Bonneville Dam Second Powerhouse
Gatewell Velocity and Pressure Measurements
Data Collection Report

Revision 02

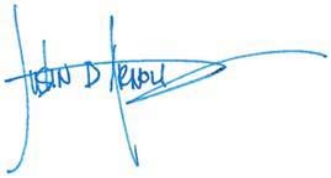
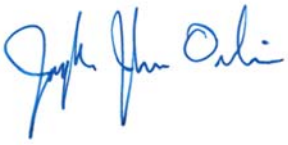
Alden Document No.: 7214NWP052

Prepared for:

US Army Corps of Engineers, Portland District

Contract No.: W9127N18D0002
Task Order No.: W9127N21F0004

December 2022

Signature Block			
Prepared By:	Justin D. Arnold, PE Principal Engineer Alden		21 December 2022
Reviewed By:	Joseph J. Orlins, PE, Ph.D. Associate Vice President AECOM		28 November 2022
Reviewed By:	Daniel Gessler, PE, Ph.D. Vice President Alden	 Digitally signed by Dan Gessler Date: 2022.12.21 16:48:17 -07'00'	21 December 2022

Record of Revisions

Revision No.	Revision Date	Change Description	Reason for Change
0	10/21/2022	Initial Issue	
1	12/06/2022	Editorial Revisions	USACE Comments
2	12/21/2022	Clarification of screen approach velocity criterion	USACE Comment

Table of Contents

List of Appendices

List of Tables

List of Figures

List of Photos

Executive Summary

The purpose of this project was to collect velocity and pressure data at the Bonneville Dam second powerhouse to facilitate the evaluation of hydraulic conditions with flow control corbels installed in Slots A and B of Unit 15 relative to previous gatewell configurations. This was accomplished by measuring dynamic pressure fluctuations at the exit of Gatewell Slots 14A (no flow control corbel) and 15A (prototype flow control corbel), and by measuring flow velocities upstream of the vertical barrier screens (VBSs) in all gatewell slots of Unit 15 for unit flows of 15 kcfs and 18 kcfs.

The field program was conducted between May 16 and June 10, 2022. Pressure measurements were made at three lateral positions within the test gatewell slots for turbine start-up, shut-down, and steady-state operation using submersible pressure transducers. Three-dimensional velocity measurements were made 0.65 feet upstream of the VBS face using four Nortek Vectrino Acoustic Doppler Velocimeters (ADVs) deployed from a traversing beam assembly. The velocity measurement grid included 16 equally spaced positions over the VBS width at one-foot intervals between elevations 34 and 56 and at two-foot intervals between elevations 56 and 72 (ft, NAVD88).

The pressure data required minimal post-processing. The velocity data were post-processed to remove outliers which can result from a variety of sources. Results are presented graphically in the body of the report, and velocity data are tabulated Appendix B.

The dynamic pressure signals were similar between the two test gatewell slots, with characteristic signatures produced by the governor on the turbine units and one- to two-minute fluctuation periods dictated by variations in the forebay water level. The flow control corbel in Gatewell Slot 15A resulted in a decrease in gatewell discharge, a smaller change in hydraulic grade line (HGL) between operational and non-operational states of the unit, and marginally larger high-frequency pressure fluctuations at the gatewell exit, relative to the unmodified gatewell beam in Gatewell Slot 14A.

The general flow patterns were similar in all gatewell slots tested and were largely independent of unit discharge. The largest screen approach velocity component magnitudes were measured at the lowest measurement elevations and typically near the north-south extents of the VBSs. The sweeping velocity magnitudes were also largest at the lower measurement elevations and over the north-central region of the VBSs. A counterclockwise circulation cell formed in all gatewell slots, centered near the top of the VBSs, south of the gatewell centerline. Flow recirculation was also evident at the north-south extremes of the velocity measurement grid. Flow turbulence, characterized by the root-mean-square (RMS) of the total velocity magnitude was similar between Slots A and B and somewhat lower in Slot C, due to an apparent decrease in flow circulation intensity. The largest RMS values typically occurred at the lowest measurement elevations at the north and south extents of the gatewells and within regions of flow circulation.

A comparison of the results from the 2022 and 2015 test programs suggests that the flow control corbels may have altered the flow split between gatewell slots relative to the flow control plates evaluated in 2015. The comparative data also indicate that the gatewell flow patterns, and perhaps flow splits between gatewell slots, are sensitive to the circulation patterns within the forebay. As such, the increase in screen approach velocity components observed in 2022 may be driven by the change in gatewell beam configuration, differences in unit operations and forebay flow patterns between test years, or a combination of both. More detailed conclusions and recommendations are presented in Section 5.0.

1.0 Introduction

The data collection program discussed in this report was authorized by the United States Army Corps of Engineers (USACE), Portland District (CENWP) under Contract Number W9127N18D0002, Task Order Number W9128N21F0004, B2 FGE Gatewell Velocity and Pressure Measurements.

The purpose of this data collection report (DCR) is to provide documentation of the means and methods employed during the data collection field program as well as post processing of the data. Data collection findings are summarized in Section 3.0 and a brief discussion and quantitative comparison of the current data set with previously collected data are included in Section 4.0. The analysis and observations presented are intended to facilitate further evaluation by CENWP.

1.1 Site Description

Bonneville Dam is located on the Columbia River, at River Mile 146, between Oregon & Washington State (Figure 1-1). The dam was originally constructed in 1938 and is currently operated by CENWP.

The dam is a run-of-river project spanning across the Columbia River between Robins Island, Bradford Island, and Cascades Island. Bonneville Dam consists of two powerhouses (B1 & B2), a spillway, and a navigation lock (Figure 1-2).

This project focused on the vertical barrier screens (VBSs) at the Second Powerhouse located between Cascades Island and the Washington shore. The Second Powerhouse (B2) consists of turbine unit numbers 11 through 18 (Figure 1-3). Each turbine unit includes three gatewell slots, A, B, and C, with the A slot on the south (Oregon) side and the C slot on the north (Washington) side. VBS locations are referenced by unit number and slot designation. For example, Gatewell 14A describes the A-slot of Unit 14.

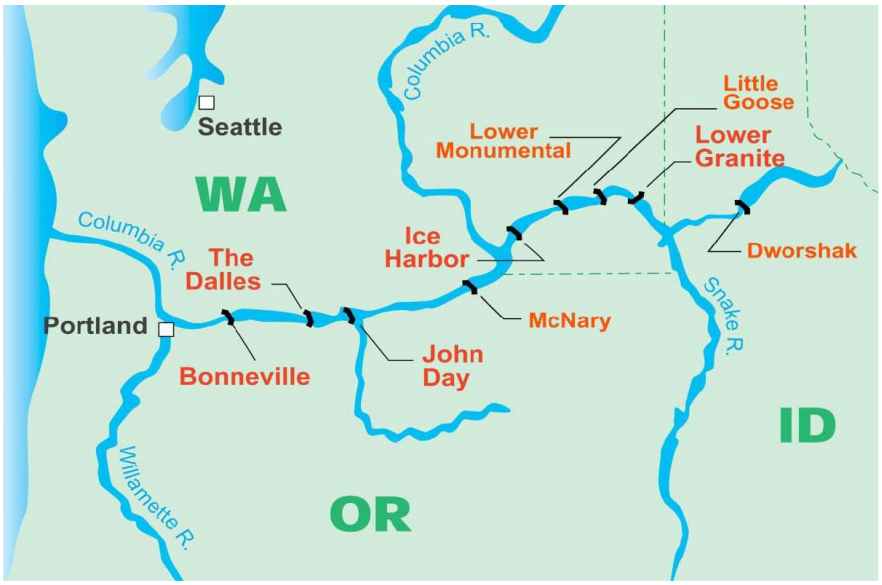


Figure 1-1 Vicinity Map

Figure 1-2 Location Map, Bonneville Dam

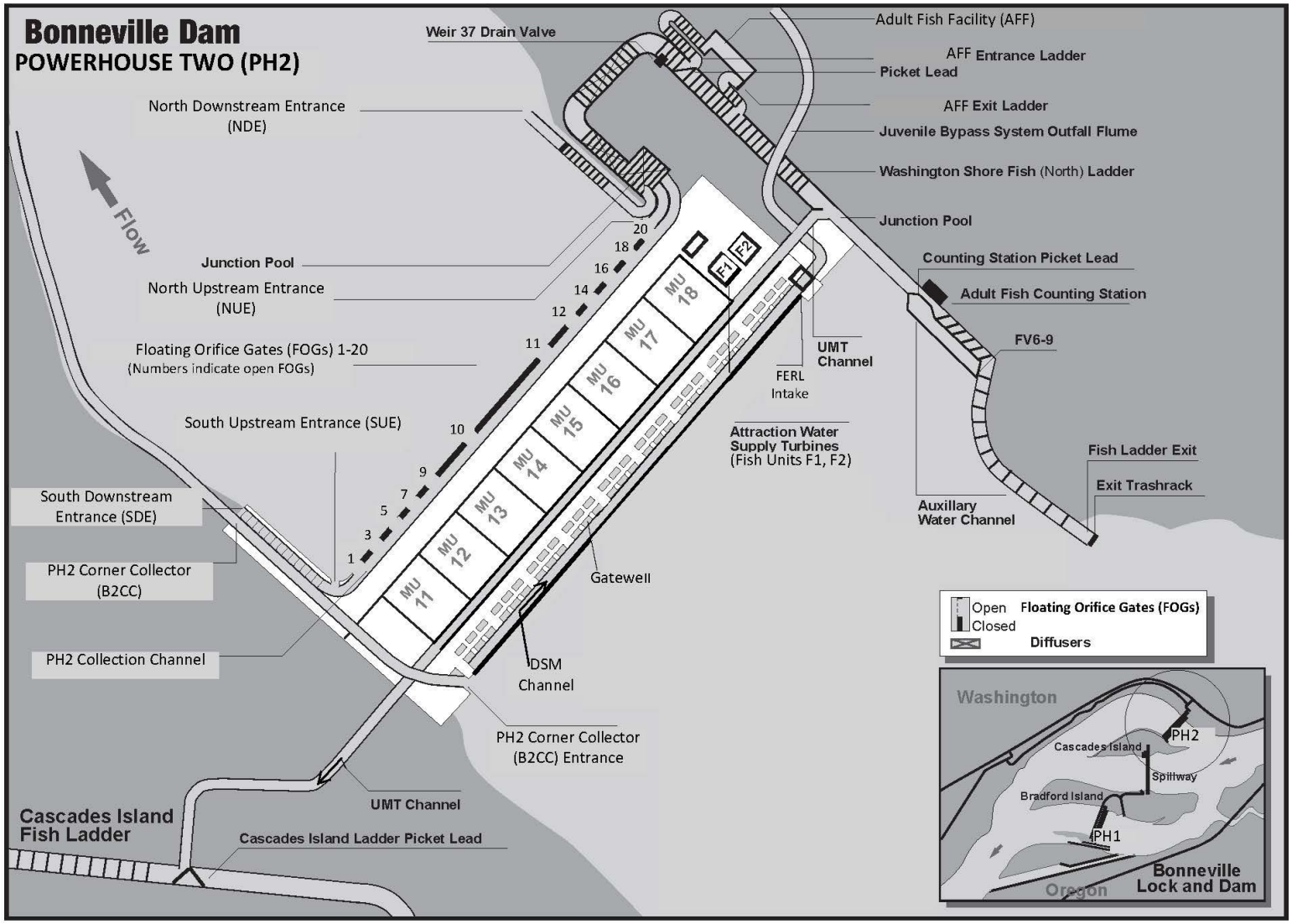


Figure 1-3 Bonneville Dam Powerhouse Two (from USACE)

1.2 Background

The juvenile bypass system (JBS) at B2 was designed to guide out-migrating salmonids away from the hydroelectric turbines and around the dam. The JBS operates by diverting flow upwards into a vertical gatewell at each turbine intake, aided by a turning vane positioned near the gatewell beam. Submerged traveling screens (STSs) guide fish into the gatewells; vertical barrier screens (VBSs) prevent fish within the gatewells from returning to the turbine intakes; and submerged orifices provide a pathway for fish to enter the downstream migrant (DSM) channel which leads to the project tailrace. These features are shown in Figure 1-4 and Figure 1-5.

Juvenile fish screen criteria have been developed by NOAA's National Marine Fisheries Service (NMFS) (NMFS, 2022) for guidance when designing and evaluating fish screening structures. Per the criteria specific to vertical barrier screens, the average velocity through the VBSs should not exceed 1 fps. Based on criteria developed for other types of exclusion screens, an even distribution of flow through the VBS is required to prevent impingement of juvenile fish on the screens prior to entering the DSM channel and the sweeping velocity parallel to the screen face must be adequate to transport fish past the screen without delay. In general, the sweeping velocity should be larger than the design approach velocity and spatial variations in screen approach velocity should be less than 10% of the design approach velocity.

Since installation of the JBS, several studies have been conducted to evaluate and improve the hydraulic conditions within the gatewells relevant to fish passage. The design of modifications to the system were developed using Computational Fluid Dynamics (CFD) modeling and gatewell velocity measurements conducted by PNNL (2011) and Harbor/Alden (2013). Based on these studies and additional gatewell velocity measurement programs (Harbor/Alden 2014; Harbor/Alden 2015), flow control plates and modified VBSs were installed in the gatewells of all units at B2 to improve the hydraulic and fish passage conditions via reduction in flow and turbulence intensities.

Routine inspections have since revealed a structural failure of the anchor bolts used to secure the flow control plates, likely due to vibration. In response to concerns that the connection of the plates could fail and result in the plates being drawn into the turbine units, an alternative design was developed which entails replacement of the plates with cast-in-place concrete flow control corbels, shown in Figure 1-6 and Figure 1-7, meant to provide the benefits of the flow control plates with a mitigated risk for connection failure.

1.3 Study Objectives

Prototypes of the flow control corbels were constructed in Slots A and B of Unit 15. The objectives of this study were to collect velocity and pressure data with the corbel in place and collect baseline pressure data in Slot A of Unit 14, which did not include a corbel or flow control plate.

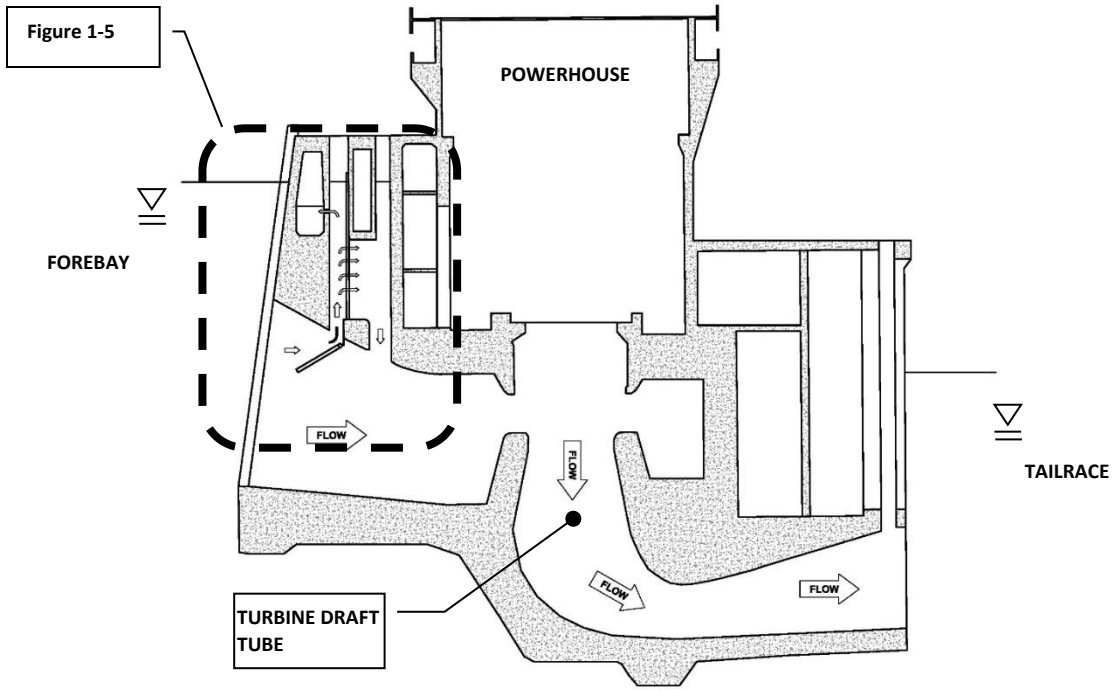


Figure 1-4 Cross Section of Bonneville Dam Second Powerhouse (from USACE)

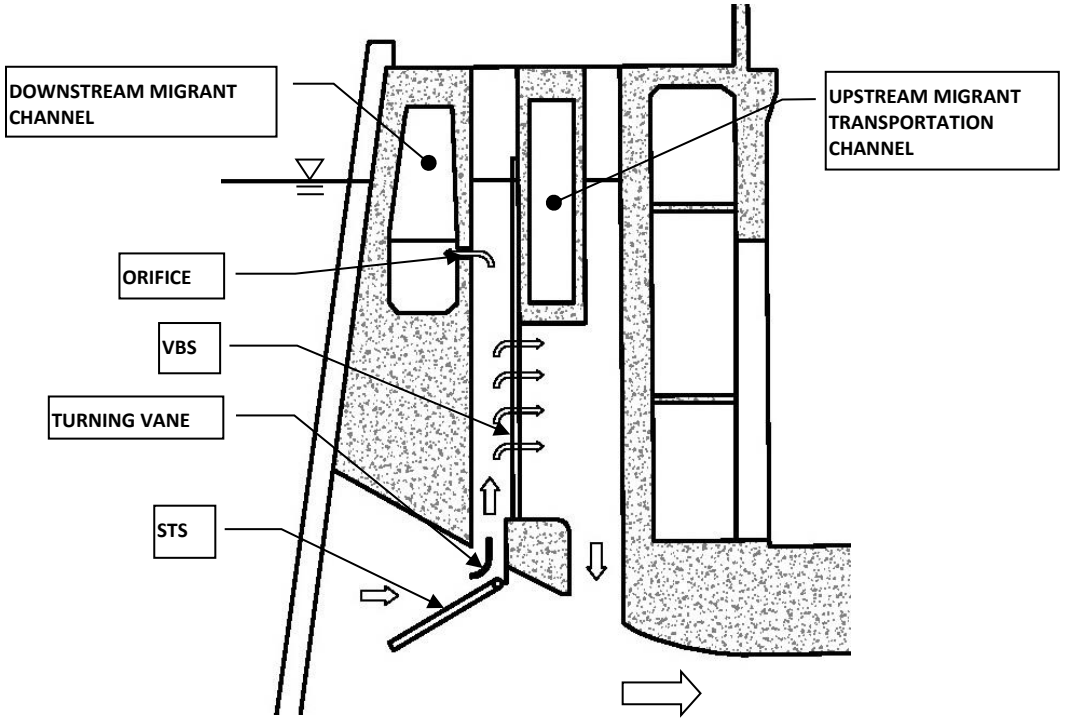


Figure 1-5 Detail Section of Gatewell and Flow Path (from USACE)

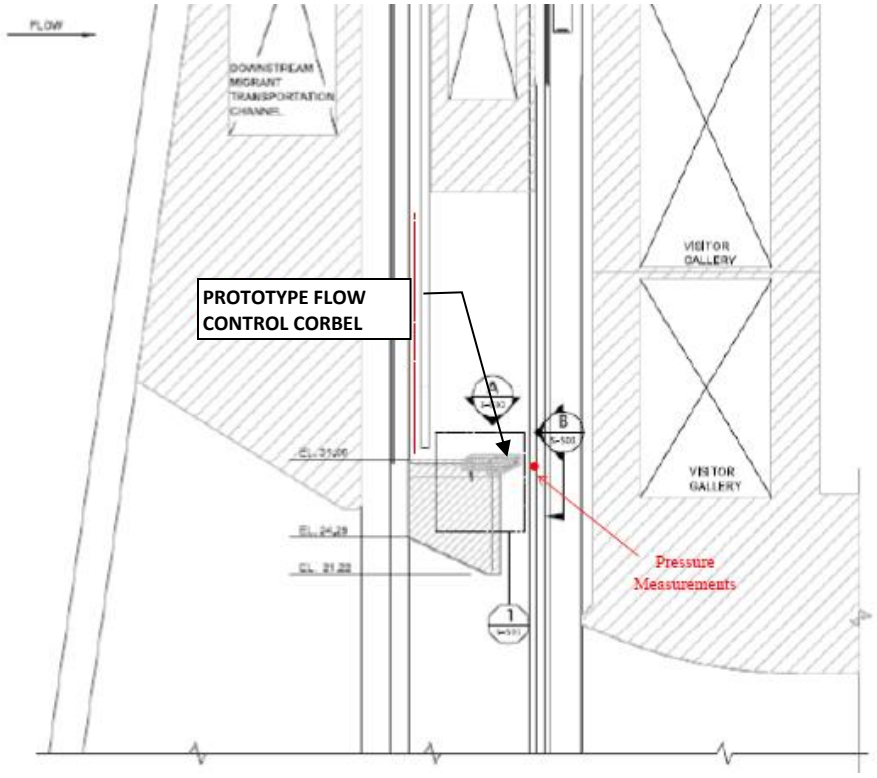


Figure 1-6 Prototype Flow Control Corbel Installation (from USACE)

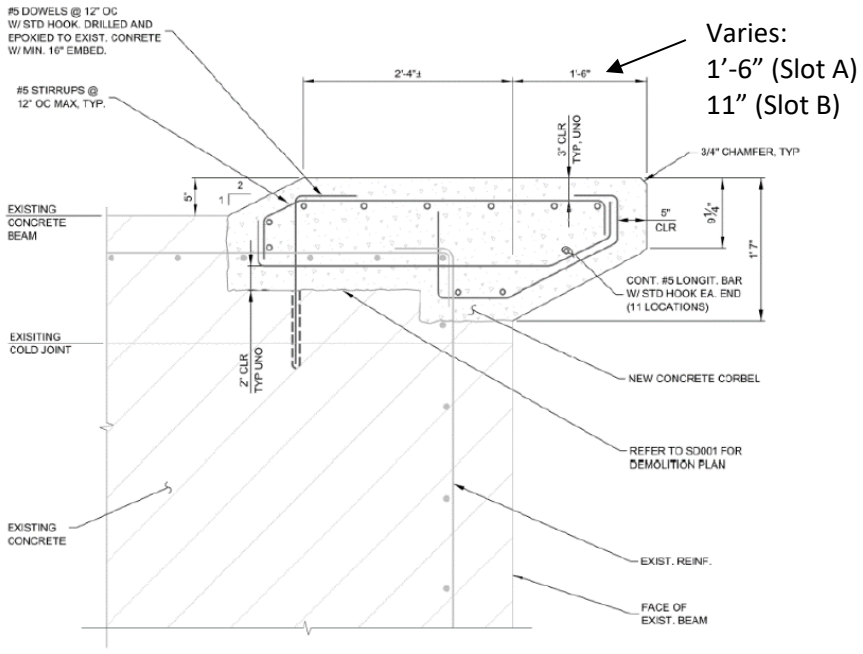


Figure 1-7 Detail of Flow Control Corbel (from USACE)

2.0 Test Program and Procedures

Pressure data was collected in Gatewell Slots 14A and 15A on May 20 and May 27, 2022, respectively. Velocity data were collected for two discharges in each of the three gatewell slots of Unit 15 between June 1, 2022, and June 9, 2022.

2.1 Test Conditions and Data

The target flow conditions for pressure and velocity measurements are summarized in Table 2-1. Pressure Tests were conducted to establish a baseline for pressure fluctuations under pre-corbel conditions in Slot A of Unit 14 and to establish post-corbel installation pressure fluctuations in Slot A of Unit 15. Seven separate tests were conducted in each gatewell slot to capture turbine start-up, turbine shut-down, and steady state operation, including duplicate tests of these events.

Velocity traverses were conducted in all gatewell slots of Unit 15 where corbels were installed in Slots A and B. The two target flows for velocity measurements were 18 kcfs and 15 kcfs. The lower of these two discharges represents the middle of the 1% peak efficiency flow. Velocity measurements were made for both flows in each gatewell slot successively, to minimize the need to relocate the velocity meter deployment equipment.

Table 2-1 Target Testing Conditions

Measurement Type	Test No.	Unit	Slot	Target Unit Discharge
Pressure	1-7	14	A	0-18 kcfs
	1-7	15	A	0-18 kcfs
Velocity	1	15	A	18 kcfs
	2	15	A	15 kcfs
	3	15	B	18 kcfs
	4	15	B	15 kcfs
	5	15	C	18 kcfs
	6	15	C	15 kcfs

In addition to velocity traverses and dynamic pressure readings (discussed in the subsequent sections), the following information was recorded for all tests conducted:

- The date the test was performed;
- The start and end times of data collection;
- The locations where measurements were made;
- The hydrologic and hydraulic conditions at the time of data collection, including:
    - Total river flow (kcfs);
    - Spillway flow (kcfs);
    - Total Powerhouse 2 flow / flow through each unit (kcfs);

- Forebay pool elevation (ft) and location of measurement;
- Tailrace pool elevation (ft) and location of measurement;
- Water surface elevation in gatewell (ft) upstream and downstream of the VBS at the beginning, middle, and end of testing;
- B2 corner collector status (on or off);
- Turbine intake extension status (in or out);
- Number and designation of orifices in operation in test gatewell (1 or 2).

2.2 Instrumentation and Deployment Methods

2.2.1 Pressure Measurements

Dynamic pressure measurements were made using submersible pressure transducers deployed on mounting brackets fixed to the top surface of the gatewell beam / flow control corbel. The pressure sensors were VersaLine VL 1000 Series transducers manufactured by PMC Engineering (model number VL1213). The gauge pressure sensors, similar to that shown in Photo 2-1, were supplied with 125 feet of vented cable, had a pressure rating of 50 psi, and accuracy of 0.25% of full-scale (*i.e.*, 0.13 psi or 0.29 ft of water column (WC)).

Pressure data were recorded using a computerized data acquisition system (DAS) consisting of a custom power supply, commercially available analog-to-digital board, and LabVIEW based interface (Photo 2-2). The DAS recorded pressure data at 1 Hz and 200 Hz and output the Hydraulic Grade Line (HGL) at the sensors.

Photo 2-1 Representative Pressure Sensor

The pressure transducers were deployed at the end of mounting brackets (shown in Figure 2-1 through Figure 2-3), which were attached to the gatewell beam in Unit 14A and corbel in Unit 15A. The brackets consisted of 2x2 tube steel arms, welded to a ¼-inch steel base plate (flange), which was connected to the concrete with 3/8-inch diameter screw-type anchors. The end of the mounting arms projected beyond the downstream face of the gatewell beam/corbel, where the transducers were threaded into a mounting plate and bolted to a drop plate at the end of the mounting arm. Cables from the transducers were fixed to the concrete surface using small clips and zip-ties and were routed up the downstream VBS slot. Wooden wedges were set within the slot at intervals of approximately 6 feet to keep the cable in the slot and provide multiple attachment points from the gatewell beam to the deck surface. The pressure sensor installation is shown in Photo 2-3 through Photo 2-6.

The gatewells were dewatered for installation of the pressure transducers. Access to the gatewell was gained via a crane suspended man-basket (Photo 2-7). The Bonneville Operations crew operated the crane, installed self-retracting lifelines within the gatewell, and aided with installation of the mounting brackets.

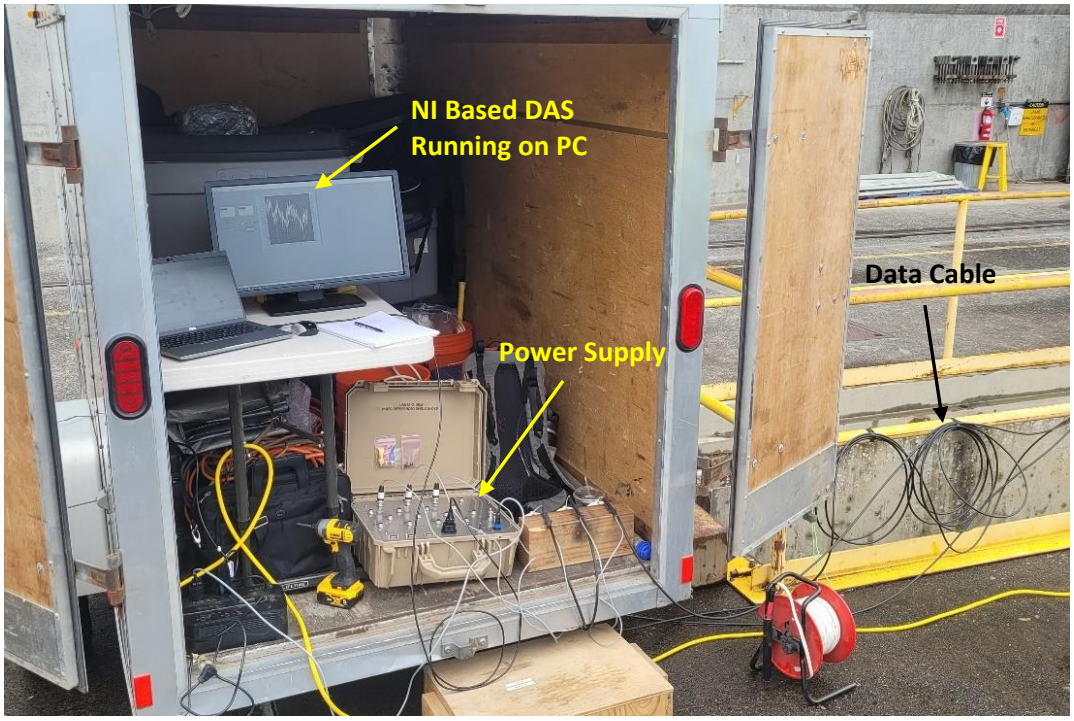


Photo 2-2 Pressure Sensor DAS

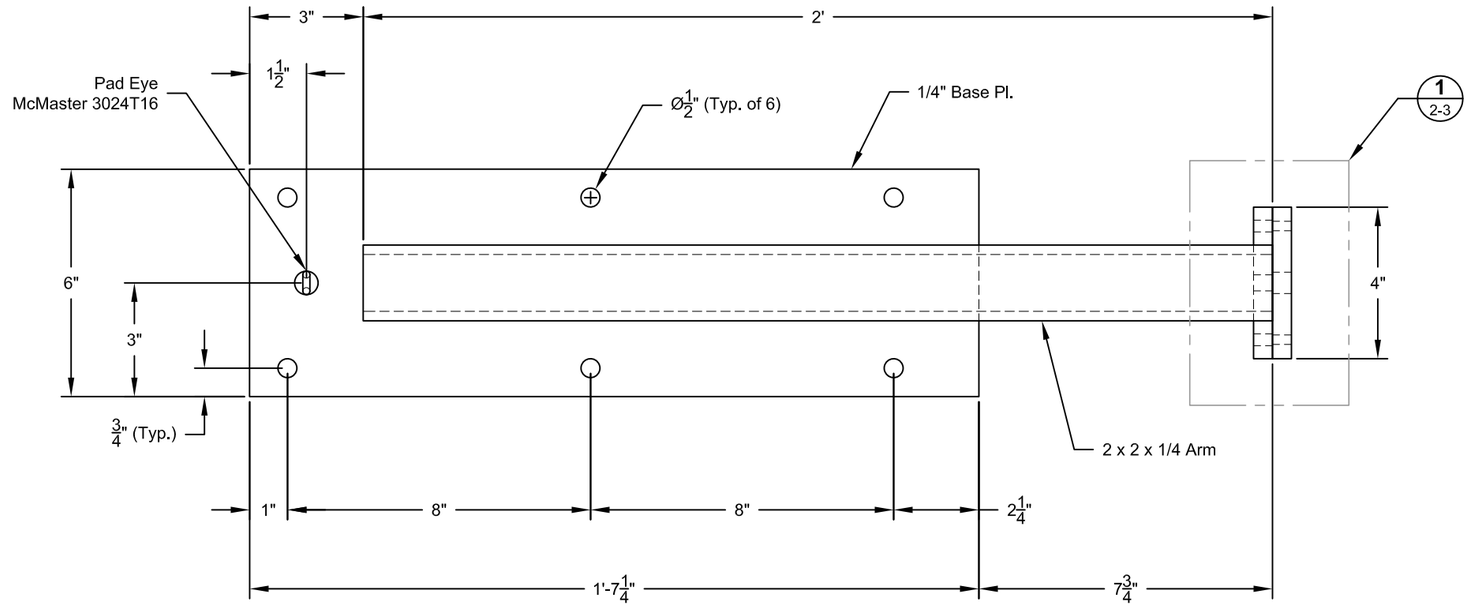
Photo 2-3 Pressure Sensors Installed in Unit 14A

Photo 2-4 Pressure Sensors Installed in Unit 15A

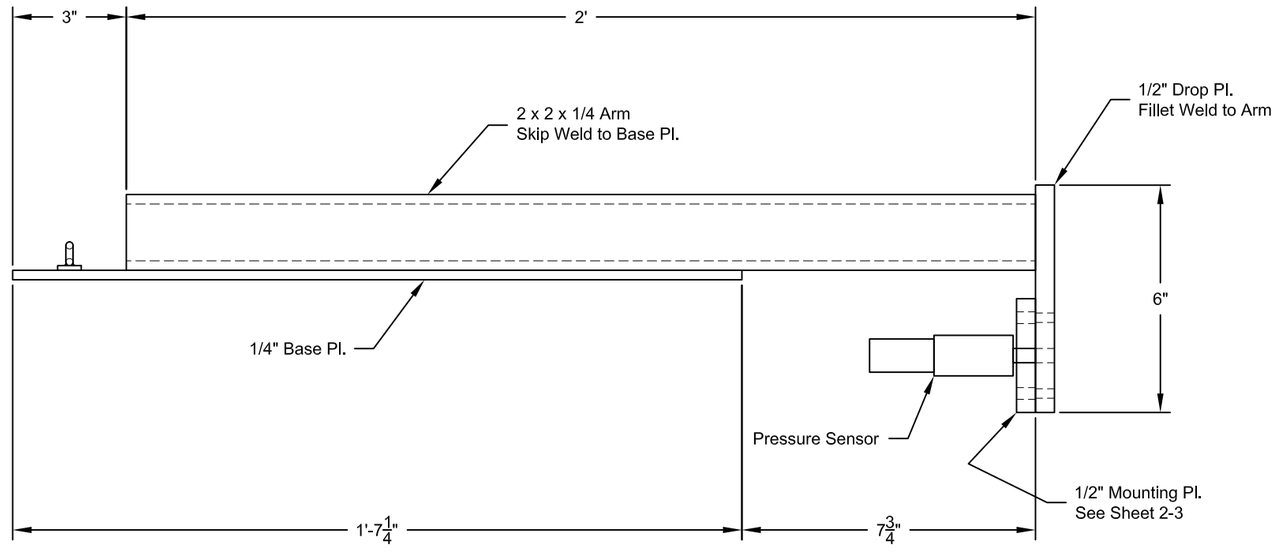
Photo 2-5 Pressure Sensor Cable Routing to Downstream VBS Slot – Unit 14A

Photo 2-6 Wedges and Pressure Sensor Cable Routing in VBS Slot

Photo 2-7 Crane and Man-Basket used for Pressure Sensor Installation



Plan View



Elevation View

Notes:
1. Debur all edges
2. Coat finished assembly w/ red oxide primer

REV:	DESCRIPTION:	DES:	DATE:	CHK:	DATE:
0	For Fabrication	JDA	04/19/22	-	-
1	Report	JDA	10/03/22	-	-

PRESSURE SENSOR MOUNT TYPE 1

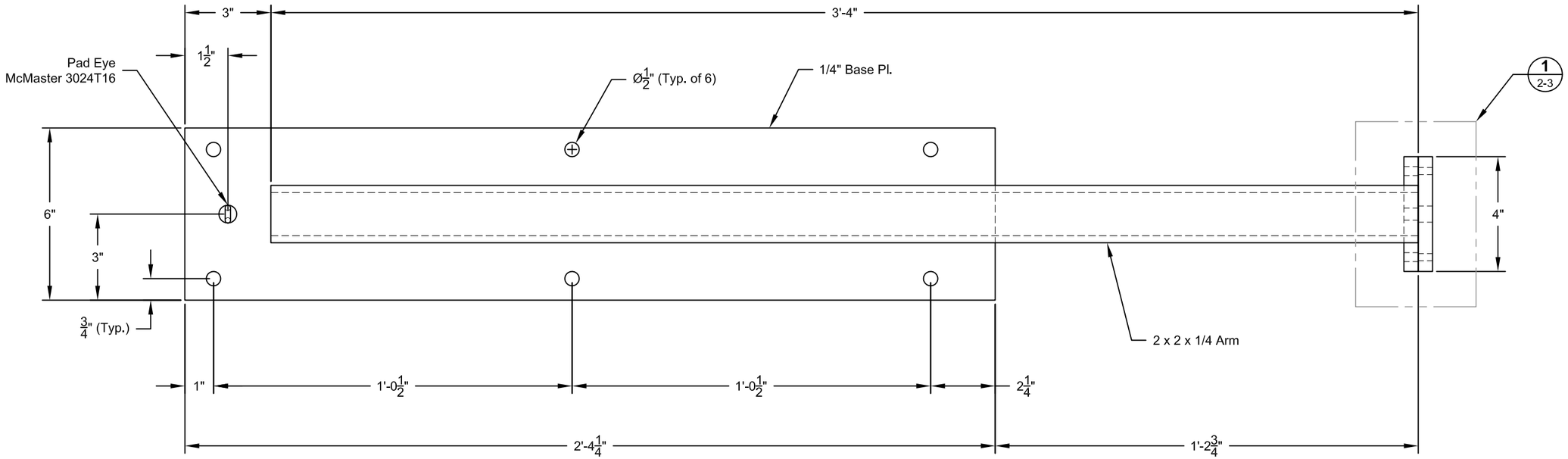
B2 FGE Velocity / Pressure Measurements 2022
USACE - CENWP
Portland, Oregon

SCALE:	DATE:	PROJECT NUMBER:
1:4	10/03/2022	7214NWP052

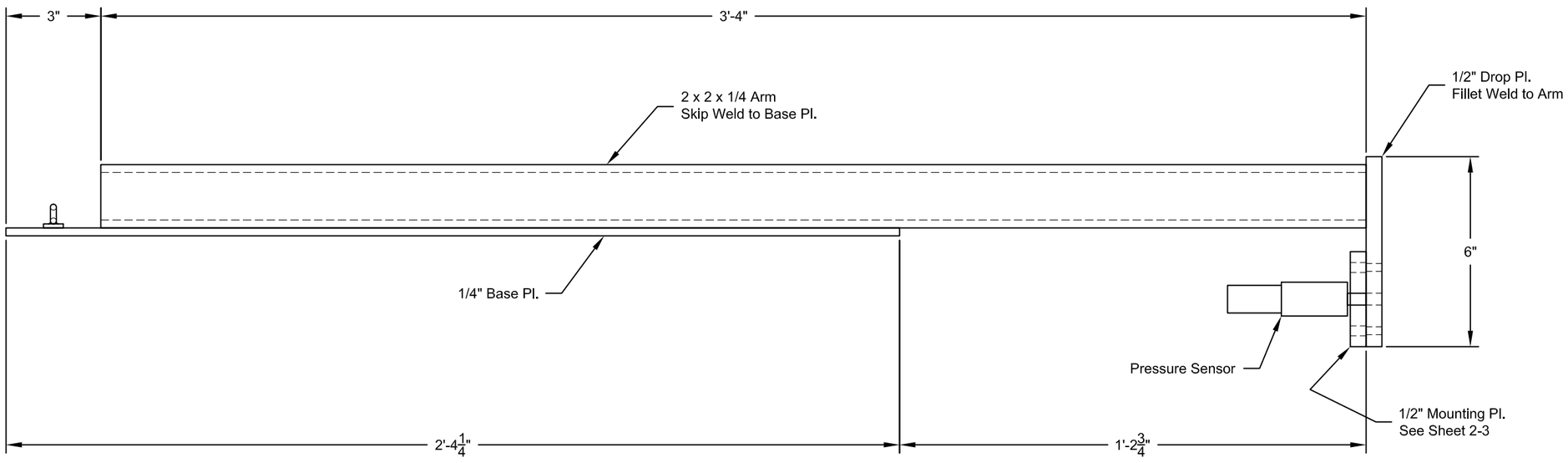
ALDEN
711 100TH STREET SE
EVERETT, WA 98208
(425) 881-7700
WWW.ALDENLAB.COM

FIGURE NUMBER:
2-1

SHEET:
(2-1) PXD-MOUNT-T1



Plan View



Elevation View

Notes:
1. Debur all edges
2. Coat finished assembly w/ red oxide primer

REV:	DESCRIPTION:	DES:	DATE:	CHK:	DATE:
0	For Fabrication	JDA	04/19/22	-	-
1	Report	JDA	10/03/22	-	-

PRESSURE SENSOR MOUNT TYPE 2

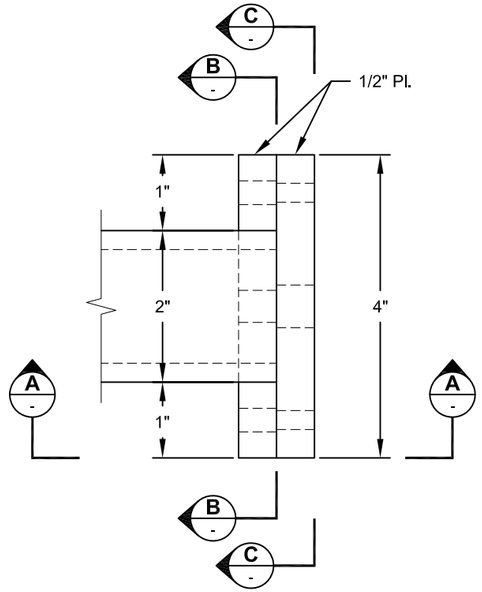
B2 FGE Velocity / Pressure Measurements 2022
USACE - CENWP
Portland, Oregon

SCALE:	DATE:	PROJECT NUMBER:
1:4	10/03/2022	7214NWP052

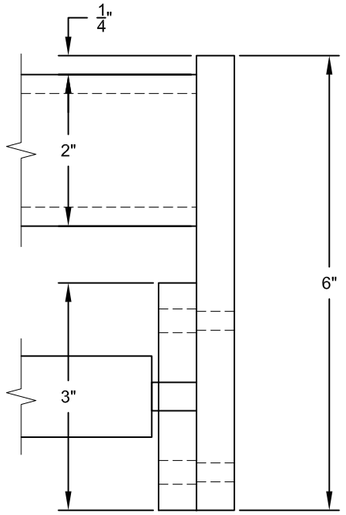
ALDEN
711 100TH STREET SE
EVERETT, WA 98208
(425) 881-7700
WWW.ALDENLAB.COM

FIGURE NUMBER:
2-2

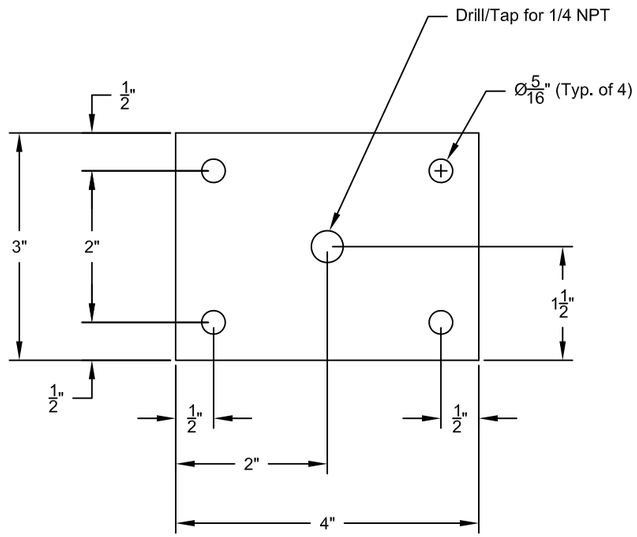
SHEET:
(2-2) PXD-MOUNT-T2



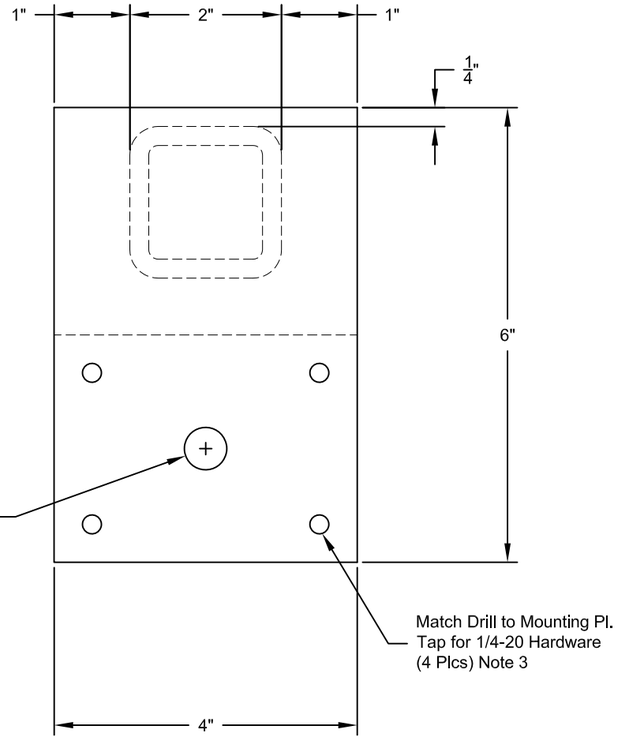
Detail 1/2-1 1/2-2



Section A -



Section B -



Section C -

Notes:
1. Debur all edges
2. Coat finished assembly w/ red oxide primer
3. Hardware to be provided by Alden

REV:	DESCRIPTION:	DES:	DATE:	CHK:	DATE:
0	For Fabrication	JDA	04/19/22	-	-
1	Report	JDA	10/03/22	-	-

PRESSURE SENSOR MOUNT
DROP & MOUNTING PLATES
B2 FGE Velocity / Pressure Measurements 2022
USACE - CENWP
Portland, Oregon

SCALE:	DATE:	PROJECT NUMBER:
1:2	10/03/2022	7214NWP052

ALDEN
711 100TH STREET SE
EVERETT, WA 98208
(425) 881-7700
WWW.ALDENLAB.COM

FIGURE NUMBER:
2-3

SHEET:
(2-3) PXD-MOUNT-PL

2.2.2 Velocity Measurements

Three-dimensional velocity measurements were made in the gatewells of Unit 15 using four Nortek Vectrino Acoustic Doppler Velocimeters (ADVs). The ADVs consist of a single acoustic transmitter and four acoustic receivers, along with a signal conditioning module. Figure 2-8 shows an ADV attached to a stanchion of the traversing beam used for instrument deployment and positioning.

