0.008	0.020
18.5	0.021	0.033	0.041	0.038	0.007	0.021
18.6	0.021	0.031	0.041	0.036	0.010	0.018
18.7	0.020	0.029	0.044	0.036	0.007	0.018
18.8	0.023	0.033	0.046	0.037	0.006	0.015
18.9	0.024	0.033	0.048	0.037	0.003	0.012
19.0	0.031	0.036	0.047	0.034	0.004	0.014
19.1	0.033	0.039	0.048	0.034	0.004	0.014
19.2	0.035	0.043	0.051	0.033	0.006	0.017
19.3	0.035	0.041	0.053	0.030	0.006	0.020
19.4	0.033	0.039	0.052	0.032	0.006	0.019
19.5	0.030	0.036	0.053	0.037	0.007	0.015
19.6	0.029	0.034	0.048	0.034	0.008	0.016
19.7	0.028	0.033	0.043	0.035	0.009	0.017
19.8	0.029	0.035	0.044	0.038	0.014	0.020
19.9	0.031	0.039	0.052	0.039	0.013	0.020
20.0	0.031	0.040	0.054	0.038	0.011	0.020
20.1	0.027	0.039	0.051	0.034	0.007	0.020
20.2	0.025	0.038	0.049	0.034	0.006	0.022
20.3	0.023	0.037	0.046	0.033	0.007	0.020
20.4	0.019	0.033	0.049	0.035	0.009	0.020
20.5	0.016	0.033	0.046	0.039	0.010	0.021
20.6	0.016	0.033	0.040	0.040	0.011	0.020
20.7	0.018	0.033	0.035	0.038	0.011	0.018

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
20.8	0.023	0.037	0.033	0.037	0.011	0.015
20.9	0.026	0.039	0.031	0.038	0.013	0.017
21.0	0.028	0.040	0.029	0.041	0.012	0.019
21.1	0.027	0.040	0.032	0.043	0.009	0.018
21.2	0.027	0.039	0.030	0.042	0.009	0.015
21.3	0.028	0.037	0.029	0.042	0.008	0.015
21.4	0.029	0.035	0.027	0.040	0.008	0.018
21.5	0.032	0.033	0.026	0.036	0.008	0.017
21.6	0.035	0.034	0.031	0.038	0.008	0.018
21.7	0.035	0.034	0.031	0.041	0.008	0.017
21.8	0.031	0.034	0.029	0.041	0.009	0.016
21.9	0.027	0.036	0.030	0.040	0.004	0.015
22.0	0.027	0.037	0.030	0.039	0.001	0.012
22.1	0.028	0.036	0.033	0.042	-0.001	0.011
22.2	0.029	0.034	0.033	0.043	-0.001	0.013
22.3	0.027	0.032	0.032	0.042	-0.004	0.012
22.4	0.024	0.031	0.032	0.039	-0.005	0.011
22.5	0.024	0.033	0.033	0.037	-0.005	0.011
22.6	0.023	0.030	0.035	0.038	-0.002	0.013
22.7	0.023	0.028	0.038	0.041	-0.001	0.014
22.8	0.022	0.029	0.037	0.041	0.000	0.013
22.9	0.019	0.031	0.036	0.038	-0.001	0.013
23.0	0.018	0.033	0.035	0.035	-0.001	0.013
23.1	0.019	0.034	0.035	0.037	-0.001	0.014
23.2	0.019	0.037	0.035	0.037	-0.001	0.012
23.3	0.016	0.034	0.037	0.037	-0.002	0.011
23.4	0.016	0.034	0.036	0.034	-0.001	0.013
23.5	0.015	0.031	0.037	0.032	0.001	0.014
23.6	0.014	0.029	0.039	0.029	0.003	0.014
23.7	0.013	0.030	0.037	0.030	0.006	0.016

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
23.8	0.012	0.031	0.037	0.033	0.007	0.016
23.9	0.014	0.034	0.036	0.036	0.005	0.015
24.0	0.017	0.035	0.038	0.034	0.004	0.014
24.1	0.018	0.034	0.039	0.036	0.004	0.012
24.2	0.017	0.033	0.039	0.035	0.002	0.013
24.3	0.016	0.030	0.036	0.033	0.001	0.014
24.4	0.016	0.027	0.034	0.032	0.001	0.014
24.5	0.017	0.026	0.033	0.033	0.002	0.014
24.6	0.018	0.024	0.032	0.032	0.004	0.014
24.7	0.018	0.023	0.033	0.034	0.004	0.012
24.8	0.018	0.023	0.032	0.032	0.004	0.012
24.9	0.018	0.023	0.032	0.033	0.004	0.014
25.0	0.018	0.022	0.032	0.035	0.005	0.014
25.1	0.015	0.022	0.031	0.036	0.003	0.014
25.2	0.013	0.022	0.032	0.036	0.003	0.014
25.3	0.014	0.024	0.034	0.036	0.001	0.013
25.4	0.012	0.024	0.031	0.034	0.001	0.011
25.5	0.010	0.021	0.026	0.031	0.002	0.011
25.6	0.010	0.024	0.023	0.029	0.001	0.012
25.7	0.010	0.027	0.024	0.032	-0.003	0.011
25.8	0.012	0.029	0.023	0.031	-0.005	0.011
25.9	0.014	0.032	0.022	0.029	-0.006	0.011
26.0	0.014	0.032	0.022	0.027	-0.005	0.011
26.1	0.013	0.029	0.022	0.028	-0.004	0.012
26.2	0.013	0.029	0.023	0.031	-0.004	0.011
26.3	0.012	0.029	0.024	0.034	-0.004	0.011
26.4	0.010	0.028	0.020	0.030	-0.004	0.012
26.5	0.007	0.027	0.017	0.026	-0.003	0.012
26.6	0.005	0.024	0.016	0.026	-0.002	0.012
26.7	0.004	0.020	0.015	0.024	-0.001	0.012

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
26.8	0.004	0.018	0.012	0.022	-0.001	0.011
26.9	0.006	0.021	0.012	0.023	-0.002	0.011
27.0	0.009	0.023	0.013	0.023	-0.003	0.009
27.1	0.010	0.023	0.013	0.023	-0.004	0.008
27.2	0.010	0.023	0.014	0.022	-0.004	0.008
27.3	0.012	0.026	0.015	0.022	-0.004	0.008
27.4	0.011	0.026	0.015	0.021	-0.004	0.009
27.5	0.011	0.025	0.015	0.021	-0.003	0.010
27.6	0.010	0.023	0.017	0.024	-0.002	0.011
27.7	0.009	0.020	0.018	0.025	-0.003	0.011
27.8	0.009	0.018	0.018	0.027	-0.003	0.012
27.9	0.009	0.020	0.020	0.028	-0.003	0.012
28.0	0.009	0.023	0.021	0.027	-0.003	0.014
28.1	0.009	0.026	0.019	0.025	-0.002	0.016
28.2	0.011	0.027	0.017	0.023	-0.002	0.016
28.3	0.013	0.029	0.016	0.023	-0.003	0.015
28.4	0.014	0.030	0.015	0.022	-0.003	0.014
28.5	0.014	0.030	0.013	0.022	-0.003	0.014
28.6	0.015	0.029	0.012	0.024	-0.002	0.015
28.7	0.016	0.028	0.011	0.025	0.000	0.017
28.8	0.016	0.026	0.011	0.025	0.003	0.019
28.9	0.015	0.024	0.012	0.026	0.004	0.021
29.0	0.013	0.022	0.014	0.026	0.002	0.021
29.1	0.011	0.021	0.017	0.027	0.001	0.021
29.2	0.010	0.021	0.022	0.029	0.000	0.022
29.3	0.009	0.022	0.026	0.030	0.001	0.024
29.4	0.008	0.021	0.027	0.028	0.001	0.024
29.5	0.008	0.021	0.026	0.027	0.001	0.022
29.6	0.009	0.022	0.025	0.027	0.002	0.020
29.7	0.010	0.024	0.024	0.025	0.002	0.019

Cycle Time (sec)	Velocities Measured at 0.394-m (15.5-in) Radial Position					
	6.35E-3 m (0.250 in) V (m/s)	6.35E-3 m (0.25 -in) StdDev (m/s)	1.59E-2 m (0.625 in) V (m/s)	1.59E-2 m (0.625 in) StdDev (m/s)	2.22E-2 m (0.875 in) V (m/s)	2.22E-2 m (0.875 in) StdDev (m/s)
29.8	0.010	0.026	0.024	0.024	0.002	0.018
29.9	0.010	0.025	0.024	0.023	0.002	0.018
30.0	0.011	0.024	0.025	0.021	0.002	0.017

Small-Tank Wall Velocity Data

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
0.10	0.001	0.018	0.001	0.013	-0.005	0.011	0.006	0.018	0.005	0.023	0.001	0.013
0.20	0.001	0.017	0.000	0.012	-0.004	0.014	0.006	0.017	0.006	0.022	0.002	0.014
0.30	0.003	0.016	0.002	0.012	-0.001	0.014	0.005	0.017	0.009	0.023	0.009	0.017
0.40	0.007	0.017	0.005	0.014	0.009	0.015	0.008	0.022	0.016	0.026	0.021	0.019
0.50	0.023	0.018	0.010	0.014	0.038	0.014	0.029	0.025	0.040	0.030	0.046	0.021
0.60	0.051	0.017	0.043	0.013	0.087	0.015	0.071	0.020	0.078	0.020	0.080	0.014
0.70	0.091	0.033	0.090	0.022	0.153	0.053	0.113	0.018	0.117	0.018	0.113	0.010
0.80	0.244	0.196	0.204	0.147	0.330	0.108	0.195	0.063	0.184	0.084	0.147	0.018
0.90	0.437	0.168	0.432	0.156	0.527	0.087	0.377	0.104	0.286	0.085	0.188	0.049
1.00	0.644	0.197	0.611	0.122	0.542	0.112	0.438	0.089	0.327	0.079	0.254	0.053
1.10	0.578	0.148	0.660	0.151	0.462	0.081	0.500	0.064	0.365	0.076	0.326	0.070
1.20	0.462	0.137	0.561	0.146	0.325	0.060	0.506	0.127	0.427	0.100	0.398	0.104
1.30	0.436	0.114	0.419	0.182	0.300	0.052	0.474	0.058	0.447	0.116	0.471	0.076
1.40	0.458	0.131	0.417	0.168	0.304	0.099	0.324	0.069	0.413	0.094	0.456	0.096
1.50	0.548	0.177	0.402	0.152	0.296	0.082	0.271	0.062	0.334	0.071	0.369	0.069
1.60	0.492	0.156	0.476	0.148	0.282	0.092	0.281	0.093	0.275	0.040	0.336	0.062
1.70	0.441	0.151	0.504	0.180	0.285	0.078	0.260	0.085	0.248	0.043	0.321	0.062
1.80	0.473	0.162	0.356	0.114	0.331	0.096	0.232	0.042	0.248	0.065	0.277	0.046
1.90	0.512	0.136	0.403	0.150	0.278	0.076	0.237	0.055	0.268	0.099	0.270	0.057
2.00	0.489	0.163	0.471	0.152	0.293	0.098	0.253	0.078	0.264	0.082	0.309	0.091
2.10	0.471	0.141	0.494	0.139	0.301	0.077	0.275	0.104	0.243	0.060	0.323	0.095
2.20	0.451	0.154	0.480	0.119	0.252	0.080	0.267	0.103	0.254	0.045	0.312	0.092
2.30	0.517	0.138	0.383	0.090	0.285	0.089	0.243	0.087	0.291	0.112	0.291	0.083
2.40	0.524	0.148	0.434	0.149	0.266	0.083	0.226	0.078	0.290	0.087	0.311	0.083
2.50	0.510	0.185	0.506	0.171	0.308	0.081	0.248	0.093	0.258	0.067	0.306	0.065
2.60	0.432	0.106	0.459	0.118	0.309	0.076	0.237	0.068	0.239	0.046	0.294	0.086
2.70	0.491	0.100	0.486	0.152	0.314	0.070	0.248	0.064	0.255	0.061	0.293	0.068
2.80	0.523	0.150	0.454	0.170	0.263	0.107	0.278	0.052	0.274	0.066	0.310	0.084

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
2.90	0.465	0.154	0.404	0.089	0.261	0.097	0.274	0.048	0.293	0.096	0.306	0.065
3.00	0.475	0.097	0.488	0.162	0.286	0.117	0.252	0.092	0.277	0.070	0.304	0.067
3.10	0.500	0.147	0.442	0.122	0.323	0.119	0.263	0.092	0.273	0.068	0.298	0.043
3.20	0.509	0.114	0.498	0.195	0.295	0.076	0.271	0.081	0.272	0.068	0.313	0.056
3.30	0.518	0.185	0.388	0.096	0.285	0.095	0.245	0.057	0.306	0.079	0.307	0.076
3.40	0.414	0.188	0.379	0.112	0.267	0.068	0.262	0.102	0.260	0.060	0.331	0.119
3.50	0.327	0.130	0.364	0.131	0.241	0.060	0.265	0.077	0.240	0.053	0.286	0.077
3.60	0.263	0.061	0.265	0.081	0.222	0.054	0.235	0.056	0.255	0.054	0.275	0.073
3.70	0.232	0.063	0.198	0.055	0.197	0.048	0.217	0.067	0.264	0.055	0.285	0.066
3.80	0.207	0.048	0.198	0.051	0.184	0.050	0.240	0.084	0.246	0.045	0.283	0.056
3.90	0.188	0.041	0.187	0.047	0.186	0.039	0.214	0.051	0.242	0.040	0.273	0.055
4.00	0.172	0.034	0.177	0.034	0.177	0.039	0.206	0.053	0.232	0.034	0.266	0.056
4.10	0.157	0.039	0.172	0.025	0.170	0.040	0.213	0.044	0.230	0.043	0.257	0.058
4.20	0.146	0.035	0.158	0.024	0.167	0.041	0.193	0.042	0.222	0.039	0.229	0.039
4.30	0.138	0.035	0.152	0.029	0.158	0.040	0.186	0.040	0.210	0.043	0.225	0.033
4.40	0.122	0.041	0.142	0.029	0.157	0.035	0.184	0.036	0.203	0.043	0.223	0.031
4.50	0.108	0.035	0.134	0.035	0.157	0.029	0.176	0.035	0.188	0.045	0.223	0.021
4.60	0.109	0.038	0.128	0.037	0.152	0.030	0.169	0.040	0.184	0.037	0.211	0.025
4.70	0.110	0.035	0.115	0.043	0.137	0.044	0.165	0.046	0.186	0.039	0.213	0.031
4.80	0.102	0.032	0.109	0.049	0.125	0.045	0.163	0.043	0.184	0.035	0.207	0.041
4.90	0.102	0.033	0.099	0.050	0.128	0.044	0.151	0.040	0.182	0.038	0.207	0.041
5.00	0.101	0.036	0.101	0.046	0.128	0.032	0.155	0.032	0.185	0.045	0.202	0.033
5.10	0.102	0.036	0.097	0.036	0.135	0.033	0.153	0.027	0.175	0.042	0.202	0.039
5.20	0.105	0.026	0.086	0.040	0.132	0.032	0.144	0.031	0.187	0.044	0.200	0.047
5.30	0.107	0.030	0.094	0.045	0.143	0.032	0.140	0.028	0.177	0.049	0.202	0.057
5.40	0.102	0.034	0.092	0.036	0.144	0.035	0.141	0.029	0.165	0.046	0.198	0.060
5.50	0.100	0.043	0.091	0.036	0.138	0.043	0.146	0.027	0.158	0.052	0.196	0.056
5.60	0.099	0.037	0.085	0.030	0.131	0.037	0.140	0.039	0.162	0.052	0.174	0.041
5.70	0.089	0.032	0.089	0.030	0.128	0.038	0.130	0.048	0.165	0.050	0.169	0.052
5.80	0.098	0.035	0.090	0.036	0.124	0.034	0.133	0.045	0.164	0.053	0.166	0.044
5.90	0.100	0.038	0.091	0.034	0.110	0.041	0.138	0.032	0.157	0.045	0.156	0.039

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
6.00	0.098	0.041	0.099	0.027	0.104	0.045	0.133	0.043	0.153	0.045	0.156	0.038
6.10	0.094	0.040	0.116	0.024	0.106	0.041	0.126	0.038	0.145	0.036	0.157	0.037
6.20	0.085	0.035	0.117	0.028	0.108	0.035	0.139	0.032	0.148	0.033	0.158	0.041
6.30	0.078	0.032	0.109	0.030	0.110	0.044	0.136	0.033	0.140	0.039	0.172	0.035
6.40	0.077	0.044	0.104	0.039	0.117	0.040	0.130	0.026	0.143	0.037	0.176	0.027
6.50	0.080	0.040	0.099	0.043	0.118	0.035	0.127	0.030	0.140	0.039	0.164	0.036
6.60	0.075	0.029	0.097	0.050	0.118	0.036	0.126	0.030	0.140	0.042	0.155	0.042
6.70	0.080	0.021	0.103	0.044	0.124	0.044	0.125	0.032	0.139	0.047	0.153	0.032
6.80	0.076	0.036	0.097	0.051	0.124	0.045	0.118	0.042	0.132	0.048	0.153	0.032
6.90	0.075	0.029	0.094	0.051	0.112	0.042	0.125	0.040	0.126	0.048	0.154	0.038
7.00	0.079	0.031	0.097	0.043	0.119	0.047	0.137	0.034	0.123	0.048	0.146	0.041
7.10	0.087	0.040	0.101	0.041	0.112	0.047	0.134	0.028	0.118	0.046	0.141	0.040
7.20	0.089	0.042	0.102	0.041	0.104	0.047	0.141	0.031	0.116	0.055	0.150	0.036
7.30	0.081	0.031	0.087	0.045	0.097	0.052	0.140	0.027	0.117	0.053	0.149	0.030
7.40	0.078	0.030	0.090	0.035	0.095	0.040	0.137	0.031	0.117	0.046	0.141	0.034
7.50	0.087	0.033	0.094	0.038	0.104	0.039	0.135	0.030	0.120	0.040	0.132	0.031
7.60	0.087	0.039	0.099	0.042	0.104	0.035	0.128	0.031	0.119	0.040	0.135	0.032
7.70	0.087	0.038	0.097	0.032	0.107	0.033	0.123	0.033	0.112	0.036	0.135	0.032
7.80	0.090	0.034	0.092	0.025	0.099	0.023	0.119	0.032	0.109	0.037	0.138	0.031
7.90	0.091	0.041	0.098	0.034	0.091	0.033	0.116	0.034	0.108	0.035	0.131	0.032
8.00	0.090	0.034	0.095	0.040	0.094	0.035	0.111	0.038	0.108	0.038	0.128	0.030
8.10	0.095	0.029	0.088	0.042	0.098	0.035	0.115	0.033	0.108	0.048	0.124	0.023
8.20	0.096	0.030	0.083	0.039	0.094	0.041	0.118	0.040	0.111	0.048	0.123	0.032
8.30	0.087	0.036	0.081	0.042	0.086	0.037	0.116	0.046	0.104	0.051	0.125	0.040
8.40	0.079	0.034	0.092	0.043	0.090	0.035	0.101	0.061	0.100	0.046	0.127	0.042
8.50	0.081	0.032	0.085	0.045	0.093	0.041	0.106	0.052	0.103	0.046	0.129	0.050
8.60	0.076	0.035	0.078	0.052	0.090	0.041	0.102	0.044	0.103	0.039	0.122	0.049
8.70	0.069	0.038	0.079	0.059	0.091	0.042	0.105	0.037	0.103	0.035	0.123	0.039
8.80	0.064	0.043	0.077	0.060	0.089	0.032	0.105	0.039	0.102	0.035	0.129	0.038
8.90	0.070	0.041	0.079	0.050	0.090	0.029	0.104	0.040	0.103	0.037	0.117	0.042
9.00	0.074	0.038	0.073	0.049	0.089	0.039	0.103	0.042	0.101	0.040	0.120	0.036

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
9.10	0.069	0.032	0.069	0.045	0.090	0.032	0.106	0.040	0.102	0.042	0.120	0.034
9.20	0.066	0.029	0.072	0.046	0.089	0.032	0.101	0.034	0.100	0.038	0.123	0.028
9.30	0.066	0.027	0.077	0.047	0.085	0.033	0.103	0.031	0.094	0.037	0.114	0.035
9.40	0.055	0.032	0.076	0.045	0.093	0.029	0.102	0.028	0.091	0.040	0.108	0.039
9.50	0.054	0.028	0.081	0.044	0.094	0.034	0.103	0.033	0.090	0.033	0.111	0.025
9.60	0.062	0.036	0.084	0.045	0.093	0.039	0.098	0.032	0.092	0.031	0.109	0.032
9.70	0.059	0.037	0.076	0.041	0.088	0.037	0.097	0.036	0.091	0.035	0.098	0.042
9.80	0.059	0.031	0.068	0.044	0.087	0.035	0.100	0.035	0.090	0.040	0.097	0.035
9.90	0.060	0.027	0.062	0.047	0.091	0.040	0.101	0.042	0.092	0.039	0.098	0.036
10.00	0.063	0.027	0.057	0.047	0.083	0.036	0.101	0.038	0.089	0.036	0.098	0.036
10.10	0.065	0.030	0.057	0.044	0.079	0.035	0.101	0.032	0.087	0.040	0.104	0.032
10.20	0.060	0.033	0.060	0.048	0.076	0.038	0.099	0.036	0.082	0.038	0.109	0.029
10.30	0.058	0.026	0.049	0.045	0.077	0.042	0.096	0.038	0.074	0.043	0.107	0.027
10.40	0.059	0.025	0.050	0.046	0.088	0.035	0.091	0.033	0.075	0.040	0.095	0.034
10.50	0.062	0.027	0.049	0.035	0.085	0.032	0.085	0.037	0.073	0.043	0.094	0.033
10.60	0.062	0.030	0.038	0.027	0.084	0.033	0.083	0.039	0.070	0.039	0.093	0.033
10.70	0.059	0.031	0.043	0.036	0.088	0.034	0.081	0.034	0.078	0.035	0.090	0.026
10.80	0.063	0.028	0.043	0.037	0.090	0.026	0.083	0.029	0.075	0.038	0.086	0.026
10.90	0.064	0.028	0.047	0.033	0.082	0.026	0.083	0.027	0.073	0.039	0.087	0.027
11.00	0.058	0.032	0.055	0.036	0.076	0.032	0.074	0.030	0.074	0.037	0.083	0.027
11.10	0.051	0.034	0.052	0.033	0.079	0.022	0.070	0.029	0.078	0.034	0.087	0.022
11.20	0.047	0.035	0.051	0.034	0.081	0.027	0.073	0.037	0.079	0.036	0.088	0.019
11.30	0.050	0.032	0.052	0.041	0.076	0.030	0.071	0.038	0.080	0.040	0.087	0.026
11.40	0.053	0.029	0.050	0.038	0.075	0.027	0.074	0.040	0.075	0.042	0.077	0.029
11.50	0.051	0.025	0.046	0.034	0.073	0.030	0.071	0.044	0.074	0.039	0.073	0.022
11.60	0.045	0.025	0.047	0.031	0.071	0.029	0.069	0.045	0.074	0.032	0.074	0.021
11.70	0.042	0.027	0.041	0.034	0.071	0.031	0.072	0.043	0.070	0.031	0.080	0.020
11.80	0.038	0.027	0.043	0.033	0.066	0.035	0.067	0.042	0.072	0.030	0.086	0.022
11.90	0.040	0.029	0.045	0.033	0.063	0.039	0.062	0.040	0.064	0.031	0.085	0.024
12.00	0.049	0.028	0.047	0.030	0.062	0.040	0.058	0.040	0.064	0.029	0.088	0.023
12.10	0.053	0.029	0.050	0.034	0.063	0.039	0.058	0.036	0.066	0.028	0.077	0.031

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
12.20	0.054	0.035	0.051	0.035	0.061	0.039	0.063	0.037	0.063	0.028	0.075	0.027
12.30	0.053	0.038	0.050	0.031	0.059	0.038	0.068	0.037	0.062	0.029	0.072	0.033
12.40	0.051	0.038	0.051	0.025	0.057	0.037	0.070	0.039	0.063	0.035	0.068	0.028
12.50	0.050	0.032	0.050	0.024	0.057	0.038	0.065	0.032	0.063	0.034	0.067	0.028
12.60	0.049	0.031	0.048	0.031	0.055	0.034	0.063	0.028	0.059	0.038	0.066	0.025
12.70	0.043	0.036	0.045	0.033	0.053	0.031	0.059	0.028	0.054	0.038	0.065	0.030
12.80	0.044	0.039	0.052	0.034	0.050	0.034	0.056	0.030	0.048	0.035	0.060	0.034
12.90	0.043	0.040	0.048	0.030	0.056	0.033	0.062	0.028	0.049	0.032	0.057	0.033
13.00	0.040	0.039	0.042	0.030	0.058	0.032	0.062	0.028	0.050	0.032	0.060	0.034
13.10	0.041	0.037	0.036	0.030	0.060	0.034	0.058	0.031	0.050	0.033	0.060	0.036
13.20	0.038	0.034	0.036	0.027	0.061	0.034	0.052	0.030	0.053	0.038	0.054	0.034
13.30	0.034	0.032	0.038	0.029	0.061	0.030	0.051	0.027	0.050	0.038	0.060	0.033
13.40	0.037	0.029	0.038	0.030	0.060	0.030	0.048	0.028	0.051	0.039	0.061	0.034
13.50	0.037	0.030	0.037	0.029	0.059	0.028	0.047	0.028	0.050	0.040	0.065	0.032
13.60	0.035	0.036	0.039	0.027	0.057	0.030	0.052	0.029	0.051	0.043	0.065	0.032
13.70	0.033	0.031	0.044	0.033	0.054	0.028	0.054	0.035	0.046	0.041	0.064	0.031
13.80	0.031	0.029	0.044	0.033	0.052	0.028	0.051	0.032	0.042	0.038	0.057	0.031
13.90	0.029	0.029	0.044	0.033	0.055	0.033	0.052	0.027	0.040	0.034	0.060	0.029
14.00	0.028	0.028	0.046	0.035	0.051	0.033	0.051	0.030	0.041	0.033	0.060	0.028
14.10	0.029	0.028	0.047	0.038	0.051	0.025	0.050	0.033	0.050	0.033	0.054	0.028
14.20	0.032	0.026	0.041	0.040	0.050	0.028	0.049	0.032	0.050	0.027	0.057	0.031
14.30	0.032	0.031	0.036	0.034	0.047	0.034	0.052	0.030	0.048	0.028	0.060	0.028
14.40	0.032	0.031	0.039	0.030	0.045	0.032	0.047	0.031	0.052	0.029	0.057	0.027
14.50	0.030	0.031	0.039	0.030	0.043	0.032	0.043	0.035	0.054	0.029	0.055	0.032
14.60	0.029	0.028	0.040	0.036	0.041	0.032	0.043	0.036	0.051	0.029	0.048	0.035
14.70	0.029	0.028	0.042	0.038	0.043	0.033	0.045	0.035	0.051	0.026	0.047	0.038
14.80	0.029	0.027	0.041	0.039	0.047	0.030	0.047	0.031	0.051	0.022	0.050	0.039
14.90	0.033	0.026	0.040	0.039	0.046	0.027	0.045	0.033	0.050	0.023	0.048	0.036
15.00	0.030	0.027	0.041	0.036	0.046	0.027	0.052	0.036	0.051	0.023	0.049	0.039
15.10	0.028	0.025	0.044	0.035	0.043	0.029	0.051	0.034	0.045	0.023	0.049	0.040
15.20	0.026	0.025	0.040	0.037	0.042	0.030	0.048	0.030	0.046	0.030	0.049	0.041

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
15.30	0.028	0.029	0.038	0.037	0.040	0.029	0.045	0.030	0.050	0.030	0.052	0.041
15.40	0.030	0.027	0.041	0.037	0.039	0.031	0.045	0.032	0.047	0.027	0.049	0.040
15.50	0.029	0.029	0.041	0.036	0.042	0.035	0.045	0.031	0.045	0.029	0.045	0.037
15.60	0.028	0.032	0.041	0.037	0.043	0.032	0.046	0.028	0.046	0.029	0.043	0.036
15.70	0.027	0.030	0.038	0.036	0.043	0.033	0.045	0.026	0.044	0.032	0.040	0.035
15.80	0.024	0.028	0.032	0.032	0.042	0.031	0.044	0.028	0.041	0.033	0.034	0.033
15.90	0.024	0.032	0.029	0.028	0.040	0.028	0.039	0.027	0.035	0.030	0.032	0.034
16.00	0.026	0.030	0.030	0.032	0.038	0.027	0.037	0.028	0.033	0.027	0.034	0.035
16.10	0.026	0.031	0.034	0.034	0.035	0.027	0.039	0.027	0.034	0.027	0.035	0.034
16.20	0.023	0.028	0.032	0.036	0.036	0.028	0.039	0.025	0.035	0.025	0.034	0.031
16.30	0.023	0.029	0.034	0.036	0.035	0.030	0.040	0.024	0.038	0.027	0.033	0.031
16.40	0.025	0.028	0.031	0.032	0.037	0.030	0.041	0.028	0.038	0.027	0.039	0.031
16.50	0.025	0.028	0.026	0.028	0.033	0.030	0.045	0.027	0.038	0.026	0.041	0.031
16.60	0.024	0.030	0.028	0.028	0.035	0.027	0.044	0.025	0.038	0.026	0.037	0.029
16.70	0.023	0.029	0.033	0.034	0.037	0.029	0.041	0.025	0.035	0.027	0.034	0.028
16.80	0.022	0.028	0.034	0.035	0.036	0.027	0.046	0.028	0.034	0.027	0.039	0.029
16.90	0.021	0.025	0.034	0.036	0.034	0.027	0.045	0.028	0.037	0.028	0.040	0.030
17.00	0.021	0.025	0.031	0.035	0.034	0.026	0.045	0.030	0.035	0.030	0.037	0.031
17.10	0.025	0.029	0.027	0.033	0.034	0.025	0.046	0.030	0.034	0.030	0.035	0.032
17.20	0.026	0.027	0.026	0.032	0.033	0.025	0.045	0.028	0.034	0.031	0.031	0.033
17.30	0.026	0.024	0.025	0.033	0.033	0.025	0.044	0.027	0.033	0.031	0.030	0.036
17.40	0.025	0.020	0.025	0.032	0.032	0.026	0.041	0.024	0.028	0.030	0.030	0.035
17.50	0.026	0.023	0.027	0.032	0.029	0.026	0.044	0.026	0.025	0.030	0.031	0.034
17.60	0.028	0.023	0.026	0.031	0.024	0.024	0.042	0.027	0.026	0.028	0.034	0.034
17.70	0.029	0.026	0.026	0.035	0.024	0.024	0.036	0.026	0.030	0.030	0.035	0.034
17.80	0.027	0.028	0.026	0.034	0.026	0.025	0.035	0.028	0.034	0.029	0.034	0.036
17.90	0.023	0.025	0.023	0.032	0.028	0.027	0.033	0.031	0.038	0.030	0.032	0.034
18.00	0.022	0.023	0.022	0.030	0.030	0.025	0.032	0.029	0.040	0.027	0.033	0.033
18.10	0.022	0.022	0.021	0.029	0.027	0.024	0.031	0.030	0.035	0.023	0.033	0.031
18.20	0.021	0.023	0.022	0.028	0.028	0.023	0.030	0.032	0.030	0.024	0.033	0.028
18.30	0.019	0.024	0.023	0.030	0.028	0.024	0.029	0.029	0.030	0.025	0.035	0.026

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
18.40	0.017	0.023	0.026	0.031	0.026	0.024	0.027	0.028	0.030	0.025	0.034	0.027
18.50	0.020	0.023	0.024	0.033	0.028	0.024	0.026	0.030	0.031	0.026	0.035	0.027
18.60	0.022	0.024	0.021	0.031	0.028	0.024	0.026	0.030	0.030	0.022	0.035	0.026
18.70	0.024	0.023	0.020	0.029	0.028	0.025	0.025	0.030	0.030	0.025	0.032	0.025
18.80	0.025	0.021	0.019	0.028	0.029	0.024	0.022	0.029	0.032	0.026	0.031	0.026
18.90	0.025	0.020	0.019	0.029	0.029	0.024	0.022	0.029	0.032	0.025	0.031	0.030
19.00	0.024	0.021	0.018	0.027	0.027	0.024	0.023	0.032	0.032	0.022	0.027	0.029
19.10	0.023	0.024	0.019	0.029	0.028	0.026	0.025	0.032	0.032	0.021	0.027	0.028
19.20	0.022	0.025	0.018	0.030	0.030	0.028	0.025	0.031	0.030	0.022	0.027	0.025
19.30	0.022	0.025	0.016	0.029	0.030	0.029	0.024	0.030	0.028	0.022	0.028	0.022
19.40	0.022	0.026	0.014	0.027	0.032	0.030	0.024	0.028	0.024	0.022	0.027	0.021
19.50	0.023	0.024	0.015	0.026	0.034	0.027	0.027	0.029	0.025	0.024	0.026	0.023
19.60	0.022	0.024	0.013	0.026	0.031	0.024	0.029	0.028	0.027	0.027	0.023	0.022
19.70	0.021	0.024	0.015	0.028	0.029	0.024	0.028	0.027	0.025	0.026	0.018	0.022
19.80	0.018	0.020	0.016	0.029	0.029	0.024	0.028	0.028	0.024	0.022	0.018	0.023
19.90	0.018	0.021	0.013	0.029	0.028	0.024	0.029	0.028	0.022	0.022	0.021	0.025
20.00	0.019	0.024	0.010	0.028	0.024	0.024	0.028	0.030	0.021	0.024	0.025	0.027
20.10	0.017	0.024	0.010	0.027	0.022	0.024	0.024	0.029	0.020	0.022	0.029	0.028
20.20	0.018	0.022	0.013	0.028	0.023	0.025	0.024	0.028	0.021	0.024	0.030	0.022
20.30	0.017	0.020	0.012	0.026	0.022	0.024	0.026	0.030	0.019	0.024	0.031	0.022
20.40	0.018	0.020	0.009	0.024	0.022	0.023	0.026	0.028	0.017	0.024	0.031	0.023
20.50	0.018	0.018	0.009	0.027	0.022	0.021	0.024	0.027	0.015	0.025	0.029	0.024
20.60	0.020	0.016	0.008	0.026	0.021	0.021	0.025	0.027	0.012	0.022	0.027	0.024
20.70	0.022	0.017	0.007	0.025	0.019	0.021	0.027	0.031	0.009	0.018	0.027	0.025
20.80	0.023	0.020	0.007	0.023	0.019	0.020	0.028	0.030	0.010	0.022	0.025	0.023
20.90	0.021	0.019	0.008	0.023	0.021	0.022	0.030	0.032	0.011	0.026	0.027	0.021
21.00	0.021	0.020	0.008	0.021	0.020	0.022	0.029	0.030	0.012	0.025	0.026	0.020
21.10	0.022	0.023	0.007	0.021	0.017	0.020	0.030	0.030	0.011	0.023	0.022	0.023
21.20	0.023	0.026	0.009	0.022	0.015	0.022	0.028	0.029	0.015	0.027	0.020	0.023
21.30	0.021	0.028	0.009	0.023	0.015	0.025	0.025	0.026	0.015	0.026	0.020	0.024
21.40	0.020	0.031	0.011	0.023	0.017	0.025	0.023	0.024	0.016	0.027	0.020	0.022

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
21.50	0.021	0.035	0.009	0.023	0.017	0.025	0.023	0.023	0.013	0.026	0.019	0.018
21.60	0.019	0.035	0.008	0.023	0.017	0.022	0.022	0.023	0.011	0.025	0.018	0.019
21.70	0.018	0.033	0.008	0.022	0.018	0.021	0.023	0.025	0.011	0.024	0.019	0.019
21.80	0.018	0.032	0.009	0.023	0.018	0.020	0.020	0.021	0.011	0.028	0.020	0.018
21.90	0.017	0.028	0.010	0.024	0.015	0.021	0.019	0.021	0.012	0.027	0.018	0.021
22.00	0.018	0.024	0.009	0.024	0.014	0.022	0.020	0.024	0.012	0.026	0.017	0.023
22.10	0.019	0.025	0.008	0.025	0.013	0.019	0.021	0.027	0.009	0.024	0.017	0.024
22.20	0.019	0.027	0.007	0.025	0.011	0.019	0.019	0.029	0.008	0.022	0.017	0.024
22.30	0.019	0.029	0.006	0.024	0.010	0.019	0.020	0.029	0.009	0.019	0.017	0.024
22.40	0.020	0.029	0.006	0.022	0.009	0.016	0.019	0.026	0.010	0.020	0.014	0.024
22.50	0.019	0.028	0.006	0.021	0.007	0.013	0.015	0.025	0.009	0.019	0.014	0.022
22.60	0.018	0.026	0.006	0.022	0.006	0.014	0.011	0.024	0.009	0.019	0.017	0.023
22.70	0.018	0.028	0.006	0.020	0.006	0.016	0.010	0.023	0.007	0.020	0.017	0.024
22.80	0.017	0.029	0.005	0.019	0.005	0.017	0.011	0.023	0.005	0.020	0.013	0.022
22.90	0.016	0.029	0.004	0.018	0.006	0.019	0.011	0.022	0.006	0.018	0.012	0.022
23.00	0.016	0.028	0.003	0.017	0.005	0.020	0.013	0.021	0.007	0.018	0.013	0.020
23.10	0.018	0.027	0.004	0.019	0.003	0.019	0.014	0.020	0.006	0.019	0.013	0.020
23.20	0.020	0.027	0.006	0.020	0.002	0.018	0.014	0.020	0.006	0.020	0.014	0.022
23.30	0.022	0.026	0.007	0.019	0.001	0.019	0.013	0.021	0.005	0.018	0.015	0.022
23.40	0.021	0.025	0.008	0.018	0.001	0.019	0.011	0.022	0.002	0.014	0.015	0.021
23.50	0.017	0.024	0.009	0.016	0.002	0.018	0.013	0.022	0.004	0.016	0.013	0.020
23.60	0.015	0.022	0.009	0.015	0.002	0.018	0.012	0.021	0.005	0.015	0.014	0.022
23.70	0.013	0.023	0.010	0.016	0.002	0.020	0.010	0.019	0.003	0.013	0.015	0.025
23.80	0.012	0.025	0.008	0.017	0.004	0.022	0.010	0.018	0.003	0.014	0.015	0.023
23.90	0.013	0.026	0.008	0.017	0.002	0.022	0.008	0.017	0.006	0.019	0.016	0.022
24.00	0.012	0.025	0.009	0.018	0.002	0.020	0.006	0.017	0.006	0.019	0.015	0.020
24.10	0.012	0.027	0.009	0.019	0.001	0.020	0.007	0.019	0.003	0.018	0.013	0.019
24.20	0.012	0.027	0.008	0.019	0.002	0.019	0.008	0.022	0.003	0.017	0.010	0.019
24.30	0.012	0.028	0.006	0.017	0.003	0.018	0.008	0.023	0.001	0.016	0.009	0.018
24.40	0.011	0.028	0.005	0.013	0.003	0.018	0.009	0.022	0.001	0.017	0.010	0.017
24.50	0.010	0.028	0.005	0.013	0.003	0.018	0.011	0.024	0.001	0.017	0.013	0.016

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
24.60	0.011	0.029	0.005	0.015	0.003	0.018	0.010	0.023	0.001	0.016	0.015	0.017
24.70	0.010	0.026	0.005	0.018	0.004	0.020	0.009	0.023	0.001	0.018	0.013	0.017
24.80	0.008	0.025	0.005	0.020	0.005	0.019	0.006	0.021	0.002	0.018	0.013	0.019
24.90	0.007	0.026	0.005	0.020	0.006	0.018	0.005	0.022	0.002	0.019	0.013	0.022
25.00	0.007	0.027	0.005	0.017	0.005	0.018	0.004	0.022	0.003	0.019	0.013	0.024
25.10	0.007	0.027	0.006	0.016	0.003	0.018	0.005	0.022	0.003	0.019	0.014	0.025
25.20	0.009	0.028	0.008	0.015	0.003	0.018	0.005	0.022	0.002	0.017	0.014	0.025
25.30	0.010	0.027	0.010	0.015	0.003	0.017	0.006	0.023	0.002	0.019	0.012	0.025
25.40	0.009	0.025	0.009	0.016	0.002	0.018	0.008	0.023	0.004	0.022	0.012	0.023
25.50	0.007	0.023	0.009	0.017	0.001	0.019	0.007	0.022	0.006	0.021	0.012	0.022
25.60	0.005	0.022	0.009	0.019	0.000	0.017	0.007	0.023	0.008	0.021	0.012	0.024
25.70	0.006	0.023	0.007	0.018	0.000	0.015	0.007	0.022	0.007	0.019	0.010	0.025
25.80	0.007	0.023	0.005	0.017	-0.001	0.013	0.006	0.021	0.008	0.021	0.010	0.023
25.90	0.006	0.022	0.005	0.017	0.000	0.014	0.007	0.021	0.010	0.023	0.009	0.021
26.00	0.006	0.022	0.006	0.017	0.000	0.014	0.007	0.020	0.011	0.025	0.007	0.021
26.10	0.005	0.022	0.006	0.018	0.000	0.015	0.006	0.019	0.011	0.026	0.006	0.021
26.20	0.006	0.022	0.006	0.018	-0.001	0.015	0.004	0.018	0.011	0.023	0.005	0.021
26.30	0.007	0.023	0.007	0.017	-0.002	0.013	0.004	0.020	0.009	0.019	0.003	0.018
26.40	0.007	0.023	0.009	0.015	-0.003	0.012	0.005	0.020	0.008	0.017	0.004	0.019
26.50	0.006	0.023	0.011	0.014	-0.004	0.012	0.005	0.020	0.006	0.017	0.005	0.019
26.60	0.006	0.023	0.011	0.015	-0.004	0.012	0.006	0.020	0.005	0.018	0.006	0.018
26.70	0.006	0.023	0.012	0.017	-0.003	0.012	0.007	0.021	0.006	0.017	0.007	0.019
26.80	0.006	0.023	0.012	0.018	-0.003	0.012	0.007	0.021	0.007	0.016	0.007	0.020
26.90	0.006	0.023	0.012	0.017	-0.002	0.012	0.006	0.022	0.007	0.015	0.006	0.019
27.00	0.005	0.022	0.011	0.015	-0.002	0.012	0.005	0.021	0.007	0.016	0.005	0.017
27.10	0.005	0.020	0.009	0.014	-0.001	0.011	0.004	0.020	0.007	0.017	0.004	0.016
27.20	0.005	0.019	0.008	0.015	-0.001	0.010	0.004	0.020	0.008	0.016	0.003	0.015
27.30	0.006	0.019	0.008	0.015	-0.001	0.009	0.004	0.019	0.010	0.016	0.003	0.014
27.40	0.007	0.018	0.006	0.013	-0.002	0.009	0.005	0.020	0.009	0.017	0.005	0.016
27.50	0.006	0.018	0.005	0.012	-0.003	0.009	0.005	0.019	0.008	0.018	0.006	0.018
27.60	0.006	0.018	0.004	0.012	-0.002	0.010	0.004	0.017	0.007	0.017	0.008	0.020

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
27.70	0.006	0.019	0.003	0.014	-0.001	0.009	0.003	0.015	0.008	0.014	0.009	0.022
27.80	0.006	0.020	0.003	0.016	-0.002	0.007	0.001	0.013	0.009	0.013	0.009	0.019
27.90	0.006	0.018	0.003	0.015	-0.002	0.007	0.000	0.013	0.009	0.012	0.008	0.016
28.00	0.006	0.018	0.004	0.015	-0.002	0.009	0.001	0.014	0.009	0.012	0.006	0.014
28.10	0.006	0.018	0.004	0.017	-0.001	0.009	0.001	0.015	0.009	0.012	0.005	0.015
28.20	0.006	0.017	0.005	0.018	0.000	0.010	0.002	0.017	0.009	0.013	0.005	0.016
28.30	0.005	0.018	0.004	0.017	0.001	0.010	0.002	0.016	0.009	0.014	0.006	0.017
28.40	0.005	0.018	0.003	0.015	0.002	0.011	0.002	0.016	0.008	0.014	0.006	0.016
28.50	0.004	0.018	0.002	0.013	0.001	0.012	0.003	0.017	0.007	0.016	0.005	0.016
28.60	0.003	0.017	0.001	0.012	0.002	0.013	0.004	0.018	0.006	0.017	0.002	0.013
28.70	0.003	0.017	0.000	0.011	0.002	0.013	0.005	0.018	0.005	0.017	0.001	0.013
28.80	0.004	0.017	0.000	0.011	0.001	0.012	0.005	0.018	0.005	0.017	0.001	0.013
28.90	0.005	0.018	0.001	0.012	0.001	0.013	0.006	0.019	0.005	0.018	0.002	0.015
29.00	0.005	0.019	0.001	0.012	0.000	0.014	0.006	0.020	0.006	0.017	0.003	0.016
29.10	0.006	0.020	0.000	0.011	0.002	0.014	0.007	0.021	0.005	0.017	0.004	0.016
29.20	0.006	0.021	0.000	0.012	0.002	0.014	0.007	0.022	0.005	0.016	0.005	0.015
29.30	0.007	0.021	0.000	0.014	0.001	0.012	0.006	0.023	0.005	0.015	0.004	0.013
29.40	0.008	0.020	0.000	0.016	0.000	0.012	0.006	0.024	0.005	0.014	0.004	0.014
29.50	0.010	0.020	0.000	0.018	0.000	0.012	0.007	0.025	0.004	0.013	0.003	0.013
29.60	0.009	0.020	0.000	0.019	-0.002	0.011	0.006	0.026	0.002	0.011	0.002	0.012
29.70	0.007	0.019	0.000	0.019	-0.004	0.010	0.005	0.027	0.001	0.012	0.002	0.012
29.80	0.004	0.019	0.001	0.017	-0.005	0.010	0.004	0.026	0.002	0.014	0.002	0.013
29.90	0.002	0.019	0.001	0.016	-0.005	0.010	0.003	0.024	0.004	0.019	0.002	0.013
30.00	0.001	0.018	0.000	0.014	-0.005	0.011	0.004	0.021	0.005	0.022	0.002	0.013

Small-Tank Wall Velocity Data, contd.

Cycle Time (sec)	Velocities Measured at 0.381 m (15 in) Radial Position											
	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
0.10	0.003	0.013	0.002	0.012	0.011	0.021	0.006	0.018	0.009	0.026	0.010	0.023
0.20	0.006	0.013	0.004	0.012	0.019	0.022	0.009	0.020	0.008	0.027	0.009	0.024
0.30	0.016	0.018	0.017	0.020	0.032	0.022	0.020	0.026	0.015	0.030	0.018	0.029
0.40	0.031	0.017	0.029	0.022	0.043	0.022	0.027	0.028	0.022	0.032	0.024	0.032
0.50	0.056	0.013	0.046	0.021	0.057	0.020	0.038	0.031	0.027	0.035	0.028	0.034
0.60	0.085	0.012	0.068	0.016	0.073	0.018	0.055	0.027	0.036	0.033	0.036	0.033
0.70	0.111	0.011	0.091	0.012	0.088	0.017	0.068	0.021	0.046	0.029	0.043	0.032
0.80	0.137	0.015	0.109	0.010	0.099	0.016	0.076	0.019	0.056	0.028	0.049	0.030
0.90	0.163	0.032	0.128	0.015	0.109	0.014	0.082	0.019	0.060	0.027	0.053	0.029
1.00	0.210	0.066	0.160	0.045	0.128	0.019	0.095	0.017	0.067	0.028	0.058	0.028
1.10	0.261	0.084	0.199	0.061	0.173	0.043	0.119	0.021	0.083	0.027	0.069	0.027
1.20	0.350	0.074	0.247	0.074	0.254	0.082	0.166	0.063	0.109	0.027	0.087	0.025
1.30	0.444	0.115	0.349	0.087	0.350	0.118	0.262	0.094	0.161	0.071	0.120	0.047
1.40	0.434	0.111	0.411	0.094	0.346	0.080	0.331	0.114	0.214	0.114	0.156	0.070
1.50	0.411	0.121	0.432	0.110	0.380	0.093	0.428	0.100	0.265	0.112	0.194	0.083
1.60	0.377	0.104	0.407	0.095	0.434	0.072	0.424	0.093	0.367	0.091	0.249	0.087
1.70	0.342	0.114	0.356	0.056	0.438	0.087	0.452	0.106	0.375	0.074	0.255	0.076
1.80	0.326	0.067	0.331	0.078	0.374	0.059	0.429	0.126	0.325	0.078	0.245	0.084
1.90	0.329	0.093	0.336	0.097	0.373	0.056	0.416	0.078	0.307	0.074	0.263	0.084
2.00	0.330	0.071	0.346	0.074	0.357	0.070	0.362	0.068	0.305	0.069	0.294	0.095
2.10	0.318	0.053	0.387	0.092	0.375	0.104	0.377	0.094	0.328	0.118	0.341	0.114
2.20	0.323	0.049	0.383	0.109	0.362	0.100	0.392	0.094	0.351	0.109	0.343	0.095
2.30	0.317	0.054	0.366	0.067	0.357	0.067	0.337	0.050	0.363	0.105	0.365	0.098
2.40	0.329	0.077	0.359	0.061	0.357	0.060	0.339	0.061	0.352	0.104	0.348	0.092
2.50	0.355	0.086	0.365	0.077	0.366	0.069	0.377	0.091	0.369	0.086	0.344	0.090
2.60	0.348	0.093	0.381	0.090	0.380	0.088	0.375	0.088	0.398	0.090	0.350	0.088
2.70	0.322	0.052	0.387	0.079	0.373	0.093	0.370	0.073	0.426	0.104	0.380	0.109
2.80	0.329	0.077	0.400	0.071	0.391	0.061	0.371	0.097	0.379	0.101	0.345	0.113

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
2.90	0.345	0.043	0.401	0.075	0.440	0.064	0.392	0.084	0.382	0.103	0.339	0.106
3.00	0.360	0.077	0.397	0.060	0.415	0.054	0.428	0.088	0.373	0.078	0.358	0.098
3.10	0.376	0.104	0.387	0.061	0.420	0.084	0.393	0.078	0.396	0.077	0.373	0.095
3.20	0.371	0.081	0.382	0.077	0.376	0.066	0.412	0.105	0.365	0.091	0.373	0.109
3.30	0.361	0.087	0.374	0.061	0.361	0.070	0.393	0.120	0.363	0.101	0.377	0.109
3.40	0.331	0.074	0.357	0.052	0.349	0.059	0.386	0.074	0.315	0.086	0.352	0.095
3.50	0.318	0.056	0.345	0.052	0.328	0.093	0.429	0.091	0.312	0.083	0.337	0.096
3.60	0.296	0.045	0.321	0.048	0.355	0.090	0.417	0.098	0.317	0.095	0.354	0.089
3.70	0.283	0.053	0.330	0.048	0.357	0.068	0.379	0.070	0.337	0.098	0.354	0.112
3.80	0.278	0.069	0.331	0.057	0.348	0.078	0.357	0.059	0.360	0.103	0.348	0.102
3.90	0.275	0.053	0.317	0.066	0.341	0.069	0.358	0.061	0.355	0.094	0.352	0.099
4.00	0.267	0.053	0.309	0.082	0.316	0.051	0.353	0.066	0.326	0.065	0.316	0.073
4.10	0.256	0.044	0.318	0.066	0.304	0.054	0.331	0.059	0.320	0.058	0.328	0.074
4.20	0.267	0.048	0.316	0.050	0.324	0.036	0.329	0.073	0.301	0.059	0.312	0.055
4.30	0.263	0.054	0.303	0.042	0.302	0.050	0.313	0.090	0.303	0.052	0.299	0.059
4.40	0.257	0.055	0.301	0.044	0.307	0.063	0.304	0.065	0.303	0.070	0.293	0.068
4.50	0.247	0.062	0.275	0.043	0.290	0.058	0.295	0.059	0.294	0.043	0.286	0.049
4.60	0.254	0.056	0.262	0.039	0.293	0.054	0.308	0.049	0.292	0.031	0.279	0.052
4.70	0.245	0.058	0.247	0.048	0.286	0.053	0.310	0.045	0.285	0.039	0.282	0.052
4.80	0.236	0.063	0.249	0.038	0.285	0.037	0.289	0.043	0.269	0.057	0.280	0.065
4.90	0.238	0.062	0.257	0.037	0.279	0.034	0.282	0.045	0.245	0.052	0.265	0.063
5.00	0.225	0.057	0.252	0.042	0.279	0.029	0.278	0.041	0.243	0.065	0.259	0.066
5.10	0.221	0.045	0.234	0.034	0.272	0.035	0.277	0.036	0.228	0.064	0.245	0.055
5.20	0.221	0.038	0.231	0.039	0.260	0.038	0.259	0.028	0.220	0.054	0.232	0.050
5.30	0.224	0.031	0.231	0.043	0.250	0.051	0.250	0.040	0.220	0.051	0.234	0.050
5.40	0.234	0.028	0.234	0.046	0.241	0.054	0.248	0.040	0.222	0.046	0.234	0.050
5.50	0.224	0.035	0.220	0.035	0.236	0.053	0.260	0.042	0.223	0.043	0.232	0.051
5.60	0.211	0.036	0.209	0.031	0.227	0.034	0.252	0.035	0.205	0.043	0.215	0.049
5.70	0.216	0.026	0.201	0.026	0.223	0.039	0.241	0.040	0.200	0.035	0.209	0.050
5.80	0.209	0.021	0.200	0.039	0.216	0.030	0.246	0.044	0.199	0.046	0.211	0.058
5.90	0.198	0.017	0.204	0.039	0.231	0.023	0.223	0.036	0.195	0.047	0.203	0.047

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
6.00	0.192	0.022	0.206	0.035	0.221	0.035	0.221	0.051	0.200	0.039	0.206	0.046
6.10	0.193	0.027	0.211	0.033	0.212	0.033	0.213	0.041	0.201	0.041	0.204	0.053
6.20	0.188	0.023	0.199	0.036	0.204	0.034	0.203	0.047	0.195	0.042	0.190	0.053
6.30	0.189	0.026	0.188	0.041	0.194	0.027	0.187	0.040	0.187	0.036	0.180	0.048
6.40	0.185	0.043	0.184	0.045	0.195	0.026	0.188	0.047	0.172	0.046	0.166	0.052
6.50	0.182	0.038	0.188	0.038	0.189	0.025	0.177	0.058	0.169	0.039	0.166	0.052
6.60	0.180	0.033	0.191	0.043	0.189	0.028	0.171	0.041	0.171	0.035	0.170	0.048
6.70	0.178	0.029	0.188	0.046	0.179	0.036	0.174	0.043	0.167	0.037	0.164	0.041
6.80	0.178	0.034	0.183	0.059	0.177	0.043	0.169	0.040	0.147	0.039	0.152	0.040
6.90	0.165	0.039	0.186	0.042	0.168	0.039	0.159	0.045	0.136	0.048	0.146	0.049
7.00	0.166	0.036	0.186	0.034	0.160	0.048	0.149	0.042	0.130	0.051	0.143	0.053
7.10	0.164	0.037	0.193	0.040	0.165	0.050	0.145	0.041	0.125	0.053	0.137	0.052
7.20	0.166	0.036	0.179	0.042	0.160	0.044	0.143	0.035	0.116	0.048	0.131	0.053
7.30	0.164	0.024	0.170	0.040	0.152	0.035	0.148	0.030	0.102	0.046	0.121	0.049
7.40	0.159	0.026	0.168	0.034	0.145	0.032	0.139	0.029	0.112	0.041	0.123	0.045
7.50	0.155	0.029	0.170	0.032	0.145	0.028	0.137	0.037	0.116	0.046	0.126	0.047
7.60	0.150	0.024	0.174	0.026	0.141	0.030	0.130	0.035	0.120	0.037	0.126	0.041
7.70	0.146	0.022	0.168	0.035	0.142	0.029	0.132	0.034	0.113	0.041	0.123	0.044
7.80	0.140	0.033	0.155	0.046	0.136	0.024	0.131	0.036	0.114	0.027	0.123	0.038
7.90	0.129	0.039	0.138	0.062	0.137	0.030	0.125	0.032	0.121	0.038	0.125	0.045
8.00	0.126	0.036	0.140	0.044	0.132	0.036	0.133	0.040	0.117	0.041	0.118	0.046
8.10	0.119	0.037	0.138	0.031	0.129	0.040	0.135	0.043	0.110	0.047	0.110	0.049
8.20	0.117	0.040	0.136	0.031	0.129	0.031	0.129	0.036	0.108	0.048	0.110	0.049
8.30	0.133	0.032	0.136	0.027	0.128	0.030	0.113	0.046	0.111	0.048	0.111	0.049
8.40	0.132	0.029	0.123	0.035	0.126	0.035	0.119	0.042	0.124	0.040	0.114	0.045
8.50	0.126	0.028	0.110	0.044	0.117	0.040	0.125	0.046	0.123	0.042	0.117	0.043
8.60	0.125	0.036	0.113	0.050	0.112	0.039	0.126	0.053	0.119	0.048	0.118	0.045
8.70	0.113	0.046	0.110	0.046	0.115	0.032	0.121	0.047	0.120	0.049	0.114	0.047
8.80	0.112	0.042	0.107	0.052	0.124	0.033	0.122	0.044	0.117	0.047	0.115	0.046
8.90	0.117	0.041	0.108	0.049	0.125	0.026	0.127	0.033	0.105	0.050	0.108	0.048
9.00	0.113	0.037	0.111	0.052	0.121	0.030	0.122	0.032	0.102	0.048	0.103	0.049

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
9.10	0.109	0.035	0.118	0.040	0.124	0.032	0.119	0.037	0.097	0.038	0.098	0.045
9.20	0.109	0.035	0.134	0.037	0.122	0.037	0.118	0.039	0.083	0.038	0.092	0.045
9.30	0.105	0.039	0.123	0.036	0.123	0.032	0.114	0.042	0.088	0.040	0.097	0.045
9.40	0.109	0.035	0.117	0.028	0.124	0.029	0.110	0.046	0.090	0.043	0.099	0.046
9.50	0.110	0.039	0.124	0.027	0.121	0.021	0.109	0.050	0.089	0.045	0.094	0.049
9.60	0.103	0.039	0.115	0.030	0.125	0.020	0.108	0.044	0.087	0.045	0.092	0.051
9.70	0.100	0.041	0.108	0.027	0.123	0.023	0.107	0.040	0.088	0.051	0.097	0.051
9.80	0.098	0.045	0.103	0.034	0.120	0.027	0.107	0.030	0.092	0.051	0.099	0.051
9.90	0.098	0.041	0.111	0.036	0.117	0.024	0.106	0.037	0.096	0.039	0.097	0.044
10.00	0.100	0.041	0.109	0.023	0.115	0.021	0.104	0.043	0.096	0.045	0.095	0.047
10.10	0.100	0.035	0.107	0.026	0.108	0.024	0.104	0.046	0.098	0.049	0.096	0.047
10.20	0.097	0.040	0.106	0.028	0.108	0.025	0.095	0.052	0.094	0.042	0.090	0.043
10.30	0.097	0.035	0.107	0.025	0.111	0.020	0.091	0.052	0.087	0.033	0.085	0.036
10.40	0.096	0.029	0.103	0.031	0.105	0.021	0.096	0.060	0.086	0.039	0.083	0.041
10.50	0.091	0.031	0.101	0.028	0.113	0.027	0.096	0.062	0.080	0.048	0.080	0.048
10.60	0.089	0.033	0.092	0.021	0.108	0.031	0.103	0.057	0.077	0.055	0.079	0.054
10.70	0.089	0.040	0.091	0.025	0.112	0.029	0.101	0.053	0.082	0.050	0.079	0.048
10.80	0.094	0.030	0.093	0.034	0.112	0.029	0.096	0.047	0.076	0.045	0.077	0.046
10.90	0.093	0.035	0.094	0.030	0.107	0.036	0.093	0.047	0.076	0.045	0.075	0.047
11.00	0.091	0.033	0.086	0.024	0.105	0.035	0.094	0.043	0.083	0.043	0.078	0.045
11.10	0.086	0.033	0.088	0.023	0.102	0.034	0.091	0.047	0.081	0.038	0.077	0.041
11.20	0.086	0.037	0.086	0.027	0.101	0.035	0.086	0.044	0.079	0.037	0.077	0.041
11.30	0.084	0.039	0.085	0.036	0.091	0.040	0.086	0.043	0.088	0.036	0.080	0.043
11.40	0.082	0.037	0.091	0.033	0.086	0.043	0.087	0.046	0.084	0.036	0.075	0.042
11.50	0.084	0.033	0.092	0.029	0.075	0.040	0.086	0.038	0.084	0.032	0.075	0.041
11.60	0.087	0.029	0.088	0.026	0.076	0.044	0.086	0.036	0.080	0.030	0.077	0.037
11.70	0.084	0.028	0.079	0.035	0.085	0.043	0.087	0.036	0.082	0.033	0.079	0.040
11.80	0.088	0.026	0.075	0.036	0.087	0.040	0.084	0.034	0.077	0.032	0.076	0.039
11.90	0.091	0.025	0.077	0.028	0.092	0.045	0.078	0.034	0.075	0.031	0.072	0.040
12.00	0.089	0.027	0.075	0.029	0.086	0.043	0.077	0.035	0.071	0.028	0.071	0.038
12.10	0.090	0.022	0.068	0.038	0.088	0.036	0.077	0.036	0.070	0.033	0.074	0.040