ADVs operate by emitting a sound wave at a known frequency (10 MHz) from the transmitter and receiving a reflected sound wave off particles suspended in the fluid. As the particles pass the stationary probe, the reflected sound waves are shifted in frequency, and the direction and magnitude of the fluid's velocity is calculated using the relationship in Equation (2.1) below.

$$\Delta f = \frac{\Delta v}{c} f_o \tag{2.1}$$

where: Δf = change in frequency (Hz)
Δv = change in velocity (m/s or ft/s)
c = speed of sound *(1497 m/s at 25 degrees-Celsius)*
f_o = transmitted frequency.

The ADV must also measure the water temperature to accurately adjust for the change in speed of sound with temperature (salinity is assumed to be negligible in the gatewells at Bonneville Dam). In order to assure the ADV was using an accurate recording of the water temperature, the instrument was not initiated until it was fully submerged for several minutes.

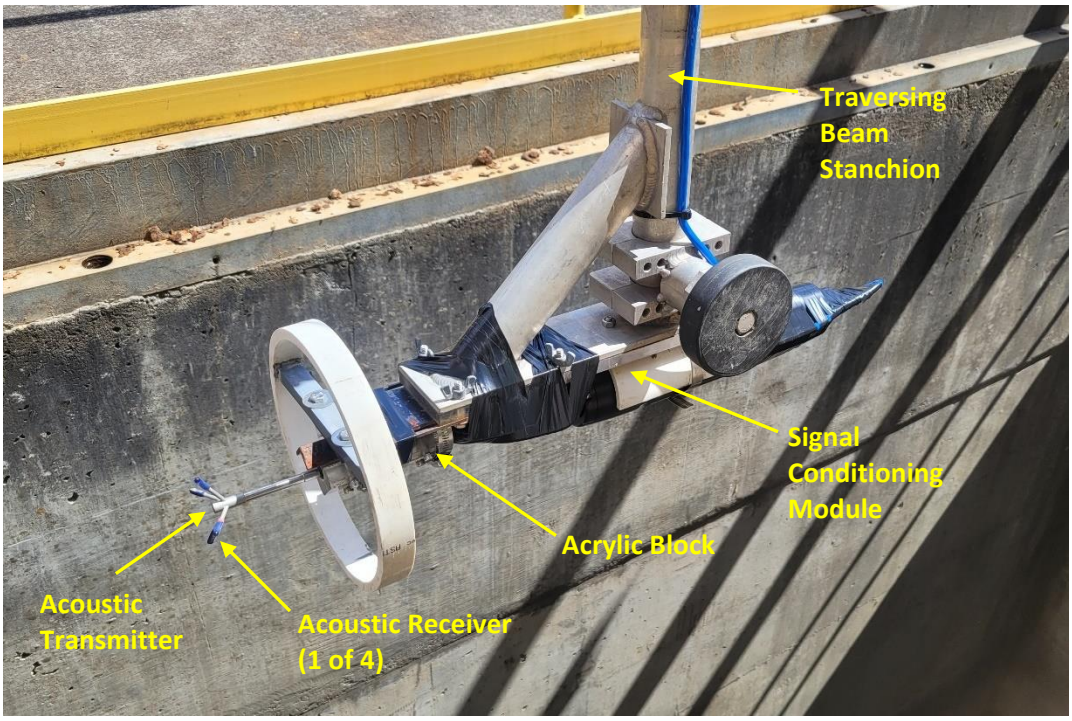


Photo 2-8 Nortek Vectrino ADV Installed on Traversing Beam Stanchion

Measurements were collected over a sampling volume with a pre-determined focal length (center of the sampling volume) based on the geometry of the probes. The accuracy of the ADV can be within 1 percent of the actual velocity, depending on water quality, velocity range, probe orientation, electronic noise, and mechanical noise (such as vibration). It was not possible to control the water quality, but it was possible to clean the VBSs such that accumulated debris did not affect the results. As such, the VBS in each gatewell associated with testing was cleaned prior to data collection. Cleaning was typically conducted within two hours of the beginning of data collection but no more than 24 hours prior to the beginning of data collection.

Probe orientation was controlled by means of its physical attachment to the traversing beam. The probes were affixed to the traversing beam using a square acrylic block nested in a steel angle. The orientation of the four receivers was established relative to the flat side of the square acrylic block in the laboratory prior to field data collection using a granite reference surface and post-mounted scribe. Photo 2-9 shows probe number ARL-03 in an acrylic housing.

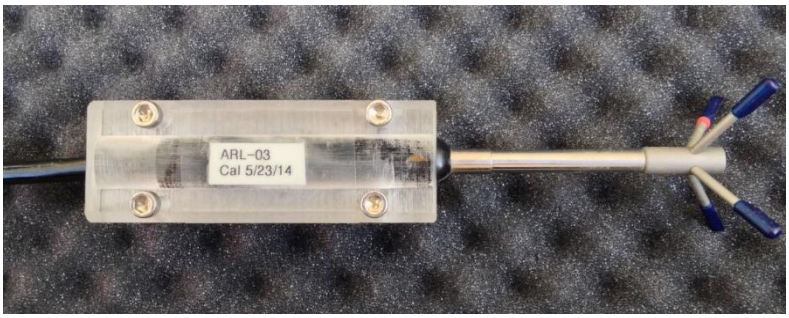


Photo 2-9 ADV in Calibrated Acrylic Block Housing

Electrical noise interferences were mitigated by ensuring all power sources were properly grounded and locating power source cables away from the transmitting end of the ADV probes.

2.2.3 Traversing Beam

The equipment used to deploy the ADVs was originally designed and built by Pacific Northwest National Laboratory (PNNL) and subsequently modified by the Harbor-Alden team in 2014. The general configuration of the traversing beam is illustrated in Figure 2-4 and shown in Photo 2-10 through Photo 2-12.

The traversing beam was lowered by two cable hoists suspended from an aluminum hoist frame. The elevation of the beam was determined by a graduated tape, fixed to the winch cable as it was lowered into position. The beam was then held in place in the gatewell by engaging a cam with a rope that extended plates on either side of the beam to create a compressive clamping force into the sides of the gatewell slots. Upon releasing the cam, the plates retracted via tension springs and the beam was allowed to move vertically via the hoist cables.

To address vibrations that might be initiated by the turbulent nature of the flow surrounding the probes, the four stanchions which held the probes below the traversing beam were connected with a common tie-bar made from aluminum channel. Connecting all four stanchions together was intended to stiffen the overall measurement apparatus and control any oscillations such that all four probes experience the same relative motion.

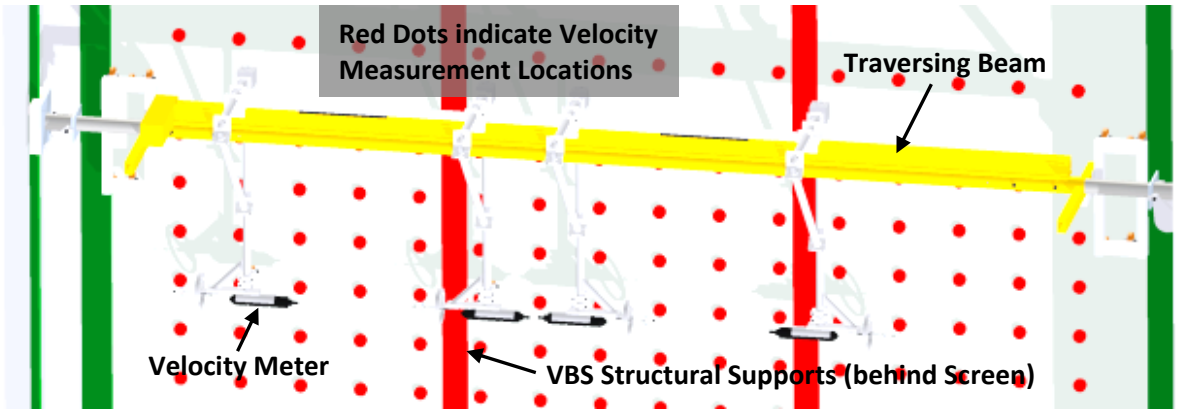


Figure 2-4 Rendering of Traversing Beam Deployed in Gatewell

No major changes to the apparatus were made for the current study. However, the following actions were taken prior to mobilizing to the field:

- The aluminum tie-beam was replaced, as it was not recovered with the other equipment;
- The pulleys, rope, and rope clutches associated with operation of the traverse beam pusher arms were replaced;
- Wire rope slings which attach the lifting arms to the winch hoist cable were replaced with turn buckles;
- The bearings of the aluminum trolleys which travel within the aluminum extrusion of the traverse beam were removed, cleaned using an ultrasonic cleaner, and reassembled/realigned;
- All wooden components of the deployment apparatus were replaced;
- One side of the lifting arms, which had been severed (by others) for use at a different project, were bevel welded back to the parent beam to avoid the interference of splice plates (installed by others) with the bumper wheel assemblies; and
- A festoon system was developed to prevent snagging of the data cables which had been experienced during execution of prior test programs (Photo 2-13).

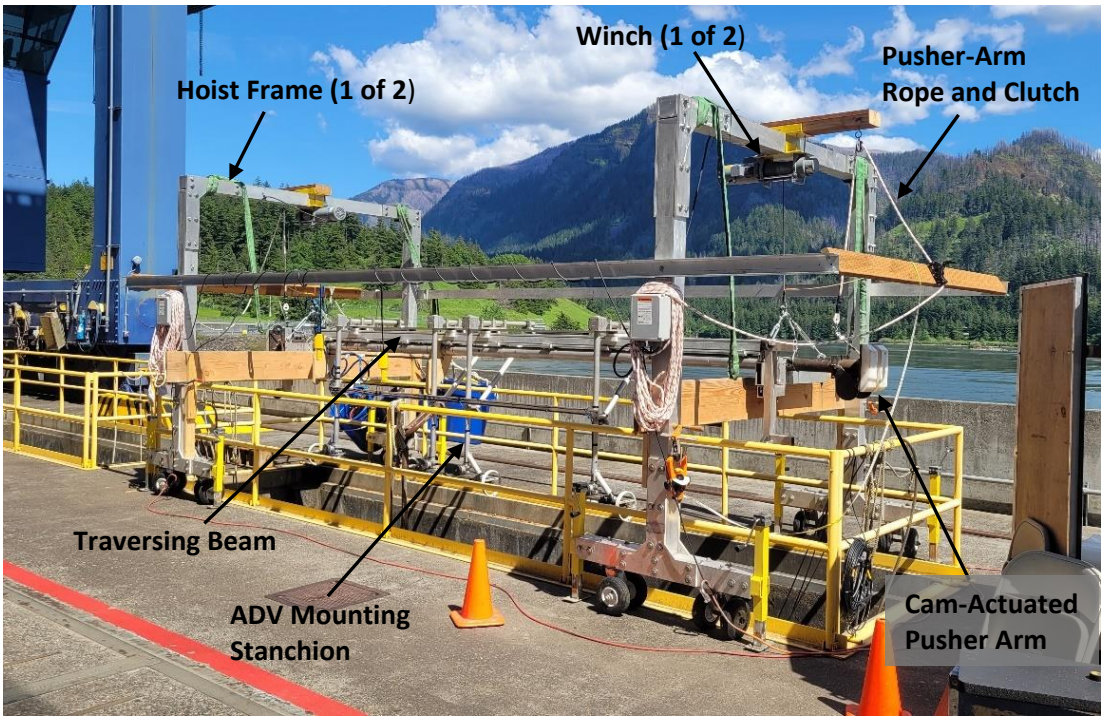


Photo 2-10 Velocity Meter Deployment System Overview

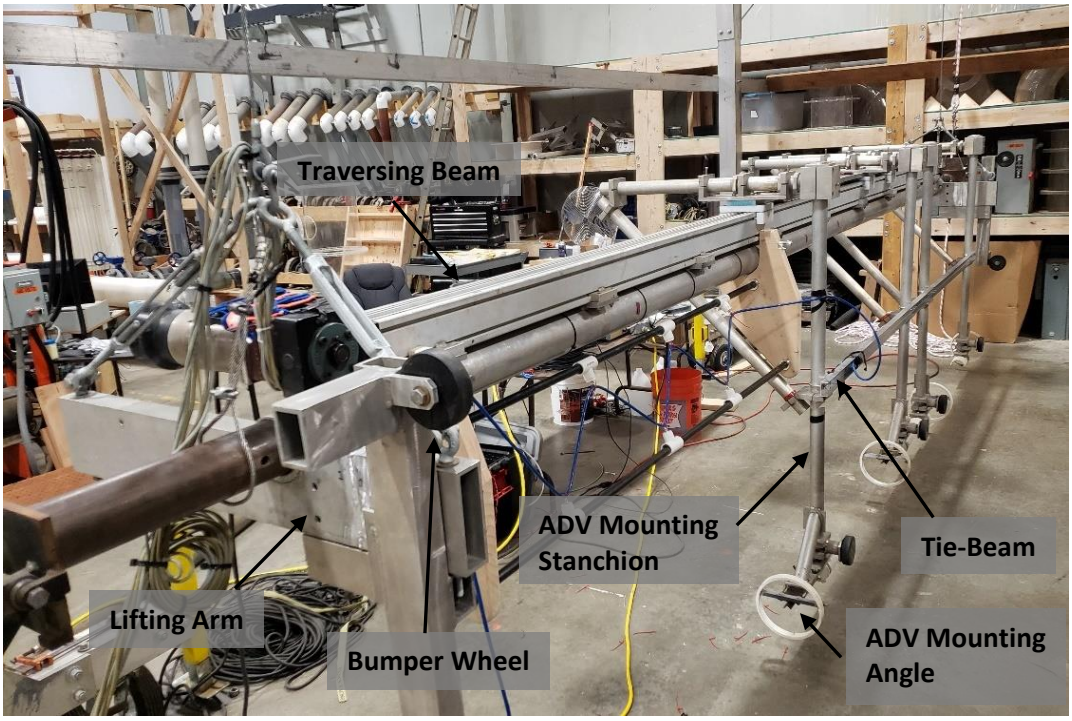


Photo 2-11 Velocity Meter Traversing Beam Setup

Photo 2-12 Traversing Beam Deployed in Gatewell

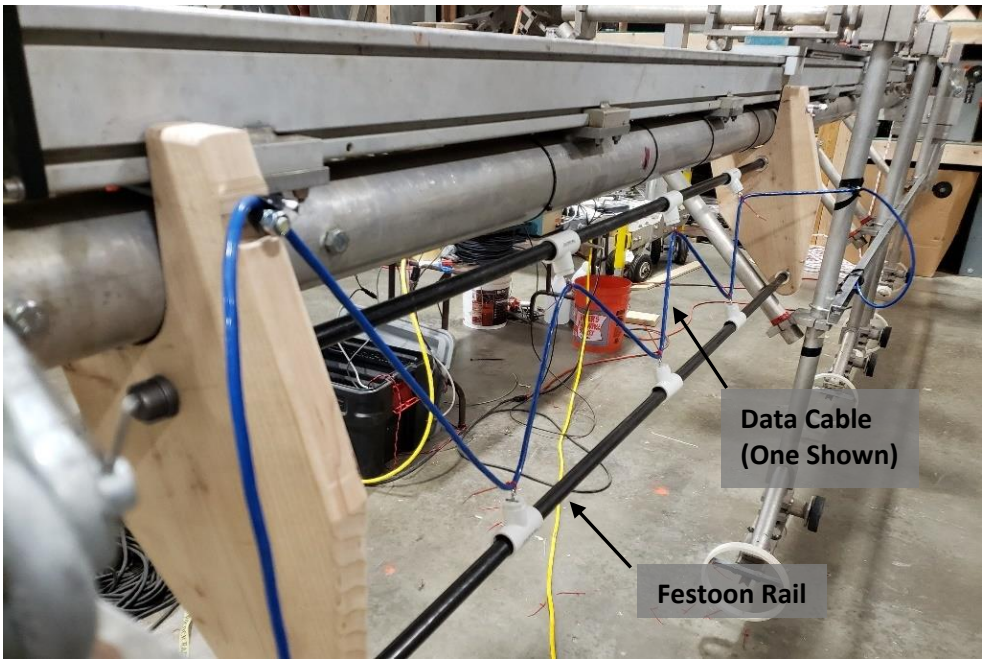


Photo 2-13 Velocity Meter Data Cable Festoon System

Traverse control equipment similar to that used during the 2015 study by Harbor-Alden (shown in Photo 2-14) was used for conducting the velocity measurements.

The control center included:

- Parker Hannifin Corporation 6K8 Motion Controller;
- Parker Hannifin ZETA microstepping driver; and
- Laptop computers running motion control and data collection software.

The motion controller and micro-stepping driver used for the traversing beam during the 2015 study were not located during site reconnaissance. It was found that the component model numbers have since become obsolete, are not supported by the manufacturer, and are not available for purchase in new condition. Rather than developing a new control system, which would have required re-writing the motion control code, functionally identical components were borrowed from PNNL for this study.

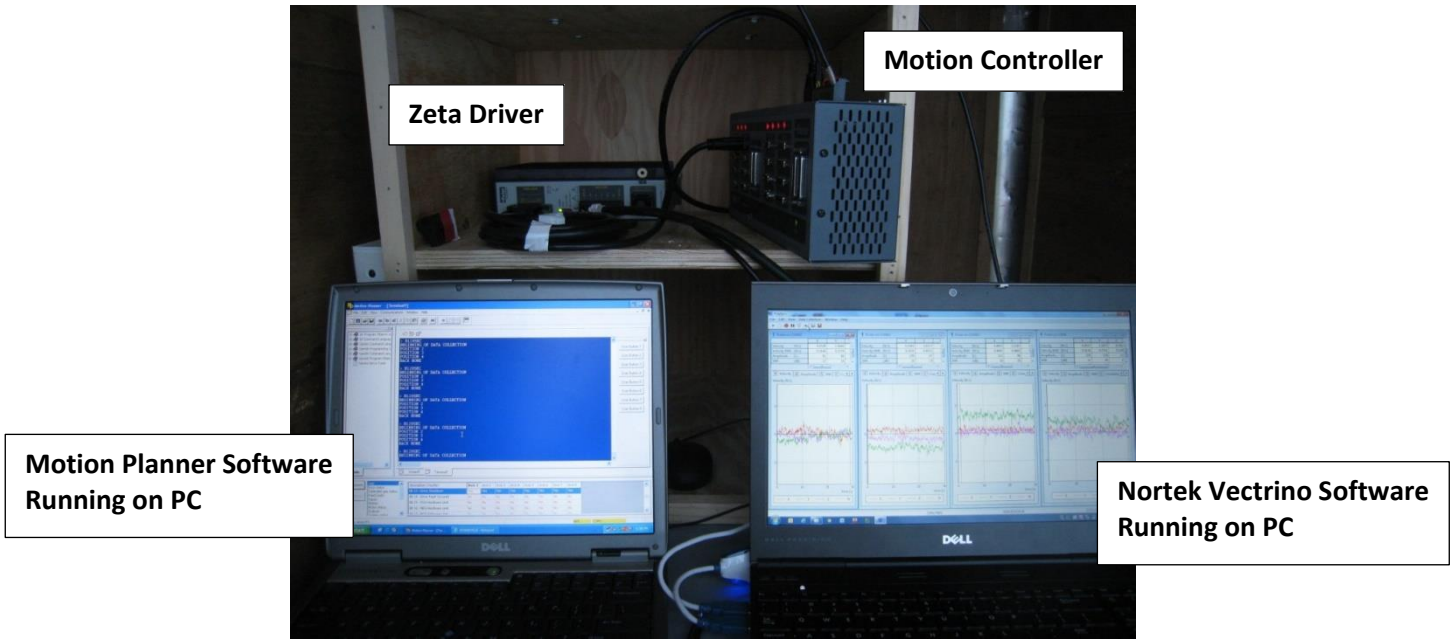


Photo 2-14 Traversing Beam Control Center (from 2015 Program)

2.2.4 Water Levels

In addition to pressure and velocity measurements within the gatewell, the water surface on both sides of the VBS was monitored using an electronic level meter manufactured by Solinst and shown in Photo 2-15. The meter forms a simple DC circuit which is closed when the electrode in the metallic sensor head is submerged. The sensor head is attached to circuitry within a reel via plastic-sheathed cable, graduated at 0.01 ft increments. When the circuit is completed, a light on the reel is illuminated and a tone is produced. The indicator cable was referenced to the known elevation of the powerhouse deck at the approximate center of each gatewell slot, providing the vertical distance from the elevation datum to the water surface.

Photo 2-15 Electronic Water Level Probe

2.2.5 Data Collection Center

A covered cargo trailer, approximately 7 feet wide by 10 feet long, was used as a field office and temporary storage facility for data collection operations. The trailer was located between the test gatewells and was positioned such that gantry crane and normal vehicle travel on the dam were not obstructed (Photo 2-16).

Power was supplied to drive the traverse beam, hoist system, and data collection equipment via a USACE-supplied 480 VAC circuit hookup at Gatewell 14C and load center (Photo 2-17). The load center provided ample power to run all necessary components, though care was taken to limit the length of extension cord runs, particularly those supplying the hoist winches and traverse controller, to ensure satisfactory operation.

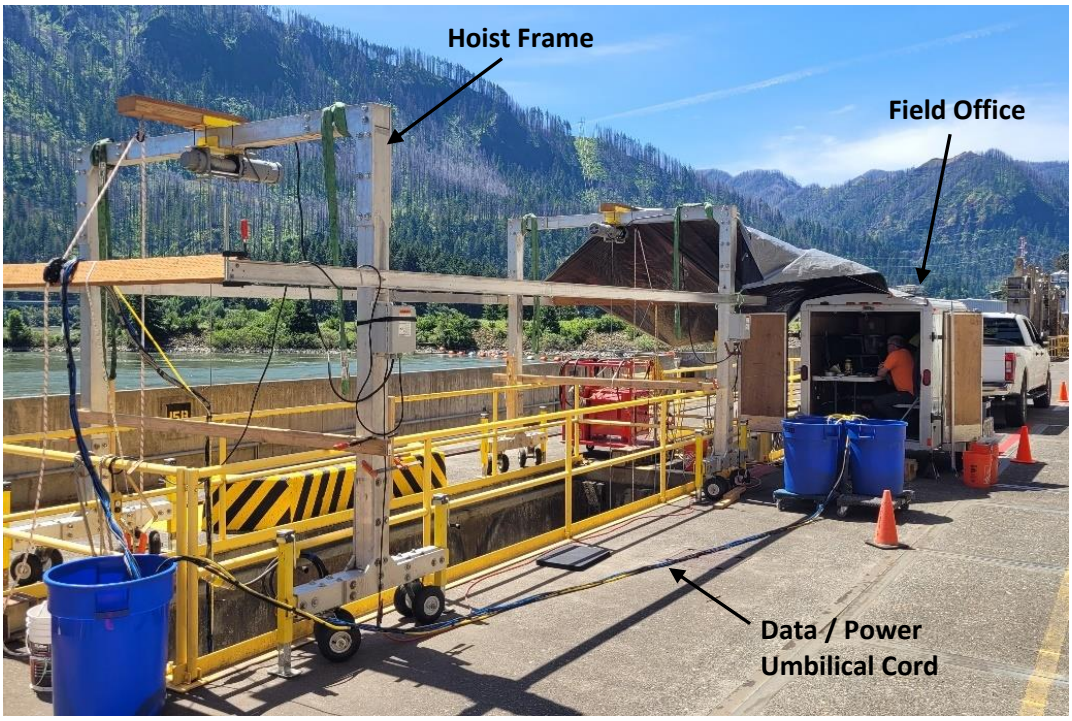


Photo 2-16 Field Operations Setup

Photo 2-17 Load Center used to Power Data Collection Equipment

2.3 Measurement Locations

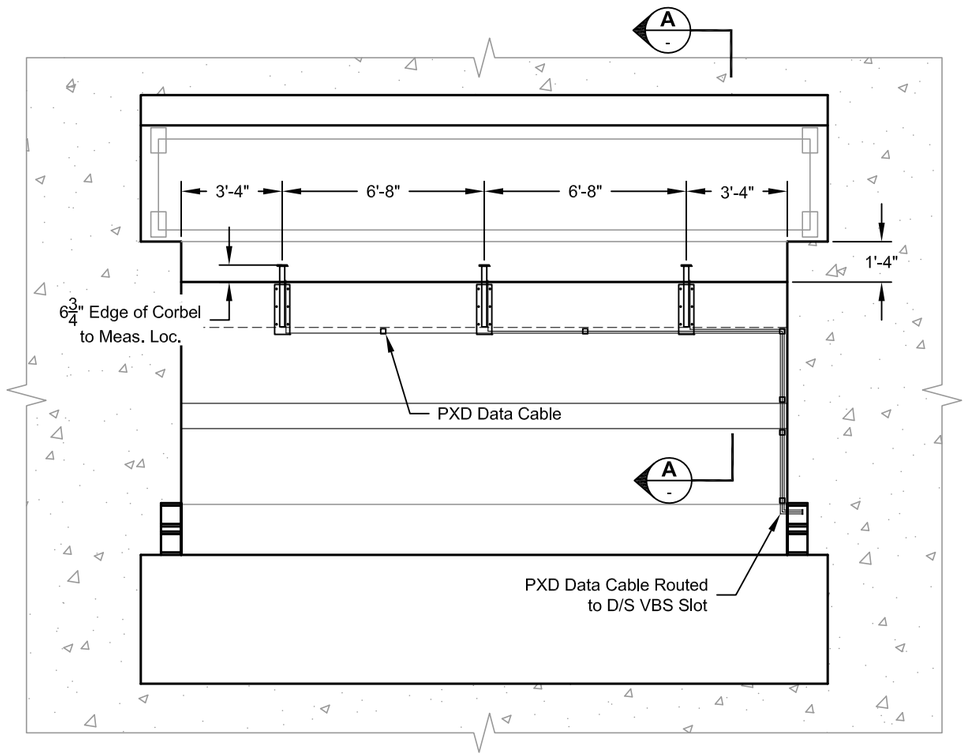
2.3.1 Pressure Measurements

Pressure measurements were made at three lateral locations within the gatewells, as shown in Figure 2-5. The measurements were made to characterize the magnitude of transient pressure waves acting on the flow control corbels/plates during turbine startup and shutdown and turbulent pressure fluctuations experienced during normal (steady-state) operation.

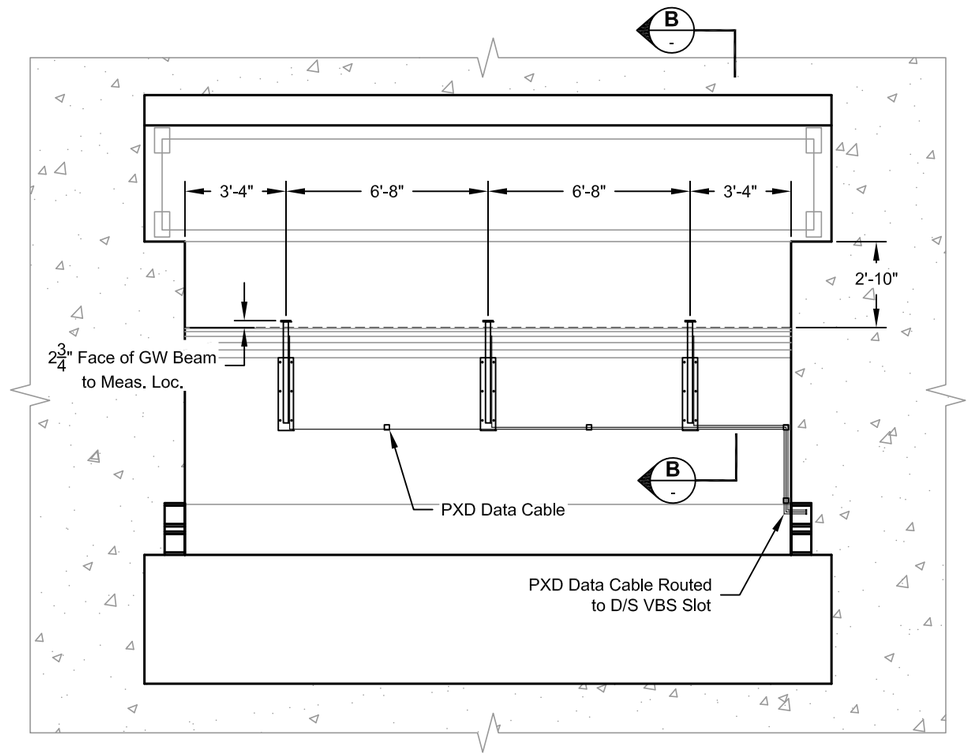
Data collection began prior to turbine start-up or shut-down and continued until steady hydraulic conditions were reached. Separate data files were generated for these events for durations up to 20 minutes, as summarized in Table 2-2.

Table 2-2 Pressure Test Designations and Durations

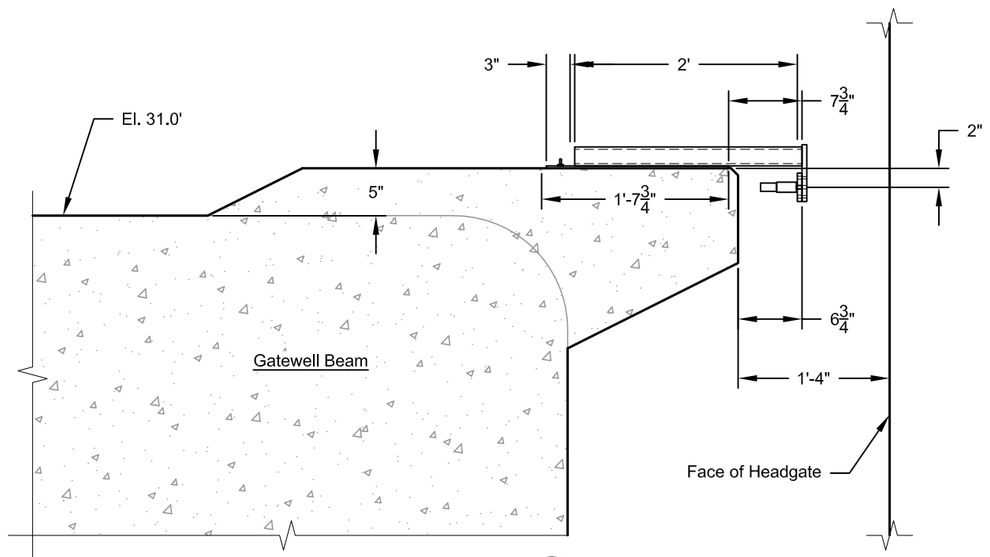
Pressure Test No.	Event	Test Duration (min)
1	Ramp to 18 kcfs	15
2	Steady State Operation at 18 kcfs	5
3	Shut-down	15
4	Start-up	15 (U14) / 20 (U15)
5	Steady State Operation at 18 kcfs	10
6	Shut-down	15
7	Start-up	20



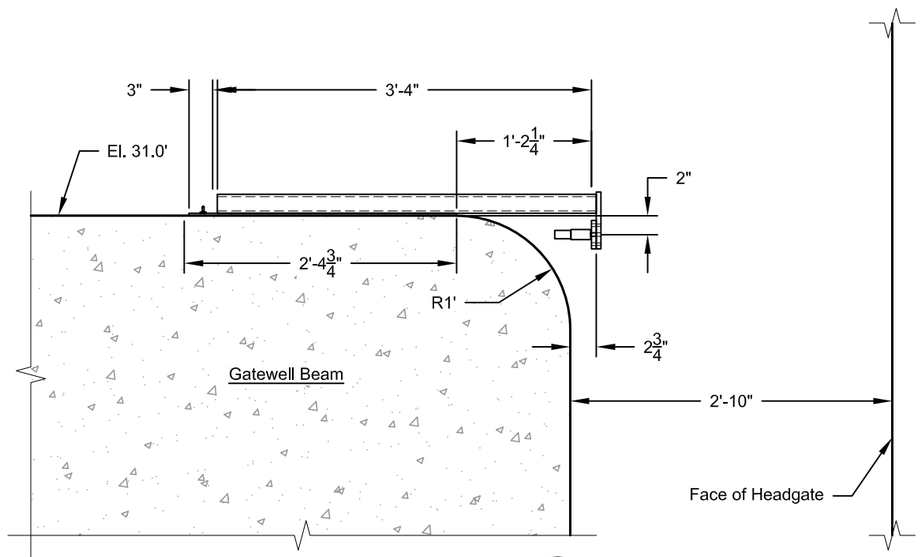
Plan View - Modified Gatewell
Scale: 1" = 5'



Plan View - Unmodified Gatewell
Scale: 1" = 5'



Section A -
Scale: 3/4" = 1'



Section B -
Scale: 3/4" = 1'

Notes:
1. Elevations given MSL

REV:	DESCRIPTION:	DES:	DATE:	CHK:	DATE:
0	Concept	JDA	04/11/22	-	-
1	Report	JDA	10/03/22	-	-

PRESSURE MEASUREMENT LOCATIONS

B2 FGE Velocity / Pressure Measurements 2022
USACE - CENWP
Portland, Oregon

SCALE:	DATE:	PROJECT NUMBER:
1:60	10/03/2022	7214NWP052

ALDEN
711 100TH STREET SE
EVERETT, WA 98208
(425) 881-7700
WWW.ALDENLAB.COM

FIGURE NUMBER:
2-5

SHEET:
(2-5) PML

2.3.2 Velocity Measurements

The local Cartesian coordinate origin (0,0,0) was set at Elevation 0 feet on the face of the VBS screen at the northern edge (*i.e.,* Washington side) of each gatewell. Data were collected approximately 15-inches from the VBS's lateral extents and 14-inches on center for sixteen equally spaced data points. All measurements were made 0.65 ft. from the face of the VBS. No data was collected directly in front of the support channels located behind the VBSs. The data measurement positions are illustrated in Figure 2-6 and Figure 2-7.

Velocity data were collected in two grids. The Fine Resolution Grid consisted of 16 measurements across the gatewell width, taken at one foot vertical spacing between Elevations 34[1] and 56 ft. The Coarse Resolution Grid consisted of 16 measurements across the gatewell width, taken at two-foot vertical spacing between Elevations 58 and 74 ft (or the water surface elevation). Using four ADVs, the sixteen lateral measurement locations were covered by four unique traverse positions. The traverse positions were numbered 1 through 4 from north to south. The total number of measurement locations in the Fine and Coarse Resolution Grids was 544. The naming convention used for the instruments is summarized in Table 2-3.

Table 2-3 Velocity Meter Naming Convention

Designation	Location
WA-1	Northern most probe
WA-2	Second northernmost probe
OR-2	Second southernmost probe
OR-1	Southernmost probe

In addition to Fine and Coarse Resolution grids, three duplicate measurements were made at elevations 38, 43, 53, 55, 60, and 66 ft, for a total of 18 additional (duplicate) locations. This was accomplished by positioning the traverse at a fifth location, such that the first location measured by probe "A" coincided with the last measurement location of probe "B". The duplicate data were collected to facilitate evaluation of the influence of the instruments on the test results in terms of unique performance characteristics and orientation. It is important to note, however, that because the duplicate measurements were not made at same time as the original measurements (with a typical lag of approximately 11 minutes), the comparative results may be influenced by temporal variability in the discharge and/or flow patterns. Based on the measurement grid, there were three lateral locations where duplicate measurements were made:

- WA-2, Position 1 was duplicated by WA-1, Position 5 (Y = 4.57 ft)
- OR-2, Position 1 was duplicated by WA-2, Position 5 (Y = 9.24 ft)
- OR-1, Position 1 was duplicated by OR-2, Position 5 (Y = 13.90 ft)

The ADVs have a default X-direction which is oriented along the axis of one of the probe's receivers marked with a red ring. The ADVs were oriented such that the X-direction was normal to the VBS,

[1] Due to STS interferences discovered during the 2013 Field Program, the lowest targeted elevation was Elevation 34 ft.

sensing the approach velocity (Vx). The Y-direction of the probes was oriented vertically (up or down) sensing the vertical sweeping velocity (Vy), per Figure 2-8 and Photo 2-18. The probe's Z-direction is defined as the vector towards the probe's transmitter, sensing the lateral sweeping velocity (Vz). To facilitate comparison with existing data sets, a coordinate transformation was used to convert velocity components from the Vectrino software to the standardized coordinate system. The data were post-processed to describe the velocity components as follows:

Vx_USACE: Screen Approach Velocity, with positive X-direction into the screen

Vy_USACE: Positive Y-direction towards Oregon (South)

Vz_USACE: Positive Z-direction upward

Vtot_USACE: The resultant velocity

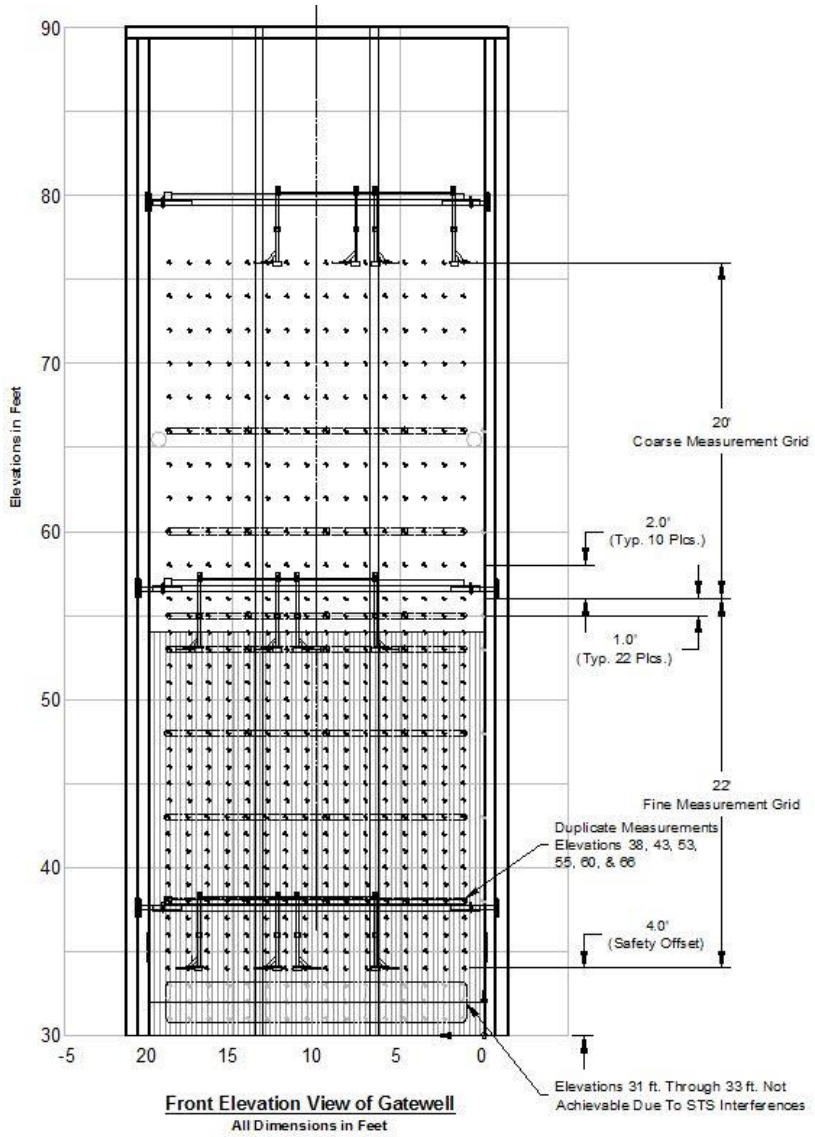


Figure 2-6 Velocity Measurement Locations

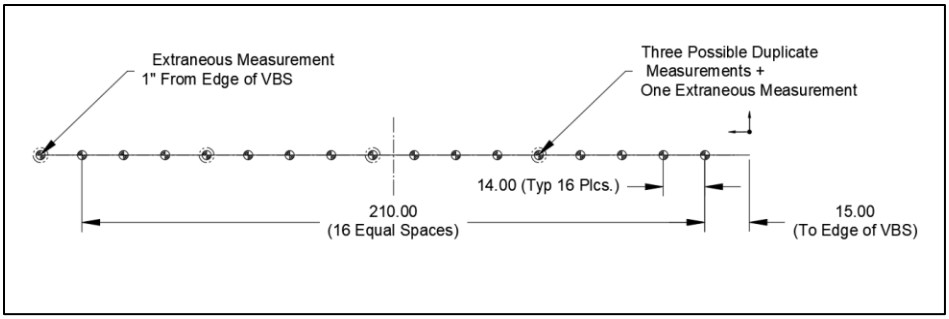


Figure 2-7 Horizontal Measurement Spacing

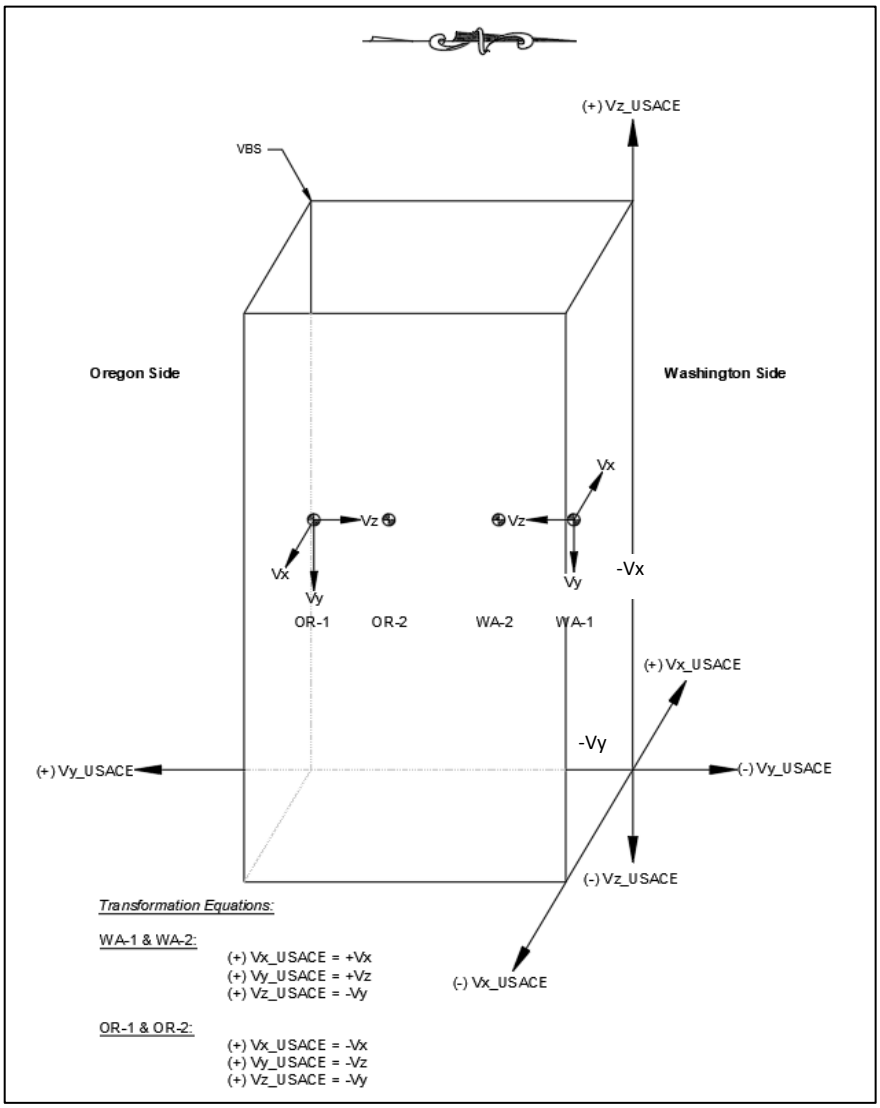


Figure 2-8 ADV Coordinate Transformation

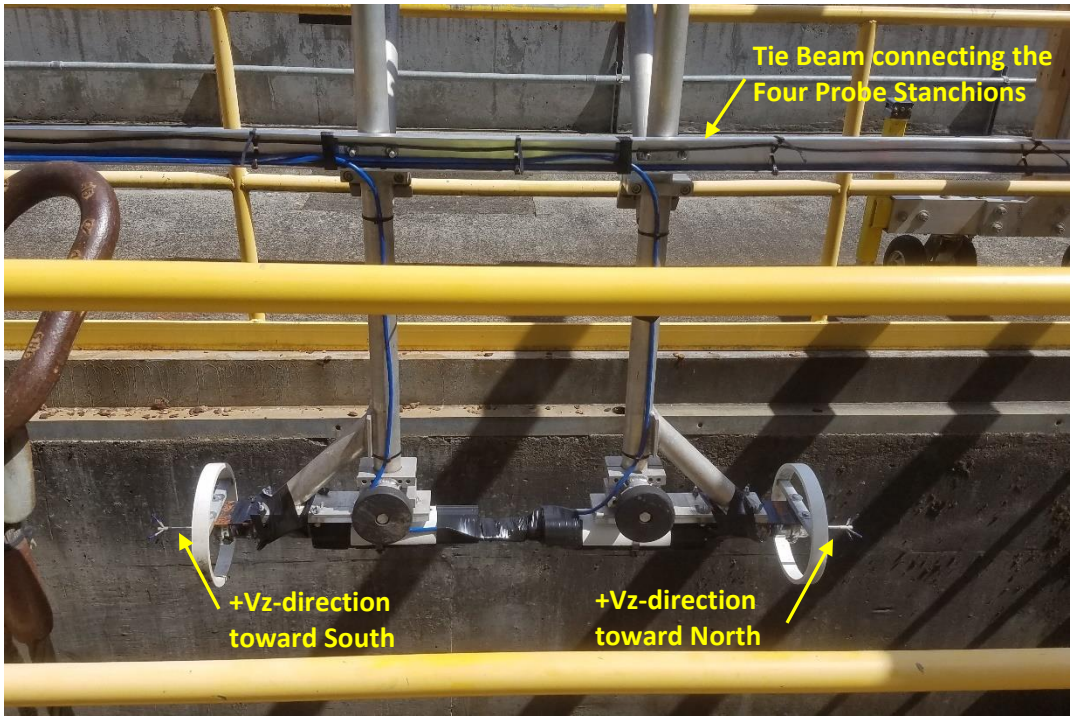


Photo 2-18 Probe Orientation within Gatewell (Looking East)

Data collection began at the initiation of the traversing beam motion control program and stopped when the traversing beam returned to the "home" position. A continuous time series of velocity data was recorded at each measurement elevation. The data were post-processed to separate the data from each of the four probes and a MATLAB script was used to parse the data collected while the traversing beam was at rest at each discrete lateral position. The time for the traversing beam to move between positions (26 seconds) was determined before field data collection and was used for parsing the time series.

Velocity data were collected at a sampling frequency of 200 Hz for 120 seconds (24,000 data points) at each measurement location. The motion control program (included in Appendix A) was written to move the traversing beam from the home position to the first measurement position (farthest north), hold for 120 seconds, traverse to the second measurement position, hold for 120 seconds, and so on until the full traverse was completed. After the final measurements position, the traversing beam returned to the home position. Inductive sensors positioned along the length of the (fixed) deployment beam and a metallic pick-up mounted on the (mobile) traversing beam were used to confirm the position of the velocity meters. The power supply associated with the inductive sensors included LED lights, which indicated when a measurement position was reached.

On occasion, the traversing beam came to rest before reaching the intended measurement position or was knocked out of position due to hydraulic drag on the assembly. In these instances, the beam was either re-homed and data collection was re-initiated, or the traversing beam was driven to the appropriate locations manually for collection of velocity data at the individual positions.

2.4 Field Operations

2.4.1 Test Sequence

The data collection equipment was mobilized to Bonneville Dam on Monday May 16, 2022. The sequence of events during field operations is presented in Table 2-4.

Table 2-4 Equipment Setup and Data Collection Sequence

Week	Primary Activity	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	Mobilization / Pressure Sensor Installation / Unit 14 Pressure Test		Mob.*	PXD** Installation (U14)	Equip. setup / Rewater U14	Rewater U14	Pressure Test U14, Travel	
2	Equipment Setup / Pressure Sensor Installation / Unit 15 Pressure Test		Travel	Setup, PXD Installation (U15)	Equip. setup	No Site Work	Pressure Test U15, Travel	
3	Velocity Setup / Velocity Testing		Holiday	Travel, Equip. setup	Vel. Test U15A 18kcfs	Vel. Test U15A 15kcfs	Travel	
4	Velocity Testing / Demobilization	Travel	Vel. Test U15B 18kcfs	Vel. Test U15B 15kcfs	Vel. Test U15C 18kcfs	Vel. Test U15C 15kcfs	Demob.*	

* Mob./Demob. = Personnel & equipment mobilization / demobilization to/from site
* PXD = Pressure transducers

2.4.2 Support from Bonneville Operations Staff

The field program was conducted with support from Bonneville Operations (BON Ops) staff. In addition to assisting with set-up and disassembly of the velocity meter deployment apparatus, BON Ops:

- Located and positioned the load center to power the data collection field office;
- Conducted all gatewell dewatering and rewatering operations;
- Installed fall protection within the gatewells and assisted with pressure sensor installation;
- Administered the Hazardous Energy Control Program Lock-Out Tag-Out procedure;
- Used the gantry crane to relocate the velocity deployment apparatus from the assembly area to, and between, the test gatewells;
- Cleaned the VBSs prior to each test; and
- Aided in troubleshooting and resolution of various issues with the components of the velocity traverse system.

The Dam Operations staff were also helpful in establishing and maintaining the desired flows for testing and providing operational data.

2.5 Data Processing

Separate time series data files were generated at each velocity measurement elevation for each test and for each pressure measurement operating mode (*i.e.,* start-up, steady state, shut-down). The data files were converted from binary files to text files using the Nortek Vectrino file conversion toolbox or via the pressure measurement DAS.

2.5.1 Pressure Data

The one-second pressure data were post-processed using Microsoft Excel. Spot checks were made against the 200 Hz data, which indicated the same trends with slightly higher amplitude in the data signals. Although the 200 Hz data is available, if needed, the discussion in this report is focused on the 1-second data.

The pressure sensor DAS was configured to output the HGL relative to the installed elevation of the sensors. The timeseries depths were converted into project HGL by adding the sensor mounting elevation to the recorded HGL.

Upon review of the data, consistent differences between the forebay water surface elevation (provided by Bonneville Operations) and the gatewell water surface elevation (measured using the pressure transducers) were noted. While these differences are expected during unit operation, differences of up to approximately 0.3 ft remained during times when the units were shut down and the gatewell and forebay levels were expected to match. Although the observed difference is within the instrument accuracy, and the forebay water surface elevations provided were measured at the north end of the forebay (far from the test gatewells), the factory calibrations were adjusted as part of the data processing, based on the multiple instances of zero unit flow and initial data collected in the laboratory prior to field testing. For the no-flow cases, this procedure produced a match between the water surface indicated by adjacent sensors within approximately 0.03 ft and a match between average measured and provided forebay levels within approximately 0.02 ft.

2.5.2 Velocity Data

Post-processing of the velocity data was conducted using MATLAB software. Data files were read into MATLAB and sorted into structured[2] data sets.

The velocity data were split into the x, y, and z component velocities and simultaneously transformed into the USACE Cartesian coordinate system depicted in Figure 2-8. The data were then parsed into each discrete measurement position.

Positional parsing of the velocity data was accomplished by defining the beginning and end of each of the following time segments and multiplying the relative time by the sampling frequency (200 Hz). For example:

Position 1: Zero to 120 seconds

[2] A “structure” in MATLAB is an array with specified fields and values. It is organizationally similar to using nested folders for organization, except the variables within the structure are called using the structure name, a dot, and then the variable. For example, EL_34.WA1 is the variable WA1 under the structure EL_34.

Traverse 1: Translation between Position 1 and Position 2

Position 2: End of Traverse 1 plus 120 seconds

Traverse 2: Translation between Position 2 and Position 3

Position 3: End of Traverse 2 plus 120 seconds

Traverse 3: Translation between Position 3 and Position 4

Position 4: End of Traverse 3 plus 120 seconds

An example of the resulting variables for WA-1's x-component of velocity at Elevation 34 is as follows:

EL_34.WA1x1 – Elevation 34, WA-1 probe, x-component, 1st position

EL_34.WA1x2 – Elevation 34, WA-1 probe, x-component, 2nd position

EL_34.WA1x3 – Elevation 34, WA-1 probe, x-component, 3rd position

EL_34.WA1x4 – Elevation 34, WA-1 probe, x-component, 4th position

Once the data were parsed into their respective velocity components, elevations, and positions, the data were post-processed for removal of spurious data points.

2.5.2.1 Outlier Testing and Post-Processing

ADV data may be adversely affected by the combined effects of:

- Signal aliasing
- Velocity fluctuations
- Poor water quality
- Deployment hardware vibrations
- Close proximity to a physical boundary
- Close proximity to other acoustic sources (such as other ADVs)
- Electrical noise
- Large debris passing through the measurement volume

These influences may result in a velocity signal that exhibits *noise* in the form of velocity spikes (Photo 2-19). The Signal-to-Noise (SNR) ratio should be above 10 decibels and the correlation percentage should be above 60% at a minimum.

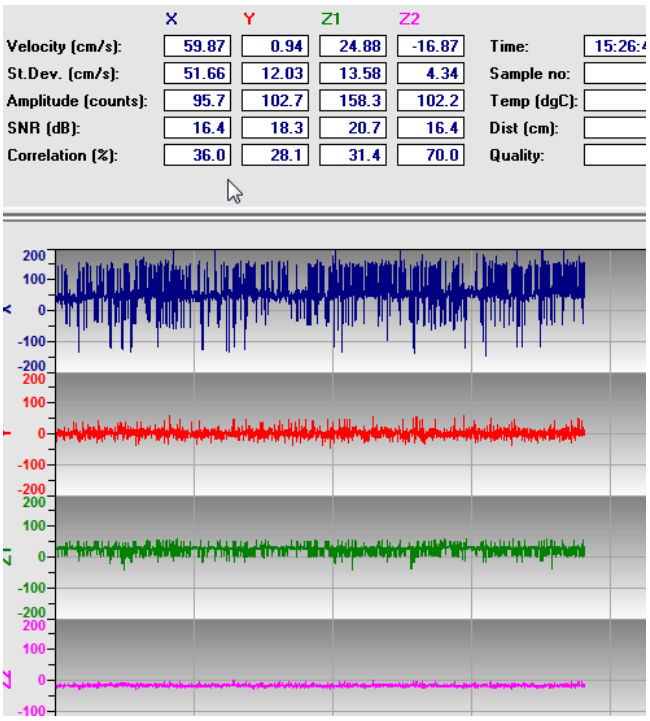


Photo 2-19 Example of "Noisy" Data

The velocity data were collected using settings which permit the highest SNR and correlation percentage possible. However, it was not possible to adjust the settings on an elevation-by-elevation basis or a position-by-position basis due to the time required to collect data over the full measurement grid.

Even when collecting clean data, post-processing helps to reduce unwanted influences of noise in the velocity signals.

To remove spikes from the time series, a kernel-density filter method was employed. The kernel density method uses a bivariate kernel density function (Duong and Hazelton, 2003) to automatically select a cutoff threshold and to calculate the major and minor axes of the phase-space ellipse used for spike detection and elimination (Islam, 2013). The method does not require iteration but does require replacement of the removed data through interpolation techniques. The method is more computationally efficient than the phase-space method, and according to the author of the technique, it can be a more robust method for filtering data which are 40% or more contaminated by spurious points.

The kernel density method identifies the "good" data as that which is the most dense (has the largest kernel density), as depicted in Figure 2-9.

The process for this method is as follows:

1) Calculate the forward (Eq. 2.12) and backward (Eq. 2.13) differences of the 1st derivative, Δu. Select the method which provides the smallest absolute value.

$$\Delta u_i = (u_{i+1} - u_i) \tag{2.12}$$

$$\Delta u_i = (u_i - u_{i-1}) \tag{2.13}$$

2) Calculate the rotation angle of the principal axes using the least-squares approximation.

$$\theta = tan^{-1}\left(\frac{N\sum_{i=1}^{N} u_i\Delta u_i - \sum_{i=1}^{N} u_i \sum_{i=1}^{N} \Delta u_i}{N\sum_{i=1}^{N} u_i^2 - \left(\sum_{i=1}^{N} u_i\right)^2}\right) \quad (2.14)$$

3) Transform the data using:

$$u_t = ucos\theta + \Delta usin\theta \; ; \; \Delta u_t = -usin\theta + \Delta ucos\theta \quad (2.15)$$

4) Rescale the data to range between 0 and 1 by using the below equations where the subscript, s, refers to the component being scaled:

$$u_s = \frac{u - \min(u)}{\max(u) - \min(u)} \; ; \; \Delta u = \frac{\Delta u - \min(\Delta u)}{\max(\Delta u) - \min(\Delta u)} \quad (2.16)$$

5) Once the data has been rescaled, the kernel density estimation may be obtained using Eq. 2.17. Here, h_u and $h_{\Delta u}$ are the bandwidths along the two axes about the identified peak and are defined as a percentage of the grid size used to divide the *u and Δu axes*. Figure 2-9 illustrates the kernel density for the 2013 field data correlating with gatewell 14A, El. 34 ft., WA-1, position 1.

$$\hat{f}(u, \Delta u) = \frac{1}{2\pi N h_u h_{\Delta u}} \sum_i^N exp\left[-\frac{(u-u_i)^2}{(2h_u^2)} - \frac{(\Delta u - \Delta u_i)^2}{(2h_{\Delta u}^2)}\right] \quad (2.17)$$

6) After the peak has been identified, an ellipse may be defined surrounding the peak. The size of the ellipse is determined as the extent where the slope of the peak falls off below 0.4, while moving outward from the central peak, as defined in Eq. 2.18. Here n_u *and* $n_{\Delta u}$ denote the size of the grid used to calculate the kernel density (e.g., 256 x 256), and the subscript, *p*, denotes the peak. Data that lay outside of the ellipse is defined as spurious data and are removed from the original time series and replaced with linearly interpolated values.

$$S_u = \frac{n_u|\Delta\hat{f}(u_{i+1} - u, \Delta u_p)|}{\hat{f}(u_p, \Delta u_p)} \leq 0.4 \; ; \; S_{\Delta u} = \frac{n_{\Delta u}|\Delta\hat{f}(u_p, \Delta u_{i+1} - \Delta u)|}{\hat{f}(u_p, \Delta u_p)} \leq 0.4 \quad (2.18)$$

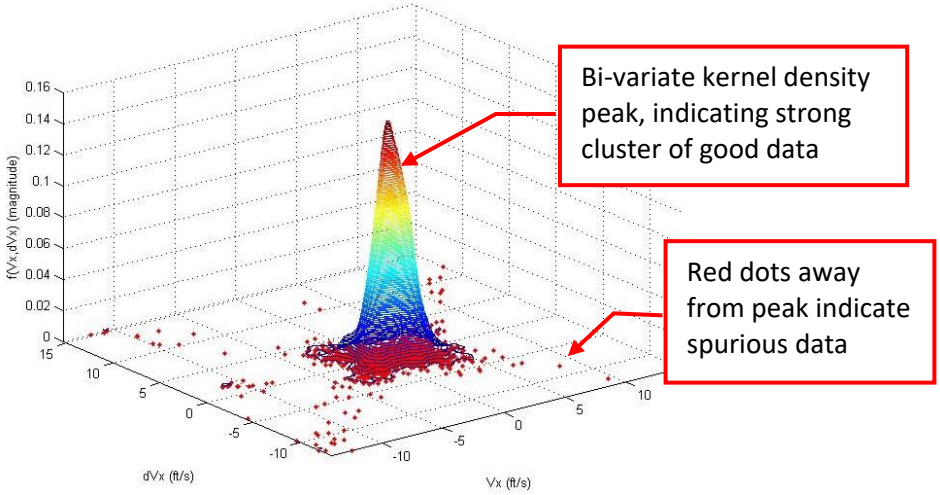


Figure 2-9 Example Kernel Density Estimation

2.5.2.2 Statistical Analysis

After despiking, the mean velocity components and turbulence was computed. The root mean square (RMS) of the velocity fluctuations about the mean (mathematically equal to the standard deviation about the mean of the samples) was calculated as an indicator of turbulence.

$$RMS_i = \sqrt{\frac{\Sigma(v_{i,n} - \bar{v}_i)^2}{N}} \tag{2.19}$$

$$RMS = \sqrt{{RMS_x}^2 + {RMS_y}^2 + {RMS_z}^2} \tag{2.20}$$

2.5.2.3 Fail Testing Post-Processed Data

Post-processing with a despiking filter may still provide questionable results if the initial time series collected were compromised by the items noted in Section 2.5.2.1.

Reduced data quality due to extreme velocity fluctuations, poor water quality (such as aerated water), and deployment hardware vibrations are the most difficult to control/avoid. If data collected at a particular location is excessively compromised, the despiking process could still produce a spurious result. A good indication of this is if the RMS of velocity fluctuation is greater than 2 times the mean of the resultant or if the mean of the velocity is zero but contains a large velocity fluctuation. Accordingly, despiked data were rejected if this condition was met:

$$If\ \frac{RMS}{V_{tot}} > 2, then\ Fail \tag{2.21}$$

3.0 Results and Discussion

3.1 Pressure Data

The pressure data are presented by test gatewell slot in the following Sections. For reference, Slot 14A was not equipped with flow control devices and Slot 15A included a flow control corbel. Note that Unit 13 was out of service, so Unit 12 was operated as the "adjacent unit" during pressure testing.

3.1.1 Gatewell Slot 14A

The sequence of Unit 14A tests is shown graphically in Figure 3-1. The first test commenced with Unit 14 operating at approximately 13 kcfs and the discharge was ramped to approximately 18 kcfs. All subsequent tests involved either unit shut-down, steady state operation at 18 kcfs, or unit start-up from zero-flow to 18 kcfs, as summarized in Table 2-2. The forebay and unit discharge data were provided by Bonneville Operations at a 2-second temporal resolution.

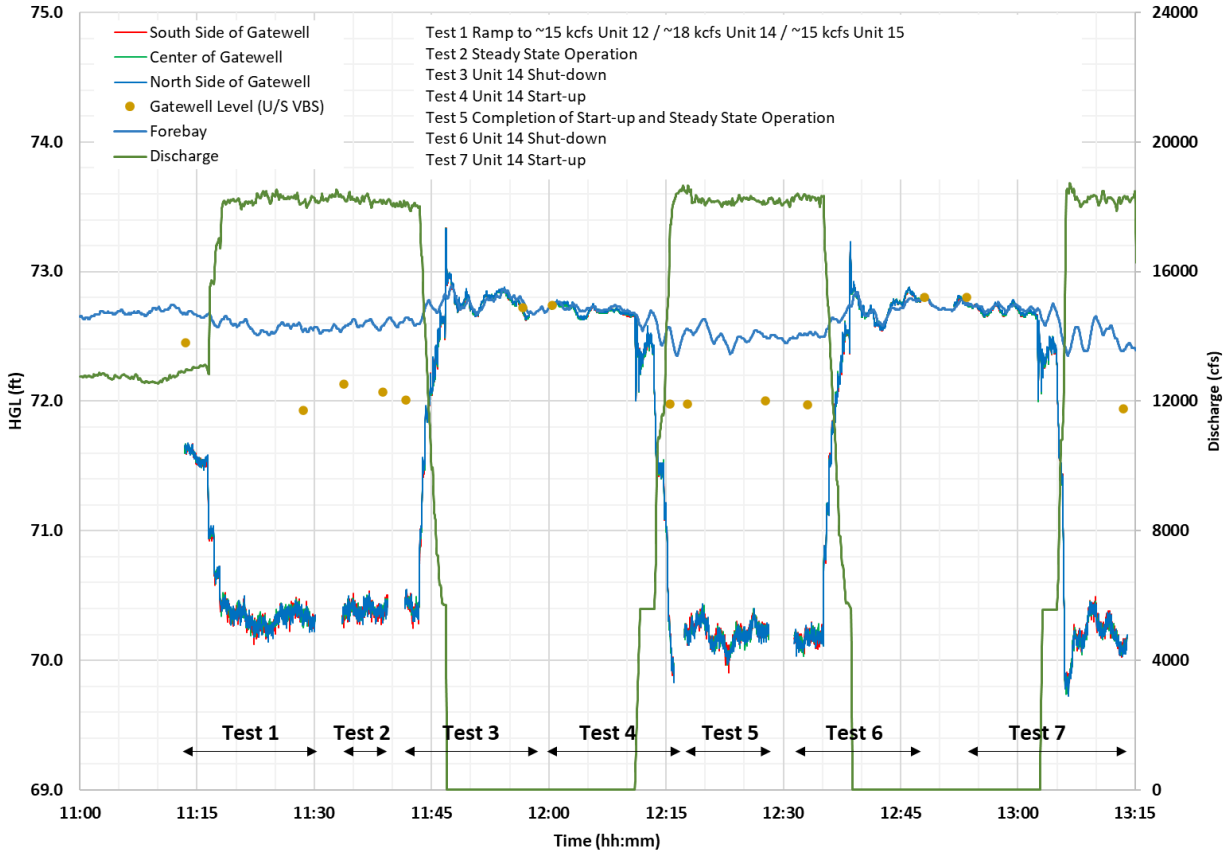


Figure 3-1 Pressure Test Sequence – Unit 14A

A summary of forebay water level, discharge, and measured HGLs for steady-state operations within each pressure test is presented in Table 3-1. For 18 kcfs operation, the difference in forebay level and

HGL at the pressure measurement location averaged 2.26 ft. When the Unit was not operating, the standard deviation of the pressure sensor signals closely matched that of the forebay level despite the difference in sampling frequency (1 Hz PXD versus 0.5 Hz Forebay). When the Unit was operating, the standard deviation of the pressure sensor signal was up to four times that of the forebay readings, which is attributed primarily to turbulent velocity fluctuations in the flow leaving the gatewell. Subtracting the forebay standard deviations from the PXD standard deviations provides an indication of the variability of gatewell exit velocities. On average, the gatewell exit velocities varied by 1.2 fps (1 standard deviation) and a majority of the velocity variations were within 2.4 fps (2 standard deviations).

Table 3-1 Summary of Steady-State Pressure Test Results – Unit 14A

Test	Start	End	Discharge (cfs)		Forebay (ft)		PXD Level (ft)		Level
			Avg	StDev	Avg	StDev	Avg	StDev	Diff. (ft)
1	11:20:00	11:28:34	18,248	124	72.57	0.03	70.33	0.06	2.24
2	11:33:44	11:38:44	18,217	89	72.59	0.02	70.39	0.04	2.20
3	11:41:42	11:43:00	18,030	78	72.62	0.02	70.42	0.06	2.20
	11:47:50	11:56:42	0	0	72.77	0.05	72.78	0.05	0.00
4	12:00:27	12:10:00	0	0	72.72	0.02	72.70	0.04	0.02
5	12:17:45	12:27:45	18,197	105	72.51	0.06	70.21	0.08	2.29
6	12:33:05	12:35:00	18,259	74	72.52	0.01	70.19	0.04	2.32
	12:39:50	12:48:05	0	0	72.71	0.06	72.72	0.09	-0.02
7	12:53:29	13:02:30	0	0	72.72	0.02	72.70	0.03	0.02
	13:09:48	13:13:29	18,220	121	72.53	0.07	70.23	0.09	2.30

The measured HGLs from each individual test are presented in Figure 3-2 through Figure 3-8. There were no appreciable differences in the pressure recorded at the three lateral positions for any of the tests. During all steady state operations, the pressure signal followed a sine-wave pattern which followed the fluctuation in forebay level, typically on a period of approximately 2 to 3 minutes.

For all ramping of flows, the data signal exhibited a stair-step signature until steady flow was achieved and the HGL decreased by approximately 2.9 ft. The stair-steps correlated with alternating increases and leveling-out of flow produced by the governor on the turbine units. When the Unit was ramped from 13 kcfs to 18 kcfs (Test 1, Figure 3-2), the steps were well defined with minimal oscillation in HGL. When the Unit was ramped from no-flow up to 18 kcfs, however, (Tests 4 and 7, Figure 3-5 and Figure 3-8) the steps were more jagged, particularly at the initiation of turbine operation. For these cases, pressure fluctuations of approximately 0.6 ft WC were attenuated over a 2.5-minute duration with a period of 10 to 20 seconds.

The pressure data also exhibited a stair-step signature for unit shut-downs (Tests 3 and 6, Figure 3-4 and Figure 3-7), although the steps were more frequent, recurring on an interval of approximately 20 seconds. This, again, was a result of the governor on the turbine Unit. Each successive increase in HGL (corresponding to a decrease in discharge) was followed by a brief pressure drop of approximately 0.2 ft WC, with the peak resulting from the incoming flow momentum. From full flow to no flow, the HGL increased approximately 2.5 ft. Near the completion of turbine shut-down, the flow was dropped from approximately 5 kcfs to 0. This produced a spike in HGL with a peak-to-peak amplitude of approximately 0.8 ft WC and maximum value above the forebay water surface elevation.

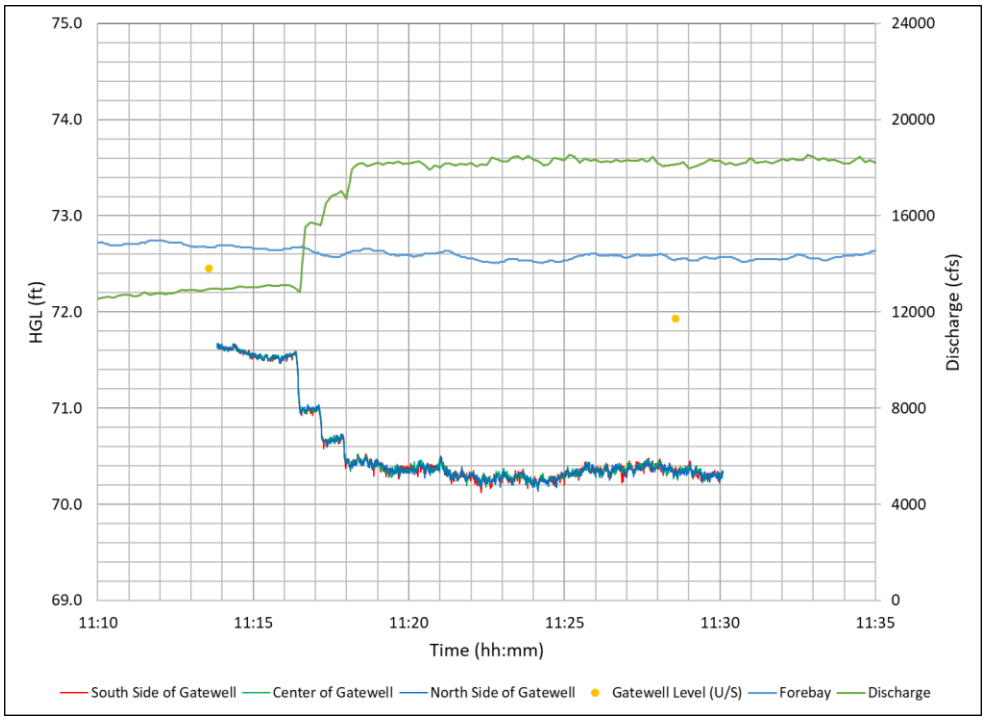


Figure 3-2 Pressure Test 1 – Unit 14A – Ramp Up from 13 kcfs to 18 kcfs

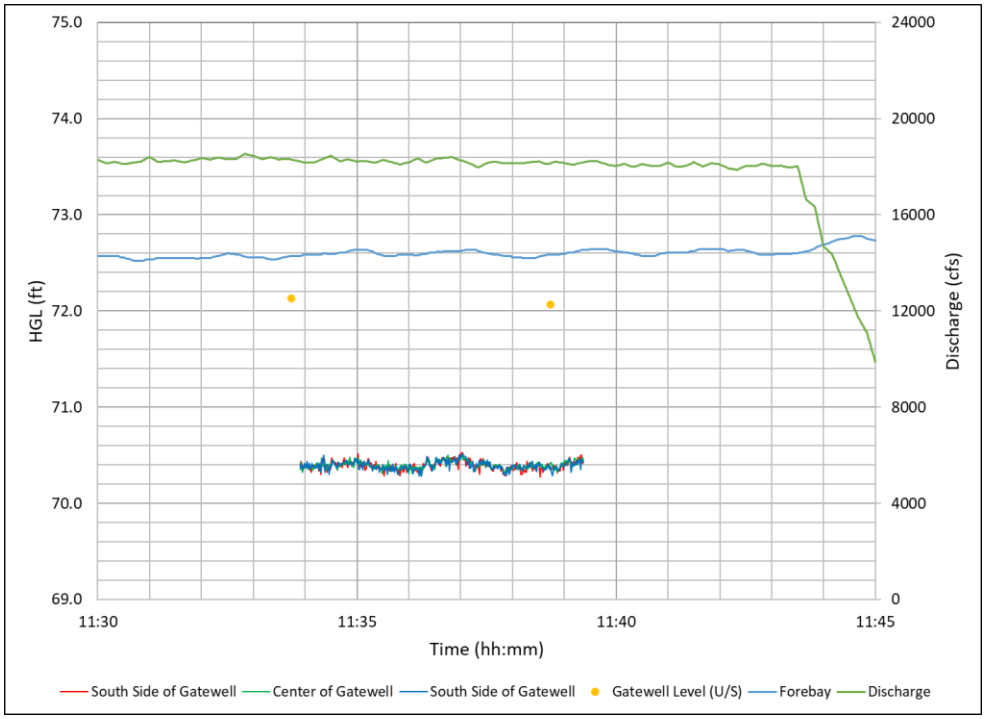


Figure 3-3 Pressure Test 2 – Unit 14A – 18 kcfs Steady State

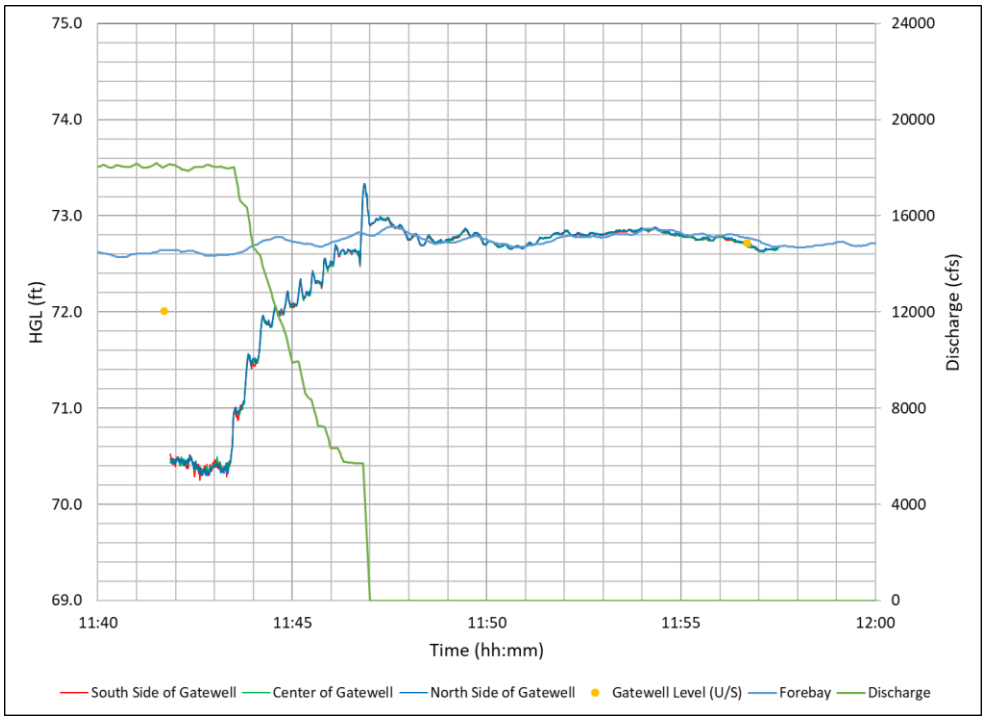


Figure 3-4 Pressure Test 3 – Unit 14A – Shut-Down

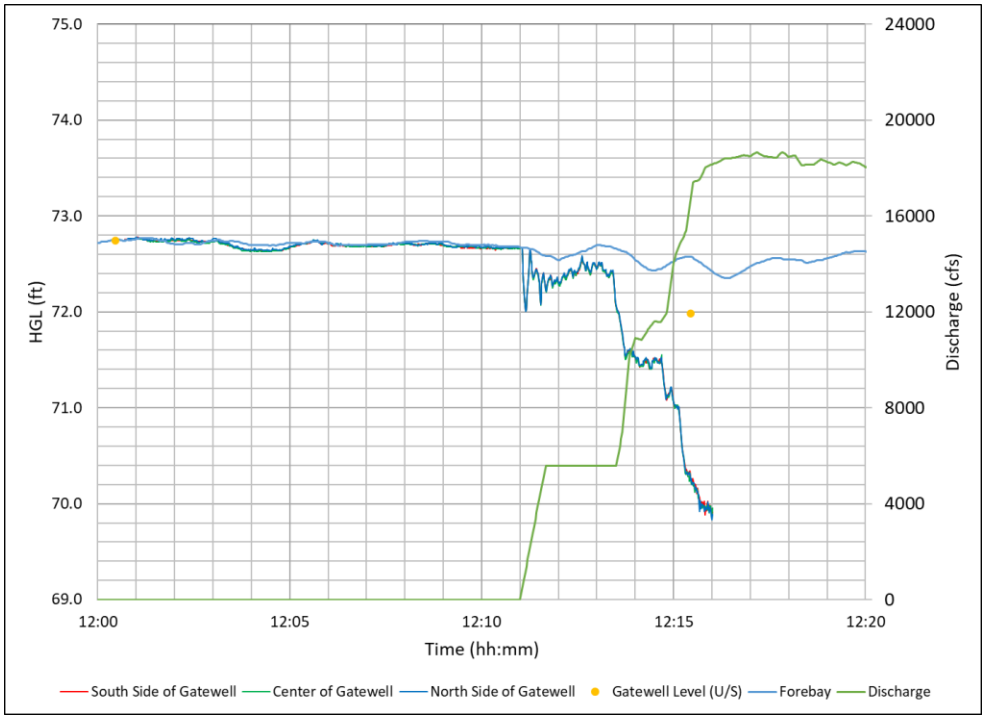


Figure 3-5 Pressure Test 4 – Unit 14A – Start-Up to 18 kcfs

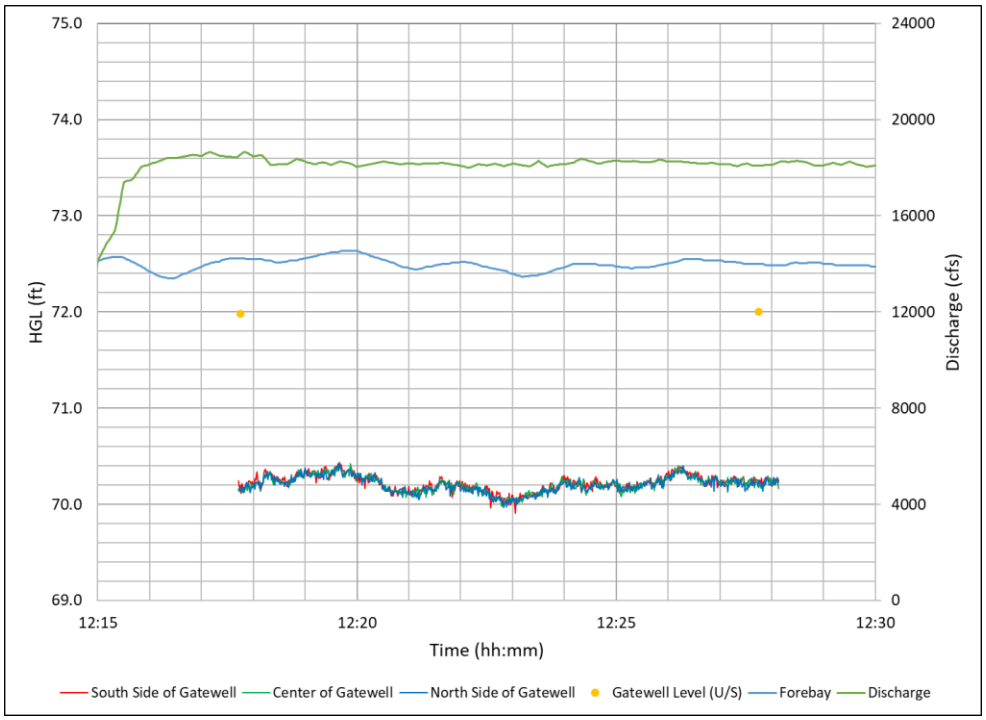


Figure 3-6 Pressure Test 5 – Unit 14A – 18 kcfs Steady State

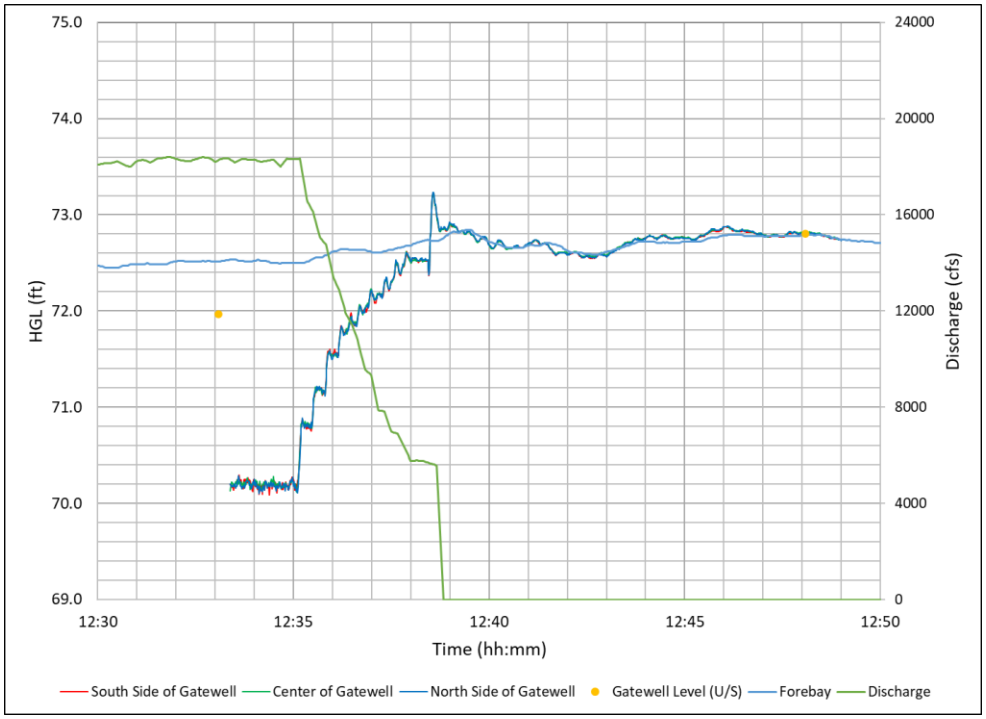


Figure 3-7 Pressure Test 6 – Unit 14A – Shut-Down

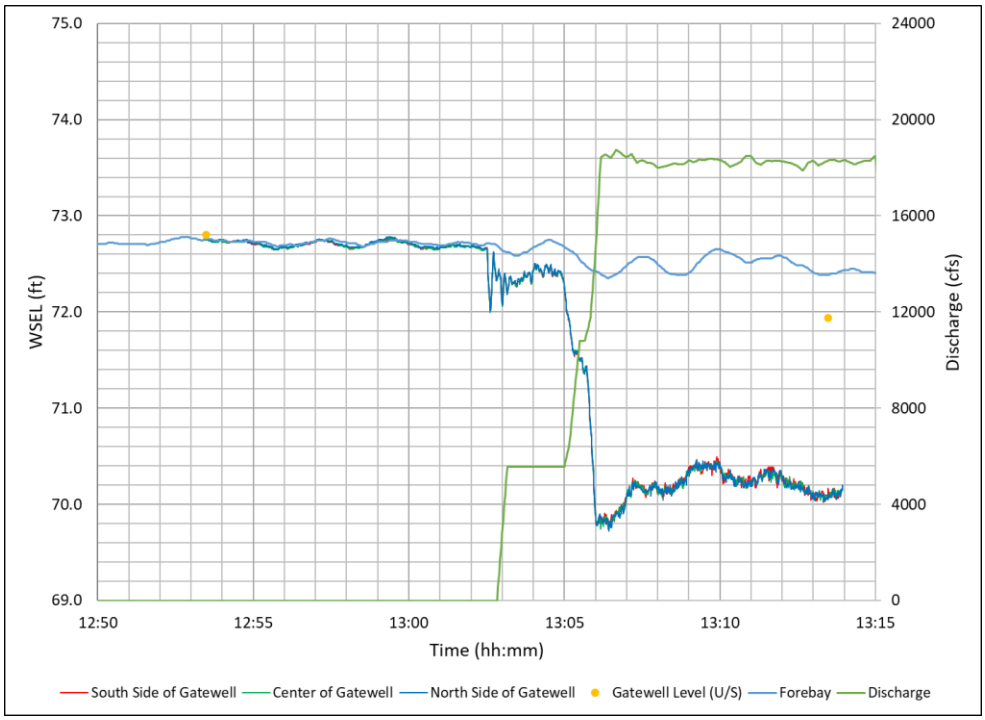


Figure 3-8 Pressure Test 7 – Unit 14A – Start-Up to 18 kcfs

3.1.2 Gatewell Slot 15A

The sequence of Unit 15A tests is shown graphically in Figure 3-9. As with tests conducted in Unit 14A, the first test commenced with Unit 15 operating at approximately 13 kcfs and all subsequent tests involved either unit shut-down, steady state operation at 18 kcfs, or unit start-up from zero-flow to 18 kcfs. Forebay data was available at 2 second temporal resolution from Bonneville Operations. However, the corresponding unit operations data were lost or corrupted during retrieval, so unit discharges were only available at a 5-minute temporal resolution.