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
12.20	0.089	0.022	0.068	0.040	0.089	0.037	0.071	0.039	0.065	0.035	0.071	0.042
12.30	0.086	0.024	0.069	0.033	0.086	0.037	0.074	0.044	0.061	0.033	0.067	0.040
12.40	0.085	0.022	0.071	0.033	0.083	0.039	0.073	0.047	0.059	0.035	0.063	0.042
12.50	0.082	0.024	0.067	0.036	0.086	0.035	0.073	0.045	0.065	0.032	0.066	0.043
12.60	0.076	0.026	0.064	0.037	0.088	0.032	0.072	0.043	0.063	0.034	0.065	0.043
12.70	0.082	0.029	0.064	0.039	0.089	0.030	0.070	0.040	0.068	0.038	0.067	0.045
12.80	0.082	0.027	0.065	0.040	0.088	0.028	0.069	0.039	0.071	0.038	0.065	0.043
12.90	0.080	0.020	0.070	0.050	0.089	0.024	0.067	0.037	0.065	0.032	0.063	0.040
13.00	0.075	0.025	0.064	0.047	0.086	0.025	0.059	0.037	0.065	0.032	0.064	0.041
13.10	0.077	0.029	0.066	0.044	0.090	0.024	0.059	0.037	0.068	0.033	0.062	0.041
13.20	0.075	0.028	0.064	0.040	0.086	0.027	0.056	0.039	0.071	0.031	0.063	0.038
13.30	0.073	0.032	0.061	0.034	0.080	0.026	0.061	0.038	0.067	0.031	0.060	0.038
13.40	0.073	0.033	0.057	0.038	0.078	0.029	0.065	0.041	0.067	0.034	0.059	0.039
13.50	0.073	0.027	0.058	0.039	0.074	0.027	0.061	0.038	0.063	0.034	0.061	0.039
13.60	0.073	0.029	0.060	0.036	0.078	0.024	0.063	0.039	0.063	0.033	0.060	0.038
13.70	0.073	0.031	0.060	0.035	0.073	0.023	0.066	0.038	0.065	0.036	0.061	0.041
13.80	0.079	0.034	0.058	0.035	0.072	0.023	0.068	0.033	0.063	0.037	0.061	0.041
13.90	0.076	0.032	0.053	0.039	0.074	0.024	0.066	0.032	0.059	0.038	0.060	0.042
14.00	0.070	0.033	0.052	0.038	0.075	0.018	0.062	0.035	0.059	0.036	0.059	0.041
14.10	0.066	0.033	0.052	0.037	0.079	0.019	0.062	0.033	0.058	0.036	0.058	0.041
14.20	0.062	0.034	0.054	0.041	0.080	0.018	0.067	0.024	0.057	0.037	0.054	0.040
14.30	0.060	0.036	0.051	0.041	0.077	0.017	0.068	0.026	0.057	0.034	0.052	0.038
14.40	0.058	0.034	0.054	0.043	0.078	0.022	0.070	0.032	0.056	0.034	0.054	0.036
14.50	0.055	0.035	0.054	0.041	0.073	0.027	0.071	0.031	0.052	0.038	0.054	0.036
14.60	0.056	0.036	0.053	0.036	0.071	0.028	0.066	0.032	0.051	0.040	0.052	0.035
14.70	0.060	0.037	0.055	0.037	0.071	0.029	0.066	0.033	0.052	0.040	0.052	0.037
14.80	0.054	0.036	0.052	0.033	0.079	0.022	0.067	0.032	0.053	0.040	0.052	0.036
14.90	0.049	0.037	0.053	0.036	0.076	0.023	0.067	0.033	0.049	0.041	0.050	0.036
15.00	0.047	0.040	0.053	0.040	0.075	0.025	0.068	0.024	0.049	0.043	0.050	0.039
15.10	0.052	0.035	0.051	0.039	0.073	0.029	0.067	0.023	0.046	0.042	0.050	0.038
15.20	0.054	0.036	0.046	0.037	0.072	0.032	0.063	0.024	0.046	0.041	0.048	0.037

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
15.30	0.057	0.036	0.039	0.036	0.076	0.029	0.066	0.030	0.044	0.038	0.047	0.036
15.40	0.058	0.032	0.038	0.037	0.075	0.026	0.067	0.033	0.043	0.035	0.046	0.037
15.50	0.053	0.035	0.039	0.036	0.072	0.029	0.067	0.034	0.045	0.038	0.048	0.037
15.60	0.049	0.039	0.042	0.037	0.068	0.034	0.062	0.034	0.046	0.037	0.052	0.036
15.70	0.044	0.040	0.045	0.034	0.068	0.038	0.060	0.035	0.048	0.037	0.055	0.038
15.80	0.041	0.037	0.045	0.035	0.064	0.040	0.056	0.033	0.047	0.038	0.053	0.038
15.90	0.040	0.038	0.042	0.031	0.061	0.038	0.055	0.032	0.043	0.038	0.049	0.038
16.00	0.039	0.036	0.043	0.029	0.057	0.030	0.054	0.031	0.035	0.033	0.045	0.035
16.10	0.042	0.033	0.043	0.031	0.060	0.026	0.054	0.034	0.034	0.034	0.045	0.036
16.20	0.047	0.030	0.044	0.037	0.067	0.024	0.055	0.035	0.035	0.033	0.044	0.036
16.30	0.052	0.030	0.044	0.035	0.065	0.027	0.053	0.036	0.040	0.036	0.046	0.038
16.40	0.051	0.031	0.046	0.035	0.062	0.024	0.049	0.032	0.039	0.035	0.047	0.037
16.50	0.047	0.030	0.044	0.035	0.061	0.026	0.048	0.032	0.035	0.034	0.043	0.035
16.60	0.051	0.033	0.044	0.037	0.063	0.029	0.051	0.033	0.035	0.037	0.041	0.039
16.70	0.049	0.031	0.041	0.040	0.062	0.029	0.052	0.034	0.032	0.035	0.042	0.038
16.80	0.042	0.026	0.042	0.038	0.057	0.031	0.045	0.031	0.034	0.036	0.045	0.038
16.90	0.041	0.026	0.040	0.036	0.059	0.025	0.044	0.031	0.036	0.039	0.045	0.039
17.00	0.040	0.028	0.040	0.035	0.059	0.022	0.047	0.036	0.033	0.038	0.044	0.040
17.10	0.038	0.031	0.039	0.035	0.060	0.027	0.046	0.035	0.032	0.034	0.043	0.038
17.20	0.038	0.035	0.035	0.035	0.061	0.030	0.044	0.033	0.028	0.032	0.042	0.038
17.30	0.039	0.033	0.038	0.036	0.057	0.030	0.045	0.034	0.028	0.029	0.044	0.037
17.40	0.040	0.029	0.041	0.032	0.055	0.031	0.043	0.031	0.034	0.036	0.046	0.040
17.50	0.040	0.030	0.042	0.027	0.055	0.028	0.041	0.033	0.032	0.034	0.043	0.039
17.60	0.037	0.026	0.041	0.028	0.053	0.026	0.042	0.035	0.030	0.032	0.040	0.038
17.70	0.039	0.027	0.040	0.030	0.052	0.027	0.042	0.036	0.024	0.027	0.036	0.035
17.80	0.044	0.027	0.041	0.035	0.050	0.028	0.039	0.034	0.019	0.026	0.035	0.036
17.90	0.045	0.029	0.037	0.034	0.050	0.028	0.041	0.036	0.023	0.030	0.035	0.038
18.00	0.042	0.028	0.036	0.031	0.052	0.027	0.041	0.035	0.024	0.030	0.035	0.037
18.10	0.041	0.029	0.037	0.032	0.050	0.027	0.035	0.032	0.025	0.032	0.036	0.037
18.20	0.042	0.026	0.038	0.031	0.050	0.029	0.036	0.031	0.026	0.034	0.036	0.038
18.30	0.042	0.025	0.040	0.031	0.050	0.034	0.035	0.029	0.023	0.032	0.033	0.038

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
18.40	0.042	0.028	0.038	0.029	0.046	0.033	0.034	0.028	0.026	0.031	0.035	0.038
18.50	0.043	0.026	0.038	0.029	0.048	0.034	0.035	0.027	0.024	0.031	0.033	0.037
18.60	0.043	0.025	0.043	0.030	0.053	0.037	0.033	0.026	0.024	0.032	0.034	0.036
18.70	0.047	0.026	0.047	0.034	0.055	0.030	0.034	0.032	0.021	0.031	0.031	0.036
18.80	0.047	0.030	0.049	0.034	0.054	0.031	0.031	0.031	0.022	0.033	0.032	0.037
18.90	0.044	0.030	0.048	0.034	0.050	0.030	0.028	0.027	0.023	0.035	0.034	0.038
19.00	0.041	0.028	0.048	0.034	0.050	0.029	0.029	0.025	0.022	0.036	0.032	0.038
19.10	0.037	0.028	0.047	0.028	0.049	0.026	0.026	0.022	0.021	0.035	0.032	0.037
19.20	0.035	0.032	0.045	0.025	0.046	0.029	0.027	0.023	0.020	0.033	0.033	0.037
19.30	0.036	0.033	0.042	0.027	0.044	0.028	0.028	0.024	0.017	0.031	0.030	0.035
19.40	0.036	0.031	0.040	0.029	0.045	0.032	0.027	0.022	0.019	0.031	0.030	0.034
19.50	0.036	0.029	0.039	0.027	0.045	0.033	0.027	0.023	0.019	0.030	0.029	0.032
19.60	0.036	0.028	0.040	0.029	0.044	0.035	0.031	0.028	0.022	0.032	0.031	0.033
19.70	0.037	0.031	0.036	0.029	0.043	0.037	0.031	0.028	0.026	0.035	0.033	0.035
19.80	0.038	0.032	0.032	0.030	0.042	0.035	0.032	0.026	0.026	0.034	0.033	0.035
19.90	0.035	0.030	0.032	0.030	0.042	0.035	0.033	0.028	0.027	0.031	0.032	0.034
20.00	0.034	0.026	0.031	0.028	0.042	0.035	0.032	0.027	0.028	0.030	0.033	0.033
20.10	0.035	0.026	0.033	0.028	0.042	0.036	0.030	0.027	0.027	0.031	0.032	0.033
20.20	0.033	0.024	0.036	0.032	0.040	0.037	0.030	0.029	0.028	0.033	0.033	0.035
20.30	0.032	0.023	0.036	0.034	0.040	0.039	0.029	0.031	0.030	0.034	0.032	0.035
20.40	0.030	0.024	0.038	0.033	0.038	0.037	0.025	0.028	0.034	0.035	0.035	0.035
20.50	0.031	0.025	0.037	0.034	0.039	0.035	0.022	0.029	0.033	0.036	0.036	0.037
20.60	0.031	0.028	0.034	0.034	0.040	0.034	0.022	0.031	0.036	0.036	0.039	0.037
20.70	0.027	0.025	0.031	0.031	0.039	0.034	0.019	0.029	0.036	0.035	0.038	0.035
20.80	0.026	0.021	0.030	0.031	0.039	0.034	0.018	0.029	0.034	0.032	0.034	0.031
20.90	0.030	0.020	0.031	0.031	0.037	0.034	0.019	0.027	0.031	0.030	0.034	0.030
21.00	0.034	0.021	0.032	0.030	0.040	0.037	0.017	0.025	0.024	0.026	0.031	0.028
21.10	0.037	0.020	0.030	0.030	0.040	0.040	0.015	0.024	0.022	0.027	0.027	0.028
21.20	0.036	0.020	0.027	0.030	0.042	0.038	0.015	0.025	0.023	0.029	0.024	0.029
21.30	0.034	0.023	0.026	0.030	0.041	0.036	0.016	0.023	0.025	0.031	0.024	0.031
21.40	0.034	0.023	0.028	0.029	0.037	0.033	0.019	0.024	0.025	0.030	0.025	0.031

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
21.50	0.030	0.019	0.024	0.026	0.033	0.028	0.019	0.026	0.023	0.027	0.024	0.029
21.60	0.028	0.018	0.020	0.025	0.032	0.030	0.016	0.024	0.022	0.028	0.023	0.028
21.70	0.027	0.018	0.019	0.026	0.033	0.034	0.016	0.024	0.021	0.028	0.025	0.030
21.80	0.025	0.019	0.018	0.027	0.033	0.033	0.018	0.022	0.022	0.029	0.027	0.031
21.90	0.028	0.019	0.020	0.026	0.031	0.032	0.018	0.022	0.020	0.026	0.027	0.028
22.00	0.032	0.020	0.020	0.024	0.032	0.032	0.019	0.022	0.018	0.025	0.026	0.027
22.10	0.028	0.020	0.020	0.025	0.031	0.032	0.019	0.024	0.019	0.025	0.025	0.026
22.20	0.025	0.020	0.018	0.025	0.035	0.033	0.018	0.024	0.018	0.027	0.025	0.027
22.30	0.025	0.022	0.018	0.025	0.036	0.034	0.018	0.026	0.020	0.030	0.026	0.027
22.40	0.027	0.023	0.018	0.027	0.034	0.033	0.016	0.025	0.020	0.030	0.026	0.026
22.50	0.027	0.023	0.020	0.027	0.027	0.030	0.013	0.026	0.020	0.030	0.025	0.026
22.60	0.026	0.019	0.021	0.027	0.022	0.027	0.012	0.025	0.022	0.027	0.026	0.026
22.70	0.022	0.017	0.019	0.026	0.024	0.030	0.016	0.027	0.021	0.022	0.025	0.025
22.80	0.021	0.020	0.019	0.027	0.023	0.029	0.018	0.025	0.023	0.024	0.027	0.027
22.90	0.021	0.021	0.018	0.025	0.022	0.027	0.019	0.026	0.021	0.025	0.025	0.028
23.00	0.021	0.021	0.019	0.026	0.020	0.027	0.018	0.025	0.020	0.026	0.023	0.027
23.10	0.021	0.021	0.020	0.024	0.020	0.025	0.018	0.023	0.017	0.024	0.023	0.026
23.20	0.020	0.021	0.021	0.026	0.021	0.025	0.018	0.023	0.015	0.025	0.022	0.027
23.30	0.020	0.021	0.021	0.026	0.022	0.026	0.020	0.028	0.012	0.024	0.019	0.026
23.40	0.018	0.021	0.021	0.025	0.019	0.028	0.020	0.026	0.015	0.025	0.020	0.026
23.50	0.016	0.018	0.018	0.024	0.019	0.026	0.019	0.023	0.019	0.025	0.023	0.026
23.60	0.017	0.019	0.017	0.024	0.021	0.025	0.017	0.023	0.020	0.024	0.024	0.025
23.70	0.018	0.019	0.019	0.022	0.023	0.023	0.016	0.024	0.019	0.025	0.022	0.025
23.80	0.018	0.018	0.018	0.019	0.024	0.020	0.017	0.028	0.016	0.025	0.020	0.025
23.90	0.018	0.017	0.018	0.018	0.025	0.019	0.017	0.025	0.015	0.026	0.018	0.025
24.00	0.019	0.016	0.017	0.016	0.027	0.019	0.015	0.022	0.014	0.023	0.017	0.026
24.10	0.019	0.017	0.015	0.015	0.026	0.018	0.011	0.020	0.013	0.022	0.017	0.025
24.20	0.020	0.019	0.013	0.015	0.024	0.020	0.010	0.019	0.016	0.023	0.019	0.024
24.30	0.020	0.018	0.011	0.015	0.022	0.021	0.012	0.018	0.020	0.025	0.021	0.025
24.40	0.017	0.019	0.014	0.019	0.022	0.022	0.013	0.020	0.021	0.022	0.021	0.025
24.50	0.015	0.019	0.014	0.021	0.020	0.026	0.012	0.022	0.018	0.018	0.019	0.023

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
24.60	0.016	0.017	0.013	0.020	0.018	0.027	0.011	0.023	0.016	0.018	0.018	0.022
24.70	0.018	0.019	0.012	0.019	0.018	0.025	0.012	0.025	0.017	0.020	0.016	0.022
24.80	0.017	0.020	0.013	0.020	0.017	0.023	0.014	0.028	0.018	0.023	0.016	0.023
24.90	0.015	0.022	0.012	0.018	0.019	0.019	0.015	0.027	0.019	0.025	0.016	0.025
25.00	0.015	0.023	0.012	0.020	0.023	0.017	0.015	0.026	0.019	0.024	0.017	0.024
25.10	0.015	0.023	0.011	0.021	0.023	0.018	0.011	0.022	0.018	0.024	0.018	0.025
25.20	0.016	0.022	0.010	0.022	0.020	0.020	0.011	0.022	0.015	0.020	0.017	0.024
25.30	0.015	0.023	0.010	0.023	0.018	0.023	0.012	0.022	0.015	0.020	0.016	0.024
25.40	0.012	0.023	0.011	0.024	0.020	0.024	0.012	0.024	0.017	0.022	0.017	0.026
25.50	0.011	0.022	0.013	0.027	0.020	0.025	0.011	0.024	0.017	0.023	0.017	0.027
25.60	0.012	0.022	0.012	0.027	0.020	0.024	0.011	0.024	0.014	0.022	0.016	0.026
25.70	0.013	0.021	0.010	0.025	0.020	0.025	0.010	0.023	0.011	0.018	0.015	0.023
25.80	0.013	0.018	0.007	0.020	0.020	0.026	0.010	0.023	0.008	0.016	0.014	0.024
25.90	0.013	0.017	0.009	0.021	0.021	0.028	0.009	0.022	0.010	0.017	0.013	0.024
26.00	0.013	0.018	0.012	0.024	0.019	0.027	0.007	0.020	0.012	0.018	0.014	0.024
26.10	0.011	0.017	0.012	0.023	0.018	0.026	0.007	0.019	0.012	0.019	0.013	0.023
26.20	0.010	0.018	0.011	0.022	0.018	0.025	0.008	0.022	0.014	0.019	0.013	0.021
26.30	0.011	0.019	0.010	0.020	0.018	0.023	0.007	0.023	0.012	0.017	0.012	0.021
26.40	0.013	0.018	0.010	0.018	0.017	0.021	0.008	0.024	0.008	0.016	0.011	0.020
26.50	0.013	0.018	0.009	0.017	0.017	0.020	0.009	0.024	0.007	0.018	0.010	0.021
26.60	0.012	0.019	0.008	0.017	0.019	0.019	0.008	0.023	0.008	0.018	0.010	0.021
26.70	0.010	0.019	0.008	0.016	0.019	0.020	0.007	0.021	0.009	0.018	0.011	0.021
26.80	0.009	0.018	0.007	0.016	0.019	0.024	0.008	0.021	0.011	0.020	0.012	0.022
26.90	0.011	0.020	0.005	0.017	0.019	0.024	0.007	0.020	0.012	0.022	0.013	0.023
27.00	0.011	0.021	0.004	0.018	0.017	0.023	0.007	0.020	0.012	0.022	0.013	0.024
27.10	0.008	0.020	0.005	0.018	0.017	0.023	0.005	0.018	0.012	0.022	0.014	0.024
27.20	0.005	0.020	0.004	0.017	0.014	0.021	0.003	0.016	0.009	0.017	0.012	0.021
27.30	0.005	0.018	0.004	0.016	0.012	0.023	0.003	0.017	0.009	0.019	0.011	0.021
27.40	0.006	0.019	0.006	0.020	0.011	0.024	0.004	0.020	0.013	0.022	0.012	0.023
27.50	0.006	0.021	0.007	0.021	0.009	0.023	0.004	0.020	0.014	0.024	0.013	0.024
27.60	0.007	0.020	0.006	0.018	0.008	0.024	0.006	0.021	0.014	0.026	0.013	0.026

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
27.70	0.007	0.019	0.007	0.020	0.008	0.025	0.008	0.022	0.014	0.028	0.014	0.026
27.80	0.009	0.019	0.008	0.021	0.007	0.023	0.009	0.023	0.013	0.026	0.015	0.025
27.90	0.009	0.019	0.009	0.020	0.009	0.021	0.009	0.023	0.013	0.024	0.015	0.024
28.00	0.010	0.018	0.007	0.018	0.012	0.022	0.008	0.022	0.014	0.025	0.015	0.024
28.10	0.010	0.018	0.007	0.019	0.013	0.025	0.007	0.020	0.015	0.025	0.015	0.024
28.20	0.008	0.019	0.009	0.019	0.012	0.025	0.008	0.018	0.017	0.025	0.014	0.024
28.30	0.007	0.019	0.009	0.019	0.011	0.022	0.008	0.019	0.018	0.027	0.015	0.026
28.40	0.005	0.018	0.009	0.019	0.011	0.020	0.007	0.017	0.019	0.027	0.017	0.027
28.50	0.004	0.016	0.008	0.017	0.011	0.020	0.008	0.019	0.019	0.026	0.017	0.026
28.60	0.004	0.016	0.008	0.018	0.010	0.021	0.007	0.020	0.019	0.028	0.017	0.027
28.70	0.004	0.017	0.008	0.019	0.010	0.021	0.006	0.022	0.019	0.028	0.017	0.027
28.80	0.004	0.018	0.006	0.020	0.010	0.020	0.007	0.023	0.019	0.029	0.015	0.026
28.90	0.004	0.018	0.006	0.019	0.010	0.020	0.007	0.023	0.016	0.030	0.014	0.027
29.00	0.004	0.017	0.006	0.020	0.010	0.019	0.007	0.022	0.016	0.031	0.014	0.026
29.10	0.005	0.017	0.006	0.019	0.010	0.020	0.007	0.021	0.016	0.030	0.015	0.027
29.20	0.005	0.018	0.006	0.018	0.010	0.021	0.008	0.022	0.018	0.030	0.017	0.028
29.30	0.004	0.018	0.006	0.018	0.010	0.022	0.008	0.023	0.016	0.030	0.015	0.028
29.40	0.003	0.016	0.006	0.017	0.009	0.022	0.006	0.022	0.014	0.027	0.014	0.027
29.50	0.004	0.016	0.007	0.018	0.008	0.022	0.005	0.020	0.014	0.027	0.013	0.026
29.60	0.003	0.017	0.009	0.019	0.009	0.021	0.006	0.020	0.014	0.027	0.012	0.025
29.70	0.002	0.016	0.011	0.020	0.009	0.020	0.006	0.020	0.016	0.028	0.013	0.024
29.80	0.002	0.016	0.010	0.018	0.008	0.018	0.006	0.018	0.015	0.029	0.013	0.024
29.90	0.002	0.016	0.008	0.016	0.007	0.016	0.007	0.017	0.013	0.029	0.013	0.025
30.00	0.002	0.015	0.006	0.015	0.008	0.016	0.008	0.019	0.010	0.027	0.011	0.024

Small-Tank Wall Velocity Data, contd.

Velocities Measured at 0.381 m (15 in) Radial Position										
Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
0.10	0.010	0.020	0.009	0.024	0.007	0.023	0.020	0.026	0.014	0.029
0.20	0.010	0.022	0.010	0.025	0.011	0.027	0.026	0.029	0.014	0.025
0.30	0.022	0.029	0.021	0.031	0.025	0.028	0.043	0.028	0.019	0.027
0.40	0.026	0.031	0.028	0.036	0.029	0.024	0.045	0.027	0.024	0.027
0.50	0.030	0.032	0.031	0.036	0.029	0.024	0.043	0.026	0.025	0.027
0.60	0.036	0.034	0.031	0.034	0.033	0.025	0.041	0.025	0.023	0.024
0.70	0.039	0.034	0.032	0.033	0.035	0.027	0.040	0.026	0.020	0.024
0.80	0.042	0.032	0.033	0.033	0.035	0.028	0.040	0.028	0.020	0.025
0.90	0.047	0.031	0.034	0.034	0.034	0.028	0.040	0.030	0.019	0.026
1.00	0.050	0.029	0.035	0.036	0.034	0.028	0.040	0.030	0.017	0.026
1.10	0.055	0.027	0.038	0.037	0.037	0.028	0.042	0.029	0.017	0.026
1.20	0.064	0.024	0.045	0.037	0.041	0.029	0.045	0.028	0.021	0.028
1.30	0.080	0.022	0.058	0.035	0.047	0.026	0.048	0.029	0.023	0.028
1.40	0.099	0.026	0.076	0.035	0.057	0.026	0.053	0.029	0.023	0.029
1.50	0.123	0.053	0.099	0.049	0.066	0.025	0.059	0.026	0.023	0.031
1.60	0.131	0.084	0.121	0.091	0.070	0.026	0.064	0.024	0.027	0.034
1.70	0.136	0.078	0.112	0.064	0.071	0.035	0.067	0.024	0.030	0.036
1.80	0.166	0.090	0.113	0.087	0.063	0.044	0.067	0.025	0.031	0.037
1.90	0.219	0.095	0.138	0.118	0.056	0.053	0.065	0.030	0.031	0.038
2.00	0.283	0.122	0.161	0.135	0.068	0.084	0.061	0.036	0.030	0.038
2.10	0.354	0.109	0.170	0.122	0.066	0.085	0.067	0.055	0.027	0.040
2.20	0.336	0.081	0.178	0.104	0.069	0.072	0.075	0.080	0.025	0.042
2.30	0.367	0.092	0.207	0.079	0.082	0.068	0.071	0.076	0.024	0.046
2.40	0.344	0.080	0.223	0.084	0.100	0.069	0.064	0.076	0.024	0.052
2.50	0.318	0.095	0.256	0.100	0.126	0.078	0.059	0.076	0.023	0.056
2.60	0.302	0.086	0.272	0.106	0.142	0.072	0.073	0.071	0.022	0.051
2.70	0.335	0.113	0.268	0.106	0.140	0.062	0.087	0.075	0.034	0.056
2.80	0.310	0.126	0.308	0.131	0.170	0.118	0.088	0.064	0.038	0.048

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
2.90	0.296	0.108	0.308	0.130	0.168	0.111	0.088	0.062	0.047	0.054
3.00	0.343	0.119	0.334	0.132	0.202	0.130	0.106	0.071	0.041	0.047
3.10	0.350	0.113	0.311	0.107	0.212	0.126	0.115	0.077	0.040	0.050
3.20	0.381	0.127	0.320	0.109	0.227	0.119	0.110	0.083	0.050	0.064
3.30	0.390	0.117	0.289	0.079	0.224	0.105	0.111	0.102	0.059	0.067
3.40	0.389	0.105	0.313	0.086	0.213	0.108	0.097	0.088	0.060	0.083
3.50	0.362	0.109	0.311	0.078	0.225	0.107	0.097	0.078	0.049	0.083
3.60	0.392	0.083	0.307	0.076	0.249	0.103	0.115	0.087	0.056	0.073
3.70	0.372	0.125	0.323	0.075	0.235	0.101	0.110	0.088	0.054	0.072
3.80	0.337	0.101	0.322	0.064	0.236	0.104	0.119	0.111	0.049	0.065
3.90	0.349	0.104	0.296	0.081	0.239	0.115	0.115	0.118	0.045	0.057
4.00	0.306	0.080	0.257	0.094	0.230	0.116	0.109	0.087	0.041	0.058
4.10	0.335	0.089	0.264	0.088	0.230	0.119	0.121	0.101	0.042	0.058
4.20	0.323	0.051	0.270	0.104	0.206	0.091	0.125	0.108	0.038	0.055
4.30	0.295	0.066	0.275	0.100	0.207	0.072	0.108	0.085	0.029	0.049
4.40	0.283	0.065	0.265	0.079	0.198	0.066	0.107	0.073	0.022	0.039
4.50	0.279	0.054	0.267	0.071	0.197	0.086	0.105	0.087	0.023	0.033
4.60	0.265	0.073	0.263	0.066	0.182	0.069	0.095	0.096	0.023	0.029
4.70	0.278	0.064	0.258	0.064	0.153	0.072	0.084	0.096	0.023	0.034
4.80	0.291	0.073	0.241	0.071	0.140	0.085	0.093	0.106	0.026	0.044
4.90	0.285	0.074	0.216	0.080	0.138	0.086	0.078	0.084	0.023	0.048
5.00	0.274	0.066	0.224	0.093	0.124	0.085	0.078	0.079	0.022	0.044
5.10	0.261	0.046	0.191	0.084	0.125	0.092	0.070	0.069	0.020	0.043
5.20	0.243	0.046	0.186	0.081	0.110	0.067	0.062	0.067	0.020	0.047
5.30	0.248	0.048	0.176	0.090	0.101	0.062	0.057	0.059	0.032	0.061
5.40	0.245	0.053	0.158	0.102	0.087	0.054	0.048	0.055	0.034	0.057
5.50	0.241	0.060	0.156	0.097	0.087	0.054	0.040	0.052	0.040	0.075
5.60	0.226	0.055	0.161	0.092	0.096	0.059	0.042	0.060	0.048	0.070
5.70	0.218	0.064	0.164	0.094	0.097	0.062	0.036	0.054	0.037	0.049
5.80	0.223	0.069	0.156	0.088	0.094	0.083	0.038	0.061	0.028	0.044
5.90	0.212	0.047	0.158	0.092	0.093	0.083	0.037	0.051	0.022	0.047

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
6.00	0.213	0.054	0.149	0.081	0.092	0.074	0.044	0.053	0.020	0.052
6.10	0.206	0.064	0.145	0.083	0.085	0.075	0.046	0.052	0.016	0.044
6.20	0.185	0.064	0.141	0.086	0.078	0.070	0.037	0.045	0.015	0.041
6.30	0.174	0.060	0.132	0.080	0.074	0.065	0.038	0.038	0.015	0.054
6.40	0.159	0.057	0.118	0.074	0.067	0.062	0.034	0.035	0.016	0.055
6.50	0.163	0.066	0.122	0.069	0.071	0.066	0.035	0.045	0.013	0.043
6.60	0.169	0.062	0.121	0.066	0.078	0.064	0.037	0.050	0.013	0.036
6.70	0.161	0.046	0.110	0.065	0.082	0.065	0.042	0.045	0.011	0.029
6.80	0.156	0.042	0.109	0.062	0.075	0.064	0.030	0.037	0.014	0.038
6.90	0.156	0.050	0.104	0.066	0.080	0.061	0.024	0.029	0.015	0.037
7.00	0.156	0.056	0.098	0.070	0.079	0.060	0.027	0.036	0.015	0.040
7.10	0.148	0.052	0.102	0.063	0.081	0.061	0.022	0.039	0.015	0.041
7.20	0.147	0.057	0.101	0.066	0.077	0.067	0.023	0.039	0.019	0.043
7.30	0.141	0.053	0.095	0.065	0.076	0.058	0.026	0.043	0.024	0.046
7.40	0.135	0.049	0.092	0.062	0.068	0.053	0.032	0.045	0.019	0.037
7.50	0.136	0.047	0.089	0.060	0.070	0.064	0.034	0.045	0.013	0.033
7.60	0.132	0.045	0.087	0.065	0.067	0.070	0.037	0.050	0.008	0.033
7.70	0.133	0.048	0.090	0.073	0.068	0.069	0.039	0.047	0.005	0.024
7.80	0.132	0.050	0.087	0.069	0.073	0.071	0.036	0.045	0.009	0.028
7.90	0.130	0.053	0.084	0.071	0.064	0.060	0.029	0.043	0.009	0.028
8.00	0.120	0.050	0.082	0.064	0.065	0.061	0.030	0.042	0.008	0.030
8.10	0.110	0.052	0.089	0.068	0.069	0.065	0.024	0.037	0.012	0.037
8.20	0.112	0.050	0.084	0.065	0.072	0.076	0.022	0.036	0.010	0.035
8.30	0.110	0.050	0.078	0.065	0.070	0.069	0.034	0.041	0.010	0.033
8.40	0.105	0.050	0.072	0.058	0.072	0.066	0.039	0.044	0.010	0.032
8.50	0.111	0.045	0.078	0.063	0.077	0.063	0.038	0.048	0.010	0.030
8.60	0.117	0.042	0.082	0.060	0.067	0.065	0.032	0.051	0.016	0.035
8.70	0.107	0.044	0.079	0.058	0.059	0.060	0.030	0.046	0.020	0.033
8.80	0.112	0.045	0.078	0.054	0.061	0.061	0.036	0.050	0.023	0.039
8.90	0.112	0.046	0.081	0.055	0.061	0.067	0.039	0.048	0.018	0.035
9.00	0.105	0.050	0.079	0.053	0.053	0.065	0.040	0.044	0.015	0.029

Velocities Measured at 0.381 m (15 in) Radial Position										
Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev
		(m/s)		(m/s)		(m/s)		(m/s)		(m/s)
9.10	0.100	0.053	0.086	0.054	0.057	0.063	0.038	0.043	0.020	0.035
9.20	0.101	0.052	0.090	0.055	0.063	0.068	0.034	0.041	0.026	0.042
9.30	0.106	0.050	0.078	0.063	0.063	0.071	0.027	0.040	0.032	0.044
9.40	0.108	0.050	0.076	0.065	0.059	0.066	0.035	0.041	0.028	0.038
9.50	0.100	0.053	0.075	0.064	0.060	0.069	0.026	0.043	0.026	0.037
9.60	0.097	0.056	0.079	0.066	0.062	0.069	0.027	0.043	0.024	0.036
9.70	0.105	0.051	0.073	0.059	0.067	0.075	0.026	0.041	0.025	0.040
9.80	0.106	0.052	0.071	0.058	0.066	0.076	0.032	0.044	0.020	0.039
9.90	0.098	0.049	0.074	0.062	0.062	0.073	0.038	0.046	0.024	0.048
10.00	0.094	0.050	0.076	0.065	0.063	0.075	0.038	0.049	0.022	0.046
10.10	0.093	0.044	0.071	0.063	0.069	0.075	0.040	0.053	0.022	0.042
10.20	0.085	0.044	0.067	0.060	0.072	0.073	0.039	0.053	0.023	0.046
10.30	0.083	0.040	0.073	0.062	0.071	0.074	0.040	0.054	0.025	0.046
10.40	0.079	0.042	0.075	0.064	0.072	0.069	0.039	0.053	0.024	0.045
10.50	0.080	0.047	0.075	0.068	0.073	0.068	0.037	0.052	0.020	0.038
10.60	0.080	0.052	0.068	0.064	0.072	0.068	0.038	0.055	0.019	0.042
10.70	0.076	0.047	0.063	0.057	0.072	0.071	0.035	0.056	0.019	0.043
10.80	0.078	0.047	0.061	0.053	0.072	0.071	0.041	0.064	0.020	0.044
10.90	0.075	0.049	0.061	0.052	0.071	0.068	0.045	0.062	0.021	0.046
11.00	0.074	0.048	0.058	0.052	0.071	0.070	0.043	0.057	0.024	0.046
11.10	0.074	0.044	0.062	0.051	0.070	0.069	0.041	0.056	0.023	0.044
11.20	0.075	0.046	0.060	0.056	0.067	0.068	0.039	0.052	0.021	0.040
11.30	0.073	0.050	0.054	0.058	0.069	0.066	0.042	0.056	0.021	0.042
11.40	0.066	0.048	0.052	0.059	0.075	0.067	0.041	0.049	0.021	0.042
11.50	0.067	0.049	0.054	0.061	0.070	0.065	0.043	0.050	0.019	0.037
11.60	0.075	0.044	0.056	0.064	0.068	0.064	0.043	0.053	0.020	0.038
11.70	0.075	0.046	0.057	0.063	0.062	0.064	0.046	0.054	0.024	0.045
11.80	0.075	0.047	0.052	0.056	0.063	0.067	0.048	0.054	0.024	0.047
11.90	0.069	0.049	0.055	0.052	0.062	0.064	0.046	0.053	0.024	0.048
12.00	0.070	0.047	0.053	0.050	0.061	0.061	0.044	0.052	0.028	0.051
12.10	0.077	0.047	0.050	0.049	0.061	0.063	0.050	0.050	0.032	0.053

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
12.20	0.078	0.049	0.051	0.050	0.062	0.061	0.049	0.048	0.030	0.050
12.30	0.072	0.047	0.053	0.052	0.064	0.061	0.051	0.049	0.027	0.052
12.40	0.068	0.050	0.049	0.045	0.067	0.060	0.055	0.050	0.028	0.050
12.50	0.067	0.053	0.046	0.041	0.063	0.057	0.053	0.050	0.030	0.050
12.60	0.068	0.053	0.042	0.042	0.062	0.056	0.053	0.047	0.026	0.050
12.70	0.065	0.052	0.042	0.042	0.070	0.058	0.058	0.051	0.025	0.049
12.80	0.060	0.049	0.041	0.042	0.073	0.059	0.060	0.052	0.023	0.046
12.90	0.061	0.047	0.043	0.044	0.074	0.057	0.056	0.051	0.024	0.046
13.00	0.064	0.049	0.043	0.045	0.074	0.058	0.059	0.054	0.026	0.043
13.10	0.057	0.049	0.042	0.048	0.067	0.061	0.058	0.052	0.027	0.046
13.20	0.054	0.045	0.044	0.043	0.066	0.060	0.055	0.051	0.026	0.051
13.30	0.052	0.046	0.046	0.044	0.064	0.055	0.057	0.047	0.023	0.049
13.40	0.051	0.045	0.045	0.042	0.066	0.054	0.062	0.046	0.021	0.045
13.50	0.059	0.043	0.038	0.043	0.062	0.055	0.056	0.046	0.024	0.046
13.60	0.056	0.043	0.041	0.046	0.062	0.057	0.052	0.046	0.023	0.043
13.70	0.057	0.045	0.044	0.045	0.058	0.055	0.053	0.045	0.025	0.041
13.80	0.059	0.045	0.044	0.043	0.059	0.053	0.050	0.043	0.029	0.039
13.90	0.062	0.045	0.049	0.045	0.056	0.052	0.048	0.047	0.031	0.040
14.00	0.059	0.045	0.048	0.044	0.057	0.057	0.048	0.049	0.029	0.034
14.10	0.058	0.045	0.050	0.046	0.055	0.056	0.050	0.051	0.025	0.030
14.20	0.052	0.042	0.049	0.045	0.054	0.055	0.050	0.047	0.021	0.027
14.30	0.048	0.041	0.051	0.044	0.051	0.053	0.052	0.045	0.019	0.026
14.40	0.052	0.038	0.051	0.043	0.056	0.055	0.049	0.043	0.020	0.026
14.50	0.055	0.033	0.049	0.041	0.053	0.051	0.048	0.045	0.018	0.024
14.60	0.053	0.030	0.044	0.041	0.055	0.053	0.049	0.042	0.016	0.026
14.70	0.052	0.034	0.043	0.043	0.052	0.051	0.050	0.038	0.016	0.026
14.80	0.051	0.032	0.040	0.042	0.054	0.051	0.050	0.036	0.015	0.025
14.90	0.051	0.031	0.041	0.041	0.061	0.057	0.048	0.039	0.013	0.024
15.00	0.051	0.034	0.042	0.043	0.060	0.053	0.045	0.035	0.013	0.027
15.10	0.053	0.034	0.038	0.042	0.054	0.047	0.046	0.033	0.014	0.026
15.20	0.051	0.034	0.033	0.045	0.048	0.044	0.047	0.034	0.018	0.028

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
15.30	0.050	0.034	0.028	0.044	0.043	0.038	0.047	0.035	0.022	0.031
15.40	0.049	0.039	0.027	0.045	0.044	0.036	0.045	0.032	0.022	0.029
15.50	0.051	0.036	0.031	0.045	0.041	0.036	0.047	0.031	0.021	0.030
15.60	0.057	0.036	0.031	0.044	0.040	0.039	0.052	0.033	0.021	0.030
15.70	0.061	0.039	0.031	0.044	0.038	0.041	0.054	0.032	0.023	0.032
15.80	0.058	0.038	0.029	0.043	0.036	0.039	0.052	0.032	0.024	0.033
15.90	0.055	0.037	0.030	0.045	0.037	0.038	0.050	0.037	0.025	0.037
16.00	0.056	0.038	0.031	0.043	0.037	0.042	0.046	0.036	0.029	0.039
16.10	0.056	0.039	0.028	0.042	0.037	0.043	0.043	0.036	0.031	0.039
16.20	0.054	0.039	0.029	0.042	0.036	0.040	0.042	0.037	0.030	0.039
16.30	0.053	0.039	0.029	0.041	0.035	0.039	0.039	0.036	0.031	0.040
16.40	0.055	0.038	0.029	0.041	0.041	0.042	0.041	0.038	0.031	0.044
16.50	0.051	0.037	0.029	0.043	0.038	0.038	0.044	0.041	0.030	0.044
16.60	0.048	0.041	0.029	0.045	0.036	0.041	0.039	0.035	0.030	0.040
16.70	0.053	0.040	0.028	0.045	0.038	0.040	0.038	0.034	0.028	0.041
16.80	0.055	0.040	0.030	0.044	0.039	0.039	0.041	0.035	0.029	0.043
16.90	0.055	0.039	0.037	0.050	0.045	0.043	0.043	0.033	0.027	0.041
17.00	0.056	0.042	0.037	0.049	0.042	0.040	0.042	0.035	0.026	0.039
17.10	0.055	0.042	0.034	0.047	0.039	0.037	0.039	0.039	0.023	0.035
17.20	0.057	0.045	0.034	0.049	0.039	0.037	0.040	0.039	0.023	0.035
17.30	0.059	0.044	0.037	0.050	0.039	0.039	0.040	0.035	0.021	0.036
17.40	0.057	0.044	0.037	0.048	0.036	0.038	0.041	0.030	0.019	0.036
17.50	0.054	0.044	0.034	0.046	0.036	0.038	0.039	0.029	0.020	0.035
17.60	0.051	0.043	0.035	0.044	0.036	0.040	0.038	0.030	0.021	0.034
17.70	0.048	0.043	0.039	0.042	0.038	0.041	0.037	0.031	0.020	0.031
17.80	0.050	0.046	0.038	0.042	0.036	0.041	0.033	0.032	0.024	0.032
17.90	0.047	0.046	0.032	0.039	0.040	0.041	0.032	0.031	0.027	0.034
18.00	0.045	0.043	0.029	0.039	0.040	0.038	0.035	0.033	0.028	0.036
18.10	0.046	0.041	0.030	0.041	0.042	0.036	0.034	0.034	0.023	0.033
18.20	0.046	0.041	0.027	0.041	0.045	0.035	0.035	0.035	0.021	0.030
18.30	0.043	0.043	0.026	0.043	0.046	0.034	0.033	0.033	0.023	0.030

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
18.40	0.043	0.046	0.030	0.042	0.044	0.036	0.037	0.037	0.023	0.032
18.50	0.043	0.043	0.031	0.037	0.044	0.041	0.041	0.041	0.023	0.035
18.60	0.044	0.040	0.031	0.039	0.042	0.040	0.041	0.042	0.024	0.035
18.70	0.041	0.042	0.029	0.041	0.043	0.041	0.042	0.039	0.022	0.035
18.80	0.042	0.042	0.026	0.039	0.041	0.041	0.043	0.040	0.020	0.033
18.90	0.044	0.041	0.027	0.038	0.038	0.040	0.046	0.041	0.021	0.033
19.00	0.043	0.039	0.026	0.038	0.036	0.040	0.046	0.037	0.024	0.034
19.10	0.044	0.040	0.025	0.038	0.034	0.040	0.043	0.035	0.025	0.036
19.20	0.047	0.041	0.030	0.036	0.032	0.041	0.043	0.036	0.028	0.033
19.30	0.042	0.039	0.029	0.036	0.029	0.041	0.044	0.035	0.027	0.031
19.40	0.041	0.036	0.026	0.037	0.028	0.041	0.045	0.035	0.028	0.033
19.50	0.038	0.034	0.022	0.034	0.027	0.037	0.042	0.035	0.030	0.033
19.60	0.040	0.034	0.022	0.031	0.026	0.035	0.043	0.036	0.029	0.035
19.70	0.041	0.035	0.023	0.033	0.028	0.037	0.044	0.034	0.027	0.033
19.80	0.040	0.037	0.027	0.033	0.029	0.036	0.045	0.033	0.026	0.035
19.90	0.037	0.036	0.028	0.035	0.029	0.034	0.046	0.029	0.025	0.035
20.00	0.037	0.036	0.026	0.036	0.030	0.034	0.045	0.028	0.022	0.032
20.10	0.037	0.036	0.027	0.036	0.027	0.035	0.043	0.030	0.021	0.029
20.20	0.037	0.037	0.029	0.036	0.027	0.035	0.042	0.031	0.022	0.027
20.30	0.035	0.037	0.031	0.036	0.025	0.037	0.039	0.030	0.026	0.030
20.40	0.036	0.035	0.031	0.033	0.022	0.038	0.036	0.029	0.026	0.032
20.50	0.040	0.039	0.031	0.033	0.023	0.038	0.035	0.029	0.025	0.033
20.60	0.042	0.038	0.030	0.033	0.025	0.038	0.036	0.030	0.021	0.032
20.70	0.040	0.035	0.028	0.034	0.026	0.036	0.037	0.030	0.018	0.030
20.80	0.033	0.030	0.027	0.035	0.025	0.035	0.037	0.027	0.016	0.027
20.90	0.037	0.030	0.025	0.034	0.024	0.035	0.038	0.025	0.019	0.027
21.00	0.037	0.030	0.023	0.034	0.020	0.030	0.037	0.022	0.021	0.029
21.10	0.031	0.029	0.022	0.033	0.022	0.028	0.039	0.024	0.021	0.032
21.20	0.025	0.030	0.020	0.030	0.023	0.028	0.038	0.027	0.021	0.032
21.30	0.023	0.031	0.021	0.030	0.022	0.030	0.036	0.028	0.021	0.031
21.40	0.026	0.032	0.024	0.032	0.021	0.032	0.037	0.026	0.022	0.034

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle Time (sec)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.359-m (14.125-in) V (m/s)	0.359-m (14.125-in) StdDev (m/s)	0.410-m (16.125-in) V (m/s)	0.410-m (16.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.511-m (20.125-in) V (m/s)	0.511-m (20.125-in) StdDev (m/s)
21.50	0.025	0.031	0.023	0.032	0.021	0.035	0.035	0.024	0.021	0.034
21.60	0.025	0.028	0.023	0.032	0.021	0.035	0.036	0.024	0.023	0.034
21.70	0.030	0.032	0.023	0.033	0.021	0.033	0.039	0.019	0.024	0.035
21.80	0.033	0.033	0.022	0.034	0.021	0.032	0.041	0.019	0.021	0.032
21.90	0.034	0.031	0.024	0.033	0.021	0.033	0.040	0.023	0.019	0.030
22.00	0.033	0.028	0.023	0.033	0.020	0.035	0.040	0.020	0.017	0.029
22.10	0.031	0.027	0.021	0.035	0.022	0.038	0.036	0.016	0.015	0.030
22.20	0.032	0.026	0.023	0.035	0.024	0.038	0.035	0.014	0.014	0.030
22.30	0.033	0.024	0.027	0.036	0.021	0.035	0.036	0.017	0.014	0.028
22.40	0.031	0.022	0.027	0.035	0.019	0.032	0.037	0.021	0.016	0.029
22.50	0.030	0.022	0.028	0.037	0.019	0.031	0.038	0.021	0.016	0.031
22.60	0.030	0.025	0.027	0.039	0.019	0.028	0.033	0.019	0.014	0.031
22.70	0.030	0.027	0.027	0.039	0.019	0.027	0.031	0.019	0.013	0.030
22.80	0.031	0.029	0.026	0.038	0.016	0.027	0.031	0.020	0.012	0.030
22.90	0.028	0.030	0.025	0.038	0.016	0.028	0.032	0.019	0.011	0.030
23.00	0.027	0.028	0.024	0.037	0.017	0.030	0.031	0.018	0.010	0.031
23.10	0.029	0.028	0.026	0.036	0.016	0.030	0.031	0.020	0.010	0.029
23.20	0.028	0.029	0.026	0.036	0.017	0.031	0.032	0.021	0.010	0.031
23.30	0.027	0.028	0.024	0.036	0.017	0.032	0.037	0.023	0.011	0.034
23.40	0.026	0.027	0.021	0.035	0.017	0.030	0.037	0.025	0.012	0.035
23.50	0.026	0.026	0.023	0.036	0.018	0.028	0.035	0.024	0.009	0.032
23.60	0.028	0.025	0.026	0.037	0.018	0.027	0.036	0.023	0.009	0.033
23.70	0.025	0.024	0.028	0.037	0.018	0.028	0.036	0.024	0.010	0.035
23.80	0.024	0.026	0.027	0.038	0.022	0.027	0.032	0.022	0.011	0.036
23.90	0.021	0.024	0.026	0.037	0.025	0.027	0.030	0.020	0.012	0.037
24.00	0.021	0.028	0.024	0.034	0.027	0.027	0.032	0.019	0.012	0.035
24.10	0.021	0.029	0.024	0.034	0.024	0.026	0.036	0.019	0.009	0.031
24.20	0.021	0.025	0.025	0.036	0.023	0.029	0.038	0.019	0.008	0.028
24.30	0.021	0.025	0.024	0.037	0.021	0.028	0.035	0.017	0.010	0.030
24.40	0.021	0.027	0.023	0.038	0.016	0.026	0.033	0.018	0.011	0.030
24.50	0.020	0.027	0.024	0.037	0.014	0.026	0.034	0.020	0.014	0.030

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
24.60	0.020	0.026	0.023	0.037	0.015	0.029	0.035	0.022	0.018	0.031
24.70	0.016	0.023	0.024	0.038	0.016	0.032	0.034	0.024	0.017	0.031
24.80	0.013	0.023	0.023	0.037	0.017	0.031	0.032	0.023	0.016	0.030
24.90	0.014	0.025	0.023	0.037	0.016	0.029	0.030	0.023	0.016	0.031
25.00	0.015	0.025	0.023	0.036	0.013	0.025	0.031	0.024	0.014	0.030
25.10	0.018	0.026	0.022	0.034	0.011	0.027	0.030	0.024	0.014	0.029
25.20	0.019	0.028	0.023	0.036	0.010	0.029	0.031	0.025	0.015	0.030
25.30	0.017	0.027	0.023	0.037	0.009	0.028	0.030	0.027	0.015	0.030
25.40	0.017	0.029	0.021	0.036	0.009	0.028	0.030	0.029	0.013	0.029
25.50	0.018	0.030	0.020	0.035	0.009	0.027	0.030	0.029	0.011	0.028
25.60	0.018	0.030	0.020	0.035	0.009	0.027	0.027	0.029	0.010	0.027
25.70	0.019	0.028	0.019	0.034	0.009	0.028	0.026	0.029	0.010	0.028
25.80	0.019	0.031	0.020	0.034	0.009	0.028	0.028	0.029	0.012	0.028
25.90	0.017	0.031	0.020	0.034	0.010	0.027	0.026	0.027	0.013	0.031
26.00	0.016	0.029	0.019	0.035	0.009	0.026	0.019	0.025	0.015	0.033
26.10	0.014	0.026	0.018	0.036	0.006	0.023	0.016	0.023	0.014	0.032
26.20	0.013	0.024	0.015	0.035	0.005	0.023	0.017	0.022	0.013	0.031
26.30	0.013	0.025	0.014	0.033	0.007	0.028	0.017	0.023	0.012	0.031
26.40	0.014	0.023	0.014	0.034	0.007	0.029	0.017	0.023	0.011	0.030
26.50	0.014	0.023	0.016	0.036	0.006	0.028	0.021	0.024	0.010	0.027
26.60	0.013	0.023	0.018	0.036	0.006	0.027	0.025	0.026	0.009	0.028
26.70	0.013	0.023	0.018	0.035	0.004	0.025	0.027	0.025	0.010	0.029
26.80	0.014	0.023	0.017	0.036	0.005	0.025	0.027	0.025	0.010	0.031
26.90	0.014	0.024	0.017	0.039	0.006	0.026	0.027	0.023	0.012	0.031
27.00	0.014	0.025	0.017	0.038	0.007	0.026	0.026	0.020	0.013	0.032
27.10	0.015	0.025	0.014	0.034	0.006	0.025	0.026	0.022	0.013	0.030
27.20	0.014	0.025	0.015	0.034	0.006	0.024	0.026	0.024	0.015	0.029
27.30	0.012	0.023	0.016	0.034	0.006	0.023	0.024	0.024	0.016	0.030
27.40	0.011	0.024	0.015	0.033	0.007	0.022	0.022	0.023	0.015	0.029
27.50	0.011	0.025	0.014	0.032	0.007	0.021	0.021	0.022	0.018	0.030
27.60	0.011	0.025	0.013	0.031	0.006	0.023	0.022	0.022	0.016	0.028

Velocities Measured at 0.381 m (15 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
27.70	0.014	0.024	0.013	0.030	0.005	0.022	0.023	0.024	0.017	0.029
27.80	0.017	0.024	0.013	0.030	0.005	0.021	0.022	0.023	0.016	0.029
27.90	0.018	0.023	0.014	0.032	0.006	0.021	0.022	0.022	0.017	0.030
28.00	0.016	0.023	0.015	0.033	0.004	0.020	0.020	0.021	0.018	0.030
28.10	0.014	0.024	0.016	0.034	0.003	0.018	0.019	0.019	0.016	0.029
28.20	0.012	0.022	0.017	0.033	0.003	0.018	0.019	0.021	0.015	0.028
28.30	0.013	0.024	0.017	0.029	0.005	0.021	0.018	0.021	0.014	0.029
28.40	0.015	0.026	0.017	0.029	0.006	0.021	0.016	0.020	0.014	0.031
28.50	0.014	0.026	0.017	0.029	0.007	0.023	0.017	0.021	0.013	0.031
28.60	0.014	0.026	0.018	0.030	0.007	0.024	0.018	0.023	0.014	0.031
28.70	0.014	0.026	0.019	0.030	0.006	0.025	0.017	0.025	0.012	0.030
28.80	0.012	0.024	0.019	0.031	0.005	0.023	0.016	0.025	0.009	0.029
28.90	0.011	0.023	0.020	0.032	0.004	0.020	0.017	0.023	0.006	0.028
29.00	0.011	0.022	0.019	0.032	0.006	0.021	0.018	0.022	0.005	0.027
29.10	0.014	0.023	0.018	0.032	0.006	0.022	0.019	0.022	0.007	0.026
29.20	0.016	0.025	0.018	0.033	0.006	0.022	0.020	0.021	0.009	0.026
29.30	0.015	0.026	0.017	0.031	0.007	0.021	0.022	0.022	0.010	0.025
29.40	0.015	0.026	0.015	0.029	0.009	0.020	0.021	0.023	0.010	0.025
29.50	0.013	0.024	0.015	0.028	0.011	0.020	0.019	0.023	0.009	0.025
29.60	0.010	0.022	0.015	0.028	0.011	0.021	0.018	0.024	0.009	0.025
29.70	0.009	0.020	0.015	0.028	0.009	0.021	0.022	0.024	0.007	0.025
29.80	0.011	0.020	0.013	0.027	0.010	0.022	0.023	0.024	0.008	0.026
29.90	0.012	0.020	0.013	0.026	0.011	0.023	0.023	0.025	0.009	0.027
30.00	0.013	0.020	0.012	0.024	0.011	0.023	0.022	0.026	0.011	0.027

Small-Tank Wall Velocity Data, contd.