A summary of forebay water level, discharge, and PXD HGLs for steady-state operations within each pressure test is presented in Table 3-2. For 18 kcfs operation, the difference in forebay level and HGL at the pressure measurement location averaged 1.96 ft. This is approximately 0.3 ft less than observed in Slot 14A. Because the unit discharges were virtually identical for Unit 14 and Unit 15 tests, and the VBSs were cleaned prior to testing, the reduced differential between forebay level and PXD HGL is indicative of a decrease in gatewell flow in Unit 15 (an intended function of the flow control corbel).

As with Unit 14A, the standard deviation of the pressure sensor signals closely matched that of the forebay level for Unit 15A tests when the unit was not operating. The difference of the forebay and PXD standard deviations indicates that, on average, the gatewell exit velocities varied by 1.4 fps (1 standard deviation) and a majority of the velocity variations were within 2.8 fps (2 standard deviations).

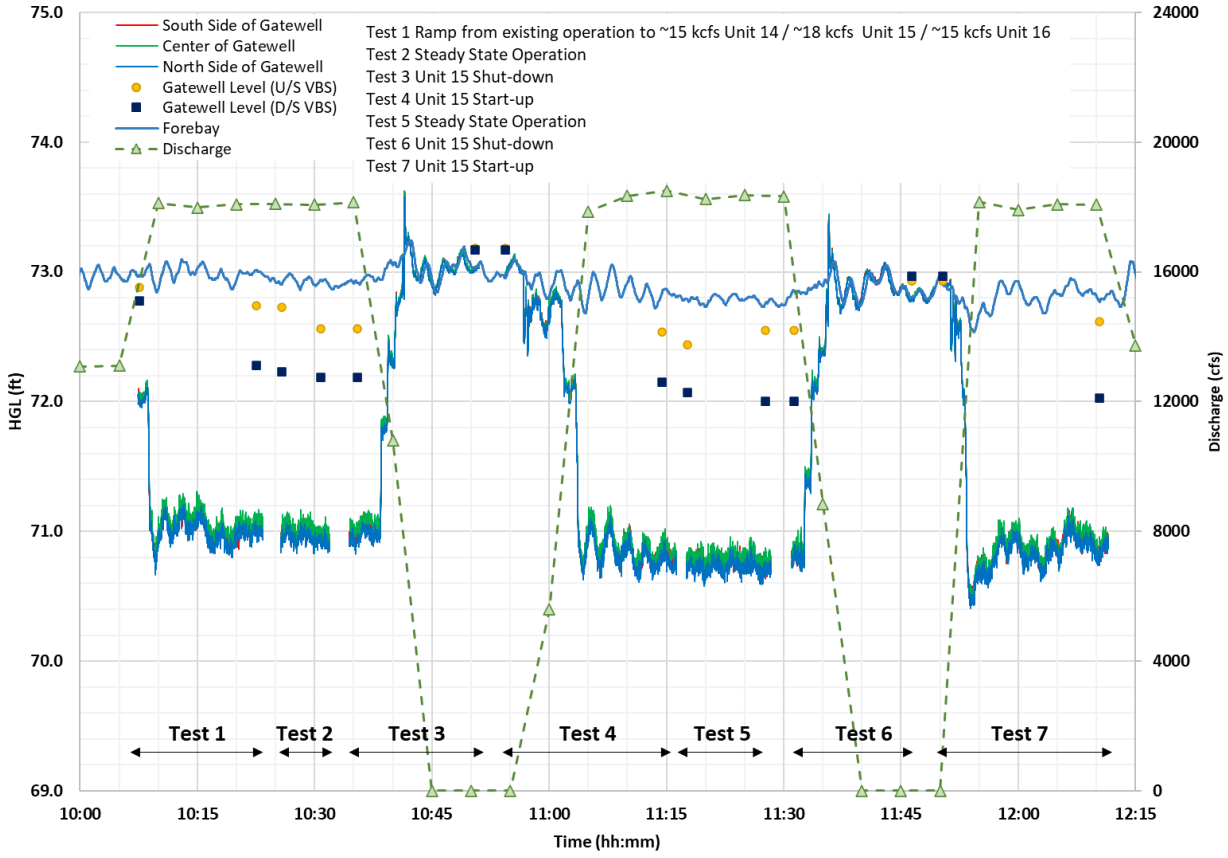


Figure 3-9 Pressure Test Sequence – Unit 15A

Table 3-2 Summary of Steady-State Pressure Test Results – Unit 15A

Test	Start	End	Discharge (cfs)		Forebay (ft)		PXD Level (ft)		Level
			Avg	StDev	Avg	StDev	Avg	StDev	Diff. (ft)
1	10:11:02	10:22:33	18067	-	72.99	0.05	71.04	0.09	1.95
2	10:25:47	10:30:47	18082	-	72.93	0.03	70.99	0.06	1.94
3	10:35:29	10:38:16	18143	-	72.95	0.02	71.03	0.06	1.92
	10:41:58	10:50:29	0	-	73.04	0.10	73.03	0.08	0.01
4	11:05:38	11:14:23	18238	-	72.87	0.08	70.86	0.11	2.01
5	11:17:41	11:27:41	18362	-	72.79	0.03	70.76	0.06	2.02
6	11:38:23	11:46:22	0	-	72.90	0.08	72.89	0.09	0.00
7	11:50:21	11:51:15	0	-	72.88	0.01	72.90	0.01	-0.02
	11:55:49	12:10:21	18025	-	72.82	0.07	70.89	0.11	1.94

The measured HGLs from each individual test are presented in Figure 3-10 through Figure 3-16. During unit operation, the HGL recorded at the north side of the gatewell was consistently lower than the other measurement locations. This suggests there may be a slight bias in gatewell exit flow toward the north.

Like the tests conducted in Unit 14A, the pressure signal followed a sine-wave pattern which mimicked fluctuations in the forebay level.

During ramping operations, the HGL decreased in a stair-step fashion, as discussed in Section 3.1.1, and the HGL decreased by approximate 2.2 ft (versus 2.9 ft in Unit 14A). Other than the Unit 15 start-up occurring over a longer duration for Test 4, general trends in HGL observed for Tests 1, 4, and 7 (Figure 3-10, Figure 3-13, and Figure 3-16) were similar to those discussed for Unit 14 in Section 3.1.1. The general trend in HGL during shut-down of Unit 15 (Tests 3 and 6, Figure 3-12 and Figure 3-15) also closely resembled that of Unit 14, though the HGL increased by approximate 2 ft (versus 2.5 ft in Unit 14A).

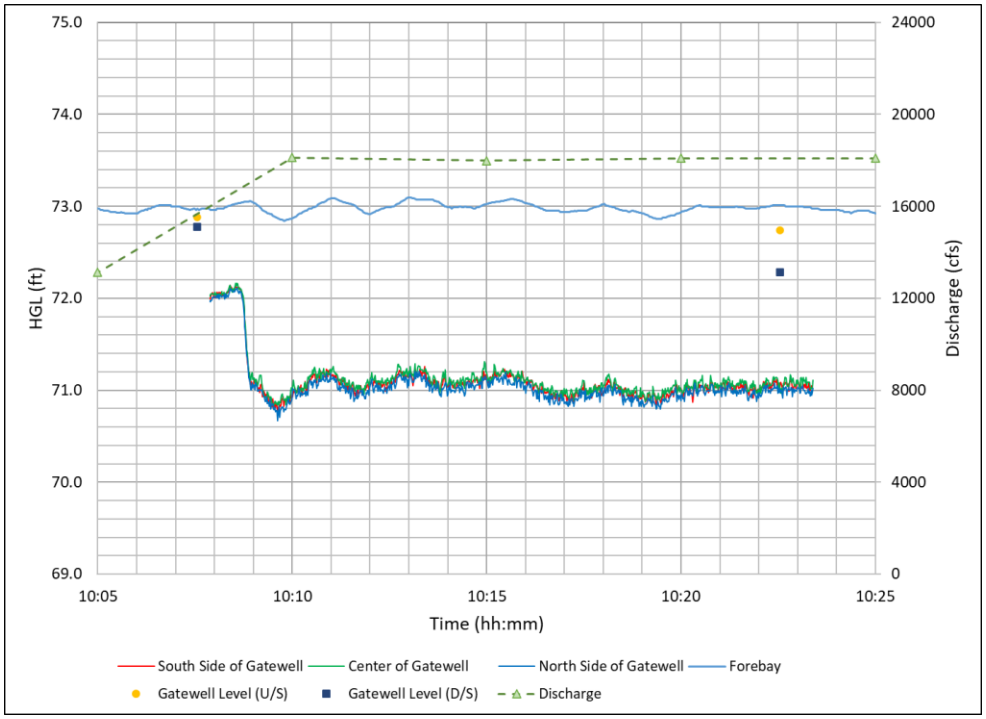


Figure 3-10 Pressure Test 1 – Unit 15A – Ramp Up from 13kcfs to 18 kcfs

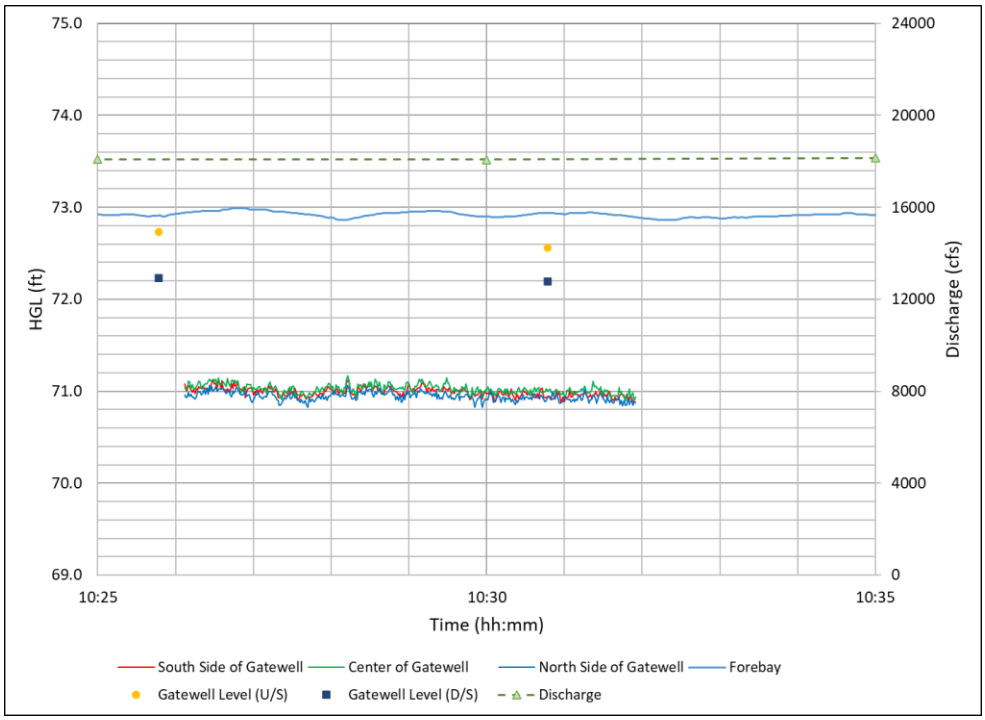


Figure 3-11 Pressure Test 2 – Unit 15A – 18 kcfs Steady State

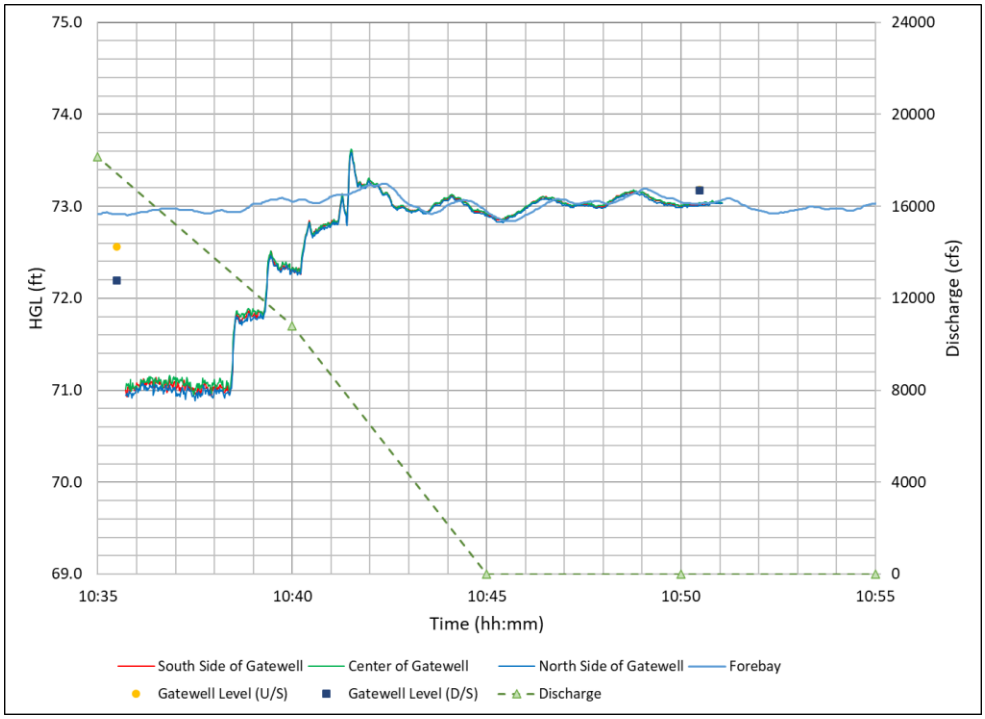


Figure 3-12 Pressure Test 3 – Unit 15A – Shut-Down

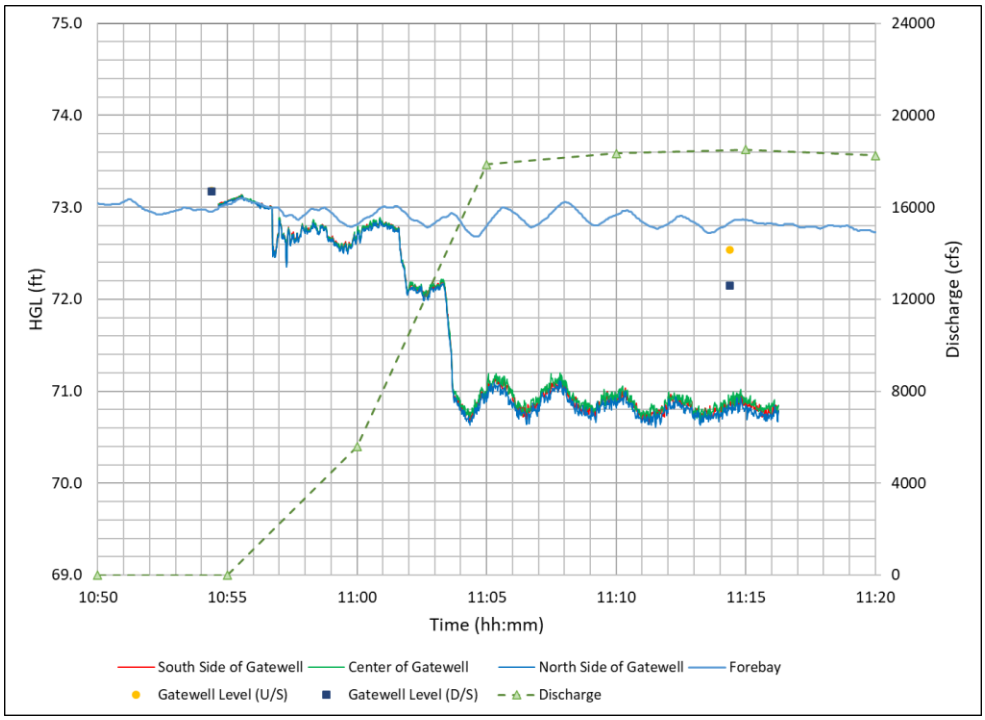


Figure 3-13 Pressure Test 4 – Unit 15A – Start-Up to 18 kcfs

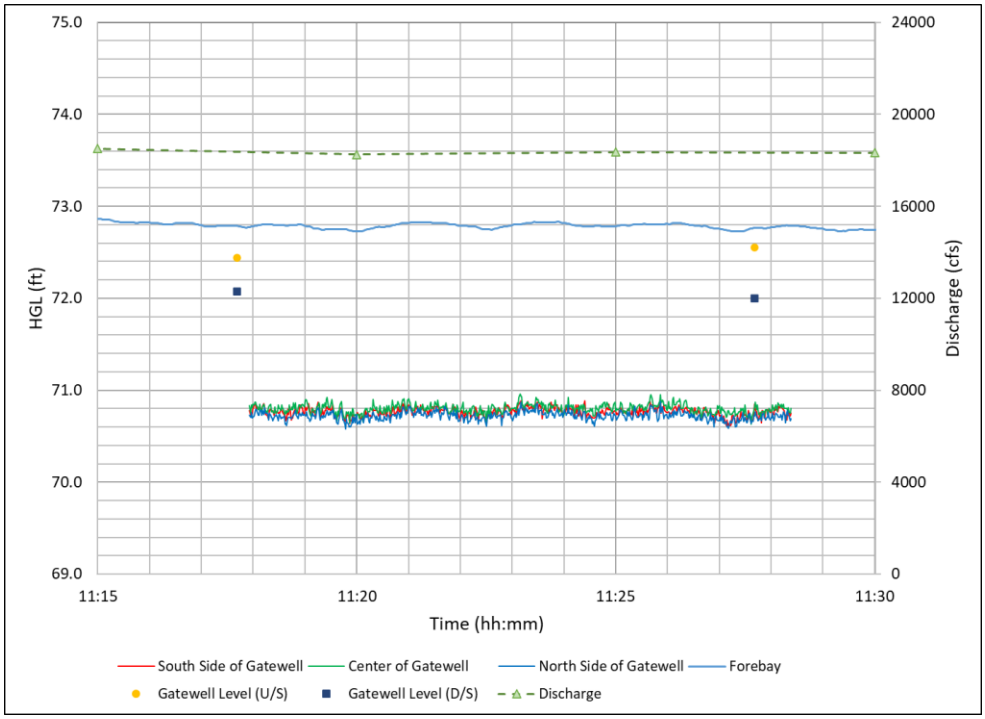


Figure 3-14 Pressure Test 5 – Unit 15A – 18 kcfs Steady State

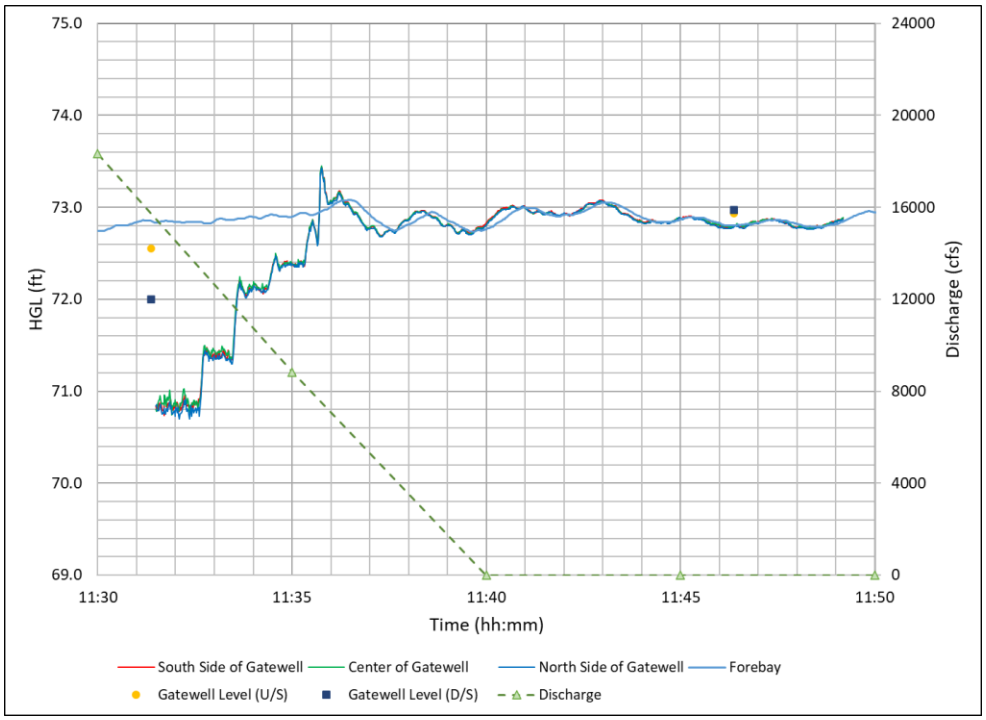


Figure 3-15 Pressure Test 6 – Unit 15A – Shut-Down

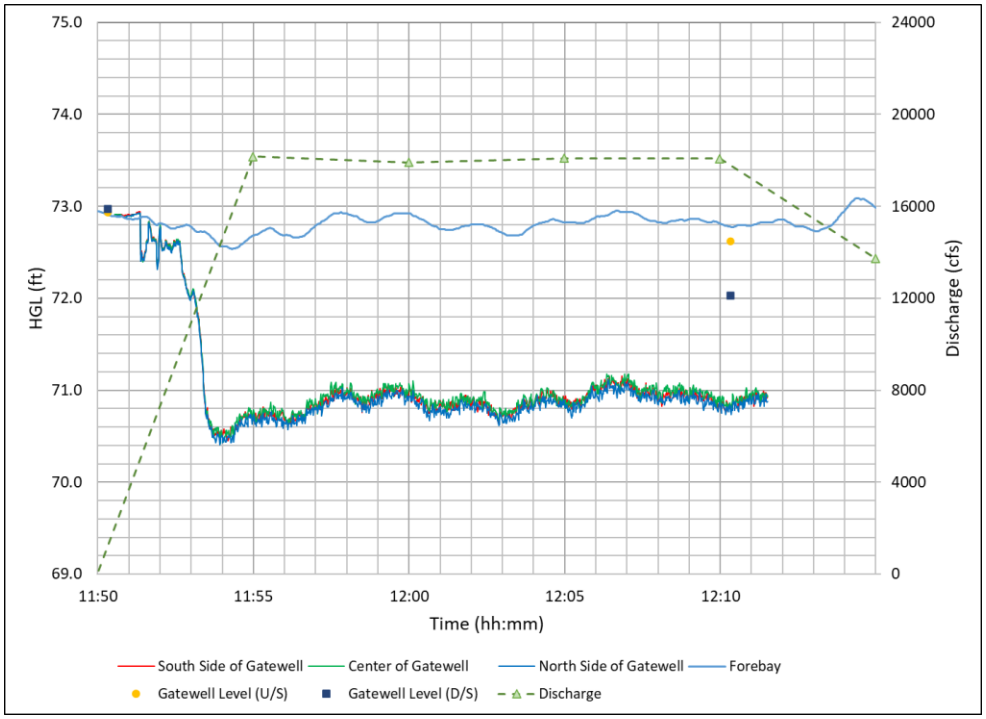


Figure 3-16 Pressure Test 7 – Unit 15A – Start-Up to 18 kcfs

3.2 Velocity Data

Post-processed data is presented by unit discharge in the following Sections. Tabulated data from all velocity tests are presented in Appendix B.

3.2.1 18 kcfs Unit Discharge

Daily hydrologic conditions and unit operations are summarized in Figure 3-17 through Figure 3-19. The forebay level was constant within approximately 0.5 ft, except for Test 3 (Slot C), for which the forebay level fluctuated approximately 0.7 feet during testing. The forebay level declined steadily during Test 1 (Slot A), stepped up approximately one-third of the way through Test 3 (Slot B) and climbed steadily during Test 5 (Slot C).

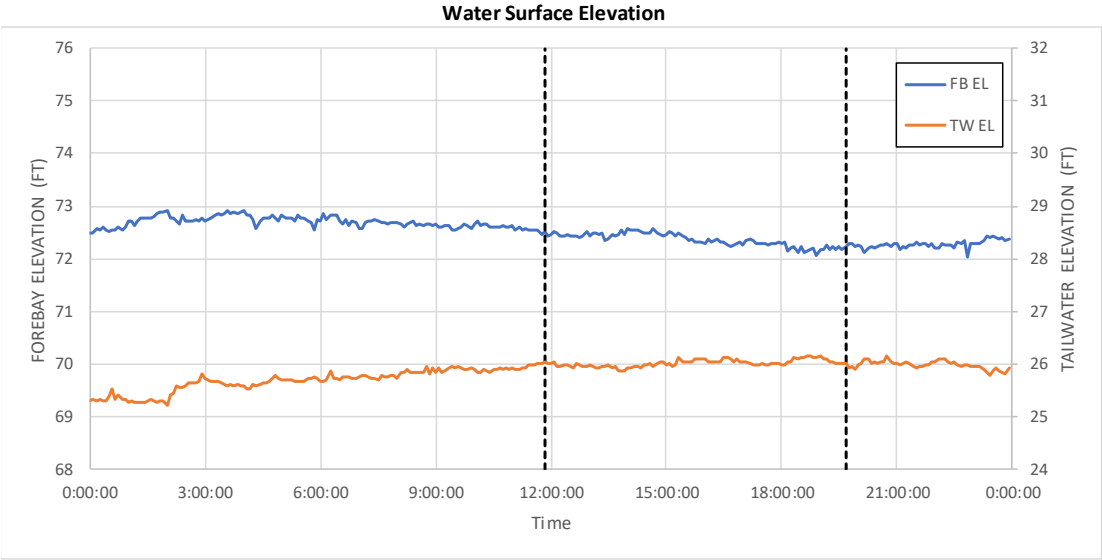
Units 13 and 17 were out of service for the duration of testing. Units 14 through 16 were ramped to the target discharges a minimum of 15 minutes before the commencement of data collection and were held relatively constant throughout the data collection period. All three Units were typically operating in the 14 to 15 kcfs range for several hours prior to the data collection window, except for Test 5 (Slot C) where the discharge ranged between approximately 13 and 15 kcfs with some erratic fluctuation in the hour and a half leading up to the test window. Despite this fluctuation, minimal flow ramping was required for Units 14 and 16 while the discharge through Unit 15 was typically increased by 4 to 5 kcfs to facilitate the tests.

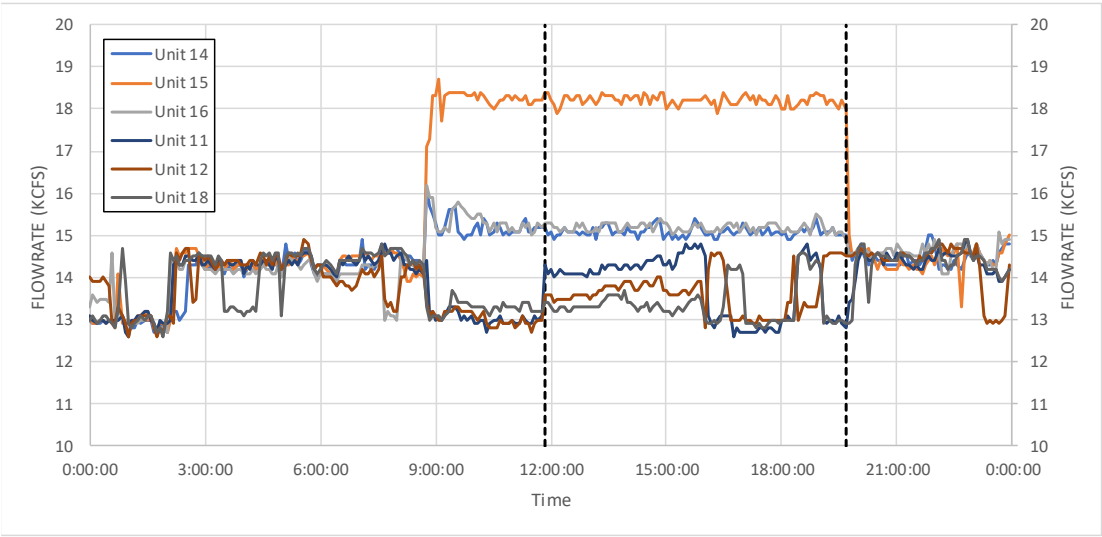
All other operational Units were modulated leading up to and throughout the testing windows, typically between 13 and 14.5 kcfs. The most stable total powerhouse discharge in the hours prior to testing occurred for Test 3 (Slot B). The least stable total powerhouse discharge within the testing windows occurred for Test 5 (Slot C), for which Units 11 and 12 were offline for the first 20 to 30% of the data collection window.

It is considered unlikely that the fluctuations in forebay level observed during the testing windows would have significant influence on the flow patterns within the gatewell, particularly at measurement elevations below the top of the VBS.

The flow ramping required prior to and during the test windows is also considered unlikely to have dramatic influence on the gatewell flow patterns, because the total powerhouse flow was largely stable, and therefore, the macro-scale flow circulation patterns within the forebay were likely as stable as could be expected in advance of the testing windows. Nonetheless, the largest excursion in powerhouse flow, which occurred during data collection in Slot C (Test 5), and the localized effects of unit flow modulation should be considered in the interpretation of the velocity data.

TEST NO. 1							
Data Collection Unit	**15A**	**Flow Condition**				**18 KCFS**	
DATE	1 June 2022	DIFFERENTIAL HEAD ACROSS VBS					
BEGIN DATA COLLECTION	11:50	11:53	0.39	16:29	0.49		
END DATA COLLECTION	19:40	14:23	0.49	19:28	0.44		

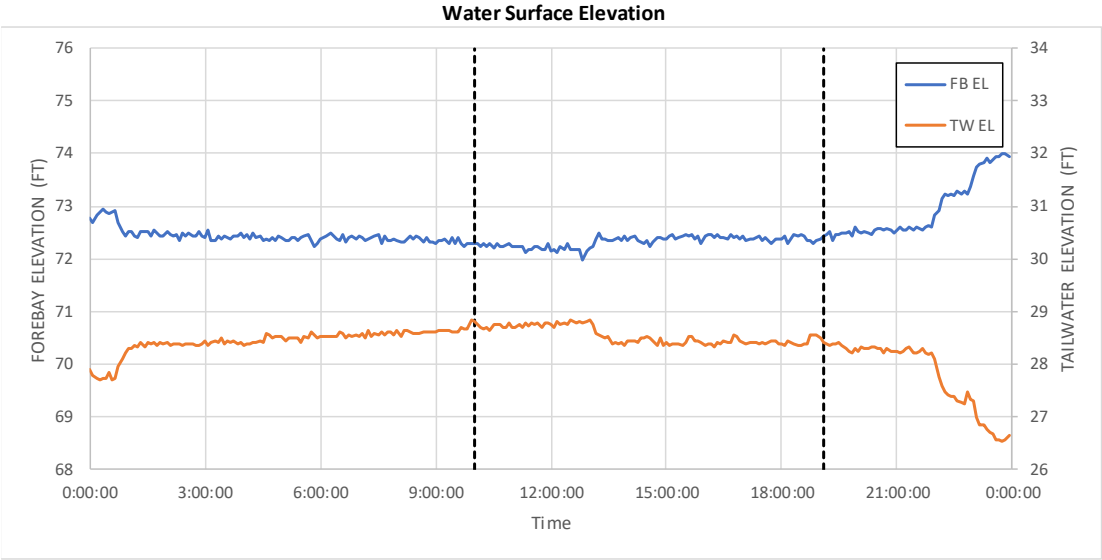


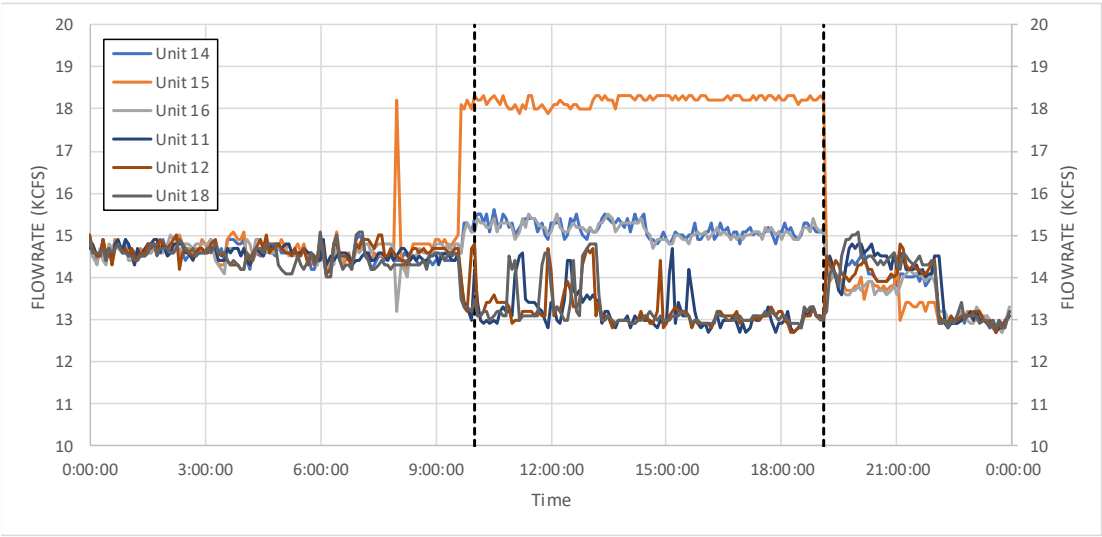


HYDRAULICS & HYDROLOGY SUMMARY FOR PERIOD OF DATA COLLECTION								
AVERAGE TOTAL FLOW			346.5		**AVERAGE SPILLWAY FLOW**			147.9
B2 AVERAGE FLOW			89.3		**FISH 1**	2.3	**FISH 2**	2.3
FLOW	**UNIT 11**	**UNIT 12**	**UNIT 13**	**UNIT 14**	**UNIT 15**	**UNIT 16**	**UNIT 17**	**UNIT 18**
AVERAGE	13.8	13.6	0.0	15.1	18.2	15.2	0.0	13.4
MAX	14.8	14.6	0.0	15.4	18.4	15.5	0.0	14.6
MIN	12.6	12.8	0.0	14.9	17.9	14.9	0.0	12.8
STDEV	0.74	0.49	0.00	0.12	0.12	0.10	0.00	0.46
AVERAGE FOREBAY W/S ELEVATION			72.4		**AVERAGE TAILWATER W/S ELEVATION**			26.0
B2CC	OPEN		**T.I.E**	OUT		**NO. ORIFICE OPEN**		1

Figure 3-17 Hydrologic and Operational Data – Test 1 – Slot A – 18 kcfs

TEST NO. 3							
Data Collection Unit	**15B**	**Flow Condition**				**18 KCFS**	
DATE	6 June 2022	DIFFERENTIAL HEAD ACROSS VBS					
BEGIN DATA COLLECTION	10:00	10:00	0.48	16:33	0.52		
END DATA COLLECTION	19:05	12:58	0.51	19:01	0.57		

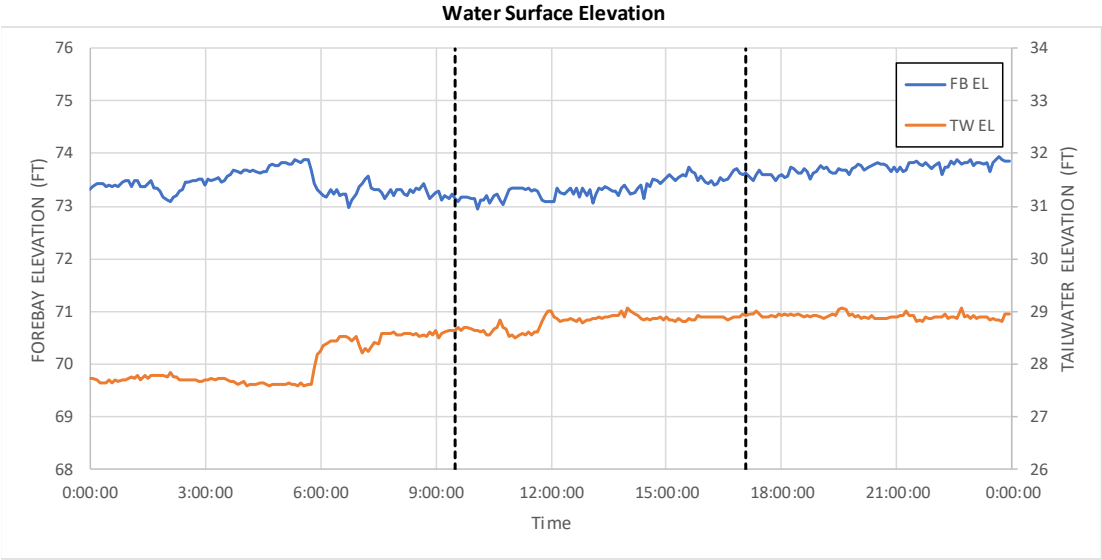


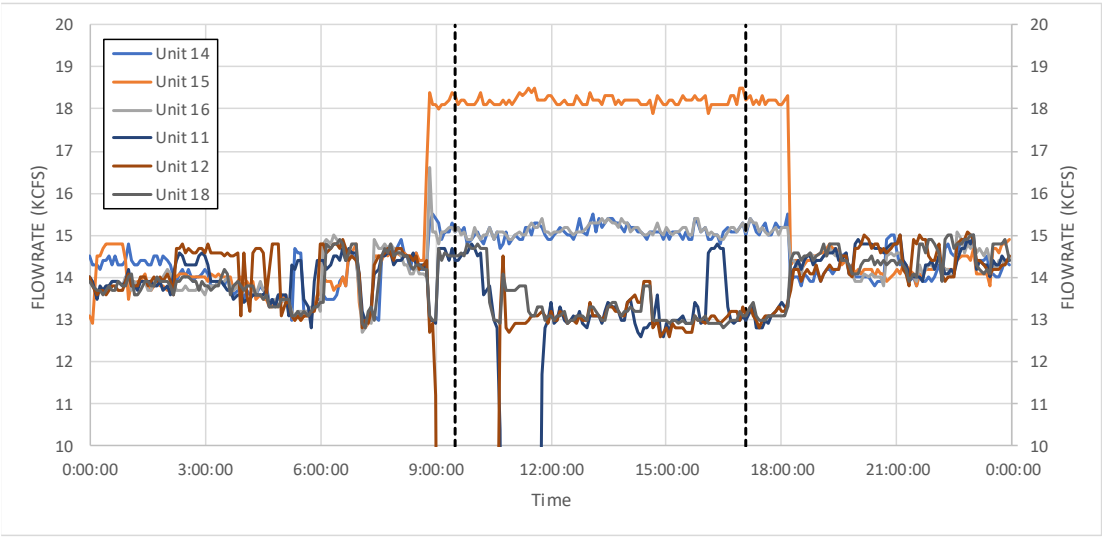


HYDRAULICS & HYDROLOGY SUMMARY FOR PERIOD OF DATA COLLECTION								
AVERAGE TOTAL FLOW			392.8		**AVERAGE SPILLWAY FLOW**			193.8
B2 AVERAGE FLOW			88.1		**FISH 1**	2.2	**FISH 2**	2.3
FLOW	**UNIT 11**	**UNIT 12**	**UNIT 13**	**UNIT 14**	**UNIT 15**	**UNIT 16**	**UNIT 17**	**UNIT 18**
AVERAGE	13.2	13.2	0.0	15.2	18.2	15.1	0.0	13.2
MAX	14.7	14.8	0.0	15.6	18.3	15.5	0.0	14.8
MIN	12.7	12.7	0.0	14.8	17.9	14.7	0.0	12.8
STDEV	0.43	0.43	0.00	0.20	0.11	0.17	0.00	0.48
AVERAGE FOREBAY W/S ELEVATION			72.3		**AVERAGE TAILWATER W/S ELEVATION**			28.5
B2CC	OPEN		**T.I.E**	OUT		**NO. ORIFICE OPEN**		1

Figure 3-18 Hydrologic and Operational Data – Test 3 – Slot B – 18 kcfs

TEST NO. 5					
Data Collection Unit	**15C**	**Flow Condition**			**18 KCFS**
DATE	8 June 2022	DIFFERENTIAL HEAD ACROSS VBS			
BEGIN DATA COLLECTION	9:30	9:30	0.44	16:57	0.64
END DATA COLLECTION	17:05	12:18	0.48		





HYDRAULICS & HYDROLOGY SUMMARY FOR PERIOD OF DATA COLLECTION								
AVERAGE TOTAL FLOW			401.9		**AVERAGE SPILLWAY FLOW**			203.4
B2 AVERAGE FLOW			84.5		**FISH 1**	2.3	**FISH 2**	2.2
FLOW	**UNIT 11**	**UNIT 12**	**UNIT 13**	**UNIT 14**	**UNIT 15**	**UNIT 16**	**UNIT 17**	**UNIT 18**
AVERAGE	11.6	11.2	0.0	15.1	18.2	15.1	0.0	13.3
MAX	14.8	14.5	0.0	15.5	18.5	15.4	0.0	14.8
MIN	0.0	0.0	0.0	14.7	17.9	14.9	0.0	12.8
STDEV	4.56	4.62	0.00	0.17	0.12	0.14	0.00	0.55
AVERAGE FOREBAY W/S ELEVATION			73.3		**AVERAGE TAILWATER W/S ELEVATION**			28.8
B2CC	OPEN		**T.I.E**	OUT		**NO. ORIFICE OPEN**		1

Figure 3-19 Hydrologic and Operational Data – Test 5 – Slot C – 18 kcfs

A full traverse of measurement locations was achieved in Slot A (Test 1). Positioning issues were encountered in Slots B and C (Tests 3 and 5) at the lowest two measurement elevations. For these tests, the traversing beam was either unreliable in travelling to the intended positions, was knocked out of position during data collection, or became unresponsive. Therefore, for Tests 3 and 5, velocity measurements were made only at the centerline (home) position at elevations 34 ft and 35 ft.

It was thought that the issues encountered during Test 3 were related to the high flow velocities and turbulence within the gatewell and the limited holding torque of the drive motor. After the completion of Test 5, during which the traversing beam became unresponsive, an inspection of the drive belt and interior of the aluminum extrusion revealed a significant accumulation of gritty sediment (Photo 3-1 through Photo 3-3). This condition was addressed by removing the end cap of the traversing beam and flushing the interior of the aluminum extrusion with the high-pressure wash water used to clean the VBSs (Photo 3-4 and Photo 3-5). No traverse positioning issues were experienced during the sixth and final test, though, a similar sediment accumulation was observed inside the aluminum extrusion during disassembly of the beam at the completion of field testing.