Velocities Measured at 0.394 m (15.5 in) Radial Position												
Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
0.10	0.007	0.019	-0.001	0.022	0.003	0.017	0.005	0.022	-0.005	0.007	0.003	0.017
0.20	0.005	0.021	-0.001	0.023	0.002	0.019	0.005	0.024	-0.001	0.010	0.003	0.017
0.30	0.005	0.022	0.000	0.022	0.005	0.020	0.010	0.024	0.005	0.014	0.006	0.017
0.40	0.005	0.018	0.000	0.023	0.012	0.023	0.015	0.025	0.014	0.019	0.009	0.016
0.50	0.005	0.013	0.004	0.024	0.023	0.024	0.027	0.028	0.041	0.019	0.024	0.020
0.60	0.019	0.017	0.026	0.022	0.043	0.022	0.058	0.025	0.081	0.014	0.055	0.015
0.70	0.050	0.015	0.059	0.021	0.080	0.014	0.105	0.016	0.121	0.017	0.094	0.008
0.80	0.084	0.021	0.116	0.034	0.126	0.027	0.168	0.047	0.172	0.036	0.133	0.013
0.90	0.221	0.116	0.306	0.137	0.253	0.087	0.345	0.161	0.249	0.053	0.199	0.058
1.00	0.454	0.202	0.450	0.132	0.438	0.104	0.462	0.101	0.328	0.095	0.238	0.074
1.10	0.484	0.150	0.480	0.125	0.505	0.066	0.553	0.060	0.501	0.053	0.335	0.101
1.20	0.462	0.133	0.425	0.094	0.501	0.071	0.560	0.076	0.579	0.067	0.475	0.065
1.30	0.548	0.175	0.413	0.100	0.441	0.080	0.469	0.072	0.521	0.068	0.545	0.116
1.40	0.456	0.124	0.386	0.080	0.383	0.086	0.411	0.085	0.428	0.089	0.557	0.085
1.50	0.477	0.135	0.398	0.092	0.401	0.110	0.356	0.111	0.389	0.084	0.487	0.092
1.60	0.409	0.127	0.398	0.106	0.412	0.072	0.384	0.097	0.362	0.061	0.419	0.093
1.70	0.444	0.198	0.408	0.094	0.385	0.076	0.378	0.070	0.353	0.071	0.416	0.065
1.80	0.473	0.143	0.412	0.095	0.365	0.076	0.405	0.096	0.410	0.075	0.421	0.083
1.90	0.492	0.170	0.444	0.115	0.371	0.078	0.384	0.092	0.434	0.081	0.411	0.066
2.00	0.484	0.116	0.433	0.131	0.398	0.069	0.378	0.092	0.388	0.074	0.347	0.062
2.10	0.425	0.120	0.358	0.120	0.374	0.047	0.359	0.087	0.412	0.089	0.340	0.098
2.20	0.437	0.133	0.416	0.084	0.398	0.069	0.364	0.077	0.420	0.070	0.361	0.081
2.30	0.445	0.179	0.410	0.117	0.406	0.096	0.373	0.102	0.399	0.054	0.390	0.105
2.40	0.467	0.172	0.375	0.088	0.395	0.086	0.357	0.081	0.414	0.067	0.382	0.065
2.50	0.433	0.157	0.410	0.120	0.435	0.058	0.337	0.093	0.418	0.067	0.391	0.085
2.60	0.455	0.183	0.397	0.073	0.457	0.101	0.361	0.100	0.383	0.076	0.420	0.084
2.70	0.487	0.061	0.410	0.104	0.396	0.078	0.408	0.086	0.371	0.086	0.424	0.073
2.80	0.413	0.126	0.423	0.139	0.421	0.084	0.410	0.074	0.345	0.083	0.382	0.070

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
2.90	0.401	0.102	0.408	0.127	0.461	0.100	0.384	0.085	0.394	0.074	0.399	0.101
3.00	0.371	0.122	0.385	0.086	0.388	0.089	0.380	0.056	0.411	0.069	0.424	0.086
3.10	0.463	0.200	0.392	0.095	0.394	0.106	0.412	0.058	0.415	0.082	0.426	0.081
3.20	0.453	0.125	0.425	0.128	0.376	0.097	0.377	0.074	0.400	0.078	0.428	0.075
3.30	0.421	0.125	0.403	0.086	0.413	0.116	0.368	0.047	0.414	0.054	0.430	0.092
3.40	0.476	0.236	0.419	0.110	0.359	0.085	0.349	0.075	0.371	0.077	0.431	0.069
3.50	0.404	0.162	0.383	0.120	0.313	0.070	0.340	0.091	0.364	0.081	0.420	0.079
3.60	0.324	0.088	0.299	0.083	0.277	0.094	0.284	0.059	0.349	0.081	0.373	0.082
3.70	0.283	0.100	0.258	0.060	0.250	0.046	0.264	0.062	0.299	0.056	0.321	0.053
3.80	0.223	0.061	0.200	0.032	0.217	0.036	0.246	0.060	0.263	0.041	0.307	0.052
3.90	0.178	0.047	0.167	0.040	0.196	0.046	0.244	0.062	0.260	0.034	0.288	0.055
4.00	0.163	0.032	0.152	0.028	0.185	0.030	0.226	0.048	0.252	0.038	0.283	0.043
4.10	0.145	0.037	0.146	0.026	0.174	0.039	0.214	0.039	0.244	0.036	0.282	0.049
4.20	0.139	0.029	0.138	0.032	0.164	0.030	0.193	0.034	0.238	0.031	0.282	0.043
4.30	0.128	0.028	0.125	0.025	0.157	0.022	0.192	0.042	0.225	0.028	0.268	0.050
4.40	0.114	0.031	0.126	0.020	0.152	0.025	0.176	0.036	0.216	0.030	0.261	0.052
4.50	0.101	0.029	0.120	0.022	0.152	0.030	0.152	0.036	0.212	0.026	0.248	0.045
4.60	0.096	0.038	0.111	0.018	0.157	0.027	0.153	0.038	0.206	0.028	0.223	0.033
4.70	0.098	0.039	0.109	0.028	0.158	0.032	0.158	0.032	0.193	0.024	0.223	0.031
4.80	0.101	0.033	0.103	0.033	0.149	0.036	0.160	0.025	0.188	0.031	0.213	0.035
4.90	0.098	0.034	0.106	0.035	0.136	0.024	0.154	0.020	0.187	0.027	0.204	0.038
5.00	0.092	0.047	0.114	0.029	0.131	0.029	0.148	0.017	0.177	0.036	0.205	0.041
5.10	0.096	0.035	0.112	0.037	0.125	0.034	0.140	0.026	0.170	0.031	0.207	0.047
5.20	0.098	0.040	0.112	0.041	0.122	0.035	0.135	0.028	0.171	0.026	0.211	0.045
5.30	0.105	0.043	0.105	0.028	0.130	0.031	0.147	0.024	0.161	0.032	0.207	0.040
5.40	0.101	0.032	0.107	0.024	0.135	0.035	0.145	0.025	0.150	0.041	0.194	0.042
5.50	0.099	0.034	0.111	0.032	0.128	0.031	0.139	0.029	0.160	0.024	0.189	0.050
5.60	0.106	0.039	0.115	0.034	0.127	0.031	0.139	0.028	0.160	0.022	0.192	0.046
5.70	0.103	0.048	0.106	0.044	0.119	0.042	0.136	0.039	0.155	0.033	0.193	0.037
5.80	0.108	0.054	0.107	0.027	0.120	0.033	0.136	0.053	0.147	0.044	0.185	0.031
5.90	0.107	0.054	0.114	0.031	0.123	0.036	0.140	0.047	0.144	0.036	0.181	0.027

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
6.00	0.104	0.047	0.117	0.029	0.116	0.041	0.132	0.043	0.141	0.030	0.185	0.026
6.10	0.098	0.044	0.113	0.027	0.125	0.036	0.130	0.040	0.147	0.030	0.185	0.031
6.20	0.094	0.045	0.111	0.021	0.133	0.034	0.130	0.038	0.145	0.034	0.172	0.026
6.30	0.088	0.045	0.112	0.032	0.129	0.036	0.129	0.047	0.145	0.038	0.158	0.042
6.40	0.092	0.036	0.113	0.030	0.126	0.038	0.125	0.051	0.139	0.036	0.165	0.042
6.50	0.091	0.032	0.108	0.034	0.125	0.042	0.116	0.043	0.131	0.035	0.162	0.035
6.60	0.093	0.031	0.112	0.037	0.121	0.043	0.118	0.043	0.127	0.047	0.161	0.038
6.70	0.093	0.033	0.111	0.038	0.119	0.030	0.124	0.042	0.127	0.045	0.157	0.040
6.80	0.096	0.032	0.114	0.042	0.109	0.028	0.125	0.037	0.126	0.038	0.147	0.048
6.90	0.090	0.036	0.107	0.038	0.105	0.027	0.127	0.036	0.125	0.037	0.138	0.028
7.00	0.095	0.033	0.092	0.044	0.102	0.022	0.121	0.039	0.125	0.035	0.141	0.034
7.10	0.091	0.027	0.082	0.039	0.101	0.022	0.114	0.043	0.127	0.036	0.140	0.029
7.20	0.082	0.037	0.082	0.045	0.100	0.031	0.120	0.042	0.132	0.035	0.140	0.026
7.30	0.074	0.038	0.090	0.041	0.101	0.035	0.122	0.035	0.120	0.025	0.135	0.026
7.40	0.068	0.036	0.088	0.026	0.096	0.033	0.119	0.036	0.117	0.029	0.134	0.032
7.50	0.069	0.037	0.096	0.031	0.095	0.033	0.114	0.041	0.129	0.026	0.135	0.036
7.60	0.064	0.038	0.087	0.034	0.088	0.040	0.114	0.033	0.126	0.028	0.134	0.040
7.70	0.071	0.037	0.085	0.040	0.083	0.043	0.119	0.033	0.123	0.024	0.137	0.037
7.80	0.077	0.038	0.088	0.044	0.088	0.040	0.120	0.026	0.115	0.028	0.134	0.030
7.90	0.078	0.043	0.086	0.050	0.090	0.039	0.116	0.027	0.114	0.032	0.132	0.029
8.00	0.081	0.046	0.094	0.048	0.095	0.034	0.117	0.028	0.107	0.036	0.131	0.035
8.10	0.084	0.054	0.090	0.060	0.099	0.038	0.113	0.030	0.111	0.033	0.134	0.032
8.20	0.085	0.046	0.090	0.059	0.100	0.035	0.105	0.026	0.107	0.034	0.131	0.029
8.30	0.086	0.037	0.081	0.057	0.090	0.029	0.107	0.027	0.104	0.034	0.128	0.029
8.40	0.090	0.043	0.080	0.052	0.083	0.026	0.107	0.024	0.103	0.035	0.126	0.027
8.50	0.090	0.045	0.083	0.039	0.087	0.026	0.110	0.021	0.109	0.041	0.128	0.027
8.60	0.085	0.039	0.073	0.039	0.078	0.033	0.105	0.020	0.112	0.047	0.125	0.024
8.70	0.086	0.032	0.077	0.036	0.085	0.033	0.105	0.032	0.106	0.045	0.129	0.025
8.80	0.085	0.033	0.071	0.035	0.089	0.027	0.100	0.029	0.107	0.044	0.132	0.026
8.90	0.085	0.036	0.069	0.034	0.090	0.030	0.106	0.026	0.105	0.044	0.127	0.025
9.00	0.085	0.039	0.066	0.041	0.089	0.034	0.102	0.025	0.106	0.043	0.116	0.024

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
9.10	0.081	0.039	0.063	0.041	0.091	0.038	0.108	0.031	0.106	0.048	0.117	0.027
9.20	0.081	0.028	0.063	0.032	0.085	0.038	0.094	0.035	0.108	0.039	0.115	0.030
9.30	0.084	0.034	0.066	0.029	0.085	0.037	0.091	0.041	0.108	0.048	0.114	0.023
9.40	0.085	0.037	0.066	0.032	0.086	0.037	0.093	0.036	0.099	0.052	0.121	0.020
9.50	0.085	0.029	0.072	0.035	0.085	0.040	0.094	0.036	0.089	0.047	0.116	0.020
9.60	0.079	0.032	0.070	0.030	0.084	0.040	0.092	0.037	0.087	0.039	0.115	0.025
9.70	0.080	0.034	0.075	0.028	0.077	0.038	0.096	0.036	0.087	0.039	0.108	0.024
9.80	0.078	0.029	0.071	0.030	0.077	0.036	0.091	0.035	0.095	0.038	0.113	0.023
9.90	0.073	0.029	0.070	0.032	0.079	0.033	0.092	0.040	0.096	0.041	0.112	0.027
10.00	0.066	0.029	0.068	0.036	0.077	0.028	0.087	0.039	0.085	0.046	0.114	0.029
10.10	0.060	0.034	0.071	0.030	0.075	0.026	0.079	0.041	0.085	0.044	0.110	0.036
10.20	0.056	0.029	0.072	0.034	0.071	0.020	0.083	0.039	0.091	0.044	0.108	0.034
10.30	0.053	0.034	0.073	0.030	0.061	0.024	0.086	0.029	0.095	0.041	0.105	0.040
10.40	0.059	0.034	0.067	0.033	0.068	0.027	0.087	0.032	0.093	0.039	0.103	0.039
10.50	0.060	0.040	0.075	0.031	0.071	0.030	0.088	0.033	0.095	0.031	0.106	0.038
10.60	0.060	0.041	0.080	0.024	0.068	0.032	0.085	0.039	0.092	0.029	0.108	0.037
10.70	0.062	0.042	0.078	0.028	0.069	0.034	0.080	0.046	0.092	0.031	0.109	0.028
10.80	0.066	0.040	0.083	0.025	0.067	0.032	0.084	0.042	0.092	0.031	0.102	0.024
10.90	0.065	0.038	0.080	0.027	0.063	0.032	0.081	0.043	0.091	0.032	0.098	0.024
11.00	0.066	0.037	0.073	0.025	0.060	0.028	0.075	0.041	0.086	0.033	0.098	0.024
11.10	0.070	0.032	0.068	0.035	0.063	0.025	0.077	0.042	0.085	0.039	0.103	0.023
11.20	0.065	0.031	0.058	0.036	0.063	0.024	0.079	0.042	0.084	0.039	0.100	0.019
11.30	0.051	0.031	0.063	0.031	0.059	0.029	0.076	0.045	0.078	0.032	0.102	0.018
11.40	0.053	0.026	0.065	0.030	0.053	0.034	0.080	0.049	0.080	0.033	0.099	0.023
11.50	0.052	0.023	0.064	0.036	0.052	0.031	0.080	0.047	0.079	0.029	0.099	0.022
11.60	0.045	0.030	0.066	0.034	0.050	0.033	0.084	0.046	0.080	0.027	0.095	0.025
11.70	0.040	0.033	0.068	0.024	0.051	0.036	0.080	0.039	0.081	0.031	0.098	0.027
11.80	0.042	0.035	0.064	0.025	0.053	0.038	0.074	0.043	0.076	0.031	0.098	0.022
11.90	0.042	0.037	0.062	0.035	0.050	0.036	0.073	0.040	0.073	0.034	0.096	0.029
12.00	0.042	0.034	0.061	0.034	0.050	0.036	0.072	0.038	0.069	0.037	0.093	0.026
12.10	0.040	0.033	0.059	0.027	0.047	0.036	0.071	0.042	0.070	0.034	0.095	0.016

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
12.20	0.042	0.037	0.060	0.026	0.048	0.038	0.072	0.045	0.073	0.032	0.085	0.025
12.30	0.045	0.034	0.053	0.030	0.048	0.040	0.074	0.048	0.071	0.031	0.078	0.020
12.40	0.046	0.032	0.056	0.028	0.055	0.039	0.072	0.049	0.071	0.036	0.080	0.028
12.50	0.040	0.030	0.059	0.024	0.056	0.038	0.070	0.044	0.066	0.035	0.077	0.029
12.60	0.037	0.029	0.054	0.023	0.057	0.035	0.066	0.041	0.064	0.038	0.077	0.031
12.70	0.041	0.037	0.050	0.024	0.054	0.031	0.063	0.043	0.061	0.035	0.080	0.031
12.80	0.043	0.034	0.053	0.024	0.052	0.031	0.067	0.043	0.062	0.037	0.081	0.028
12.90	0.044	0.038	0.058	0.027	0.052	0.031	0.069	0.042	0.063	0.037	0.074	0.030
13.00	0.041	0.040	0.056	0.023	0.047	0.031	0.059	0.039	0.057	0.039	0.074	0.028
13.10	0.040	0.039	0.051	0.026	0.041	0.034	0.063	0.035	0.056	0.040	0.076	0.023
13.20	0.037	0.037	0.046	0.026	0.042	0.034	0.064	0.036	0.054	0.035	0.075	0.023
13.30	0.036	0.034	0.046	0.026	0.042	0.033	0.061	0.037	0.053	0.034	0.074	0.024
13.40	0.036	0.030	0.042	0.025	0.044	0.035	0.056	0.039	0.056	0.037	0.069	0.028
13.50	0.037	0.030	0.039	0.025	0.046	0.037	0.055	0.037	0.051	0.040	0.067	0.026
13.60	0.037	0.029	0.038	0.028	0.044	0.039	0.055	0.037	0.049	0.038	0.068	0.029
13.70	0.034	0.028	0.041	0.027	0.047	0.038	0.056	0.039	0.050	0.039	0.069	0.029
13.80	0.034	0.036	0.048	0.028	0.045	0.036	0.055	0.038	0.046	0.041	0.069	0.034
13.90	0.033	0.038	0.049	0.028	0.042	0.034	0.051	0.036	0.043	0.041	0.066	0.028
14.00	0.030	0.038	0.049	0.025	0.043	0.030	0.053	0.033	0.043	0.041	0.063	0.028
14.10	0.029	0.037	0.049	0.025	0.040	0.032	0.051	0.033	0.042	0.038	0.060	0.031
14.20	0.028	0.033	0.044	0.029	0.042	0.032	0.043	0.035	0.042	0.035	0.063	0.030
14.30	0.030	0.032	0.045	0.031	0.039	0.030	0.043	0.037	0.041	0.031	0.064	0.030
14.40	0.030	0.031	0.040	0.035	0.040	0.028	0.038	0.036	0.041	0.032	0.065	0.032
14.50	0.031	0.031	0.040	0.033	0.038	0.030	0.044	0.037	0.042	0.033	0.072	0.032
14.60	0.029	0.034	0.037	0.032	0.038	0.031	0.046	0.036	0.043	0.032	0.074	0.025
14.70	0.029	0.034	0.039	0.031	0.039	0.032	0.047	0.036	0.043	0.033	0.070	0.028
14.80	0.028	0.028	0.036	0.035	0.040	0.027	0.045	0.032	0.045	0.036	0.070	0.021
14.90	0.026	0.023	0.038	0.030	0.039	0.029	0.047	0.035	0.043	0.035	0.066	0.022
15.00	0.020	0.022	0.036	0.032	0.038	0.033	0.049	0.033	0.040	0.033	0.062	0.021
15.10	0.019	0.020	0.034	0.034	0.037	0.032	0.048	0.032	0.042	0.034	0.063	0.021
15.20	0.021	0.018	0.031	0.033	0.040	0.032	0.044	0.031	0.037	0.033	0.065	0.028

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
15.30	0.022	0.019	0.033	0.035	0.036	0.029	0.041	0.029	0.035	0.030	0.064	0.028
15.40	0.022	0.019	0.036	0.034	0.033	0.024	0.043	0.034	0.035	0.032	0.059	0.028
15.50	0.022	0.021	0.037	0.032	0.033	0.024	0.040	0.035	0.033	0.034	0.064	0.027
15.60	0.020	0.020	0.035	0.033	0.033	0.025	0.037	0.032	0.033	0.033	0.063	0.024
15.70	0.017	0.022	0.033	0.034	0.032	0.023	0.034	0.026	0.035	0.031	0.057	0.024
15.80	0.017	0.023	0.031	0.033	0.033	0.025	0.032	0.027	0.036	0.033	0.055	0.026
15.90	0.016	0.020	0.032	0.029	0.038	0.031	0.034	0.029	0.036	0.033	0.053	0.026
16.00	0.018	0.021	0.033	0.032	0.036	0.034	0.034	0.031	0.037	0.029	0.055	0.027
16.10	0.021	0.021	0.029	0.031	0.029	0.032	0.034	0.032	0.040	0.030	0.056	0.029
16.20	0.022	0.022	0.029	0.032	0.023	0.032	0.032	0.032	0.040	0.028	0.056	0.029
16.30	0.020	0.024	0.028	0.029	0.021	0.033	0.035	0.036	0.036	0.026	0.053	0.029
16.40	0.019	0.023	0.026	0.030	0.024	0.034	0.033	0.034	0.038	0.027	0.053	0.027
16.50	0.019	0.022	0.026	0.030	0.023	0.030	0.028	0.031	0.037	0.033	0.052	0.029
16.60	0.020	0.022	0.028	0.031	0.026	0.029	0.023	0.029	0.031	0.036	0.054	0.030
16.70	0.019	0.021	0.024	0.031	0.029	0.025	0.024	0.030	0.030	0.037	0.051	0.029
16.80	0.017	0.020	0.023	0.031	0.028	0.027	0.025	0.028	0.029	0.036	0.051	0.030
16.90	0.016	0.020	0.024	0.027	0.029	0.028	0.028	0.027	0.030	0.036	0.054	0.027
17.00	0.015	0.020	0.024	0.029	0.032	0.028	0.024	0.026	0.031	0.035	0.056	0.027
17.10	0.015	0.021	0.026	0.032	0.030	0.028	0.024	0.027	0.030	0.033	0.058	0.029
17.20	0.013	0.021	0.024	0.033	0.029	0.025	0.027	0.028	0.032	0.032	0.054	0.027
17.30	0.013	0.024	0.024	0.033	0.029	0.025	0.028	0.025	0.029	0.030	0.052	0.027
17.40	0.009	0.020	0.019	0.031	0.029	0.028	0.028	0.022	0.026	0.027	0.051	0.028
17.50	0.005	0.016	0.018	0.031	0.027	0.030	0.027	0.023	0.029	0.028	0.055	0.025
17.60	0.005	0.015	0.018	0.033	0.024	0.032	0.028	0.026	0.031	0.030	0.059	0.028
17.70	0.004	0.016	0.018	0.033	0.022	0.035	0.027	0.027	0.033	0.028	0.055	0.031
17.80	0.004	0.014	0.018	0.033	0.020	0.033	0.026	0.026	0.032	0.031	0.051	0.031
17.90	0.003	0.014	0.022	0.032	0.022	0.033	0.028	0.026	0.032	0.031	0.050	0.032
18.00	0.005	0.016	0.022	0.029	0.025	0.036	0.025	0.025	0.029	0.028	0.050	0.032
18.10	0.004	0.018	0.021	0.030	0.023	0.032	0.025	0.028	0.030	0.028	0.050	0.031
18.20	0.004	0.019	0.019	0.031	0.020	0.029	0.023	0.027	0.028	0.027	0.052	0.030
18.30	0.004	0.015	0.018	0.030	0.019	0.025	0.024	0.026	0.023	0.030	0.058	0.028

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
18.40	0.005	0.016	0.018	0.032	0.018	0.025	0.020	0.022	0.020	0.031	0.059	0.025
18.50	0.007	0.018	0.021	0.033	0.017	0.026	0.018	0.020	0.019	0.031	0.057	0.025
18.60	0.009	0.018	0.022	0.029	0.016	0.028	0.018	0.020	0.020	0.033	0.054	0.027
18.70	0.009	0.020	0.023	0.025	0.019	0.027	0.016	0.021	0.023	0.034	0.052	0.027
18.80	0.008	0.019	0.025	0.027	0.018	0.024	0.019	0.023	0.025	0.030	0.050	0.030
18.90	0.010	0.022	0.023	0.030	0.021	0.026	0.022	0.024	0.024	0.030	0.046	0.029
19.00	0.011	0.023	0.022	0.029	0.025	0.025	0.021	0.023	0.022	0.032	0.046	0.028
19.10	0.010	0.023	0.019	0.028	0.027	0.024	0.020	0.023	0.022	0.033	0.049	0.028
19.20	0.010	0.023	0.017	0.025	0.027	0.024	0.023	0.026	0.020	0.033	0.047	0.027
19.30	0.010	0.021	0.016	0.026	0.025	0.025	0.023	0.026	0.019	0.031	0.049	0.028
19.40	0.009	0.021	0.014	0.026	0.022	0.025	0.023	0.025	0.021	0.033	0.048	0.025
19.50	0.010	0.021	0.013	0.029	0.021	0.025	0.020	0.025	0.020	0.031	0.048	0.027
19.60	0.012	0.023	0.011	0.030	0.020	0.025	0.020	0.025	0.020	0.030	0.047	0.027
19.70	0.011	0.023	0.011	0.030	0.021	0.023	0.021	0.024	0.019	0.030	0.045	0.026
19.80	0.008	0.022	0.013	0.028	0.024	0.023	0.023	0.023	0.017	0.027	0.044	0.028
19.90	0.004	0.018	0.016	0.028	0.024	0.024	0.022	0.022	0.017	0.027	0.043	0.028
20.00	0.005	0.017	0.019	0.028	0.022	0.024	0.022	0.023	0.018	0.026	0.043	0.029
20.10	0.007	0.019	0.018	0.029	0.021	0.024	0.023	0.023	0.019	0.024	0.046	0.028
20.20	0.009	0.020	0.013	0.026	0.020	0.023	0.024	0.023	0.021	0.025	0.047	0.030
20.30	0.010	0.022	0.013	0.027	0.018	0.024	0.024	0.024	0.023	0.024	0.046	0.030
20.40	0.012	0.025	0.014	0.027	0.019	0.026	0.026	0.027	0.021	0.024	0.043	0.029
20.50	0.013	0.025	0.016	0.026	0.019	0.023	0.025	0.029	0.021	0.022	0.041	0.031
20.60	0.014	0.027	0.016	0.027	0.017	0.020	0.020	0.026	0.021	0.021	0.039	0.033
20.70	0.015	0.031	0.016	0.026	0.018	0.023	0.019	0.025	0.020	0.022	0.038	0.031
20.80	0.013	0.029	0.013	0.023	0.016	0.025	0.018	0.023	0.018	0.025	0.039	0.032
20.90	0.012	0.028	0.010	0.025	0.015	0.026	0.019	0.024	0.017	0.025	0.042	0.035
21.00	0.011	0.029	0.009	0.025	0.014	0.026	0.019	0.024	0.015	0.024	0.041	0.034
21.10	0.009	0.029	0.009	0.025	0.012	0.024	0.017	0.021	0.015	0.025	0.040	0.037
21.20	0.007	0.027	0.010	0.025	0.013	0.022	0.017	0.023	0.014	0.023	0.038	0.035
21.30	0.006	0.025	0.010	0.027	0.014	0.023	0.020	0.025	0.012	0.021	0.038	0.032
21.40	0.006	0.022	0.009	0.028	0.014	0.021	0.018	0.025	0.014	0.021	0.038	0.032

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
21.50	0.005	0.020	0.008	0.026	0.012	0.020	0.015	0.024	0.012	0.020	0.038	0.032
21.60	0.002	0.019	0.007	0.026	0.010	0.020	0.017	0.026	0.010	0.019	0.037	0.033
21.70	0.003	0.020	0.007	0.026	0.008	0.019	0.018	0.026	0.008	0.019	0.038	0.034
21.80	0.003	0.020	0.007	0.026	0.008	0.019	0.022	0.028	0.009	0.019	0.038	0.034
21.90	0.002	0.018	0.007	0.025	0.009	0.019	0.023	0.026	0.011	0.019	0.040	0.034
22.00	0.002	0.018	0.008	0.026	0.009	0.019	0.022	0.027	0.010	0.017	0.041	0.034
22.10	0.003	0.019	0.008	0.026	0.008	0.019	0.024	0.030	0.010	0.017	0.042	0.034
22.20	0.003	0.019	0.008	0.025	0.008	0.020	0.021	0.029	0.010	0.017	0.040	0.033
22.30	0.002	0.018	0.009	0.025	0.006	0.020	0.019	0.030	0.009	0.019	0.038	0.031
22.40	0.000	0.015	0.010	0.026	0.006	0.020	0.018	0.030	0.009	0.019	0.034	0.030
22.50	0.001	0.014	0.010	0.028	0.006	0.019	0.016	0.029	0.010	0.018	0.034	0.030
22.60	0.002	0.015	0.008	0.028	0.006	0.018	0.015	0.025	0.009	0.016	0.032	0.030
22.70	0.002	0.013	0.007	0.029	0.008	0.018	0.017	0.026	0.010	0.019	0.031	0.031
22.80	0.003	0.015	0.006	0.028	0.009	0.018	0.019	0.028	0.010	0.022	0.030	0.029
22.90	0.003	0.016	0.006	0.029	0.009	0.018	0.024	0.030	0.009	0.022	0.031	0.026
23.00	0.002	0.014	0.006	0.030	0.008	0.018	0.021	0.028	0.008	0.021	0.031	0.027
23.10	0.001	0.015	0.007	0.030	0.007	0.017	0.020	0.031	0.008	0.023	0.029	0.028
23.20	0.001	0.016	0.007	0.027	0.006	0.015	0.019	0.031	0.007	0.023	0.027	0.030
23.30	0.002	0.018	0.008	0.029	0.007	0.017	0.019	0.032	0.007	0.020	0.027	0.031
23.40	0.003	0.020	0.006	0.027	0.006	0.016	0.019	0.033	0.009	0.020	0.025	0.029
23.50	0.004	0.021	0.007	0.026	0.003	0.016	0.017	0.029	0.010	0.021	0.025	0.028
23.60	0.005	0.022	0.007	0.025	0.003	0.018	0.015	0.026	0.011	0.022	0.027	0.027
23.70	0.005	0.021	0.008	0.025	0.005	0.018	0.015	0.024	0.009	0.020	0.024	0.022
23.80	0.006	0.020	0.008	0.026	0.009	0.018	0.016	0.025	0.006	0.017	0.021	0.021
23.90	0.005	0.020	0.007	0.026	0.011	0.018	0.019	0.024	0.008	0.018	0.020	0.022
24.00	0.005	0.019	0.005	0.023	0.010	0.017	0.018	0.021	0.007	0.017	0.018	0.023
24.10	0.004	0.017	0.005	0.022	0.010	0.018	0.017	0.019	0.004	0.015	0.015	0.020
24.20	0.003	0.016	0.006	0.024	0.011	0.019	0.017	0.019	0.003	0.015	0.017	0.023
24.30	0.004	0.018	0.006	0.026	0.008	0.020	0.015	0.019	0.004	0.014	0.017	0.024
24.40	0.004	0.020	0.005	0.026	0.004	0.021	0.015	0.020	0.004	0.014	0.015	0.022
24.50	0.004	0.022	0.004	0.025	0.003	0.022	0.015	0.020	0.004	0.015	0.014	0.022

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
24.60	0.004	0.022	0.004	0.026	0.003	0.022	0.016	0.021	0.003	0.014	0.013	0.024
24.70	0.002	0.018	0.003	0.026	0.001	0.020	0.016	0.022	0.002	0.013	0.012	0.021
24.80	0.003	0.016	0.003	0.026	-0.001	0.018	0.015	0.024	0.001	0.014	0.011	0.021
24.90	0.002	0.016	0.003	0.025	-0.001	0.017	0.013	0.025	0.000	0.014	0.010	0.021
25.00	0.002	0.019	0.004	0.024	-0.001	0.016	0.012	0.025	-0.001	0.013	0.011	0.022
25.10	0.002	0.021	0.005	0.024	-0.002	0.015	0.013	0.022	0.000	0.013	0.010	0.021
25.20	0.001	0.018	0.005	0.022	-0.002	0.016	0.012	0.021	0.001	0.013	0.010	0.020
25.30	0.001	0.020	0.005	0.023	-0.001	0.017	0.011	0.020	0.001	0.013	0.010	0.023
25.40	-0.001	0.018	0.007	0.024	0.000	0.018	0.012	0.021	0.001	0.014	0.012	0.025
25.50	-0.002	0.018	0.010	0.026	0.000	0.018	0.013	0.020	0.001	0.015	0.014	0.027
25.60	-0.002	0.016	0.011	0.028	-0.002	0.019	0.013	0.021	0.001	0.016	0.015	0.027
25.70	-0.003	0.013	0.010	0.027	-0.002	0.019	0.012	0.022	0.001	0.017	0.014	0.023
25.80	-0.002	0.012	0.005	0.025	-0.002	0.019	0.011	0.021	0.003	0.019	0.011	0.021
25.90	-0.001	0.014	0.002	0.024	-0.001	0.019	0.010	0.021	0.004	0.021	0.009	0.023
26.00	-0.001	0.016	0.001	0.024	0.000	0.020	0.010	0.023	0.003	0.019	0.010	0.025
26.10	-0.001	0.017	0.000	0.025	0.000	0.018	0.008	0.023	0.003	0.016	0.011	0.025
26.20	-0.002	0.014	-0.001	0.025	-0.002	0.019	0.007	0.022	0.003	0.016	0.011	0.023
26.30	-0.003	0.013	-0.001	0.024	-0.003	0.020	0.006	0.021	0.001	0.014	0.011	0.023
26.40	-0.002	0.017	-0.001	0.024	-0.003	0.020	0.007	0.020	-0.001	0.013	0.010	0.023
26.50	-0.001	0.017	-0.001	0.023	-0.005	0.019	0.007	0.019	-0.002	0.011	0.011	0.025
26.60	-0.002	0.014	-0.001	0.024	-0.004	0.019	0.006	0.019	-0.001	0.013	0.011	0.025
26.70	-0.001	0.013	-0.001	0.024	-0.001	0.021	0.005	0.018	-0.001	0.013	0.009	0.024
26.80	-0.001	0.013	0.001	0.025	-0.001	0.021	0.004	0.019	-0.002	0.011	0.008	0.022
26.90	-0.002	0.014	0.002	0.027	-0.001	0.022	0.005	0.019	-0.002	0.012	0.008	0.020
27.00	-0.001	0.015	0.003	0.028	-0.002	0.023	0.004	0.018	0.001	0.014	0.006	0.019
27.10	0.001	0.017	0.003	0.027	-0.001	0.025	0.005	0.017	0.002	0.015	0.006	0.018
27.20	0.002	0.018	0.002	0.025	-0.001	0.024	0.005	0.017	0.002	0.015	0.007	0.018
27.30	0.003	0.017	0.002	0.026	-0.001	0.021	0.003	0.017	0.001	0.013	0.007	0.019
27.40	0.003	0.016	0.002	0.027	0.000	0.022	0.001	0.017	0.000	0.011	0.006	0.020
27.50	0.002	0.015	0.001	0.025	0.000	0.021	0.003	0.019	-0.002	0.010	0.004	0.018
27.60	0.001	0.014	-0.001	0.024	0.000	0.018	0.004	0.020	-0.004	0.008	0.004	0.019

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
27.70	0.001	0.014	-0.001	0.025	-0.001	0.015	0.003	0.018	-0.004	0.008	0.003	0.019
27.80	0.001	0.013	-0.001	0.025	-0.002	0.014	0.003	0.018	-0.003	0.008	0.002	0.018
27.90	0.001	0.013	0.000	0.026	-0.003	0.016	0.003	0.017	-0.003	0.008	0.001	0.018
28.00	0.001	0.013	0.000	0.025	-0.003	0.017	0.004	0.017	-0.003	0.009	0.001	0.018
28.10	0.001	0.014	0.000	0.024	-0.004	0.015	0.005	0.018	-0.003	0.010	0.001	0.017
28.20	0.001	0.015	-0.001	0.022	-0.005	0.012	0.005	0.019	-0.002	0.012	0.002	0.016
28.30	0.001	0.016	-0.001	0.023	-0.004	0.014	0.005	0.018	-0.002	0.012	0.002	0.016
28.40	0.001	0.015	0.000	0.024	-0.002	0.018	0.003	0.016	-0.002	0.012	0.002	0.016
28.50	0.002	0.016	0.000	0.023	-0.001	0.020	0.000	0.012	-0.002	0.012	0.003	0.016
28.60	0.003	0.016	0.000	0.024	0.000	0.021	-0.001	0.010	-0.002	0.014	0.003	0.017
28.70	0.001	0.015	-0.001	0.024	-0.001	0.018	-0.001	0.009	-0.002	0.013	0.003	0.019
28.80	0.002	0.016	-0.001	0.024	-0.001	0.016	-0.001	0.009	-0.002	0.011	0.001	0.018
28.90	0.003	0.016	0.000	0.024	-0.001	0.016	-0.001	0.009	-0.003	0.010	-0.001	0.017
29.00	0.003	0.015	-0.001	0.021	-0.001	0.015	0.000	0.012	-0.003	0.009	-0.001	0.018
29.10	0.004	0.017	-0.002	0.017	-0.002	0.013	0.001	0.014	-0.005	0.007	0.000	0.018
29.20	0.005	0.018	-0.002	0.017	-0.001	0.013	0.000	0.014	-0.006	0.007	0.000	0.018
29.30	0.004	0.016	-0.001	0.018	-0.001	0.013	0.001	0.014	-0.005	0.009	0.001	0.017
29.40	0.003	0.014	-0.001	0.017	0.000	0.015	0.001	0.015	-0.004	0.010	0.000	0.016
29.50	0.002	0.012	-0.001	0.017	0.001	0.017	-0.001	0.016	-0.003	0.010	0.000	0.015
29.60	0.002	0.012	-0.001	0.018	0.002	0.021	-0.002	0.015	-0.003	0.010	0.000	0.013
29.70	0.003	0.013	-0.001	0.020	0.002	0.020	-0.004	0.011	-0.004	0.010	0.000	0.013
29.80	0.003	0.014	0.000	0.021	0.003	0.021	-0.002	0.014	-0.005	0.009	0.001	0.014
29.90	0.004	0.015	0.002	0.022	0.003	0.020	0.000	0.016	-0.006	0.007	0.003	0.016
30.00	0.005	0.017	0.001	0.023	0.002	0.017	0.000	0.014	-0.006	0.006	0.004	0.017

Small-Tank Wall Velocity Data, contd.

Velocities Measured at 0.394 m (15.5 in) Radial Position												
Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
0.10	0.005	0.015	0.017	0.023	0.000	0.020	0.001	0.015	0.008	0.020	-0.002	0.016
0.20	0.008	0.016	0.019	0.021	0.006	0.022	0.006	0.018	0.015	0.022	-0.001	0.017
0.30	0.016	0.016	0.020	0.022	0.020	0.025	0.017	0.024	0.025	0.024	0.006	0.020
0.40	0.026	0.022	0.028	0.026	0.033	0.025	0.024	0.026	0.035	0.026	0.012	0.023
0.50	0.050	0.022	0.047	0.022	0.049	0.027	0.038	0.025	0.046	0.023	0.016	0.025
0.60	0.082	0.014	0.070	0.016	0.067	0.025	0.051	0.024	0.058	0.019	0.020	0.026
0.70	0.111	0.011	0.094	0.012	0.082	0.020	0.063	0.022	0.068	0.017	0.025	0.027
0.80	0.139	0.009	0.114	0.007	0.093	0.018	0.074	0.019	0.073	0.020	0.029	0.029
0.90	0.180	0.038	0.130	0.011	0.110	0.022	0.083	0.020	0.076	0.021	0.034	0.029
1.00	0.245	0.061	0.167	0.039	0.150	0.060	0.096	0.027	0.088	0.019	0.042	0.027
1.10	0.376	0.082	0.266	0.092	0.237	0.097	0.135	0.056	0.116	0.038	0.056	0.026
1.20	0.431	0.081	0.353	0.101	0.310	0.076	0.199	0.108	0.155	0.091	0.079	0.024
1.30	0.552	0.069	0.418	0.092	0.404	0.102	0.286	0.122	0.184	0.115	0.110	0.032
1.40	0.572	0.056	0.480	0.117	0.441	0.063	0.371	0.089	0.228	0.130	0.153	0.085
1.50	0.492	0.089	0.525	0.086	0.458	0.068	0.391	0.098	0.269	0.121	0.177	0.098
1.60	0.441	0.091	0.479	0.073	0.456	0.072	0.430	0.082	0.361	0.103	0.201	0.117
1.70	0.443	0.064	0.460	0.062	0.438	0.076	0.441	0.071	0.388	0.056	0.223	0.116
1.80	0.434	0.075	0.424	0.054	0.422	0.085	0.429	0.061	0.401	0.085	0.281	0.101
1.90	0.406	0.074	0.436	0.075	0.437	0.087	0.382	0.065	0.383	0.061	0.308	0.088
2.00	0.414	0.077	0.438	0.067	0.458	0.075	0.392	0.085	0.357	0.076	0.316	0.058
2.10	0.407	0.090	0.420	0.056	0.417	0.063	0.419	0.080	0.354	0.074	0.351	0.065
2.20	0.427	0.099	0.384	0.074	0.433	0.091	0.423	0.068	0.392	0.076	0.360	0.079
2.30	0.437	0.081	0.424	0.110	0.417	0.072	0.454	0.078	0.394	0.089	0.361	0.088
2.40	0.428	0.065	0.411	0.071	0.436	0.086	0.425	0.067	0.392	0.086	0.349	0.091
2.50	0.428	0.058	0.424	0.080	0.451	0.078	0.430	0.071	0.401	0.084	0.371	0.083
2.60	0.476	0.096	0.408	0.072	0.486	0.074	0.456	0.078	0.417	0.099	0.402	0.062
2.70	0.430	0.072	0.463	0.067	0.463	0.061	0.470	0.083	0.423	0.100	0.353	0.070
2.80	0.425	0.096	0.436	0.084	0.463	0.066	0.482	0.079	0.437	0.087	0.377	0.074

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
2.90	0.425	0.103	0.441	0.089	0.479	0.091	0.494	0.069	0.447	0.074	0.420	0.057
3.00	0.457	0.096	0.450	0.087	0.468	0.108	0.449	0.084	0.436	0.059	0.377	0.096
3.10	0.467	0.118	0.455	0.099	0.471	0.090	0.483	0.073	0.436	0.097	0.351	0.091
3.20	0.469	0.103	0.466	0.072	0.482	0.071	0.469	0.071	0.433	0.101	0.400	0.066
3.30	0.466	0.054	0.438	0.082	0.490	0.082	0.474	0.100	0.459	0.063	0.427	0.079
3.40	0.458	0.063	0.427	0.079	0.443	0.088	0.450	0.086	0.429	0.092	0.388	0.070
3.50	0.425	0.085	0.426	0.079	0.447	0.069	0.465	0.084	0.418	0.067	0.386	0.102
3.60	0.383	0.064	0.397	0.059	0.457	0.070	0.464	0.069	0.406	0.084	0.394	0.059
3.70	0.347	0.059	0.388	0.061	0.438	0.041	0.454	0.077	0.411	0.066	0.398	0.075
3.80	0.319	0.061	0.364	0.057	0.391	0.055	0.424	0.066	0.369	0.066	0.402	0.054
3.90	0.302	0.064	0.370	0.064	0.370	0.068	0.398	0.068	0.371	0.062	0.363	0.053
4.00	0.298	0.059	0.357	0.049	0.370	0.086	0.410	0.052	0.360	0.050	0.334	0.079
4.10	0.297	0.054	0.333	0.044	0.365	0.089	0.376	0.060	0.337	0.044	0.324	0.068
4.20	0.297	0.045	0.327	0.033	0.351	0.076	0.362	0.056	0.330	0.047	0.323	0.078
4.30	0.283	0.028	0.319	0.039	0.337	0.059	0.362	0.045	0.335	0.048	0.316	0.065
4.40	0.280	0.042	0.293	0.050	0.320	0.061	0.350	0.038	0.318	0.042	0.285	0.055
4.50	0.275	0.058	0.287	0.054	0.312	0.055	0.342	0.043	0.298	0.044	0.278	0.060
4.60	0.260	0.051	0.279	0.046	0.292	0.053	0.332	0.044	0.292	0.046	0.271	0.071
4.70	0.261	0.044	0.286	0.042	0.291	0.037	0.329	0.048	0.279	0.053	0.246	0.069
4.80	0.254	0.045	0.285	0.051	0.285	0.031	0.326	0.050	0.287	0.039	0.236	0.065
4.90	0.245	0.048	0.274	0.049	0.275	0.039	0.306	0.035	0.281	0.041	0.238	0.043
5.00	0.224	0.039	0.256	0.043	0.266	0.046	0.295	0.031	0.263	0.037	0.231	0.050
5.10	0.225	0.040	0.242	0.054	0.275	0.050	0.293	0.030	0.249	0.035	0.211	0.052
5.20	0.235	0.054	0.231	0.060	0.264	0.033	0.263	0.031	0.240	0.033	0.206	0.058
5.30	0.221	0.041	0.246	0.051	0.253	0.031	0.243	0.035	0.225	0.048	0.203	0.054
5.40	0.221	0.043	0.235	0.047	0.253	0.037	0.231	0.038	0.217	0.041	0.193	0.054
5.50	0.217	0.052	0.231	0.052	0.250	0.041	0.228	0.035	0.218	0.044	0.182	0.050
5.60	0.208	0.038	0.241	0.041	0.240	0.038	0.221	0.046	0.203	0.052	0.168	0.056
5.70	0.206	0.035	0.237	0.039	0.226	0.038	0.205	0.043	0.202	0.037	0.160	0.056
5.80	0.209	0.036	0.237	0.037	0.221	0.054	0.207	0.049	0.204	0.036	0.164	0.059
5.90	0.203	0.037	0.237	0.040	0.215	0.036	0.200	0.047	0.202	0.035	0.158	0.055

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
6.00	0.200	0.038	0.235	0.042	0.202	0.037	0.201	0.039	0.197	0.033	0.143	0.045
6.10	0.193	0.041	0.228	0.036	0.206	0.040	0.204	0.038	0.173	0.037	0.148	0.049
6.20	0.189	0.042	0.215	0.040	0.208	0.039	0.193	0.045	0.171	0.041	0.142	0.042
6.30	0.179	0.041	0.213	0.027	0.198	0.033	0.186	0.048	0.168	0.038	0.138	0.045
6.40	0.170	0.036	0.211	0.036	0.197	0.029	0.185	0.051	0.169	0.033	0.127	0.049
6.50	0.167	0.028	0.198	0.034	0.191	0.035	0.176	0.040	0.164	0.041	0.117	0.053
6.60	0.169	0.030	0.183	0.028	0.191	0.038	0.155	0.041	0.161	0.034	0.103	0.055
6.70	0.165	0.038	0.178	0.031	0.193	0.051	0.151	0.052	0.163	0.027	0.086	0.063
6.80	0.160	0.040	0.177	0.031	0.183	0.040	0.151	0.041	0.164	0.033	0.086	0.065
6.90	0.166	0.028	0.175	0.038	0.164	0.039	0.151	0.045	0.160	0.033	0.080	0.059
7.00	0.165	0.022	0.168	0.036	0.154	0.036	0.157	0.037	0.155	0.036	0.080	0.063
7.10	0.157	0.018	0.162	0.036	0.157	0.035	0.143	0.040	0.152	0.046	0.080	0.064
7.20	0.155	0.026	0.150	0.039	0.159	0.033	0.140	0.045	0.152	0.041	0.075	0.056
7.30	0.157	0.031	0.149	0.039	0.158	0.027	0.132	0.049	0.149	0.037	0.071	0.049
7.40	0.159	0.030	0.147	0.046	0.154	0.029	0.129	0.053	0.144	0.036	0.075	0.047
7.50	0.152	0.023	0.137	0.049	0.153	0.028	0.133	0.049	0.140	0.037	0.086	0.046
7.60	0.134	0.025	0.143	0.034	0.148	0.029	0.126	0.054	0.134	0.040	0.085	0.045
7.70	0.129	0.025	0.145	0.032	0.153	0.029	0.128	0.052	0.141	0.032	0.075	0.051
7.80	0.131	0.030	0.144	0.035	0.156	0.027	0.126	0.052	0.134	0.033	0.073	0.050
7.90	0.123	0.036	0.137	0.036	0.153	0.025	0.122	0.046	0.129	0.029	0.077	0.051
8.00	0.116	0.035	0.133	0.035	0.145	0.026	0.126	0.052	0.128	0.025	0.076	0.049
8.10	0.114	0.034	0.127	0.037	0.137	0.029	0.119	0.053	0.125	0.026	0.080	0.052
8.20	0.111	0.044	0.128	0.044	0.131	0.036	0.115	0.058	0.121	0.022	0.085	0.056
8.30	0.115	0.035	0.135	0.048	0.128	0.039	0.113	0.058	0.117	0.028	0.091	0.057
8.40	0.118	0.027	0.131	0.044	0.131	0.037	0.121	0.054	0.118	0.032	0.083	0.049
8.50	0.110	0.023	0.130	0.050	0.130	0.032	0.118	0.057	0.108	0.033	0.079	0.052
8.60	0.110	0.027	0.129	0.045	0.130	0.034	0.110	0.050	0.110	0.029	0.077	0.049
8.70	0.116	0.028	0.125	0.047	0.123	0.036	0.106	0.053	0.115	0.029	0.088	0.055
8.80	0.121	0.023	0.125	0.042	0.122	0.032	0.103	0.053	0.114	0.031	0.081	0.048
8.90	0.119	0.018	0.114	0.030	0.122	0.029	0.096	0.048	0.109	0.031	0.082	0.048
9.00	0.110	0.024	0.107	0.032	0.119	0.036	0.090	0.045	0.107	0.034	0.080	0.049

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
9.10	0.106	0.032	0.102	0.036	0.112	0.041	0.092	0.045	0.104	0.042	0.079	0.052
9.20	0.099	0.031	0.110	0.032	0.112	0.044	0.096	0.045	0.102	0.040	0.078	0.054
9.30	0.099	0.024	0.110	0.032	0.118	0.036	0.098	0.038	0.100	0.043	0.083	0.058
9.40	0.100	0.028	0.106	0.032	0.117	0.035	0.105	0.041	0.096	0.044	0.082	0.062
9.50	0.097	0.031	0.102	0.034	0.113	0.029	0.103	0.036	0.095	0.042	0.079	0.061
9.60	0.094	0.030	0.103	0.034	0.112	0.030	0.103	0.037	0.093	0.040	0.075	0.060
9.70	0.094	0.032	0.098	0.034	0.106	0.035	0.101	0.044	0.096	0.036	0.075	0.062
9.80	0.105	0.024	0.091	0.044	0.111	0.036	0.098	0.046	0.089	0.040	0.077	0.060
9.90	0.103	0.024	0.086	0.052	0.105	0.032	0.092	0.045	0.093	0.037	0.079	0.055
10.00	0.099	0.022	0.083	0.046	0.103	0.034	0.086	0.043	0.089	0.039	0.078	0.054
10.10	0.097	0.031	0.084	0.046	0.099	0.030	0.082	0.045	0.080	0.041	0.081	0.052
10.20	0.089	0.032	0.084	0.047	0.095	0.034	0.079	0.047	0.084	0.039	0.089	0.053
10.30	0.094	0.046	0.082	0.047	0.100	0.037	0.075	0.050	0.083	0.044	0.080	0.047
10.40	0.102	0.041	0.085	0.038	0.107	0.037	0.082	0.051	0.081	0.046	0.074	0.049
10.50	0.109	0.033	0.088	0.030	0.104	0.036	0.081	0.049	0.083	0.041	0.070	0.051
10.60	0.110	0.031	0.087	0.033	0.101	0.039	0.075	0.048	0.081	0.044	0.065	0.051
10.70	0.104	0.031	0.087	0.039	0.103	0.042	0.074	0.036	0.079	0.047	0.067	0.054
10.80	0.102	0.034	0.091	0.038	0.101	0.044	0.072	0.036	0.079	0.049	0.066	0.056
10.90	0.096	0.031	0.093	0.038	0.096	0.046	0.067	0.042	0.079	0.045	0.066	0.056
11.00	0.089	0.031	0.094	0.041	0.091	0.043	0.064	0.044	0.076	0.044	0.064	0.056
11.10	0.088	0.039	0.095	0.037	0.085	0.042	0.068	0.043	0.072	0.038	0.063	0.053
11.20	0.091	0.037	0.099	0.032	0.087	0.034	0.073	0.045	0.078	0.039	0.061	0.052
11.30	0.095	0.034	0.094	0.031	0.085	0.036	0.071	0.050	0.081	0.039	0.062	0.054
11.40	0.097	0.033	0.084	0.041	0.087	0.031	0.069	0.048	0.075	0.044	0.063	0.053
11.50	0.093	0.043	0.075	0.044	0.083	0.034	0.061	0.044	0.072	0.046	0.064	0.053
11.60	0.091	0.043	0.077	0.049	0.085	0.036	0.058	0.042	0.067	0.047	0.060	0.052
11.70	0.088	0.038	0.077	0.047	0.080	0.036	0.061	0.040	0.068	0.047	0.063	0.053
11.80	0.090	0.038	0.079	0.048	0.079	0.042	0.061	0.041	0.069	0.042	0.066	0.053
11.90	0.087	0.044	0.075	0.051	0.077	0.038	0.061	0.046	0.073	0.043	0.064	0.053
12.00	0.087	0.046	0.075	0.048	0.078	0.038	0.061	0.051	0.071	0.043	0.062	0.051
12.10	0.085	0.043	0.073	0.042	0.078	0.039	0.062	0.049	0.068	0.039	0.061	0.051

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
12.20	0.087	0.039	0.065	0.040	0.080	0.034	0.065	0.053	0.072	0.033	0.055	0.054
12.30	0.082	0.036	0.063	0.041	0.084	0.036	0.067	0.053	0.079	0.030	0.058	0.062
12.40	0.080	0.043	0.057	0.041	0.082	0.031	0.070	0.050	0.076	0.025	0.055	0.056
12.50	0.076	0.049	0.059	0.038	0.074	0.029	0.071	0.051	0.073	0.027	0.052	0.059
12.60	0.075	0.045	0.065	0.037	0.072	0.028	0.071	0.050	0.071	0.029	0.055	0.059
12.70	0.075	0.048	0.068	0.041	0.071	0.023	0.064	0.050	0.070	0.031	0.050	0.057
12.80	0.075	0.048	0.060	0.039	0.072	0.025	0.060	0.044	0.071	0.031	0.043	0.050
12.90	0.074	0.040	0.059	0.037	0.070	0.034	0.055	0.039	0.072	0.032	0.041	0.048
13.00	0.074	0.043	0.057	0.039	0.063	0.034	0.054	0.040	0.076	0.033	0.041	0.044
13.10	0.070	0.041	0.054	0.039	0.062	0.033	0.055	0.041	0.084	0.033	0.042	0.047
13.20	0.069	0.038	0.062	0.038	0.064	0.033	0.053	0.041	0.088	0.035	0.043	0.049
13.30	0.073	0.035	0.061	0.036	0.062	0.031	0.056	0.038	0.084	0.036	0.048	0.049
13.40	0.070	0.033	0.062	0.034	0.060	0.031	0.053	0.042	0.084	0.034	0.045	0.051
13.50	0.066	0.029	0.061	0.035	0.059	0.032	0.051	0.044	0.084	0.029	0.037	0.049
13.60	0.065	0.031	0.060	0.034	0.059	0.034	0.047	0.042	0.085	0.028	0.035	0.042
13.70	0.066	0.032	0.061	0.038	0.052	0.037	0.049	0.041	0.079	0.031	0.037	0.038
13.80	0.063	0.033	0.065	0.039	0.048	0.037	0.048	0.038	0.077	0.032	0.039	0.040
13.90	0.062	0.033	0.068	0.044	0.051	0.036	0.050	0.035	0.080	0.036	0.038	0.039
14.00	0.064	0.033	0.066	0.046	0.051	0.037	0.049	0.034	0.077	0.036	0.033	0.039
14.10	0.061	0.036	0.060	0.049	0.045	0.031	0.049	0.035	0.078	0.035	0.035	0.035
14.20	0.059	0.036	0.054	0.050	0.040	0.036	0.049	0.038	0.081	0.036	0.039	0.036
14.30	0.060	0.039	0.047	0.046	0.039	0.035	0.051	0.034	0.079	0.033	0.041	0.034
14.40	0.057	0.040	0.056	0.047	0.044	0.033	0.051	0.034	0.070	0.032	0.040	0.033
14.50	0.058	0.042	0.062	0.045	0.048	0.030	0.050	0.036	0.068	0.035	0.040	0.036
14.60	0.058	0.040	0.065	0.042	0.047	0.031	0.047	0.036	0.067	0.037	0.038	0.034
14.70	0.060	0.039	0.065	0.041	0.047	0.030	0.045	0.040	0.065	0.038	0.036	0.032
14.80	0.057	0.034	0.064	0.042	0.044	0.029	0.046	0.042	0.062	0.034	0.041	0.032
14.90	0.056	0.031	0.062	0.042	0.040	0.027	0.048	0.043	0.061	0.035	0.044	0.034
15.00	0.051	0.036	0.061	0.038	0.043	0.027	0.044	0.041	0.062	0.034	0.042	0.032
15.10	0.052	0.040	0.059	0.037	0.041	0.029	0.043	0.041	0.064	0.035	0.042	0.029
15.20	0.056	0.038	0.058	0.039	0.041	0.032	0.046	0.040	0.062	0.036	0.036	0.033

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
15.30	0.054	0.039	0.056	0.036	0.042	0.034	0.051	0.041	0.062	0.033	0.036	0.039
15.40	0.055	0.038	0.056	0.034	0.043	0.033	0.051	0.039	0.064	0.034	0.034	0.036
15.50	0.052	0.037	0.052	0.037	0.041	0.032	0.049	0.039	0.062	0.034	0.035	0.034
15.60	0.048	0.037	0.054	0.036	0.041	0.031	0.048	0.035	0.055	0.034	0.040	0.036
15.70	0.049	0.035	0.051	0.034	0.039	0.034	0.049	0.034	0.054	0.037	0.040	0.034
15.80	0.049	0.030	0.050	0.031	0.037	0.035	0.047	0.031	0.057	0.031	0.039	0.036
15.90	0.052	0.027	0.050	0.033	0.039	0.036	0.048	0.035	0.057	0.035	0.037	0.038
16.00	0.054	0.028	0.050	0.035	0.038	0.031	0.047	0.035	0.061	0.028	0.037	0.040
16.10	0.055	0.031	0.043	0.036	0.036	0.029	0.048	0.036	0.067	0.026	0.033	0.038
16.20	0.054	0.030	0.041	0.039	0.031	0.029	0.046	0.036	0.070	0.027	0.037	0.037
16.30	0.052	0.028	0.040	0.040	0.028	0.031	0.047	0.035	0.069	0.027	0.035	0.036
16.40	0.056	0.027	0.038	0.039	0.030	0.032	0.044	0.033	0.066	0.026	0.037	0.037
16.50	0.055	0.029	0.039	0.042	0.032	0.030	0.043	0.034	0.065	0.027	0.036	0.040
16.60	0.052	0.028	0.038	0.042	0.037	0.031	0.041	0.034	0.062	0.024	0.035	0.040
16.70	0.051	0.025	0.036	0.041	0.032	0.031	0.036	0.035	0.062	0.024	0.032	0.041
16.80	0.048	0.030	0.035	0.043	0.027	0.030	0.036	0.034	0.061	0.026	0.033	0.044
16.90	0.046	0.029	0.036	0.043	0.028	0.029	0.040	0.034	0.059	0.027	0.029	0.042
17.00	0.046	0.027	0.034	0.043	0.028	0.029	0.040	0.036	0.056	0.024	0.029	0.040
17.10	0.049	0.028	0.034	0.044	0.030	0.030	0.034	0.036	0.053	0.024	0.029	0.035
17.20	0.050	0.023	0.034	0.043	0.030	0.031	0.032	0.033	0.055	0.026	0.031	0.033
17.30	0.045	0.022	0.035	0.041	0.029	0.031	0.034	0.032	0.059	0.027	0.038	0.040
17.40	0.044	0.025	0.032	0.043	0.032	0.035	0.032	0.032	0.061	0.029	0.034	0.038
17.50	0.037	0.025	0.032	0.042	0.034	0.034	0.035	0.032	0.057	0.028	0.029	0.036
17.60	0.035	0.030	0.032	0.039	0.036	0.035	0.033	0.029	0.056	0.028	0.034	0.036
17.70	0.033	0.029	0.036	0.034	0.034	0.033	0.033	0.031	0.055	0.027	0.038	0.037
17.80	0.032	0.024	0.040	0.032	0.029	0.031	0.032	0.029	0.053	0.030	0.038	0.036
17.90	0.033	0.024	0.040	0.033	0.030	0.031	0.029	0.026	0.049	0.031	0.034	0.035
18.00	0.033	0.024	0.039	0.032	0.031	0.028	0.023	0.025	0.050	0.028	0.031	0.036
18.10	0.035	0.025	0.037	0.032	0.030	0.024	0.022	0.027	0.052	0.027	0.031	0.036
18.20	0.039	0.022	0.039	0.031	0.029	0.024	0.020	0.027	0.053	0.024	0.030	0.035
18.30	0.036	0.020	0.041	0.034	0.026	0.027	0.020	0.027	0.051	0.024	0.028	0.035

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
18.40	0.037	0.023	0.041	0.033	0.023	0.027	0.020	0.022	0.048	0.025	0.027	0.034
18.50	0.035	0.025	0.039	0.034	0.021	0.026	0.020	0.023	0.044	0.025	0.026	0.032
18.60	0.034	0.025	0.039	0.031	0.021	0.026	0.021	0.025	0.037	0.022	0.028	0.032
18.70	0.033	0.027	0.039	0.034	0.021	0.025	0.023	0.026	0.038	0.022	0.031	0.034
18.80	0.032	0.026	0.036	0.034	0.023	0.026	0.022	0.028	0.040	0.021	0.028	0.033
18.90	0.031	0.027	0.035	0.031	0.024	0.027	0.019	0.028	0.048	0.017	0.029	0.034
19.00	0.032	0.025	0.035	0.030	0.022	0.024	0.018	0.030	0.050	0.018	0.033	0.039
19.10	0.035	0.023	0.032	0.030	0.026	0.024	0.017	0.029	0.055	0.018	0.032	0.038
19.20	0.033	0.025	0.029	0.026	0.026	0.023	0.019	0.031	0.052	0.017	0.027	0.035
19.30	0.031	0.025	0.027	0.024	0.025	0.026	0.021	0.033	0.047	0.017	0.025	0.034
19.40	0.032	0.025	0.028	0.023	0.025	0.027	0.022	0.030	0.042	0.021	0.024	0.033
19.50	0.034	0.022	0.030	0.027	0.023	0.026	0.022	0.027	0.045	0.022	0.023	0.032
19.60	0.032	0.024	0.030	0.029	0.021	0.023	0.023	0.029	0.049	0.017	0.022	0.033
19.70	0.032	0.023	0.027	0.029	0.025	0.024	0.018	0.027	0.046	0.018	0.017	0.033
19.80	0.029	0.017	0.022	0.027	0.027	0.024	0.020	0.027	0.040	0.023	0.018	0.034
19.90	0.028	0.016	0.021	0.028	0.025	0.026	0.024	0.027	0.038	0.026	0.018	0.033
20.00	0.027	0.015	0.021	0.028	0.026	0.026	0.025	0.027	0.040	0.023	0.020	0.032
20.10	0.027	0.016	0.021	0.028	0.027	0.025	0.025	0.028	0.040	0.027	0.021	0.030
20.20	0.033	0.018	0.021	0.027	0.026	0.028	0.024	0.029	0.041	0.026	0.020	0.029
20.30	0.033	0.018	0.023	0.028	0.026	0.029	0.021	0.028	0.041	0.023	0.018	0.025
20.40	0.033	0.016	0.023	0.029	0.027	0.029	0.019	0.029	0.041	0.022	0.016	0.023
20.50	0.028	0.019	0.022	0.029	0.024	0.026	0.018	0.028	0.040	0.025	0.015	0.023
20.60	0.023	0.017	0.022	0.027	0.025	0.028	0.019	0.028	0.039	0.026	0.014	0.022
20.70	0.022	0.019	0.020	0.025	0.028	0.030	0.019	0.027	0.034	0.026	0.014	0.023
20.80	0.021	0.023	0.019	0.024	0.027	0.029	0.018	0.029	0.035	0.029	0.015	0.025
20.90	0.018	0.026	0.021	0.027	0.022	0.025	0.020	0.032	0.033	0.028	0.016	0.026
21.00	0.018	0.029	0.021	0.028	0.020	0.025	0.020	0.031	0.032	0.028	0.017	0.028
21.10	0.019	0.028	0.018	0.024	0.020	0.026	0.019	0.029	0.031	0.027	0.016	0.028
21.20	0.022	0.026	0.018	0.024	0.022	0.029	0.023	0.030	0.033	0.028	0.017	0.030
21.30	0.027	0.023	0.018	0.025	0.022	0.029	0.025	0.031	0.031	0.024	0.016	0.031
21.40	0.027	0.022	0.015	0.025	0.020	0.028	0.023	0.028	0.028	0.025	0.014	0.028