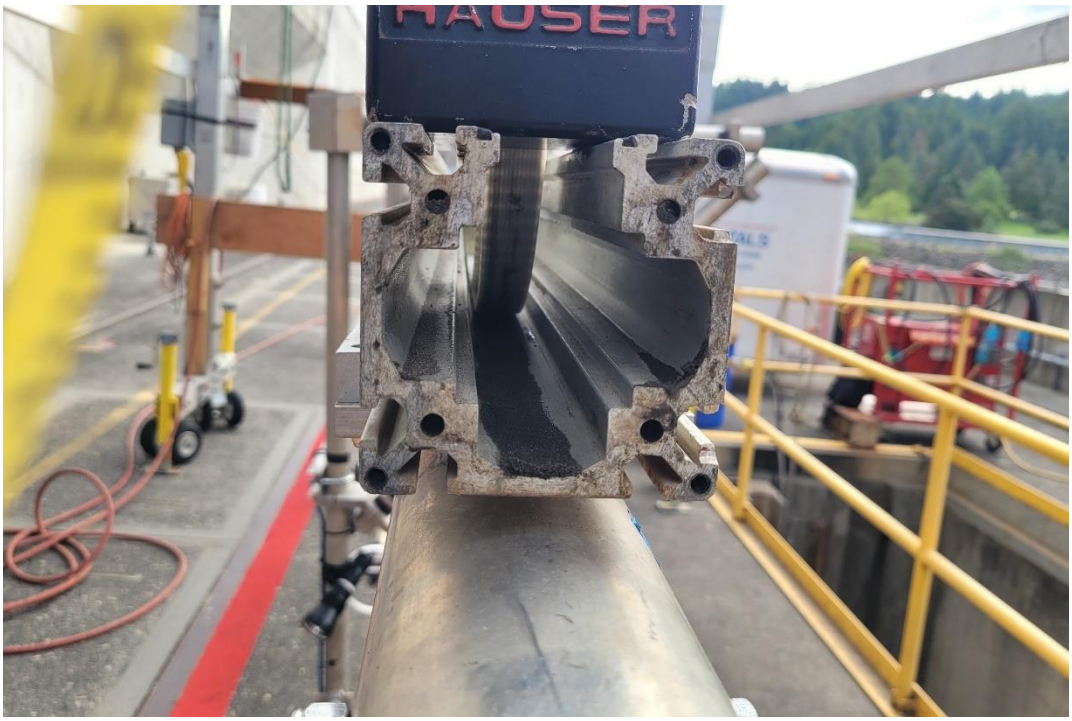


Photo 3-1 Grit Accumulation within Aluminum Extrusion of Traversing Beam (End View)

Photo 3-2 Grit Accumulation on Trolley Guide Surfaces within Traversing Beam

Photo 3-3 Sample of Grit Retrieved from Interior of Traversing Beam

Photo 3-4 Flushing of Grit from Traversing Beam (End View)

Photo 3-5 Flushing of Grit from Traversing Beam (Side View)

The average and range of through screen velocity (Vx), total velocity (Vtot), and RMS values of the total velocity for 18 kcfs unit discharge are summarized in Table 3-3. The average Vx component magnitude was the largest in Slot C and smallest in Slot A, with minimum and maximum values following the same trend. The maximum approach velocity component magnitudes reached 1.17 fps in Slot A, 1.27 fps in Slot B, and 1.39 fps in Slot C. Also, consistent to the trend, the maximum sweeping velocity component of 5.99 fps and maximum total velocity magnitude of 6.05 fps were measured in Slot C.

Table 3-3 Summary of Velocity Data from Elevation 34 ft to 56 ft – 18 kcfs Unit Discharge

Slot	Approach Velocity, Vx, (fps)		Sweeping Velocity, Vyz, (fps)		Total Velocity, Vtot, (fps)		Total Velocity RMS (fps)		Failed Data / No. Data Points
	Avg.	Range	Avg.	Range	Avg.	Range	Avg.	Range	
15A	0.65	0.20 – 1.17	2.82	0.18 – 5.60	2.88	0.41 – 5.65	1.27	0.74 – 2.19	21 / 368
15B	0.70	0.23 – 1.27	2.94	0.04 – 5.79	3.06	0.37 – 5.83	1.36	0.46 – 2.39	22 / 368
15C	0.71	0.30 – 1.39	2.76	0.10 – 5.99	2.88	0.44 – 6.05	1.09	0.49 – 2.18	7 / 368

The gatewell discharges were estimated using two methods: the Vx components were integrated over the entire measurement grid as an indication of the discharge through the measurement plane and the Z-component velocities (Vz) at the lowest measurement elevation were integrated as an indication of the discharge entering the gatewells. Both of the integration methods are subject to errors because the measurements were not made over the full extents of either plane. In the case of the Vx components, the lowest measurements were made at elevation 34 ft, while the base of the VBSs are set at elevation 31 ft (no samples were made in the lowest 8% of the plane). The same limitation applies to the Vz components, as any flow passing through the VBS below the measurement elevation would not be captured, and the velocity profile at the gatewell entrance is not likely to be uniform due to the presence of the turning vanes, the effect of which was not captured using the single longitudinal (X-axis) measurement position. In addition to these limitations, the flow integrated on the basis of Vz is further influenced by the use of centerline data in Slots B and C.

The estimated gatewell discharges are summarized in Table 3-4. Integration of the Vx components indicates that the gatewell discharge varied from 323 cfs in Slot A to 370 in Slot C, or by approximately 8% of the average. Integration of the Vz components indicates slightly wider range in flow split, with individual gatewell discharges varying from 338 cfs (Slot A) to 400 cfs (Slot C), and a slightly higher total gatewell discharge (1,118 cfs vs. 1,048 cfs).

Table 3-4 Estimated Gatewell Discharges – 18 kcfs Unit Discharge

Slot / Basis	Vx		Vz	
	Discharge (cfs)	% of Average	Discharge (cfs)	% of Average
15A	323	92.5%	338	90.6%
15B	355	101.6%	381	102.1%
15C	370	105.9%	400	107.3%
Average (cfs)	349		373	
Total (cfs)	1,048		1,118	

The sweeping velocity components were similar between the gatewell slots, as shown in Figure 3-20. The sweeping velocity magnitudes were consistently highest at the lower elevations within the gatewell and the region 4.5 to 12.5 feet from the north side of the VBS. A counter-clockwise circulation cell formed in all gatewell slots, centered at (Y, Z) coordinates of approximately (15, 55). Above elevation 50 ft, flow traveled vertically upward and toward to north over the north half of the VBS width and vertically downward over the south quarter of the VBS width. Flow recirculation at the north-south extremes is also evident by the outboard heading of the velocity vectors along the edges of the measurement grid.

The largest Vx components were measured at the lower measurement elevations and typically at the outboard extents of the VBSs (Figure 3-20). The Vx contours shown at elevations 34 and 35 for Slots B and C exhibit less variation with lateral position, but this is a result of data collection at the home position only for these slots/elevations. Despite the difference in lateral measurement densities, a variation in approach velocity components below elevation 40 is evident between Slot A and Slots B and C, as characterized by a lack of screen approach velocities in excess of 1.2 fps at the south side of Slot A (elevation 34 – 36 ft) and at the north size of Slot A (elevation 37 – 40 ft). Other than these differences, the general variations in approach velocity components, and their magnitudes, is similar amongst the slots.

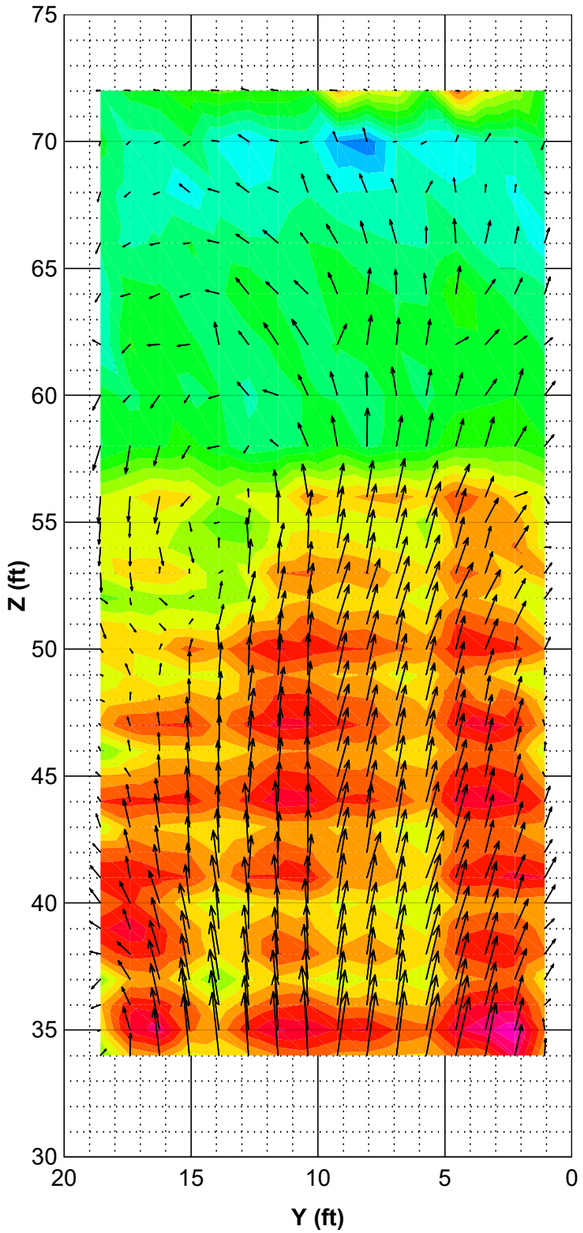
The total velocity magnitudes (Figure 3-21) are also generally similar between gatewell slots. Again, the appearance of the contours for Slots B and C at the lowest elevations is influenced by the collection of centerline data. The total velocity magnitudes are highest at the lower measurement elevations and decrease with increasing elevation. In all cases, the flow field was biased toward the north, which suggests, perhaps, that flow approaches the gatewells from the south side, and flow momentum toward the north is not dissipated at the STSs or turning vanes leading to the gatewells. The orientation of the sweeping velocity vectors (shown in Figure 3-20) also indicate a directional bias toward the north. The decay in total velocity magnitude is most abrupt in Slot C, followed by Slot B, and Slot A. This is consistent with the trend in screen approach velocity component magnitudes at the lower measurement elevations (*i.e.,* the relatively larger Vx components observed in Slot C are indicative of stronger flow withdrawal in the lower regions of the VBS than in other gatewell slots).

The total velocity RMS values (Figure 3-22) are similar in Slots A and B. The largest values occurred at the lowest measurement elevations at the north and south extents of the gatewells. Regions of elevated RMS values are also present near the edges of the VBSs from elevation 34 ft to approximately elevation 57 ft and at the central region of the VBS at elevation 58 ft. At the lower measurement elevations, the elevated RMS values are thought to be a function of relatively high total velocity magnitudes and boundary effects near the gatewell piers. Elsewhere, the elevated RMS values appear to correlate with regions of flow recirculation, particularly at locations near the “eye” of the large-scale circulation cell within the gatewells.

The RMS values are generally lower in Slot C, except at the entrance to the gatewell (lowest measurement elevations). By inspection of the sweeping velocity vectors, it is apparent that the circulation intensity is lower in Slot C than the other Slots, particularly over the central region of the VBS at elevation ~58 to 62 ft. In addition, the velocity vectors at the edges of the measurement grid (Y = 1 and 18.6 ft) in Slot C are generally oriented more vertically that the other Slots, indicating less flow circulation near the edges of the VBS. While the source of the difference in RMS values cannot be stated definitively, contributing factors may include: the difference in unit operations (Units 11 and 12 were operated at lower discharges for Test 5), larger discharge through the lower region of the VBS in Slot C

(the circulation velocities were lower in Slot C), and perhaps the lack of a corbel in Slot C. The hypothesis that decreased circulation velocities in Slot C influenced the RMS values is supported by the improved similarity in trends between slots in Figure 3-23, where the RMS values have been non-dimensionalized by the total velocity magnitude.

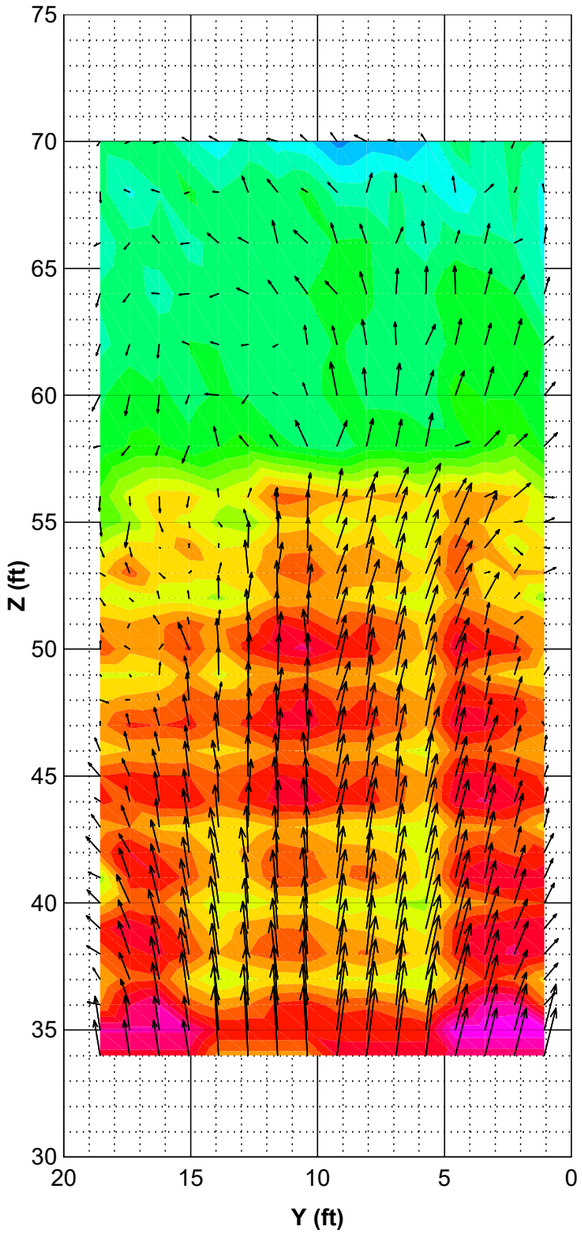
Slot A



Test 1
Date: June 1, 2022
Forebay: 72.2 ft
Tailwater: 25.2 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.2 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

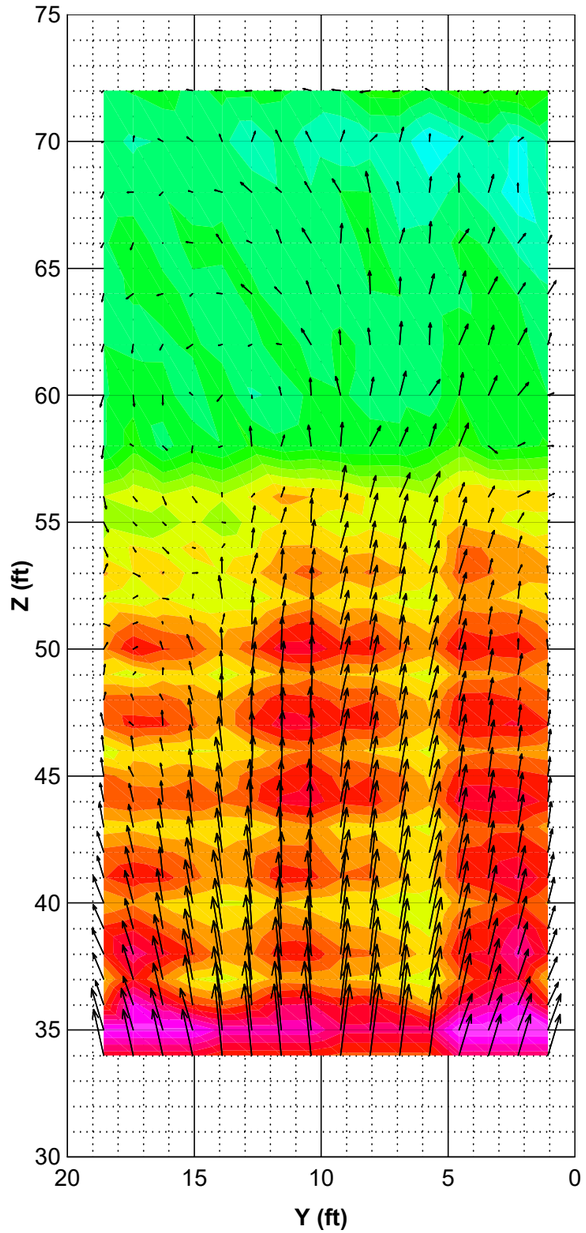
Slot B



Test 3
Date: June 6, 2022
Forebay: 72.2 ft
Tailwater: 27.6 ft
B2CC: Open
TIE: Out
North Orifice: Open

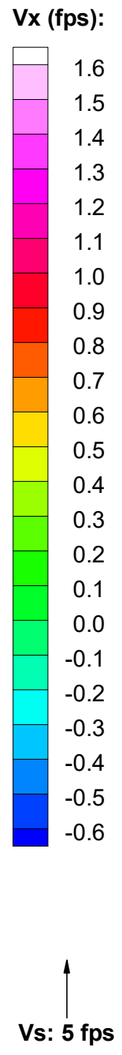
Unit 11: 13.2 kcfs
Unit 12: 13.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.2 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Slot C



Test 5
Date: June 8, 2022
Forebay: 73.2 ft
Tailwater: 27.8 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 11.6 kcfs
Unit 12: 11.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.8 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN
ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

APPROACH AND SWEEPING VELOCITY COMPONENTS - 18 KCFS

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

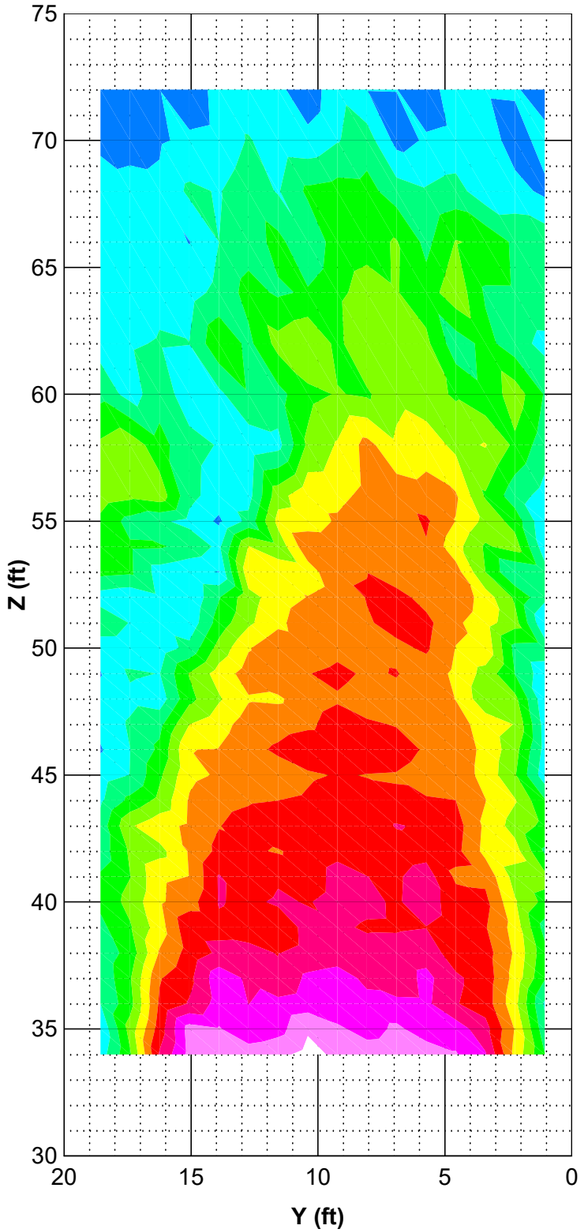
PROJECT NUMBER: 7214NWP052

DATE: 10-03-2022

FIGURE NUMBER:

3-20

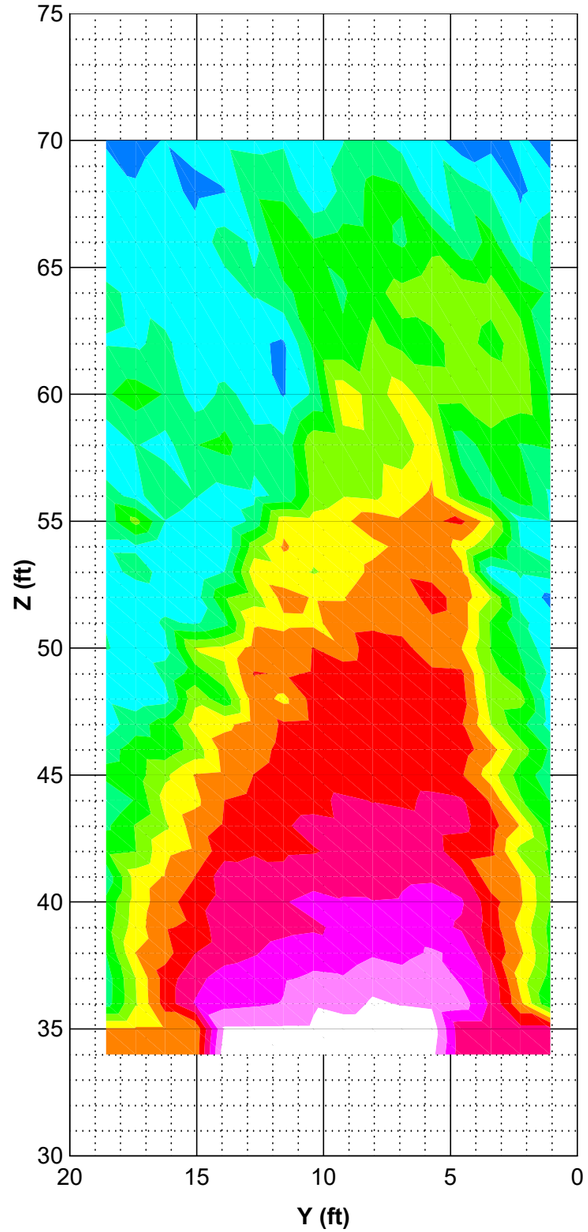
Slot A



Test 1
Date: June 1, 2022
Forebay: 72.2 ft
Tailwater: 25.2 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.2 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

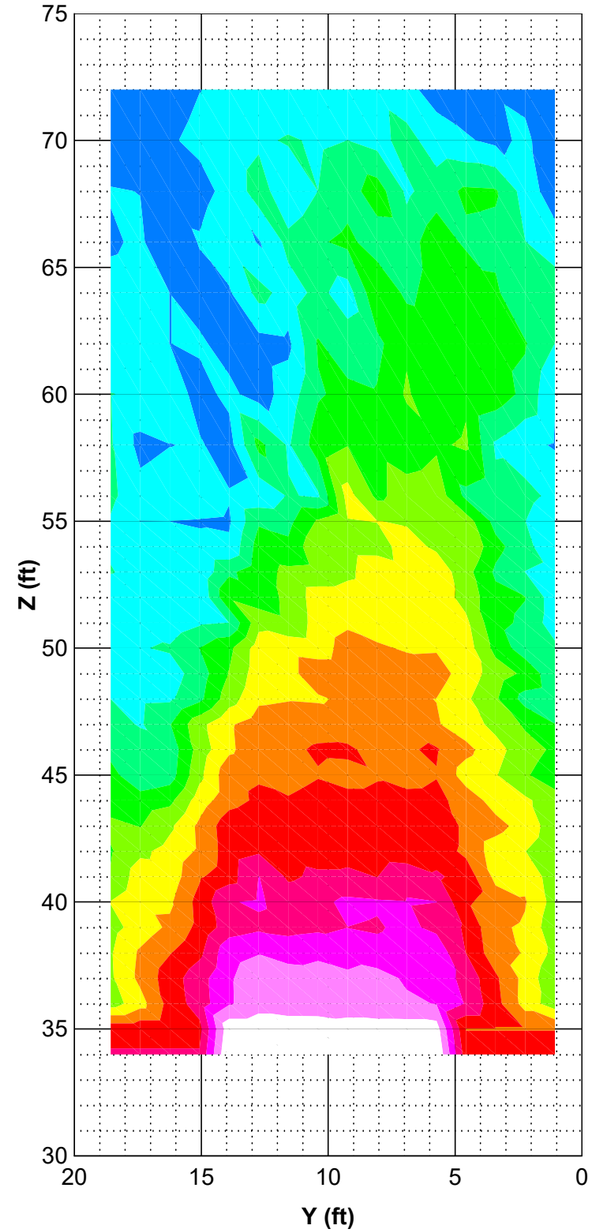
Slot B



Test 3
Date: June 6, 2022
Forebay: 72.2 ft
Tailwater: 27.6 ft
B2CC: Open
TIE: Out
North Orifice: Open

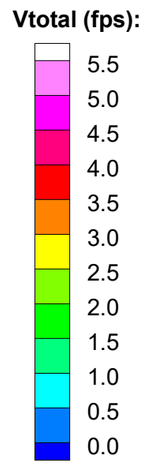
Unit 11: 13.2 kcfs
Unit 12: 13.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.2 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Slot C



Test 5
Date: June 8, 2022
Forebay: 73.2 ft
Tailwater: 27.8 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 11.6 kcfs
Unit 12: 11.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.8 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN
ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

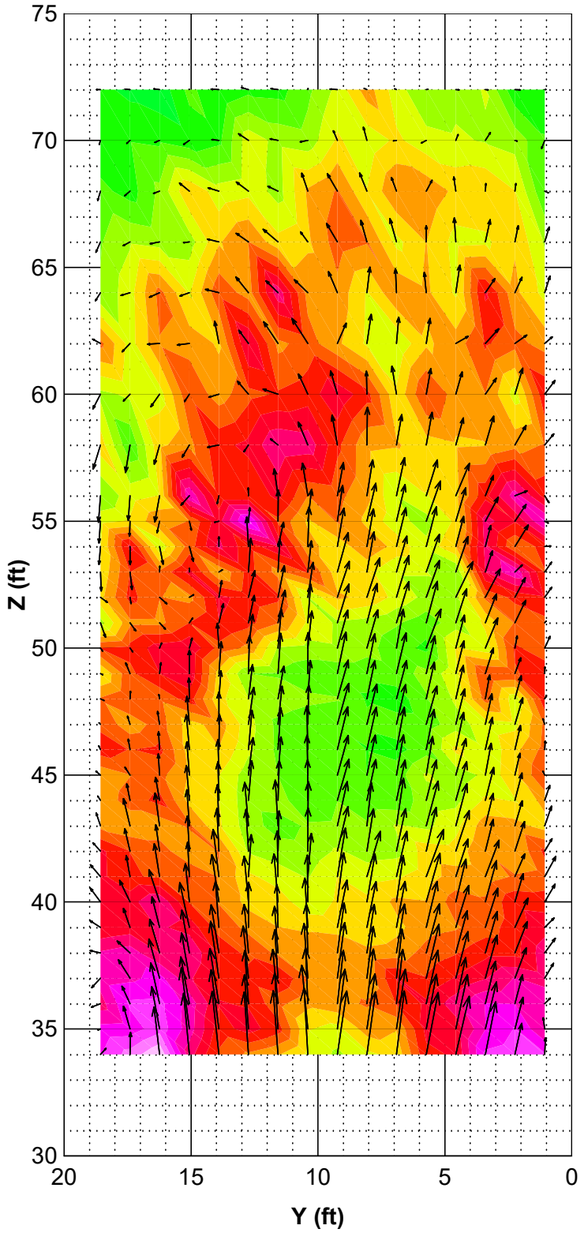
TOTAL VELOCITY MAGNITUDES
18 KCFS
B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

DATE: 10-03-2022
PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

3-21

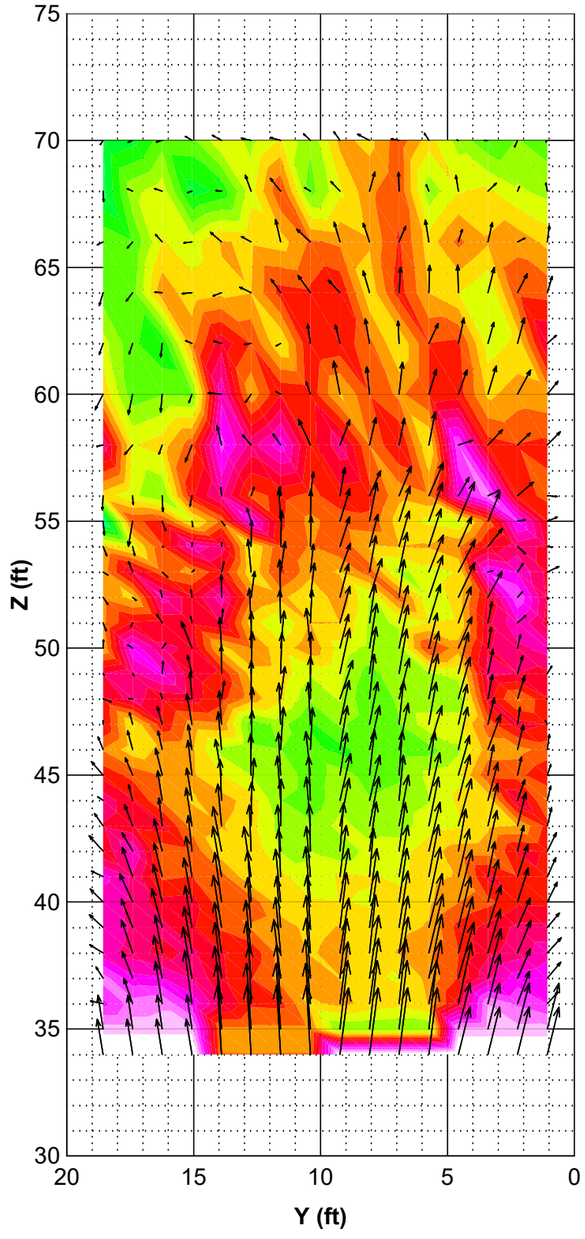
Slot A



Test 1
Date: June 1, 2022
Forebay: 72.2 ft
Tailwater: 25.2 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.2 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

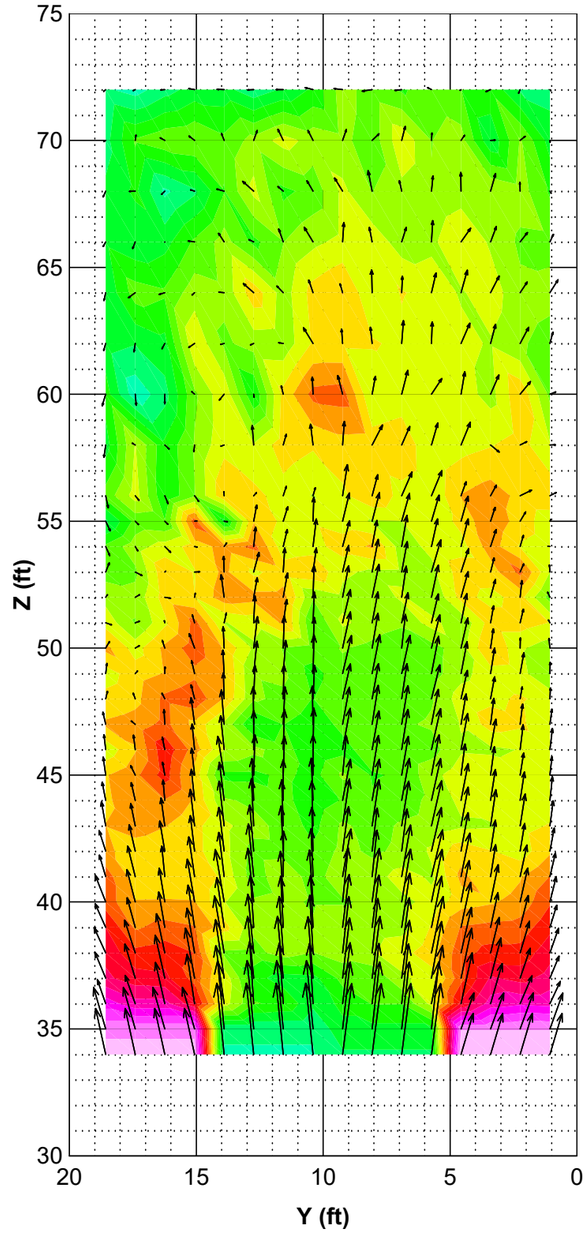
Slot B



Test 3
Date: June 6, 2022
Forebay: 72.2 ft
Tailwater: 27.6 ft
B2CC: Open
TIE: Out
North Orifice: Open

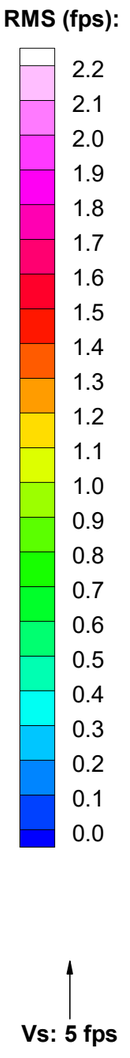
Unit 11: 13.2 kcfs
Unit 12: 13.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.2 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Slot C



Test 5
Date: June 8, 2022
Forebay: 73.2 ft
Tailwater: 27.8 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 11.6 kcfs
Unit 12: 11.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.8 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN

ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

ROOT MEAN SQUARE OF TOTAL VELOCITY MAGNITUDE - 18 KCFS

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

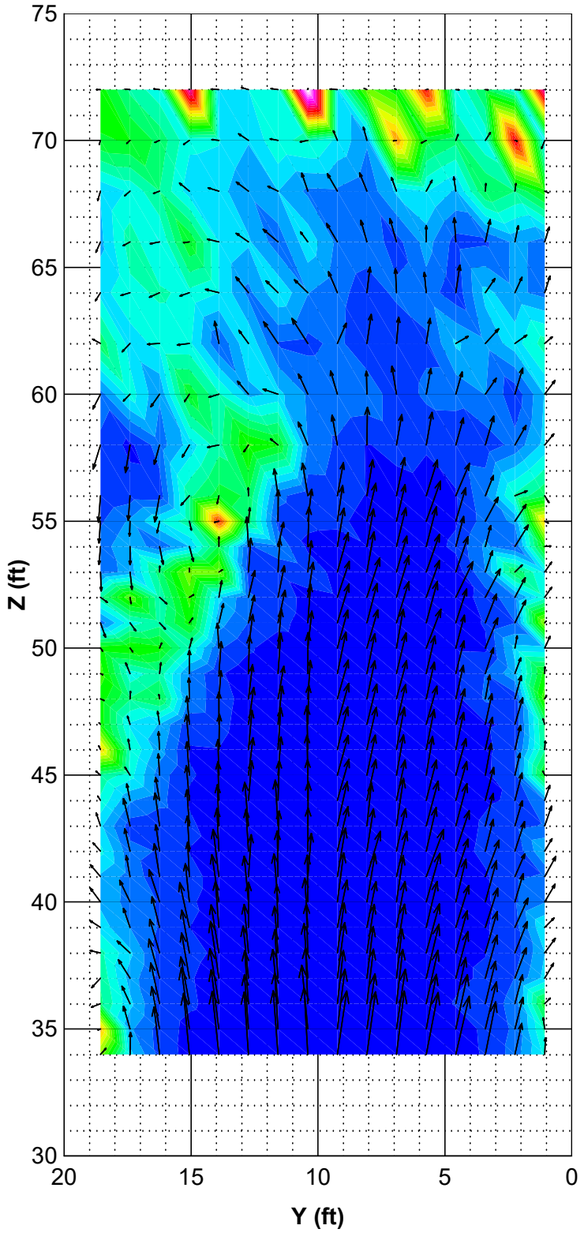
PROJECT NUMBER: 7214NWP052

DATE: 10-03-2022

FIGURE NUMBER:

3-22

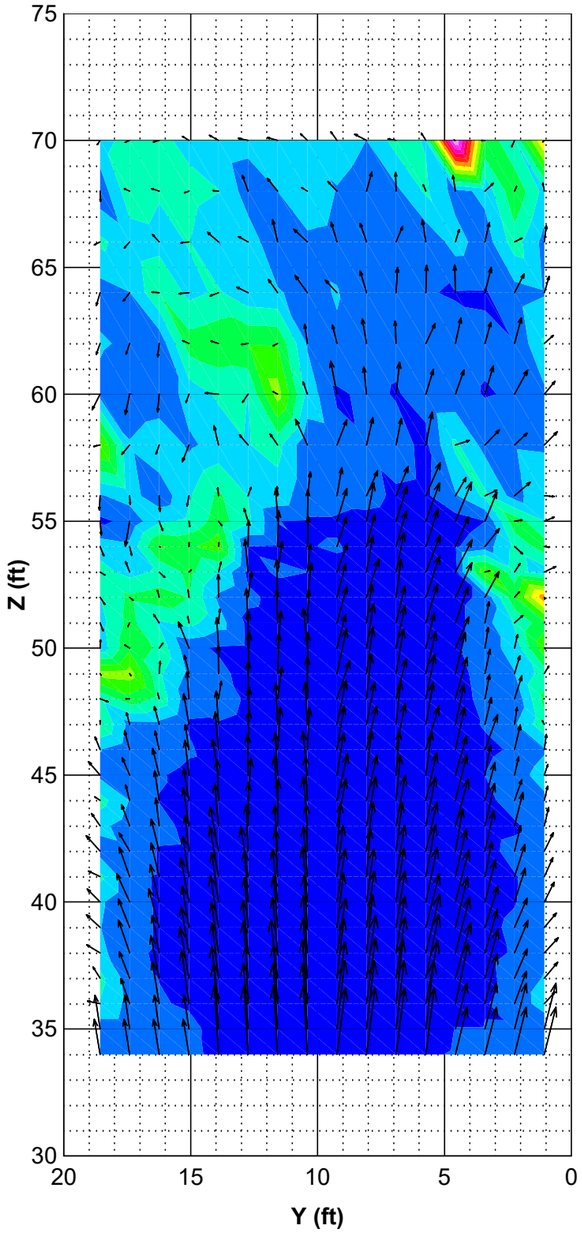
Slot A



Test 1
Date: June 1, 2022
Forebay: 72.2 ft
Tailwater: 25.2 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.2 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

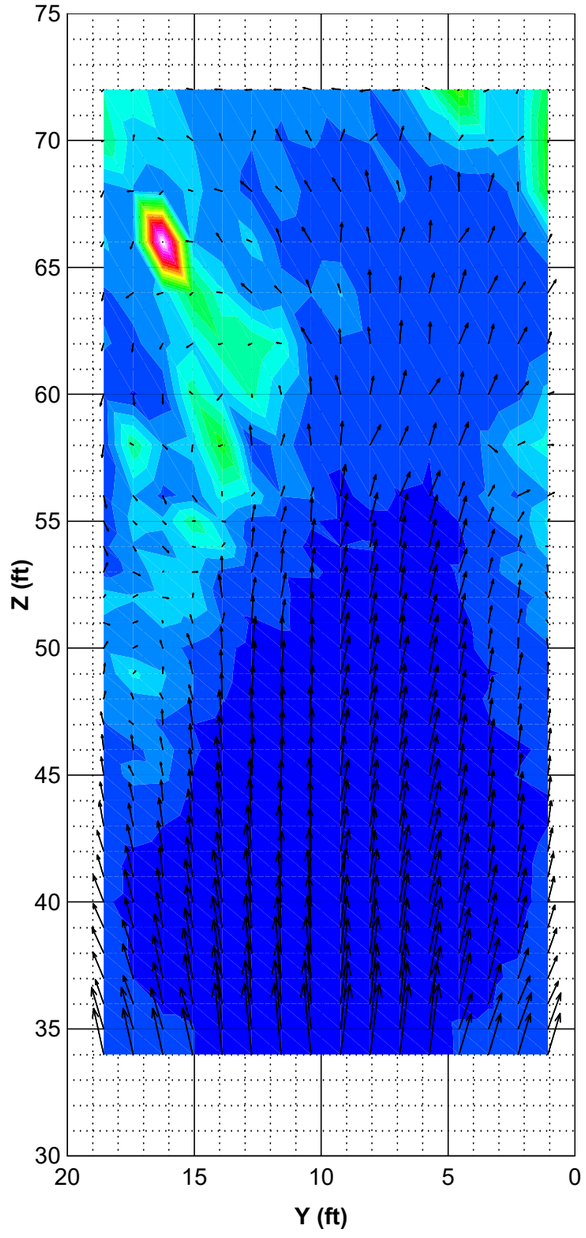
Slot B



Test 3
Date: June 6, 2022
Forebay: 72.2 ft
Tailwater: 27.6 ft
B2CC: Open
TIE: Out
North Orifice: Open

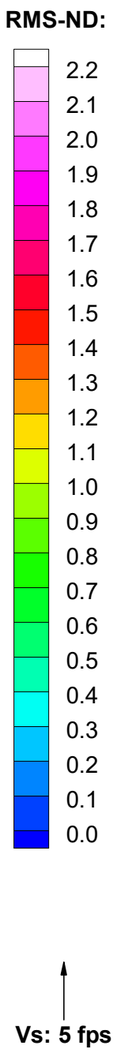
Unit 11: 13.2 kcfs
Unit 12: 13.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.2 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Slot C



Test 5
Date: June 8, 2022
Forebay: 73.2 ft
Tailwater: 27.8 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 11.6 kcfs
Unit 12: 11.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.8 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN

ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

NON-DIMENSOAL ROOT MEAN SQUARE OF TOTAL VELOCITY MAGNITUDE - 18 KCFS

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

DATE: 10-03-2022

PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

3-23

3.2.2 15 kcfs Unit Discharge

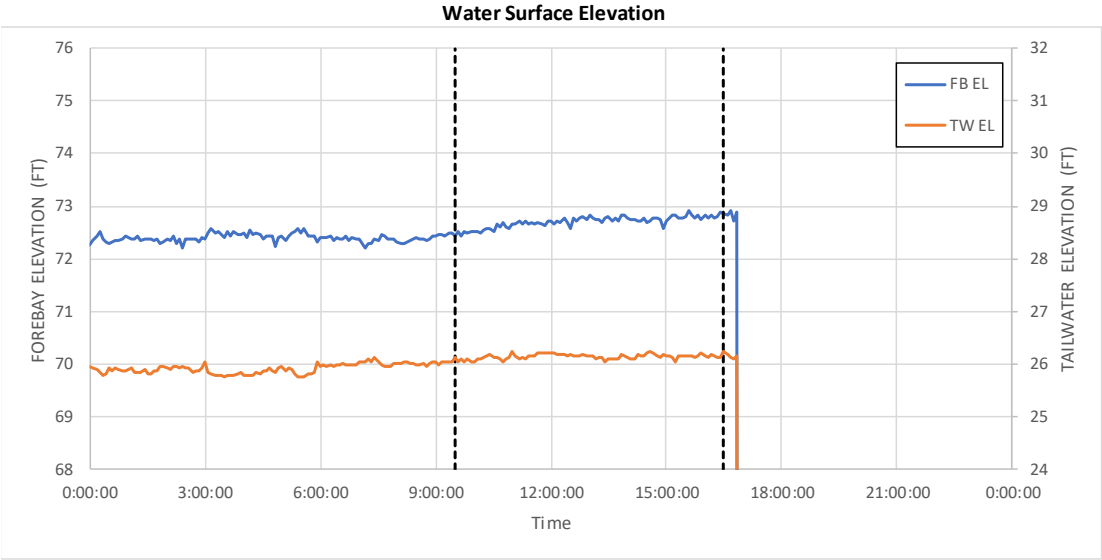
Daily hydrologic conditions and unit operations are summarized in Figure 3-24 through Figure 3-26. The forebay level was constant within approximately 0.7 ft, for all 15 kcfs tests. A slow and steady increase in forebay level occurred for Test 2 (Slot A), a pronounced decrease and recovery of level occurred during the first 20 minutes of data collection in Slot B (Test 4) and a fairly rapid decline in level occurred over the first 50 minutes of data collection in Slot C (Test 6) followed by a generally stable forebay elevation.

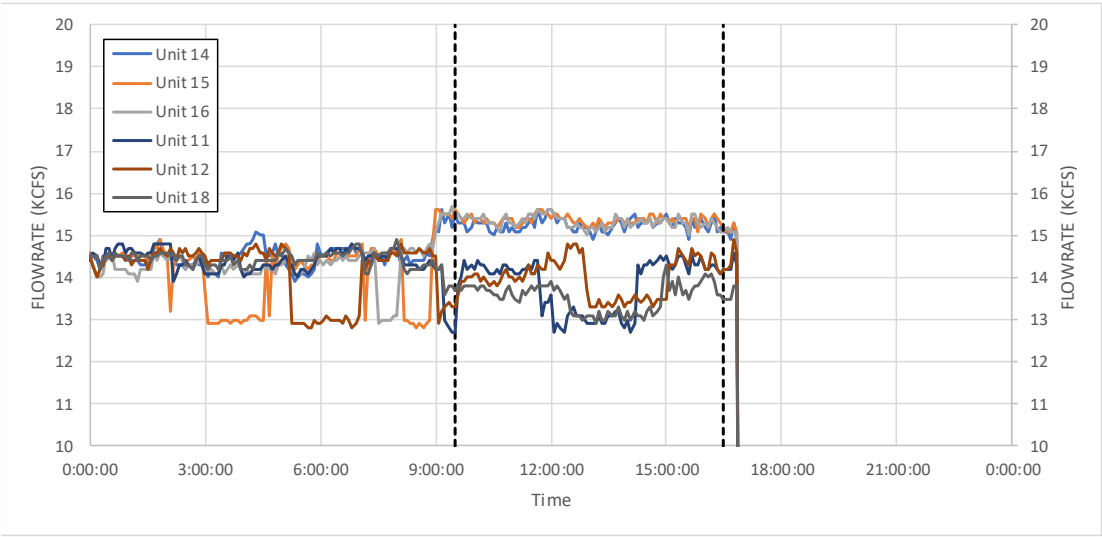
Units 13 and 17 were out of service for the duration of testing. Units 14 through 16 were ramped to the target discharge range a minimum of 50 minutes before the commencement of data collection and were held relatively constant throughout the data collection period. All three Units were typically operating in the 13 to 15 kcfs range for several hours prior to the data collection window, though the Unit 15 discharge leading up to the testing window in Slot A (Test 2) was more erratic than observed for the other 15 kcfs tests. With this exception, minimal flow ramping was required for Units 14 through 16 leading up to the testing windows.