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
21.50	0.025	0.021	0.016	0.025	0.019	0.025	0.019	0.026	0.027	0.027	0.014	0.029
21.60	0.025	0.023	0.016	0.024	0.020	0.026	0.017	0.028	0.026	0.027	0.014	0.027
21.70	0.026	0.024	0.017	0.023	0.020	0.025	0.017	0.027	0.022	0.027	0.012	0.028
21.80	0.027	0.024	0.016	0.023	0.020	0.024	0.015	0.023	0.022	0.026	0.013	0.030
21.90	0.027	0.023	0.016	0.023	0.019	0.023	0.013	0.023	0.025	0.025	0.015	0.031
22.00	0.024	0.023	0.015	0.021	0.018	0.023	0.012	0.023	0.024	0.024	0.015	0.029
22.10	0.022	0.022	0.018	0.020	0.016	0.023	0.012	0.023	0.024	0.025	0.017	0.027
22.20	0.022	0.021	0.019	0.020	0.020	0.029	0.011	0.023	0.021	0.024	0.017	0.027
22.30	0.022	0.022	0.017	0.021	0.021	0.028	0.013	0.024	0.027	0.024	0.018	0.028
22.40	0.023	0.024	0.017	0.023	0.022	0.029	0.014	0.026	0.030	0.024	0.017	0.030
22.50	0.020	0.023	0.015	0.022	0.023	0.031	0.014	0.024	0.027	0.024	0.014	0.027
22.60	0.019	0.025	0.014	0.022	0.024	0.031	0.010	0.020	0.024	0.020	0.013	0.025
22.70	0.018	0.024	0.014	0.023	0.023	0.029	0.010	0.021	0.024	0.021	0.015	0.026
22.80	0.016	0.022	0.017	0.024	0.022	0.029	0.012	0.023	0.025	0.021	0.018	0.027
22.90	0.014	0.021	0.019	0.023	0.023	0.031	0.010	0.024	0.024	0.022	0.015	0.024
23.00	0.012	0.020	0.023	0.026	0.023	0.031	0.008	0.024	0.024	0.024	0.014	0.022
23.10	0.012	0.019	0.023	0.027	0.024	0.030	0.009	0.025	0.025	0.024	0.013	0.021
23.20	0.014	0.020	0.022	0.026	0.024	0.031	0.007	0.023	0.023	0.023	0.013	0.020
23.30	0.016	0.018	0.019	0.026	0.022	0.029	0.005	0.021	0.021	0.022	0.013	0.018
23.40	0.015	0.017	0.018	0.025	0.020	0.028	0.004	0.020	0.021	0.018	0.014	0.020
23.50	0.013	0.016	0.018	0.025	0.016	0.027	0.004	0.019	0.021	0.018	0.013	0.020
23.60	0.014	0.016	0.018	0.023	0.017	0.024	0.006	0.020	0.024	0.021	0.012	0.021
23.70	0.013	0.016	0.018	0.024	0.020	0.025	0.006	0.019	0.023	0.022	0.013	0.020
23.80	0.014	0.015	0.017	0.023	0.024	0.025	0.008	0.021	0.022	0.018	0.016	0.018
23.90	0.016	0.017	0.019	0.024	0.028	0.024	0.012	0.023	0.019	0.017	0.018	0.019
24.00	0.018	0.021	0.019	0.021	0.026	0.023	0.011	0.021	0.016	0.019	0.019	0.022
24.10	0.015	0.019	0.020	0.019	0.024	0.023	0.010	0.019	0.015	0.018	0.019	0.023
24.20	0.012	0.018	0.019	0.020	0.027	0.025	0.008	0.017	0.014	0.017	0.019	0.023
24.30	0.013	0.018	0.016	0.020	0.026	0.025	0.008	0.017	0.011	0.017	0.016	0.023
24.40	0.013	0.019	0.014	0.020	0.023	0.027	0.009	0.019	0.010	0.018	0.015	0.022
24.50	0.012	0.018	0.015	0.019	0.022	0.027	0.011	0.021	0.009	0.019	0.016	0.025

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
24.60	0.012	0.017	0.016	0.018	0.021	0.026	0.010	0.020	0.007	0.018	0.015	0.024
24.70	0.012	0.018	0.016	0.019	0.018	0.023	0.007	0.019	0.008	0.020	0.013	0.023
24.80	0.013	0.019	0.015	0.019	0.017	0.023	0.006	0.017	0.010	0.020	0.011	0.022
24.90	0.014	0.021	0.014	0.020	0.018	0.025	0.005	0.017	0.008	0.018	0.011	0.021
25.00	0.017	0.020	0.012	0.022	0.019	0.025	0.006	0.017	0.008	0.017	0.010	0.021
25.10	0.016	0.019	0.014	0.026	0.021	0.026	0.008	0.019	0.008	0.017	0.009	0.021
25.20	0.018	0.019	0.016	0.026	0.020	0.024	0.007	0.019	0.010	0.018	0.008	0.019
25.30	0.022	0.021	0.015	0.025	0.017	0.022	0.008	0.020	0.011	0.018	0.008	0.019
25.40	0.022	0.022	0.013	0.021	0.016	0.021	0.009	0.020	0.011	0.020	0.009	0.021
25.50	0.021	0.023	0.011	0.021	0.014	0.021	0.010	0.022	0.011	0.020	0.008	0.020
25.60	0.020	0.023	0.012	0.023	0.017	0.024	0.011	0.022	0.012	0.022	0.006	0.018
25.70	0.016	0.023	0.013	0.024	0.020	0.023	0.012	0.023	0.011	0.022	0.007	0.018
25.80	0.015	0.023	0.013	0.025	0.020	0.022	0.013	0.023	0.011	0.022	0.007	0.019
25.90	0.016	0.024	0.014	0.024	0.018	0.022	0.014	0.022	0.011	0.023	0.010	0.023
26.00	0.016	0.023	0.014	0.023	0.015	0.021	0.016	0.022	0.011	0.022	0.013	0.027
26.10	0.016	0.024	0.012	0.021	0.013	0.021	0.015	0.021	0.010	0.021	0.012	0.029
26.20	0.017	0.024	0.010	0.019	0.014	0.022	0.012	0.021	0.009	0.020	0.011	0.029
26.30	0.017	0.023	0.009	0.019	0.013	0.023	0.011	0.021	0.009	0.020	0.012	0.031
26.40	0.020	0.025	0.008	0.021	0.013	0.023	0.012	0.020	0.011	0.022	0.013	0.028
26.50	0.020	0.027	0.006	0.021	0.013	0.023	0.011	0.022	0.013	0.023	0.011	0.023
26.60	0.019	0.026	0.006	0.020	0.015	0.024	0.011	0.024	0.012	0.022	0.008	0.023
26.70	0.017	0.026	0.008	0.021	0.016	0.025	0.008	0.022	0.012	0.022	0.007	0.023
26.80	0.015	0.023	0.011	0.020	0.014	0.025	0.007	0.021	0.015	0.023	0.006	0.023
26.90	0.013	0.020	0.013	0.021	0.012	0.023	0.007	0.020	0.014	0.023	0.005	0.022
27.00	0.012	0.020	0.014	0.020	0.012	0.020	0.007	0.020	0.013	0.024	0.002	0.020
27.10	0.011	0.020	0.011	0.020	0.011	0.019	0.007	0.020	0.012	0.023	0.002	0.022
27.20	0.010	0.018	0.009	0.019	0.012	0.021	0.007	0.021	0.011	0.022	0.002	0.023
27.30	0.007	0.015	0.009	0.016	0.012	0.021	0.008	0.022	0.011	0.022	0.003	0.023
27.40	0.006	0.015	0.010	0.018	0.011	0.022	0.008	0.021	0.011	0.024	0.004	0.024
27.50	0.006	0.015	0.013	0.024	0.011	0.023	0.008	0.022	0.011	0.024	0.004	0.021
27.60	0.006	0.016	0.013	0.024	0.012	0.024	0.008	0.022	0.011	0.025	0.004	0.020

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
27.70	0.006	0.017	0.013	0.023	0.011	0.024	0.007	0.021	0.011	0.026	0.005	0.020
27.80	0.006	0.018	0.011	0.022	0.009	0.023	0.005	0.021	0.010	0.025	0.004	0.019
27.90	0.007	0.017	0.009	0.022	0.008	0.022	0.004	0.021	0.011	0.026	0.003	0.020
28.00	0.008	0.015	0.009	0.021	0.008	0.022	0.004	0.020	0.010	0.025	0.002	0.018
28.10	0.008	0.017	0.009	0.020	0.007	0.021	0.004	0.020	0.010	0.025	0.002	0.019
28.20	0.008	0.019	0.011	0.020	0.006	0.019	0.005	0.019	0.010	0.025	0.002	0.018
28.30	0.008	0.019	0.013	0.021	0.007	0.018	0.005	0.021	0.011	0.026	0.000	0.018
28.40	0.008	0.019	0.012	0.021	0.007	0.019	0.006	0.023	0.011	0.025	-0.001	0.017
28.50	0.008	0.018	0.010	0.018	0.008	0.021	0.006	0.025	0.011	0.024	-0.002	0.014
28.60	0.008	0.018	0.009	0.017	0.008	0.022	0.005	0.024	0.009	0.022	-0.001	0.017
28.70	0.009	0.017	0.011	0.022	0.007	0.024	0.004	0.023	0.007	0.020	0.000	0.018
28.80	0.009	0.017	0.013	0.026	0.008	0.023	0.005	0.022	0.007	0.020	-0.001	0.016
28.90	0.009	0.017	0.013	0.026	0.008	0.021	0.004	0.022	0.007	0.019	-0.002	0.016
29.00	0.010	0.018	0.013	0.026	0.009	0.020	0.002	0.021	0.008	0.019	-0.002	0.015
29.10	0.011	0.020	0.013	0.023	0.010	0.019	0.001	0.019	0.009	0.021	-0.003	0.014
29.20	0.011	0.021	0.012	0.020	0.010	0.020	0.001	0.017	0.009	0.020	-0.003	0.012
29.30	0.011	0.022	0.012	0.022	0.009	0.019	0.001	0.017	0.010	0.018	-0.005	0.009
29.40	0.011	0.022	0.013	0.022	0.007	0.018	0.001	0.017	0.013	0.019	-0.006	0.007
29.50	0.010	0.021	0.014	0.022	0.007	0.019	0.000	0.016	0.013	0.021	-0.007	0.008
29.60	0.008	0.018	0.014	0.021	0.006	0.019	0.002	0.015	0.011	0.019	-0.006	0.009
29.70	0.007	0.017	0.015	0.021	0.004	0.018	0.002	0.015	0.010	0.018	-0.006	0.010
29.80	0.006	0.015	0.017	0.022	0.004	0.019	0.002	0.015	0.009	0.017	-0.007	0.009
29.90	0.007	0.015	0.017	0.022	0.002	0.019	0.000	0.015	0.008	0.019	-0.008	0.008
30.00	0.006	0.015	0.018	0.022	0.002	0.019	0.000	0.016	0.007	0.019	-0.007	0.007

Small-Tank Wall Velocity Data, contd.

Velocities Measured at 0.394 m (15.5 in) Radial Position										
Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
0.10	0.010	0.022	0.015	0.017	0.015	0.015	-0.003	0.014	0.018	0.030
0.20	0.018	0.022	0.018	0.019	0.023	0.017	-0.001	0.017	0.019	0.026
0.30	0.024	0.021	0.023	0.023	0.027	0.026	0.011	0.020	0.020	0.030
0.40	0.031	0.022	0.023	0.030	0.027	0.026	0.015	0.020	0.021	0.031
0.50	0.039	0.024	0.023	0.031	0.028	0.026	0.018	0.022	0.023	0.032
0.60	0.044	0.025	0.024	0.032	0.030	0.027	0.019	0.023	0.024	0.034
0.70	0.046	0.028	0.027	0.032	0.031	0.027	0.021	0.025	0.023	0.033
0.80	0.049	0.030	0.030	0.032	0.034	0.028	0.023	0.025	0.023	0.032
0.90	0.054	0.032	0.032	0.032	0.034	0.027	0.024	0.025	0.024	0.032
1.00	0.067	0.027	0.033	0.033	0.036	0.026	0.027	0.026	0.024	0.030
1.10	0.089	0.022	0.038	0.035	0.040	0.026	0.030	0.026	0.026	0.029
1.20	0.112	0.031	0.044	0.034	0.047	0.027	0.034	0.027	0.029	0.030
1.30	0.151	0.076	0.055	0.034	0.058	0.026	0.038	0.028	0.032	0.031
1.40	0.162	0.114	0.070	0.035	0.067	0.024	0.041	0.027	0.035	0.032
1.50	0.177	0.156	0.089	0.053	0.073	0.024	0.046	0.027	0.037	0.032
1.60	0.182	0.145	0.098	0.076	0.075	0.030	0.050	0.026	0.037	0.033
1.70	0.210	0.116	0.097	0.069	0.081	0.060	0.052	0.028	0.038	0.034
1.80	0.261	0.099	0.112	0.094	0.083	0.089	0.050	0.031	0.038	0.034
1.90	0.280	0.076	0.110	0.080	0.077	0.102	0.043	0.034	0.038	0.035
2.00	0.291	0.088	0.108	0.075	0.059	0.083	0.036	0.036	0.036	0.034
2.10	0.334	0.110	0.138	0.091	0.050	0.060	0.027	0.030	0.032	0.034
2.20	0.341	0.101	0.176	0.117	0.060	0.058	0.017	0.024	0.027	0.030
2.30	0.354	0.076	0.182	0.101	0.069	0.058	0.015	0.024	0.025	0.028
2.40	0.401	0.071	0.187	0.082	0.098	0.082	0.014	0.024	0.023	0.029
2.50	0.362	0.085	0.192	0.072	0.117	0.098	0.014	0.031	0.028	0.038
2.60	0.383	0.074	0.226	0.101	0.146	0.118	0.012	0.029	0.030	0.038
2.70	0.350	0.045	0.237	0.103	0.145	0.109	0.009	0.024	0.032	0.042
2.80	0.407	0.093	0.237	0.107	0.158	0.102	0.017	0.034	0.034	0.041

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
2.90	0.395	0.071	0.253	0.105	0.153	0.099	0.023	0.034	0.038	0.045
3.00	0.383	0.076	0.267	0.092	0.162	0.094	0.036	0.047	0.034	0.045
3.10	0.421	0.126	0.277	0.098	0.185	0.096	0.038	0.043	0.038	0.049
3.20	0.413	0.085	0.269	0.084	0.164	0.107	0.035	0.038	0.043	0.059
3.30	0.413	0.081	0.282	0.095	0.151	0.096	0.043	0.065	0.039	0.066
3.40	0.402	0.070	0.264	0.101	0.156	0.086	0.043	0.062	0.037	0.074
3.50	0.369	0.109	0.254	0.082	0.188	0.102	0.061	0.086	0.032	0.054
3.60	0.439	0.110	0.257	0.102	0.175	0.113	0.064	0.070	0.031	0.048
3.70	0.422	0.103	0.245	0.097	0.172	0.126	0.053	0.062	0.033	0.050
3.80	0.388	0.113	0.236	0.095	0.166	0.116	0.039	0.046	0.033	0.051
3.90	0.369	0.104	0.234	0.110	0.176	0.123	0.025	0.039	0.029	0.036
4.00	0.347	0.102	0.239	0.132	0.164	0.106	0.026	0.057	0.035	0.036
4.10	0.322	0.099	0.225	0.116	0.157	0.094	0.017	0.038	0.035	0.046
4.20	0.300	0.092	0.214	0.098	0.163	0.103	0.014	0.030	0.032	0.044
4.30	0.293	0.071	0.192	0.085	0.173	0.102	0.014	0.035	0.034	0.045
4.40	0.282	0.083	0.182	0.074	0.179	0.106	0.017	0.045	0.026	0.036
4.50	0.281	0.076	0.182	0.074	0.169	0.099	0.028	0.059	0.021	0.028
4.60	0.271	0.073	0.178	0.074	0.180	0.104	0.045	0.069	0.019	0.028
4.70	0.263	0.079	0.177	0.085	0.170	0.087	0.042	0.064	0.020	0.036
4.80	0.265	0.075	0.172	0.094	0.155	0.075	0.051	0.082	0.020	0.045
4.90	0.231	0.061	0.163	0.089	0.155	0.077	0.046	0.080	0.017	0.040
5.00	0.229	0.060	0.157	0.095	0.155	0.076	0.048	0.083	0.013	0.033
5.10	0.215	0.050	0.134	0.085	0.152	0.092	0.045	0.078	0.007	0.030
5.20	0.203	0.061	0.120	0.065	0.146	0.088	0.049	0.077	0.003	0.029
5.30	0.205	0.056	0.111	0.077	0.136	0.081	0.051	0.082	0.006	0.034
5.40	0.205	0.061	0.113	0.084	0.125	0.073	0.045	0.074	0.008	0.032
5.50	0.197	0.050	0.108	0.073	0.116	0.068	0.046	0.077	0.008	0.032
5.60	0.167	0.043	0.105	0.077	0.102	0.068	0.042	0.068	0.009	0.034
5.70	0.164	0.055	0.109	0.085	0.092	0.074	0.035	0.058	0.008	0.036
5.80	0.165	0.032	0.096	0.069	0.095	0.076	0.043	0.063	0.013	0.039
5.90	0.157	0.046	0.086	0.076	0.096	0.071	0.045	0.067	0.012	0.039

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
6.00	0.150	0.038	0.087	0.069	0.079	0.066	0.041	0.063	0.011	0.037
6.10	0.140	0.036	0.086	0.067	0.076	0.067	0.032	0.056	0.011	0.034
6.20	0.132	0.042	0.079	0.068	0.071	0.068	0.032	0.061	0.013	0.036
6.30	0.123	0.050	0.068	0.071	0.059	0.062	0.039	0.070	0.011	0.035
6.40	0.116	0.054	0.061	0.078	0.048	0.058	0.043	0.076	0.006	0.034
6.50	0.111	0.059	0.066	0.081	0.048	0.064	0.040	0.069	0.008	0.033
6.60	0.098	0.058	0.058	0.077	0.047	0.062	0.036	0.063	0.007	0.031
6.70	0.099	0.066	0.061	0.084	0.054	0.065	0.033	0.066	0.005	0.030
6.80	0.098	0.062	0.063	0.077	0.056	0.071	0.034	0.070	0.006	0.029
6.90	0.108	0.063	0.062	0.071	0.059	0.076	0.037	0.070	0.008	0.030
7.00	0.120	0.055	0.068	0.074	0.057	0.070	0.032	0.065	0.007	0.029
7.10	0.117	0.050	0.059	0.072	0.059	0.067	0.029	0.062	0.006	0.027
7.20	0.110	0.057	0.055	0.068	0.057	0.066	0.026	0.059	0.003	0.023
7.30	0.104	0.053	0.058	0.053	0.052	0.068	0.030	0.063	0.003	0.023
7.40	0.101	0.052	0.062	0.053	0.052	0.075	0.036	0.060	0.003	0.024
7.50	0.100	0.057	0.065	0.050	0.053	0.075	0.037	0.055	0.004	0.025
7.60	0.092	0.054	0.056	0.047	0.060	0.068	0.027	0.053	0.005	0.025
7.70	0.091	0.049	0.053	0.052	0.054	0.063	0.026	0.054	0.007	0.027
7.80	0.097	0.051	0.056	0.056	0.049	0.066	0.030	0.060	0.010	0.030
7.90	0.107	0.050	0.055	0.053	0.047	0.066	0.031	0.064	0.009	0.029
8.00	0.105	0.047	0.058	0.053	0.043	0.058	0.027	0.060	0.007	0.026
8.10	0.100	0.045	0.062	0.050	0.037	0.051	0.024	0.047	0.005	0.024
8.20	0.089	0.041	0.057	0.047	0.039	0.053	0.028	0.047	0.005	0.022
8.30	0.079	0.054	0.054	0.051	0.038	0.051	0.028	0.056	0.003	0.022
8.40	0.092	0.060	0.055	0.058	0.037	0.054	0.031	0.061	0.006	0.023
8.50	0.089	0.062	0.057	0.065	0.034	0.051	0.033	0.052	0.009	0.028
8.60	0.086	0.057	0.054	0.058	0.035	0.052	0.035	0.057	0.012	0.029
8.70	0.088	0.048	0.051	0.057	0.040	0.050	0.034	0.058	0.014	0.030
8.80	0.085	0.051	0.046	0.053	0.041	0.056	0.033	0.054	0.014	0.033
8.90	0.079	0.049	0.043	0.054	0.032	0.058	0.033	0.050	0.014	0.035
9.00	0.082	0.047	0.041	0.054	0.030	0.058	0.031	0.046	0.011	0.029

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
9.10	0.083	0.049	0.043	0.053	0.034	0.057	0.032	0.043	0.014	0.035
9.20	0.080	0.050	0.044	0.057	0.037	0.059	0.034	0.040	0.016	0.035
9.30	0.084	0.042	0.047	0.057	0.032	0.056	0.036	0.045	0.016	0.032
9.40	0.079	0.047	0.044	0.055	0.030	0.054	0.039	0.046	0.014	0.029
9.50	0.079	0.045	0.043	0.055	0.029	0.049	0.048	0.045	0.011	0.027
9.60	0.083	0.046	0.043	0.052	0.031	0.048	0.045	0.045	0.013	0.029
9.70	0.085	0.047	0.047	0.048	0.035	0.054	0.045	0.046	0.014	0.031
9.80	0.084	0.053	0.044	0.054	0.041	0.058	0.046	0.048	0.014	0.029
9.90	0.088	0.053	0.045	0.053	0.044	0.057	0.049	0.054	0.013	0.025
10.00	0.086	0.055	0.051	0.054	0.041	0.051	0.049	0.058	0.013	0.022
10.10	0.081	0.052	0.055	0.052	0.036	0.048	0.054	0.064	0.012	0.024
10.20	0.075	0.051	0.051	0.053	0.035	0.054	0.048	0.051	0.015	0.026
10.30	0.068	0.052	0.047	0.051	0.038	0.060	0.051	0.062	0.015	0.027
10.40	0.072	0.053	0.049	0.050	0.045	0.056	0.053	0.067	0.018	0.029
10.50	0.073	0.053	0.049	0.053	0.047	0.055	0.047	0.063	0.022	0.030
10.60	0.077	0.054	0.047	0.053	0.050	0.058	0.042	0.065	0.020	0.030
10.70	0.082	0.052	0.055	0.058	0.048	0.050	0.041	0.061	0.017	0.026
10.80	0.085	0.044	0.055	0.058	0.046	0.044	0.044	0.065	0.016	0.024
10.90	0.088	0.043	0.056	0.056	0.050	0.047	0.046	0.067	0.019	0.032
11.00	0.089	0.044	0.053	0.052	0.052	0.051	0.044	0.067	0.013	0.027
11.10	0.094	0.049	0.051	0.053	0.054	0.047	0.044	0.062	0.010	0.023
11.20	0.093	0.049	0.046	0.054	0.051	0.046	0.048	0.059	0.010	0.023
11.30	0.091	0.045	0.041	0.056	0.046	0.040	0.049	0.058	0.018	0.026
11.40	0.090	0.046	0.043	0.054	0.041	0.043	0.045	0.058	0.025	0.026
11.50	0.094	0.049	0.046	0.058	0.039	0.043	0.042	0.055	0.032	0.025
11.60	0.098	0.051	0.042	0.057	0.043	0.045	0.041	0.051	0.035	0.023
11.70	0.088	0.053	0.042	0.058	0.041	0.049	0.044	0.058	0.039	0.026
11.80	0.089	0.051	0.042	0.053	0.038	0.047	0.046	0.053	0.036	0.031
11.90	0.093	0.050	0.046	0.055	0.038	0.046	0.046	0.051	0.031	0.029
12.00	0.091	0.048	0.049	0.055	0.037	0.045	0.050	0.052	0.032	0.028
12.10	0.088	0.046	0.055	0.054	0.032	0.045	0.047	0.051	0.030	0.025

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
12.20	0.089	0.049	0.053	0.047	0.035	0.042	0.050	0.050	0.033	0.026
12.30	0.085	0.050	0.049	0.042	0.037	0.045	0.052	0.046	0.036	0.031
12.40	0.080	0.047	0.046	0.044	0.036	0.052	0.050	0.051	0.032	0.031
12.50	0.078	0.042	0.043	0.047	0.040	0.048	0.048	0.055	0.033	0.029
12.60	0.081	0.042	0.047	0.045	0.036	0.042	0.048	0.051	0.031	0.031
12.70	0.079	0.039	0.046	0.045	0.039	0.043	0.049	0.051	0.034	0.033
12.80	0.073	0.040	0.043	0.047	0.043	0.043	0.056	0.054	0.038	0.035
12.90	0.070	0.043	0.039	0.043	0.046	0.044	0.054	0.050	0.045	0.039
13.00	0.073	0.042	0.037	0.041	0.045	0.046	0.060	0.054	0.045	0.039
13.10	0.069	0.042	0.043	0.041	0.044	0.043	0.060	0.056	0.043	0.041
13.20	0.062	0.043	0.045	0.038	0.047	0.046	0.059	0.055	0.040	0.039
13.30	0.064	0.041	0.048	0.043	0.044	0.045	0.058	0.054	0.041	0.041
13.40	0.068	0.041	0.049	0.043	0.040	0.045	0.056	0.053	0.044	0.044
13.50	0.071	0.044	0.046	0.041	0.041	0.042	0.056	0.054	0.050	0.053
13.60	0.069	0.044	0.043	0.042	0.045	0.048	0.056	0.058	0.052	0.052
13.70	0.070	0.045	0.043	0.042	0.043	0.045	0.058	0.062	0.056	0.048
13.80	0.069	0.043	0.037	0.040	0.048	0.045	0.057	0.060	0.057	0.046
13.90	0.070	0.045	0.038	0.040	0.050	0.048	0.055	0.058	0.052	0.044
14.00	0.065	0.043	0.035	0.037	0.049	0.045	0.056	0.056	0.050	0.046
14.10	0.061	0.040	0.035	0.036	0.047	0.042	0.055	0.052	0.052	0.046
14.20	0.062	0.039	0.035	0.037	0.050	0.045	0.058	0.054	0.053	0.044
14.30	0.062	0.036	0.038	0.037	0.056	0.046	0.055	0.056	0.054	0.041
14.40	0.064	0.036	0.039	0.035	0.055	0.045	0.060	0.058	0.056	0.040
14.50	0.062	0.035	0.043	0.034	0.054	0.044	0.062	0.057	0.051	0.038
14.60	0.063	0.037	0.040	0.031	0.050	0.042	0.057	0.053	0.048	0.031
14.70	0.057	0.042	0.035	0.035	0.049	0.044	0.058	0.051	0.046	0.027
14.80	0.055	0.043	0.035	0.039	0.050	0.045	0.054	0.049	0.044	0.028
14.90	0.055	0.043	0.039	0.039	0.046	0.047	0.055	0.050	0.044	0.027
15.00	0.053	0.039	0.040	0.037	0.046	0.049	0.053	0.051	0.047	0.029
15.10	0.055	0.039	0.038	0.036	0.047	0.050	0.052	0.048	0.045	0.032
15.20	0.054	0.041	0.038	0.037	0.043	0.049	0.049	0.047	0.044	0.033

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
15.30	0.050	0.039	0.032	0.037	0.047	0.050	0.046	0.045	0.044	0.034
15.40	0.050	0.034	0.030	0.041	0.052	0.044	0.048	0.042	0.044	0.036
15.50	0.050	0.034	0.031	0.044	0.056	0.045	0.055	0.044	0.043	0.037
15.60	0.050	0.029	0.034	0.043	0.055	0.047	0.055	0.044	0.042	0.036
15.70	0.046	0.027	0.033	0.042	0.053	0.044	0.052	0.043	0.041	0.033
15.80	0.046	0.031	0.030	0.037	0.050	0.042	0.051	0.043	0.044	0.036
15.90	0.048	0.033	0.031	0.037	0.050	0.045	0.052	0.046	0.044	0.035
16.00	0.046	0.037	0.034	0.038	0.050	0.044	0.051	0.045	0.046	0.034
16.10	0.044	0.037	0.035	0.042	0.050	0.043	0.047	0.043	0.044	0.032
16.20	0.041	0.035	0.032	0.040	0.052	0.042	0.048	0.044	0.044	0.029
16.30	0.041	0.035	0.034	0.043	0.054	0.039	0.047	0.046	0.045	0.028
16.40	0.043	0.036	0.038	0.044	0.052	0.044	0.044	0.041	0.044	0.027
16.50	0.043	0.037	0.040	0.044	0.051	0.044	0.042	0.037	0.046	0.027
16.60	0.047	0.038	0.034	0.044	0.050	0.043	0.041	0.038	0.048	0.028
16.70	0.044	0.039	0.032	0.044	0.052	0.041	0.041	0.041	0.050	0.026
16.80	0.042	0.037	0.032	0.041	0.050	0.038	0.043	0.040	0.050	0.024
16.90	0.041	0.040	0.032	0.042	0.043	0.036	0.044	0.041	0.051	0.025
17.00	0.040	0.041	0.033	0.040	0.044	0.036	0.045	0.038	0.048	0.026
17.10	0.039	0.041	0.034	0.039	0.046	0.034	0.047	0.038	0.046	0.028
17.20	0.038	0.039	0.036	0.039	0.045	0.030	0.048	0.039	0.046	0.026
17.30	0.038	0.037	0.031	0.040	0.043	0.035	0.046	0.035	0.044	0.025
17.40	0.037	0.037	0.026	0.037	0.042	0.036	0.048	0.033	0.042	0.030
17.50	0.037	0.038	0.023	0.037	0.040	0.035	0.048	0.034	0.041	0.034
17.60	0.036	0.040	0.022	0.036	0.042	0.033	0.046	0.036	0.038	0.031
17.70	0.034	0.040	0.024	0.035	0.043	0.034	0.044	0.036	0.035	0.029
17.80	0.033	0.039	0.023	0.033	0.040	0.036	0.043	0.037	0.036	0.031
17.90	0.034	0.036	0.022	0.030	0.040	0.033	0.041	0.038	0.033	0.030
18.00	0.034	0.032	0.024	0.029	0.044	0.030	0.036	0.035	0.030	0.030
18.10	0.031	0.031	0.024	0.030	0.049	0.028	0.038	0.035	0.032	0.025
18.20	0.026	0.032	0.025	0.029	0.048	0.026	0.038	0.036	0.036	0.024
18.30	0.024	0.033	0.024	0.029	0.043	0.025	0.035	0.037	0.034	0.030

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
18.40	0.025	0.034	0.022	0.030	0.044	0.025	0.030	0.032	0.030	0.031
18.50	0.026	0.033	0.020	0.029	0.042	0.026	0.029	0.031	0.030	0.030
18.60	0.025	0.032	0.018	0.029	0.040	0.027	0.029	0.031	0.030	0.027
18.70	0.025	0.034	0.017	0.029	0.038	0.027	0.029	0.032	0.031	0.029
18.80	0.027	0.037	0.019	0.028	0.038	0.025	0.029	0.032	0.030	0.029
18.90	0.029	0.041	0.022	0.028	0.039	0.027	0.029	0.034	0.031	0.030
19.00	0.028	0.038	0.024	0.031	0.039	0.027	0.028	0.033	0.031	0.033
19.10	0.023	0.033	0.024	0.034	0.036	0.026	0.029	0.035	0.036	0.034
19.20	0.023	0.033	0.025	0.036	0.035	0.028	0.030	0.035	0.035	0.033
19.30	0.023	0.034	0.023	0.035	0.030	0.029	0.030	0.034	0.032	0.033
19.40	0.025	0.034	0.023	0.035	0.030	0.027	0.029	0.034	0.031	0.033
19.50	0.027	0.035	0.024	0.037	0.030	0.027	0.028	0.034	0.028	0.035
19.60	0.026	0.034	0.021	0.035	0.029	0.027	0.025	0.033	0.026	0.035
19.70	0.025	0.035	0.018	0.031	0.030	0.030	0.023	0.031	0.026	0.034
19.80	0.023	0.035	0.017	0.032	0.031	0.030	0.018	0.029	0.029	0.034
19.90	0.023	0.034	0.020	0.032	0.032	0.030	0.021	0.030	0.030	0.033
20.00	0.020	0.032	0.022	0.033	0.032	0.031	0.025	0.031	0.030	0.030
20.10	0.019	0.030	0.021	0.032	0.034	0.032	0.027	0.032	0.027	0.030
20.20	0.018	0.029	0.019	0.032	0.033	0.031	0.024	0.031	0.027	0.028
20.30	0.018	0.032	0.022	0.033	0.036	0.033	0.027	0.033	0.029	0.027
20.40	0.021	0.029	0.023	0.032	0.034	0.033	0.026	0.033	0.028	0.025
20.50	0.021	0.029	0.024	0.032	0.030	0.033	0.024	0.033	0.027	0.025
20.60	0.023	0.033	0.025	0.031	0.028	0.033	0.024	0.032	0.027	0.025
20.70	0.022	0.030	0.026	0.031	0.025	0.033	0.025	0.032	0.028	0.026
20.80	0.023	0.030	0.027	0.031	0.025	0.033	0.026	0.031	0.027	0.027
20.90	0.023	0.030	0.026	0.030	0.025	0.032	0.028	0.033	0.023	0.026
21.00	0.023	0.028	0.026	0.030	0.025	0.033	0.031	0.035	0.024	0.026
21.10	0.023	0.026	0.024	0.029	0.029	0.033	0.029	0.034	0.023	0.028
21.20	0.021	0.024	0.021	0.030	0.031	0.032	0.030	0.031	0.021	0.027
21.30	0.020	0.021	0.017	0.031	0.032	0.034	0.029	0.031	0.019	0.026
21.40	0.019	0.018	0.018	0.032	0.034	0.035	0.027	0.032	0.020	0.026

Velocities Measured at 0.394 m (15.5 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
21.50	0.017	0.018	0.021	0.029	0.033	0.032	0.028	0.032	0.019	0.026
21.60	0.018	0.020	0.020	0.028	0.032	0.029	0.027	0.028	0.017	0.027
21.70	0.020	0.027	0.020	0.028	0.035	0.034	0.025	0.027	0.016	0.026
21.80	0.020	0.027	0.018	0.026	0.033	0.035	0.026	0.026	0.016	0.023
21.90	0.021	0.024	0.019	0.028	0.033	0.037	0.026	0.025	0.016	0.022
22.00	0.021	0.023	0.018	0.030	0.034	0.036	0.025	0.024	0.015	0.023
22.10	0.020	0.023	0.017	0.030	0.032	0.036	0.025	0.026	0.015	0.024
22.20	0.020	0.025	0.016	0.027	0.029	0.035	0.024	0.026	0.014	0.025
22.30	0.021	0.025	0.015	0.027	0.028	0.036	0.023	0.025	0.015	0.026
22.40	0.023	0.025	0.015	0.029	0.026	0.035	0.024	0.026	0.018	0.026
22.50	0.023	0.022	0.017	0.030	0.025	0.034	0.024	0.024	0.020	0.026
22.60	0.022	0.022	0.015	0.026	0.027	0.033	0.019	0.023	0.020	0.025
22.70	0.019	0.023	0.014	0.027	0.027	0.031	0.014	0.022	0.020	0.026
22.80	0.020	0.025	0.014	0.029	0.029	0.029	0.012	0.020	0.019	0.026
22.90	0.021	0.025	0.015	0.029	0.031	0.032	0.011	0.020	0.019	0.025
23.00	0.017	0.021	0.013	0.028	0.031	0.033	0.012	0.018	0.018	0.025
23.10	0.013	0.021	0.013	0.029	0.030	0.034	0.013	0.018	0.018	0.026
23.20	0.013	0.021	0.014	0.029	0.028	0.032	0.018	0.022	0.018	0.026
23.30	0.015	0.019	0.013	0.026	0.029	0.030	0.021	0.025	0.018	0.026
23.40	0.014	0.018	0.013	0.023	0.027	0.033	0.022	0.024	0.020	0.028
23.50	0.013	0.020	0.013	0.023	0.027	0.034	0.023	0.022	0.024	0.029
23.60	0.012	0.023	0.013	0.024	0.029	0.035	0.023	0.019	0.023	0.028
23.70	0.012	0.023	0.016	0.025	0.028	0.034	0.024	0.020	0.022	0.028
23.80	0.013	0.021	0.021	0.027	0.024	0.031	0.024	0.022	0.023	0.030
23.90	0.012	0.022	0.020	0.025	0.022	0.026	0.024	0.023	0.022	0.030
24.00	0.012	0.021	0.019	0.025	0.022	0.026	0.026	0.024	0.020	0.029
24.10	0.014	0.020	0.020	0.027	0.022	0.026	0.024	0.022	0.021	0.029
24.20	0.015	0.019	0.017	0.025	0.023	0.028	0.021	0.024	0.022	0.030
24.30	0.015	0.019	0.016	0.024	0.024	0.027	0.021	0.023	0.024	0.029
24.40	0.015	0.020	0.016	0.023	0.023	0.025	0.025	0.024	0.025	0.029
24.50	0.016	0.020	0.015	0.023	0.025	0.026	0.028	0.026	0.026	0.030

Velocities Measured at 0.394 m (15.5 in) Radial Position										
Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev
		(m/s)		(m/s)		(m/s)		(m/s)		(m/s)
24.60	0.017	0.021	0.014	0.024	0.025	0.026	0.027	0.027	0.028	0.032
24.70	0.018	0.022	0.014	0.024	0.027	0.028	0.024	0.026	0.030	0.032
24.80	0.016	0.021	0.013	0.023	0.029	0.030	0.023	0.025	0.028	0.030
24.90	0.014	0.019	0.014	0.023	0.030	0.030	0.023	0.025	0.026	0.028
25.00	0.012	0.018	0.016	0.026	0.032	0.031	0.023	0.024	0.025	0.029
25.10	0.011	0.019	0.016	0.025	0.032	0.031	0.022	0.023	0.024	0.029
25.20	0.009	0.019	0.016	0.024	0.029	0.030	0.023	0.024	0.023	0.029
25.30	0.009	0.020	0.016	0.026	0.026	0.028	0.022	0.025	0.021	0.029
25.40	0.009	0.019	0.014	0.027	0.026	0.029	0.022	0.024	0.019	0.028
25.50	0.008	0.018	0.012	0.024	0.026	0.028	0.021	0.024	0.019	0.028
25.60	0.008	0.019	0.010	0.023	0.026	0.028	0.021	0.023	0.019	0.027
25.70	0.007	0.018	0.009	0.022	0.026	0.028	0.020	0.022	0.019	0.026
25.80	0.008	0.017	0.009	0.019	0.024	0.028	0.019	0.024	0.020	0.026
25.90	0.010	0.019	0.011	0.021	0.022	0.025	0.018	0.025	0.019	0.025
26.00	0.009	0.019	0.013	0.022	0.022	0.025	0.017	0.024	0.020	0.026
26.10	0.010	0.020	0.012	0.025	0.024	0.026	0.018	0.023	0.018	0.028
26.20	0.009	0.021	0.009	0.023	0.024	0.025	0.019	0.024	0.017	0.029
26.30	0.008	0.019	0.008	0.019	0.022	0.024	0.019	0.023	0.016	0.027
26.40	0.006	0.019	0.009	0.021	0.021	0.022	0.018	0.022	0.014	0.026
26.50	0.006	0.019	0.010	0.022	0.023	0.023	0.017	0.022	0.013	0.026
26.60	0.006	0.020	0.011	0.023	0.024	0.025	0.015	0.021	0.013	0.025
26.70	0.007	0.019	0.012	0.025	0.024	0.028	0.014	0.018	0.013	0.025
26.80	0.009	0.020	0.013	0.027	0.023	0.029	0.013	0.018	0.014	0.025
26.90	0.010	0.020	0.014	0.026	0.022	0.028	0.013	0.019	0.015	0.027
27.00	0.011	0.020	0.015	0.024	0.023	0.028	0.013	0.020	0.016	0.027
27.10	0.011	0.020	0.015	0.022	0.023	0.028	0.013	0.022	0.015	0.027
27.20	0.011	0.021	0.016	0.022	0.024	0.030	0.014	0.022	0.014	0.027
27.30	0.012	0.021	0.015	0.021	0.023	0.030	0.014	0.022	0.014	0.027
27.40	0.012	0.020	0.014	0.021	0.021	0.028	0.015	0.024	0.014	0.027
27.50	0.013	0.020	0.015	0.021	0.020	0.028	0.014	0.025	0.015	0.028
27.60	0.013	0.018	0.015	0.022	0.019	0.027	0.012	0.025	0.016	0.028

Velocities Measured at 0.394 m (15.5 in) Radial Position										
Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev
		(m/s)		(m/s)		(m/s)		(m/s)		(m/s)
27.70	0.012	0.015	0.017	0.025	0.017	0.025	0.011	0.023	0.016	0.029
27.80	0.013	0.015	0.015	0.023	0.013	0.022	0.010	0.020	0.016	0.030
27.90	0.015	0.018	0.014	0.022	0.013	0.023	0.009	0.017	0.016	0.030
28.00	0.016	0.019	0.013	0.020	0.014	0.024	0.009	0.018	0.016	0.030
28.10	0.017	0.020	0.010	0.017	0.013	0.023	0.009	0.018	0.017	0.031
28.20	0.016	0.020	0.009	0.016	0.012	0.022	0.009	0.020	0.018	0.030
28.30	0.014	0.020	0.008	0.018	0.013	0.024	0.008	0.019	0.017	0.029
28.40	0.013	0.020	0.007	0.018	0.013	0.024	0.005	0.019	0.016	0.029
28.50	0.012	0.020	0.004	0.015	0.014	0.023	0.004	0.021	0.014	0.028
28.60	0.011	0.020	0.002	0.014	0.015	0.021	0.006	0.022	0.014	0.029
28.70	0.011	0.020	0.003	0.013	0.016	0.021	0.005	0.021	0.015	0.028
28.80	0.012	0.021	0.006	0.015	0.016	0.021	0.005	0.021	0.017	0.026
28.90	0.012	0.021	0.007	0.016	0.015	0.019	0.006	0.022	0.018	0.022
29.00	0.012	0.022	0.009	0.019	0.016	0.018	0.005	0.019	0.019	0.021
29.10	0.012	0.024	0.009	0.021	0.016	0.017	0.005	0.020	0.018	0.022
29.20	0.012	0.025	0.009	0.021	0.016	0.015	0.004	0.019	0.017	0.024
29.30	0.011	0.023	0.011	0.020	0.016	0.016	0.003	0.018	0.016	0.025
29.40	0.009	0.022	0.011	0.018	0.017	0.016	0.001	0.017	0.016	0.025
29.50	0.008	0.022	0.012	0.019	0.017	0.017	0.000	0.017	0.015	0.025
29.60	0.008	0.022	0.011	0.019	0.015	0.015	0.000	0.016	0.015	0.025
29.70	0.008	0.021	0.010	0.018	0.014	0.015	0.001	0.016	0.016	0.025
29.80	0.009	0.021	0.010	0.017	0.012	0.014	0.000	0.016	0.016	0.027
29.90	0.010	0.022	0.011	0.017	0.012	0.015	-0.001	0.016	0.017	0.029
30.00	0.009	0.023	0.013	0.017	0.013	0.016	-0.001	0.016	0.018	0.030

Small-Tank Wall Velocity Data, contd.

Cycle Time (sec)	Velocities Measured at 0.406 m (16 in) Radial Position											
	1.59E-2-m (0.625-in)	1.59E-2-m (0.625-in)	2.86E-2-m (1.125-in)	2.86E-2-m (1.125-in)	5.40E-2-m (2.125-in)	5.40E-2-m (2.125-in)	7.94E-2-m (3.125-in)	7.94E-2-m (3.125-in)	0.105-m (4.125-in)	0.105-m (4.125-in)	0.130-m (5.125-in)	0.130-m (5.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
0.10	-0.004	0.012	-0.005	0.011	0.009	0.022	0.002	0.016	0.000	0.024	0.014	0.021
0.20	-0.004	0.012	-0.005	0.012	0.008	0.022	0.002	0.017	0.001	0.025	0.014	0.021
0.30	-0.005	0.011	-0.004	0.011	0.006	0.016	0.007	0.021	0.006	0.026	0.017	0.024
0.40	-0.007	0.010	-0.004	0.010	0.006	0.016	0.013	0.023	0.016	0.028	0.022	0.028
0.50	-0.007	0.010	0.006	0.011	0.019	0.019	0.029	0.022	0.038	0.029	0.037	0.029
0.60	-0.001	0.012	0.034	0.012	0.049	0.015	0.059	0.016	0.074	0.021	0.066	0.023
0.70	0.022	0.014	0.061	0.017	0.088	0.011	0.095	0.013	0.113	0.016	0.097	0.016
0.80	0.056	0.025	0.120	0.057	0.155	0.062	0.146	0.048	0.159	0.020	0.131	0.016
0.90	0.141	0.061	0.239	0.067	0.260	0.082	0.231	0.077	0.228	0.068	0.171	0.028
1.00	0.269	0.083	0.396	0.113	0.521	0.082	0.414	0.127	0.396	0.088	0.264	0.079
1.10	0.346	0.103	0.461	0.081	0.596	0.071	0.579	0.090	0.570	0.090	0.416	0.096
1.20	0.302	0.088	0.388	0.084	0.577	0.082	0.652	0.079	0.619	0.074	0.497	0.132
1.30	0.299	0.108	0.364	0.084	0.498	0.069	0.631	0.048	0.626	0.053	0.602	0.078
1.40	0.263	0.093	0.408	0.128	0.457	0.063	0.555	0.082	0.551	0.057	0.571	0.063
1.50	0.308	0.070	0.354	0.072	0.472	0.075	0.501	0.061	0.520	0.061	0.554	0.084
1.60	0.294	0.093	0.414	0.088	0.452	0.085	0.481	0.071	0.481	0.075	0.510	0.052
1.70	0.286	0.074	0.398	0.076	0.444	0.068	0.459	0.055	0.462	0.078	0.491	0.065
1.80	0.315	0.086	0.358	0.092	0.436	0.074	0.459	0.067	0.486	0.053	0.489	0.072
1.90	0.284	0.084	0.340	0.108	0.438	0.056	0.477	0.078	0.459	0.060	0.470	0.073
2.00	0.276	0.105	0.440	0.122	0.473	0.052	0.486	0.074	0.496	0.062	0.496	0.085
2.10	0.327	0.086	0.355	0.095	0.481	0.060	0.509	0.090	0.495	0.095	0.475	0.075
2.20	0.283	0.071	0.380	0.091	0.478	0.073	0.547	0.056	0.529	0.048	0.493	0.077
2.30	0.329	0.108	0.372	0.071	0.478	0.084	0.486	0.052	0.487	0.077	0.486	0.104
2.40	0.334	0.082	0.416	0.096	0.482	0.085	0.495	0.084	0.493	0.066	0.477	0.070
2.50	0.329	0.106	0.382	0.079	0.465	0.049	0.484	0.057	0.513	0.070	0.521	0.067
2.60	0.309	0.099	0.355	0.093	0.482	0.060	0.478	0.058	0.497	0.076	0.511	0.062
2.70	0.306	0.068	0.359	0.078	0.467	0.049	0.508	0.079	0.499	0.080	0.509	0.072
2.80	0.299	0.071	0.405	0.111	0.468	0.078	0.503	0.088	0.540	0.082	0.479	0.070

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
2.90	0.281	0.074	0.356	0.090	0.484	0.112	0.489	0.085	0.509	0.070	0.502	0.078
3.00	0.295	0.084	0.325	0.074	0.487	0.109	0.486	0.083	0.510	0.081	0.512	0.082
3.10	0.305	0.091	0.418	0.088	0.467	0.071	0.505	0.092	0.521	0.076	0.526	0.083
3.20	0.300	0.103	0.359	0.079	0.461	0.062	0.520	0.073	0.521	0.067	0.537	0.069
3.30	0.286	0.083	0.381	0.134	0.475	0.057	0.483	0.047	0.525	0.073	0.495	0.072
3.40	0.250	0.051	0.322	0.073	0.478	0.087	0.495	0.090	0.499	0.061	0.452	0.078
3.50	0.259	0.053	0.274	0.063	0.384	0.060	0.448	0.090	0.441	0.067	0.454	0.093
3.60	0.208	0.045	0.242	0.050	0.312	0.066	0.400	0.079	0.385	0.054	0.437	0.078
3.70	0.194	0.032	0.217	0.031	0.268	0.048	0.317	0.065	0.357	0.049	0.413	0.058
3.80	0.154	0.026	0.179	0.028	0.236	0.053	0.298	0.072	0.332	0.051	0.377	0.051
3.90	0.144	0.032	0.169	0.027	0.206	0.049	0.255	0.054	0.290	0.033	0.342	0.050
4.00	0.124	0.042	0.151	0.034	0.204	0.044	0.265	0.038	0.277	0.031	0.318	0.046
4.10	0.117	0.031	0.141	0.036	0.191	0.041	0.236	0.028	0.275	0.029	0.305	0.044
4.20	0.103	0.035	0.119	0.031	0.182	0.033	0.209	0.031	0.255	0.041	0.290	0.037
4.30	0.098	0.036	0.109	0.032	0.161	0.028	0.191	0.033	0.230	0.045	0.267	0.042
4.40	0.085	0.029	0.108	0.028	0.156	0.022	0.202	0.031	0.214	0.039	0.263	0.040
4.50	0.079	0.030	0.109	0.024	0.147	0.034	0.196	0.033	0.206	0.041	0.245	0.034
4.60	0.082	0.021	0.093	0.035	0.137	0.022	0.182	0.023	0.198	0.036	0.229	0.029
4.70	0.074	0.028	0.081	0.035	0.125	0.026	0.176	0.026	0.191	0.031	0.224	0.033
4.80	0.061	0.028	0.075	0.031	0.123	0.029	0.164	0.028	0.184	0.041	0.229	0.031
4.90	0.064	0.034	0.075	0.027	0.120	0.035	0.169	0.035	0.176	0.053	0.226	0.039
5.00	0.076	0.038	0.080	0.032	0.115	0.038	0.172	0.044	0.170	0.051	0.215	0.042
5.10	0.071	0.036	0.078	0.035	0.116	0.034	0.166	0.041	0.168	0.041	0.209	0.043
5.20	0.072	0.046	0.083	0.031	0.116	0.025	0.162	0.038	0.168	0.040	0.213	0.040
5.30	0.072	0.043	0.092	0.032	0.108	0.024	0.152	0.028	0.162	0.037	0.208	0.045
5.40	0.072	0.038	0.090	0.030	0.107	0.027	0.154	0.026	0.152	0.040	0.201	0.045
5.50	0.071	0.045	0.091	0.026	0.100	0.030	0.152	0.026	0.153	0.037	0.194	0.055
5.60	0.068	0.049	0.090	0.028	0.103	0.031	0.150	0.027	0.150	0.041	0.189	0.050
5.70	0.074	0.047	0.100	0.024	0.110	0.037	0.152	0.025	0.149	0.043	0.200	0.046
5.80	0.079	0.044	0.099	0.032	0.114	0.044	0.155	0.028	0.153	0.047	0.200	0.045
5.90	0.083	0.047	0.089	0.034	0.121	0.031	0.152	0.035	0.154	0.044	0.187	0.040

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
6.00	0.088	0.054	0.079	0.039	0.118	0.034	0.149	0.037	0.151	0.050	0.192	0.041
6.10	0.084	0.053	0.089	0.036	0.117	0.035	0.144	0.030	0.152	0.046	0.189	0.040
6.20	0.094	0.052	0.093	0.036	0.119	0.038	0.137	0.034	0.155	0.052	0.174	0.037
6.30	0.084	0.052	0.088	0.037	0.121	0.035	0.141	0.026	0.150	0.053	0.163	0.037
6.40	0.081	0.052	0.099	0.036	0.111	0.036	0.135	0.031	0.157	0.040	0.160	0.041
6.50	0.080	0.052	0.101	0.032	0.111	0.044	0.129	0.031	0.158	0.043	0.168	0.040
6.60	0.081	0.049	0.096	0.037	0.113	0.052	0.132	0.033	0.159	0.046	0.177	0.019
6.70	0.077	0.048	0.090	0.040	0.123	0.050	0.136	0.035	0.168	0.049	0.173	0.022
6.80	0.075	0.050	0.094	0.040	0.116	0.037	0.138	0.042	0.161	0.048	0.169	0.026
6.90	0.074	0.043	0.094	0.035	0.122	0.038	0.132	0.041	0.155	0.048	0.167	0.021
7.00	0.067	0.042	0.087	0.034	0.119	0.042	0.129	0.044	0.150	0.046	0.167	0.025
7.10	0.074	0.043	0.087	0.031	0.117	0.048	0.127	0.046	0.139	0.035	0.161	0.016
7.20	0.076	0.043	0.090	0.032	0.120	0.044	0.126	0.048	0.133	0.038	0.157	0.026
7.30	0.067	0.045	0.095	0.034	0.119	0.038	0.126	0.046	0.132	0.045	0.161	0.026
7.40	0.068	0.042	0.088	0.028	0.119	0.038	0.128	0.042	0.134	0.042	0.162	0.029
7.50	0.062	0.041	0.082	0.024	0.122	0.029	0.129	0.042	0.142	0.031	0.160	0.032
7.60	0.061	0.039	0.083	0.028	0.119	0.024	0.125	0.046	0.136	0.036	0.151	0.035
7.70	0.061	0.035	0.086	0.031	0.118	0.021	0.124	0.039	0.136	0.028	0.145	0.030
7.80	0.060	0.027	0.088	0.034	0.112	0.029	0.122	0.030	0.132	0.034	0.148	0.028
7.90	0.065	0.024	0.083	0.033	0.115	0.024	0.116	0.036	0.137	0.033	0.142	0.026
8.00	0.066	0.026	0.081	0.036	0.109	0.027	0.110	0.036	0.132	0.030	0.143	0.025
8.10	0.062	0.025	0.076	0.045	0.111	0.021	0.115	0.030	0.126	0.032	0.139	0.027
8.20	0.058	0.027	0.069	0.041	0.106	0.020	0.119	0.026	0.119	0.029	0.135	0.026
8.30	0.065	0.040	0.068	0.040	0.096	0.016	0.118	0.028	0.122	0.039	0.140	0.031
8.40	0.069	0.045	0.066	0.042	0.095	0.021	0.121	0.028	0.118	0.046	0.137	0.029
8.50	0.064	0.039	0.065	0.042	0.096	0.026	0.125	0.028	0.107	0.053	0.140	0.029
8.60	0.066	0.032	0.078	0.042	0.113	0.022	0.125	0.027	0.107	0.050	0.139	0.030
8.70	0.066	0.026	0.081	0.043	0.108	0.033	0.124	0.031	0.102	0.055	0.130	0.031
8.80	0.064	0.026	0.086	0.039	0.105	0.032	0.120	0.033	0.097	0.055	0.130	0.030
8.90	0.063	0.034	0.079	0.045	0.096	0.037	0.117	0.035	0.105	0.050	0.122	0.035
9.00	0.064	0.037	0.075	0.042	0.087	0.036	0.115	0.034	0.107	0.043	0.122	0.035

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
9.10	0.068	0.033	0.077	0.044	0.098	0.034	0.108	0.036	0.113	0.039	0.120	0.042
9.20	0.064	0.033	0.069	0.044	0.094	0.032	0.106	0.029	0.107	0.037	0.117	0.043
9.30	0.064	0.031	0.067	0.044	0.095	0.030	0.104	0.024	0.106	0.042	0.112	0.036
9.40	0.067	0.030	0.070	0.037	0.092	0.028	0.109	0.028	0.101	0.042	0.109	0.034
9.50	0.069	0.033	0.065	0.040	0.087	0.033	0.110	0.030	0.106	0.044	0.108	0.035
9.60	0.070	0.032	0.068	0.041	0.088	0.035	0.112	0.026	0.109	0.048	0.116	0.036
9.70	0.073	0.039	0.063	0.043	0.088	0.033	0.110	0.026	0.105	0.053	0.111	0.037
9.80	0.067	0.042	0.059	0.045	0.081	0.031	0.107	0.028	0.104	0.054	0.110	0.039
9.90	0.068	0.040	0.053	0.042	0.074	0.039	0.110	0.032	0.100	0.051	0.114	0.035
10.00	0.055	0.032	0.058	0.040	0.072	0.038	0.107	0.035	0.101	0.048	0.119	0.029
10.10	0.050	0.032	0.056	0.040	0.072	0.031	0.098	0.034	0.096	0.044	0.114	0.029
10.20	0.049	0.039	0.057	0.050	0.070	0.029	0.102	0.035	0.091	0.043	0.114	0.032
10.30	0.048	0.033	0.061	0.049	0.067	0.036	0.103	0.033	0.094	0.046	0.109	0.040
10.40	0.045	0.034	0.064	0.040	0.069	0.046	0.103	0.024	0.093	0.049	0.104	0.042
10.50	0.041	0.031	0.062	0.035	0.066	0.044	0.106	0.021	0.085	0.044	0.103	0.040
10.60	0.039	0.034	0.059	0.041	0.066	0.039	0.106	0.028	0.088	0.048	0.099	0.041
10.70	0.046	0.031	0.062	0.046	0.064	0.034	0.102	0.035	0.086	0.049	0.095	0.043
10.80	0.051	0.032	0.062	0.046	0.065	0.034	0.103	0.026	0.081	0.050	0.087	0.039
10.90	0.051	0.033	0.062	0.043	0.065	0.034	0.099	0.027	0.079	0.046	0.088	0.039
11.00	0.050	0.036	0.059	0.039	0.063	0.031	0.095	0.028	0.077	0.042	0.094	0.041
11.10	0.047	0.039	0.061	0.042	0.065	0.031	0.089	0.035	0.078	0.040	0.096	0.028
11.20	0.045	0.034	0.062	0.047	0.067	0.032	0.088	0.031	0.081	0.039	0.097	0.025
11.30	0.050	0.032	0.071	0.038	0.066	0.033	0.089	0.027	0.084	0.043	0.098	0.028
11.40	0.042	0.025	0.068	0.032	0.063	0.033	0.094	0.025	0.080	0.039	0.094	0.022
11.50	0.040	0.021	0.063	0.026	0.062	0.034	0.094	0.028	0.080	0.039	0.095	0.027
11.60	0.043	0.020	0.059	0.026	0.054	0.032	0.088	0.027	0.073	0.040	0.089	0.017
11.70	0.044	0.022	0.057	0.031	0.059	0.037	0.083	0.029	0.075	0.046	0.083	0.022
11.80	0.045	0.025	0.054	0.036	0.058	0.038	0.080	0.027	0.077	0.039	0.085	0.025
11.90	0.049	0.032	0.054	0.035	0.062	0.038	0.077	0.029	0.080	0.034	0.088	0.015
12.00	0.041	0.032	0.058	0.034	0.061	0.037	0.080	0.027	0.076	0.033	0.092	0.017
12.10	0.041	0.038	0.056	0.034	0.063	0.039	0.078	0.025	0.076	0.031	0.086	0.017