All other operational units were modulated prior to and throughout the testing windows, typically between 13 and 14.5 kcfs. Unlike the 18 kcfs tests, there were no instances in which any of the B2 units (other than Unit 13 and 17) were offline during the test windows. The largest disparity in the discharge through Units 14 through 16 and all other units occurred during Test 4 (Slot B) for which Units 11, 12, and 18 were operated at 13 kcfs over a majority of the test window. The smallest difference in discharge between the Units 14 through 16 and all other units occurred during Test 6 (Slot C), for which Units 11, 12, and 15 were operated at approximately 14.5 kcfs over a majority of the test window.

As with the 18 kcfs tests, it is considered unlikely that the forebay level fluctuations and flow ramping had significant influence on the gatewell flow patterns. However, the localized effects of unit flow modulation should still be considered in the interpretation of the velocity data.

TEST NO. 2					
Data Collection Unit	**15A**	**Flow Condition**			**15 KCFS**
DATE	2 June 2022	DIFFERENTIAL HEAD ACROSS VBS			
BEGIN DATA COLLECTION	9:30	9:35	0.27	14:12	0.25
END DATA COLLECTION	16:30	12:10	0.30	16:21	0.20

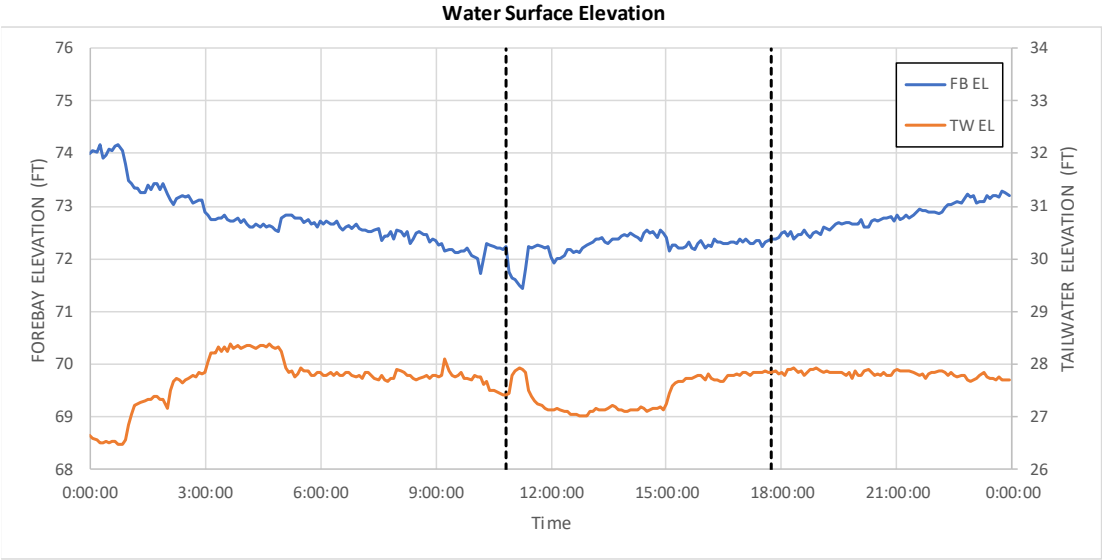


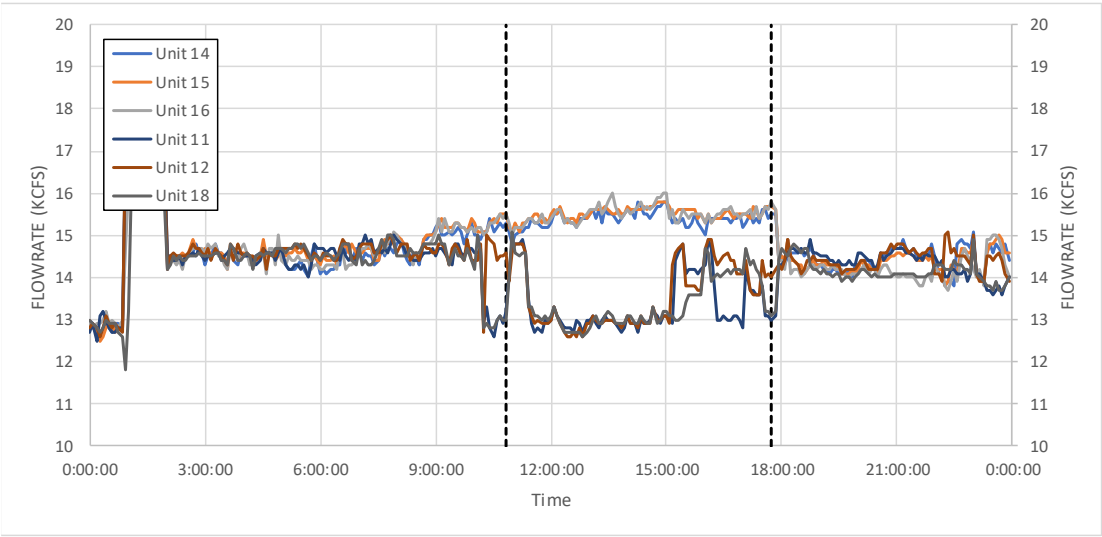


HYDRAULICS & HYDROLOGY SUMMARY FOR PERIOD OF DATA COLLECTION								
AVERAGE TOTAL FLOW			347.5		**AVERAGE SPILLWAY FLOW**			149.4
B2 AVERAGE FLOW			87.3		**FISH 1**	2.6	**FISH 2**	2.4
FLOW	**UNIT 11**	**UNIT 12**	**UNIT 13**	**UNIT 14**	**UNIT 15**	**UNIT 16**	**UNIT 17**	**UNIT 18**
AVERAGE	13.8	14.0	0.0	15.3	15.4	15.3	0.0	13.5
MAX	14.5	14.8	0.0	15.6	15.6	15.6	0.0	14.3
MIN	12.7	13.3	0.0	14.9	15.1	15.0	0.0	12.9
STDEV	0.63	0.45	0.00	0.15	0.10	0.14	0.00	0.33
AVERAGE FOREBAY W/S ELEVATION			72.7		**AVERAGE TAILWATER W/S ELEVATION**			26.1
B2CC	OPEN		**T.I.E**	OUT		**NO. ORIFICE OPEN**		1

Figure 3-24 Hydrologic and Operational Data – Test 2 – Slot A – 15 kcfs

TEST NO. 4							
Data Collection Unit	**15B**	**Flow Condition**				**15 KCFS**	
DATE	7 June 2022	DIFFERENTIAL HEAD ACROSS VBS					
BEGIN DATA COLLECTION	10:50	10:52	0.27	15:35	0.49		
END DATA COLLECTION	17:45	13:15	0.40	17:36	0.27		

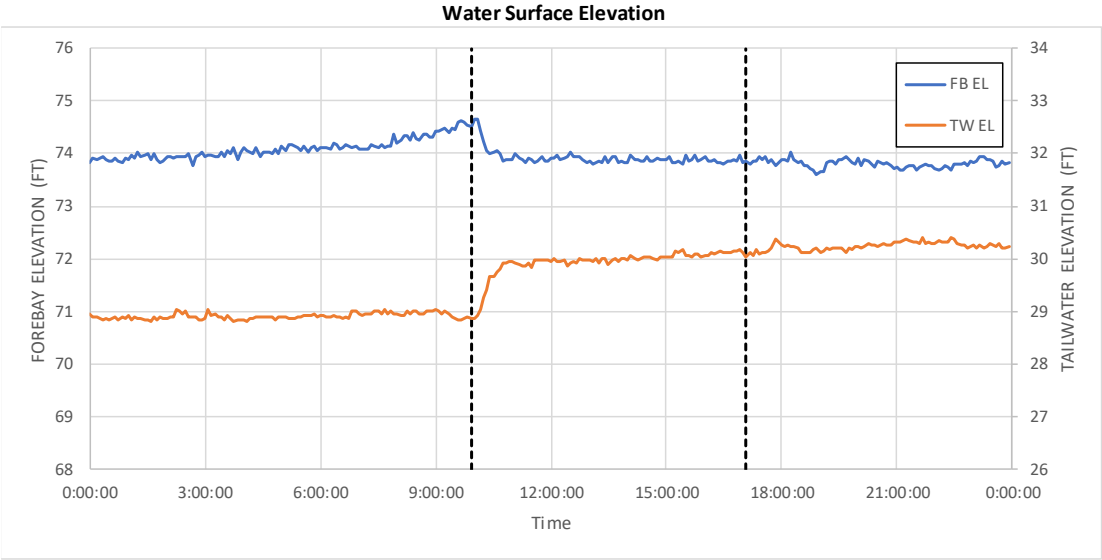


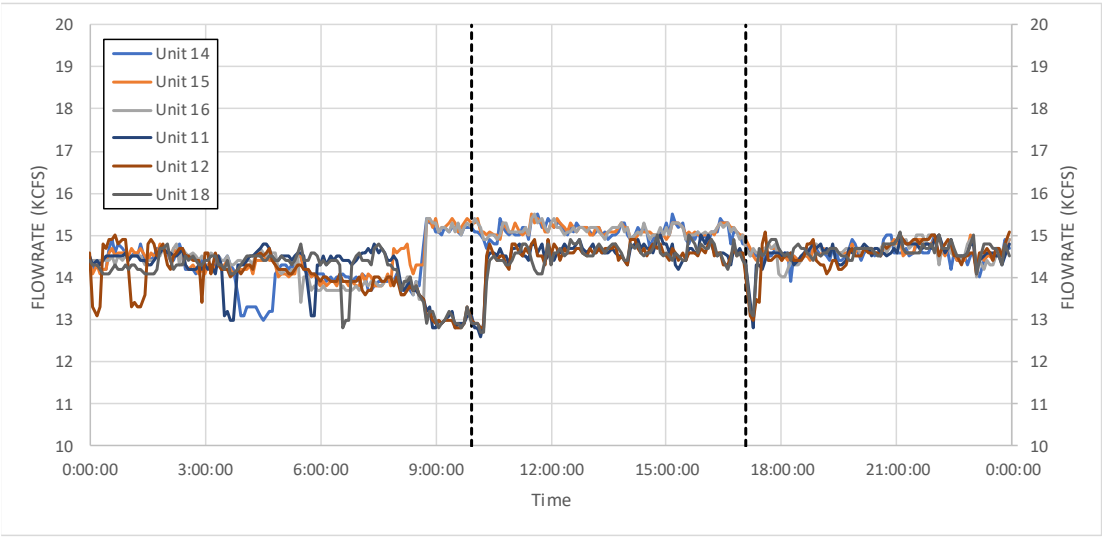


HYDRAULICS & HYDROLOGY SUMMARY FOR PERIOD OF DATA COLLECTION								
AVERAGE TOTAL FLOW			372.5		**AVERAGE SPILLWAY FLOW**			169.9
B2 AVERAGE FLOW			86.7		**FISH 1**	2.4	**FISH 2**	2.1
FLOW	**UNIT 11**	**UNIT 12**	**UNIT 13**	**UNIT 14**	**UNIT 15**	**UNIT 16**	**UNIT 17**	**UNIT 18**
AVERAGE	13.4	13.6	0.0	15.4	15.5	15.5	0.0	13.4
MAX	14.9	14.9	0.0	15.8	15.8	16.0	0.0	15.1
MIN	12.7	12.6	0.0	14.8	15.1	15.0	0.0	12.6
STDEV	0.66	0.74	0.00	0.18	0.15	0.19	0.00	0.63
AVERAGE FOREBAY W/S ELEVATION			72.2		**AVERAGE TAILWATER W/S ELEVATION**			27.4
B2CC	OPEN		**T.I.E**	OUT		**NO. ORIFICE OPEN**		1

Figure 3-25 Hydrologic and Operational Data – Test 4 – Slot B – 15 kcfs

TEST NO. 6							
Data Collection Unit	**15C**	**Flow Condition**				**15 KCFS**	
DATE	9 June 2022	DIFFERENTIAL HEAD ACROSS VBS (ft)					
BEGIN DATA COLLECTION	9:55	9:56	0.21	14:52	0.32		
END DATA COLLECTION	17:05	12:36	0.36	16:55	0.47		





HYDRAULICS & HYDROLOGY SUMMARY FOR PERIOD OF DATA COLLECTION								
AVERAGE TOTAL FLOW			426.2		**AVERAGE SPILLWAY FLOW**			224.1
B2 AVERAGE FLOW			88.9		**FISH 1**	2.2	**FISH 2**	2.0
FLOW	**UNIT 11**	**UNIT 12**	**UNIT 13**	**UNIT 14**	**UNIT 15**	**UNIT 16**	**UNIT 17**	**UNIT 18**
AVERAGE	14.5	14.5	0.0	15.1	15.1	15.1	0.0	14.5
MAX	15.0	14.9	0.0	15.5	15.5	15.5	0.0	15.0
MIN	12.6	12.8	0.0	14.7	14.9	14.7	0.0	12.7
STDEV	0.45	0.43	0.00	0.18	0.14	0.15	0.00	0.46
AVERAGE FOREBAY W/S ELEVATION			73.9		**AVERAGE TAILWATER W/S ELEVATION**			29.9
B2CC	OPEN		**T.I.E**	OUT		**NO. ORIFICE OPEN**		1

Figure 3-26 Hydrologic and Operational Data – Test 6 – Slot C – 15 kcfs

Unlike testing conducted at 18 kcfs, a full traverse of measurement locations was achieved in all gatewell slots for the 15 kcfs tests.

The through screen velocity (Vx), total velocity (Vtot), and RMS values of the total velocity for 15 kcfs unit discharge are summarized in Table 3-5. Similar to the 18 kcfs tests, the average Vx components were higher in Slots B and C than in Slot A. Although the average Vx component was marginally larger in Slot B than Slot C, the minimum and maximum Vx components were larger in Slot C, which is consistent with the 18 kcfs tests. As could be expected, the maximum component magnitudes and RMS values were consistently lower for the 15 kcfs than the 18 kcfs tests.

Table 3-5 Summary of Velocity Data from Elevation 34 ft to 56 ft – 15 kcfs Unit Discharge

Slot	Approach Velocity, Vx, (fps)		Sweeping Velocity, Vyz, (fps)		Total Velocity, Vtot, (fps)		Total Velocity RMS (fps)		Failed Data / No. Data Points
	Avg.	Range	Avg.	Range	Avg.	Range	Avg.	Range	
15A	0.51	0.16 – 0.97	2.32	0.02 – 4.69	2.40	0.32 – 4.72	1.07	0.64 – 1.89	22 / 368
15B	0.56	0.18 – 0.99	2.49	0.09 – 5.19	2.58	0.39 – 5.23	1.14	0.68 – 2.14	15 / 368
15C	0.55	0.23 – 1.11	2.26	0.09 – 4.98	2.35	0.38 – 5.02	0.92	0.47 – 1.78	4 / 368

The estimated gatewell discharges for the 15 kcfs tests are summarized in Table 3-6. Integration of the Vx components indicates that the gatewell discharge varied from 258 cfs in Slot A to 278 in Slot C, a range of 96% to 104% of the average gatewell discharge. As with the 18 kcfs tests, integration of the Vz components indicates a slightly wider range in flow split, with individual gatewell discharges varying from 277 cfs (Slot A) to 320 cfs (Slot B), and a slightly higher total gatewell discharge (916 cfs vs. 807 cfs).

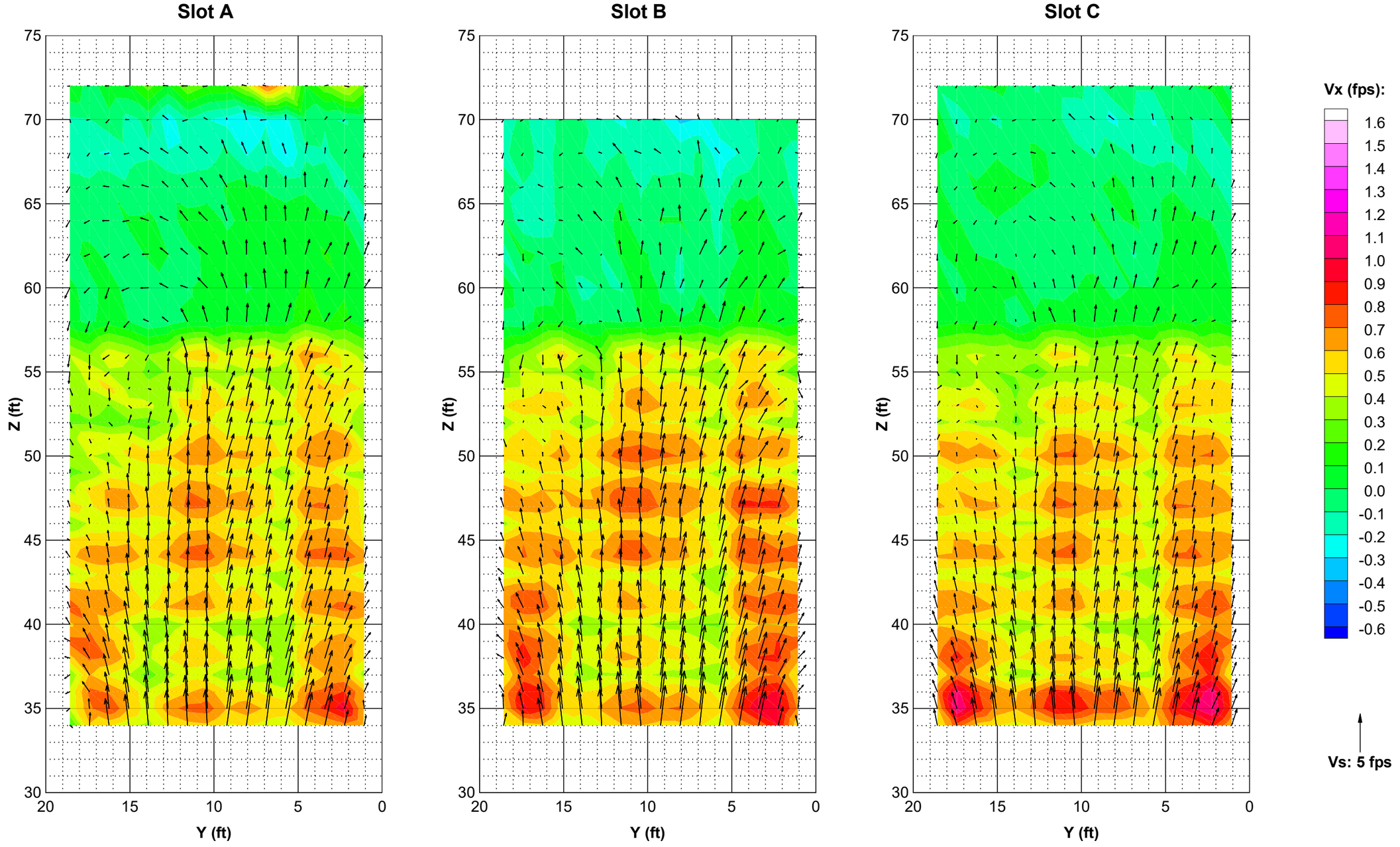
Table 3-6 Estimated Gatewell Discharges – 15 kcfs Unit Discharge

Slot / Basis	Vx		Vz	
	Discharge (cfs)	% of Average	Discharge (cfs)	% of Average
15A	258	96.1%	277	90.8%
15B	270	100.4%	320	104.8%
15C	278	103.5%	319	104.4%
Average (cfs)	269		305	
Total (cfs)	807		916	

The sweeping velocity components (Figure 3-27) were similar between gatewell slots and closely matched results obtained at 18 kcfs. A counter-clockwise circulation cell is evident in all slots with the “eye” located at roughly the same location observed for the 18 kcfs tests. Flow recirculation at the north-south extremes is also apparent, as indicated by the outboard heading of the velocity vectors at the edges of the measurement grid.

The trend in approach velocity components shown in Figure 3-27 is similar to that observed for the 18 kcfs tests, except that the component magnitudes are smaller.

The total velocity vector magnitudes (Figure 3-28) and RMS values (Figure 3-29 and Figure 3-30) are also generally similar between slots and closely match the results of the 18 kcfs tests. The lower unit discharge produced lower velocity magnitudes and RMS values, but the pattern of velocity decay and locations of elevated RMS values are essentially identical to that discussed for the 18 kcfs tests.



Test 2
Date: June 2, 2022
Forebay: 72.7 ft
Tailwater: 26.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 14.0 kcfs
Unit 13: 0 kcfs
Unit 14: 15.3 kcfs
Unit 15: 15.4 kcfs
Unit 16: 15.3 kcfs
Unit 17: 0 kcfs
Unit 18: 13.5 kcfs

Test 4
Date: June 7, 2022
Forebay: 72.2 ft
Tailwater: 27.4 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.4 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.4 kcfs
Unit 15: 15.5 kcfs
Unit 16: 15.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

Test 6
Date: June 9, 2022
Forebay: 73.9 ft
Tailwater: 29.9 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 14.5 kcfs
Unit 12: 14.5 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 15.1 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 14.5 kcfs

DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN
ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

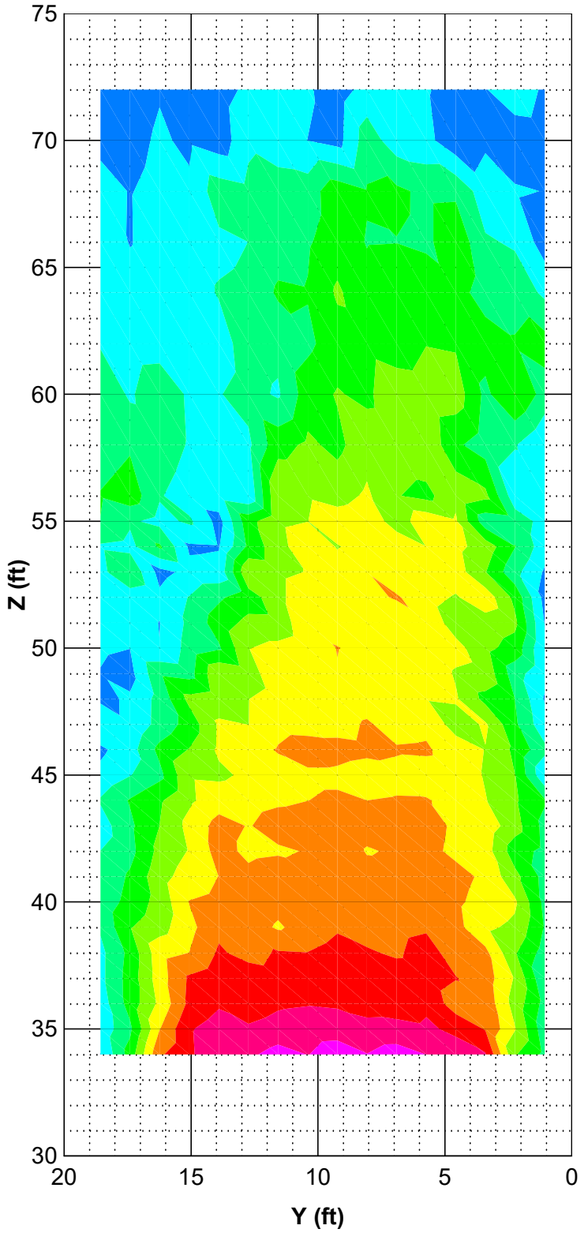
APPROACH AND SWEEPING VELOCITY COMPONENTS - 15 KCFS
B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

DATE: 10-03-2022
PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

3-27

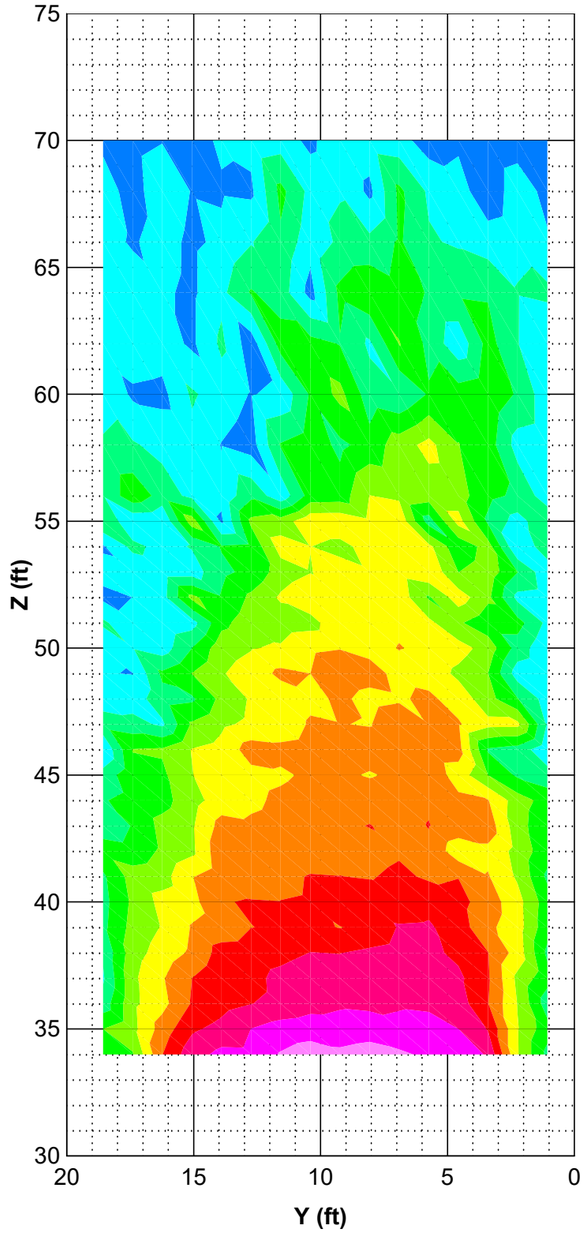
Slot A



Test 2
Date: June 2, 2022
Forebay: 72.7 ft
Tailwater: 26.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 14.0 kcfs
Unit 13: 0 kcfs
Unit 14: 15.3 kcfs
Unit 15: 15.4 kcfs
Unit 16: 15.3 kcfs
Unit 17: 0 kcfs
Unit 18: 13.5 kcfs

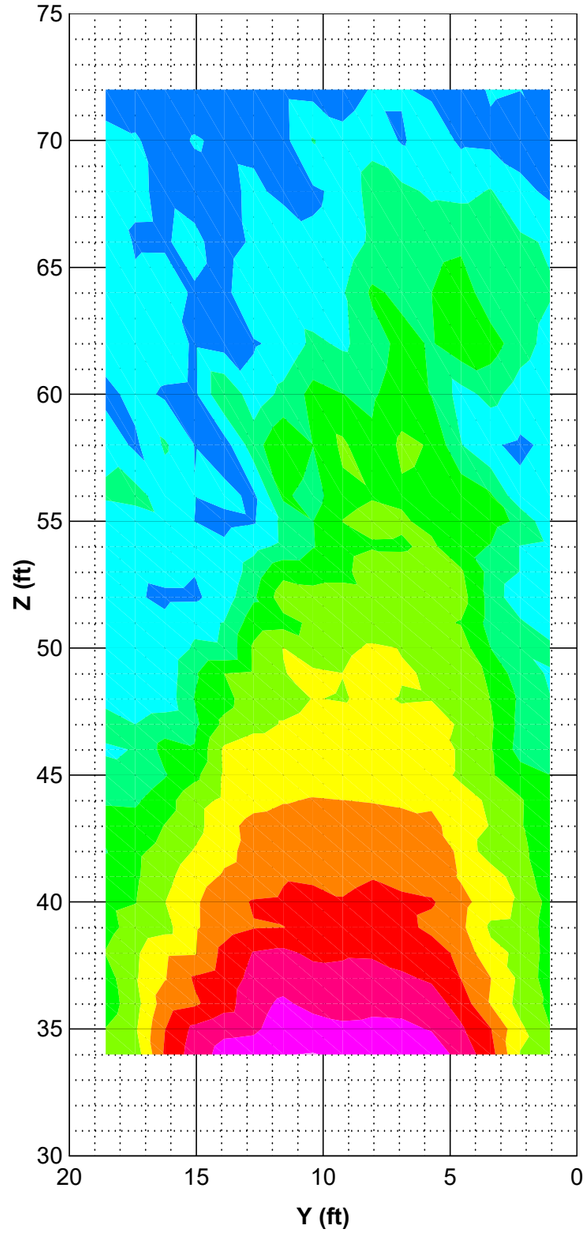
Slot B



Test 4
Date: June 7, 2022
Forebay: 72.2 ft
Tailwater: 27.4 ft
B2CC: Open
TIE: Out
North Orifice: Open

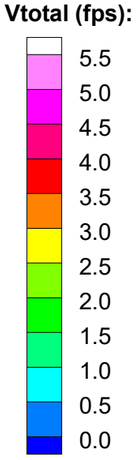
Unit 11: 13.4 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.4 kcfs
Unit 15: 15.5 kcfs
Unit 16: 15.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

Slot C



Test 6
Date: June 9, 2022
Forebay: 73.9 ft
Tailwater: 29.9 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 14.5 kcfs
Unit 12: 14.5 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 15.1 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 14.5 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN

ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

TOTAL VELOCITY MAGNITUDES 15 KCFS

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

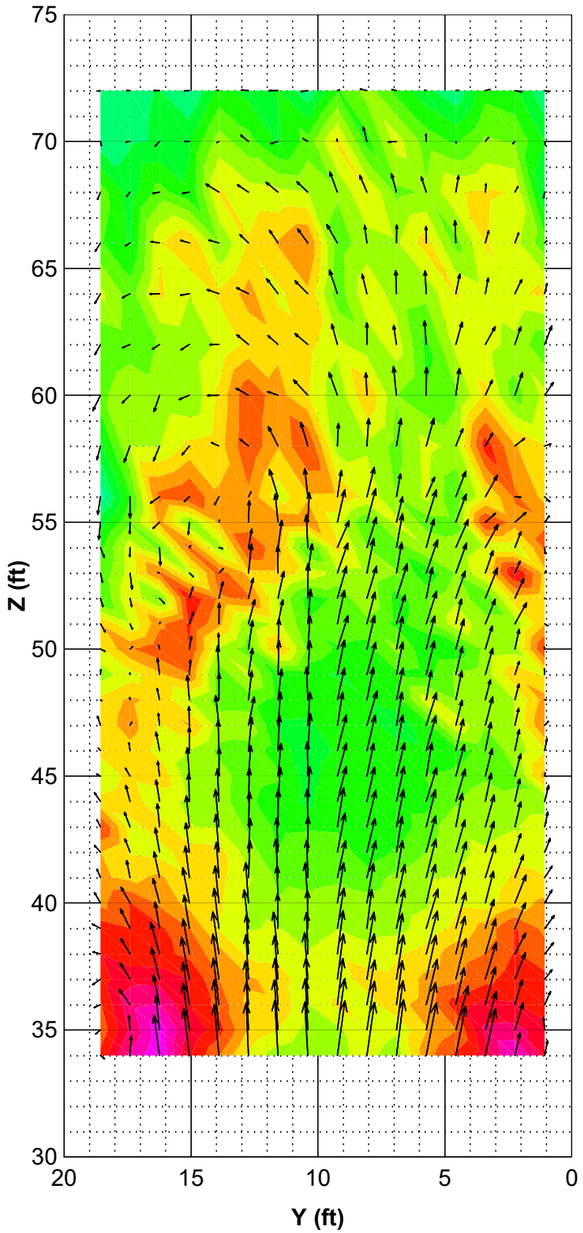
DATE: 10-03-2022

PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

3-28

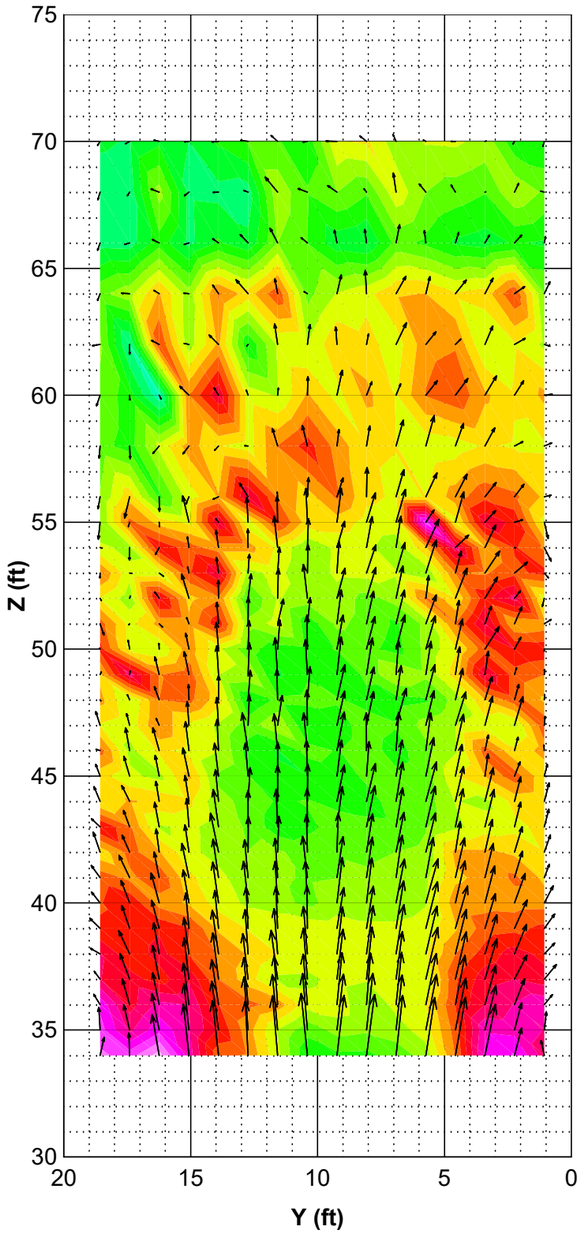
Slot A



Test 2
Date: June 2, 2022
Forebay: 72.7 ft
Tailwater: 26.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 14.0 kcfs
Unit 13: 0 kcfs
Unit 14: 15.3 kcfs
Unit 15: 15.4 kcfs
Unit 16: 15.3 kcfs
Unit 17: 0 kcfs
Unit 18: 13.5 kcfs

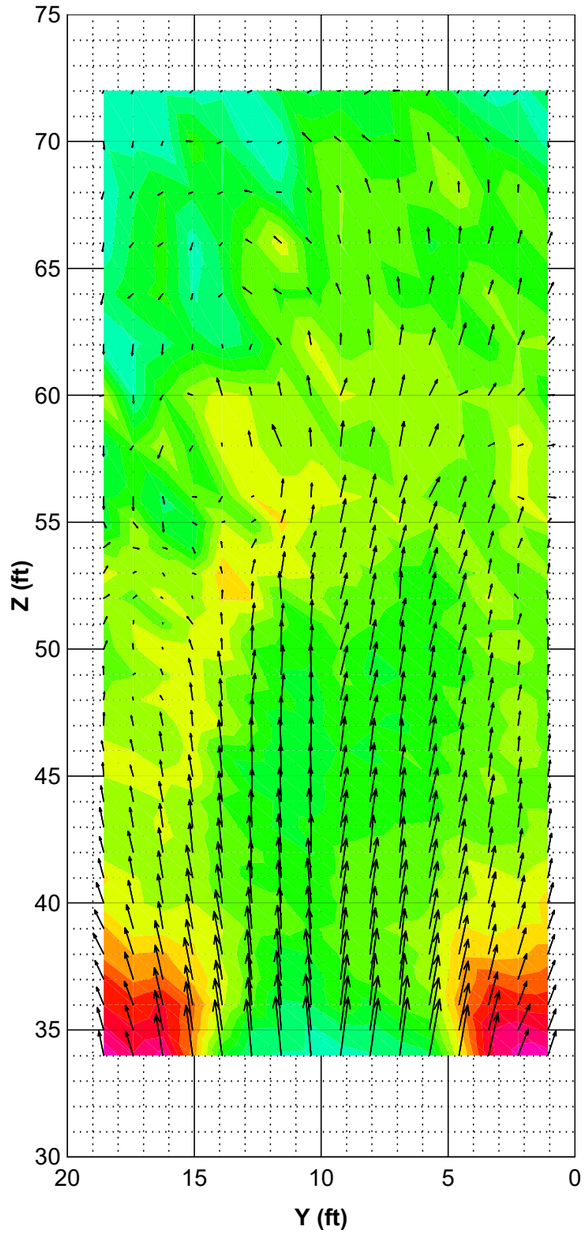
Slot B



Test 4
Date: June 7, 2022
Forebay: 72.2 ft
Tailwater: 27.4 ft
B2CC: Open
TIE: Out
North Orifice: Open

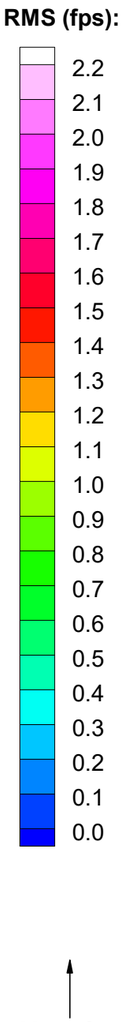
Unit 11: 13.4 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.4 kcfs
Unit 15: 15.5 kcfs
Unit 16: 15.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

Slot C



Test 6
Date: June 9, 2022
Forebay: 73.9 ft
Tailwater: 29.9 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 14.5 kcfs
Unit 12: 14.5 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 15.1 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 14.5 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

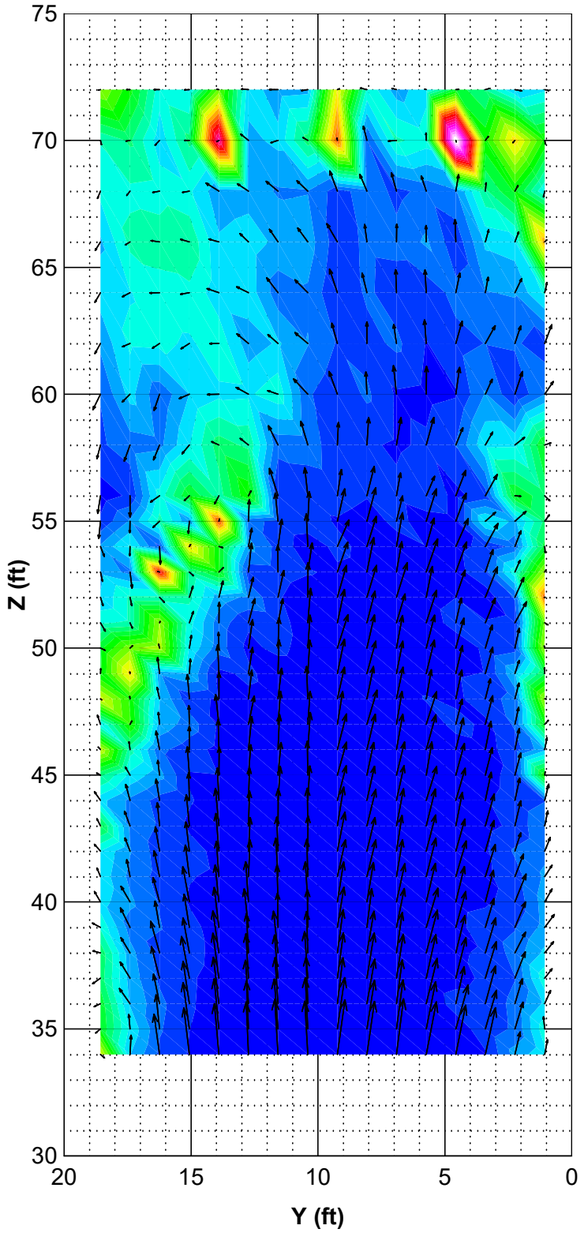
ALDEN
ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

ROOT MEAN SQUARE OF TOTAL VELOCITY MAGNITUDE - 15 KCFS
B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

PROJECT NUMBER: 7214NWP052
DATE: 10-03-2022

FIGURE NUMBER:
3-29

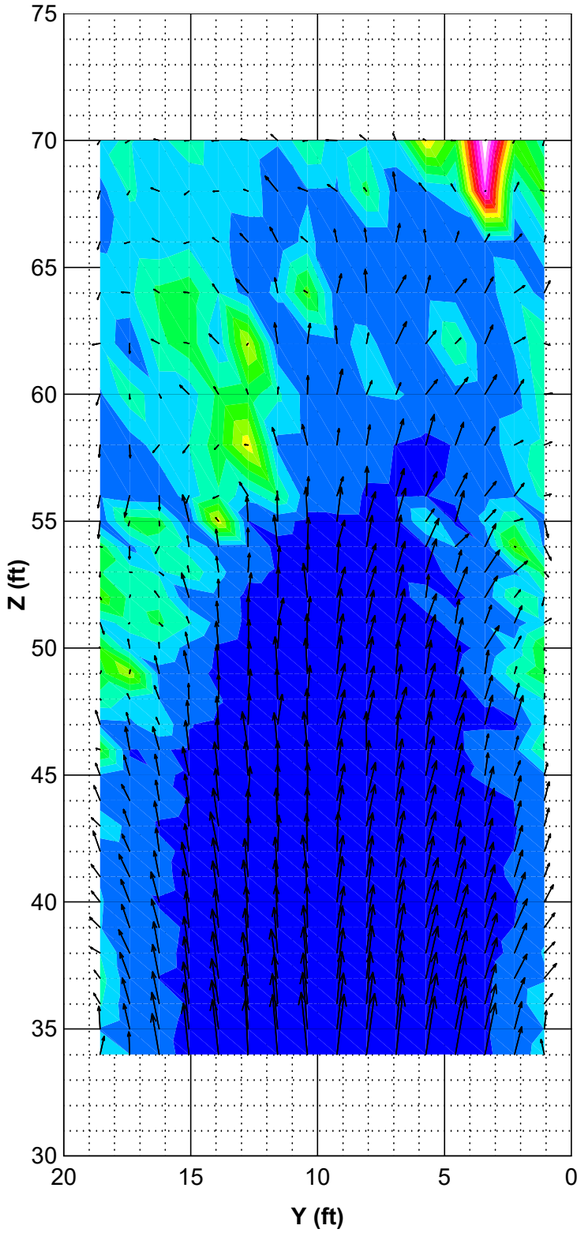
Slot A



Test 2
Date: June 2, 2022
Forebay: 72.7 ft
Tailwater: 26.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.8 kcfs
Unit 12: 14.0 kcfs
Unit 13: 0 kcfs
Unit 14: 15.3 kcfs
Unit 15: 15.4 kcfs
Unit 16: 15.3 kcfs
Unit 17: 0 kcfs
Unit 18: 13.5 kcfs

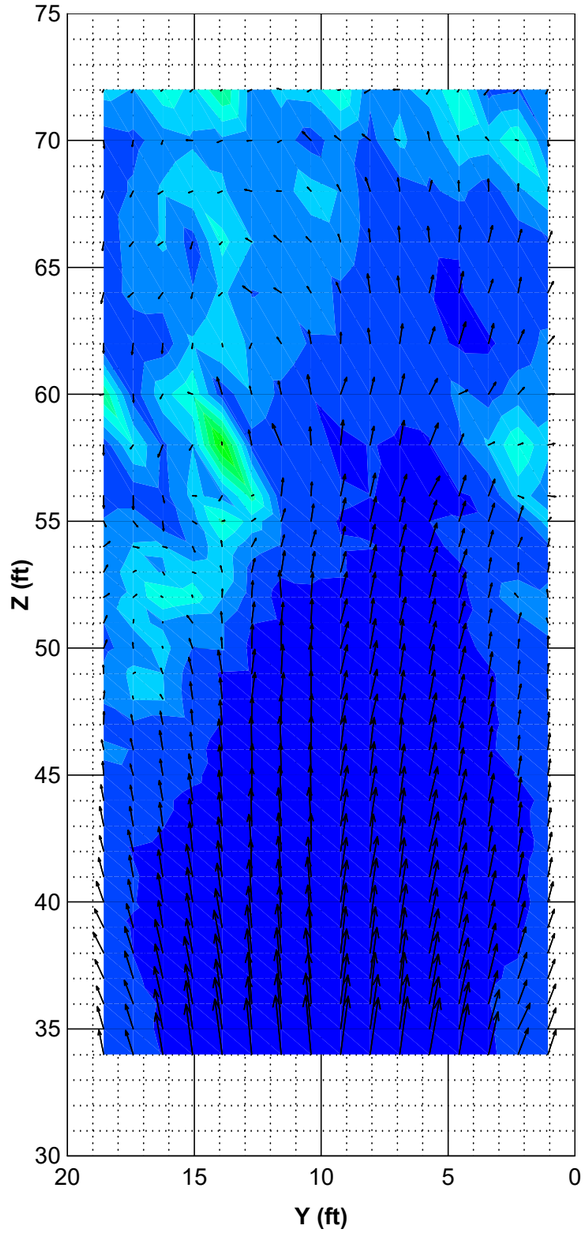
Slot B



Test 4
Date: June 7, 2022
Forebay: 72.2 ft
Tailwater: 27.4 ft
B2CC: Open
TIE: Out
North Orifice: Open

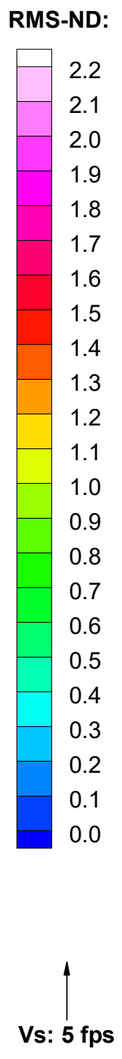
Unit 11: 13.4 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.4 kcfs
Unit 15: 15.5 kcfs
Unit 16: 15.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

Slot C



Test 6
Date: June 9, 2022
Forebay: 73.9 ft
Tailwater: 29.9 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 14.5 kcfs
Unit 12: 14.5 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcf
Unit 15: 15.1 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 14.5 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN

ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

NON-DIMENSIONAL ROOT MEAN SQUARE OF TOTAL VELOCITY MAGNITUDE - 15 KCFS

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

DATE: 10-03-2022

PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

3-30

3.2.3 Duplicate Data

Data collection was duplicated at several points over the measurement grid, with the duplicate data collected using the probe adjacent to the one used to collect the original data, as described in Section 2.3.2. Duplicating measurements in this manner provides an indication of both the repeatability of the data and any experimental influences, such as probe function and orientation. However, it is important to note that because the original and duplicate data were not collected simultaneously, variability in the results is also susceptible to variation in discharge and natural variability of the flow field within the gatewells.