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
12.20	0.040	0.033	0.048	0.036	0.062	0.043	0.073	0.028	0.079	0.035	0.086	0.021
12.30	0.039	0.032	0.051	0.031	0.055	0.037	0.067	0.026	0.071	0.037	0.087	0.024
12.40	0.035	0.032	0.053	0.035	0.055	0.040	0.065	0.025	0.069	0.038	0.085	0.030
12.50	0.035	0.032	0.048	0.037	0.049	0.034	0.063	0.025	0.068	0.037	0.084	0.036
12.60	0.037	0.033	0.049	0.035	0.052	0.032	0.058	0.028	0.070	0.035	0.082	0.033
12.70	0.040	0.036	0.047	0.035	0.053	0.033	0.058	0.033	0.070	0.036	0.081	0.025
12.80	0.038	0.034	0.039	0.032	0.046	0.034	0.062	0.031	0.067	0.033	0.079	0.021
12.90	0.029	0.031	0.033	0.030	0.043	0.032	0.064	0.026	0.061	0.032	0.077	0.033
13.00	0.030	0.030	0.036	0.032	0.045	0.038	0.061	0.029	0.056	0.035	0.071	0.036
13.10	0.030	0.033	0.037	0.033	0.043	0.037	0.058	0.031	0.057	0.035	0.067	0.035
13.20	0.032	0.032	0.036	0.035	0.044	0.038	0.059	0.024	0.059	0.037	0.071	0.032
13.30	0.031	0.035	0.036	0.038	0.047	0.033	0.060	0.023	0.057	0.037	0.067	0.034
13.40	0.027	0.033	0.035	0.035	0.050	0.029	0.060	0.025	0.057	0.036	0.066	0.038
13.50	0.028	0.032	0.029	0.032	0.051	0.026	0.057	0.028	0.058	0.034	0.072	0.036
13.60	0.030	0.033	0.029	0.033	0.050	0.027	0.054	0.029	0.056	0.037	0.073	0.032
13.70	0.033	0.036	0.025	0.032	0.044	0.027	0.050	0.029	0.061	0.029	0.073	0.031
13.80	0.034	0.031	0.027	0.034	0.043	0.027	0.045	0.030	0.059	0.027	0.067	0.030
13.90	0.030	0.030	0.025	0.030	0.038	0.023	0.049	0.029	0.052	0.029	0.067	0.030
14.00	0.030	0.033	0.024	0.029	0.037	0.024	0.046	0.026	0.048	0.036	0.069	0.034
14.10	0.025	0.034	0.022	0.028	0.036	0.031	0.049	0.029	0.045	0.037	0.058	0.036
14.20	0.027	0.034	0.020	0.031	0.029	0.030	0.049	0.033	0.049	0.034	0.056	0.037
14.30	0.027	0.030	0.020	0.029	0.027	0.030	0.046	0.035	0.053	0.032	0.056	0.037
14.40	0.023	0.027	0.025	0.026	0.034	0.032	0.046	0.038	0.054	0.036	0.053	0.034
14.50	0.018	0.027	0.028	0.027	0.032	0.034	0.050	0.038	0.055	0.038	0.052	0.034
14.60	0.020	0.028	0.032	0.024	0.027	0.033	0.052	0.037	0.057	0.040	0.053	0.034
14.70	0.025	0.026	0.032	0.023	0.027	0.031	0.050	0.035	0.058	0.038	0.052	0.036
14.80	0.022	0.023	0.032	0.023	0.033	0.027	0.049	0.034	0.058	0.040	0.047	0.033
14.90	0.021	0.025	0.031	0.024	0.031	0.030	0.049	0.038	0.055	0.038	0.049	0.032
15.00	0.018	0.028	0.029	0.025	0.031	0.033	0.049	0.034	0.057	0.033	0.048	0.031
15.10	0.016	0.024	0.026	0.023	0.032	0.032	0.046	0.028	0.059	0.035	0.052	0.031
15.20	0.016	0.026	0.020	0.020	0.038	0.029	0.042	0.031	0.058	0.033	0.055	0.032

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
15.30	0.016	0.028	0.022	0.025	0.036	0.025	0.040	0.033	0.054	0.034	0.052	0.032
15.40	0.014	0.021	0.020	0.023	0.035	0.023	0.037	0.035	0.051	0.037	0.050	0.029
15.50	0.012	0.019	0.013	0.020	0.038	0.026	0.035	0.036	0.048	0.041	0.051	0.027
15.60	0.014	0.023	0.010	0.020	0.036	0.028	0.035	0.035	0.048	0.042	0.055	0.028
15.70	0.021	0.025	0.011	0.020	0.035	0.027	0.036	0.036	0.047	0.043	0.053	0.032
15.80	0.021	0.021	0.011	0.018	0.035	0.027	0.033	0.035	0.048	0.042	0.056	0.031
15.90	0.025	0.023	0.014	0.021	0.033	0.027	0.034	0.035	0.045	0.040	0.057	0.029
16.00	0.027	0.025	0.018	0.027	0.032	0.031	0.038	0.034	0.045	0.037	0.056	0.029
16.10	0.027	0.025	0.016	0.024	0.034	0.028	0.037	0.033	0.043	0.035	0.055	0.031
16.20	0.026	0.026	0.014	0.021	0.035	0.025	0.036	0.034	0.044	0.036	0.053	0.033
16.30	0.026	0.028	0.014	0.023	0.034	0.025	0.039	0.036	0.048	0.033	0.055	0.033
16.40	0.025	0.029	0.011	0.022	0.034	0.029	0.043	0.036	0.047	0.035	0.050	0.035
16.50	0.026	0.029	0.010	0.021	0.034	0.027	0.041	0.035	0.045	0.033	0.044	0.039
16.60	0.026	0.029	0.013	0.026	0.037	0.028	0.039	0.036	0.047	0.033	0.043	0.040
16.70	0.025	0.031	0.014	0.031	0.035	0.024	0.041	0.038	0.043	0.033	0.043	0.040
16.80	0.021	0.029	0.012	0.028	0.030	0.025	0.042	0.038	0.042	0.033	0.040	0.040
16.90	0.022	0.028	0.012	0.025	0.033	0.030	0.042	0.035	0.040	0.034	0.037	0.039
17.00	0.024	0.027	0.008	0.019	0.033	0.030	0.037	0.034	0.041	0.033	0.037	0.034
17.10	0.026	0.027	0.008	0.018	0.030	0.027	0.037	0.036	0.037	0.035	0.042	0.031
17.20	0.024	0.028	0.011	0.020	0.028	0.023	0.036	0.038	0.033	0.039	0.040	0.030
17.30	0.025	0.027	0.014	0.024	0.028	0.024	0.035	0.035	0.029	0.038	0.044	0.033
17.40	0.023	0.026	0.013	0.025	0.025	0.022	0.033	0.032	0.031	0.038	0.042	0.035
17.50	0.025	0.028	0.012	0.024	0.027	0.021	0.032	0.034	0.035	0.040	0.043	0.040
17.60	0.023	0.028	0.012	0.024	0.025	0.022	0.031	0.034	0.036	0.037	0.042	0.040
17.70	0.021	0.025	0.011	0.022	0.021	0.024	0.031	0.034	0.036	0.032	0.041	0.042
17.80	0.021	0.026	0.012	0.024	0.022	0.025	0.031	0.033	0.039	0.033	0.040	0.040
17.90	0.019	0.022	0.014	0.026	0.022	0.023	0.029	0.032	0.040	0.033	0.041	0.039
18.00	0.017	0.022	0.014	0.025	0.022	0.020	0.027	0.029	0.041	0.034	0.039	0.039
18.10	0.018	0.025	0.013	0.024	0.022	0.023	0.026	0.029	0.043	0.034	0.038	0.037
18.20	0.020	0.024	0.012	0.025	0.021	0.023	0.023	0.030	0.044	0.036	0.041	0.034
18.30	0.019	0.022	0.011	0.023	0.019	0.022	0.023	0.031	0.043	0.037	0.042	0.033

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
18.40	0.015	0.021	0.010	0.023	0.017	0.020	0.026	0.032	0.042	0.034	0.039	0.035
18.50	0.015	0.020	0.010	0.026	0.015	0.019	0.027	0.032	0.040	0.033	0.037	0.035
18.60	0.017	0.024	0.011	0.026	0.015	0.020	0.028	0.032	0.037	0.034	0.037	0.036
18.70	0.017	0.025	0.012	0.025	0.016	0.019	0.027	0.034	0.032	0.034	0.036	0.036
18.80	0.018	0.026	0.012	0.025	0.018	0.018	0.024	0.033	0.033	0.032	0.035	0.033
18.90	0.017	0.026	0.011	0.024	0.017	0.017	0.023	0.034	0.029	0.032	0.036	0.032
19.00	0.017	0.025	0.011	0.024	0.015	0.017	0.021	0.035	0.029	0.033	0.035	0.029
19.10	0.018	0.025	0.011	0.022	0.013	0.016	0.021	0.036	0.028	0.032	0.030	0.027
19.20	0.017	0.023	0.012	0.021	0.011	0.016	0.020	0.035	0.032	0.030	0.028	0.025
19.30	0.016	0.021	0.013	0.023	0.012	0.017	0.023	0.037	0.032	0.030	0.028	0.025
19.40	0.017	0.025	0.012	0.022	0.012	0.021	0.025	0.035	0.027	0.028	0.029	0.027
19.50	0.019	0.023	0.008	0.017	0.016	0.023	0.025	0.034	0.022	0.028	0.030	0.026
19.60	0.021	0.021	0.006	0.018	0.017	0.021	0.023	0.029	0.024	0.031	0.028	0.027
19.70	0.017	0.021	0.006	0.019	0.017	0.020	0.023	0.027	0.026	0.033	0.027	0.030
19.80	0.014	0.021	0.006	0.019	0.014	0.015	0.027	0.028	0.026	0.033	0.028	0.028
19.90	0.015	0.025	0.007	0.021	0.015	0.014	0.025	0.025	0.028	0.032	0.026	0.026
20.00	0.013	0.025	0.008	0.024	0.012	0.013	0.022	0.025	0.029	0.031	0.029	0.028
20.10	0.012	0.024	0.008	0.024	0.008	0.013	0.026	0.028	0.030	0.029	0.028	0.027
20.20	0.012	0.023	0.008	0.024	0.006	0.011	0.026	0.028	0.031	0.029	0.026	0.026
20.30	0.013	0.021	0.007	0.025	0.010	0.012	0.020	0.024	0.034	0.029	0.026	0.025
20.40	0.015	0.024	0.006	0.024	0.013	0.014	0.020	0.023	0.034	0.027	0.026	0.024
20.50	0.014	0.026	0.005	0.023	0.015	0.016	0.021	0.025	0.035	0.026	0.023	0.022
20.60	0.015	0.028	0.005	0.023	0.015	0.018	0.019	0.025	0.036	0.028	0.024	0.021
20.70	0.015	0.026	0.003	0.020	0.016	0.018	0.018	0.025	0.036	0.027	0.025	0.022
20.80	0.015	0.023	0.003	0.020	0.016	0.019	0.016	0.023	0.032	0.028	0.026	0.024
20.90	0.012	0.018	0.005	0.021	0.015	0.020	0.014	0.022	0.029	0.031	0.026	0.025
21.00	0.012	0.017	0.005	0.021	0.014	0.017	0.014	0.023	0.027	0.031	0.026	0.026
21.10	0.013	0.019	0.004	0.019	0.012	0.018	0.015	0.025	0.025	0.028	0.026	0.026
21.20	0.013	0.022	0.004	0.019	0.011	0.017	0.017	0.025	0.027	0.030	0.027	0.026
21.30	0.013	0.023	0.005	0.019	0.009	0.019	0.017	0.024	0.026	0.031	0.027	0.027
21.40	0.012	0.019	0.006	0.019	0.010	0.021	0.016	0.024	0.026	0.031	0.025	0.028

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
21.50	0.012	0.016	0.007	0.017	0.011	0.020	0.017	0.025	0.026	0.032	0.023	0.030
21.60	0.013	0.016	0.007	0.016	0.010	0.021	0.017	0.021	0.026	0.029	0.021	0.029
21.70	0.012	0.016	0.008	0.016	0.009	0.020	0.016	0.018	0.028	0.029	0.020	0.028
21.80	0.011	0.016	0.008	0.016	0.007	0.018	0.014	0.018	0.029	0.031	0.018	0.028
21.90	0.011	0.015	0.005	0.016	0.008	0.018	0.014	0.021	0.030	0.031	0.018	0.029
22.00	0.011	0.017	0.005	0.017	0.009	0.019	0.016	0.023	0.028	0.031	0.018	0.028
22.10	0.011	0.017	0.008	0.020	0.011	0.021	0.017	0.024	0.028	0.031	0.022	0.026
22.20	0.010	0.015	0.012	0.023	0.012	0.023	0.017	0.024	0.026	0.030	0.025	0.028
22.30	0.009	0.015	0.013	0.021	0.012	0.023	0.016	0.023	0.023	0.026	0.027	0.030
22.40	0.009	0.015	0.013	0.019	0.013	0.024	0.015	0.022	0.023	0.026	0.026	0.028
22.50	0.009	0.014	0.013	0.018	0.013	0.025	0.016	0.023	0.026	0.028	0.025	0.026
22.60	0.008	0.016	0.012	0.018	0.012	0.024	0.016	0.022	0.027	0.029	0.024	0.023
22.70	0.008	0.016	0.011	0.019	0.010	0.022	0.016	0.022	0.026	0.027	0.021	0.023
22.80	0.007	0.016	0.010	0.019	0.011	0.024	0.018	0.022	0.022	0.025	0.020	0.026
22.90	0.005	0.017	0.008	0.019	0.013	0.024	0.015	0.019	0.022	0.025	0.020	0.025
23.00	0.005	0.018	0.007	0.020	0.011	0.020	0.013	0.018	0.021	0.025	0.023	0.024
23.10	0.006	0.016	0.009	0.021	0.009	0.019	0.013	0.019	0.021	0.024	0.024	0.024
23.20	0.006	0.015	0.010	0.020	0.008	0.020	0.013	0.017	0.022	0.023	0.020	0.023
23.30	0.005	0.014	0.010	0.019	0.009	0.021	0.015	0.020	0.022	0.026	0.018	0.023
23.40	0.004	0.014	0.009	0.020	0.010	0.022	0.015	0.022	0.018	0.025	0.018	0.021
23.50	0.005	0.015	0.007	0.019	0.011	0.025	0.013	0.021	0.014	0.024	0.018	0.021
23.60	0.006	0.015	0.006	0.019	0.012	0.028	0.013	0.020	0.013	0.026	0.020	0.021
23.70	0.006	0.015	0.005	0.020	0.012	0.027	0.014	0.022	0.012	0.027	0.022	0.021
23.80	0.006	0.016	0.003	0.019	0.011	0.021	0.016	0.023	0.012	0.027	0.022	0.022
23.90	0.005	0.016	0.002	0.017	0.013	0.020	0.016	0.022	0.011	0.026	0.021	0.022
24.00	0.003	0.016	0.002	0.016	0.015	0.020	0.015	0.019	0.010	0.025	0.018	0.021
24.10	0.003	0.014	0.003	0.017	0.016	0.020	0.015	0.017	0.010	0.025	0.013	0.020
24.20	0.002	0.011	0.005	0.018	0.015	0.022	0.014	0.017	0.010	0.025	0.010	0.021
24.30	0.001	0.009	0.006	0.018	0.018	0.024	0.013	0.019	0.010	0.025	0.009	0.022
24.40	0.003	0.011	0.004	0.016	0.021	0.025	0.012	0.019	0.010	0.024	0.009	0.023
24.50	0.003	0.013	0.002	0.016	0.021	0.028	0.012	0.020	0.011	0.025	0.010	0.024

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
24.60	0.001	0.013	0.001	0.017	0.020	0.030	0.012	0.021	0.010	0.026	0.011	0.025
24.70	-0.001	0.013	0.001	0.019	0.020	0.029	0.013	0.022	0.008	0.024	0.013	0.024
24.80	-0.003	0.011	0.000	0.019	0.017	0.027	0.014	0.024	0.008	0.024	0.016	0.022
24.90	-0.004	0.010	0.000	0.019	0.014	0.024	0.015	0.025	0.008	0.027	0.019	0.022
25.00	-0.004	0.010	0.000	0.019	0.014	0.025	0.017	0.026	0.007	0.027	0.020	0.021
25.10	-0.004	0.011	0.001	0.019	0.011	0.023	0.018	0.026	0.007	0.024	0.020	0.021
25.20	-0.004	0.011	0.004	0.020	0.011	0.022	0.018	0.025	0.007	0.023	0.018	0.021
25.30	-0.004	0.011	0.005	0.020	0.010	0.021	0.017	0.024	0.008	0.024	0.015	0.020
25.40	-0.004	0.012	0.005	0.021	0.009	0.020	0.015	0.023	0.010	0.025	0.014	0.021
25.50	-0.004	0.011	0.005	0.021	0.008	0.022	0.013	0.023	0.011	0.024	0.015	0.023
25.60	-0.004	0.010	0.005	0.020	0.008	0.022	0.012	0.024	0.013	0.023	0.015	0.023
25.70	-0.004	0.010	0.005	0.020	0.008	0.022	0.011	0.023	0.016	0.023	0.016	0.024
25.80	-0.003	0.010	0.005	0.019	0.007	0.020	0.010	0.021	0.017	0.021	0.017	0.026
25.90	-0.003	0.011	0.004	0.017	0.007	0.020	0.010	0.018	0.016	0.022	0.018	0.025
26.00	-0.004	0.010	0.004	0.016	0.008	0.020	0.009	0.016	0.014	0.025	0.017	0.024
26.10	-0.005	0.011	0.004	0.015	0.009	0.019	0.008	0.016	0.014	0.027	0.015	0.025
26.20	-0.005	0.010	0.003	0.015	0.011	0.021	0.009	0.016	0.013	0.026	0.014	0.026
26.30	-0.004	0.011	0.004	0.015	0.011	0.021	0.010	0.019	0.010	0.025	0.014	0.026
26.40	-0.003	0.011	0.005	0.014	0.009	0.021	0.012	0.023	0.007	0.024	0.014	0.025
26.50	-0.002	0.012	0.006	0.016	0.006	0.018	0.012	0.024	0.004	0.022	0.014	0.024
26.60	-0.002	0.012	0.004	0.015	0.005	0.018	0.011	0.022	0.002	0.019	0.014	0.025
26.70	-0.002	0.012	0.003	0.014	0.006	0.019	0.010	0.020	0.002	0.019	0.014	0.025
26.80	-0.002	0.013	0.003	0.013	0.007	0.021	0.009	0.021	0.003	0.021	0.013	0.026
26.90	-0.003	0.013	0.004	0.014	0.007	0.022	0.009	0.022	0.004	0.022	0.012	0.026
27.00	-0.004	0.012	0.004	0.016	0.006	0.020	0.008	0.022	0.006	0.025	0.012	0.026
27.10	-0.004	0.012	0.004	0.018	0.005	0.018	0.008	0.022	0.007	0.026	0.013	0.025
27.20	-0.004	0.012	0.004	0.019	0.003	0.015	0.009	0.021	0.007	0.026	0.012	0.025
27.30	-0.003	0.012	0.001	0.015	0.002	0.013	0.010	0.022	0.005	0.025	0.011	0.025
27.40	-0.002	0.013	-0.001	0.012	0.004	0.013	0.011	0.021	0.005	0.025	0.011	0.023
27.50	-0.001	0.014	-0.002	0.011	0.006	0.015	0.011	0.022	0.005	0.025	0.011	0.022
27.60	-0.001	0.013	-0.004	0.010	0.007	0.015	0.009	0.020	0.006	0.025	0.011	0.021

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	1.59E-2-m (0.625-in) V (m/s)	1.59E-2-m (0.625-in) StdDev (m/s)	2.86E-2-m (1.125-in) V (m/s)	2.86E-2-m (1.125-in) StdDev (m/s)	5.40E-2-m (2.125-in) V (m/s)	5.40E-2-m (2.125-in) StdDev (m/s)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.105-m (4.125-in) V (m/s)	0.105-m (4.125-in) StdDev (m/s)	0.130-m (5.125-in) V (m/s)	0.130-m (5.125-in) StdDev (m/s)
27.70	0.000	0.013	-0.005	0.010	0.006	0.017	0.007	0.018	0.006	0.025	0.010	0.021
27.80	0.001	0.014	-0.005	0.010	0.007	0.019	0.006	0.017	0.005	0.026	0.010	0.021
27.90	0.000	0.013	-0.004	0.009	0.009	0.019	0.005	0.017	0.005	0.026	0.010	0.020
28.00	0.000	0.013	-0.002	0.009	0.009	0.018	0.004	0.016	0.006	0.027	0.009	0.018
28.10	0.000	0.013	-0.002	0.009	0.008	0.018	0.004	0.017	0.006	0.026	0.008	0.017
28.20	0.000	0.014	-0.001	0.010	0.007	0.021	0.005	0.016	0.007	0.026	0.008	0.016
28.30	0.000	0.015	-0.001	0.011	0.007	0.022	0.004	0.014	0.005	0.023	0.008	0.016
28.40	0.000	0.015	-0.002	0.011	0.006	0.024	0.003	0.013	0.004	0.022	0.010	0.018
28.50	0.000	0.015	-0.002	0.011	0.006	0.025	0.002	0.014	0.004	0.022	0.010	0.019
28.60	0.000	0.015	-0.003	0.010	0.006	0.026	0.003	0.015	0.004	0.022	0.009	0.017
28.70	0.000	0.015	-0.004	0.009	0.007	0.025	0.003	0.015	0.005	0.021	0.010	0.016
28.80	0.000	0.016	-0.005	0.008	0.009	0.024	0.003	0.016	0.005	0.020	0.010	0.017
28.90	-0.001	0.015	-0.006	0.008	0.009	0.023	0.004	0.016	0.005	0.020	0.011	0.018
29.00	-0.002	0.014	-0.006	0.008	0.008	0.022	0.006	0.016	0.005	0.020	0.011	0.019
29.10	-0.001	0.015	-0.006	0.008	0.009	0.023	0.006	0.016	0.006	0.020	0.011	0.020
29.20	0.000	0.017	-0.006	0.008	0.009	0.025	0.006	0.016	0.006	0.020	0.012	0.020
29.30	-0.001	0.015	-0.005	0.010	0.010	0.027	0.006	0.016	0.008	0.019	0.013	0.019
29.40	-0.002	0.014	-0.005	0.011	0.011	0.028	0.005	0.017	0.009	0.020	0.015	0.020
29.50	-0.002	0.014	-0.005	0.012	0.011	0.030	0.005	0.018	0.009	0.020	0.016	0.022
29.60	-0.003	0.014	-0.004	0.012	0.010	0.031	0.004	0.017	0.009	0.021	0.016	0.023
29.70	-0.002	0.013	-0.004	0.013	0.009	0.032	0.003	0.015	0.008	0.022	0.016	0.023
29.80	-0.002	0.013	-0.003	0.013	0.009	0.032	0.003	0.015	0.006	0.023	0.015	0.022
29.90	-0.003	0.013	-0.002	0.014	0.008	0.029	0.002	0.016	0.004	0.024	0.014	0.022
30.00	-0.004	0.012	-0.002	0.014	0.007	0.025	0.001	0.016	0.003	0.024	0.014	0.022

Small-Tank Wall Velocity Data, contd.

Cycle Time (sec)	Velocities Measured at 0.406 m (16 in) Radial Position											
	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
0.10	0.009	0.015	0.004	0.015	0.002	0.013	0.009	0.018	0.003	0.015	0.006	0.015
0.20	0.011	0.016	0.004	0.014	0.007	0.017	0.009	0.019	0.010	0.020	0.010	0.017
0.30	0.016	0.018	0.012	0.015	0.018	0.021	0.015	0.021	0.021	0.021	0.020	0.020
0.40	0.023	0.021	0.020	0.018	0.029	0.021	0.021	0.025	0.030	0.021	0.022	0.025
0.50	0.033	0.027	0.034	0.024	0.047	0.018	0.029	0.026	0.039	0.020	0.028	0.029
0.60	0.056	0.026	0.055	0.022	0.067	0.016	0.043	0.024	0.049	0.019	0.033	0.028
0.70	0.085	0.020	0.079	0.018	0.081	0.014	0.058	0.019	0.058	0.018	0.040	0.027
0.80	0.113	0.015	0.096	0.021	0.094	0.012	0.069	0.017	0.064	0.018	0.046	0.027
0.90	0.137	0.015	0.113	0.020	0.107	0.013	0.077	0.018	0.072	0.018	0.052	0.026
1.00	0.184	0.036	0.134	0.025	0.138	0.032	0.087	0.016	0.085	0.023	0.061	0.025
1.10	0.318	0.125	0.187	0.063	0.206	0.085	0.106	0.017	0.112	0.037	0.075	0.030
1.20	0.427	0.101	0.275	0.087	0.296	0.114	0.147	0.045	0.155	0.069	0.103	0.043
1.30	0.532	0.076	0.402	0.070	0.369	0.108	0.186	0.084	0.191	0.092	0.143	0.082
1.40	0.593	0.057	0.513	0.069	0.473	0.047	0.216	0.109	0.174	0.066	0.185	0.127
1.50	0.570	0.071	0.546	0.047	0.489	0.072	0.275	0.120	0.205	0.102	0.183	0.150
1.60	0.535	0.074	0.540	0.061	0.503	0.063	0.372	0.098	0.299	0.107	0.187	0.141
1.70	0.483	0.080	0.508	0.043	0.481	0.092	0.421	0.081	0.386	0.109	0.202	0.150
1.80	0.469	0.066	0.505	0.076	0.460	0.071	0.433	0.066	0.420	0.067	0.256	0.155
1.90	0.478	0.087	0.498	0.071	0.465	0.081	0.433	0.072	0.409	0.056	0.298	0.122
2.00	0.461	0.078	0.492	0.046	0.467	0.068	0.444	0.048	0.432	0.100	0.320	0.096
2.10	0.449	0.063	0.483	0.086	0.470	0.058	0.443	0.068	0.431	0.079	0.331	0.094
2.20	0.475	0.081	0.488	0.089	0.477	0.070	0.454	0.103	0.405	0.065	0.361	0.069
2.30	0.512	0.058	0.504	0.056	0.478	0.078	0.455	0.078	0.386	0.065	0.380	0.080
2.40	0.528	0.073	0.520	0.071	0.445	0.073	0.448	0.058	0.428	0.077	0.374	0.081
2.50	0.551	0.051	0.517	0.065	0.485	0.079	0.481	0.065	0.423	0.070	0.369	0.061
2.60	0.508	0.071	0.473	0.057	0.472	0.079	0.465	0.063	0.426	0.068	0.374	0.061
2.70	0.491	0.064	0.460	0.092	0.499	0.066	0.496	0.070	0.434	0.076	0.390	0.034
2.80	0.530	0.060	0.468	0.092	0.473	0.070	0.497	0.067	0.450	0.070	0.435	0.063

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
2.90	0.501	0.082	0.487	0.068	0.500	0.079	0.510	0.057	0.465	0.054	0.423	0.087
3.00	0.517	0.055	0.514	0.057	0.497	0.067	0.507	0.076	0.479	0.062	0.401	0.061
3.10	0.508	0.079	0.497	0.064	0.507	0.079	0.501	0.069	0.490	0.063	0.426	0.083
3.20	0.515	0.067	0.496	0.086	0.518	0.083	0.527	0.056	0.492	0.068	0.459	0.068
3.30	0.487	0.081	0.523	0.062	0.482	0.094	0.544	0.069	0.479	0.047	0.443	0.086
3.40	0.473	0.076	0.509	0.069	0.463	0.077	0.517	0.047	0.437	0.056	0.435	0.073
3.50	0.450	0.075	0.510	0.068	0.480	0.091	0.504	0.048	0.422	0.066	0.405	0.092
3.60	0.431	0.082	0.488	0.054	0.447	0.049	0.487	0.047	0.421	0.058	0.419	0.074
3.70	0.423	0.068	0.454	0.041	0.434	0.063	0.474	0.055	0.441	0.074	0.430	0.085
3.80	0.415	0.057	0.421	0.058	0.436	0.058	0.466	0.062	0.429	0.064	0.374	0.080
3.90	0.374	0.045	0.384	0.043	0.426	0.040	0.431	0.052	0.385	0.056	0.373	0.067
4.00	0.349	0.052	0.369	0.067	0.410	0.049	0.395	0.065	0.378	0.066	0.365	0.042
4.10	0.340	0.051	0.351	0.053	0.384	0.042	0.395	0.054	0.361	0.055	0.354	0.052
4.20	0.324	0.054	0.336	0.049	0.367	0.035	0.367	0.059	0.341	0.056	0.335	0.038
4.30	0.322	0.044	0.331	0.058	0.350	0.034	0.356	0.060	0.326	0.052	0.332	0.044
4.40	0.313	0.041	0.323	0.050	0.337	0.039	0.337	0.047	0.320	0.042	0.308	0.047
4.50	0.299	0.045	0.312	0.040	0.328	0.044	0.323	0.046	0.313	0.032	0.289	0.036
4.60	0.279	0.044	0.308	0.043	0.326	0.052	0.321	0.044	0.292	0.050	0.275	0.042
4.70	0.284	0.043	0.305	0.044	0.314	0.053	0.312	0.052	0.280	0.053	0.259	0.048
4.80	0.275	0.027	0.296	0.028	0.298	0.047	0.291	0.053	0.262	0.065	0.256	0.045
4.90	0.271	0.031	0.288	0.031	0.287	0.041	0.283	0.061	0.240	0.067	0.255	0.051
5.00	0.260	0.030	0.270	0.031	0.268	0.056	0.282	0.053	0.230	0.078	0.247	0.054
5.10	0.252	0.027	0.265	0.035	0.255	0.037	0.275	0.049	0.215	0.067	0.233	0.047
5.20	0.238	0.034	0.253	0.030	0.257	0.033	0.269	0.044	0.203	0.069	0.229	0.051
5.30	0.242	0.039	0.250	0.024	0.261	0.032	0.263	0.044	0.204	0.073	0.217	0.037
5.40	0.238	0.043	0.245	0.026	0.254	0.045	0.251	0.044	0.197	0.068	0.204	0.045
5.50	0.224	0.041	0.245	0.036	0.246	0.051	0.239	0.035	0.179	0.061	0.189	0.051
5.60	0.220	0.040	0.233	0.028	0.240	0.047	0.227	0.042	0.175	0.064	0.181	0.049
5.70	0.214	0.030	0.233	0.024	0.232	0.050	0.222	0.041	0.176	0.069	0.181	0.046
5.80	0.218	0.047	0.235	0.041	0.236	0.059	0.225	0.032	0.161	0.061	0.175	0.040
5.90	0.218	0.038	0.236	0.043	0.225	0.057	0.213	0.032	0.158	0.057	0.161	0.044

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
6.00	0.213	0.047	0.233	0.049	0.203	0.048	0.206	0.029	0.153	0.058	0.164	0.039
6.10	0.204	0.049	0.221	0.047	0.188	0.040	0.208	0.044	0.153	0.060	0.157	0.033
6.20	0.197	0.046	0.220	0.055	0.185	0.037	0.203	0.049	0.147	0.052	0.151	0.038
6.30	0.187	0.051	0.210	0.048	0.192	0.036	0.185	0.040	0.146	0.049	0.143	0.045
6.40	0.180	0.047	0.200	0.048	0.187	0.037	0.177	0.038	0.135	0.052	0.133	0.051
6.50	0.172	0.034	0.183	0.039	0.190	0.038	0.174	0.031	0.149	0.045	0.126	0.051
6.60	0.169	0.042	0.181	0.021	0.186	0.033	0.169	0.033	0.141	0.057	0.122	0.059
6.70	0.172	0.039	0.182	0.027	0.180	0.036	0.157	0.042	0.129	0.056	0.123	0.062
6.80	0.174	0.032	0.176	0.028	0.174	0.035	0.156	0.032	0.134	0.052	0.118	0.067
6.90	0.168	0.029	0.176	0.037	0.171	0.036	0.149	0.031	0.131	0.044	0.112	0.057
7.00	0.167	0.030	0.169	0.037	0.165	0.038	0.137	0.026	0.130	0.046	0.103	0.053
7.10	0.159	0.026	0.159	0.042	0.163	0.025	0.134	0.035	0.119	0.051	0.095	0.053
7.20	0.151	0.027	0.151	0.030	0.158	0.024	0.136	0.033	0.110	0.052	0.094	0.057
7.30	0.157	0.030	0.151	0.031	0.150	0.020	0.142	0.036	0.113	0.049	0.092	0.057
7.40	0.155	0.024	0.146	0.029	0.138	0.018	0.136	0.034	0.117	0.046	0.085	0.057
7.50	0.156	0.025	0.144	0.029	0.130	0.023	0.132	0.031	0.119	0.041	0.086	0.051
7.60	0.154	0.032	0.140	0.029	0.124	0.022	0.136	0.031	0.113	0.037	0.088	0.048
7.70	0.155	0.042	0.133	0.032	0.127	0.028	0.132	0.024	0.109	0.048	0.081	0.052
7.80	0.148	0.040	0.142	0.039	0.120	0.031	0.124	0.040	0.103	0.046	0.081	0.056
7.90	0.144	0.041	0.134	0.045	0.126	0.029	0.119	0.032	0.101	0.043	0.085	0.053
8.00	0.141	0.036	0.138	0.043	0.135	0.030	0.115	0.029	0.099	0.047	0.082	0.049
8.10	0.138	0.040	0.132	0.040	0.140	0.026	0.114	0.030	0.104	0.044	0.075	0.048
8.20	0.139	0.041	0.122	0.042	0.140	0.025	0.112	0.027	0.104	0.046	0.077	0.050
8.30	0.134	0.037	0.115	0.047	0.131	0.029	0.106	0.024	0.105	0.043	0.073	0.046
8.40	0.136	0.038	0.110	0.052	0.132	0.038	0.110	0.025	0.093	0.038	0.075	0.045
8.50	0.131	0.037	0.123	0.045	0.127	0.044	0.112	0.022	0.085	0.042	0.077	0.043
8.60	0.127	0.035	0.120	0.046	0.127	0.041	0.108	0.027	0.089	0.039	0.079	0.040
8.70	0.128	0.029	0.117	0.041	0.132	0.041	0.102	0.030	0.086	0.041	0.073	0.042
8.80	0.130	0.029	0.115	0.039	0.128	0.034	0.098	0.032	0.085	0.042	0.070	0.052
8.90	0.130	0.031	0.115	0.040	0.124	0.038	0.090	0.046	0.080	0.045	0.064	0.050
9.00	0.130	0.027	0.114	0.042	0.120	0.044	0.082	0.045	0.071	0.049	0.075	0.054

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
9.10	0.130	0.025	0.113	0.047	0.125	0.037	0.085	0.045	0.069	0.050	0.080	0.056
9.20	0.125	0.020	0.107	0.044	0.121	0.036	0.091	0.041	0.080	0.046	0.076	0.057
9.30	0.122	0.030	0.106	0.043	0.119	0.036	0.092	0.033	0.080	0.049	0.081	0.054
9.40	0.127	0.030	0.110	0.038	0.116	0.035	0.089	0.035	0.075	0.051	0.078	0.053
9.50	0.120	0.028	0.111	0.036	0.111	0.044	0.086	0.033	0.073	0.051	0.082	0.050
9.60	0.111	0.038	0.112	0.042	0.101	0.051	0.079	0.033	0.066	0.049	0.080	0.052
9.70	0.105	0.043	0.114	0.042	0.106	0.049	0.082	0.036	0.061	0.047	0.081	0.054
9.80	0.101	0.038	0.106	0.043	0.105	0.051	0.089	0.037	0.060	0.048	0.078	0.052
9.90	0.101	0.043	0.104	0.045	0.097	0.047	0.090	0.038	0.061	0.051	0.073	0.056
10.00	0.105	0.038	0.099	0.047	0.100	0.049	0.087	0.039	0.065	0.050	0.069	0.057
10.10	0.107	0.030	0.096	0.049	0.095	0.047	0.090	0.037	0.070	0.053	0.078	0.050
10.20	0.113	0.027	0.100	0.042	0.099	0.045	0.089	0.033	0.070	0.051	0.077	0.048
10.30	0.110	0.025	0.096	0.041	0.099	0.042	0.089	0.037	0.064	0.051	0.066	0.050
10.40	0.110	0.025	0.093	0.044	0.096	0.040	0.086	0.038	0.069	0.054	0.071	0.052
10.50	0.109	0.024	0.093	0.042	0.096	0.040	0.081	0.039	0.071	0.053	0.070	0.054
10.60	0.111	0.022	0.096	0.046	0.090	0.043	0.080	0.034	0.069	0.052	0.074	0.051
10.70	0.108	0.018	0.094	0.042	0.091	0.045	0.077	0.034	0.062	0.051	0.074	0.047
10.80	0.106	0.030	0.093	0.040	0.092	0.044	0.079	0.038	0.059	0.049	0.072	0.042
10.90	0.101	0.029	0.096	0.041	0.094	0.036	0.081	0.035	0.056	0.050	0.068	0.045
11.00	0.098	0.024	0.093	0.040	0.090	0.038	0.078	0.032	0.054	0.049	0.062	0.039
11.10	0.093	0.026	0.087	0.042	0.085	0.037	0.072	0.035	0.062	0.042	0.068	0.039
11.20	0.089	0.033	0.081	0.041	0.081	0.036	0.066	0.032	0.064	0.037	0.073	0.040
11.30	0.089	0.029	0.085	0.038	0.079	0.036	0.069	0.031	0.063	0.039	0.067	0.041
11.40	0.088	0.032	0.087	0.033	0.085	0.034	0.073	0.030	0.063	0.043	0.061	0.042
11.50	0.092	0.032	0.082	0.033	0.085	0.032	0.071	0.032	0.064	0.049	0.060	0.040
11.60	0.095	0.025	0.085	0.039	0.083	0.029	0.070	0.025	0.069	0.049	0.058	0.035
11.70	0.098	0.026	0.087	0.041	0.083	0.028	0.076	0.025	0.065	0.048	0.059	0.033
11.80	0.099	0.025	0.086	0.037	0.083	0.027	0.077	0.020	0.060	0.047	0.061	0.037
11.90	0.094	0.028	0.080	0.037	0.076	0.033	0.074	0.024	0.061	0.044	0.063	0.034
12.00	0.082	0.031	0.082	0.039	0.071	0.034	0.069	0.022	0.064	0.044	0.059	0.031
12.10	0.082	0.032	0.080	0.038	0.072	0.039	0.070	0.028	0.062	0.044	0.059	0.036

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
12.20	0.080	0.034	0.080	0.037	0.071	0.039	0.063	0.024	0.062	0.045	0.056	0.035
12.30	0.075	0.033	0.080	0.034	0.071	0.032	0.060	0.032	0.065	0.043	0.061	0.034
12.40	0.075	0.037	0.083	0.032	0.074	0.035	0.056	0.035	0.064	0.044	0.062	0.035
12.50	0.074	0.039	0.082	0.031	0.069	0.034	0.058	0.037	0.065	0.045	0.059	0.038
12.60	0.077	0.041	0.081	0.035	0.068	0.032	0.062	0.036	0.063	0.040	0.064	0.038
12.70	0.077	0.038	0.076	0.040	0.068	0.031	0.066	0.035	0.061	0.044	0.066	0.039
12.80	0.073	0.041	0.078	0.036	0.065	0.035	0.068	0.035	0.062	0.046	0.065	0.037
12.90	0.063	0.041	0.075	0.030	0.066	0.034	0.060	0.037	0.062	0.043	0.059	0.036
13.00	0.065	0.043	0.074	0.030	0.067	0.033	0.058	0.039	0.068	0.042	0.055	0.041
13.10	0.066	0.038	0.074	0.031	0.071	0.031	0.065	0.035	0.065	0.040	0.050	0.043
13.20	0.068	0.035	0.073	0.030	0.070	0.031	0.062	0.035	0.061	0.041	0.052	0.038
13.30	0.072	0.035	0.075	0.031	0.071	0.031	0.062	0.040	0.059	0.039	0.055	0.037
13.40	0.074	0.035	0.076	0.035	0.070	0.029	0.059	0.040	0.056	0.041	0.059	0.037
13.50	0.073	0.037	0.081	0.035	0.066	0.032	0.059	0.040	0.054	0.040	0.055	0.038
13.60	0.068	0.038	0.079	0.032	0.066	0.031	0.062	0.037	0.051	0.036	0.052	0.036
13.70	0.066	0.041	0.080	0.032	0.062	0.028	0.069	0.029	0.052	0.042	0.049	0.035
13.80	0.063	0.043	0.082	0.033	0.057	0.027	0.067	0.025	0.047	0.041	0.049	0.038
13.90	0.065	0.043	0.076	0.030	0.056	0.026	0.065	0.028	0.049	0.040	0.046	0.040
14.00	0.065	0.042	0.074	0.030	0.059	0.027	0.068	0.030	0.052	0.042	0.051	0.040
14.10	0.064	0.038	0.069	0.032	0.064	0.024	0.065	0.034	0.052	0.041	0.055	0.040
14.20	0.063	0.039	0.066	0.035	0.060	0.026	0.056	0.034	0.051	0.043	0.051	0.038
14.30	0.067	0.041	0.069	0.036	0.057	0.030	0.059	0.028	0.051	0.043	0.049	0.038
14.40	0.064	0.037	0.071	0.033	0.057	0.030	0.066	0.026	0.049	0.041	0.051	0.039
14.50	0.063	0.037	0.071	0.027	0.061	0.031	0.071	0.021	0.044	0.040	0.050	0.034
14.60	0.061	0.040	0.068	0.026	0.058	0.032	0.069	0.022	0.040	0.041	0.051	0.034
14.70	0.056	0.040	0.065	0.029	0.054	0.035	0.066	0.024	0.038	0.038	0.052	0.034
14.80	0.057	0.039	0.069	0.033	0.055	0.039	0.066	0.027	0.038	0.035	0.050	0.035
14.90	0.056	0.034	0.070	0.031	0.058	0.038	0.060	0.029	0.043	0.038	0.048	0.033
15.00	0.056	0.030	0.067	0.026	0.055	0.036	0.058	0.036	0.043	0.041	0.047	0.035
15.10	0.054	0.029	0.065	0.028	0.049	0.031	0.059	0.034	0.045	0.040	0.044	0.035
15.20	0.052	0.031	0.060	0.034	0.049	0.031	0.057	0.027	0.049	0.038	0.046	0.035

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
15.30	0.050	0.029	0.057	0.032	0.047	0.031	0.059	0.029	0.049	0.037	0.051	0.037
15.40	0.051	0.028	0.057	0.030	0.049	0.030	0.057	0.028	0.047	0.039	0.049	0.036
15.50	0.052	0.030	0.063	0.029	0.052	0.028	0.053	0.029	0.044	0.040	0.044	0.034
15.60	0.055	0.029	0.062	0.026	0.056	0.030	0.053	0.031	0.043	0.040	0.038	0.037
15.70	0.049	0.033	0.058	0.026	0.055	0.030	0.050	0.034	0.044	0.043	0.039	0.034
15.80	0.045	0.035	0.056	0.026	0.047	0.029	0.052	0.035	0.042	0.043	0.039	0.032
15.90	0.051	0.036	0.052	0.032	0.043	0.032	0.053	0.031	0.043	0.043	0.041	0.034
16.00	0.048	0.035	0.053	0.033	0.048	0.032	0.055	0.032	0.044	0.041	0.041	0.034
16.10	0.044	0.034	0.054	0.034	0.045	0.030	0.053	0.035	0.046	0.038	0.039	0.035
16.20	0.039	0.030	0.055	0.033	0.047	0.027	0.049	0.031	0.046	0.036	0.037	0.034
16.30	0.037	0.027	0.056	0.035	0.044	0.027	0.052	0.031	0.051	0.037	0.039	0.037
16.40	0.038	0.027	0.055	0.034	0.048	0.026	0.054	0.031	0.050	0.037	0.040	0.037
16.50	0.038	0.031	0.054	0.032	0.047	0.026	0.050	0.029	0.051	0.036	0.039	0.036
16.60	0.039	0.033	0.053	0.032	0.042	0.029	0.051	0.027	0.050	0.036	0.040	0.038
16.70	0.036	0.031	0.053	0.034	0.041	0.030	0.049	0.029	0.048	0.037	0.044	0.039
16.80	0.037	0.032	0.054	0.035	0.041	0.029	0.047	0.030	0.041	0.039	0.045	0.038
16.90	0.040	0.030	0.051	0.035	0.043	0.026	0.049	0.027	0.040	0.041	0.046	0.036
17.00	0.039	0.027	0.051	0.037	0.043	0.027	0.053	0.030	0.043	0.041	0.049	0.036
17.10	0.037	0.026	0.052	0.038	0.049	0.030	0.053	0.032	0.044	0.040	0.045	0.037
17.20	0.036	0.029	0.048	0.036	0.051	0.030	0.054	0.031	0.039	0.035	0.044	0.036
17.30	0.034	0.034	0.048	0.034	0.047	0.031	0.048	0.030	0.039	0.033	0.042	0.035
17.40	0.034	0.037	0.047	0.033	0.044	0.034	0.044	0.029	0.037	0.033	0.041	0.034
17.50	0.034	0.037	0.048	0.033	0.046	0.036	0.045	0.031	0.042	0.032	0.043	0.035
17.60	0.033	0.036	0.048	0.033	0.043	0.036	0.042	0.031	0.044	0.030	0.043	0.035
17.70	0.030	0.035	0.052	0.034	0.042	0.036	0.039	0.031	0.043	0.031	0.044	0.034
17.80	0.028	0.035	0.051	0.034	0.040	0.034	0.037	0.029	0.039	0.033	0.042	0.030
17.90	0.030	0.036	0.046	0.031	0.041	0.035	0.034	0.027	0.037	0.031	0.043	0.030
18.00	0.031	0.037	0.045	0.025	0.042	0.035	0.030	0.028	0.037	0.030	0.043	0.034
18.10	0.030	0.033	0.043	0.024	0.042	0.034	0.029	0.031	0.036	0.031	0.038	0.030
18.20	0.028	0.031	0.043	0.022	0.041	0.036	0.030	0.033	0.037	0.031	0.040	0.029
18.30	0.030	0.031	0.042	0.021	0.036	0.033	0.033	0.034	0.034	0.030	0.041	0.029

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
18.40	0.034	0.031	0.039	0.028	0.035	0.034	0.034	0.031	0.037	0.027	0.043	0.027
18.50	0.032	0.033	0.036	0.028	0.040	0.037	0.033	0.030	0.034	0.027	0.039	0.024
18.60	0.031	0.030	0.034	0.027	0.042	0.036	0.035	0.033	0.032	0.028	0.036	0.028
18.70	0.038	0.032	0.036	0.030	0.042	0.034	0.036	0.034	0.030	0.028	0.039	0.030
18.80	0.037	0.032	0.036	0.030	0.042	0.029	0.037	0.033	0.028	0.026	0.045	0.033
18.90	0.034	0.031	0.036	0.027	0.040	0.027	0.037	0.033	0.029	0.026	0.047	0.031
19.00	0.031	0.031	0.034	0.026	0.037	0.029	0.038	0.034	0.028	0.026	0.046	0.030
19.10	0.028	0.030	0.032	0.028	0.033	0.030	0.038	0.034	0.026	0.027	0.042	0.029
19.20	0.030	0.029	0.030	0.026	0.034	0.028	0.037	0.035	0.025	0.026	0.044	0.033
19.30	0.031	0.028	0.027	0.025	0.035	0.026	0.035	0.036	0.021	0.026	0.042	0.034
19.40	0.031	0.029	0.026	0.025	0.033	0.026	0.031	0.034	0.021	0.027	0.037	0.033
19.50	0.031	0.027	0.026	0.028	0.034	0.023	0.031	0.034	0.029	0.028	0.035	0.030
19.60	0.030	0.027	0.026	0.026	0.034	0.025	0.033	0.036	0.029	0.029	0.034	0.028
19.70	0.027	0.029	0.027	0.026	0.036	0.025	0.035	0.037	0.032	0.029	0.038	0.028
19.80	0.026	0.031	0.028	0.026	0.033	0.025	0.034	0.037	0.033	0.029	0.039	0.027
19.90	0.025	0.030	0.028	0.025	0.030	0.025	0.034	0.037	0.038	0.032	0.039	0.026
20.00	0.027	0.029	0.026	0.022	0.029	0.026	0.036	0.036	0.035	0.031	0.038	0.024
20.10	0.028	0.028	0.028	0.024	0.025	0.025	0.037	0.035	0.034	0.032	0.037	0.022
20.20	0.028	0.027	0.027	0.025	0.020	0.024	0.037	0.033	0.036	0.031	0.037	0.026
20.30	0.025	0.025	0.025	0.026	0.020	0.027	0.037	0.033	0.037	0.029	0.034	0.025
20.40	0.020	0.025	0.023	0.025	0.021	0.026	0.035	0.035	0.037	0.030	0.035	0.025
20.50	0.018	0.026	0.022	0.024	0.023	0.025	0.037	0.037	0.036	0.030	0.039	0.026
20.60	0.018	0.025	0.019	0.022	0.027	0.026	0.038	0.036	0.035	0.031	0.040	0.027
20.70	0.019	0.025	0.017	0.021	0.029	0.026	0.038	0.033	0.035	0.029	0.038	0.027
20.80	0.022	0.024	0.016	0.021	0.028	0.026	0.039	0.032	0.036	0.026	0.038	0.028
20.90	0.022	0.023	0.015	0.019	0.027	0.029	0.036	0.033	0.033	0.027	0.037	0.026
21.00	0.022	0.024	0.018	0.021	0.029	0.029	0.034	0.036	0.031	0.027	0.034	0.024
21.10	0.023	0.026	0.021	0.024	0.028	0.024	0.033	0.035	0.027	0.026	0.032	0.025
21.20	0.021	0.023	0.023	0.024	0.025	0.019	0.030	0.032	0.026	0.026	0.031	0.025
21.30	0.019	0.022	0.022	0.022	0.023	0.019	0.027	0.031	0.025	0.022	0.031	0.022
21.40	0.020	0.024	0.021	0.025	0.023	0.020	0.027	0.032	0.023	0.022	0.032	0.024

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
21.50	0.020	0.024	0.019	0.023	0.023	0.020	0.025	0.032	0.024	0.026	0.029	0.026
21.60	0.018	0.024	0.019	0.023	0.024	0.022	0.025	0.033	0.024	0.026	0.028	0.027
21.70	0.017	0.026	0.022	0.023	0.022	0.021	0.025	0.031	0.026	0.027	0.026	0.026
21.80	0.016	0.020	0.020	0.021	0.021	0.021	0.027	0.032	0.024	0.027	0.027	0.027
21.90	0.013	0.015	0.018	0.022	0.021	0.023	0.025	0.032	0.023	0.026	0.028	0.028
22.00	0.014	0.018	0.016	0.020	0.021	0.024	0.023	0.032	0.025	0.029	0.027	0.028
22.10	0.013	0.020	0.015	0.018	0.020	0.022	0.024	0.034	0.027	0.031	0.027	0.028
22.20	0.013	0.022	0.015	0.020	0.021	0.022	0.027	0.035	0.025	0.031	0.027	0.028
22.30	0.012	0.024	0.018	0.023	0.022	0.021	0.025	0.033	0.022	0.028	0.025	0.027
22.40	0.012	0.022	0.019	0.024	0.024	0.019	0.023	0.031	0.022	0.028	0.023	0.027
22.50	0.013	0.023	0.020	0.024	0.023	0.019	0.023	0.031	0.024	0.029	0.022	0.026
22.60	0.011	0.022	0.020	0.021	0.022	0.020	0.024	0.032	0.021	0.025	0.022	0.026
22.70	0.010	0.021	0.020	0.020	0.022	0.020	0.023	0.031	0.019	0.024	0.022	0.027
22.80	0.013	0.022	0.021	0.019	0.021	0.020	0.022	0.031	0.018	0.025	0.021	0.028
22.90	0.015	0.022	0.019	0.020	0.018	0.019	0.021	0.030	0.018	0.023	0.021	0.027
23.00	0.014	0.021	0.017	0.020	0.014	0.018	0.020	0.029	0.018	0.022	0.023	0.027
23.10	0.016	0.021	0.015	0.018	0.013	0.018	0.020	0.027	0.020	0.024	0.026	0.027
23.20	0.018	0.022	0.014	0.016	0.017	0.019	0.019	0.027	0.020	0.025	0.024	0.027
23.30	0.014	0.021	0.014	0.016	0.020	0.022	0.018	0.028	0.020	0.026	0.020	0.027
23.40	0.011	0.020	0.012	0.016	0.019	0.021	0.017	0.028	0.020	0.026	0.018	0.027
23.50	0.011	0.022	0.014	0.017	0.020	0.020	0.018	0.026	0.020	0.025	0.017	0.027
23.60	0.011	0.023	0.015	0.017	0.021	0.021	0.018	0.027	0.018	0.024	0.018	0.028
23.70	0.009	0.021	0.016	0.018	0.022	0.022	0.018	0.027	0.016	0.025	0.020	0.029
23.80	0.007	0.022	0.014	0.018	0.020	0.021	0.016	0.026	0.015	0.026	0.021	0.029
23.90	0.007	0.023	0.013	0.017	0.020	0.022	0.017	0.024	0.014	0.025	0.022	0.029
24.00	0.008	0.022	0.012	0.016	0.019	0.022	0.018	0.025	0.014	0.024	0.024	0.029
24.10	0.008	0.022	0.012	0.016	0.017	0.020	0.019	0.027	0.015	0.026	0.024	0.028
24.20	0.009	0.022	0.014	0.018	0.016	0.019	0.017	0.023	0.016	0.028	0.021	0.026
24.30	0.009	0.023	0.015	0.018	0.015	0.018	0.018	0.022	0.013	0.026	0.020	0.025
24.40	0.008	0.021	0.014	0.017	0.009	0.016	0.017	0.020	0.011	0.028	0.021	0.026
24.50	0.006	0.020	0.014	0.016	0.009	0.017	0.019	0.022	0.011	0.028	0.020	0.025

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
24.60	0.007	0.021	0.013	0.015	0.009	0.017	0.023	0.023	0.012	0.028	0.020	0.024
24.70	0.006	0.021	0.012	0.016	0.010	0.020	0.020	0.023	0.011	0.026	0.020	0.025
24.80	0.005	0.020	0.012	0.016	0.013	0.023	0.018	0.022	0.011	0.024	0.020	0.027
24.90	0.006	0.020	0.014	0.016	0.012	0.020	0.019	0.022	0.015	0.024	0.019	0.025
25.00	0.006	0.021	0.014	0.016	0.013	0.020	0.017	0.023	0.016	0.023	0.017	0.021
25.10	0.007	0.022	0.013	0.018	0.013	0.019	0.016	0.023	0.014	0.022	0.015	0.019
25.20	0.006	0.020	0.014	0.019	0.011	0.016	0.017	0.022	0.014	0.024	0.016	0.019
25.30	0.006	0.019	0.012	0.019	0.009	0.016	0.017	0.024	0.015	0.026	0.018	0.022
25.40	0.004	0.018	0.010	0.017	0.009	0.019	0.018	0.024	0.013	0.023	0.018	0.024
25.50	0.005	0.016	0.009	0.016	0.009	0.021	0.017	0.023	0.014	0.022	0.016	0.023
25.60	0.004	0.016	0.009	0.016	0.012	0.021	0.015	0.022	0.016	0.023	0.016	0.022
25.70	0.001	0.013	0.008	0.017	0.015	0.022	0.015	0.022	0.016	0.021	0.016	0.021
25.80	-0.001	0.011	0.009	0.019	0.017	0.023	0.016	0.021	0.013	0.021	0.014	0.019
25.90	0.001	0.012	0.010	0.019	0.019	0.024	0.016	0.020	0.010	0.020	0.012	0.017
26.00	0.004	0.013	0.011	0.017	0.017	0.024	0.017	0.019	0.009	0.017	0.011	0.016
26.10	0.005	0.014	0.011	0.017	0.013	0.023	0.017	0.020	0.009	0.017	0.010	0.019
26.20	0.004	0.014	0.010	0.016	0.011	0.022	0.016	0.020	0.010	0.019	0.011	0.021
26.30	0.003	0.015	0.008	0.015	0.011	0.022	0.015	0.021	0.009	0.018	0.012	0.023
26.40	0.002	0.016	0.006	0.015	0.011	0.021	0.015	0.021	0.009	0.018	0.014	0.023
26.50	0.002	0.017	0.006	0.015	0.012	0.021	0.014	0.021	0.009	0.018	0.014	0.019
26.60	0.002	0.017	0.006	0.016	0.010	0.020	0.013	0.021	0.009	0.018	0.016	0.020
26.70	0.004	0.019	0.007	0.016	0.011	0.019	0.013	0.022	0.010	0.018	0.015	0.019
26.80	0.004	0.019	0.007	0.015	0.011	0.019	0.014	0.022	0.009	0.018	0.015	0.018
26.90	0.004	0.019	0.009	0.016	0.012	0.019	0.014	0.022	0.007	0.017	0.016	0.017
27.00	0.005	0.019	0.010	0.017	0.013	0.020	0.014	0.023	0.009	0.016	0.017	0.018
27.10	0.006	0.021	0.011	0.018	0.014	0.021	0.013	0.024	0.011	0.016	0.015	0.017
27.20	0.006	0.023	0.011	0.018	0.015	0.021	0.013	0.025	0.011	0.018	0.015	0.017
27.30	0.006	0.023	0.010	0.018	0.014	0.017	0.012	0.024	0.011	0.020	0.014	0.019
27.40	0.006	0.023	0.009	0.018	0.013	0.015	0.012	0.025	0.010	0.020	0.011	0.020
27.50	0.006	0.023	0.007	0.017	0.012	0.016	0.012	0.025	0.008	0.020	0.008	0.018
27.60	0.006	0.023	0.006	0.018	0.010	0.016	0.011	0.023	0.008	0.019	0.007	0.018

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.181-m (7.125-in) V (m/s)	0.181-m (7.125-in) StdDev (m/s)	0.206-m (8.125-in) V (m/s)	0.206-m (8.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.257-m (10.125-in) V (m/s)	0.257-m (10.125-in) StdDev (m/s)	0.283-m (11.125-in) V (m/s)	0.283-m (11.125-in) StdDev (m/s)
27.70	0.006	0.024	0.006	0.019	0.009	0.016	0.012	0.023	0.007	0.017	0.006	0.017
27.80	0.006	0.021	0.008	0.018	0.008	0.017	0.012	0.023	0.006	0.015	0.005	0.018
27.90	0.004	0.019	0.007	0.019	0.006	0.018	0.012	0.023	0.007	0.015	0.006	0.019
28.00	0.003	0.019	0.006	0.020	0.005	0.018	0.012	0.022	0.007	0.016	0.007	0.021
28.10	0.004	0.018	0.005	0.020	0.004	0.017	0.011	0.021	0.007	0.017	0.007	0.022
28.20	0.004	0.018	0.004	0.019	0.004	0.017	0.010	0.021	0.007	0.018	0.008	0.022
28.30	0.004	0.020	0.005	0.018	0.005	0.014	0.011	0.023	0.007	0.017	0.010	0.019
28.40	0.006	0.022	0.006	0.018	0.005	0.012	0.011	0.024	0.005	0.015	0.011	0.020
28.50	0.007	0.022	0.007	0.019	0.005	0.011	0.011	0.023	0.004	0.015	0.011	0.021
28.60	0.007	0.020	0.005	0.019	0.005	0.012	0.012	0.021	0.005	0.015	0.010	0.023
28.70	0.007	0.019	0.004	0.019	0.008	0.015	0.012	0.020	0.007	0.014	0.009	0.022
28.80	0.006	0.018	0.004	0.018	0.007	0.015	0.011	0.019	0.008	0.014	0.010	0.024
28.90	0.006	0.019	0.004	0.018	0.004	0.013	0.011	0.018	0.007	0.012	0.011	0.023
29.00	0.007	0.021	0.005	0.018	0.002	0.011	0.010	0.019	0.008	0.013	0.010	0.020
29.10	0.008	0.020	0.007	0.016	0.003	0.011	0.009	0.017	0.010	0.016	0.009	0.018
29.20	0.007	0.020	0.007	0.015	0.003	0.012	0.008	0.017	0.010	0.019	0.010	0.020
29.30	0.006	0.019	0.006	0.014	0.004	0.013	0.008	0.017	0.009	0.020	0.011	0.020
29.40	0.005	0.018	0.003	0.014	0.004	0.013	0.008	0.018	0.007	0.019	0.011	0.020
29.50	0.005	0.018	0.002	0.015	0.002	0.012	0.009	0.020	0.007	0.017	0.010	0.018
29.60	0.004	0.016	0.002	0.014	0.002	0.013	0.010	0.020	0.005	0.016	0.011	0.016
29.70	0.004	0.015	0.004	0.012	0.003	0.014	0.012	0.020	0.004	0.016	0.012	0.016
29.80	0.004	0.015	0.006	0.013	0.003	0.015	0.012	0.019	0.003	0.015	0.010	0.015
29.90	0.004	0.015	0.006	0.014	0.003	0.015	0.012	0.019	0.003	0.014	0.007	0.013
30.00	0.006	0.015	0.006	0.015	0.003	0.015	0.012	0.018	0.004	0.015	0.004	0.011

Small-Tank Wall Velocity Data, contd.