Because the sample size at any given measurement location is large (24,000 discrete samples), the standard error often used in the comparison of paired data sets is relatively small. This means that for the original and duplicate data to be considered similar (or identical), the average vector and/or component magnitudes must match very closely. For the velocity data collected, this generally equates to a match within 1 to 2%. This level of repeatability is not to be expected in this case because the unit discharges varied by ±2% during the testing windows and temporal changes in flow split between the test gatewell slots and flow patterns within the gatewells are likely. Therefore, a "typical" statistical comparison would generally indicate that the differences in the original and duplicate data, discussed below, are "statistically significant", even in cases were the results are similar in a practical sense, for instance a match within 10%.

Probable environmental and experimental errors must be considered in the interpretation of the duplicate data. These include:

- Variability in unit discharge introduces a probable error of 2%.
- Variability in gatewell flow pattern may be capable of producing dissimilar results between the original and duplicate measurements as the velocity vector magnitudes and directions may change on a timescale larger than the sample duration at any discrete point. A value cannot be quantified for this parameter based on the data collected in 2022, but for the purpose of discussion, a 10% probable error is suggested over a majority of the measurement grid. However, it should be noted that evaluations of flow stability conducted in the 2014 test year indicated positionally dependent variations in the screen approach and sweeping velocity components as large as 136% and 50%, respectively over a one-hour time period.
- Probe axis alignment is established by the acrylic mounting blocks, the mounting angle at the end of the deployment arms, the alignment and deflection (plumbness) of the deployment arms, and the horizontal alignment of the deployment beam. For the purposes of discussion, a relative rotational precision of 3 degrees is suggested for Vx and Vz and a relative rotational precision of 1 degree is suggested for Vy. The potential influence of relative differences in the rotation (alignment) of the velocity meters varies across the measurement axes, as discussed below.

Note that the accuracy of the velocity meters (1% of the full-scale velocity range, or approximately 0.1 fps) is not included in the probable error analysis, as this error would be systematic in nature, and it is assumed that any bias would be uniform across all of the velocity meters used.

The maximum probable errors associated with comparison of the original and duplicate data are summarized in Table 3-7. Because the X- and Y- velocity components are generally dominated by the Z-velocity component (as indicated by the near 90-degree characteristic vector angles) they are highly sensitive to probe rotation, and probe rotation is the primary contributor to the maximum probable error. Conversely, because the measured vertical velocity component is largely insensitive to small

relative differences in probe orientation, the maximum probable errors in the Vz, Vs, and Vt vector magnitudes is governed primarily by variability in discharge and flow field.

Table 3-7 Estimate of Maximum Probable Error

Source / Component	Rotation Precision (deg)	Characteristic Vector Angle (deg)	Probable Error	Max. Probable Error
Unit Discharge	-	-	2%	-
Flow Pattern Variability	-	-	10%	-
Vx	3	85 (X-Z)	59.7%	60.5%
Vy	1	88 (Y-Z)	50%	51%
Vz	3	85 (X-Z)	0.6%	10.2%
Vs	-	-	0.6%	10.2%
Vt	-	-	0%	10.2%

The original and duplicate total velocity magnitudes are compared in Table 3-8, where grey shaded cells indicate the RMS value is more than twice the mean value (fail test) and red shaded cells indicate the difference in measured values falls outside of the estimate maximum probable error of 10%. The five instances in which the measured velocity magnitude did not pass the fail test at the duplicate measurement locations occurred at approximately the same position within the gatewell, where variability in the velocity field can be expected due to the circulation cell present. Of the 108 duplicate measurement locations, the original and duplicate total velocity magnitude did not match within the estimated error band in 41 instances. These instances were consistently located above the top of the VBS and/or in circulation cells.

At measurement elevations of 53 ft and lower (positions below the top of the VBS), the largest differences in total velocity magnitude occurred at Y = 15.07 ft. Despite percentage differences as high as 42% at discrete measurement locations, on average, the original and duplicate measurements of velocity magnitude matched within ±2%. This is a general indication that the velocity probes functioned similarly, and that the variability observed can be attributed to natural variations in the gatewell flow field.

The original and duplicate Vx components are compared in Table 3-9. Almost all of the screen approach velocities measured above the top of the VBS did not pass the fail test, and all instances where the original and duplicate data did not match within the estimated probable error (±60%) occurred in this region. This is attributed, again, to the small component magnitudes and variability in flow patterns. Below the top of the VBSs, the similarity in the original and duplicate measurements degrades progressively from south (Y = 15.07 ft) where Vx matched within 3% on average, to the north (Y = 5.74 ft) where Vx matched within 32% on average. This trend is most likely driven by differences in relative rotations of the probe axes, given the estimated probable error in determining Vx and the fact that the total velocity magnitude was highly repeatable at the original and duplicate measurement locations.

The original and duplicate Vy components are compared in Table 3-10. Duplicate data collected near the center of the VBS do not correlate well with the original data. At this lateral position, the two data sets were collected with probes which faced opposite directions (Photo 2-18). When coupled with the Vz component magnitudes, the seemingly large differences in Vy components amount to an average

difference in vector angle of approximately 11.6 degrees. The observed difference is likely related to the influence of the probe body or protective “halo” around the probe head. That is, in one instance the flow approached without obstruction from the probe or mounting system and in the other instance flow encountered the probe/mounting system before reaching the measurement volume. At the outboard lateral positions (Y = 15.07 and 5.74 ft), similarity of the original and duplicate data tends to be most pronounced at the lower measurement elevations. This trend is likely related to the gatewell flow field (as well as similar orientation of the ADV probes), indicating that the lateral stability of the flow field is greatest near the gatewell entrance.

The original and duplicate Vz components are compared in Table 3-11. Because these velocity components were typically dominant in the total vector magnitude, the trends are largely similar to those discussed for the total vector magnitude. On average, the original and duplicate data agreed within approximately 3 to 5% at measurement locations below the top of the VBS. It should be noted that poor agreement between the data at Y = 15.07 ft and above elevation 48 ft are likely the result of variation in the counter-clockwise circulation cell in that region of the gatewell.

Table 3-8 Duplicate Data Comparison – Total Velocity Magnitude

Test	Flow	Slot	Y-Pos (ft)	15.07				10.40				5.74			
			El (ft)	Vt(1)	Vt(2)	Difference		Vt(1)	Vt(2)	Difference		Vt(1)	Vt(2)	Difference	
			(ft)	(fps)	(fps)	(fps)	(%)	(fps)	(fps)	(fps)	(%)	(fps)	(fps)	(fps)	(%)
1	18	A	68	1.10	1.00	-0.10	-9%	1.60	1.78	0.18	11%	1.05	1.87	0.82	78%
			58	1.17	1.14	-0.03	-3%	2.09	1.45	-0.63	-30%	2.78	2.73	-0.05	-2%
			53	0.60	0.55	-0.05	-8%	2.71	3.44	0.73	27%	3.38	2.96	-0.42	-13%
			48	1.86	2.34	0.48	26%	3.35	3.48	0.13	4%	3.20	3.04	-0.15	-5%
			43	3.08	3.11	0.03	1%	3.75	3.78	0.03	1%	3.91	3.73	-0.18	-5%
			38	3.68	3.63	-0.05	-1%	4.16	4.00	-0.15	-4%	4.27	4.26	-0.01	0%
3	18	B	68	0.38	0.69	0.32	83%	0.57	1.39	0.83	146%	0.59	1.14	0.55	94%
			58	1.48	0.52	-0.96	-65%	2.37	2.08	-0.29	-12%	2.82	2.63	-0.19	-7%
			53	0.59	0.72	0.12	20%	2.47	3.21	0.74	30%	3.35	3.46	0.10	3%
			48	2.37	1.60	-0.77	-33%	3.69	3.23	-0.45	-12%	3.85	3.65	-0.20	-5%
			43	3.26	3.41	0.15	5%	4.13	4.02	-0.11	-3%	4.18	4.22	0.04	1%
			38	3.99	4.18	0.20	5%	4.85	4.78	-0.07	-1%	5.06	5.09	0.03	1%
5	18	C	68	0.36	0.50	0.14	39%	1.00	1.06	0.06	6%	1.29	1.34	0.05	4%
			58	0.55	0.76	0.21	39%	1.76	0.95	-0.81	-46%	1.92	2.03	0.12	6%
			53	0.63	0.63	-0.01	-1%	2.17	1.95	-0.21	-10%	2.84	2.74	-0.10	-3%
			48	1.38	1.95	0.57	42%	2.93	3.11	0.17	6%	2.99	2.85	-0.14	-5%
			43	3.11	3.40	0.29	9%	3.83	3.90	0.06	2%	3.89	3.81	-0.08	-2%
			38	3.88	4.08	0.19	5%	4.90	4.68	-0.23	-5%	4.83	4.51	-0.33	-7%
2	15	A	68	0.58	0.79	0.20	35%	1.27	1.54	0.27	21%	1.38	1.31	-0.07	-5%
			58	0.95	0.81	-0.14	-15%	2.09	1.43	-0.66	-32%	2.41	2.35	-0.06	-3%
			53	0.64	0.66	0.01	2%	2.53	2.66	0.13	5%	2.96	2.58	-0.37	-13%
			48	2.14	1.63	-0.51	-24%	2.81	2.78	-0.02	-1%	2.52	2.70	0.18	7%
			43	2.66	2.61	-0.05	-2%	3.19	3.16	-0.03	-1%	3.20	3.15	-0.05	-2%
			38	3.01	3.28	0.28	9%	3.51	3.46	-0.05	-2%	3.71	3.53	-0.18	-5%
4	15	B	68	0.48	0.59	0.11	23%	0.85	1.33	0.48	57%	0.92	1.29	0.38	41%
			58	0.82	1.10	0.27	33%	1.78	1.27	-0.51	-29%	2.65	2.30	-0.35	-13%
			53	0.75	0.48	-0.27	-36%	2.48	2.61	0.14	5%	2.92	2.87	-0.05	-2%
			48	1.41	1.12	-0.30	-21%	2.89	2.80	-0.09	-3%	3.08	3.17	0.08	3%
			43	2.43	2.81	0.38	16%	3.26	3.33	0.07	2%	3.51	3.49	-0.02	-1%
			38	3.09	3.17	0.09	3%	4.01	3.73	-0.28	-7%	4.13	4.14	0.02	0%
6	15	C	68	0.33	0.53	0.20	60%	0.43	1.03	0.60	139%	0.92	1.40	0.48	52%
			58	0.49	0.63	0.14	29%	1.51	0.47	-1.03	-69%	1.96	2.11	0.14	7%
			53	0.52	0.60	0.08	15%	1.83	1.95	0.12	7%	2.24	2.13	-0.11	-5%
			48	1.51	1.04	-0.48	-31%	2.51	2.47	-0.04	-2%	2.48	2.55	0.07	3%
			43	2.33	2.41	0.08	3%	3.22	3.11	-0.11	-4%	3.08	3.15	0.07	2%
			38	2.95	3.14	0.19	7%	3.88	3.89	0.00	0%	3.76	3.65	-0.11	-3%
Avg. (El > 53 ft)				0.72	0.76	0.03	21%	1.44	1.32	-0.13	14%	1.72	1.87	0.15	21%
Avg. (El <= 53 ft)				2.16	2.19	0.03	0%	3.29	3.31	0.02	1%	3.47	3.39	-0.08	-2%

Grey cells: standard deviation > 2 x mean Value

Red cells: Difference > probable error estimate (10%)

Table 3-9 Duplicate Data Comparison – Vx Component

Test	Flow	Slot	Y-Pos (ft)	15.07				10.40				5.74			
			El (ft)	Vx(1)	Vx(2)	Diff	% Diff	Vx(1)	Vx(2)	Diff	% Diff	Vx(1)	Vx(2)	Diff	% Diff
1	18	A	68	-0.27	-0.20	0.07	-27%	-0.11	-0.18	-0.07	67%	-0.09	-0.25	-0.16	165%
			58	0.14	0.00	-0.14	-99%	0.01	0.04	0.03	275%	0.05	0.18	0.13	256%
			53	0.50	0.51	0.00	1%	0.72	0.60	-0.12	-17%	0.53	0.65	0.12	22%
			48	0.66	0.80	0.14	21%	0.83	0.72	-0.12	-14%	0.57	0.73	0.16	27%
			43	0.56	0.58	0.02	4%	0.62	0.61	-0.01	-2%	0.44	0.60	0.16	36%
			38	0.70	0.69	0.00	-1%	0.75	0.67	-0.09	-11%	0.55	0.71	0.16	28%
3	18	B	68	0.03	-0.18	-0.20	-800%	0.03	-0.12	-0.14	-560%	-0.17	-0.15	0.01	-9%
			58	0.02	-0.04	-0.06	-272%	-0.03	0.08	0.10	-399%	0.04	0.19	0.15	338%
			53	0.54	0.44	-0.10	-18%	0.75	0.68	-0.07	-10%	0.52	0.65	0.13	25%
			48	0.76	0.78	0.03	3%	0.91	0.83	-0.08	-9%	0.61	0.73	0.13	21%
			43	0.57	0.60	0.04	6%	0.59	0.52	-0.07	-12%	0.44	0.62	0.19	43%
			38	0.80	0.75	-0.05	-6%	0.77	0.65	-0.12	-16%	0.56	0.78	0.22	39%
5	18	C	68	-0.07	-0.03	0.04	-58%	-0.09	0.00	0.09	-102%	-0.16	-0.03	0.13	-81%
			58	0.07	0.06	-0.01	-16%	0.06	-0.05	-0.11	-174%	0.09	0.16	0.06	70%
			53	0.46	0.59	0.13	29%	0.74	0.57	-0.17	-23%	0.53	0.66	0.13	24%
			48	0.67	0.76	0.09	14%	0.83	0.75	-0.08	-9%	0.59	0.69	0.10	17%
			43	0.54	0.57	0.03	5%	0.68	0.57	-0.11	-16%	0.48	0.67	0.19	41%
			38	0.82	0.75	-0.06	-8%	0.87	0.72	-0.15	-17%	0.56	0.75	0.19	34%
2	15	A	68	-0.13	-0.19	-0.06	49%	-0.16	-0.19	-0.03	22%	-0.31	-0.19	0.12	-40%
			58	0.00	-0.06	-0.06	-11788%	0.01	0.00	-0.01	-129%	0.06	0.15	0.09	164%
			53	0.43	0.44	0.01	3%	0.57	0.53	-0.05	-8%	0.43	0.53	0.10	24%
			48	0.61	0.57	-0.04	-6%	0.67	0.58	-0.09	-13%	0.45	0.58	0.13	28%
			43	0.47	0.46	-0.02	-4%	0.51	0.43	-0.08	-16%	0.36	0.49	0.13	35%
			38	0.56	0.54	-0.02	-4%	0.59	0.45	-0.14	-23%	0.36	0.55	0.19	54%
4	15	B	68	-0.05	-0.12	-0.07	121%	-0.14	-0.19	-0.05	35%	-0.27	-0.21	0.05	-19%
			58	0.06	0.03	-0.03	-52%	0.01	-0.04	-0.04	-719%	0.00	0.12	0.12	118556%
			53	0.53	0.45	-0.08	-15%	0.68	0.64	-0.05	-7%	0.41	0.57	0.16	40%
			48	0.60	0.58	-0.02	-4%	0.73	0.66	-0.07	-9%	0.50	0.60	0.10	20%
			43	0.50	0.51	0.01	2%	0.48	0.42	-0.06	-12%	0.31	0.48	0.18	58%
			38	0.57	0.58	0.01	2%	0.60	0.50	-0.10	-16%	0.44	0.61	0.17	40%
6	15	C	68	-0.01	-0.05	-0.03	296%	-0.06	-0.08	-0.02	24%	-0.13	-0.11	0.03	-22%
			58	0.08	0.01	-0.07	-90%	0.06	-0.08	-0.14	-220%	0.06	0.14	0.08	129%
			53	0.43	0.57	0.14	33%	0.57	0.59	0.02	4%	0.39	0.48	0.09	22%
			48	0.55	0.64	0.09	16%	0.67	0.57	-0.10	-15%	0.47	0.52	0.05	12%
			43	0.40	0.40	0.00	1%	0.45	0.41	-0.04	-9%	0.33	0.46	0.14	42%
			38	0.57	0.58	0.00	1%	0.62	0.56	-0.06	-10%	0.40	0.58	0.18	44%
Avg. (El > 53 ft)				-0.01	-0.06	-0.05	-1062%	-0.03	-0.07	-0.03	-157%	-0.07	0.00	0.07	9959%
Avg. (El <= 53 ft)				0.57	0.59	0.01	3%	0.68	0.59	-0.08	-12%	0.47	0.61	0.15	32%

Grey cells: standard deviation > 2 x mean Value

Red cells: Difference > probable error estimate (60%)

Table 3-10 Duplicate Data Comparison – Vy Component

Test	Flow	Slot	Y-Pos (ft)	15.07				10.40				5.74			
			El (ft)	Vy(1)	Vy(2)	Diff	% Diff	Vy(1)	Vy(2)	Diff	% Diff	Vy(1)	Vy(2)	Diff	% Diff
1	18	A	68	0.82	0.94	0.12	15%	0.50	0.95	0.45	89%	-0.50	0.28	0.78	-156%
			58	0.58	0.11	-0.47	-81%	0.79	0.17	-0.62	-78%	-0.50	-0.65	-0.15	30%
			53	0.00	-0.20	-0.20	4159%	-0.30	-0.79	-0.49	165%	-1.11	-0.72	0.39	-35%
			48	0.03	0.21	0.18	690%	-0.22	-0.50	-0.28	126%	-0.69	-0.34	0.35	-51%
			43	0.20	0.22	0.02	9%	-0.06	-0.82	-0.76	1324%	-1.01	-0.92	0.09	-9%
			38	0.63	0.60	-0.03	-5%	0.13	-0.60	-0.72	-571%	-1.10	-1.14	-0.04	3%
3	18	B	68	0.36	0.62	0.26	72%	0.48	0.76	0.28	59%	0.21	0.09	-0.12	-56%
			58	0.54	0.34	-0.20	-37%	0.99	-0.18	-1.17	-118%	-0.54	-1.15	-0.61	113%
			53	-0.20	-0.23	-0.03	17%	-0.27	-0.68	-0.42	156%	-1.22	-0.92	0.30	-25%
			48	0.15	0.09	-0.06	-42%	0.00	-0.82	-0.82	77267%	-0.75	-0.90	-0.15	20%
			43	0.48	0.48	0.00	-1%	0.33	-0.61	-0.94	-289%	-0.81	-1.00	-0.19	23%
			38	0.65	0.67	0.01	2%	0.36	-0.59	-0.95	-265%	-1.18	-1.23	-0.05	5%
5	18	C	68	0.33	0.45	0.12	34%	0.49	0.26	-0.23	-47%	-0.13	-0.38	-0.25	200%
			58	0.06	0.09	0.03	54%	0.21	-0.11	-0.33	-154%	-0.53	-0.62	-0.08	15%
			53	-0.43	-0.20	0.23	-54%	-0.28	-0.76	-0.48	170%	-0.78	-0.74	0.04	-5%
			48	0.28	0.27	-0.01	-2%	-0.13	-0.56	-0.43	327%	-0.70	-0.52	0.18	-26%
			43	0.35	0.44	0.09	25%	0.10	-0.61	-0.71	-725%	-0.86	-0.75	0.12	-13%
			38	0.62	0.66	0.03	5%	0.26	-0.60	-0.86	-332%	-0.98	-0.85	0.13	-13%
2	15	A	68	0.56	0.73	0.17	31%	0.91	0.83	-0.07	-8%	0.41	0.20	-0.21	-51%
			58	0.60	0.33	-0.27	-45%	0.58	0.10	-0.48	-83%	-0.65	-0.79	-0.14	22%
			53	-0.35	0.01	0.37	-103%	-0.38	-0.69	-0.31	81%	-0.95	-0.96	-0.01	1%
			48	0.17	0.06	-0.11	-63%	0.10	-0.75	-0.85	-845%	-0.43	-0.71	-0.29	68%
			43	0.25	0.25	0.00	1%	0.03	-0.69	-0.72	-2590%	-0.77	-0.79	-0.02	3%
			38	0.53	0.61	0.08	15%	0.09	-0.51	-0.60	-683%	-0.95	-0.91	0.04	-4%
4	15	B	68	0.38	0.58	0.20	51%	0.78	1.01	0.23	29%	0.54	0.47	-0.07	-14%
			58	0.49	0.10	-0.40	-80%	0.42	-0.07	-0.50	-117%	-0.71	-0.65	0.06	-9%
			53	0.10	-0.16	-0.27	-255%	-0.06	-0.62	-0.57	1023%	-0.89	-0.69	0.19	-22%
			48	0.02	0.08	0.05	207%	-0.22	-0.80	-0.59	273%	-0.76	-0.83	-0.07	9%
			43	0.18	0.60	0.43	243%	0.02	-0.44	-0.46	-2918%	-0.79	-0.67	0.12	-16%
			38	0.42	0.55	0.13	32%	0.33	-0.51	-0.84	-257%	-0.94	-0.93	0.01	-1%
6	15	C	68	0.31	0.40	0.09	30%	0.29	0.86	0.58	201%	-0.20	0.55	0.76	-375%
			58	0.25	-0.05	-0.30	-120%	0.08	-0.18	-0.25	-333%	-0.73	-0.66	0.08	-11%
			53	-0.27	-0.13	0.14	-52%	-0.30	-0.47	-0.17	55%	-0.65	-0.51	0.14	-21%
			48	0.17	0.12	-0.05	-30%	0.00	-0.62	-0.61	14841%	-0.43	-0.58	-0.15	35%
			43	0.25	0.20	-0.05	-21%	0.17	-0.55	-0.71	-430%	-0.59	-0.64	-0.05	9%
			38	0.50	0.56	0.07	14%	0.19	-0.40	-0.59	-308%	-0.75	-0.73	0.02	-3%
Avg. (El > 53 ft)				0.44	0.39	-0.05	-6%	0.54	0.37	-0.18	-47%	-0.28	-0.28	0.00	-24%
Avg. (El <= 53 ft)				0.20	0.24	0.04	200%	-0.01	-0.62	-0.62	3567%	-0.84	-0.79	0.05	-3%

Grey cells: standard deviation > 2 x mean Value

Red cells: Difference > probable error estimate (51%)

Table 3-11 Duplicate Data Comparison – Vz Component

Test	Flow	Slot	Y-Pos (ft)	15.07				10.40				5.74			
			El (ft)	Vz(1)	Vz(2)	Diff	% Diff	Vz(1)	Vz(2)	Diff	% Diff	Vz(1)	Vz(2)	Diff	% Diff
1	18	A	68	0.68	0.28	-0.40	-59%	1.52	1.50	-0.02	-1%	0.92	1.83	0.91	99%
			58	-1.01	-1.13	-0.13	12%	1.93	1.44	-0.49	-25%	2.74	2.65	-0.09	-3%
			53	0.32	-0.08	-0.40	-125%	2.59	3.30	0.70	27%	3.15	2.80	-0.36	-11%
			48	1.74	2.19	0.45	26%	3.23	3.36	0.13	4%	3.07	2.94	-0.13	-4%
			43	3.02	3.05	0.02	1%	3.70	3.64	-0.06	-2%	3.75	3.56	-0.19	-5%
			38	3.56	3.52	-0.04	-1%	4.09	3.90	-0.18	-4%	4.09	4.05	-0.04	-1%
3	18	B	68	-0.11	0.26	0.37	-331%	0.31	1.16	0.86	280%	0.53	1.13	0.60	115%
			58	-1.38	-0.39	0.99	-72%	2.15	2.07	-0.08	-4%	2.76	2.35	-0.41	-15%
			53	0.16	-0.51	-0.67	-427%	2.34	3.06	0.73	31%	3.08	3.27	0.19	6%
			48	2.24	1.39	-0.85	-38%	3.57	3.01	-0.56	-16%	3.72	3.46	-0.26	-7%
			43	3.17	3.32	0.15	5%	4.07	3.94	-0.14	-3%	4.08	4.06	-0.03	-1%
			38	3.85	4.06	0.21	5%	4.77	4.70	-0.07	-2%	4.89	4.88	-0.01	0%
5	18	C	68	0.10	0.21	0.10	98%	0.87	1.03	0.16	19%	1.27	1.28	0.01	1%
			58	-0.54	-0.75	-0.21	40%	1.74	0.94	-0.81	-46%	1.84	1.93	0.09	5%
			53	0.01	-0.01	-0.02	-168%	2.02	1.71	-0.31	-15%	2.68	2.56	-0.12	-5%
			48	1.17	1.78	0.60	51%	2.81	2.96	0.15	5%	2.85	2.72	-0.13	-5%
			43	3.04	3.32	0.28	9%	3.77	3.80	0.04	1%	3.77	3.68	-0.09	-2%
			38	3.75	3.95	0.21	6%	4.82	4.58	-0.24	-5%	4.70	4.36	-0.34	-7%
2	15	A	68	-0.09	0.20	0.29	-327%	0.87	1.28	0.41	47%	1.28	1.28	0.00	0%
			58	-0.73	-0.74	0.00	1%	2.00	1.43	-0.58	-29%	2.32	2.20	-0.11	-5%
			53	-0.33	0.49	0.81	-250%	2.43	2.51	0.08	3%	2.77	2.34	-0.43	-15%
			48	2.05	1.53	-0.52	-25%	2.72	2.62	-0.11	-4%	2.44	2.54	0.10	4%
			43	2.60	2.55	-0.05	-2%	3.15	3.06	-0.09	-3%	3.09	3.01	-0.08	-3%
			38	2.91	3.18	0.28	9%	3.46	3.39	-0.07	-2%	3.57	3.37	-0.20	-6%
4	15	B	68	-0.29	-0.08	0.21	-72%	0.30	0.85	0.55	181%	0.69	1.19	0.50	72%
			58	-0.66	-1.09	-0.44	66%	1.73	1.27	-0.46	-27%	2.56	2.20	-0.35	-14%
			53	0.51	0.03	-0.48	-94%	2.38	2.46	0.08	3%	2.76	2.73	-0.03	-1%
			48	1.28	0.95	-0.33	-26%	2.78	2.59	-0.19	-7%	2.95	3.00	0.05	2%
			43	2.38	2.70	0.32	14%	3.22	3.27	0.05	2%	3.41	3.39	-0.02	0%
			38	3.01	3.07	0.06	2%	3.95	3.66	-0.29	-7%	3.99	3.99	0.00	0%
6	15	C	68	-0.11	-0.34	-0.22	203%	0.31	0.55	0.24	76%	0.89	1.28	0.39	44%
			58	-0.42	-0.63	-0.21	51%	1.50	0.43	-1.07	-71%	1.82	2.00	0.17	10%
			53	-0.11	0.11	0.23	-198%	1.71	1.80	0.09	5%	2.10	2.01	-0.10	-5%
			48	1.40	0.81	-0.59	-42%	2.42	2.32	-0.10	-4%	2.40	2.43	0.03	1%
			43	2.28	2.37	0.08	4%	3.19	3.03	-0.15	-5%	3.01	3.05	0.04	1%
			38	2.85	3.04	0.19	7%	3.83	3.82	-0.01	0%	3.67	3.53	-0.13	-4%
Avg. (El > 53 ft)				-0.38	-0.35	0.03	-32%	1.27	1.16	-0.11	33%	1.63	1.78	0.14	26%
Avg. (El <= 53 ft)				1.95	1.95	0.00	-52%	3.21	3.19	-0.02	0%	3.33	3.24	-0.10	-3%

Grey cells: standard deviation > 2 x mean Value

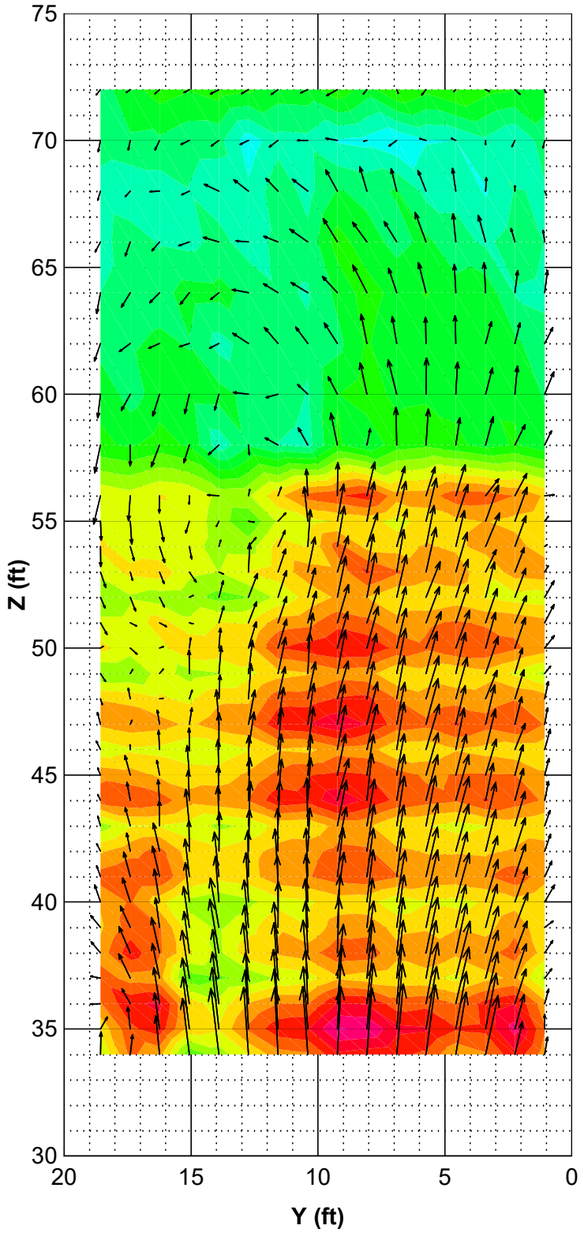
Red cells: Difference > probable error estimate (10%)

4.0 Comparison of 2022 and 2015 Data Sets

4.1 2015 Test Results

During processing of the 2022 data and preliminary comparison with the 2015 data, a transposition error in the data processing code was identified. In essence, the data from each probe and elevation were plotted in the mirrored position of which they were collected, such that the results from Probe 1-Position 1 were plotted at the location of Probe 1-Position 4. The corrected data from the 2015 program are presented in Figure 4-1 through Figure 4-3. While the corrected plots appear somewhat different relative to the plots presented in the 2015 report, the summary statistics presented therein remain valid.

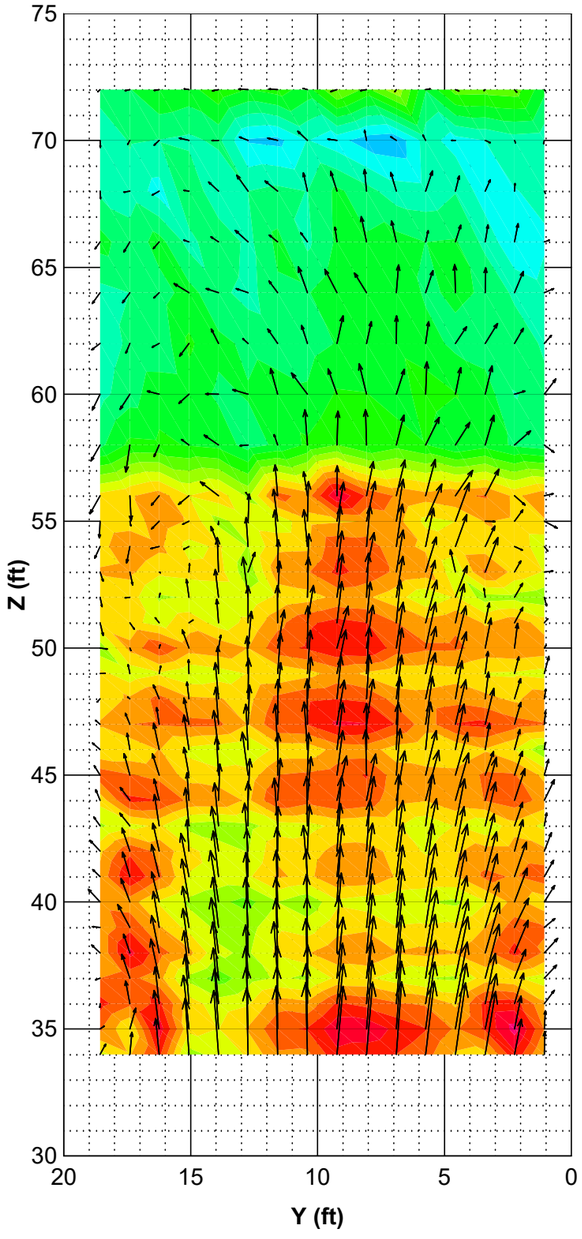
Slot A



Test 1
Date: June 2, 2015
Forebay: 73.7 ft
Tailwater: 18.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.6 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 13.7 kcfs
Unit 15: 18.3 kcfs
Unit 16: 13.7 kcfs
Unit 17: 0 kcfs
Unit 18: 13.6 kcfs

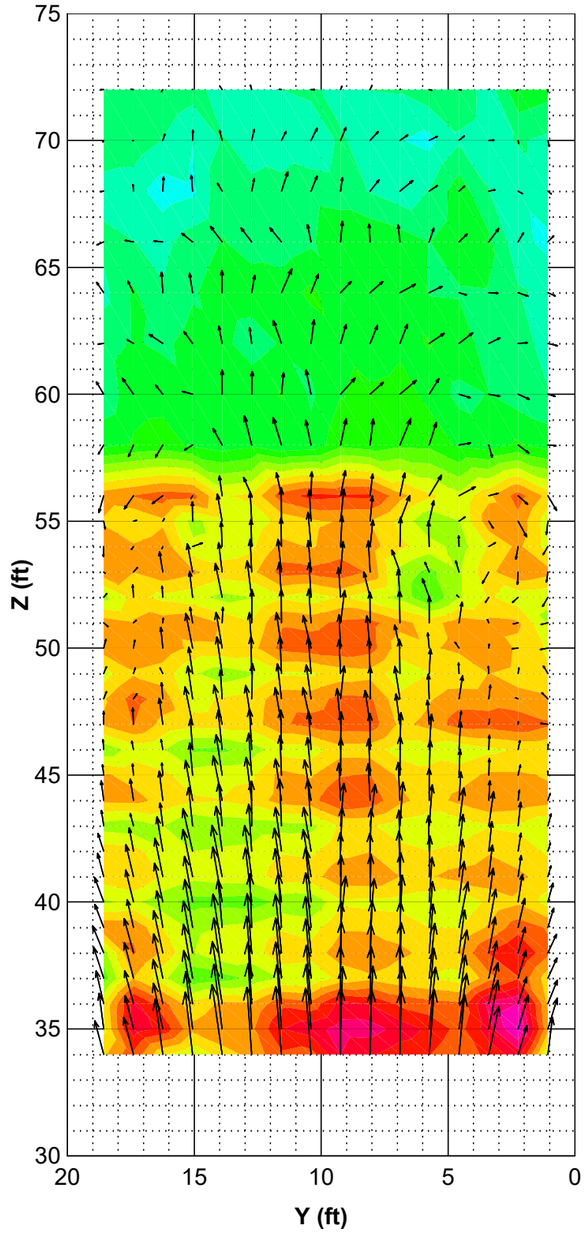
Slot B



Test 2
Date: June 3, 2015
Forebay: 72.9 ft
Tailwater: 16.3 ft
B2CC: Open
TIE: Out
North Orifice: Open

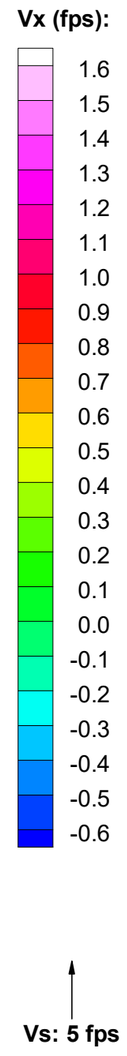
Unit 11: 1.9 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcfs
Unit 15: 18.3 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Slot C



Test 3
Date: June 4, 2015
Forebay: 73.6 ft
Tailwater: 16.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 9.7 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcf
Unit 15: 18.0 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 6.5 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN

ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

APPROACH AND SWEEPING VELOCITY COMPONENTS - 18 KCFS (2015)

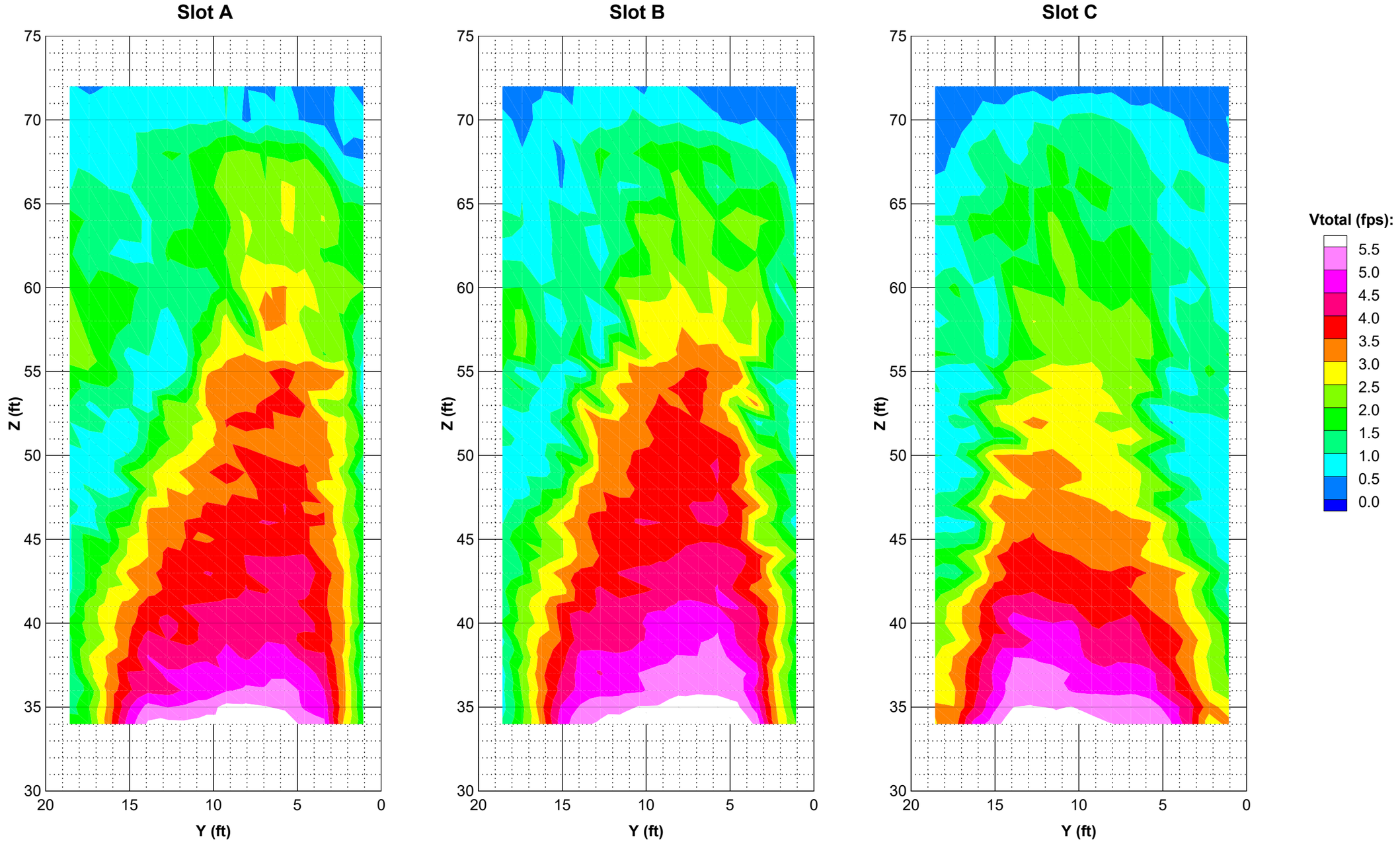
B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

DATE: 10-03-2022

PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

4-1



Test 1
Date: June 2, 2015
Forebay: 73.7 ft
Tailwater: 18.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.6 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 13.7 kcfs
Unit 15: 18.3 kcfs
Unit 16: 13.7 kcfs
Unit 17: 0 kcfs
Unit 18: 13.6 kcfs

Test 2
Date: June 3, 2015
Forebay: 72.9 ft
Tailwater: 16.3 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 1.9 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcfs
Unit 15: 18.3 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Test 3
Date: June 4, 2015
Forebay: 73.6 ft
Tailwater: 16.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 9.7 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcf
Unit 15: 18.0 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 6.5 kcfs

DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN
ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

TOTAL VELOCITY MAGNITUDES 18 KCFS (2015)