Velocities Measured at 0.406 m (16 in) Radial Position										
Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
0.10	0.008	0.022	0.005	0.017	-0.003	0.013	0.003	0.018	-0.001	0.017
0.20	0.011	0.021	0.007	0.020	-0.003	0.013	0.003	0.018	0.000	0.018
0.30	0.023	0.028	0.017	0.025	0.001	0.013	0.009	0.022	0.009	0.021
0.40	0.027	0.029	0.020	0.026	0.006	0.014	0.014	0.024	0.016	0.025
0.50	0.032	0.029	0.020	0.026	0.006	0.015	0.015	0.024	0.015	0.025
0.60	0.037	0.030	0.023	0.025	0.007	0.017	0.015	0.023	0.013	0.024
0.70	0.042	0.030	0.027	0.027	0.009	0.018	0.015	0.023	0.012	0.023
0.80	0.046	0.029	0.029	0.026	0.012	0.020	0.016	0.023	0.012	0.023
0.90	0.049	0.028	0.031	0.026	0.013	0.020	0.016	0.022	0.011	0.023
1.00	0.054	0.026	0.034	0.027	0.013	0.021	0.015	0.022	0.012	0.023
1.10	0.061	0.024	0.039	0.026	0.016	0.024	0.015	0.024	0.014	0.025
1.20	0.079	0.022	0.047	0.031	0.020	0.027	0.017	0.026	0.016	0.026
1.30	0.098	0.024	0.060	0.029	0.027	0.028	0.020	0.026	0.016	0.027
1.40	0.119	0.061	0.075	0.028	0.036	0.028	0.025	0.026	0.019	0.028
1.50	0.121	0.094	0.088	0.025	0.044	0.029	0.030	0.027	0.022	0.028
1.60	0.118	0.095	0.094	0.047	0.051	0.031	0.034	0.026	0.024	0.028
1.70	0.132	0.105	0.088	0.067	0.056	0.033	0.037	0.026	0.025	0.027
1.80	0.149	0.095	0.092	0.071	0.053	0.035	0.039	0.026	0.026	0.025
1.90	0.177	0.099	0.096	0.060	0.051	0.042	0.039	0.026	0.024	0.024
2.00	0.202	0.102	0.119	0.085	0.060	0.075	0.030	0.026	0.021	0.025
2.10	0.222	0.107	0.127	0.081	0.063	0.076	0.021	0.025	0.018	0.026
2.20	0.245	0.129	0.121	0.071	0.072	0.098	0.020	0.022	0.015	0.028
2.30	0.278	0.109	0.122	0.078	0.071	0.087	0.011	0.015	0.012	0.028
2.40	0.301	0.099	0.142	0.088	0.069	0.068	0.008	0.023	0.010	0.029
2.50	0.334	0.104	0.131	0.061	0.073	0.064	0.010	0.031	0.005	0.024
2.60	0.342	0.092	0.155	0.071	0.077	0.077	0.020	0.045	0.005	0.033
2.70	0.344	0.097	0.179	0.071	0.080	0.089	0.031	0.057	0.008	0.052
2.80	0.357	0.106	0.170	0.079	0.077	0.087	0.036	0.074	0.005	0.039

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
2.90	0.357	0.088	0.151	0.063	0.084	0.092	0.032	0.067	0.001	0.023
3.00	0.368	0.094	0.175	0.062	0.082	0.073	0.030	0.055	0.001	0.029
3.10	0.393	0.056	0.185	0.055	0.083	0.075	0.032	0.050	0.004	0.030
3.20	0.390	0.075	0.177	0.083	0.105	0.076	0.035	0.056	0.011	0.034
3.30	0.388	0.068	0.178	0.101	0.099	0.072	0.049	0.072	0.019	0.037
3.40	0.341	0.071	0.183	0.085	0.094	0.058	0.041	0.053	0.021	0.040
3.50	0.363	0.080	0.209	0.090	0.088	0.066	0.024	0.034	0.012	0.036
3.60	0.365	0.048	0.203	0.111	0.088	0.072	0.014	0.033	0.016	0.043
3.70	0.383	0.063	0.180	0.094	0.098	0.078	0.020	0.047	0.019	0.042
3.80	0.355	0.066	0.178	0.098	0.100	0.090	0.030	0.064	0.015	0.037
3.90	0.353	0.070	0.170	0.096	0.094	0.064	0.023	0.052	0.014	0.037
4.00	0.352	0.073	0.164	0.096	0.108	0.083	0.025	0.050	0.013	0.040
4.10	0.345	0.047	0.165	0.097	0.101	0.082	0.038	0.072	0.014	0.043
4.20	0.326	0.044	0.168	0.091	0.100	0.088	0.042	0.070	0.013	0.037
4.30	0.308	0.060	0.154	0.092	0.097	0.081	0.038	0.064	0.011	0.032
4.40	0.281	0.043	0.152	0.102	0.093	0.080	0.038	0.059	0.010	0.030
4.50	0.278	0.051	0.149	0.105	0.089	0.080	0.046	0.068	0.013	0.043
4.60	0.270	0.065	0.136	0.104	0.088	0.081	0.052	0.080	0.013	0.042
4.70	0.265	0.061	0.141	0.101	0.100	0.081	0.055	0.080	0.010	0.030
4.80	0.253	0.055	0.134	0.087	0.089	0.075	0.042	0.063	0.007	0.027
4.90	0.241	0.064	0.138	0.085	0.105	0.072	0.046	0.064	0.011	0.039
5.00	0.209	0.063	0.138	0.090	0.108	0.062	0.056	0.072	0.017	0.053
5.10	0.210	0.070	0.118	0.081	0.095	0.063	0.062	0.080	0.026	0.071
5.20	0.210	0.074	0.113	0.080	0.074	0.058	0.056	0.071	0.025	0.067
5.30	0.208	0.080	0.107	0.075	0.082	0.067	0.047	0.068	0.024	0.065
5.40	0.204	0.084	0.105	0.071	0.085	0.070	0.039	0.068	0.028	0.072
5.50	0.180	0.073	0.095	0.066	0.083	0.060	0.038	0.061	0.031	0.078
5.60	0.165	0.068	0.078	0.070	0.078	0.064	0.033	0.054	0.029	0.076
5.70	0.158	0.072	0.076	0.065	0.060	0.059	0.024	0.046	0.030	0.073
5.80	0.163	0.069	0.073	0.065	0.058	0.065	0.019	0.049	0.033	0.077
5.90	0.150	0.066	0.068	0.074	0.059	0.065	0.016	0.047	0.031	0.074

Velocities Measured at 0.406 m (16 in) Radial Position										
Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev	V (m/s)	StdDev
		(m/s)		(m/s)		(m/s)		(m/s)		(m/s)
6.00	0.141	0.056	0.074	0.078	0.055	0.063	0.018	0.047	0.028	0.070
6.10	0.124	0.051	0.081	0.080	0.046	0.063	0.018	0.040	0.030	0.071
6.20	0.120	0.060	0.088	0.077	0.043	0.061	0.018	0.034	0.028	0.072
6.30	0.103	0.057	0.085	0.077	0.042	0.057	0.009	0.030	0.026	0.071
6.40	0.095	0.058	0.078	0.078	0.044	0.053	0.011	0.029	0.022	0.064
6.50	0.086	0.052	0.081	0.079	0.046	0.054	0.011	0.029	0.022	0.058
6.60	0.073	0.060	0.081	0.081	0.042	0.048	0.016	0.032	0.027	0.065
6.70	0.071	0.056	0.082	0.084	0.034	0.044	0.013	0.032	0.025	0.057
6.80	0.072	0.056	0.075	0.074	0.031	0.049	0.011	0.031	0.027	0.062
6.90	0.066	0.058	0.070	0.072	0.033	0.055	0.010	0.030	0.025	0.054
7.00	0.065	0.054	0.068	0.078	0.030	0.050	0.010	0.030	0.026	0.059
7.10	0.065	0.049	0.070	0.078	0.025	0.041	0.008	0.026	0.022	0.054
7.20	0.054	0.051	0.058	0.069	0.025	0.041	0.005	0.023	0.023	0.055
7.30	0.053	0.054	0.049	0.064	0.028	0.048	0.000	0.018	0.028	0.058
7.40	0.056	0.060	0.046	0.057	0.023	0.045	0.000	0.021	0.026	0.055
7.50	0.057	0.064	0.046	0.054	0.020	0.041	0.002	0.027	0.024	0.054
7.60	0.060	0.060	0.037	0.049	0.026	0.040	0.002	0.024	0.024	0.051
7.70	0.060	0.055	0.033	0.047	0.029	0.046	0.001	0.023	0.022	0.047
7.80	0.060	0.047	0.039	0.052	0.028	0.044	0.004	0.030	0.019	0.047
7.90	0.062	0.050	0.044	0.061	0.031	0.042	0.010	0.034	0.015	0.042
8.00	0.063	0.056	0.046	0.058	0.029	0.040	0.015	0.044	0.014	0.038
8.10	0.061	0.059	0.042	0.057	0.036	0.046	0.014	0.043	0.019	0.039
8.20	0.056	0.057	0.042	0.057	0.043	0.047	0.014	0.044	0.019	0.038
8.30	0.058	0.053	0.041	0.060	0.046	0.046	0.011	0.041	0.024	0.037
8.40	0.054	0.046	0.040	0.057	0.045	0.051	0.014	0.045	0.023	0.034
8.50	0.055	0.054	0.041	0.053	0.048	0.050	0.014	0.046	0.020	0.032
8.60	0.054	0.054	0.040	0.056	0.051	0.050	0.011	0.043	0.012	0.026
8.70	0.040	0.049	0.042	0.059	0.049	0.047	0.011	0.042	0.005	0.017
8.80	0.049	0.042	0.046	0.061	0.050	0.046	0.008	0.038	0.008	0.022
8.90	0.050	0.042	0.045	0.061	0.056	0.051	0.009	0.039	0.010	0.025
9.00	0.052	0.048	0.051	0.059	0.056	0.051	0.010	0.039	0.011	0.026

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
9.10	0.050	0.046	0.051	0.057	0.053	0.051	0.011	0.041	0.011	0.025
9.20	0.048	0.050	0.049	0.057	0.053	0.054	0.010	0.043	0.012	0.028
9.30	0.050	0.057	0.047	0.054	0.056	0.058	0.010	0.044	0.012	0.033
9.40	0.048	0.061	0.046	0.052	0.050	0.058	0.011	0.044	0.010	0.026
9.50	0.047	0.061	0.051	0.051	0.051	0.057	0.008	0.039	0.010	0.027
9.60	0.044	0.055	0.051	0.046	0.054	0.055	0.007	0.042	0.006	0.025
9.70	0.048	0.056	0.060	0.050	0.053	0.051	0.005	0.038	0.007	0.025
9.80	0.046	0.053	0.064	0.053	0.052	0.051	0.005	0.036	0.008	0.026
9.90	0.042	0.052	0.063	0.052	0.054	0.054	0.008	0.037	0.007	0.025
10.00	0.039	0.053	0.070	0.051	0.048	0.048	0.008	0.038	0.010	0.025
10.10	0.043	0.056	0.069	0.049	0.050	0.049	0.009	0.034	0.015	0.030
10.20	0.045	0.061	0.064	0.054	0.051	0.054	0.010	0.035	0.014	0.029
10.30	0.046	0.060	0.060	0.052	0.047	0.053	0.011	0.036	0.013	0.027
10.40	0.045	0.056	0.063	0.055	0.053	0.053	0.009	0.036	0.016	0.032
10.50	0.043	0.058	0.060	0.054	0.046	0.047	0.006	0.034	0.015	0.034
10.60	0.040	0.056	0.065	0.056	0.046	0.049	0.008	0.034	0.015	0.032
10.70	0.041	0.056	0.068	0.055	0.048	0.049	0.007	0.029	0.017	0.035
10.80	0.046	0.061	0.068	0.055	0.043	0.046	0.011	0.029	0.014	0.032
10.90	0.051	0.061	0.070	0.056	0.042	0.041	0.018	0.035	0.013	0.033
11.00	0.050	0.060	0.064	0.055	0.045	0.038	0.017	0.034	0.016	0.036
11.10	0.053	0.057	0.059	0.054	0.046	0.042	0.019	0.035	0.017	0.034
11.20	0.056	0.058	0.064	0.061	0.050	0.037	0.022	0.038	0.021	0.034
11.30	0.060	0.061	0.065	0.063	0.050	0.039	0.025	0.038	0.023	0.035
11.40	0.059	0.059	0.065	0.065	0.048	0.038	0.027	0.038	0.021	0.034
11.50	0.059	0.058	0.061	0.065	0.045	0.039	0.025	0.039	0.027	0.035
11.60	0.059	0.059	0.061	0.069	0.046	0.042	0.026	0.043	0.029	0.037
11.70	0.049	0.058	0.058	0.063	0.044	0.046	0.029	0.043	0.024	0.036
11.80	0.046	0.054	0.064	0.055	0.043	0.045	0.032	0.043	0.024	0.036
11.90	0.048	0.052	0.061	0.052	0.044	0.045	0.033	0.043	0.024	0.040
12.00	0.048	0.052	0.065	0.054	0.048	0.047	0.037	0.042	0.024	0.042
12.10	0.042	0.054	0.064	0.054	0.046	0.041	0.036	0.042	0.024	0.042

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
12.20	0.043	0.051	0.061	0.053	0.049	0.038	0.039	0.047	0.024	0.043
12.30	0.047	0.051	0.064	0.055	0.048	0.037	0.038	0.044	0.022	0.041
12.40	0.055	0.049	0.056	0.050	0.046	0.038	0.036	0.045	0.021	0.034
12.50	0.060	0.048	0.053	0.047	0.049	0.038	0.033	0.041	0.022	0.035
12.60	0.061	0.047	0.052	0.048	0.049	0.037	0.031	0.039	0.022	0.035
12.70	0.061	0.046	0.052	0.047	0.055	0.039	0.030	0.042	0.022	0.041
12.80	0.059	0.049	0.044	0.046	0.057	0.039	0.031	0.040	0.020	0.040
12.90	0.058	0.047	0.040	0.044	0.055	0.038	0.036	0.046	0.021	0.037
13.00	0.055	0.048	0.044	0.040	0.054	0.039	0.034	0.045	0.018	0.036
13.10	0.049	0.052	0.047	0.045	0.052	0.038	0.033	0.042	0.015	0.037
13.20	0.045	0.050	0.044	0.044	0.048	0.037	0.035	0.041	0.016	0.039
13.30	0.044	0.051	0.048	0.039	0.053	0.042	0.034	0.043	0.022	0.039
13.40	0.042	0.048	0.057	0.043	0.054	0.043	0.033	0.045	0.026	0.039
13.50	0.042	0.045	0.051	0.040	0.054	0.040	0.034	0.045	0.027	0.042
13.60	0.045	0.045	0.051	0.042	0.054	0.039	0.037	0.044	0.023	0.041
13.70	0.043	0.042	0.052	0.043	0.056	0.040	0.037	0.044	0.018	0.040
13.80	0.042	0.042	0.047	0.041	0.052	0.038	0.033	0.041	0.016	0.039
13.90	0.047	0.046	0.052	0.039	0.051	0.038	0.031	0.042	0.020	0.039
14.00	0.046	0.045	0.054	0.034	0.054	0.041	0.030	0.042	0.022	0.039
14.10	0.045	0.045	0.052	0.035	0.051	0.034	0.038	0.044	0.025	0.038
14.20	0.042	0.043	0.051	0.037	0.050	0.034	0.040	0.046	0.026	0.040
14.30	0.039	0.037	0.047	0.035	0.049	0.038	0.041	0.045	0.023	0.037
14.40	0.037	0.032	0.040	0.037	0.048	0.037	0.039	0.040	0.019	0.035
14.50	0.034	0.034	0.036	0.034	0.050	0.034	0.039	0.040	0.025	0.043
14.60	0.034	0.034	0.033	0.027	0.053	0.036	0.037	0.039	0.026	0.045
14.70	0.034	0.034	0.032	0.024	0.048	0.037	0.032	0.036	0.025	0.042
14.80	0.039	0.037	0.030	0.024	0.051	0.034	0.034	0.039	0.022	0.039
14.90	0.037	0.035	0.035	0.024	0.050	0.034	0.029	0.036	0.022	0.044
15.00	0.043	0.035	0.038	0.026	0.054	0.036	0.028	0.035	0.024	0.046
15.10	0.047	0.032	0.041	0.029	0.054	0.036	0.031	0.034	0.022	0.044
15.20	0.048	0.033	0.037	0.028	0.056	0.034	0.032	0.034	0.021	0.044

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
15.30	0.047	0.034	0.037	0.030	0.056	0.032	0.031	0.033	0.021	0.044
15.40	0.048	0.034	0.041	0.033	0.057	0.034	0.028	0.034	0.024	0.046
15.50	0.050	0.037	0.041	0.033	0.056	0.037	0.025	0.035	0.026	0.048
15.60	0.048	0.038	0.036	0.032	0.054	0.038	0.024	0.033	0.025	0.048
15.70	0.047	0.039	0.037	0.033	0.056	0.038	0.022	0.029	0.024	0.047
15.80	0.048	0.038	0.037	0.032	0.060	0.040	0.024	0.031	0.023	0.046
15.90	0.050	0.038	0.037	0.032	0.061	0.040	0.024	0.036	0.025	0.048
16.00	0.047	0.036	0.038	0.034	0.055	0.038	0.022	0.038	0.026	0.047
16.10	0.046	0.036	0.038	0.035	0.050	0.037	0.019	0.038	0.024	0.046
16.20	0.045	0.034	0.042	0.036	0.053	0.039	0.019	0.037	0.023	0.045
16.30	0.045	0.035	0.043	0.037	0.052	0.040	0.019	0.037	0.024	0.047
16.40	0.042	0.033	0.039	0.037	0.054	0.040	0.016	0.033	0.025	0.044
16.50	0.043	0.034	0.039	0.039	0.052	0.040	0.021	0.038	0.023	0.042
16.60	0.042	0.037	0.039	0.036	0.050	0.042	0.022	0.037	0.023	0.042
16.70	0.041	0.038	0.038	0.035	0.051	0.041	0.022	0.036	0.025	0.044
16.80	0.043	0.038	0.032	0.034	0.050	0.038	0.019	0.035	0.023	0.044
16.90	0.043	0.035	0.034	0.035	0.052	0.039	0.017	0.034	0.020	0.040
17.00	0.046	0.034	0.034	0.035	0.054	0.038	0.019	0.035	0.021	0.040
17.10	0.047	0.036	0.028	0.036	0.052	0.037	0.019	0.033	0.023	0.041
17.20	0.046	0.037	0.027	0.036	0.050	0.040	0.020	0.032	0.021	0.039
17.30	0.047	0.040	0.030	0.032	0.049	0.039	0.019	0.031	0.022	0.038
17.40	0.046	0.039	0.026	0.029	0.051	0.035	0.017	0.029	0.021	0.038
17.50	0.047	0.040	0.026	0.033	0.054	0.033	0.017	0.033	0.020	0.035
17.60	0.047	0.041	0.023	0.033	0.053	0.035	0.016	0.034	0.019	0.037
17.70	0.043	0.040	0.022	0.033	0.058	0.039	0.015	0.032	0.019	0.038
17.80	0.044	0.039	0.021	0.033	0.056	0.034	0.018	0.034	0.020	0.038
17.90	0.045	0.040	0.023	0.035	0.054	0.035	0.019	0.035	0.019	0.036
18.00	0.045	0.037	0.025	0.032	0.049	0.036	0.017	0.034	0.015	0.036
18.10	0.043	0.035	0.025	0.031	0.049	0.037	0.018	0.032	0.013	0.036
18.20	0.043	0.034	0.024	0.029	0.049	0.037	0.017	0.032	0.015	0.036
18.30	0.041	0.032	0.024	0.029	0.047	0.038	0.017	0.033	0.020	0.038

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
18.40	0.036	0.035	0.023	0.027	0.044	0.041	0.020	0.039	0.019	0.035
18.50	0.034	0.034	0.023	0.025	0.045	0.040	0.021	0.041	0.020	0.038
18.60	0.030	0.033	0.022	0.025	0.042	0.041	0.023	0.039	0.021	0.039
18.70	0.030	0.031	0.020	0.027	0.041	0.040	0.025	0.038	0.019	0.038
18.80	0.035	0.034	0.019	0.025	0.040	0.041	0.024	0.037	0.018	0.036
18.90	0.034	0.035	0.021	0.027	0.037	0.040	0.023	0.035	0.018	0.034
19.00	0.031	0.034	0.019	0.026	0.037	0.040	0.026	0.034	0.020	0.034
19.10	0.030	0.033	0.016	0.022	0.037	0.040	0.025	0.035	0.022	0.034
19.20	0.033	0.030	0.019	0.022	0.037	0.040	0.022	0.033	0.023	0.034
19.30	0.034	0.029	0.022	0.026	0.037	0.038	0.021	0.035	0.021	0.032
19.40	0.031	0.028	0.022	0.028	0.035	0.036	0.018	0.035	0.022	0.033
19.50	0.032	0.032	0.020	0.029	0.033	0.035	0.018	0.033	0.024	0.034
19.60	0.034	0.033	0.019	0.027	0.031	0.034	0.018	0.033	0.025	0.035
19.70	0.033	0.032	0.019	0.027	0.030	0.035	0.020	0.033	0.023	0.035
19.80	0.032	0.032	0.019	0.027	0.030	0.034	0.019	0.030	0.023	0.034
19.90	0.033	0.030	0.020	0.028	0.029	0.033	0.016	0.026	0.019	0.033
20.00	0.035	0.028	0.019	0.026	0.028	0.034	0.014	0.024	0.020	0.034
20.10	0.033	0.028	0.015	0.023	0.028	0.037	0.013	0.023	0.022	0.035
20.20	0.033	0.028	0.015	0.025	0.027	0.038	0.013	0.022	0.023	0.037
20.30	0.033	0.028	0.016	0.024	0.026	0.038	0.013	0.022	0.022	0.038
20.40	0.033	0.027	0.016	0.024	0.026	0.039	0.016	0.028	0.024	0.041
20.50	0.031	0.025	0.014	0.022	0.028	0.039	0.016	0.027	0.022	0.038
20.60	0.029	0.024	0.016	0.028	0.028	0.039	0.017	0.028	0.023	0.038
20.70	0.028	0.025	0.015	0.028	0.028	0.040	0.018	0.030	0.022	0.035
20.80	0.031	0.027	0.016	0.028	0.028	0.037	0.019	0.032	0.019	0.031
20.90	0.032	0.028	0.015	0.028	0.028	0.036	0.018	0.032	0.020	0.032
21.00	0.034	0.030	0.016	0.029	0.024	0.033	0.019	0.031	0.019	0.031
21.10	0.033	0.030	0.017	0.028	0.025	0.032	0.019	0.032	0.019	0.031
21.20	0.032	0.028	0.017	0.029	0.023	0.033	0.021	0.033	0.019	0.030
21.30	0.031	0.028	0.017	0.030	0.023	0.033	0.018	0.029	0.018	0.030
21.40	0.030	0.026	0.018	0.030	0.020	0.031	0.018	0.029	0.018	0.030

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
21.50	0.031	0.027	0.019	0.030	0.015	0.027	0.016	0.028	0.017	0.029
21.60	0.032	0.024	0.018	0.030	0.012	0.023	0.013	0.026	0.018	0.030
21.70	0.033	0.024	0.016	0.029	0.011	0.024	0.014	0.028	0.018	0.030
21.80	0.033	0.027	0.015	0.028	0.013	0.025	0.018	0.034	0.018	0.028
21.90	0.032	0.029	0.018	0.031	0.014	0.028	0.018	0.031	0.021	0.029
22.00	0.031	0.030	0.016	0.031	0.010	0.022	0.016	0.029	0.024	0.032
22.10	0.030	0.029	0.016	0.033	0.010	0.021	0.015	0.029	0.021	0.029
22.20	0.032	0.029	0.015	0.034	0.013	0.021	0.014	0.030	0.020	0.030
22.30	0.033	0.030	0.015	0.034	0.017	0.023	0.014	0.033	0.018	0.028
22.40	0.029	0.029	0.017	0.033	0.016	0.024	0.014	0.032	0.014	0.026
22.50	0.027	0.027	0.019	0.034	0.014	0.024	0.012	0.030	0.013	0.027
22.60	0.025	0.027	0.019	0.033	0.012	0.023	0.012	0.028	0.013	0.027
22.70	0.025	0.024	0.019	0.033	0.010	0.023	0.013	0.029	0.013	0.027
22.80	0.022	0.022	0.017	0.031	0.009	0.022	0.013	0.028	0.014	0.027
22.90	0.020	0.021	0.017	0.032	0.014	0.029	0.013	0.028	0.014	0.027
23.00	0.018	0.024	0.016	0.033	0.014	0.028	0.013	0.029	0.013	0.027
23.10	0.020	0.027	0.018	0.033	0.013	0.026	0.011	0.028	0.013	0.027
23.20	0.021	0.026	0.019	0.031	0.010	0.023	0.010	0.025	0.013	0.027
23.30	0.022	0.025	0.018	0.029	0.011	0.023	0.009	0.024	0.011	0.026
23.40	0.020	0.022	0.017	0.032	0.010	0.024	0.008	0.025	0.013	0.025
23.50	0.018	0.021	0.016	0.030	0.012	0.022	0.007	0.025	0.015	0.026
23.60	0.012	0.023	0.016	0.033	0.010	0.022	0.007	0.025	0.019	0.028
23.70	0.012	0.024	0.014	0.031	0.010	0.022	0.006	0.023	0.020	0.026
23.80	0.012	0.024	0.014	0.032	0.008	0.022	0.006	0.024	0.019	0.024
23.90	0.011	0.025	0.014	0.031	0.008	0.022	0.007	0.023	0.018	0.023
24.00	0.012	0.028	0.014	0.031	0.008	0.021	0.010	0.025	0.015	0.021
24.10	0.012	0.027	0.015	0.030	0.007	0.016	0.010	0.027	0.014	0.024
24.20	0.011	0.023	0.014	0.027	0.006	0.017	0.010	0.026	0.013	0.023
24.30	0.010	0.022	0.014	0.026	0.004	0.018	0.011	0.025	0.013	0.024
24.40	0.011	0.021	0.015	0.025	0.004	0.019	0.010	0.023	0.012	0.023
24.50	0.012	0.021	0.017	0.027	0.005	0.020	0.011	0.024	0.013	0.023

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle Time (sec)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.359-m (14.125-in) V (m/s)	0.359-m (14.125-in) StdDev (m/s)	0.410-m (16.125-in) V (m/s)	0.410-m (16.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.511-m (20.125-in) V (m/s)	0.511-m (20.125-in) StdDev (m/s)
24.60	0.013	0.020	0.016	0.028	0.006	0.019	0.012	0.024	0.012	0.023
24.70	0.013	0.019	0.018	0.030	0.005	0.018	0.010	0.021	0.013	0.023
24.80	0.012	0.021	0.019	0.031	0.003	0.018	0.007	0.019	0.014	0.024
24.90	0.011	0.022	0.017	0.032	0.002	0.019	0.008	0.021	0.016	0.024
25.00	0.010	0.021	0.017	0.034	0.003	0.018	0.008	0.021	0.019	0.026
25.10	0.008	0.019	0.016	0.034	0.006	0.019	0.006	0.020	0.017	0.025
25.20	0.008	0.018	0.016	0.033	0.005	0.017	0.006	0.019	0.013	0.023
25.30	0.009	0.017	0.017	0.033	0.004	0.017	0.007	0.018	0.011	0.023
25.40	0.010	0.018	0.018	0.033	0.004	0.019	0.007	0.018	0.011	0.023
25.50	0.012	0.021	0.016	0.034	0.004	0.020	0.007	0.018	0.012	0.024
25.60	0.010	0.021	0.015	0.034	0.002	0.021	0.006	0.019	0.012	0.025
25.70	0.011	0.021	0.015	0.033	0.001	0.019	0.008	0.018	0.010	0.024
25.80	0.012	0.021	0.015	0.035	0.001	0.016	0.009	0.019	0.008	0.023
25.90	0.013	0.023	0.014	0.034	0.001	0.015	0.007	0.018	0.009	0.024
26.00	0.013	0.024	0.015	0.032	0.002	0.018	0.004	0.017	0.008	0.022
26.10	0.016	0.025	0.015	0.033	0.004	0.021	0.002	0.017	0.007	0.020
26.20	0.015	0.026	0.015	0.029	0.005	0.022	0.001	0.018	0.009	0.021
26.30	0.013	0.023	0.016	0.026	0.001	0.018	0.001	0.017	0.009	0.021
26.40	0.014	0.023	0.017	0.026	0.002	0.017	0.001	0.015	0.009	0.022
26.50	0.015	0.023	0.017	0.028	0.004	0.017	0.002	0.017	0.010	0.025
26.60	0.016	0.025	0.016	0.029	0.003	0.018	0.003	0.018	0.013	0.024
26.70	0.016	0.024	0.016	0.029	0.001	0.019	0.004	0.018	0.015	0.025
26.80	0.014	0.024	0.016	0.028	-0.002	0.015	0.006	0.018	0.016	0.024
26.90	0.012	0.024	0.016	0.026	-0.001	0.015	0.009	0.021	0.016	0.024
27.00	0.011	0.023	0.018	0.027	-0.001	0.014	0.009	0.021	0.016	0.024
27.10	0.012	0.025	0.019	0.028	0.000	0.017	0.009	0.022	0.015	0.025
27.20	0.013	0.025	0.018	0.028	-0.001	0.018	0.010	0.023	0.016	0.028
27.30	0.012	0.025	0.017	0.029	-0.001	0.020	0.011	0.023	0.015	0.026
27.40	0.010	0.023	0.017	0.030	-0.002	0.019	0.009	0.020	0.012	0.025
27.50	0.009	0.023	0.016	0.029	-0.002	0.017	0.006	0.018	0.011	0.026
27.60	0.010	0.023	0.014	0.028	-0.002	0.018	0.005	0.019	0.011	0.025

Velocities Measured at 0.406 m (16 in) Radial Position

Cycle	0.308-m	0.308-m	0.359-m	0.359-m	0.410-m	0.410-m	0.460-m	0.460-m	0.511-m	0.511-m
Time (sec)	(12.125-in)	(12.125-in)	(14.125-in)	(14.125-in)	(16.125-in)	(16.125-in)	(18.125-in)	(18.125-in)	(20.125-in)	(20.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
27.70	0.008	0.023	0.011	0.027	-0.001	0.018	0.007	0.020	0.011	0.026
27.80	0.007	0.021	0.009	0.026	-0.001	0.018	0.008	0.020	0.013	0.028
27.90	0.008	0.021	0.008	0.026	-0.003	0.016	0.009	0.020	0.011	0.026
28.00	0.008	0.021	0.007	0.025	-0.005	0.013	0.009	0.020	0.008	0.022
28.10	0.007	0.021	0.007	0.025	-0.006	0.012	0.009	0.021	0.007	0.019
28.20	0.006	0.022	0.010	0.024	-0.005	0.014	0.009	0.022	0.007	0.019
28.30	0.006	0.021	0.012	0.026	-0.004	0.017	0.010	0.020	0.007	0.019
28.40	0.007	0.020	0.011	0.025	-0.002	0.018	0.010	0.021	0.007	0.019
28.50	0.007	0.020	0.011	0.026	-0.003	0.016	0.011	0.022	0.007	0.018
28.60	0.006	0.019	0.010	0.024	-0.003	0.014	0.013	0.026	0.006	0.017
28.70	0.007	0.020	0.005	0.019	-0.004	0.013	0.014	0.027	0.003	0.015
28.80	0.008	0.021	0.004	0.021	-0.004	0.012	0.012	0.024	0.001	0.015
28.90	0.007	0.020	0.003	0.022	-0.004	0.012	0.008	0.021	0.001	0.016
29.00	0.005	0.019	0.001	0.020	-0.003	0.013	0.005	0.020	0.002	0.016
29.10	0.005	0.019	0.003	0.021	-0.003	0.013	0.004	0.019	0.003	0.016
29.20	0.004	0.018	0.004	0.021	-0.003	0.013	0.004	0.020	0.003	0.016
29.30	0.004	0.018	0.003	0.019	-0.003	0.012	0.004	0.018	0.003	0.016
29.40	0.004	0.018	0.004	0.018	-0.002	0.013	0.004	0.020	0.003	0.015
29.50	0.004	0.017	0.004	0.016	-0.001	0.014	0.005	0.021	0.002	0.013
29.60	0.004	0.017	0.003	0.015	0.000	0.016	0.005	0.021	0.002	0.014
29.70	0.005	0.018	0.005	0.017	0.001	0.018	0.004	0.020	0.001	0.015
29.80	0.005	0.018	0.005	0.018	0.000	0.018	0.004	0.020	0.001	0.016
29.90	0.005	0.018	0.004	0.017	0.000	0.017	0.003	0.018	-0.001	0.013
30.00	0.004	0.017	0.004	0.016	-0.001	0.015	0.001	0.017	-0.001	0.015

Small-Tank Interior Velocity Data

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
0.1	0.026	0.023	0.020	0.028	0.025	0.032	0.029	0.030	0.083	0.048	0.087	0.062
0.2	0.031	0.026	0.027	0.032	0.035	0.037	0.031	0.028	0.086	0.050	0.090	0.062
0.3	0.080	0.027	0.053	0.033	0.050	0.035	0.051	0.030	0.094	0.048	0.105	0.050
0.4	0.177	0.023	0.076	0.022	0.037	0.036	0.052	0.031	0.100	0.042	0.109	0.045
0.5	0.320	0.134	0.103	0.010	0.039	0.029	0.044	0.033	0.098	0.040	0.108	0.043
0.6	0.213	0.064	0.114	0.009	0.051	0.021	0.043	0.035	0.095	0.040	0.109	0.042
0.7	0.167	0.051	0.110	0.009	0.060	0.019	0.037	0.035	0.095	0.042	0.109	0.042
0.8	0.130	0.034	0.106	0.014	0.063	0.018	0.037	0.033	0.093	0.045	0.108	0.044
0.9	0.127	0.030	0.105	0.015	0.060	0.019	0.036	0.032	0.095	0.046	0.111	0.043
1	0.111	0.045	0.105	0.020	0.057	0.022	0.036	0.034	0.097	0.045	0.114	0.043
1.1	0.105	0.035	0.097	0.019	0.058	0.020	0.036	0.033	0.097	0.046	0.116	0.041
1.2	0.094	0.030	0.085	0.020	0.064	0.020	0.040	0.032	0.095	0.048	0.117	0.041
1.3	0.062	0.034	0.075	0.022	0.065	0.020	0.052	0.027	0.092	0.049	0.115	0.043
1.4	0.049	0.028	0.057	0.025	0.063	0.018	0.062	0.025	0.087	0.051	0.115	0.044
1.5	0.046	0.024	0.033	0.027	0.058	0.020	0.069	0.026	0.082	0.052	0.113	0.045
1.6	0.034	0.020	0.015	0.012	0.049	0.020	0.070	0.028	0.079	0.056	0.112	0.044
1.7	0.028	0.024	0.004	0.007	0.039	0.024	0.068	0.028	0.078	0.060	0.113	0.043
1.8	0.028	0.022	-0.002	0.005	0.034	0.032	0.068	0.031	0.078	0.063	0.111	0.043
1.9	0.027	0.015	0.002	0.016	0.032	0.037	0.071	0.033	0.079	0.064	0.110	0.044
2	0.033	0.018	0.016	0.036	0.043	0.049	0.071	0.038	0.081	0.064	0.108	0.045
2.1	0.045	0.023	0.034	0.041	0.046	0.050	0.069	0.043	0.083	0.063	0.107	0.045
2.2	0.061	0.022	0.048	0.035	0.074	0.091	0.077	0.045	0.087	0.063	0.107	0.046
2.3	0.071	0.024	0.071	0.040	0.082	0.070	0.088	0.051	0.092	0.061	0.107	0.047
2.4	0.092	0.030	0.088	0.067	0.073	0.055	0.097	0.064	0.095	0.059	0.106	0.048
2.5	0.098	0.029	0.090	0.041	0.084	0.068	0.111	0.058	0.099	0.057	0.107	0.048
2.6	0.102	0.027	0.093	0.025	0.106	0.067	0.119	0.055	0.104	0.056	0.108	0.046
2.7	0.102	0.030	0.098	0.036	0.116	0.049	0.118	0.048	0.113	0.066	0.110	0.044
2.8	0.104	0.028	0.094	0.036	0.116	0.060	0.139	0.071	0.145	0.144	0.109	0.042
2.9	0.113	0.027	0.088	0.024	0.119	0.076	0.122	0.053	0.139	0.117	0.109	0.042

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
3	0.110	0.038	0.087	0.025	0.107	0.061	0.128	0.052	0.127	0.107	0.109	0.044
3.1	0.115	0.036	0.096	0.029	0.104	0.049	0.143	0.067	0.136	0.115	0.110	0.045
3.2	0.132	0.038	0.099	0.036	0.102	0.037	0.130	0.061	0.142	0.103	0.104	0.047
3.3	0.140	0.030	0.098	0.023	0.107	0.032	0.149	0.072	0.139	0.075	0.098	0.053
3.4	0.148	0.037	0.090	0.017	0.126	0.034	0.146	0.079	0.145	0.067	0.092	0.058
3.5	0.164	0.027	0.089	0.018	0.111	0.019	0.122	0.055	0.156	0.092	0.091	0.060
3.6	0.164	0.042	0.089	0.030	0.113	0.031	0.161	0.059	0.154	0.076	0.093	0.062
3.7	0.174	0.041	0.096	0.029	0.112	0.036	0.152	0.060	0.158	0.068	0.098	0.059
3.8	0.179	0.037	0.102	0.034	0.112	0.037	0.160	0.068	0.152	0.061	0.101	0.054
3.9	0.169	0.052	0.104	0.033	0.126	0.040	0.145	0.083	0.151	0.069	0.102	0.051
4	0.167	0.051	0.098	0.027	0.126	0.050	0.147	0.070	0.157	0.077	0.103	0.052
4.1	0.159	0.053	0.098	0.025	0.133	0.048	0.139	0.061	0.157	0.070	0.105	0.058
4.2	0.146	0.040	0.107	0.049	0.128	0.037	0.145	0.078	0.145	0.066	0.111	0.063
4.3	0.161	0.043	0.107	0.032	0.121	0.050	0.151	0.067	0.159	0.077	0.107	0.055
4.4	0.174	0.071	0.126	0.045	0.125	0.044	0.141	0.063	0.142	0.060	0.108	0.054
4.5	0.174	0.083	0.134	0.051	0.145	0.056	0.139	0.039	0.139	0.053	0.108	0.053
4.6	0.164	0.074	0.136	0.042	0.152	0.049	0.167	0.064	0.145	0.044	0.106	0.053
4.7	0.163	0.076	0.139	0.041	0.142	0.041	0.185	0.069	0.148	0.036	0.109	0.050
4.8	0.162	0.069	0.149	0.062	0.147	0.043	0.173	0.061	0.146	0.033	0.121	0.055
4.9	0.171	0.084	0.157	0.047	0.136	0.059	0.174	0.072	0.149	0.041	0.127	0.053
5	0.157	0.081	0.154	0.056	0.130	0.046	0.200	0.072	0.151	0.049	0.130	0.045
5.1	0.144	0.071	0.130	0.069	0.133	0.045	0.196	0.075	0.149	0.061	0.132	0.051
5.2	0.136	0.057	0.127	0.062	0.133	0.053	0.184	0.085	0.146	0.050	0.134	0.049
5.3	0.127	0.045	0.133	0.051	0.132	0.051	0.193	0.069	0.159	0.054	0.143	0.050
5.4	0.140	0.054	0.133	0.059	0.120	0.043	0.178	0.064	0.152	0.046	0.144	0.051
5.5	0.142	0.058	0.122	0.052	0.119	0.045	0.172	0.068	0.148	0.036	0.137	0.053
5.6	0.135	0.063	0.106	0.051	0.114	0.058	0.171	0.051	0.144	0.036	0.138	0.040
5.7	0.155	0.076	0.099	0.042	0.107	0.060	0.163	0.077	0.140	0.046	0.144	0.035
5.8	0.141	0.055	0.102	0.062	0.107	0.055	0.160	0.082	0.143	0.040	0.157	0.046
5.9	0.138	0.069	0.116	0.065	0.131	0.076	0.178	0.082	0.146	0.046	0.165	0.056
6	0.136	0.049	0.129	0.034	0.148	0.046	0.182	0.076	0.150	0.046	0.177	0.062
6.1	0.138	0.051	0.131	0.032	0.151	0.046	0.172	0.076	0.155	0.061	0.179	0.061

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
6.2	0.140	0.058	0.123	0.042	0.141	0.059	0.167	0.065	0.161	0.074	0.185	0.067
6.3	0.137	0.044	0.114	0.044	0.138	0.055	0.166	0.060	0.149	0.068	0.179	0.062
6.4	0.143	0.050	0.114	0.054	0.146	0.063	0.166	0.059	0.144	0.059	0.171	0.066
6.5	0.139	0.046	0.115	0.035	0.138	0.085	0.170	0.064	0.146	0.053	0.176	0.066
6.6	0.139	0.052	0.125	0.037	0.140	0.080	0.158	0.068	0.153	0.039	0.177	0.054
6.7	0.136	0.036	0.115	0.047	0.153	0.063	0.156	0.068	0.150	0.049	0.175	0.055
6.8	0.140	0.039	0.110	0.038	0.149	0.053	0.152	0.071	0.140	0.052	0.186	0.056
6.9	0.147	0.053	0.110	0.054	0.141	0.044	0.147	0.072	0.138	0.044	0.190	0.056
7	0.151	0.051	0.111	0.060	0.145	0.037	0.137	0.065	0.142	0.049	0.186	0.053
7.1	0.142	0.052	0.116	0.054	0.143	0.046	0.164	0.057	0.140	0.044	0.180	0.069
7.2	0.135	0.055	0.124	0.051	0.128	0.051	0.159	0.046	0.142	0.051	0.182	0.068
7.3	0.130	0.055	0.122	0.049	0.135	0.056	0.150	0.051	0.138	0.053	0.172	0.051
7.4	0.121	0.052	0.126	0.049	0.126	0.054	0.143	0.066	0.140	0.053	0.165	0.045
7.5	0.115	0.042	0.123	0.044	0.128	0.053	0.143	0.065	0.140	0.044	0.166	0.047
7.6	0.120	0.051	0.115	0.057	0.139	0.053	0.150	0.065	0.138	0.047	0.169	0.043
7.7	0.118	0.047	0.120	0.044	0.139	0.062	0.160	0.069	0.132	0.050	0.168	0.041
7.8	0.114	0.044	0.114	0.043	0.132	0.062	0.150	0.058	0.124	0.054	0.163	0.038
7.9	0.126	0.045	0.125	0.047	0.136	0.062	0.136	0.056	0.118	0.050	0.156	0.037
8	0.106	0.040	0.108	0.047	0.146	0.062	0.137	0.062	0.121	0.047	0.154	0.041
8.1	0.105	0.037	0.116	0.052	0.138	0.061	0.137	0.063	0.120	0.047	0.154	0.033
8.2	0.116	0.034	0.118	0.054	0.141	0.051	0.129	0.057	0.121	0.043	0.146	0.036
8.3	0.109	0.029	0.113	0.039	0.138	0.054	0.128	0.061	0.129	0.045	0.148	0.038
8.4	0.106	0.040	0.114	0.038	0.135	0.055	0.122	0.058	0.130	0.039	0.156	0.036
8.5	0.102	0.036	0.104	0.041	0.133	0.055	0.112	0.056	0.135	0.034	0.163	0.034
8.6	0.099	0.035	0.105	0.045	0.126	0.057	0.108	0.055	0.135	0.030	0.150	0.043
8.7	0.108	0.042	0.104	0.050	0.131	0.056	0.100	0.058	0.135	0.032	0.154	0.048
8.8	0.109	0.044	0.106	0.052	0.132	0.044	0.104	0.058	0.138	0.036	0.153	0.055
8.9	0.102	0.038	0.104	0.046	0.139	0.040	0.104	0.066	0.136	0.034	0.154	0.052
9	0.105	0.041	0.098	0.052	0.135	0.033	0.105	0.063	0.137	0.035	0.148	0.054
9.1	0.110	0.051	0.103	0.041	0.121	0.044	0.109	0.060	0.137	0.036	0.148	0.054
9.2	0.117	0.050	0.097	0.042	0.117	0.041	0.109	0.054	0.135	0.046	0.151	0.053
9.3	0.121	0.050	0.101	0.049	0.114	0.029	0.108	0.051	0.136	0.049	0.146	0.056

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
9.4	0.127	0.055	0.105	0.057	0.111	0.028	0.104	0.055	0.133	0.042	0.141	0.054
9.5	0.118	0.053	0.106	0.059	0.118	0.038	0.096	0.044	0.132	0.039	0.146	0.051
9.6	0.113	0.050	0.108	0.058	0.117	0.038	0.090	0.031	0.132	0.044	0.140	0.046
9.7	0.105	0.051	0.100	0.057	0.111	0.032	0.087	0.037	0.125	0.045	0.138	0.048
9.8	0.116	0.045	0.098	0.055	0.105	0.031	0.089	0.036	0.126	0.047	0.143	0.046
9.9	0.110	0.044	0.107	0.047	0.108	0.043	0.097	0.039	0.126	0.038	0.143	0.044
10	0.114	0.060	0.099	0.047	0.104	0.039	0.099	0.039	0.124	0.045	0.137	0.042
10.1	0.116	0.050	0.079	0.044	0.103	0.040	0.099	0.043	0.120	0.048	0.133	0.048
10.2	0.112	0.053	0.081	0.046	0.103	0.040	0.093	0.038	0.122	0.050	0.134	0.048
10.3	0.109	0.055	0.087	0.043	0.104	0.040	0.093	0.041	0.129	0.049	0.133	0.047
10.4	0.105	0.052	0.098	0.046	0.109	0.037	0.096	0.047	0.133	0.058	0.130	0.051
10.5	0.100	0.043	0.098	0.044	0.113	0.034	0.100	0.042	0.129	0.056	0.127	0.059
10.6	0.090	0.040	0.090	0.040	0.114	0.032	0.112	0.043	0.119	0.045	0.127	0.051
10.7	0.088	0.039	0.099	0.045	0.113	0.034	0.110	0.039	0.115	0.044	0.130	0.043
10.8	0.088	0.047	0.092	0.052	0.119	0.033	0.120	0.049	0.112	0.046	0.134	0.047
10.9	0.090	0.043	0.089	0.042	0.119	0.033	0.116	0.052	0.112	0.046	0.130	0.044
11	0.085	0.040	0.092	0.042	0.118	0.036	0.121	0.051	0.110	0.048	0.131	0.044
11.1	0.088	0.046	0.091	0.037	0.113	0.045	0.121	0.062	0.111	0.046	0.127	0.045
11.2	0.093	0.045	0.092	0.042	0.120	0.037	0.120	0.066	0.110	0.047	0.127	0.047
11.3	0.086	0.039	0.088	0.050	0.126	0.033	0.115	0.052	0.110	0.049	0.129	0.049
11.4	0.095	0.039	0.083	0.052	0.124	0.034	0.107	0.049	0.105	0.047	0.132	0.045
11.5	0.095	0.038	0.077	0.046	0.129	0.036	0.112	0.048	0.101	0.051	0.136	0.046
11.6	0.095	0.035	0.079	0.048	0.128	0.034	0.116	0.049	0.100	0.052	0.131	0.050
11.7	0.092	0.035	0.083	0.054	0.119	0.037	0.113	0.045	0.099	0.048	0.127	0.054
11.8	0.085	0.031	0.088	0.048	0.123	0.028	0.112	0.045	0.101	0.047	0.130	0.052
11.9	0.078	0.037	0.093	0.050	0.129	0.030	0.105	0.037	0.100	0.049	0.130	0.050
12	0.077	0.037	0.088	0.044	0.125	0.030	0.103	0.039	0.096	0.054	0.133	0.047
12.1	0.081	0.035	0.086	0.036	0.119	0.033	0.112	0.037	0.097	0.054	0.137	0.052
12.2	0.082	0.041	0.092	0.032	0.111	0.042	0.112	0.038	0.093	0.053	0.137	0.050
12.3	0.077	0.039	0.090	0.024	0.110	0.040	0.106	0.041	0.093	0.050	0.138	0.048
12.4	0.077	0.037	0.091	0.034	0.112	0.042	0.106	0.050	0.096	0.051	0.140	0.048
12.5	0.075	0.028	0.099	0.021	0.101	0.044	0.104	0.060	0.096	0.050	0.140	0.056

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
12.6	0.076	0.028	0.103	0.032	0.096	0.043	0.105	0.058	0.096	0.048	0.137	0.059
12.7	0.080	0.032	0.094	0.037	0.092	0.049	0.109	0.047	0.095	0.045	0.134	0.060
12.8	0.079	0.032	0.085	0.034	0.087	0.054	0.103	0.050	0.089	0.046	0.137	0.061
12.9	0.069	0.032	0.094	0.049	0.078	0.055	0.097	0.046	0.089	0.045	0.136	0.059
13	0.067	0.033	0.099	0.051	0.079	0.055	0.096	0.044	0.090	0.042	0.136	0.058
13.1	0.077	0.036	0.093	0.040	0.075	0.056	0.100	0.044	0.091	0.045	0.136	0.058
13.2	0.081	0.040	0.085	0.041	0.074	0.050	0.104	0.037	0.092	0.048	0.134	0.056
13.3	0.076	0.038	0.089	0.045	0.084	0.039	0.109	0.038	0.090	0.048	0.135	0.051
13.4	0.074	0.038	0.090	0.043	0.097	0.042	0.104	0.038	0.089	0.048	0.134	0.047
13.5	0.070	0.043	0.089	0.049	0.098	0.036	0.104	0.040	0.092	0.052	0.135	0.045
13.6	0.068	0.044	0.094	0.045	0.095	0.029	0.103	0.042	0.093	0.048	0.134	0.046
13.7	0.069	0.041	0.097	0.043	0.089	0.026	0.100	0.045	0.095	0.048	0.131	0.049
13.8	0.072	0.040	0.097	0.042	0.084	0.033	0.095	0.044	0.095	0.052	0.127	0.051
13.9	0.060	0.042	0.096	0.041	0.087	0.030	0.088	0.040	0.089	0.049	0.126	0.055
14	0.059	0.038	0.097	0.039	0.079	0.029	0.088	0.037	0.091	0.046	0.128	0.054
14.1	0.064	0.035	0.095	0.039	0.078	0.041	0.088	0.034	0.087	0.046	0.128	0.053
14.2	0.067	0.035	0.092	0.040	0.078	0.044	0.089	0.032	0.085	0.049	0.127	0.054
14.3	0.070	0.035	0.089	0.044	0.075	0.033	0.087	0.037	0.090	0.054	0.122	0.056
14.4	0.069	0.035	0.085	0.051	0.075	0.038	0.088	0.035	0.099	0.053	0.122	0.053
14.5	0.067	0.033	0.085	0.051	0.085	0.046	0.086	0.034	0.097	0.054	0.126	0.051
14.6	0.068	0.035	0.080	0.053	0.091	0.046	0.088	0.036	0.097	0.055	0.123	0.053
14.7	0.063	0.040	0.081	0.047	0.089	0.046	0.086	0.036	0.099	0.059	0.119	0.050
14.8	0.058	0.039	0.085	0.039	0.085	0.039	0.084	0.036	0.096	0.052	0.123	0.045
14.9	0.054	0.037	0.089	0.039	0.089	0.036	0.090	0.033	0.096	0.050	0.121	0.047
15	0.051	0.042	0.086	0.041	0.092	0.037	0.090	0.039	0.097	0.048	0.121	0.047
15.1	0.051	0.042	0.088	0.040	0.086	0.034	0.086	0.040	0.094	0.048	0.117	0.053
15.2	0.045	0.040	0.089	0.041	0.086	0.028	0.080	0.038	0.096	0.047	0.120	0.050
15.3	0.048	0.046	0.087	0.037	0.080	0.029	0.081	0.039	0.098	0.046	0.122	0.049
15.4	0.056	0.045	0.078	0.034	0.082	0.038	0.082	0.042	0.096	0.044	0.118	0.051
15.5	0.061	0.045	0.075	0.039	0.090	0.035	0.078	0.044	0.097	0.043	0.116	0.054
15.6	0.063	0.043	0.075	0.037	0.090	0.030	0.073	0.042	0.100	0.046	0.114	0.055
15.7	0.068	0.041	0.076	0.037	0.085	0.032	0.077	0.044	0.097	0.049	0.115	0.055

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
15.8	0.069	0.043	0.076	0.038	0.077	0.030	0.078	0.042	0.094	0.050	0.118	0.053
15.9	0.067	0.049	0.072	0.035	0.080	0.033	0.082	0.039	0.095	0.051	0.116	0.053
16	0.060	0.047	0.075	0.036	0.081	0.034	0.080	0.038	0.096	0.047	0.115	0.050
16.1	0.059	0.048	0.073	0.036	0.078	0.039	0.078	0.041	0.098	0.050	0.116	0.050
16.2	0.062	0.049	0.072	0.037	0.080	0.037	0.081	0.044	0.100	0.054	0.115	0.051
16.3	0.068	0.044	0.067	0.032	0.082	0.032	0.084	0.044	0.100	0.050	0.114	0.054
16.4	0.066	0.042	0.062	0.031	0.081	0.035	0.083	0.050	0.101	0.049	0.117	0.053
16.5	0.064	0.043	0.067	0.029	0.080	0.039	0.081	0.050	0.100	0.050	0.119	0.051
16.6	0.060	0.042	0.070	0.024	0.086	0.037	0.079	0.048	0.095	0.051	0.118	0.049
16.7	0.056	0.040	0.071	0.023	0.089	0.038	0.077	0.049	0.091	0.052	0.119	0.053
16.8	0.053	0.039	0.068	0.029	0.085	0.039	0.077	0.045	0.096	0.052	0.119	0.052
16.9	0.052	0.036	0.063	0.034	0.085	0.035	0.079	0.047	0.094	0.051	0.118	0.049
17	0.057	0.038	0.057	0.032	0.081	0.033	0.074	0.048	0.094	0.048	0.115	0.051
17.1	0.056	0.045	0.059	0.029	0.083	0.035	0.073	0.043	0.093	0.043	0.113	0.055
17.2	0.052	0.047	0.059	0.031	0.079	0.035	0.080	0.045	0.096	0.047	0.111	0.058
17.3	0.052	0.042	0.060	0.032	0.085	0.038	0.086	0.046	0.098	0.050	0.108	0.057
17.4	0.055	0.041	0.059	0.031	0.089	0.040	0.087	0.047	0.100	0.046	0.111	0.056
17.5	0.050	0.038	0.052	0.029	0.085	0.037	0.083	0.048	0.101	0.044	0.110	0.059
17.6	0.050	0.039	0.051	0.030	0.082	0.040	0.075	0.048	0.099	0.047	0.108	0.056
17.7	0.048	0.037	0.052	0.028	0.083	0.039	0.072	0.047	0.098	0.047	0.109	0.054
17.8	0.046	0.034	0.059	0.031	0.081	0.035	0.072	0.046	0.097	0.045	0.108	0.053
17.9	0.052	0.033	0.059	0.033	0.076	0.033	0.073	0.047	0.092	0.045	0.107	0.054
18	0.057	0.037	0.056	0.035	0.075	0.037	0.075	0.044	0.091	0.047	0.110	0.054
18.1	0.059	0.038	0.055	0.032	0.078	0.037	0.074	0.040	0.093	0.049	0.110	0.057
18.2	0.061	0.040	0.058	0.033	0.081	0.039	0.071	0.038	0.093	0.053	0.111	0.056
18.3	0.062	0.038	0.061	0.035	0.080	0.043	0.066	0.040	0.092	0.052	0.113	0.053
18.4	0.060	0.032	0.060	0.032	0.079	0.047	0.065	0.045	0.090	0.051	0.117	0.052
18.5	0.058	0.034	0.058	0.036	0.080	0.048	0.065	0.046	0.089	0.049	0.117	0.053
18.6	0.055	0.033	0.058	0.037	0.078	0.044	0.065	0.045	0.087	0.049	0.113	0.055
18.7	0.056	0.037	0.057	0.037	0.075	0.043	0.064	0.046	0.084	0.050	0.112	0.055
18.8	0.057	0.038	0.052	0.039	0.074	0.037	0.064	0.044	0.080	0.050	0.109	0.056
18.9	0.052	0.037	0.050	0.035	0.075	0.035	0.061	0.043	0.078	0.050	0.107	0.061

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
19	0.051	0.034	0.051	0.032	0.075	0.035	0.062	0.049	0.080	0.049	0.109	0.059
19.1	0.050	0.031	0.051	0.037	0.077	0.035	0.069	0.052	0.083	0.048	0.110	0.060
19.2	0.056	0.026	0.050	0.039	0.077	0.036	0.070	0.050	0.085	0.049	0.109	0.062
19.3	0.060	0.025	0.051	0.038	0.072	0.035	0.069	0.048	0.082	0.049	0.109	0.061
19.4	0.062	0.027	0.049	0.033	0.070	0.036	0.069	0.048	0.085	0.052	0.111	0.060
19.5	0.060	0.027	0.046	0.033	0.067	0.035	0.066	0.049	0.084	0.050	0.110	0.061
19.6	0.059	0.027	0.045	0.035	0.062	0.036	0.064	0.050	0.081	0.049	0.110	0.061
19.7	0.056	0.026	0.045	0.037	0.058	0.036	0.068	0.047	0.088	0.050	0.110	0.060
19.8	0.053	0.027	0.043	0.034	0.061	0.040	0.070	0.047	0.088	0.051	0.110	0.058
19.9	0.048	0.026	0.044	0.035	0.063	0.039	0.067	0.049	0.087	0.050	0.111	0.052
20	0.042	0.027	0.046	0.035	0.065	0.040	0.063	0.050	0.084	0.048	0.115	0.052
20.1	0.041	0.025	0.050	0.034	0.068	0.036	0.059	0.049	0.084	0.048	0.117	0.055
20.2	0.040	0.027	0.051	0.032	0.067	0.029	0.060	0.050	0.083	0.047	0.116	0.056
20.3	0.038	0.023	0.051	0.032	0.069	0.028	0.063	0.051	0.081	0.048	0.115	0.058
20.4	0.039	0.021	0.048	0.032	0.069	0.027	0.066	0.053	0.081	0.048	0.110	0.059
20.5	0.043	0.021	0.046	0.034	0.065	0.029	0.069	0.054	0.079	0.050	0.105	0.060
20.6	0.044	0.024	0.041	0.032	0.064	0.032	0.070	0.053	0.076	0.047	0.103	0.058
20.7	0.043	0.025	0.038	0.030	0.064	0.034	0.069	0.051	0.072	0.049	0.101	0.057
20.8	0.043	0.025	0.038	0.028	0.067	0.036	0.068	0.051	0.073	0.050	0.101	0.057
20.9	0.044	0.026	0.036	0.028	0.067	0.038	0.065	0.051	0.075	0.048	0.100	0.058
21	0.045	0.025	0.032	0.026	0.065	0.039	0.065	0.052	0.076	0.048	0.097	0.058
21.1	0.047	0.027	0.033	0.026	0.061	0.039	0.064	0.055	0.081	0.048	0.100	0.056
21.2	0.049	0.029	0.031	0.025	0.061	0.041	0.059	0.055	0.082	0.045	0.103	0.057
21.3	0.049	0.028	0.029	0.027	0.059	0.041	0.055	0.055	0.080	0.045	0.104	0.058
21.4	0.048	0.029	0.033	0.029	0.057	0.037	0.050	0.053	0.080	0.048	0.103	0.059
21.5	0.047	0.026	0.035	0.029	0.054	0.034	0.051	0.052	0.080	0.049	0.103	0.058
21.6	0.049	0.026	0.034	0.027	0.053	0.036	0.054	0.051	0.079	0.049	0.102	0.056
21.7	0.049	0.027	0.035	0.027	0.052	0.035	0.052	0.052	0.077	0.048	0.102	0.057
21.8	0.047	0.029	0.038	0.031	0.050	0.033	0.052	0.053	0.079	0.046	0.100	0.057
21.9	0.044	0.028	0.040	0.033	0.051	0.033	0.056	0.051	0.080	0.048	0.100	0.056
22	0.043	0.027	0.041	0.033	0.050	0.032	0.056	0.051	0.079	0.049	0.102	0.053
22.1	0.040	0.031	0.043	0.035	0.049	0.031	0.054	0.052	0.081	0.052	0.103	0.052

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
22.2	0.041	0.030	0.046	0.036	0.051	0.032	0.052	0.052	0.081	0.053	0.104	0.051
22.3	0.039	0.027	0.043	0.034	0.047	0.032	0.050	0.048	0.080	0.053	0.104	0.050
22.4	0.038	0.025	0.040	0.033	0.042	0.032	0.048	0.044	0.083	0.055	0.102	0.052
22.5	0.035	0.026	0.039	0.035	0.044	0.032	0.050	0.043	0.083	0.053	0.102	0.054
22.6	0.037	0.030	0.038	0.035	0.046	0.031	0.050	0.042	0.087	0.051	0.101	0.055
22.7	0.039	0.031	0.035	0.031	0.046	0.026	0.051	0.040	0.089	0.051	0.100	0.056
22.8	0.042	0.031	0.034	0.031	0.049	0.027	0.052	0.038	0.087	0.052	0.101	0.056
22.9	0.044	0.029	0.033	0.033	0.050	0.031	0.051	0.037	0.084	0.053	0.101	0.059
23	0.044	0.029	0.029	0.035	0.049	0.032	0.051	0.037	0.083	0.053	0.098	0.061
23.1	0.040	0.027	0.028	0.037	0.046	0.029	0.054	0.038	0.087	0.051	0.096	0.062
23.2	0.035	0.029	0.030	0.038	0.045	0.031	0.055	0.036	0.092	0.049	0.095	0.063
23.3	0.038	0.033	0.030	0.037	0.046	0.035	0.054	0.034	0.096	0.046	0.098	0.063
23.4	0.044	0.034	0.031	0.037	0.044	0.035	0.053	0.038	0.098	0.048	0.099	0.062
23.5	0.047	0.035	0.033	0.033	0.044	0.036	0.052	0.039	0.096	0.046	0.098	0.060
23.6	0.049	0.035	0.031	0.031	0.043	0.036	0.052	0.036	0.095	0.041	0.098	0.059
23.7	0.046	0.033	0.031	0.032	0.040	0.033	0.053	0.034	0.094	0.040	0.098	0.058
23.8	0.041	0.032	0.032	0.031	0.039	0.034	0.053	0.037	0.095	0.041	0.100	0.058
23.9	0.043	0.035	0.030	0.030	0.038	0.033	0.053	0.038	0.094	0.042	0.099	0.058
24	0.044	0.032	0.027	0.029	0.041	0.031	0.051	0.038	0.090	0.043	0.098	0.059
24.1	0.047	0.031	0.024	0.029	0.041	0.030	0.052	0.042	0.088	0.043	0.097	0.060
24.2	0.047	0.032	0.022	0.030	0.039	0.030	0.053	0.042	0.088	0.045	0.098	0.061
24.3	0.046	0.033	0.021	0.030	0.037	0.030	0.052	0.042	0.089	0.046	0.099	0.062
24.4	0.046	0.030	0.020	0.031	0.036	0.034	0.055	0.040	0.090	0.046	0.098	0.063
24.5	0.045	0.029	0.020	0.030	0.036	0.034	0.056	0.037	0.093	0.045	0.095	0.063
24.6	0.046	0.031	0.020	0.028	0.037	0.035	0.054	0.034	0.093	0.045	0.093	0.067
24.7	0.046	0.031	0.020	0.028	0.036	0.031	0.055	0.035	0.093	0.045	0.093	0.066
24.8	0.045	0.030	0.018	0.024	0.036	0.029	0.055	0.035	0.092	0.045	0.093	0.063
24.9	0.045	0.030	0.017	0.023	0.038	0.030	0.054	0.032	0.093	0.043	0.095	0.061
25	0.044	0.030	0.016	0.022	0.043	0.030	0.054	0.031	0.094	0.040	0.094	0.060
25.1	0.043	0.030	0.015	0.023	0.046	0.026	0.053	0.035	0.092	0.040	0.092	0.061
25.2	0.042	0.031	0.018	0.025	0.049	0.027	0.051	0.037	0.091	0.042	0.093	0.059
25.3	0.040	0.032	0.019	0.028	0.051	0.029	0.048	0.040	0.090	0.042	0.094	0.058

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
25.4	0.039	0.031	0.022	0.031	0.050	0.032	0.044	0.039	0.088	0.043	0.093	0.058
25.5	0.040	0.029	0.025	0.035	0.047	0.032	0.042	0.039	0.087	0.044	0.091	0.059
25.6	0.039	0.028	0.027	0.032	0.045	0.030	0.041	0.037	0.088	0.045	0.090	0.060
25.7	0.037	0.027	0.029	0.031	0.043	0.029	0.039	0.035	0.088	0.043	0.089	0.061
25.8	0.035	0.026	0.031	0.030	0.044	0.029	0.040	0.033	0.087	0.043	0.091	0.061
25.9	0.036	0.025	0.033	0.032	0.045	0.031	0.046	0.034	0.090	0.042	0.090	0.061
26	0.035	0.024	0.034	0.034	0.044	0.030	0.049	0.039	0.092	0.043	0.091	0.061
26.1	0.035	0.025	0.030	0.031	0.041	0.029	0.046	0.040	0.093	0.045	0.091	0.061
26.2	0.034	0.025	0.025	0.026	0.042	0.031	0.043	0.038	0.093	0.047	0.089	0.062
26.3	0.033	0.024	0.023	0.027	0.043	0.034	0.043	0.039	0.091	0.050	0.086	0.063
26.4	0.033	0.024	0.023	0.028	0.042	0.035	0.042	0.038	0.092	0.050	0.083	0.064
26.5	0.032	0.025	0.024	0.029	0.041	0.033	0.043	0.037	0.092	0.048	0.083	0.064
26.6	0.031	0.025	0.025	0.030	0.041	0.031	0.044	0.039	0.093	0.044	0.084	0.066
26.7	0.030	0.025	0.024	0.031	0.042	0.030	0.045	0.039	0.091	0.044	0.086	0.067
26.8	0.031	0.026	0.021	0.030	0.042	0.030	0.047	0.038	0.092	0.045	0.088	0.067
26.9	0.030	0.027	0.022	0.028	0.039	0.029	0.047	0.039	0.093	0.045	0.090	0.065
27	0.030	0.028	0.022	0.028	0.036	0.028	0.047	0.040	0.092	0.045	0.090	0.065
27.1	0.029	0.028	0.023	0.029	0.034	0.028	0.046	0.039	0.092	0.044	0.091	0.064
27.2	0.029	0.027	0.024	0.030	0.036	0.031	0.047	0.039	0.095	0.042	0.092	0.064
27.3	0.029	0.025	0.024	0.030	0.040	0.033	0.044	0.037	0.096	0.041	0.092	0.064
27.4	0.027	0.022	0.025	0.030	0.042	0.034	0.040	0.036	0.096	0.040	0.092	0.064
27.5	0.025	0.021	0.024	0.028	0.042	0.035	0.037	0.035	0.096	0.041	0.092	0.066
27.6	0.024	0.020	0.022	0.026	0.041	0.033	0.036	0.033	0.095	0.044	0.091	0.066
27.7	0.023	0.019	0.022	0.027	0.039	0.031	0.035	0.033	0.094	0.047	0.092	0.064
27.8	0.023	0.021	0.022	0.028	0.038	0.030	0.034	0.034	0.093	0.048	0.093	0.063
27.9	0.022	0.022	0.024	0.028	0.036	0.028	0.035	0.032	0.090	0.047	0.092	0.063
28	0.021	0.024	0.026	0.029	0.037	0.028	0.036	0.031	0.087	0.046	0.090	0.063
28.1	0.022	0.025	0.025	0.029	0.039	0.031	0.035	0.029	0.087	0.044	0.090	0.063
28.2	0.022	0.027	0.025	0.028	0.040	0.033	0.036	0.030	0.086	0.044	0.091	0.064
28.3	0.023	0.027	0.025	0.028	0.039	0.033	0.037	0.029	0.084	0.044	0.092	0.064
28.4	0.023	0.027	0.024	0.028	0.038	0.033	0.037	0.030	0.082	0.045	0.092	0.064
28.5	0.024	0.028	0.022	0.028	0.037	0.032	0.037	0.031	0.082	0.046	0.091	0.063

Velocities Measured at 0.203 m (8 in) Radial Position

Cycle	7.94E-2-m	7.94E-2-m	0.156-m	0.156-m	0.232-m	0.232-m	0.308-m	0.308-m	0.460-m	0.460-m	0.613-m	0.613-m
Time (sec)	(3.125-in)	(3.125-in)	(6.125-in)	(6.125-in)	(9.125-in)	(9.125-in)	(12.125-in)	(12.125-in)	(18.125-in)	(18.125-in)	(24.125-in)	(24.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
28.6	0.022	0.028	0.021	0.027	0.035	0.029	0.038	0.032	0.084	0.045	0.092	0.062
28.7	0.021	0.026	0.020	0.026	0.034	0.028	0.039	0.032	0.086	0.046	0.093	0.060
28.8	0.022	0.024	0.019	0.027	0.033	0.028	0.038	0.029	0.089	0.045	0.094	0.059
28.9	0.024	0.024	0.018	0.027	0.035	0.029	0.037	0.027	0.089	0.046	0.093	0.058
29	0.024	0.026	0.017	0.026	0.036	0.029	0.035	0.027	0.086	0.048	0.090	0.058
29.1	0.025	0.026	0.016	0.026	0.036	0.031	0.034	0.028	0.086	0.049	0.090	0.059
29.2	0.027	0.027	0.017	0.028	0.035	0.032	0.035	0.029	0.085	0.049	0.090	0.060
29.3	0.028	0.027	0.017	0.030	0.033	0.032	0.036	0.029	0.083	0.048	0.089	0.061
29.4	0.030	0.028	0.017	0.031	0.031	0.032	0.035	0.028	0.082	0.048	0.088	0.061
29.5	0.031	0.028	0.017	0.032	0.030	0.031	0.033	0.026	0.083	0.049	0.087	0.062
29.6	0.031	0.029	0.017	0.033	0.029	0.030	0.034	0.024	0.083	0.050	0.086	0.062
29.7	0.031	0.028	0.017	0.031	0.031	0.031	0.034	0.024	0.083	0.050	0.084	0.061
29.8	0.031	0.028	0.018	0.028	0.029	0.030	0.033	0.027	0.084	0.048	0.083	0.060
29.9	0.032	0.027	0.021	0.028	0.027	0.028	0.032	0.029	0.088	0.047	0.082	0.061
30	0.029	0.024	0.022	0.028	0.027	0.030	0.032	0.030	0.089	0.045	0.082	0.063

Small-Tank Interior Velocity Data, contd.

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
0.1	0.037	0.039	0.035	0.029	0.037	0.033	0.029	0.029	0.014	0.023	0.002	0.021
0.2	0.038	0.041	0.038	0.031	0.043	0.037	0.033	0.031	0.018	0.024	0.002	0.023
0.3	0.059	0.038	0.060	0.031	0.058	0.039	0.058	0.027	0.024	0.028	0.002	0.022
0.4	0.103	0.031	0.083	0.028	0.060	0.038	0.061	0.021	0.023	0.028	0.004	0.023
0.5	0.200	0.037	0.118	0.019	0.065	0.030	0.061	0.023	0.023	0.029	0.006	0.023
0.6	0.497	0.143	0.142	0.017	0.074	0.022	0.062	0.025	0.021	0.028	0.007	0.026
0.7	0.377	0.105	0.158	0.014	0.082	0.018	0.063	0.026	0.020	0.027	0.007	0.026
0.8	0.215	0.088	0.151	0.014	0.088	0.022	0.063	0.027	0.020	0.026	0.007	0.026
0.9	0.140	0.059	0.140	0.015	0.092	0.022	0.063	0.028	0.021	0.026	0.006	0.025
1	0.118	0.057	0.138	0.019	0.095	0.020	0.064	0.027	0.021	0.026	0.005	0.025
1.1	0.133	0.066	0.129	0.026	0.099	0.022	0.067	0.027	0.020	0.027	0.004	0.024
1.2	0.114	0.065	0.105	0.021	0.105	0.022	0.074	0.025	0.019	0.027	0.004	0.023
1.3	0.103	0.046	0.088	0.032	0.110	0.020	0.084	0.022	0.020	0.028	0.006	0.025
1.4	0.101	0.034	0.066	0.038	0.112	0.022	0.094	0.018	0.020	0.027	0.008	0.024
1.5	0.088	0.022	0.038	0.024	0.107	0.024	0.107	0.014	0.022	0.027	0.008	0.024
1.6	0.091	0.019	0.039	0.019	0.105	0.034	0.118	0.014	0.022	0.025	0.009	0.025
1.7	0.099	0.029	0.060	0.018	0.095	0.046	0.125	0.024	0.020	0.022	0.009	0.025
1.8	0.103	0.019	0.082	0.031	0.105	0.071	0.133	0.055	0.020	0.021	0.007	0.023
1.9	0.105	0.023	0.099	0.048	0.127	0.058	0.149	0.096	0.020	0.021	0.007	0.022
2	0.122	0.029	0.105	0.035	0.144	0.070	0.180	0.110	0.022	0.022	0.006	0.022
2.1	0.131	0.034	0.114	0.030	0.134	0.050	0.184	0.100	0.027	0.026	0.007	0.022
2.2	0.149	0.032	0.116	0.028	0.141	0.058	0.194	0.108	0.034	0.033	0.006	0.023
2.3	0.152	0.039	0.140	0.028	0.131	0.049	0.179	0.086	0.043	0.041	0.006	0.022
2.4	0.163	0.042	0.147	0.048	0.134	0.048	0.181	0.087	0.053	0.050	0.007	0.023
2.5	0.192	0.051	0.139	0.042	0.130	0.040	0.148	0.056	0.071	0.065	0.008	0.024
2.6	0.180	0.052	0.145	0.037	0.149	0.059	0.156	0.049	0.085	0.073	0.009	0.024
2.7	0.192	0.074	0.163	0.048	0.145	0.062	0.168	0.066	0.086	0.073	0.011	0.024
2.8	0.189	0.085	0.159	0.061	0.150	0.045	0.162	0.075	0.108	0.077	0.012	0.024
2.9	0.201	0.061	0.160	0.065	0.132	0.041	0.164	0.076	0.115	0.078	0.012	0.024

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle	7.94E-2-m	7.94E-2-m	0.156-m	0.156-m	0.232-m	0.232-m	0.308-m	0.308-m	0.460-m	0.460-m	0.613-m	0.613-m
Time (sec)	(3.125-in)	(3.125-in)	(6.125-in)	(6.125-in)	(9.125-in)	(9.125-in)	(12.125-in)	(12.125-in)	(18.125-in)	(18.125-in)	(24.125-in)	(24.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
3	0.209	0.046	0.171	0.053	0.124	0.036	0.165	0.050	0.120	0.081	0.012	0.024
3.1	0.207	0.070	0.157	0.042	0.112	0.035	0.175	0.067	0.126	0.104	0.012	0.024
3.2	0.212	0.063	0.143	0.041	0.117	0.044	0.181	0.079	0.104	0.073	0.012	0.024
3.3	0.213	0.067	0.153	0.040	0.119	0.037	0.178	0.077	0.122	0.067	0.009	0.023
3.4	0.223	0.069	0.156	0.041	0.111	0.026	0.189	0.069	0.129	0.066	0.007	0.025
3.5	0.241	0.069	0.162	0.049	0.109	0.028	0.206	0.069	0.142	0.064	0.008	0.024
3.6	0.257	0.064	0.159	0.036	0.104	0.023	0.216	0.075	0.126	0.054	0.010	0.028
3.7	0.287	0.070	0.161	0.053	0.108	0.016	0.199	0.061	0.125	0.051	0.013	0.029
3.8	0.268	0.077	0.179	0.057	0.114	0.026	0.187	0.069	0.127	0.034	0.019	0.030
3.9	0.266	0.074	0.174	0.049	0.113	0.028	0.170	0.074	0.129	0.045	0.019	0.026
4	0.238	0.077	0.174	0.049	0.118	0.042	0.162	0.065	0.135	0.040	0.019	0.026
4.1	0.232	0.050	0.172	0.057	0.139	0.045	0.178	0.058	0.123	0.054	0.023	0.023
4.2	0.228	0.052	0.160	0.041	0.149	0.053	0.186	0.085	0.113	0.054	0.029	0.027
4.3	0.222	0.050	0.161	0.058	0.136	0.059	0.199	0.051	0.113	0.053	0.039	0.041
4.4	0.208	0.077	0.189	0.056	0.137	0.060	0.180	0.075	0.110	0.063	0.050	0.035
4.5	0.220	0.063	0.177	0.052	0.143	0.055	0.200	0.094	0.131	0.076	0.051	0.036
4.6	0.214	0.056	0.147	0.051	0.154	0.053	0.217	0.080	0.125	0.056	0.054	0.039
4.7	0.196	0.065	0.163	0.061	0.136	0.045	0.207	0.066	0.126	0.055	0.063	0.043
4.8	0.200	0.083	0.168	0.058	0.131	0.061	0.192	0.070	0.124	0.053	0.056	0.038
4.9	0.204	0.060	0.154	0.061	0.123	0.044	0.158	0.066	0.117	0.055	0.064	0.040
5	0.219	0.070	0.143	0.037	0.136	0.043	0.158	0.069	0.111	0.056	0.068	0.045
5.1	0.208	0.053	0.135	0.037	0.130	0.041	0.157	0.091	0.121	0.062	0.066	0.054
5.2	0.207	0.064	0.144	0.045	0.125	0.051	0.159	0.084	0.118	0.059	0.069	0.059
5.3	0.206	0.057	0.144	0.052	0.143	0.081	0.191	0.077	0.124	0.068	0.070	0.044
5.4	0.219	0.059	0.149	0.040	0.134	0.060	0.189	0.066	0.118	0.070	0.071	0.043
5.5	0.216	0.079	0.148	0.045	0.141	0.066	0.180	0.087	0.118	0.073	0.069	0.050
5.6	0.210	0.065	0.159	0.064	0.149	0.073	0.187	0.104	0.130	0.081	0.069	0.051
5.7	0.223	0.057	0.160	0.065	0.176	0.105	0.192	0.080	0.141	0.071	0.064	0.049
5.8	0.219	0.061	0.150	0.052	0.175	0.095	0.186	0.089	0.132	0.062	0.060	0.053
5.9	0.208	0.064	0.151	0.057	0.188	0.097	0.188	0.102	0.123	0.062	0.055	0.046
6	0.211	0.055	0.170	0.064	0.198	0.102	0.185	0.104	0.105	0.058	0.055	0.047
6.1	0.196	0.043	0.183	0.051	0.198	0.080	0.199	0.107	0.099	0.056	0.052	0.046

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
6.2	0.217	0.054	0.175	0.063	0.198	0.072	0.186	0.083	0.107	0.052	0.044	0.046
6.3	0.217	0.057	0.155	0.062	0.201	0.070	0.185	0.079	0.102	0.048	0.043	0.043
6.4	0.210	0.065	0.146	0.055	0.197	0.076	0.182	0.086	0.096	0.052	0.041	0.040
6.5	0.205	0.085	0.132	0.042	0.194	0.081	0.169	0.109	0.107	0.063	0.035	0.034
6.6	0.224	0.130	0.124	0.051	0.193	0.072	0.184	0.130	0.100	0.058	0.032	0.036
6.7	0.232	0.121	0.135	0.046	0.198	0.082	0.190	0.108	0.092	0.059	0.036	0.046
6.8	0.227	0.100	0.131	0.052	0.204	0.098	0.184	0.108	0.083	0.061	0.043	0.046
6.9	0.216	0.094	0.129	0.049	0.205	0.111	0.173	0.103	0.071	0.060	0.049	0.038
7	0.200	0.094	0.130	0.048	0.198	0.089	0.159	0.085	0.066	0.047	0.051	0.032
7.1	0.201	0.062	0.121	0.039	0.192	0.069	0.161	0.059	0.065	0.049	0.053	0.039
7.2	0.183	0.067	0.134	0.045	0.196	0.046	0.149	0.071	0.081	0.039	0.047	0.043
7.3	0.173	0.071	0.125	0.049	0.196	0.043	0.144	0.070	0.084	0.036	0.053	0.045
7.4	0.163	0.064	0.136	0.037	0.203	0.061	0.160	0.080	0.083	0.037	0.063	0.044
7.5	0.166	0.075	0.134	0.054	0.204	0.069	0.152	0.070	0.078	0.037	0.064	0.046
7.6	0.169	0.071	0.131	0.056	0.199	0.056	0.145	0.070	0.078	0.040	0.065	0.041
7.7	0.191	0.078	0.140	0.061	0.198	0.072	0.156	0.058	0.078	0.040	0.069	0.040
7.8	0.209	0.101	0.140	0.047	0.186	0.061	0.160	0.055	0.077	0.045	0.065	0.040
7.9	0.205	0.091	0.125	0.055	0.177	0.053	0.165	0.089	0.074	0.051	0.069	0.038
8	0.194	0.095	0.105	0.054	0.159	0.052	0.143	0.081	0.076	0.052	0.070	0.041
8.1	0.184	0.075	0.116	0.053	0.154	0.058	0.135	0.073	0.079	0.046	0.066	0.047
8.2	0.156	0.051	0.119	0.056	0.159	0.059	0.132	0.066	0.076	0.049	0.070	0.045
8.3	0.141	0.058	0.128	0.068	0.162	0.067	0.132	0.067	0.072	0.044	0.069	0.038
8.4	0.141	0.070	0.132	0.062	0.164	0.064	0.138	0.064	0.074	0.051	0.075	0.038
8.5	0.141	0.067	0.133	0.056	0.163	0.063	0.137	0.065	0.074	0.053	0.073	0.038
8.6	0.147	0.069	0.125	0.060	0.152	0.062	0.138	0.057	0.067	0.045	0.069	0.032
8.7	0.130	0.052	0.132	0.081	0.157	0.065	0.127	0.061	0.073	0.043	0.067	0.035
8.8	0.120	0.044	0.148	0.116	0.161	0.063	0.127	0.061	0.069	0.041	0.075	0.043
8.9	0.119	0.048	0.146	0.124	0.161	0.056	0.132	0.054	0.067	0.038	0.066	0.039
9	0.126	0.054	0.143	0.105	0.161	0.057	0.135	0.048	0.062	0.038	0.064	0.043
9.1	0.149	0.072	0.129	0.082	0.170	0.060	0.139	0.056	0.064	0.040	0.066	0.043
9.2	0.161	0.071	0.132	0.091	0.162	0.061	0.138	0.072	0.067	0.040	0.071	0.043
9.3	0.158	0.065	0.132	0.094	0.166	0.058	0.120	0.065	0.065	0.039	0.071	0.039

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
9.4	0.156	0.060	0.137	0.088	0.161	0.064	0.124	0.069	0.057	0.044	0.066	0.043
9.5	0.148	0.064	0.126	0.081	0.167	0.062	0.135	0.069	0.050	0.043	0.064	0.045
9.6	0.149	0.069	0.131	0.092	0.164	0.060	0.132	0.072	0.053	0.045	0.057	0.049
9.7	0.149	0.072	0.134	0.082	0.164	0.062	0.130	0.052	0.055	0.044	0.056	0.048
9.8	0.147	0.066	0.125	0.068	0.164	0.058	0.120	0.047	0.047	0.040	0.053	0.044
9.9	0.145	0.065	0.136	0.070	0.162	0.060	0.114	0.045	0.049	0.043	0.056	0.044
10	0.139	0.063	0.137	0.082	0.152	0.058	0.119	0.037	0.060	0.039	0.055	0.044
10.1	0.136	0.066	0.121	0.069	0.144	0.053	0.123	0.050	0.062	0.040	0.052	0.044
10.2	0.131	0.062	0.120	0.064	0.149	0.050	0.116	0.055	0.056	0.045	0.050	0.044
10.3	0.129	0.064	0.108	0.062	0.153	0.053	0.110	0.061	0.046	0.045	0.047	0.045
10.4	0.123	0.061	0.116	0.068	0.149	0.048	0.110	0.061	0.046	0.045	0.041	0.043
10.5	0.131	0.059	0.129	0.069	0.154	0.051	0.118	0.058	0.047	0.046	0.042	0.044
10.6	0.128	0.057	0.129	0.044	0.155	0.051	0.116	0.055	0.045	0.043	0.042	0.042
10.7	0.125	0.061	0.123	0.046	0.149	0.060	0.111	0.049	0.041	0.034	0.040	0.040
10.8	0.123	0.061	0.117	0.049	0.152	0.073	0.114	0.046	0.043	0.033	0.034	0.039
10.9	0.122	0.056	0.114	0.048	0.147	0.080	0.116	0.046	0.046	0.034	0.031	0.036
11	0.122	0.052	0.121	0.039	0.139	0.071	0.113	0.045	0.045	0.036	0.037	0.038
11.1	0.120	0.052	0.121	0.047	0.137	0.064	0.119	0.037	0.044	0.039	0.035	0.037
11.2	0.122	0.045	0.126	0.048	0.133	0.061	0.116	0.044	0.041	0.040	0.032	0.036
11.3	0.130	0.049	0.117	0.050	0.133	0.055	0.107	0.040	0.038	0.035	0.028	0.032
11.4	0.114	0.046	0.122	0.056	0.132	0.063	0.117	0.042	0.034	0.033	0.029	0.033
11.5	0.111	0.051	0.122	0.053	0.128	0.064	0.122	0.043	0.035	0.032	0.028	0.033
11.6	0.101	0.058	0.113	0.058	0.125	0.070	0.115	0.050	0.035	0.031	0.029	0.036
11.7	0.100	0.057	0.120	0.055	0.124	0.068	0.116	0.052	0.037	0.033	0.022	0.034
11.8	0.107	0.050	0.123	0.054	0.122	0.057	0.122	0.047	0.040	0.033	0.017	0.031
11.9	0.104	0.047	0.116	0.059	0.117	0.053	0.124	0.053	0.038	0.029	0.018	0.029
12	0.105	0.049	0.116	0.058	0.119	0.050	0.116	0.056	0.035	0.030	0.020	0.029
12.1	0.100	0.048	0.115	0.053	0.117	0.045	0.110	0.065	0.032	0.028	0.020	0.027
12.2	0.100	0.043	0.117	0.053	0.109	0.046	0.109	0.058	0.035	0.027	0.017	0.028
12.3	0.098	0.035	0.119	0.053	0.106	0.055	0.108	0.058	0.033	0.026	0.018	0.031
12.4	0.099	0.038	0.106	0.046	0.114	0.059	0.103	0.057	0.034	0.027	0.017	0.033
12.5	0.099	0.040	0.103	0.050	0.118	0.056	0.102	0.058	0.035	0.025	0.018	0.029

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
12.6	0.102	0.045	0.101	0.047	0.119	0.048	0.104	0.056	0.032	0.021	0.018	0.028
12.7	0.108	0.040	0.103	0.041	0.121	0.050	0.106	0.059	0.028	0.021	0.019	0.029
12.8	0.113	0.038	0.105	0.041	0.116	0.057	0.108	0.062	0.025	0.027	0.018	0.026
12.9	0.107	0.034	0.107	0.041	0.118	0.060	0.112	0.069	0.021	0.026	0.019	0.028
13	0.105	0.041	0.107	0.042	0.120	0.048	0.112	0.077	0.023	0.031	0.023	0.026
13.1	0.108	0.038	0.101	0.042	0.114	0.045	0.111	0.080	0.025	0.030	0.023	0.025
13.2	0.110	0.037	0.105	0.044	0.105	0.047	0.104	0.081	0.024	0.031	0.021	0.023
13.3	0.106	0.042	0.114	0.034	0.102	0.042	0.106	0.072	0.024	0.034	0.022	0.022
13.4	0.102	0.043	0.117	0.041	0.109	0.044	0.102	0.072	0.021	0.034	0.023	0.021
13.5	0.092	0.044	0.121	0.053	0.112	0.044	0.093	0.076	0.020	0.033	0.020	0.020
13.6	0.088	0.052	0.125	0.062	0.107	0.042	0.095	0.073	0.019	0.033	0.017	0.019
13.7	0.086	0.053	0.114	0.056	0.099	0.044	0.098	0.069	0.021	0.036	0.016	0.018
13.8	0.086	0.049	0.111	0.052	0.094	0.044	0.098	0.064	0.022	0.037	0.015	0.019
13.9	0.084	0.046	0.107	0.051	0.097	0.042	0.096	0.068	0.023	0.038	0.019	0.019
14	0.086	0.043	0.114	0.051	0.104	0.044	0.097	0.070	0.025	0.041	0.017	0.019
14.1	0.084	0.035	0.116	0.043	0.107	0.040	0.097	0.068	0.025	0.040	0.013	0.020
14.2	0.090	0.034	0.117	0.036	0.096	0.043	0.092	0.060	0.026	0.033	0.011	0.019
14.3	0.090	0.037	0.113	0.030	0.097	0.047	0.091	0.058	0.026	0.038	0.008	0.018
14.4	0.090	0.047	0.122	0.033	0.093	0.044	0.091	0.058	0.024	0.041	0.007	0.020
14.5	0.090	0.049	0.120	0.041	0.097	0.038	0.095	0.052	0.025	0.037	0.007	0.019
14.6	0.089	0.045	0.116	0.038	0.094	0.039	0.088	0.044	0.023	0.038	0.007	0.016
14.7	0.090	0.052	0.118	0.039	0.091	0.050	0.088	0.045	0.026	0.041	0.008	0.013
14.8	0.085	0.045	0.114	0.031	0.088	0.049	0.088	0.047	0.025	0.037	0.011	0.012
14.9	0.089	0.036	0.102	0.028	0.089	0.050	0.090	0.046	0.026	0.036	0.013	0.012
15	0.086	0.036	0.097	0.031	0.087	0.045	0.094	0.047	0.026	0.034	0.013	0.017
15.1	0.093	0.042	0.100	0.036	0.084	0.043	0.094	0.050	0.029	0.030	0.012	0.017
15.2	0.096	0.050	0.096	0.036	0.081	0.041	0.087	0.051	0.034	0.034	0.011	0.017
15.3	0.090	0.050	0.093	0.044	0.079	0.040	0.086	0.052	0.030	0.033	0.011	0.015
15.4	0.091	0.047	0.087	0.045	0.083	0.043	0.077	0.048	0.027	0.035	0.010	0.015
15.5	0.090	0.038	0.091	0.047	0.074	0.044	0.076	0.046	0.032	0.033	0.006	0.014
15.6	0.092	0.047	0.094	0.045	0.076	0.042	0.075	0.038	0.031	0.032	0.004	0.014
15.7	0.087	0.051	0.090	0.039	0.083	0.041	0.080	0.034	0.028	0.034	0.006	0.016

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
15.8	0.089	0.056	0.089	0.043	0.088	0.044	0.084	0.039	0.030	0.039	0.007	0.018
15.9	0.089	0.054	0.089	0.047	0.089	0.044	0.081	0.038	0.032	0.042	0.011	0.019
16	0.082	0.049	0.086	0.047	0.085	0.040	0.077	0.036	0.034	0.042	0.010	0.020
16.1	0.080	0.047	0.082	0.047	0.080	0.034	0.078	0.036	0.037	0.042	0.005	0.019
16.2	0.080	0.045	0.083	0.041	0.085	0.037	0.074	0.036	0.035	0.044	0.006	0.018
16.3	0.077	0.042	0.080	0.039	0.080	0.035	0.071	0.037	0.034	0.041	0.006	0.018
16.4	0.080	0.041	0.079	0.045	0.078	0.039	0.076	0.040	0.034	0.037	0.008	0.020
16.5	0.084	0.032	0.077	0.047	0.078	0.043	0.073	0.044	0.036	0.039	0.009	0.021
16.6	0.088	0.029	0.077	0.046	0.075	0.041	0.071	0.045	0.037	0.039	0.010	0.020
16.7	0.088	0.034	0.073	0.043	0.073	0.041	0.071	0.041	0.033	0.038	0.009	0.018
16.8	0.085	0.039	0.074	0.048	0.075	0.049	0.076	0.041	0.032	0.037	0.006	0.017
16.9	0.080	0.042	0.074	0.054	0.078	0.054	0.080	0.043	0.030	0.034	0.006	0.022
17	0.080	0.044	0.072	0.046	0.081	0.054	0.078	0.042	0.035	0.037	0.008	0.026
17.1	0.079	0.038	0.073	0.042	0.087	0.050	0.075	0.042	0.037	0.042	0.008	0.025
17.2	0.075	0.037	0.075	0.048	0.081	0.046	0.072	0.041	0.033	0.039	0.007	0.025
17.3	0.072	0.036	0.072	0.050	0.075	0.045	0.070	0.039	0.030	0.038	0.008	0.025
17.4	0.071	0.037	0.070	0.047	0.074	0.046	0.076	0.041	0.030	0.037	0.007	0.022
17.5	0.069	0.038	0.067	0.046	0.075	0.056	0.080	0.040	0.032	0.038	0.005	0.019
17.6	0.059	0.036	0.068	0.052	0.071	0.059	0.081	0.040	0.030	0.037	0.004	0.019
17.7	0.058	0.038	0.069	0.051	0.074	0.057	0.083	0.040	0.033	0.035	0.002	0.020
17.8	0.058	0.038	0.071	0.051	0.075	0.054	0.083	0.041	0.037	0.038	0.002	0.021
17.9	0.058	0.034	0.070	0.048	0.069	0.046	0.080	0.039	0.037	0.039	0.003	0.021
18	0.061	0.035	0.067	0.047	0.068	0.043	0.079	0.035	0.037	0.036	0.004	0.019
18.1	0.062	0.035	0.065	0.052	0.067	0.042	0.078	0.033	0.039	0.036	0.005	0.018
18.2	0.056	0.035	0.063	0.052	0.066	0.044	0.078	0.037	0.040	0.037	0.005	0.018
18.3	0.054	0.035	0.065	0.052	0.061	0.045	0.075	0.041	0.040	0.036	0.006	0.021
18.4	0.058	0.036	0.067	0.054	0.063	0.040	0.071	0.040	0.037	0.038	0.008	0.021
18.5	0.056	0.033	0.070	0.050	0.067	0.038	0.067	0.037	0.036	0.042	0.007	0.020
18.6	0.053	0.034	0.070	0.050	0.069	0.037	0.067	0.036	0.033	0.040	0.007	0.020
18.7	0.050	0.035	0.066	0.049	0.067	0.032	0.069	0.038	0.032	0.038	0.005	0.020
18.8	0.045	0.034	0.064	0.044	0.063	0.031	0.069	0.038	0.029	0.033	0.002	0.018
18.9	0.041	0.033	0.067	0.040	0.060	0.031	0.065	0.035	0.030	0.034	0.001	0.016

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
19	0.041	0.034	0.066	0.040	0.058	0.031	0.062	0.035	0.030	0.032	0.001	0.015
19.1	0.046	0.034	0.061	0.043	0.063	0.027	0.064	0.038	0.032	0.032	0.003	0.016
19.2	0.049	0.035	0.063	0.046	0.068	0.027	0.062	0.037	0.031	0.032	0.006	0.017
19.3	0.051	0.036	0.067	0.048	0.066	0.033	0.062	0.037	0.032	0.033	0.010	0.020
19.4	0.052	0.033	0.070	0.047	0.067	0.035	0.062	0.036	0.030	0.032	0.010	0.018
19.5	0.050	0.032	0.073	0.044	0.067	0.034	0.061	0.035	0.030	0.029	0.009	0.014
19.6	0.052	0.029	0.073	0.040	0.065	0.035	0.062	0.030	0.030	0.030	0.009	0.013
19.7	0.051	0.028	0.075	0.042	0.061	0.038	0.061	0.026	0.025	0.031	0.009	0.015
19.8	0.050	0.029	0.075	0.038	0.063	0.039	0.059	0.027	0.028	0.031	0.009	0.016
19.9	0.049	0.032	0.071	0.036	0.064	0.040	0.055	0.031	0.029	0.031	0.008	0.016
20	0.051	0.035	0.066	0.039	0.065	0.040	0.052	0.032	0.030	0.029	0.008	0.017
20.1	0.051	0.040	0.067	0.038	0.066	0.036	0.056	0.029	0.031	0.030	0.007	0.017
20.2	0.049	0.039	0.069	0.040	0.064	0.035	0.067	0.024	0.029	0.031	0.006	0.017
20.3	0.048	0.033	0.071	0.042	0.067	0.034	0.070	0.022	0.026	0.031	0.004	0.016
20.4	0.050	0.033	0.069	0.042	0.069	0.032	0.072	0.020	0.023	0.031	0.004	0.017
20.5	0.054	0.038	0.067	0.043	0.067	0.031	0.069	0.019	0.020	0.031	0.005	0.019
20.6	0.058	0.039	0.067	0.044	0.064	0.033	0.068	0.021	0.017	0.031	0.006	0.022
20.7	0.062	0.037	0.065	0.041	0.061	0.038	0.068	0.022	0.021	0.032	0.005	0.020
20.8	0.064	0.033	0.063	0.040	0.061	0.041	0.069	0.025	0.020	0.028	0.005	0.019
20.9	0.065	0.035	0.061	0.040	0.060	0.040	0.067	0.027	0.019	0.025	0.005	0.021
21	0.066	0.038	0.059	0.040	0.059	0.039	0.069	0.024	0.020	0.028	0.006	0.021
21.1	0.065	0.040	0.059	0.042	0.057	0.040	0.068	0.022	0.023	0.032	0.006	0.021
21.2	0.067	0.039	0.057	0.040	0.059	0.044	0.065	0.024	0.024	0.034	0.006	0.022
21.3	0.068	0.034	0.056	0.038	0.060	0.039	0.064	0.020	0.020	0.033	0.006	0.023
21.4	0.065	0.031	0.057	0.040	0.058	0.034	0.061	0.020	0.018	0.034	0.005	0.021
21.5	0.062	0.034	0.060	0.041	0.056	0.034	0.056	0.021	0.016	0.037	0.006	0.022
21.6	0.066	0.037	0.059	0.040	0.058	0.035	0.052	0.023	0.016	0.036	0.005	0.020
21.7	0.068	0.031	0.056	0.042	0.063	0.036	0.053	0.028	0.015	0.034	0.006	0.021
21.8	0.069	0.029	0.054	0.042	0.062	0.035	0.055	0.026	0.014	0.034	0.008	0.023
21.9	0.068	0.029	0.052	0.041	0.059	0.032	0.058	0.028	0.014	0.032	0.009	0.026
22	0.067	0.028	0.052	0.041	0.059	0.033	0.057	0.029	0.014	0.029	0.008	0.025
22.1	0.065	0.029	0.053	0.040	0.058	0.032	0.054	0.028	0.017	0.031	0.007	0.023

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle Time (sec)	7.94E-2-m (3.125-in) V (m/s)	7.94E-2-m (3.125-in) StdDev (m/s)	0.156-m (6.125-in) V (m/s)	0.156-m (6.125-in) StdDev (m/s)	0.232-m (9.125-in) V (m/s)	0.232-m (9.125-in) StdDev (m/s)	0.308-m (12.125-in) V (m/s)	0.308-m (12.125-in) StdDev (m/s)	0.460-m (18.125-in) V (m/s)	0.460-m (18.125-in) StdDev (m/s)	0.613-m (24.125-in) V (m/s)	0.613-m (24.125-in) StdDev (m/s)
22.2	0.065	0.030	0.052	0.039	0.058	0.032	0.050	0.025	0.018	0.032	0.007	0.025
22.3	0.067	0.032	0.047	0.037	0.057	0.035	0.050	0.024	0.017	0.032	0.006	0.022
22.4	0.069	0.030	0.044	0.036	0.057	0.036	0.050	0.024	0.016	0.033	0.006	0.021
22.5	0.068	0.029	0.045	0.034	0.057	0.036	0.049	0.029	0.016	0.034	0.007	0.019
22.6	0.065	0.029	0.048	0.035	0.058	0.034	0.048	0.032	0.016	0.032	0.008	0.019
22.7	0.064	0.028	0.046	0.035	0.058	0.034	0.043	0.028	0.017	0.032	0.009	0.019
22.8	0.065	0.025	0.045	0.036	0.056	0.034	0.039	0.026	0.017	0.031	0.010	0.021
22.9	0.065	0.026	0.046	0.036	0.053	0.034	0.038	0.023	0.017	0.028	0.011	0.023
23	0.061	0.027	0.048	0.035	0.051	0.034	0.041	0.024	0.019	0.030	0.010	0.022
23.1	0.057	0.029	0.045	0.033	0.048	0.036	0.045	0.027	0.019	0.029	0.009	0.021
23.2	0.054	0.029	0.042	0.033	0.048	0.039	0.046	0.028	0.021	0.027	0.009	0.019
23.3	0.053	0.032	0.040	0.032	0.050	0.038	0.048	0.027	0.025	0.030	0.006	0.018
23.4	0.048	0.032	0.041	0.032	0.049	0.037	0.048	0.025	0.022	0.030	0.004	0.017
23.5	0.049	0.036	0.041	0.033	0.045	0.037	0.045	0.023	0.019	0.027	0.005	0.017
23.6	0.053	0.042	0.041	0.032	0.044	0.036	0.048	0.024	0.021	0.031	0.007	0.017
23.7	0.054	0.041	0.043	0.031	0.042	0.037	0.053	0.030	0.020	0.029	0.008	0.019
23.8	0.052	0.039	0.047	0.031	0.042	0.037	0.052	0.033	0.019	0.028	0.008	0.020
23.9	0.053	0.037	0.049	0.030	0.041	0.036	0.050	0.032	0.017	0.024	0.008	0.020
24	0.053	0.034	0.048	0.028	0.037	0.035	0.047	0.031	0.018	0.024	0.008	0.020
24.1	0.052	0.033	0.048	0.027	0.036	0.035	0.049	0.030	0.016	0.023	0.008	0.020
24.2	0.052	0.033	0.049	0.026	0.033	0.034	0.052	0.031	0.013	0.023	0.009	0.021
24.3	0.053	0.035	0.048	0.027	0.030	0.033	0.052	0.033	0.013	0.025	0.009	0.022
24.4	0.053	0.036	0.047	0.029	0.029	0.031	0.050	0.033	0.013	0.027	0.008	0.021
24.5	0.049	0.038	0.047	0.032	0.030	0.033	0.048	0.030	0.016	0.030	0.005	0.021
24.6	0.047	0.039	0.045	0.034	0.030	0.035	0.045	0.027	0.016	0.029	0.005	0.021
24.7	0.047	0.037	0.042	0.032	0.031	0.033	0.045	0.026	0.015	0.028	0.004	0.020
24.8	0.047	0.034	0.043	0.031	0.035	0.032	0.044	0.026	0.015	0.027	0.005	0.020
24.9	0.046	0.035	0.047	0.032	0.035	0.034	0.045	0.027	0.015	0.025	0.005	0.020
25	0.046	0.036	0.049	0.032	0.032	0.032	0.046	0.031	0.015	0.025	0.004	0.018
25.1	0.047	0.034	0.053	0.030	0.031	0.030	0.045	0.034	0.015	0.023	0.004	0.018
25.2	0.047	0.033	0.053	0.029	0.029	0.031	0.043	0.034	0.015	0.023	0.004	0.017
25.3	0.048	0.033	0.051	0.029	0.030	0.034	0.040	0.032	0.014	0.024	0.003	0.016

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle	7.94E-2-m	7.94E-2-m	0.156-m	0.156-m	0.232-m	0.232-m	0.308-m	0.308-m	0.460-m	0.460-m	0.613-m	0.613-m
Time (sec)	(3.125-in)	(3.125-in)	(6.125-in)	(6.125-in)	(9.125-in)	(9.125-in)	(12.125-in)	(12.125-in)	(18.125-in)	(18.125-in)	(24.125-in)	(24.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
25.4	0.049	0.033	0.052	0.030	0.032	0.036	0.038	0.032	0.012	0.024	0.003	0.016
25.5	0.051	0.035	0.054	0.029	0.033	0.037	0.035	0.030	0.013	0.023	0.004	0.017
25.6	0.048	0.037	0.055	0.029	0.033	0.037	0.034	0.030	0.013	0.022	0.004	0.017
25.7	0.042	0.037	0.054	0.029	0.035	0.036	0.036	0.032	0.013	0.022	0.004	0.017
25.8	0.039	0.034	0.051	0.028	0.038	0.034	0.037	0.033	0.015	0.024	0.004	0.016
25.9	0.039	0.032	0.048	0.030	0.040	0.035	0.036	0.034	0.016	0.025	0.004	0.016
26	0.040	0.034	0.044	0.031	0.043	0.037	0.037	0.034	0.014	0.024	0.005	0.017
26.1	0.041	0.032	0.042	0.032	0.044	0.037	0.036	0.035	0.011	0.020	0.005	0.019
26.2	0.041	0.033	0.042	0.033	0.043	0.037	0.037	0.036	0.010	0.018	0.003	0.019
26.3	0.040	0.035	0.042	0.033	0.044	0.040	0.039	0.037	0.009	0.019	0.001	0.019
26.4	0.039	0.035	0.042	0.030	0.044	0.039	0.041	0.038	0.009	0.021	0.000	0.017
26.5	0.038	0.035	0.041	0.027	0.043	0.039	0.043	0.039	0.010	0.020	0.000	0.017
26.6	0.038	0.034	0.040	0.025	0.042	0.039	0.042	0.040	0.010	0.020	-0.001	0.017
26.7	0.038	0.034	0.041	0.026	0.040	0.038	0.040	0.040	0.009	0.020	-0.002	0.017
26.8	0.037	0.034	0.040	0.027	0.040	0.036	0.038	0.038	0.008	0.020	-0.003	0.015
26.9	0.038	0.036	0.040	0.027	0.040	0.035	0.037	0.038	0.008	0.021	-0.003	0.014
27	0.039	0.035	0.039	0.026	0.039	0.034	0.038	0.039	0.006	0.020	-0.003	0.014
27.1	0.037	0.034	0.036	0.026	0.037	0.035	0.041	0.040	0.006	0.021	-0.001	0.015
27.2	0.036	0.034	0.035	0.025	0.038	0.036	0.041	0.039	0.007	0.022	0.000	0.015
27.3	0.036	0.036	0.039	0.025	0.039	0.034	0.041	0.036	0.006	0.021	0.001	0.017
27.4	0.036	0.036	0.041	0.026	0.040	0.033	0.040	0.036	0.003	0.019	0.002	0.019
27.5	0.038	0.037	0.043	0.026	0.039	0.031	0.039	0.037	0.003	0.020	0.003	0.018
27.6	0.038	0.038	0.042	0.028	0.038	0.032	0.037	0.037	0.004	0.020	0.002	0.019
27.7	0.038	0.038	0.040	0.030	0.038	0.034	0.035	0.036	0.004	0.022	0.000	0.017
27.8	0.038	0.038	0.038	0.029	0.038	0.035	0.034	0.036	0.004	0.024	0.000	0.018
27.9	0.038	0.037	0.035	0.028	0.037	0.035	0.036	0.037	0.005	0.025	0.000	0.018
28	0.038	0.038	0.032	0.027	0.035	0.036	0.037	0.039	0.005	0.022	0.000	0.019
28.1	0.038	0.039	0.030	0.027	0.033	0.035	0.037	0.038	0.005	0.021	-0.001	0.016
28.2	0.038	0.038	0.028	0.028	0.033	0.037	0.039	0.040	0.006	0.020	-0.001	0.016
28.3	0.036	0.037	0.027	0.027	0.033	0.039	0.039	0.041	0.007	0.020	-0.001	0.016
28.4	0.036	0.038	0.027	0.027	0.034	0.036	0.038	0.040	0.008	0.021	-0.002	0.015
28.5	0.037	0.039	0.029	0.028	0.033	0.033	0.037	0.039	0.007	0.020	-0.002	0.015

Velocities Measured at 0.305 m (12 in) Radial Position

Cycle	7.94E-2-m	7.94E-2-m	0.156-m	0.156-m	0.232-m	0.232-m	0.308-m	0.308-m	0.460-m	0.460-m	0.613-m	0.613-m
Time (sec)	(3.125-in)	(3.125-in)	(6.125-in)	(6.125-in)	(9.125-in)	(9.125-in)	(12.125-in)	(12.125-in)	(18.125-in)	(18.125-in)	(24.125-in)	(24.125-in)
	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)	V (m/s)	StdDev (m/s)
28.6	0.039	0.040	0.029	0.029	0.034	0.033	0.035	0.038	0.007	0.019	-0.002	0.015
28.7	0.039	0.040	0.030	0.032	0.036	0.034	0.035	0.037	0.006	0.017	-0.002	0.017
28.8	0.039	0.040	0.029	0.033	0.037	0.032	0.033	0.036	0.007	0.019	-0.002	0.017
28.9	0.038	0.039	0.030	0.034	0.037	0.031	0.033	0.036	0.009	0.021	-0.003	0.015
29	0.037	0.038	0.031	0.031	0.037	0.029	0.035	0.040	0.010	0.021	-0.004	0.013
29.1	0.037	0.039	0.030	0.030	0.038	0.028	0.036	0.042	0.012	0.022	-0.005	0.014
29.2	0.036	0.038	0.030	0.032	0.039	0.028	0.036	0.041	0.011	0.023	-0.004	0.015
29.3	0.035	0.039	0.030	0.035	0.038	0.027	0.034	0.039	0.009	0.025	-0.003	0.016
29.4	0.034	0.039	0.029	0.036	0.035	0.028	0.033	0.035	0.009	0.025	-0.002	0.016
29.5	0.032	0.038	0.028	0.035	0.034	0.030	0.032	0.031	0.010	0.024	-0.002	0.014
29.6	0.032	0.039	0.028	0.031	0.033	0.032	0.034	0.032	0.011	0.024	-0.001	0.013
29.7	0.033	0.041	0.029	0.030	0.033	0.034	0.036	0.033	0.011	0.023	0.000	0.013
29.8	0.035	0.043	0.031	0.029	0.033	0.035	0.035	0.034	0.010	0.022	0.001	0.014
29.9	0.037	0.043	0.033	0.030	0.034	0.035	0.034	0.034	0.007	0.021	0.003	0.016
30	0.039	0.041	0.034	0.030	0.034	0.035	0.033	0.033	0.007	0.018	0.005	0.019

Appendix D: Large Tank Hydrodynamic Test Data

Large-Tank Hydrodynamic Test Velocity Data

Cycle Time (sec)	Centerline Average/Maximum Velocities and Standard Deviation Data (All Probe Location Distances measured from the Tank Center)											
	0.775-m (30.5-in) Elevation			1.31-m (51.5-in) Elevation			1.84-m (72.5-in) Elevation			2.37-m (93.5-in) Elevation		
	Exp. Avg V (m/sec)	Exp. Max V (m/sec)	Stdev (m/sec)	Exp. Avg V (m/sec)	Exp. Max V (m/sec)	Stdev (m/sec)	Exp. Avg V (m/sec)	Exp. Max V (m/sec)	Stdev (m/sec)	Exp. Avg V (m/sec)	Exp. Max V (m/sec)	Stdev (m/sec)
1	0.033	0.094	0.026	0.043	0.079	0.021	-0.006	0.030	0.022	0.029	0.052	0.017
2	0.136	0.355	0.085	0.108	0.173	0.032	0.015	0.050	0.021	0.037	0.064	0.017
3	1.118	1.591	0.409	0.598	1.403	0.331	0.044	0.087	0.022	0.048	0.077	0.020
4	1.719	1.876	0.114	1.650	1.841	0.107	0.160	0.254	0.041	0.063	0.103	0.028
5	1.665	1.956	0.156	1.715	1.919	0.132	1.290	1.599	0.204	0.113	0.184	0.038
6	1.701	1.903	0.082	1.513	1.714	0.099	1.458	1.597	0.152	0.811	1.171	0.203
7	1.630	1.793	0.087	1.539	1.690	0.062	1.280	1.581	0.444	1.269	1.504	0.152
8	1.556	1.692	0.093	1.495	1.642	0.124	1.304	1.509	0.180	1.131	1.372	0.124
9	1.548	1.755	0.124	1.549	1.749	0.093	1.274	1.529	0.183	1.055	1.390	0.207
10	1.504	1.583	0.068	1.430	1.654	0.221	1.285	1.508	0.156	0.937	1.394	0.305
11	1.491	1.696	0.109	1.411	1.583	0.124	1.117	1.307	0.129	0.943	1.326	0.211
12	1.438	1.694	0.163	1.360	1.552	0.153	1.171	1.506	0.198	1.025	1.235	0.217
13	1.257	1.477	0.098	1.206	1.502	0.189	1.140	1.364	0.150	1.120	1.324	0.141
14	0.916	1.187	0.129	0.873	0.931	0.074	0.949	1.258	0.177	0.850	1.025	0.129
15	0.553	0.740	0.191	0.609	0.757	0.092	0.667	0.914	0.198	0.674	0.876	0.256
16	0.428	0.625	0.120	0.430	0.589	0.108	0.610	0.824	0.161	0.618	0.948	0.226
17	0.360	0.490	0.080	0.281	0.488	0.122	0.479	0.637	0.138	0.526	0.756	0.113
18	0.195	0.411	0.115	0.209	0.408	0.110	0.317	0.486	0.136	0.348	0.552	0.146
19	0.175	0.329	0.081	0.145	0.258	0.086	0.222	0.376	0.123	0.276	0.512	0.129
20	0.134	0.275	0.074	0.146	0.298	0.075	0.134	0.304	0.106	0.281	0.398	0.099
21	0.130	0.205	0.060	0.159	0.269	0.084	0.150	0.254	0.084	0.246	0.383	0.138
22	0.111	0.242	0.072	0.172	0.253	0.076	0.112	0.211	0.073	0.195	0.381	0.115
23	0.082	0.182	0.051	0.124	0.233	0.072	0.070	0.186	0.073	0.169	0.321	0.086
24	0.072	0.165	0.051	0.105	0.177	0.056	0.076	0.183	0.073	0.130	0.242	0.078
25	0.068	0.149	0.053	0.093	0.170	0.047	0.061	0.130	0.062	0.106	0.245	0.075
26	0.059	0.134	0.057	0.091	0.143	0.047	0.064	0.157	0.064	0.115	0.228	0.071
27	0.056	0.174	0.056	0.060	0.105	0.041	0.061	0.160	0.065	0.114	0.237	0.080

28	0.055	0.132	0.046	0.051	0.152	0.050	0.039	0.133	0.054	0.100	0.179	0.061
29	0.031	0.108	0.033	0.042	0.132	0.056	0.015	0.147	0.054	0.103	0.157	0.053
30	0.036	0.086	0.034	0.063	0.159	0.060	0.042	0.133	0.051	0.070	0.174	0.057
31	0.027	0.114	0.038	0.047	0.148	0.047	0.031	0.110	0.043	0.063	0.129	0.048
32	0.024	0.089	0.040	0.025	0.074	0.043	0.031	0.101	0.052	0.060	0.195	0.053
33	0.025	0.080	0.036	0.034	0.102	0.041	0.026	0.121	0.051	0.054	0.123	0.041
34	0.037	0.103	0.035	0.030	0.088	0.032	0.016	0.095	0.044	0.065	0.132	0.045
35	0.032	0.103	0.040	0.024	0.080	0.039	0.003	0.090	0.043	0.053	0.134	0.048
36	0.044	0.088	0.039	0.034	0.098	0.045	-0.001	0.132	0.053	0.056	0.138	0.047
37	0.039	0.082	0.029	0.041	0.126	0.047	0.003	0.116	0.043	0.048	0.106	0.036
38	0.035	0.086	0.029	0.043	0.145	0.052	0.003	0.092	0.032	0.042	0.086	0.033
39	0.038	0.077	0.038	0.040	0.105	0.033	0.000	0.065	0.036	0.039	0.099	0.035
40	0.033	0.079	0.030	0.040	0.094	0.028	0.011	0.078	0.035	0.043	0.076	0.020
41	0.033	0.074	0.029	0.038	0.106	0.031	0.014	0.068	0.026	0.048	0.089	0.028
42	0.031	0.074	0.030	0.026	0.095	0.033	0.018	0.060	0.024	0.049	0.088	0.031
43	0.035	0.076	0.026	0.027	0.103	0.039	0.017	0.051	0.025	0.040	0.092	0.037
44	0.034	0.067	0.020	0.027	0.086	0.028	0.020	0.075	0.032	0.041	0.100	0.038
45	0.027	0.063	0.022	0.027	0.074	0.026	0.012	0.059	0.032	0.056	0.091	0.035
46	0.029	0.057	0.021	0.025	0.065	0.021	0.013	0.069	0.033	0.053	0.111	0.034
47	0.019	0.045	0.023	0.028	0.059	0.021	0.014	0.054	0.022	0.055	0.094	0.029
48	0.020	0.048	0.019	0.027	0.068	0.022	0.005	0.041	0.024	0.053	0.095	0.028
49	0.025	0.063	0.022	0.028	0.074	0.023	0.008	0.059	0.025	0.052	0.100	0.034
50	0.025	0.070	0.021	0.021	0.057	0.019	-0.001	0.039	0.021	0.049	0.092	0.032
51	0.027	0.065	0.020	0.024	0.065	0.019	-0.001	0.041	0.023	0.046	0.092	0.027
52	0.028	0.076	0.020	0.023	0.053	0.018	0.003	0.039	0.020	0.043	0.073	0.024
53	0.030	0.077	0.025	0.028	0.050	0.018	0.010	0.051	0.021	0.042	0.077	0.025
54	0.029	0.085	0.026	0.029	0.051	0.020	0.002	0.065	0.034	0.050	0.085	0.030
55	0.025	0.077	0.022	0.027	0.057	0.020	0.009	0.060	0.028	0.049	0.082	0.024
56	0.023	0.059	0.019	0.022	0.062	0.021	0.009	0.056	0.021	0.045	0.071	0.023
57	0.024	0.062	0.017	0.024	0.083	0.027	0.015	0.074	0.025	0.044	0.077	0.024
58	0.025	0.044	0.013	0.025	0.089	0.029	0.011	0.054	0.026	0.045	0.077	0.019
59	0.023	0.063	0.017	0.023	0.068	0.023	0.011	0.038	0.020	0.044	0.073	0.020

60	0.021	0.051	0.014	0.023	0.065	0.020	-0.001	0.023	0.016	0.032	0.074	0.019
61	0.026	0.062	0.019	0.022	0.070	0.022	0.005	0.029	0.016	0.028	0.059	0.018
62	0.020	0.047	0.019	0.020	0.062	0.018	0.010	0.045	0.017	0.032	0.061	0.019
63	0.013	0.048	0.018	0.022	0.067	0.019	0.006	0.032	0.019	0.031	0.071	0.024
64	0.015	0.033	0.009	0.022	0.054	0.016	0.002	0.039	0.023	0.031	0.056	0.021
65	0.015	0.035	0.012	0.020	0.051	0.015	0.009	0.045	0.018	0.035	0.056	0.018
66	0.015	0.038	0.017	0.018	0.065	0.018	-0.004	0.028	0.020	0.033	0.059	0.016
67	0.012	0.030	0.014	0.016	0.059	0.016	-0.004	0.027	0.021	0.040	0.083	0.024
68	0.013	0.041	0.015	0.020	0.050	0.015	0.004	0.029	0.021	0.040	0.071	0.022
69	0.017	0.041	0.014	0.018	0.065	0.020	-0.003	0.029	0.016	0.038	0.071	0.022
70	0.019	0.041	0.012	0.017	0.062	0.018	-0.002	0.024	0.015	0.036	0.079	0.022
71	0.020	0.062	0.017	0.014	0.051	0.017	-0.002	0.021	0.019	0.036	0.080	0.021
72	0.018	0.059	0.017	0.010	0.027	0.011	-0.003	0.033	0.019	0.035	0.068	0.018
73	0.019	0.059	0.020	0.010	0.030	0.011	0.000	0.035	0.019	0.036	0.070	0.024
74	0.017	0.057	0.018	0.013	0.030	0.013	0.002	0.039	0.018	0.034	0.067	0.025
75	0.014	0.051	0.019	0.015	0.035	0.015	-0.005	0.024	0.014	0.031	0.070	0.022

Large-Tank Hydrodynamic Test Level data

Cycle Time (sec)	Avg Level (m)	Avg Level (in)	StdDev (m)	StdDev (in)
1	2.855	112.38	0.001	0.04
2	2.855	112.41	0.001	0.04
3	2.856	112.43	0.001	0.03
4	2.801	110.29	0.015	0.59
5	2.644	104.10	0.026	1.01
6	2.427	95.54	0.030	1.20
7	2.188	86.16	0.031	1.23
8	1.947	76.64	0.031	1.22
9	1.706	67.16	0.031	1.21
10	1.461	57.52	0.027	1.06
11	1.223	48.15	0.029	1.12
12	0.991	39.03	0.028	1.11
13	0.763	30.06	0.028	1.10
14	0.536	21.11	0.027	1.08
15	0.323	12.71	0.024	0.93
16	0.164	6.47	0.015	0.61
17	0.090	3.53	0.006	0.25
18	0.183	7.20	0.017	0.67
19	0.306	12.06	0.017	0.65
20	0.383	15.07	0.018	0.71
21	0.446	17.57	0.021	0.84
22	0.506	19.90	0.017	0.68
23	0.581	22.87	0.017	0.67
24	0.659	25.95	0.016	0.62
25	0.737	29.02	0.017	0.68
26	0.821	32.34	0.017	0.68
27	0.895	35.22	0.015	0.61
28	0.978	38.51	0.017	0.68

Cycle Time (sec)	Avg Level (m)	Avg Level (in)	StdDev (m)	StdDev (in)
40	1.831	72.09	0.010	0.38
41	1.893	74.55	0.010	0.38
42	1.955	76.95	0.010	0.38
43	2.014	79.31	0.008	0.33
44	2.073	81.59	0.010	0.38
45	2.130	83.84	0.009	0.36
46	2.184	85.98	0.009	0.34
47	2.235	87.98	0.009	0.34
48	2.284	89.94	0.008	0.30
49	2.332	91.79	0.008	0.31
50	2.378	93.62	0.008	0.30
51	2.423	95.39	0.007	0.28
52	2.465	97.05	0.008	0.31
53	2.504	98.58	0.006	0.25
54	2.542	100.07	0.007	0.27
55	2.576	101.41	0.007	0.26
56	2.610	102.77	0.005	0.21
57	2.641	103.97	0.006	0.23
58	2.670	105.12	0.005	0.21
59	2.697	106.20	0.006	0.22
60	2.721	107.11	0.005	0.21
61	2.744	108.02	0.004	0.17
62	2.764	108.82	0.005	0.19
63	2.781	109.50	0.004	0.14
64	2.798	110.17	0.004	0.16
65	2.812	110.72	0.004	0.14
66	2.825	111.22	0.002	0.09
67	2.835	111.61	0.003	0.11

29	1.055	41.54	0.015	0.60		68	2.842	111.88	0.002	0.08
30	1.132	44.58	0.016	0.65		69	2.848	112.13	0.002	0.06
31	1.204	47.39	0.015	0.59		70	2.853	112.31	0.001	0.06
32	1.277	50.28	0.014	0.54		71	2.854	112.35	0.001	0.04
33	1.349	53.10	0.012	0.46		72	2.855	112.41	0.001	0.03
34	1.421	55.95	0.011	0.42		73	2.856	112.42	0.001	0.04
35	1.490	58.66	0.011	0.42		74	2.854	112.37	0.001	0.03
36	1.560	61.43	0.010	0.41		75	2.855	112.41	0.001	0.03
37	1.632	64.26	0.010	0.37						
38	1.700	66.92	0.009	0.35						
39	1.768	69.59	0.010	0.39						

Appendix E: Large Tank Simulant Data

Large Tank Simulant PSD Data

Particle Size Distribution of Potter Chemical Co. 2530 Glass Beads	
Particle Size (μm)	Vol %
37.00	0.00
40.35	0.15
44.00	0.35
47.98	0.71
52.33	1.86
57.06	4.18
62.23	7.88
67.86	13.68
74.00	16.88
80.70	17.54
88.00	15.20
95.96	9.87
104.65	5.99
114.12	3.11
124.45	1.48
135.71	0.78
148.00	0.34
161.39	0.00

Large Tank Simulant Test Level Data

Cycle Time (sec)	Avg. Level (m)	StdDev (m)	Avg. Level (ft)	StdDev (ft)
1	0.199	0.000	7.823	0.017
2	0.197	0.003	7.744	0.119
3	0.190	0.007	7.487	0.272
4	0.178	0.010	7.004	0.393
5	0.163	0.011	6.404	0.443
6	0.146	0.012	5.757	0.453
7	0.129	0.011	5.098	0.452
8	0.113	0.011	4.445	0.440
9	0.096	0.011	3.792	0.449
10	0.080	0.011	3.150	0.448
11	0.064	0.011	2.528	0.426
12	0.048	0.011	1.890	0.423
13	0.033	0.010	1.311	0.380
14	0.021	0.007	0.829	0.277
15	0.014	0.003	0.558	0.125
16	0.015	0.005	0.591	0.189
17	0.021	0.007	0.843	0.257
18	0.030	0.005	1.166	0.209
19	0.036	0.004	1.427	0.171
20	0.041	0.004	1.626	0.142
21	0.045	0.003	1.788	0.136
22	0.051	0.005	2.016	0.181
23	0.057	0.005	2.243	0.195
24	0.063	0.005	2.489	0.180
25	0.069	0.004	2.711	0.165
26	0.074	0.004	2.916	0.170
27	0.079	0.004	3.126	0.171
28	0.085	0.004	3.336	0.160
29	0.090	0.004	3.547	0.162
30	0.095	0.004	3.749	0.156

Cycle Time (sec)	Avg. Level (m)	StdDev (m)	Avg. Level (ft)	StdDev (ft)
46	0.166	0.002	6.552	0.097
47	0.170	0.002	6.679	0.091
48	0.173	0.002	6.800	0.086
49	0.176	0.002	6.916	0.083
50	0.178	0.002	7.025	0.077
51	0.181	0.002	7.125	0.072
52	0.183	0.002	7.219	0.067
53	0.186	0.002	7.308	0.063
54	0.188	0.001	7.388	0.058
55	0.190	0.001	7.464	0.052
56	0.191	0.001	7.532	0.049
57	0.193	0.001	7.594	0.043
58	0.194	0.001	7.648	0.037
59	0.195	0.001	7.695	0.034
60	0.197	0.001	7.737	0.027
61	0.197	0.001	7.771	0.023
62	0.198	0.000	7.798	0.018
63	0.199	0.000	7.818	0.014
64	0.199	0.000	7.832	0.010
65	0.199	0.000	7.840	0.009
66	0.199	0.000	7.843	0.008
67	0.199	0.000	7.844	0.009
68	0.199	0.000	7.842	0.009
69	0.199	0.000	7.839	0.009
70	0.199	0.000	7.836	0.009
71	0.199	0.000	7.834	0.009
72	0.199	0.000	7.832	0.009
73	0.199	0.000	7.830	0.008
74	0.199	0.000	7.828	0.008
75	0.199	0.000	7.827	0.008

31	0.101	0.004	3.959	0.143
32	0.106	0.004	4.161	0.149
33	0.111	0.004	4.358	0.145
34	0.116	0.004	4.552	0.143
35	0.121	0.004	4.749	0.140
36	0.125	0.004	4.937	0.138
37	0.130	0.003	5.125	0.133
38	0.135	0.003	5.308	0.131
39	0.139	0.003	5.483	0.131
40	0.144	0.003	5.654	0.123
41	0.148	0.003	5.819	0.120
42	0.152	0.003	5.978	0.115
43	0.156	0.003	6.131	0.111
44	0.159	0.003	6.276	0.108
45	0.163	0.003	6.419	0.101

Large Tank Simulant Test Velocity Data

Cycle Time (sec)	ALL CENTERLINE VELOCITY DATA WAS COLLECTED AFTER STEADY STATE (IN DENSITY) HAS BEEN ACHIEVED IN THE TANK															
	Centerline Velocites at Elevation as Measured from the Tank Center															
	0.330 m	0.330 m	0.635 m	0.635 m	0.940 m	0.940 m	1.245 m	1.245 m	1.321 m	1.321 m	1.549 m	1.549 m	1.854 m	1.854 m	2.159 m	2.159 m
	13-in	13-in	25-in	25-in	37-in	37-in	49-in	49-in	52-in	52-in	61-in	61-in	73-in	73-in	85-in	85-in
	Velocity	StdDev	Velocity	StdDev	Velocity	StdDev	Velocity	StdDev	Velocity	StdDev	Velocity	StdDev	Velocity	StdDev	Velocity	StdDev
	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec	m/sec
1	-0.110	0.049	-0.028	0.039	0.717	0.178	-0.043	0.027	-0.092	0.042	-0.054	0.018	-0.065	0.006	-0.065	0.005
2	-0.054	0.193	0.086	0.108	0.775	0.230	-0.038	0.026	-0.006	0.034	-0.074	0.022	-0.063	0.005	-0.074	0.006
3	0.138	0.261	0.294	0.156	0.760	0.223	-0.035	0.015	0.043	0.091	-0.097	0.018	-0.079	0.006	-0.065	0.010
4	0.351	0.331	0.589	0.180	0.724	0.218	-0.051	0.007	0.043	0.184	-0.053	0.021	-0.075	0.011	-0.043	0.008
5	0.651	0.497	0.961	0.194	0.700	0.183	-0.156	0.028	0.018	0.169	-0.005	0.014	-0.055	0.010	-0.038	0.007
6	0.805	0.388	1.113	0.171	0.707	0.151	-0.095	0.022	0.048	0.171	-0.026	0.027	-0.044	0.011	-0.053	0.008
7	0.800	0.381	1.087	0.181	0.723	0.180	0.047	0.091	-0.050	0.158	-0.051	0.033	-0.054	0.011	-0.068	0.009
8	0.875	0.408	1.097	0.206	0.495	0.115	0.177	0.164	0.047	0.220	-0.068	0.013	-0.066	0.012	-0.064	0.011
9	0.881	0.330	1.113	0.146	0.277	0.128	0.237	0.117	0.136	0.230	-0.078	0.035	-0.075	0.013	-0.047	0.010
10	1.058	0.240	1.134	0.184	0.092	0.153	0.285	0.139	-0.016	0.159	-0.037	0.040	-0.070	0.016	-0.037	0.006
11	1.038	0.277	1.085	0.169	-0.029	0.087	0.249	0.125	-0.166	0.058	-0.058	0.043	-0.052	0.011	-0.053	0.008
12	0.971	0.269	0.838	0.124	-0.106	0.045	0.158	0.129	-0.188	0.043	-0.096	0.068	-0.056	0.017	-0.090	0.013
13	0.752	0.284	0.553	0.113	-0.154	0.026	0.196	0.251	-0.129	0.034	-0.114	0.042	-0.083	0.018	-0.107	0.007
14	0.521	0.299	0.312	0.113	-0.175	0.037	0.304	0.210	-0.083	0.034	-0.133	0.033	-0.110	0.016	-0.101	0.007
15	0.289	0.237	0.133	0.104	-0.166	0.046	0.189	0.212	-0.082	0.032	-0.108	0.036	-0.105	0.015	-0.085	0.006
16	0.130	0.164	0.014	0.101	-0.139	0.046	-0.045	0.123	-0.123	0.045	-0.068	0.040	-0.082	0.017	-0.083	0.011
17	0.017	0.126	-0.061	0.088	-0.101	0.041	-0.135	0.035	-0.166	0.039	-0.064	0.043	-0.066	0.011	-0.101	0.011
18	-0.032	0.063	-0.120	0.068	-0.066	0.036	-0.166	0.042	-0.150	0.022	-0.092	0.051	-0.082	0.014	-0.122	0.015
19	-0.071	0.069	-0.168	0.049	-0.073	0.033	-0.107	0.032	-0.090	0.041	-0.135	0.041	-0.112	0.014	-0.133	0.005
20	-0.109	0.077	-0.183	0.043	-0.085	0.033	-0.097	0.036	-0.064	0.040	-0.135	0.042	-0.125	0.013	-0.121	0.008
21	-0.105	0.099	-0.159	0.059	-0.100	0.029	-0.133	0.033	-0.090	0.027	-0.103	0.032	-0.108	0.015	-0.098	0.010
22	-0.094	0.055	-0.115	0.054	-0.106	0.024	-0.134	0.041	-0.130	0.028	-0.086	0.020	-0.084	0.013	-0.096	0.010
23	-0.087	0.059	-0.094	0.041	-0.099	0.022	-0.119	0.047	-0.146	0.019	-0.087	0.025	-0.082	0.010	-0.100	0.012
24	-0.090	0.055	-0.084	0.046	-0.100	0.022	-0.090	0.017	-0.116	0.028	-0.098	0.029	-0.092	0.008	-0.108	0.010
25	-0.076	0.069	-0.079	0.036	-0.115	0.022	-0.078	0.019	-0.087	0.024	-0.106	0.030	-0.101	0.009	-0.103	0.010

26	-0.095	0.053	-0.085	0.024	-0.131	0.020	-0.105	0.022	-0.081	0.032	-0.098	0.031	-0.100	0.014	-0.088	0.008
27	-0.089	0.071	-0.090	0.024	-0.135	0.020	-0.144	0.030	-0.085	0.034	-0.082	0.033	-0.085	0.017	-0.074	0.009
28	-0.103	0.050	-0.092	0.024	-0.107	0.020	-0.151	0.020	-0.123	0.028	-0.056	0.029	-0.073	0.011	-0.071	0.006
29	-0.108	0.059	-0.097	0.024	-0.085	0.012	-0.136	0.031	-0.137	0.019	-0.060	0.022	-0.074	0.012	-0.081	0.006
30	-0.103	0.061	-0.102	0.020	-0.083	0.014	-0.110	0.026	-0.114	0.022	-0.087	0.031	-0.089	0.013	-0.086	0.007
31	-0.116	0.023	-0.111	0.019	-0.110	0.027	-0.092	0.036	-0.088	0.016	-0.127	0.024	-0.100	0.008	-0.084	0.010
32	-0.100	0.052	-0.110	0.026	-0.134	0.030	-0.113	0.037	-0.070	0.031	-0.132	0.027	-0.097	0.011	-0.074	0.009
33	-0.101	0.062	-0.103	0.024	-0.139	0.023	-0.139	0.044	-0.092	0.028	-0.111	0.047	-0.084	0.009	-0.066	0.006
34	-0.103	0.045	-0.100	0.017	-0.118	0.012	-0.137	0.015	-0.130	0.023	-0.111	0.046	-0.079	0.004	-0.066	0.007
35	-0.097	0.043	-0.107	0.030	-0.088	0.017	-0.118	0.019	-0.141	0.020	-0.120	0.039	-0.089	0.009	-0.077	0.010
36	-0.097	0.035	-0.107	0.020	-0.081	0.012	-0.079	0.015	-0.093	0.033	-0.129	0.031	-0.101	0.009	-0.085	0.005
37	-0.092	0.035	-0.104	0.014	-0.100	0.014	-0.076	0.024	-0.061	0.028	-0.115	0.021	-0.104	0.008	-0.079	0.003
38	-0.096	0.028	-0.093	0.013	-0.122	0.018	-0.094	0.017	-0.062	0.017	-0.096	0.016	-0.092	0.009	-0.073	0.004
39	-0.096	0.019	-0.090	0.017	-0.116	0.013	-0.130	0.026	-0.104	0.023	-0.078	0.014	-0.085	0.008	-0.073	0.007
40	-0.095	0.037	-0.093	0.014	-0.095	0.020	-0.121	0.041	-0.124	0.023	-0.084	0.021	-0.090	0.011	-0.079	0.009
41	-0.097	0.021	-0.100	0.010	-0.089	0.025	-0.096	0.010	-0.093	0.018	-0.108	0.033	-0.100	0.011	-0.093	0.007
42	-0.098	0.031	-0.107	0.015	-0.093	0.023	-0.083	0.024	-0.076	0.021	-0.129	0.036	-0.110	0.009	-0.098	0.009
43	-0.107	0.025	-0.106	0.017	-0.103	0.015	-0.069	0.023	-0.061	0.020	-0.120	0.032	-0.106	0.007	-0.094	0.009
44	-0.107	0.030	-0.103	0.016	-0.110	0.012	-0.102	0.023	-0.079	0.017	-0.100	0.031	-0.095	0.006	-0.090	0.010
45	-0.091	0.042	-0.104	0.016	-0.110	0.015	-0.153	0.027	-0.101	0.015	-0.086	0.031	-0.090	0.010	-0.090	0.009
46	-0.096	0.034	-0.112	0.014	-0.098	0.016	-0.126	0.022	-0.108	0.031	-0.089	0.040	-0.093	0.009	-0.095	0.013
47	-0.100	0.042	-0.121	0.018	-0.088	0.015	-0.061	0.026	-0.098	0.032	-0.101	0.040	-0.103	0.008	-0.105	0.012
48	-0.099	0.025	-0.119	0.016	-0.099	0.026	-0.044	0.019	-0.066	0.027	-0.107	0.030	-0.105	0.007	-0.107	0.013
49	-0.089	0.058	-0.100	0.018	-0.125	0.022	-0.091	0.027	-0.049	0.024	-0.098	0.024	-0.096	0.010	-0.100	0.012
50	-0.098	0.029	-0.087	0.018	-0.123	0.017	-0.133	0.024	-0.068	0.014	-0.077	0.019	-0.084	0.008	-0.091	0.010
51	-0.080	0.041	-0.099	0.014	-0.099	0.020	-0.126	0.025	-0.119	0.019	-0.073	0.020	-0.084	0.009	-0.091	0.007
52	-0.103	0.037	-0.115	0.017	-0.086	0.016	-0.098	0.023	-0.120	0.022	-0.089	0.022	-0.092	0.010	-0.098	0.008
53	-0.089	0.028	-0.118	0.013	-0.096	0.019	-0.079	0.029	-0.086	0.032	-0.102	0.017	-0.098	0.007	-0.103	0.008
54	-0.097	0.025	-0.113	0.011	-0.115	0.019	-0.059	0.032	-0.064	0.027	-0.100	0.016	-0.093	0.011	-0.098	0.008
55	-0.091	0.018	-0.106	0.013	-0.110	0.016	-0.080	0.030	-0.079	0.033	-0.085	0.017	-0.083	0.008	-0.089	0.004
56	-0.090	0.021	-0.102	0.009	-0.097	0.012	-0.130	0.011	-0.119	0.045	-0.074	0.009	-0.077	0.008	-0.088	0.006
57	-0.095	0.024	-0.101	0.010	-0.083	0.014	-0.145	0.029	-0.128	0.023	-0.083	0.007	-0.083	0.009	-0.090	0.008
58	-0.092	0.014	-0.102	0.011	-0.085	0.009	-0.100	0.032	-0.103	0.025	-0.100	0.017	-0.091	0.009	-0.096	0.004
59	-0.096	0.028	-0.098	0.013	-0.103	0.006	-0.044	0.020	-0.078	0.029	-0.109	0.033	-0.093	0.009	-0.098	0.006
60	-0.090	0.019	-0.086	0.010	-0.114	0.012	-0.067	0.026	-0.072	0.031	-0.102	0.029	-0.088	0.007	-0.094	0.007

61	-0.090	0.019	-0.084	0.011	-0.119	0.016	-0.111	0.011	-0.068	0.031	-0.087	0.027	-0.080	0.007	-0.085	0.010
62	-0.100	0.033	-0.091	0.012	-0.111	0.016	-0.132	0.025	-0.083	0.021	-0.080	0.038	-0.081	0.007	-0.080	0.011
63	-0.104	0.032	-0.104	0.015	-0.091	0.013	-0.106	0.020	-0.094	0.019	-0.087	0.040	-0.084	0.011	-0.083	0.009
64	-0.100	0.014	-0.113	0.013	-0.078	0.021	-0.082	0.017	-0.083	0.023	-0.101	0.034	-0.088	0.007	-0.089	0.006
65	-0.103	0.017	-0.110	0.011	-0.089	0.019	-0.072	0.021	-0.063	0.032	-0.107	0.036	-0.086	0.008	-0.091	0.009
66	-0.113	0.028	-0.097	0.014	-0.120	0.038	-0.081	0.020	-0.045	0.029	-0.099	0.047	-0.079	0.008	-0.085	0.008
67	-0.112	0.026	-0.095	0.014	-0.117	0.017	-0.110	0.016	-0.062	0.021	-0.092	0.061	-0.073	0.008	-0.079	0.006
68	-0.100	0.017	-0.101	0.012	-0.101	0.016	-0.121	0.022	-0.093	0.024	-0.085	0.052	-0.076	0.008	-0.078	0.005
69	-0.099	0.010	-0.107	0.008	-0.087	0.017	-0.097	0.019	-0.099	0.047	-0.095	0.042	-0.084	0.009	-0.079	0.005
70	-0.095	0.014	-0.105	0.010	-0.073	0.016	-0.062	0.021	-0.060	0.047	-0.102	0.037	-0.088	0.007	-0.087	0.007
71	-0.090	0.029	-0.099	0.011	-0.026	0.026	-0.048	0.020	-0.030	0.035	-0.102	0.039	-0.082	0.006	-0.088	0.006
72	-0.101	0.047	-0.097	0.009	0.075	0.117	-0.069	0.010	-0.026	0.042	-0.092	0.036	-0.076	0.004	-0.082	0.005
73	-0.095	0.015	-0.099	0.010	0.035	0.107	-0.093	0.016	-0.025	0.039	-0.081	0.032	-0.074	0.007	-0.075	0.006
74	-0.102	0.033	-0.102	0.012	0.154	0.066	-0.090	0.027	-0.059	0.034	-0.077	0.031	-0.080	0.006	-0.061	0.008
75	-0.091	0.020	-0.075	0.021	0.424	0.164	-0.058	0.025	-0.136	0.039	-0.074	0.030	-0.074	0.008	-0.057	0.005

Large Tank Simulant Test Density Data

ALL DENSITY DATA WAS COLLECTED AFTER STEADY STATE HAS BEEN ACHIEVED IN THE TANK

Cycle Time (sec)	Densities @ 0.222m (8.75-in) Radial Position at Elevation as Measured from the Tank Center													
	0.686 m	0.686 m	0.838 m	0.838 m	0.991 m	0.991 m	1.143 m	1.143 m	1.295 m	1.295 m	1.448 m	1.448 m	1.600 m	1.600 m
	27-in	27-in	33-in	33-in	39-in	39-in	45-in	45-in	51-in	51-in	57-in	57-in	63-in	63-in
	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev
	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³
1	1.191	0.0012	1.1728	0.0015	1.157	0.0018	1.063	0.0041	0.999	0.0007	0.996	0.0005	0.992	0.0004
2	1.191	0.0011	1.1728	0.0015	1.156	0.0020	1.061	0.0040	0.999	0.0008	0.996	0.0005	0.992	0.0004
3	1.191	0.0012	1.1722	0.0013	1.156	0.0021	1.062	0.0047	0.999	0.0007	0.996	0.0005	0.992	0.0000
4	1.192	0.0017	1.1718	0.0016	1.155	0.0018	1.067	0.0060	1.000	0.0008	0.996	0.0005	0.992	0.0000
5	1.195	0.0029	1.1718	0.0016	1.156	0.0017	1.077	0.0073	1.000	0.0009	0.996	0.0007	0.992	0.0000
6	1.202	0.0048	1.1734	0.0017	1.158	0.0018	1.091	0.0084	1.001	0.0015	0.997	0.0016	0.992	0.0000
7	1.212	0.0063	1.1788	0.0013	1.166	0.0020	1.106	0.0109	1.003	0.0033	0.999	0.0033	0.992	0.0000
8	1.223	0.0065	1.19	0.0034	1.179	0.0039	1.125	0.0141	1.009	0.0062	1.002	0.0054	0.992	0.0004
9	1.233	0.0054	1.2044	0.0034	1.194	0.0046	1.145	0.0160	1.019	0.0099	1.007	0.0080	0.992	0.0008
10	1.240	0.0038	1.219	0.0032	1.210	0.0041	1.166	0.0155	1.036	0.0151	1.015	0.0118	0.992	0.0011
11	1.243	0.0025	1.2312	0.0042	1.223	0.0027	1.183	0.0130	1.059	0.0197	1.026	0.0158	0.993	0.0030
12	1.244	0.0020	1.2392	0.0037	1.231	0.0028	1.197	0.0101	1.084	0.0216	1.041	0.0183	0.994	0.0057
13	1.242	0.0022	1.2432	0.0033	1.236	0.0024	1.206	0.0076	1.108	0.0213	1.056	0.0191	0.995	0.0079
14	1.240	0.0024	1.2436	0.0033	1.237	0.0014	1.211	0.0057	1.128	0.0197	1.071	0.0184	0.996	0.0098
15	1.236	0.0025	1.2422	0.0033	1.236	0.0013	1.214	0.0046	1.145	0.0168	1.084	0.0167	0.997	0.0118
16	1.233	0.0024	1.2394	0.0033	1.234	0.0009	1.215	0.0039	1.157	0.0155	1.094	0.0152	0.999	0.0136
17	1.230	0.0024	1.2362	0.0036	1.230	0.0010	1.213	0.0045	1.164	0.0144	1.101	0.0137	1.002	0.0156
18	1.227	0.0022	1.2326	0.0030	1.227	0.0011	1.208	0.0056	1.168	0.0131	1.106	0.0124	1.005	0.0175
19	1.224	0.0022	1.2284	0.0033	1.223	0.0017	1.203	0.0066	1.168	0.0115	1.108	0.0116	1.006	0.0190
20	1.222	0.0023	1.2248	0.0030	1.220	0.0023	1.197	0.0066	1.166	0.0096	1.107	0.0115	1.007	0.0206
21	1.220	0.0025	1.2212	0.0028	1.215	0.0025	1.192	0.0058	1.164	0.0078	1.104	0.0112	1.008	0.0235
22	1.218	0.0026	1.2172	0.0016	1.211	0.0034	1.189	0.0050	1.162	0.0062	1.099	0.0101	1.008	0.0247
23	1.216	0.0027	1.213	0.0014	1.206	0.0034	1.186	0.0043	1.160	0.0051	1.093	0.0089	1.007	0.0244
24	1.214	0.0030	1.2088	0.0019	1.201	0.0026	1.183	0.0039	1.158	0.0047	1.086	0.0079	1.006	0.0231
25	1.211	0.0030	1.2048	0.0020	1.197	0.0024	1.182	0.0036	1.155	0.0053	1.079	0.0072	1.005	0.0226

26	1.209	0.0028	1.201	0.0024	1.193	0.0020	1.181	0.0033	1.152	0.0059	1.072	0.0067	1.004	0.0225
27	1.207	0.0025	1.1982	0.0024	1.190	0.0017	1.180	0.0032	1.149	0.0061	1.066	0.0058	1.003	0.0216
28	1.205	0.0022	1.196	0.0027	1.188	0.0018	1.179	0.0034	1.146	0.0061	1.060	0.0052	1.002	0.0202
29	1.204	0.0019	1.195	0.0027	1.187	0.0021	1.178	0.0035	1.143	0.0064	1.056	0.0048	1.001	0.0182
30	1.203	0.0018	1.1938	0.0023	1.186	0.0020	1.177	0.0035	1.138	0.0063	1.053	0.0045	0.999	0.0158
31	1.202	0.0017	1.1932	0.0019	1.186	0.0020	1.175	0.0032	1.132	0.0065	1.049	0.0045	0.998	0.0128
32	1.202	0.0016	1.1928	0.0019	1.185	0.0021	1.173	0.0031	1.125	0.0068	1.046	0.0046	0.997	0.0103
33	1.202	0.0016	1.1926	0.0019	1.185	0.0020	1.172	0.0028	1.119	0.0072	1.042	0.0048	0.996	0.0081
34	1.202	0.0016	1.1922	0.0022	1.184	0.0021	1.170	0.0029	1.113	0.0072	1.039	0.0046	0.995	0.0063
35	1.202	0.0017	1.1914	0.0017	1.184	0.0020	1.167	0.0032	1.107	0.0071	1.036	0.0043	0.994	0.0048
36	1.202	0.0017	1.191	0.0012	1.184	0.0021	1.164	0.0033	1.099	0.0075	1.032	0.0043	0.993	0.0038
37	1.201	0.0017	1.1902	0.0016	1.183	0.0015	1.161	0.0032	1.092	0.0082	1.028	0.0043	0.993	0.0030
38	1.201	0.0017	1.1896	0.0011	1.181	0.0016	1.160	0.0030	1.086	0.0082	1.025	0.0039	0.993	0.0023
39	1.200	0.0017	1.1888	0.0011	1.180	0.0015	1.159	0.0028	1.081	0.0082	1.022	0.0036	0.993	0.0015
40	1.200	0.0017	1.1884	0.0005	1.179	0.0019	1.158	0.0028	1.075	0.0088	1.020	0.0036	0.992	0.0011
41	1.199	0.0017	1.1876	0.0005	1.177	0.0019	1.156	0.0029	1.068	0.0097	1.017	0.0040	0.992	0.0008
42	1.199	0.0016	1.1868	0.0004	1.176	0.0022	1.154	0.0029	1.060	0.0091	1.014	0.0038	0.992	0.0008
43	1.199	0.0015	1.1864	0.0005	1.175	0.0020	1.152	0.0029	1.052	0.0082	1.012	0.0033	0.992	0.0008
44	1.199	0.0014	1.1856	0.0009	1.174	0.0017	1.151	0.0030	1.045	0.0074	1.009	0.0029	0.992	0.0008
45	1.198	0.0013	1.185	0.0016	1.173	0.0017	1.150	0.0032	1.039	0.0068	1.007	0.0024	0.992	0.0006
46	1.198	0.0013	1.1846	0.0022	1.173	0.0014	1.147	0.0033	1.033	0.0062	1.005	0.0020	0.992	0.0006
47	1.198	0.0013	1.1846	0.0024	1.172	0.0011	1.144	0.0037	1.028	0.0057	1.004	0.0016	0.992	0.0006
48	1.198	0.0013	1.1838	0.0022	1.172	0.0013	1.140	0.0042	1.023	0.0050	1.002	0.0014	0.992	0.0006
49	1.197	0.0014	1.183	0.0014	1.171	0.0012	1.137	0.0043	1.019	0.0042	1.001	0.0011	0.992	0.0006
50	1.197	0.0014	1.1816	0.0015	1.170	0.0015	1.136	0.0041	1.016	0.0037	1.000	0.0010	0.992	0.0006
51	1.196	0.0015	1.1808	0.0019	1.170	0.0019	1.134	0.0040	1.014	0.0035	1.000	0.0009	0.992	0.0004
52	1.196	0.0014	1.1802	0.0019	1.169	0.0020	1.130	0.0047	1.012	0.0033	0.999	0.0009	0.992	0.0004
53	1.196	0.0014	1.18	0.0020	1.168	0.0022	1.124	0.0054	1.010	0.0030	0.999	0.0009	0.992	0.0004
54	1.196	0.0013	1.1796	0.0022	1.168	0.0022	1.119	0.0054	1.009	0.0027	0.999	0.0009	0.992	0.0004
55	1.196	0.0013	1.1794	0.0018	1.167	0.0024	1.116	0.0049	1.008	0.0024	0.998	0.0007	0.992	0.0006
56	1.195	0.0012	1.179	0.0019	1.167	0.0026	1.114	0.0046	1.007	0.0021	0.998	0.0007	0.992	0.0007
57	1.195	0.0012	1.179	0.0014	1.166	0.0028	1.110	0.0051	1.007	0.0021	0.998	0.0008	0.992	0.0007
58	1.195	0.0013	1.1788	0.0015	1.166	0.0030	1.104	0.0059	1.006	0.0019	0.998	0.0009	0.992	0.0006
59	1.194	0.0013	1.1784	0.0011	1.165	0.0031	1.098	0.0058	1.006	0.0019	0.998	0.0009	0.992	0.0007
60	1.194	0.0013	1.1782	0.0008	1.164	0.0029	1.095	0.0050	1.005	0.0018	0.998	0.0009	0.992	0.0006

61	1.193	0.0013	1.1774	0.0011	1.162	0.0027	1.094	0.0049	1.005	0.0017	0.998	0.0008	0.992	0.0006
62	1.193	0.0012	1.1766	0.0011	1.161	0.0037	1.094	0.0050	1.004	0.0017	0.998	0.0008	0.992	0.0006
63	1.193	0.0012	1.176	0.0014	1.160	0.0052	1.091	0.0051	1.003	0.0016	0.997	0.0007	0.992	0.0006
64	1.192	0.0012	1.1752	0.0016	1.159	0.0048	1.085	0.0051	1.003	0.0015	0.997	0.0006	0.992	0.0006
65	1.192	0.0012	1.1752	0.0016	1.158	0.0036	1.081	0.0048	1.002	0.0013	0.997	0.0007	0.992	0.0006
66	1.192	0.0012	1.1748	0.0013	1.158	0.0020	1.078	0.0048	1.001	0.0012	0.997	0.0007	0.992	0.0013
67	1.192	0.0013	1.1748	0.0013	1.158	0.0013	1.078	0.0050	1.001	0.0011	0.996	0.0007	0.992	0.0016
68	1.192	0.0013	1.175	0.0016	1.159	0.0024	1.077	0.0048	1.001	0.0010	0.996	0.0007	0.991	0.0020
69	1.192	0.0012	1.1752	0.0016	1.160	0.0031	1.075	0.0049	1.000	0.0010	0.996	0.0006	0.991	0.0020
70	1.192	0.0013	1.1756	0.0021	1.161	0.0042	1.071	0.0047	1.000	0.0010	0.996	0.0006	0.992	0.0016
71	1.192	0.0013	1.1748	0.0019	1.161	0.0047	1.069	0.0044	1.000	0.0009	0.996	0.0006	0.992	0.0016
72	1.192	0.0013	1.174	0.0019	1.160	0.0055	1.069	0.0042	1.000	0.0007	0.996	0.0005	0.992	0.0013
73	1.191	0.0013	1.1732	0.0015	1.159	0.0062	1.070	0.0041	0.999	0.0007	0.996	0.0005	0.992	0.0009
74	1.191	0.0013	1.1724	0.0011	1.159	0.0066	1.070	0.0040	0.999	0.0007	0.996	0.0005	0.992	0.0006
75	1.191	0.0012	1.1726	0.0011	1.160	0.0070	1.067	0.0040	0.999	0.0007	0.996	0.0004	0.992	0.0006

Large Tank Simulant Test Density Data

ALL DENSITY DATA WAS COLLECTED AFTER STEADY STATE HAS BEEN ACHIEVED IN THE TANK

Cycle Time (sec)	Densities @ 0.732 m (30.5 in) Radial Position at Elevation as Measured from the Tank Center													
	0.686 m	0.686 m	0.838 m	0.838 m	0.991 m	0.991 m	1.143 m	1.143 m	1.295 m	1.295 m	1.448 m	1.448 m	1.600 m	1.600 m
	27-in	27-in	33-in	33-in	39-in	39-in	45-in	45-in	51-in	51-in	57-in	57-in	63-in	63-in
	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev
	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³
1	1.199	0.0013	1.183	0.0014	1.150	0.0172	1.048	0.0076	0.999	0.0006	0.996	0.0005	0.999	0.0022
2	1.199	0.0012	1.183	0.0014	1.150	0.0168	1.045	0.0072	0.999	0.0007	0.996	0.0005	0.999	0.0022
3	1.199	0.0014	1.183	0.0016	1.150	0.0165	1.044	0.0067	1.000	0.0010	0.996	0.0002	0.999	0.0021
4	1.201	0.0013	1.184	0.0018	1.152	0.0167	1.045	0.0065	1.001	0.0017	0.996	0.0006	0.999	0.0024
5	1.206	0.0019	1.188	0.0024	1.156	0.0175	1.050	0.0061	1.004	0.0037	0.997	0.0014	0.999	0.0028
6	1.213	0.0021	1.195	0.0033	1.163	0.0191	1.058	0.0064	1.010	0.0064	0.999	0.0028	1.000	0.0036
7	1.222	0.0023	1.204	0.0035	1.171	0.0210	1.068	0.0067	1.019	0.0086	1.001	0.0041	1.000	0.0044
8	1.229	0.0022	1.213	0.0032	1.179	0.0217	1.080	0.0053	1.031	0.0104	1.006	0.0055	1.001	0.0052
9	1.236	0.0022	1.220	0.0030	1.186	0.0216	1.092	0.0072	1.045	0.0113	1.013	0.0075	1.000	0.0052
10	1.240	0.0021	1.226	0.0032	1.191	0.0208	1.105	0.0116	1.061	0.0117	1.023	0.0095	1.001	0.0047
11	1.242	0.0027	1.229	0.0037	1.194	0.0195	1.119	0.0175	1.076	0.0115	1.035	0.0110	1.001	0.0037
12	1.242	0.0031	1.229	0.0044	1.195	0.0185	1.132	0.0204	1.090	0.0110	1.047	0.0125	1.001	0.0031
13	1.240	0.0036	1.228	0.0047	1.195	0.0173	1.142	0.0215	1.104	0.0101	1.057	0.0134	1.002	0.0029
14	1.238	0.0041	1.226	0.0048	1.195	0.0162	1.149	0.0216	1.115	0.0092	1.065	0.0127	1.004	0.0027
15	1.234	0.0044	1.223	0.0048	1.195	0.0146	1.154	0.0204	1.125	0.0083	1.071	0.0114	1.006	0.0042
16	1.231	0.0046	1.221	0.0046	1.195	0.0127	1.159	0.0187	1.133	0.0070	1.077	0.0101	1.007	0.0050
17	1.229	0.0044	1.219	0.0045	1.195	0.0114	1.163	0.0174	1.139	0.0063	1.082	0.0091	1.007	0.0050
18	1.226	0.0044	1.217	0.0044	1.194	0.0101	1.168	0.0151	1.143	0.0056	1.083	0.0084	1.006	0.0047
19	1.224	0.0045	1.214	0.0048	1.193	0.0089	1.170	0.0129	1.146	0.0050	1.080	0.0075	1.005	0.0038
20	1.222	0.0049	1.212	0.0045	1.192	0.0078	1.172	0.0100	1.148	0.0044	1.076	0.0063	1.004	0.0031
21	1.220	0.0051	1.209	0.0043	1.191	0.0072	1.172	0.0074	1.148	0.0040	1.071	0.0059	1.004	0.0027
22	1.218	0.0047	1.207	0.0041	1.190	0.0069	1.173	0.0058	1.148	0.0039	1.067	0.0066	1.003	0.0023
23	1.216	0.0041	1.206	0.0037	1.190	0.0071	1.173	0.0043	1.148	0.0041	1.061	0.0072	1.002	0.0019
24	1.215	0.0039	1.205	0.0034	1.189	0.0072	1.173	0.0039	1.147	0.0047	1.056	0.0074	1.002	0.0013
25	1.213	0.0036	1.205	0.0033	1.189	0.0073	1.173	0.0043	1.145	0.0053	1.050	0.0073	1.002	0.0010

26	1.213	0.0036	1.204	0.0028	1.188	0.0075	1.172	0.0050	1.143	0.0056	1.043	0.0069	1.001	0.0013
27	1.212	0.0037	1.204	0.0028	1.187	0.0076	1.172	0.0051	1.141	0.0053	1.037	0.0066	1.001	0.0017
28	1.211	0.0035	1.203	0.0025	1.186	0.0075	1.172	0.0047	1.138	0.0048	1.031	0.0065	1.001	0.0015
29	1.211	0.0037	1.202	0.0023	1.185	0.0072	1.172	0.0036	1.135	0.0047	1.025	0.0063	1.001	0.0016
30	1.210	0.0036	1.200	0.0022	1.183	0.0070	1.171	0.0030	1.132	0.0058	1.019	0.0055	1.000	0.0015
31	1.209	0.0037	1.199	0.0019	1.182	0.0070	1.169	0.0024	1.127	0.0073	1.014	0.0048	1.000	0.0015
32	1.208	0.0038	1.198	0.0020	1.180	0.0069	1.167	0.0026	1.122	0.0090	1.010	0.0040	0.999	0.0010
33	1.207	0.0039	1.196	0.0019	1.179	0.0070	1.166	0.0030	1.115	0.0101	1.007	0.0033	0.999	0.0010
34	1.206	0.0038	1.195	0.0018	1.178	0.0077	1.165	0.0030	1.106	0.0113	1.005	0.0028	0.999	0.0010
35	1.205	0.0037	1.194	0.0017	1.177	0.0094	1.164	0.0027	1.096	0.0121	1.003	0.0023	0.999	0.0008
36	1.204	0.0036	1.194	0.0015	1.176	0.0108	1.163	0.0024	1.086	0.0125	1.002	0.0020	0.999	0.0008
37	1.204	0.0036	1.193	0.0015	1.176	0.0121	1.163	0.0022	1.077	0.0125	1.001	0.0017	0.999	0.0008
38	1.203	0.0034	1.193	0.0013	1.176	0.0130	1.162	0.0024	1.067	0.0121	1.000	0.0014	0.999	0.0008
39	1.203	0.0034	1.193	0.0012	1.176	0.0137	1.163	0.0025	1.059	0.0113	0.999	0.0013	0.999	0.0008
40	1.203	0.0033	1.193	0.0013	1.175	0.0144	1.163	0.0030	1.050	0.0103	0.999	0.0012	0.998	0.0010
41	1.202	0.0031	1.193	0.0015	1.175	0.0151	1.163	0.0046	1.043	0.0095	0.998	0.0010	0.998	0.0008
42	1.202	0.0030	1.193	0.0016	1.174	0.0157	1.161	0.0059	1.036	0.0084	0.998	0.0009	0.998	0.0008
43	1.202	0.0030	1.192	0.0016	1.174	0.0161	1.159	0.0073	1.031	0.0073	0.997	0.0008	0.998	0.0006
44	1.202	0.0028	1.192	0.0017	1.173	0.0166	1.157	0.0078	1.026	0.0063	0.997	0.0008	0.998	0.0006
45	1.202	0.0027	1.192	0.0016	1.173	0.0171	1.155	0.0078	1.022	0.0056	0.997	0.0007	0.998	0.0006
46	1.202	0.0025	1.192	0.0016	1.172	0.0174	1.151	0.0077	1.018	0.0048	0.997	0.0007	0.998	0.0006
47	1.202	0.0024	1.192	0.0017	1.171	0.0174	1.145	0.0098	1.016	0.0042	0.997	0.0006	0.998	0.0008
48	1.201	0.0026	1.192	0.0016	1.170	0.0176	1.139	0.0118	1.013	0.0038	0.997	0.0006	0.998	0.0008
49	1.201	0.0028	1.191	0.0015	1.169	0.0179	1.135	0.0133	1.011	0.0034	0.996	0.0005	0.998	0.0008
50	1.201	0.0032	1.191	0.0016	1.168	0.0181	1.130	0.0150	1.010	0.0031	0.996	0.0005	0.998	0.0008
51	1.200	0.0033	1.190	0.0015	1.166	0.0184	1.125	0.0187	1.009	0.0029	0.996	0.0005	0.998	0.0008
52	1.199	0.0038	1.189	0.0014	1.164	0.0184	1.120	0.0215	1.009	0.0029	0.996	0.0004	0.998	0.0008
53	1.199	0.0041	1.188	0.0013	1.162	0.0184	1.113	0.0238	1.009	0.0029	0.996	0.0004	0.998	0.0008
54	1.198	0.0044	1.187	0.0016	1.160	0.0180	1.107	0.0253	1.009	0.0028	0.996	0.0003	0.998	0.0008
55	1.198	0.0047	1.186	0.0017	1.158	0.0177	1.104	0.0253	1.009	0.0028	0.996	0.0002	0.998	0.0008
56	1.198	0.0047	1.185	0.0018	1.156	0.0174	1.102	0.0237	1.008	0.0026	0.996	0.0004	0.998	0.0008
57	1.198	0.0046	1.185	0.0019	1.154	0.0176	1.101	0.0217	1.008	0.0025	0.996	0.0004	0.998	0.0008
58	1.198	0.0047	1.184	0.0015	1.151	0.0179	1.097	0.0204	1.007	0.0024	0.996	0.0004	0.998	0.0008
59	1.198	0.0049	1.183	0.0014	1.149	0.0184	1.092	0.0191	1.006	0.0021	0.996	0.0005	0.998	0.0008
60	1.198	0.0051	1.183	0.0013	1.148	0.0190	1.087	0.0180	1.005	0.0020	0.996	0.0005	0.998	0.0005

61	1.198	0.0051	1.183	0.0015	1.148	0.0198	1.083	0.0165	1.004	0.0018	0.996	0.0004	0.998	0.0005
62	1.198	0.0050	1.184	0.0015	1.147	0.0202	1.081	0.0141	1.003	0.0017	0.996	0.0005	0.998	0.0005
63	1.198	0.0049	1.184	0.0016	1.147	0.0205	1.077	0.0123	1.002	0.0014	0.996	0.0005	0.998	0.0005
64	1.198	0.0047	1.184	0.0014	1.146	0.0206	1.073	0.0107	1.002	0.0013	0.996	0.0005	0.998	0.0005
65	1.198	0.0045	1.184	0.0012	1.146	0.0207	1.068	0.0105	1.001	0.0012	0.996	0.0005	0.998	0.0005
66	1.198	0.0044	1.184	0.0010	1.146	0.0212	1.065	0.0109	1.000	0.0010	0.996	0.0005	0.998	0.0005
67	1.198	0.0043	1.184	0.0009	1.147	0.0212	1.064	0.0109	1.000	0.0008	0.996	0.0005	0.998	0.0005
68	1.198	0.0043	1.184	0.0010	1.147	0.0213	1.063	0.0111	0.999	0.0008	0.996	0.0005	0.998	0.0005
69	1.198	0.0046	1.184	0.0012	1.147	0.0216	1.061	0.0107	0.999	0.0007	0.995	0.0005	0.998	0.0005
70	1.198	0.0045	1.183	0.0014	1.147	0.0218	1.056	0.0100	0.999	0.0007	0.995	0.0005	0.998	0.0005
71	1.198	0.0047	1.183	0.0012	1.147	0.0220	1.053	0.0094	0.999	0.0007	0.995	0.0005	0.998	0.0005
72	1.198	0.0048	1.183	0.0014	1.147	0.0223	1.052	0.0095	0.999	0.0006	0.995	0.0005	0.998	0.0005
73	1.198	0.0047	1.183	0.0014	1.146	0.0224	1.053	0.0093	0.999	0.0006	0.995	0.0005	0.998	0.0005
74	1.198	0.0048	1.183	0.0016	1.146	0.0225	1.052	0.0091	0.999	0.0005	0.995	0.0005	0.998	0.0005
75	1.197	0.0048	1.183	0.0013	1.145	0.0225	1.050	0.0088	0.999	0.0006	0.996	0.0005	0.998	0.0005

Large Tank Simulant Test Density Data, contd

ALL DENSITY DATA WAS COLLECTED AFTER STEADY STATE HAS BEEN ACHIEVED IN THE TANK														
Cycle Time (sec)	Densities @ 1.077 m (42.5 in) Radial Position at Elevation as Measured from the Tank Center													
	0.686 m	0.686 m	0.838 m	0.838 m	0.991 m	0.991 m	1.143 m	1.143 m	1.295 m	1.295 m	1.448 m	1.448 m	1.600 m	1.600 m
	27-in	27-in	33-in	33-in	39-in	39-in	45-in	45-in	51-in	51-in	57-in	57-in	63-in	63-in
	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev	Density	StdDev
	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³	g/cm ³
1	1.206	0.0093	1.180	0.0507	1.165	0.0110	1.120	0.0070	1.010	0.0033	0.998	0.0005	0.994	0.0004
2	1.212	0.0098	1.184	0.0528	1.171	0.0105	1.133	0.0074	1.015	0.0050	0.999	0.0007	0.994	0.0004
3	1.217	0.0098	1.191	0.0562	1.178	0.0099	1.146	0.0074	1.023	0.0072	1.000	0.0018	0.995	0.0005
4	1.221	0.0094	1.197	0.0589	1.185	0.0091	1.156	0.0070	1.034	0.0095	1.004	0.0031	0.995	0.0005
5	1.224	0.0087	1.204	0.0604	1.191	0.0081	1.165	0.0070	1.047	0.0112	1.008	0.0045	0.995	0.0004
6	1.226	0.0082	1.208	0.0612	1.195	0.0078	1.172	0.0073	1.061	0.0127	1.013	0.0055	0.995	0.0004
7	1.226	0.0078	1.211	0.0621	1.198	0.0080	1.179	0.0078	1.076	0.0138	1.020	0.0064	0.996	0.0008
8	1.226	0.0074	1.213	0.0619	1.199	0.0081	1.183	0.0075	1.091	0.0146	1.029	0.0078	0.996	0.0013
9	1.225	0.0072	1.213	0.0603	1.200	0.0081	1.186	0.0069	1.106	0.0149	1.039	0.0091	0.998	0.0019
10	1.223	0.0069	1.212	0.0570	1.201	0.0076	1.188	0.0062	1.118	0.0148	1.050	0.0094	0.998	0.0022
11	1.221	0.0065	1.211	0.0538	1.202	0.0070	1.188	0.0057	1.128	0.0144	1.060	0.0093	0.998	0.0021
12	1.219	0.0062	1.210	0.0513	1.202	0.0063	1.187	0.0051	1.136	0.0137	1.066	0.0086	0.998	0.0023
13	1.217	0.0059	1.208	0.0490	1.201	0.0058	1.186	0.0044	1.142	0.0130	1.070	0.0081	0.998	0.0023
14	1.215	0.0059	1.206	0.0466	1.200	0.0052	1.185	0.0039	1.145	0.0124	1.073	0.0072	0.998	0.0031
15	1.214	0.0057	1.205	0.0436	1.199	0.0051	1.184	0.0035	1.147	0.0122	1.075	0.0065	0.998	0.0044
16	1.213	0.0057	1.204	0.0390	1.198	0.0057	1.184	0.0033	1.146	0.0124	1.074	0.0060	0.999	0.0047
17	1.212	0.0056	1.203	0.0351	1.196	0.0066	1.183	0.0034	1.145	0.0127	1.072	0.0058	0.999	0.0048
18	1.211	0.0054	1.202	0.0325	1.195	0.0072	1.182	0.0034	1.143	0.0128	1.069	0.0057	0.998	0.0044
19	1.211	0.0051	1.201	0.0309	1.194	0.0076	1.181	0.0032	1.141	0.0128	1.065	0.0059	0.997	0.0037
20	1.210	0.0049	1.201	0.0293	1.194	0.0080	1.179	0.0034	1.139	0.0128	1.061	0.0064	0.997	0.0028
21	1.210	0.0047	1.200	0.0294	1.193	0.0083	1.176	0.0033	1.137	0.0127	1.056	0.0067	0.996	0.0021
22	1.209	0.0046	1.200	0.0300	1.191	0.0083	1.173	0.0034	1.135	0.0126	1.051	0.0072	0.996	0.0017
23	1.208	0.0044	1.199	0.0306	1.189	0.0084	1.172	0.0035	1.133	0.0124	1.044	0.0073	0.996	0.0013
24	1.207	0.0044	1.199	0.0309	1.186	0.0084	1.170	0.0033	1.132	0.0121	1.037	0.0069	0.995	0.0011
25	1.205	0.0044	1.198	0.0312	1.184	0.0081	1.170	0.0027	1.131	0.0126	1.031	0.0063	0.995	0.0008

26	1.204	0.0046	1.196	0.0313	1.182	0.0078	1.170	0.0023	1.128	0.0136	1.025	0.0057	0.995	0.0009
27	1.203	0.0048	1.195	0.0319	1.181	0.0076	1.169	0.0020	1.123	0.0151	1.020	0.0050	0.994	0.0005
28	1.202	0.0050	1.193	0.0326	1.180	0.0079	1.169	0.0020	1.116	0.0168	1.015	0.0042	0.994	0.0005
29	1.201	0.0052	1.192	0.0334	1.179	0.0084	1.170	0.0021	1.105	0.0176	1.011	0.0035	0.994	0.0005
30	1.200	0.0055	1.190	0.0340	1.179	0.0094	1.170	0.0021	1.094	0.0175	1.008	0.0028	0.994	0.0005
31	1.200	0.0057	1.189	0.0345	1.178	0.0104	1.170	0.0022	1.083	0.0169	1.006	0.0022	0.994	0.0005
32	1.200	0.0058	1.189	0.0347	1.178	0.0117	1.170	0.0022	1.073	0.0160	1.004	0.0018	0.994	0.0004
33	1.199	0.0060	1.188	0.0350	1.178	0.0127	1.170	0.0023	1.064	0.0147	1.002	0.0015	0.994	0.0007
34	1.199	0.0062	1.188	0.0354	1.178	0.0136	1.169	0.0026	1.055	0.0133	1.001	0.0012	0.994	0.0007
35	1.199	0.0065	1.188	0.0355	1.178	0.0148	1.168	0.0028	1.046	0.0115	1.001	0.0011	0.994	0.0007
36	1.199	0.0068	1.187	0.0356	1.178	0.0157	1.166	0.0031	1.038	0.0099	1.000	0.0009	0.994	0.0004
37	1.199	0.0071	1.187	0.0360	1.178	0.0164	1.163	0.0031	1.032	0.0085	0.999	0.0008	0.994	0.0007
38	1.199	0.0074	1.187	0.0360	1.177	0.0172	1.160	0.0032	1.027	0.0073	0.999	0.0006	0.994	0.0007
39	1.198	0.0076	1.187	0.0363	1.176	0.0180	1.157	0.0039	1.023	0.0063	0.999	0.0006	0.994	0.0008
40	1.198	0.0078	1.187	0.0364	1.175	0.0185	1.153	0.0046	1.019	0.0056	0.999	0.0006	0.994	0.0008
41	1.197	0.0081	1.187	0.0363	1.174	0.0188	1.150	0.0050	1.017	0.0049	0.998	0.0005	0.994	0.0008
42	1.197	0.0083	1.186	0.0364	1.173	0.0192	1.145	0.0054	1.015	0.0045	0.998	0.0004	0.994	0.0008
43	1.196	0.0086	1.185	0.0367	1.171	0.0196	1.140	0.0054	1.013	0.0042	0.998	0.0004	0.994	0.0008
44	1.196	0.0090	1.184	0.0377	1.170	0.0204	1.135	0.0047	1.012	0.0040	0.998	0.0006	0.994	0.0008
45	1.195	0.0092	1.183	0.0399	1.168	0.0210	1.130	0.0044	1.011	0.0038	0.998	0.0010	0.994	0.0008
46	1.195	0.0095	1.182	0.0413	1.166	0.0215	1.125	0.0046	1.010	0.0039	0.998	0.0014	0.994	0.0008
47	1.194	0.0098	1.181	0.0427	1.163	0.0216	1.121	0.0049	1.010	0.0040	0.998	0.0015	0.994	0.0008
48	1.194	0.0100	1.180	0.0438	1.161	0.0215	1.117	0.0049	1.011	0.0042	0.998	0.0014	0.994	0.0008
49	1.193	0.0101	1.179	0.0449	1.159	0.0214	1.113	0.0050	1.012	0.0046	0.998	0.0012	0.994	0.0005
50	1.193	0.0101	1.177	0.0457	1.157	0.0217	1.108	0.0050	1.013	0.0047	0.999	0.0013	0.994	0.0005
51	1.192	0.0102	1.176	0.0466	1.155	0.0218	1.102	0.0053	1.014	0.0047	0.999	0.0016	0.994	0.0005
52	1.192	0.0102	1.175	0.0474	1.154	0.0224	1.096	0.0055	1.014	0.0044	0.999	0.0023	0.994	0.0005
53	1.192	0.0104	1.175	0.0487	1.153	0.0229	1.092	0.0056	1.013	0.0041	0.999	0.0029	0.994	0.0005
54	1.192	0.0105	1.174	0.0496	1.152	0.0236	1.089	0.0056	1.012	0.0037	0.999	0.0034	0.993	0.0005
55	1.192	0.0106	1.174	0.0501	1.152	0.0242	1.086	0.0057	1.010	0.0033	0.999	0.0039	0.993	0.0005
56	1.192	0.0106	1.173	0.0513	1.151	0.0247	1.084	0.0059	1.009	0.0030	0.999	0.0042	0.993	0.0005
57	1.192	0.0106	1.173	0.0529	1.151	0.0250	1.082	0.0059	1.008	0.0028	0.999	0.0045	0.993	0.0005
58	1.192	0.0107	1.173	0.0540	1.151	0.0252	1.081	0.0058	1.007	0.0026	0.999	0.0047	0.993	0.0005
59	1.192	0.0108	1.173	0.0538	1.151	0.0253	1.078	0.0058	1.006	0.0023	0.999	0.0048	0.993	0.0005
60	1.192	0.0111	1.173	0.0535	1.151	0.0258	1.074	0.0056	1.005	0.0021	0.999	0.0050	0.993	0.0005

61	1.192	0.0118	1.173	0.0530	1.151	0.0265	1.070	0.0057	1.005	0.0019	0.999	0.0050	0.994	0.0005
62	1.192	0.0126	1.173	0.0528	1.151	0.0272	1.067	0.0059	1.004	0.0018	0.999	0.0051	0.994	0.0005
63	1.191	0.0132	1.173	0.0525	1.151	0.0276	1.066	0.0058	1.004	0.0015	0.999	0.0053	0.994	0.0005
64	1.191	0.0133	1.173	0.0522	1.151	0.0279	1.066	0.0056	1.003	0.0014	0.999	0.0054	0.994	0.0005
65	1.191	0.0131	1.173	0.0515	1.151	0.0280	1.066	0.0056	1.003	0.0013	0.999	0.0055	0.994	0.0005
66	1.191	0.0129	1.173	0.0510	1.151	0.0280	1.065	0.0056	1.003	0.0012	0.999	0.0056	0.994	0.0005
67	1.191	0.0127	1.174	0.0505	1.150	0.0280	1.063	0.0055	1.002	0.0012	0.999	0.0058	0.994	0.0005
68	1.191	0.0125	1.174	0.0502	1.150	0.0282	1.060	0.0052	1.002	0.0012	0.999	0.0059	0.994	0.0005
69	1.191	0.0122	1.174	0.0497	1.148	0.0288	1.058	0.0049	1.002	0.0011	0.999	0.0059	0.994	0.0005
70	1.191	0.0118	1.174	0.0493	1.147	0.0291	1.060	0.0047	1.002	0.0011	0.999	0.0059	0.994	0.0005

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