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

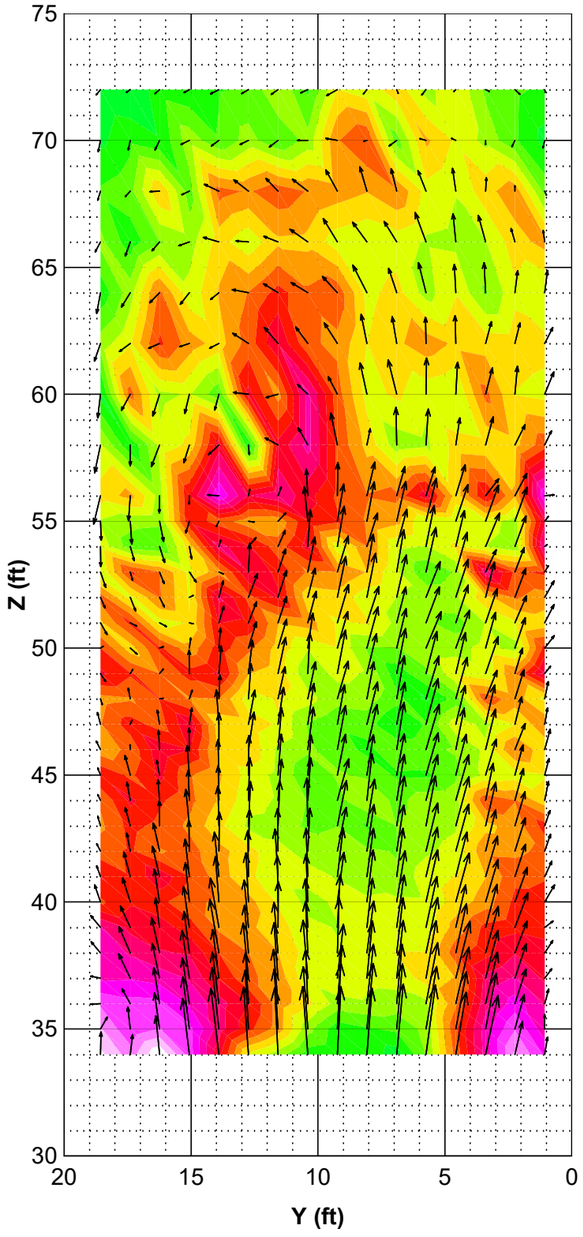
DATE: 10-03-2022

PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

4-2

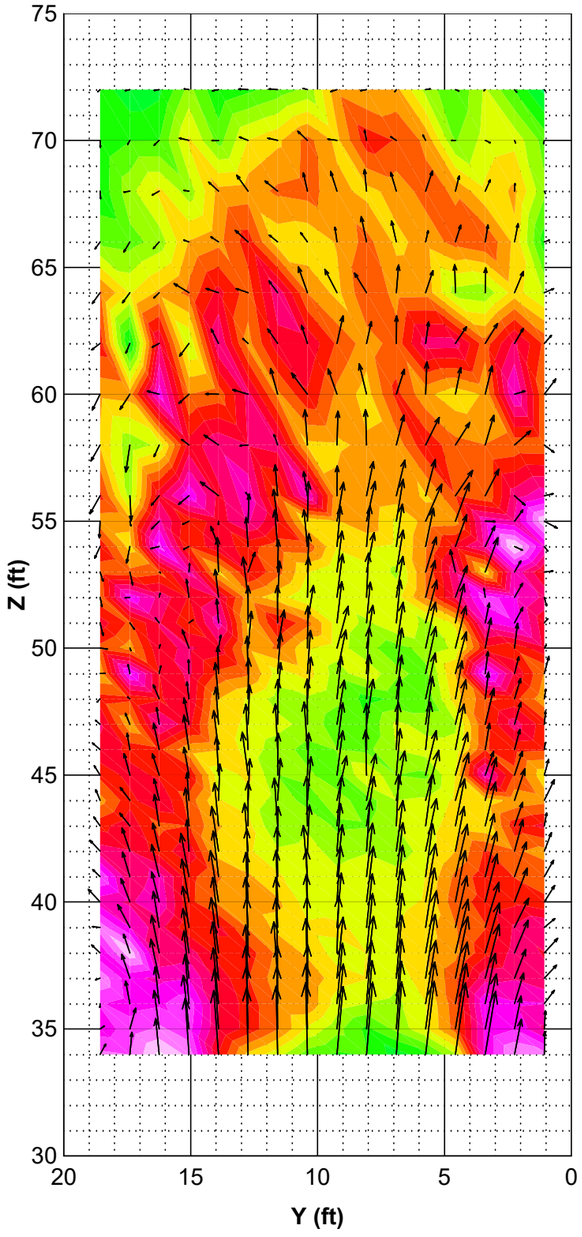
Slot A



Test 1
Date: June 2, 2015
Forebay: 73.7 ft
Tailwater: 18.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.6 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 13.7 kcfs
Unit 15: 18.3 kcfs
Unit 16: 13.7 kcfs
Unit 17: 0 kcfs
Unit 18: 13.6 kcfs

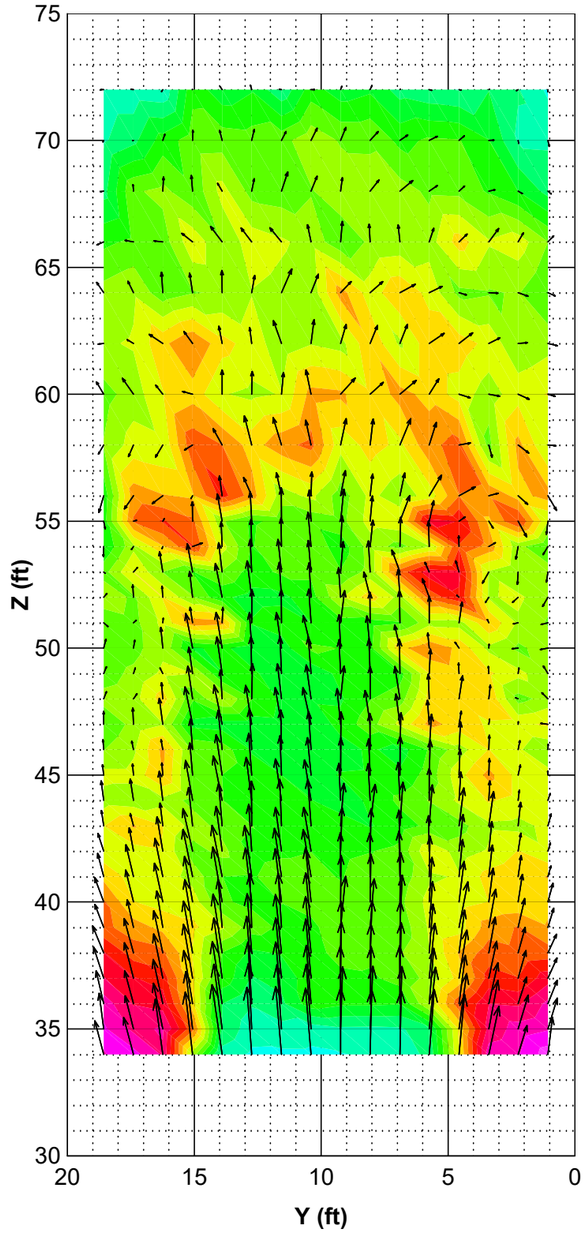
Slot B



Test 2
Date: June 3, 2015
Forebay: 72.9 ft
Tailwater: 16.3 ft
B2CC: Open
TIE: Out
North Orifice: Open

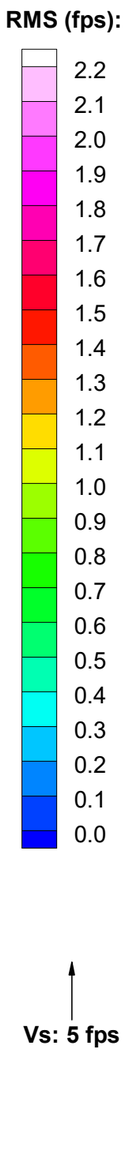
Unit 11: 1.9 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcfs
Unit 15: 18.3 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Slot C



Test 3
Date: June 4, 2015
Forebay: 73.6 ft
Tailwater: 16.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 9.7 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcf
Unit 15: 18.0 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 6.5 kcfs



DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN
ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

ROOT MEAN SQUARE OF TOTAL VELOCITY MAGNITUDE - 18 KCFS (2015)

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

DATE: 10-03-2022
PROJECT NUMBER: 7214NWP052

FIGURE NUMBER:

4-3

4.2 Results Comparison

The only known difference in the physical configuration of the gatewell and VBS between the test years is the replacement of the flow control plates (2015) with flow control corbels (2022).

Estimated gatewell discharges for the two test years (at 18 kcfs unit flow) are compared in Table 4-1. Integration of the Vx components over the measurement grid indicates a 15% increase in total gatewell discharge from 2015 to 2022, while integration of the Vz components at the lowest measurement elevation indicates a virtually identical total gatewell discharge between test years. The flow split between gatewells in 2015 was uniform within 3 to 4% of the average, while a wider range is indicated by the 2022 data with the flow split varying by approximately 6 to 10% of the average. The integrated Vz data from both test years show a bias in discharge toward Slot C, while a reversal in flow bias is indicated by the integrated Vx data between test years. Given the uncertainties associated with the integrated discharges, the observed similarities and differences may be inconclusive, although the data at minimum suggest that a shift in flow split between the gatewells may have occurred between test years.

Table 4-1 Comparison of Estimated Gatewell Discharge for 18 kcfs Unit Flow – 2022 vs. 2015

Slot / Basis	Integrated Vx				Integrated Vz			
	Discharge (cfs)		% of Average		Discharge (cfs)		% of Average	
	2015	2022	2015	2022	2015	2022	2015	2022
15A	312	323	102.6%	92.5%	362	338	97.0%	90.6%
15B	304	355	99.9%	101.6%	370	381	99.2%	102.1%
15C	296	370	97.5%	105.9%	387	400	103.8%	107.3%
Average	304	349	-	-	373	373	-	-
Total	911	1,048	-	-	1,119	1,118	-	-

Summary statistics from the two test years (at measurement positions at or below elevation 56 ft) are compared in Table 4-2, where the minimum and maximum measured values are normalized by the average values to remove any influence of potential differences in gatewell flow splits.

The average sweeping velocity components matched within ±6% between test years and had generally similar ranges, as did the RMS values of total velocity magnitude. Consistent with the foregoing comparison of gatewell discharge, the 2022 data show an increase in the average Vx component magnitude of 6% in Slot A, 17% in Slot B, and 24% in Slot C. The range in Vx values is larger in Slots A and B for the 2022 data, and smaller in Slot C. The progressive increase in average Vx component magnitudes from Slot A to Slot C indicate a change in flow split between test years and the inconsistent change in velocity range between Slots/Years suggests a variation in gatewell velocity distribution. This applies regardless of experimental error inherent in both test years, as the velocity meters remained fixed to the deployment apparatus for the duration of both programs.

Table 4-2 Summary Comparison of 2015 and 2022 Velocity Data – 18 kcfs

Slot	Test Year	Approach Velocity, Vx (fps)			Sweeping Velocity, Vyz (fps)			Total Velocity RMS (fps)		
		Avg	Min / Avg	Max / Avg	Avg	Min / Avg	Max / Avg	Avg	Min / Avg	Max / Avg
15A	*2015*	*0.61*	*0.35*	*1.82*	*2.96*	*0.09*	*2.04*	*1.23*	*0.53*	*1.87*
	2022	*0.64*	*0.30*	*1.81*	*2.78*	*0.06*	*2.01*	*1.27*	*0.58*	*1.73*
	2022 - 2015	0.03	-0.05	-0.01	-0.18	-0.03	-0.02	0.04	0.05	-0.14
	2022 / 2015	1.06	0.87	1.00	0.94	0.72	0.99	1.03	1.10	0.92
15B	*2015*	*0.60*	*0.42*	*1.73*	*3.06*	*0.04*	*2.04*	*1.23*	*0.49*	*1.67*
	2022	*0.70*	*0.32*	*1.81*	*2.94*	*0.01*	*1.96*	*1.27*	*0.34*	*1.75*
	2022 - 2015	0.10	-0.09	0.09	-0.12	-0.02	-0.08	0.04	-0.15	0.08
	2022 / 2015	1.17	0.78	1.05	0.96	0.36	0.96	1.03	0.70	1.05
15C	*2015*	*0.57*	*0.34*	*2.11*	*2.73*	*0.07*	*2.20*	*1.23*	*0.39*	*2.01*
	2022	*0.71*	*0.42*	*1.96*	*2.76*	*0.04*	*2.17*	*1.27*	*0.45*	*1.99*
	2022 - 2015	0.14	0.08	-0.16	0.03	-0.03	-0.03	0.04	0.06	-0.02
	2022 / 2015	1.24	1.23	0.93	1.01	0.57	0.99	1.03	1.15	0.99

The screen approach and sweeping velocities measured during the respective programs are compared graphically in Figure 4-4 through Figure 4-6. As with the summary statistics, the Vx data have been normalized by the average measured Vx components within each slot to remove the effect of potential differences in gatewell flow splits. The ratio of Vx components between test years do not appear in the comparison (right pane of Figures) if they fall below 0.6 or above 1.67 (*i.e.,* the data do not match within the probable error of 60%). In all cases, the measured Vx components do not match within the probable error near or above the top of the VBS (~El. 56 ft) due, primarily, to the low Vx component magnitudes and instabilities in the flow field.

In Slot A (Figure 4-4), the pattern of approach and sweeping velocity components is generally similar between test years, with the following exceptions:

- The 2022 data show the largest relative Vx component magnitudes at the lowest measurement elevations and between Y = 0 to 5 ft while this is the case at Y = 5 to 10 ft in the 2015 data.
- The 2022 data indicate consistently lower relative Vx component magnitudes between Y = 5 ft and Y = 10 ft.
- Larger relative Vx component magnitudes are present near the top-center of the VBS in the 2015 data.
- The sweeping velocity vector angles are less consistent at Y = 1.1 ft in the 2022 data set, particularly between elevations 45 and 55 ft.
- The sweeping velocity vectors are oriented more vertically at Y = 10.4 ft in the 2022 data set.

For both test years, temporal migration of the circulation cell at (Y, Z) = (15, 54) is suggested by dissimilarity between adjacent sweeping velocity vector magnitudes and directions. This is most pronounced at Y = 12.8 ft between elevations 53 and 56 ft in the 2015 data set and the region centered about (Y, Z) = (15, 54) in the 2022 data set.

In Slot B (Figure 4-5), the data from both test years indicate the presence of two circulation cells at the lateral extents of the measurement grid at elevation 54 ft. Again, the pattern of approach and sweeping velocity components is generally similar, with some exceptions:

- At the lowest measurement elevations, the maximum relative Vx component magnitude occurred just right of center in 2015, while they occurred at the north and south extremes in 2022. This observation may be influenced by the fact that data were only collected at the centerline (home) position at these elevations in 2022, while a full traverse was successfully completed in 2015.
- The 2022 data indicate consistently lower relative Vx component magnitudes between Y = 5 ft and Y = 10 ft and larger relative Vx component magnitudes are present near the top-center of the VBS in the 2015 data (as with Slot A).
- At the north and south extents of the measurement grid, the relative Vx component magnitudes were typically larger at the south in 2015 and at the north in 2022.

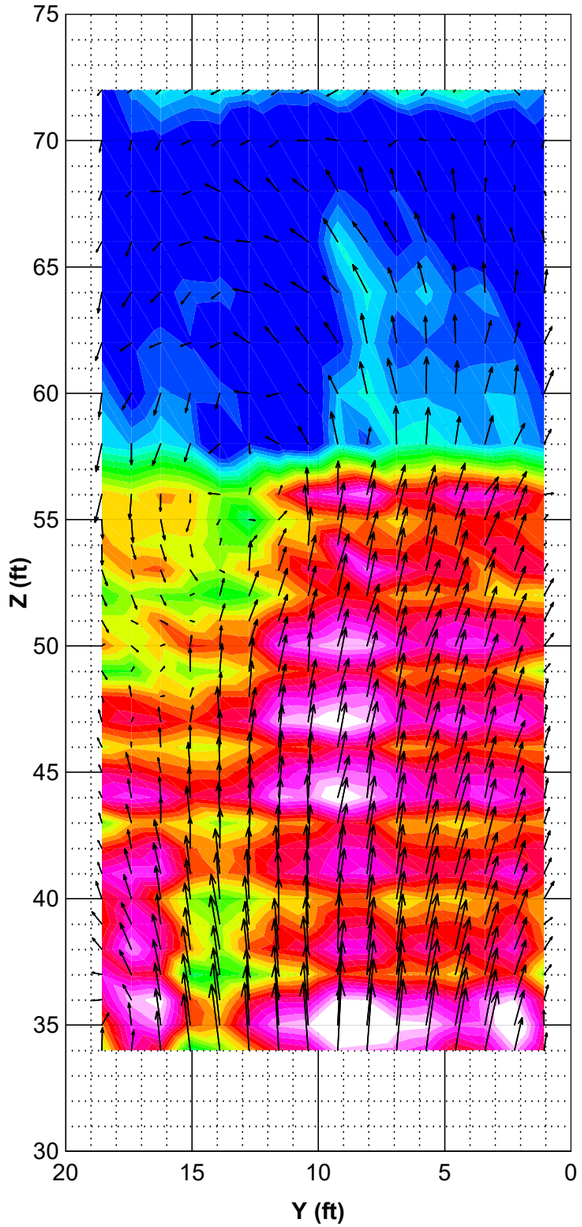
In Slot C (Figure 4-6), the screen approach and sweeping velocity components was the least similar between test years. This is most evident in the relative Vx components over the central and southern regions of the VBS, where the 2015 magnitudes were significantly larger above elevation 51 ft, and between elevations 37 and 46 ft, where the 2022 magnitudes were typically larger. As was observed in Slots A and B, the 2022 Vx component magnitudes were consistently lower between Y = 5 ft and Y = 10 ft. The sweeping velocity vectors illustrate a significant difference in the gatewell flow field between test years. The general flow circulation pattern was largely consistent between all three gatewells in 2022, whereas when compared to the Slots A and B, the 2015 data from Slot C show:

- a reduction in circulation intensity in the region of (Y, Z) = (15, 54);
- an increase in the circulation intensity in the region of (Y, Z) = (4, 54); and
- a pronounced bias in sweeping velocity vector angles toward the south.

The consistent difference in Vx component magnitudes over the north-central region of the VBSs in slots A, B, and C is likely a result of small differences in the orientation of the probe (WA2) used in that region for the respective test years. While probe orientation may have influenced the trend in Vx components over other regions of the VBS, there is not a consistent bias in the data between test years. This indicates that the inter-test year differences in Vx are, in part, a result of changes in the gatewell flow patterns, which are evident in the comparison of sweeping velocity components.

As shown in Figure 4-7, the B2 powerhouse discharges were more constant, and stable, over the course of the 2022 program than the 2015 program. In addition, the relative flow withdrawal from either side of Unit 15 was more consistent across the 2022 program, as shown in Figure 4-8. These observations correlate well with the progressive degradation of similarity from Slot A to Slot C between test years. That is, the largest similarity was observed in Slot A, where the unit operations were most similar between test years and the least similar results were observed in Slot C, where the unit operations were least similar between test years. At a minimum, this suggests that the most probable cause of the apparent shift in gatewell flow patterns is differences in the unit operations between test years, and to perhaps a lesser extent, variability of unit operations during the period of data collection.

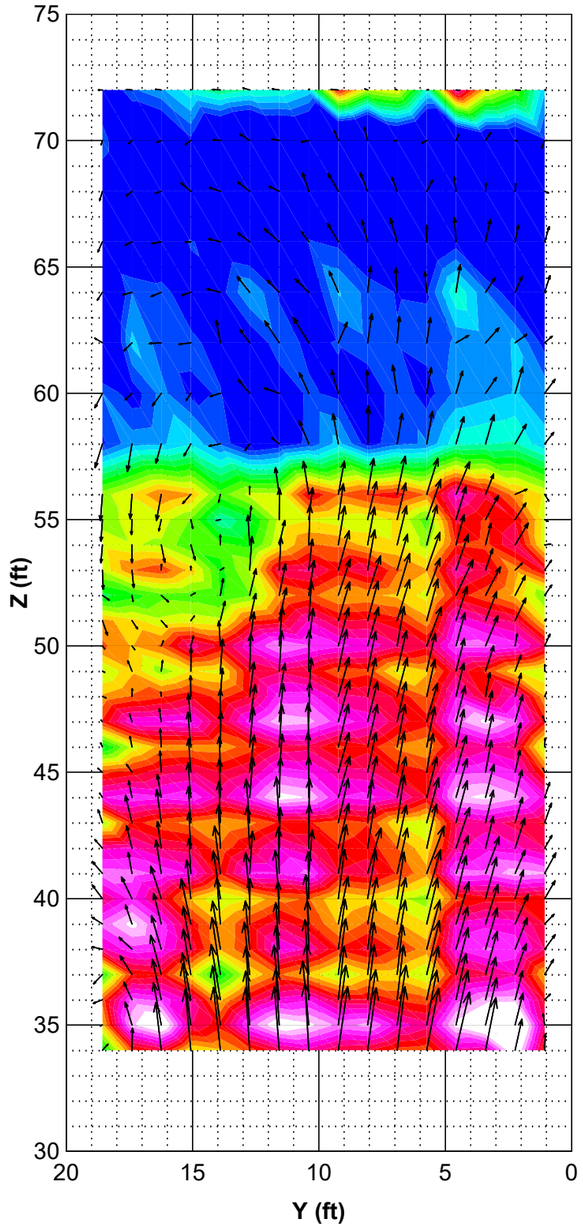
2015



Test 1
Date: June 2, 2015
Forebay: 73.7 ft
Tailwater: 18.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 13.6 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 13.7 kcfs
Unit 15: 18.3 kcfs
Unit 16: 13.7 kcfs
Unit 17: 0 kcfs
Unit 18: 13.6 kcfs

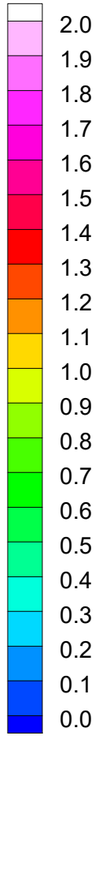
2022



Test 1
Date: June 1, 2022
Forebay: 72.2 ft
Tailwater: 25.2 ft
B2CC: Open
TIE: Out
North Orifice: Open

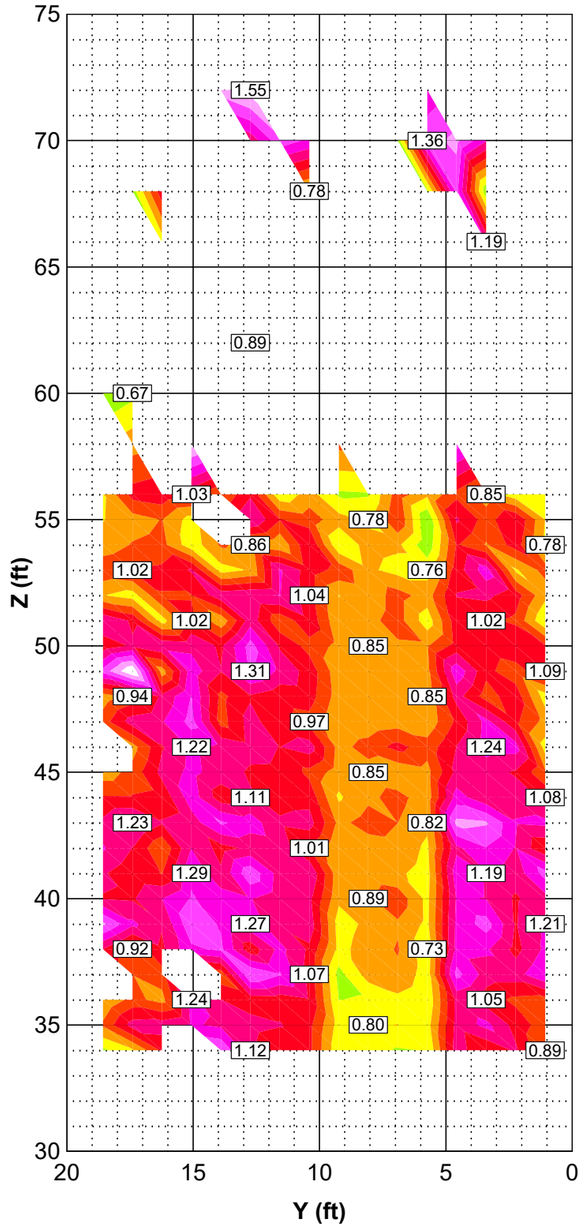
Unit 11: 13.8 kcfs
Unit 12: 13.6 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.4 kcfs

Vx-ND:



5 fps

Vx-ND (2022) / Vx-ND (2015)



Vx-ND (2022) / Vx-ND (2015)

Value Blanking: 0.6 > 2022/2015 > 1.67

DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN

ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

2015 / 2022 COMPARISON
SLOT A

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

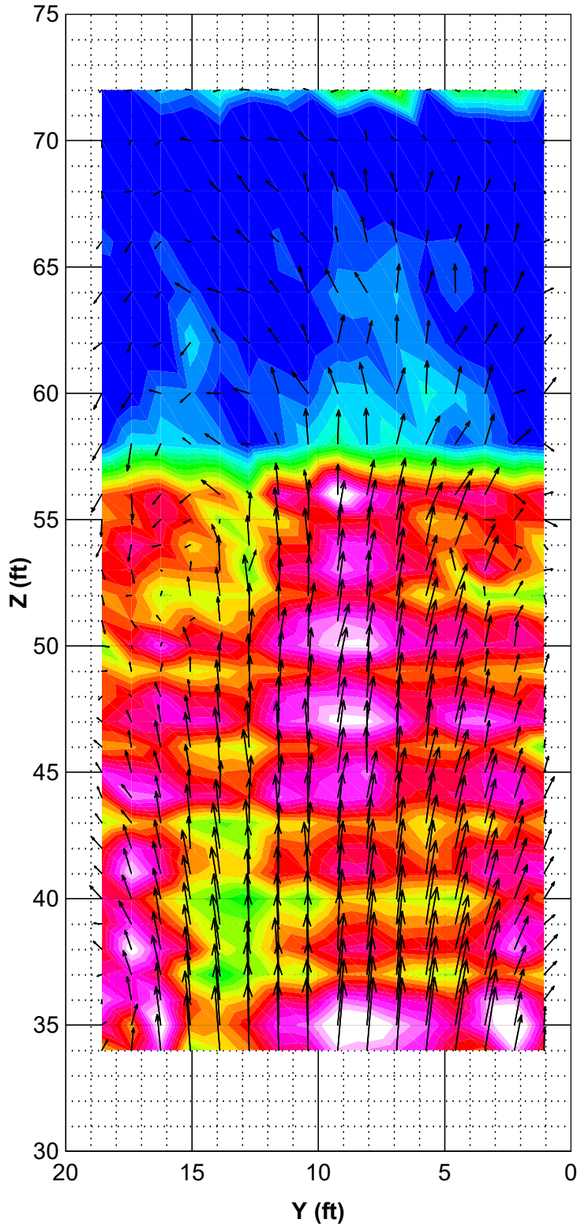
PROJECT NUMBER: 7214NWP052

DATE: 10-03-2022

FIGURE NUMBER:

4-4

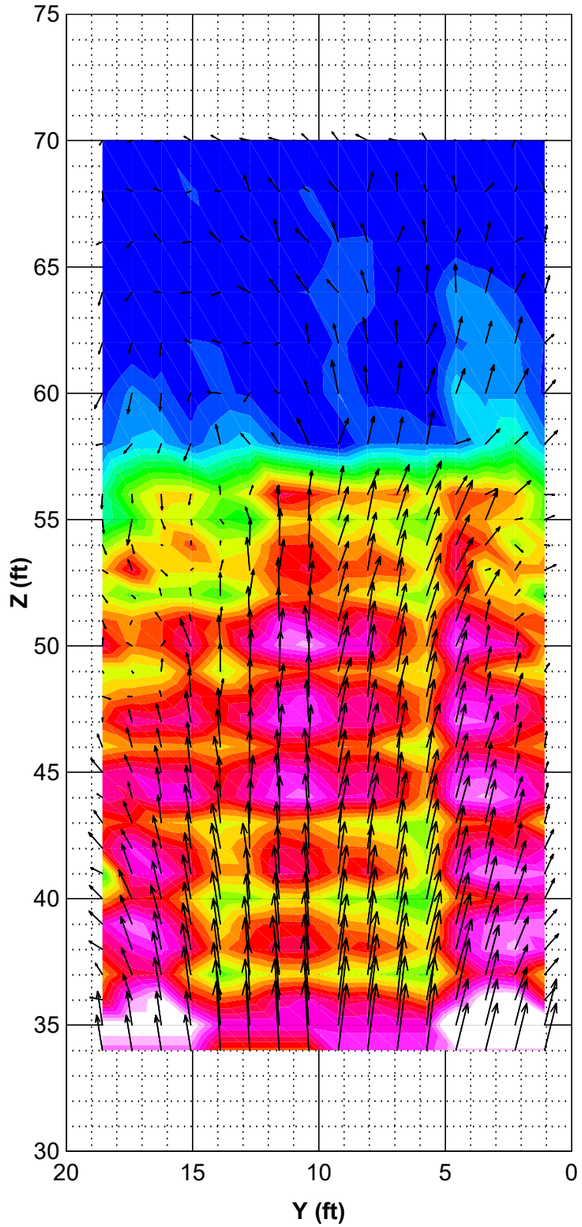
2015



Test 2
Date: June 3, 2015
Forebay: 72.9 ft
Tailwater: 16.3 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 1.9 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcfs
Unit 15: 18.3 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

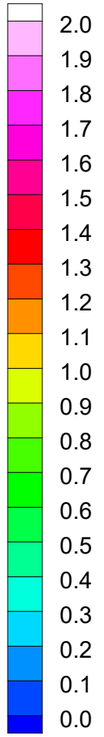
2022



Test 3
Date: June 6, 2022
Forebay: 72.3 ft
Tailwater: 28.5 ft
B2CC: Open
TIE: Out
North Orifice: Open

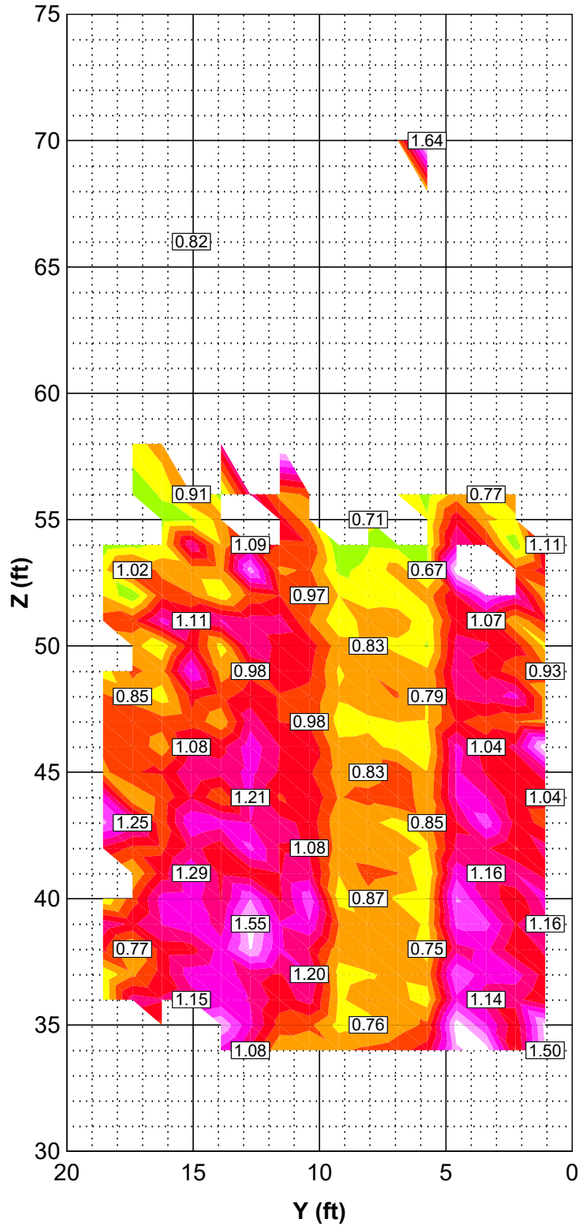
Unit 11: 13.2 kcfs
Unit 12: 13.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.2 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.2 kcfs

Vx-ND:



5 fps

Vx-ND (2022) / Vx-ND (2015)



Vx-ND (2022) / Vx-ND (2015)

Value Blanking: 0.6 > 2022/2015 > 1.67

DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN

ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

2015 / 2022 COMPARISON
SLOT B

B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

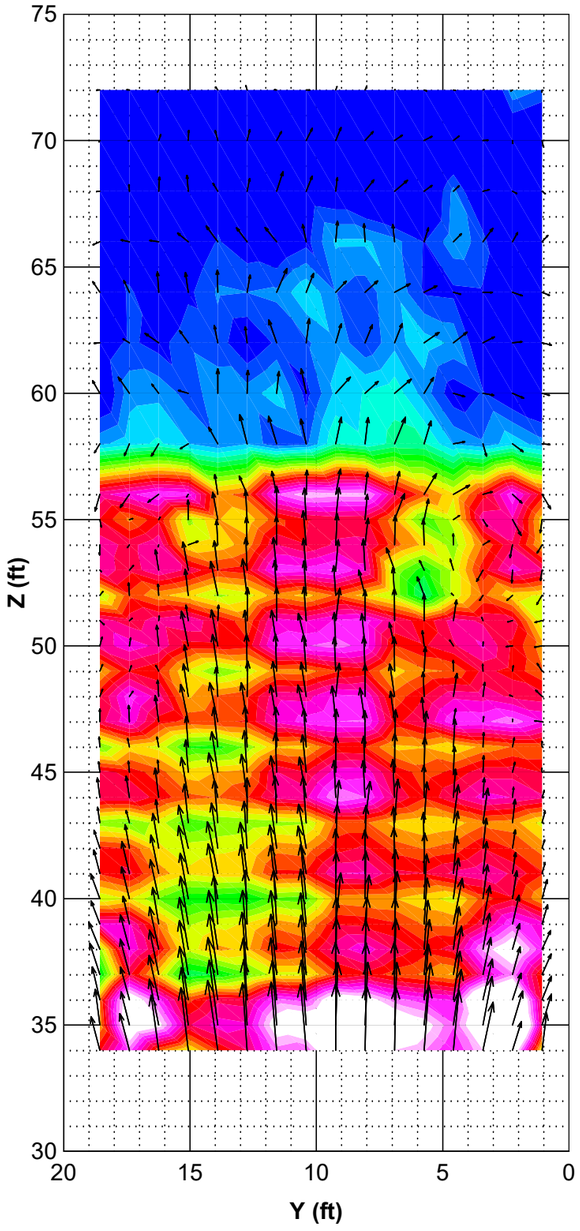
PROJECT NUMBER: 7214NWP052

DATE: 10-03-2022

FIGURE NUMBER:

4-5

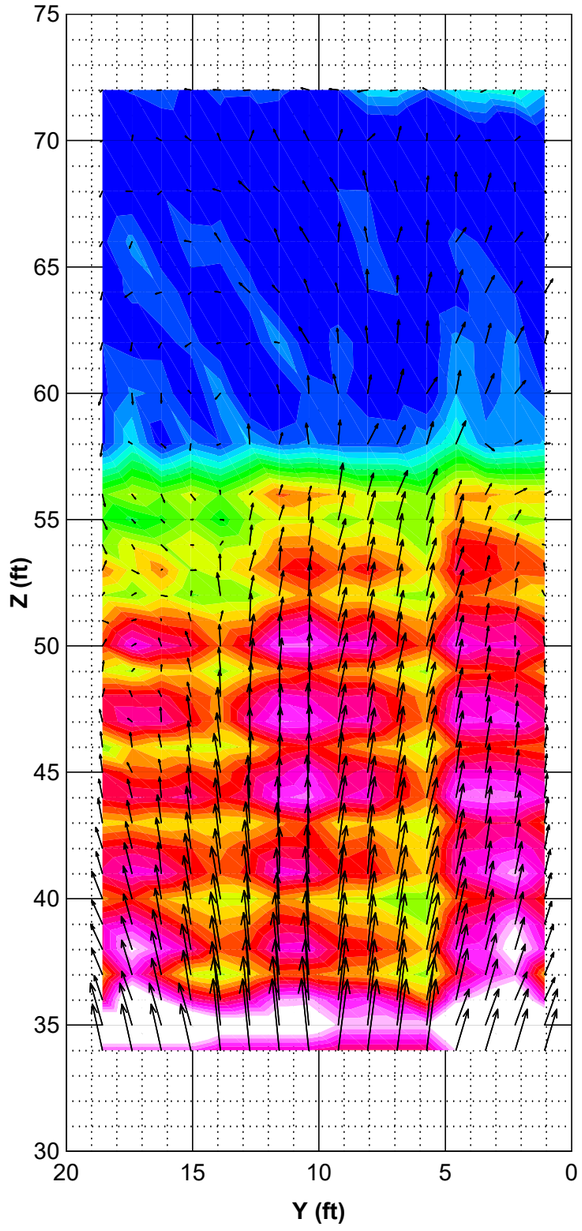
2015



Test 3
Date: June 4, 2015
Forebay: 73.6 ft
Tailwater: 16.1 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 9.7 kcfs
Unit 12: 0 kcfs
Unit 13: 0 kcfs
Unit 14: 14.4 kcfs
Unit 15: 18.0 kcfs
Unit 16: 14.5 kcfs
Unit 17: 0 kcfs
Unit 18: 6.5 kcfs

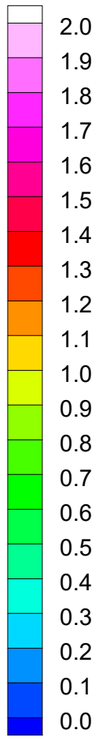
2022



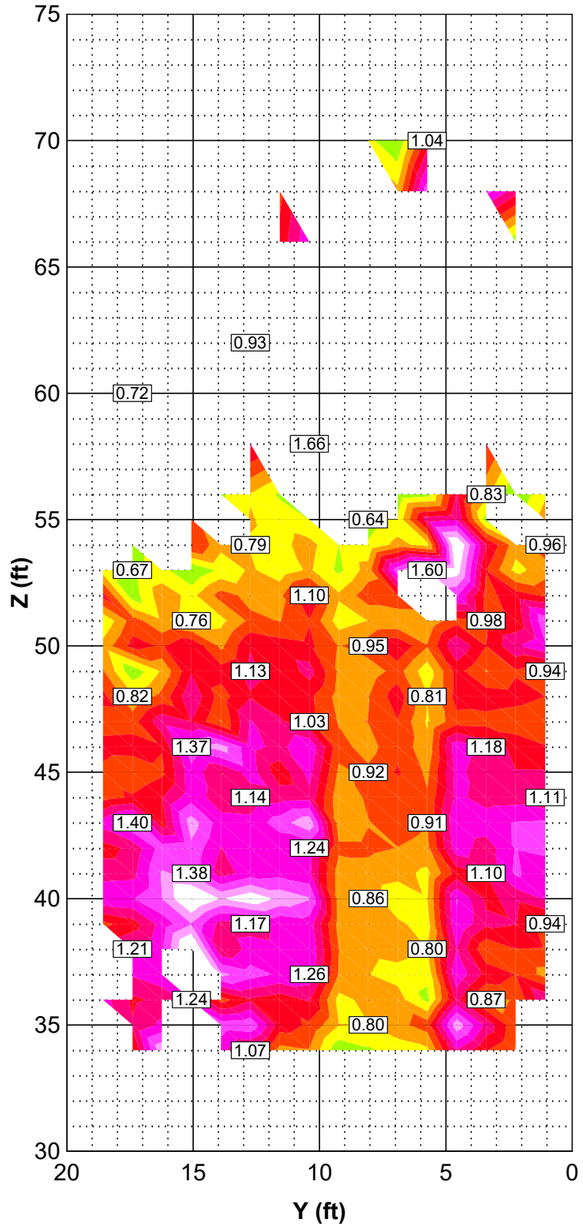
Test 5
Date: June 8, 2022
Forebay: 73.3 ft
Tailwater: 28.8 ft
B2CC: Open
TIE: Out
North Orifice: Open

Unit 11: 11.6 kcfs
Unit 12: 11.2 kcfs
Unit 13: 0 kcfs
Unit 14: 15.1 kcfs
Unit 15: 18.2 kcfs
Unit 16: 15.1 kcfs
Unit 17: 0 kcfs
Unit 18: 13.3 kcfs

Vx-ND:



Vx-ND (2022) / Vx-ND (2015)



Vx-ND (2022) / Vx-ND (2015)

Value Blanking: 0.6 > 2022/2015 > 1.67

DRAWN BY:	CHECKED BY:	APPROVED BY:
JA	--	--

ALDEN
ALDEN RESEARCH LABORATORY
711 100th St. SE
EVERETT, WA 98052
PHONE: (425) 881-7700
WEB: WWW.ALDENLAB.COM

2015 / 2022 COMPARISON
SLOT C
B2 FGE Gatewell Velocity and Pressure Measurements
USACE Portland District
Portland, Oregon

PROJECT NUMBER: 7214NWP052
DATE: 10-03-2022

FIGURE NUMBER:

4-6

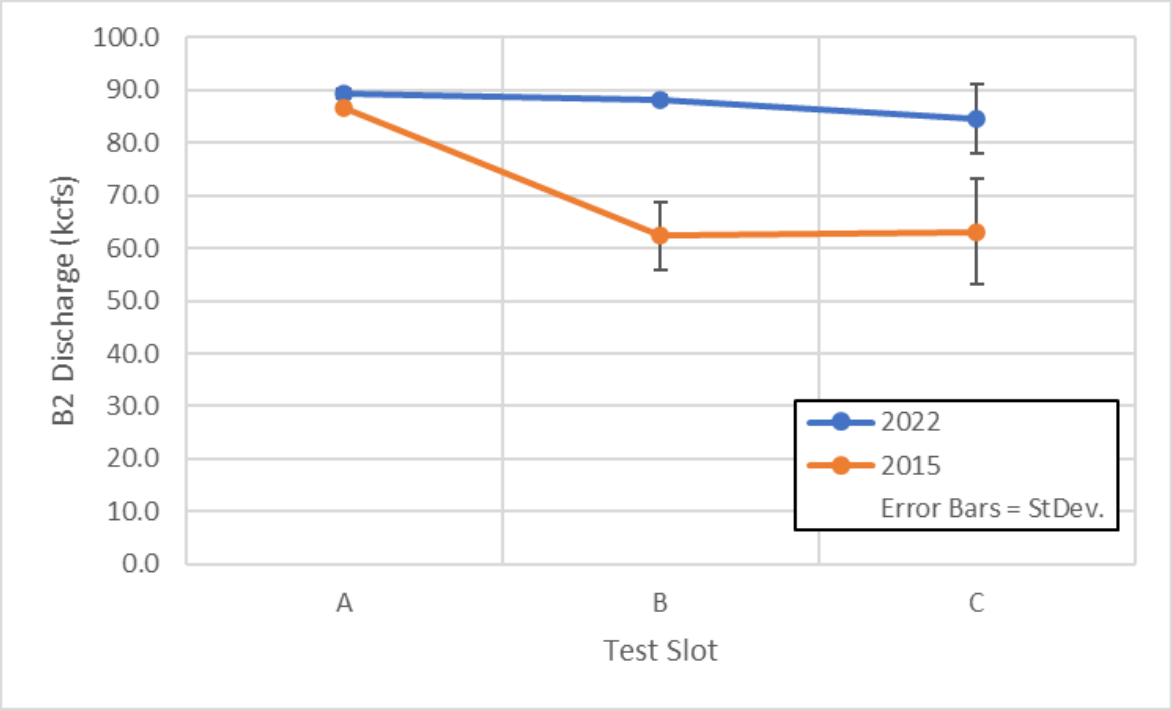


Figure 4-7 Comparison of B2 Discharge between Test Years

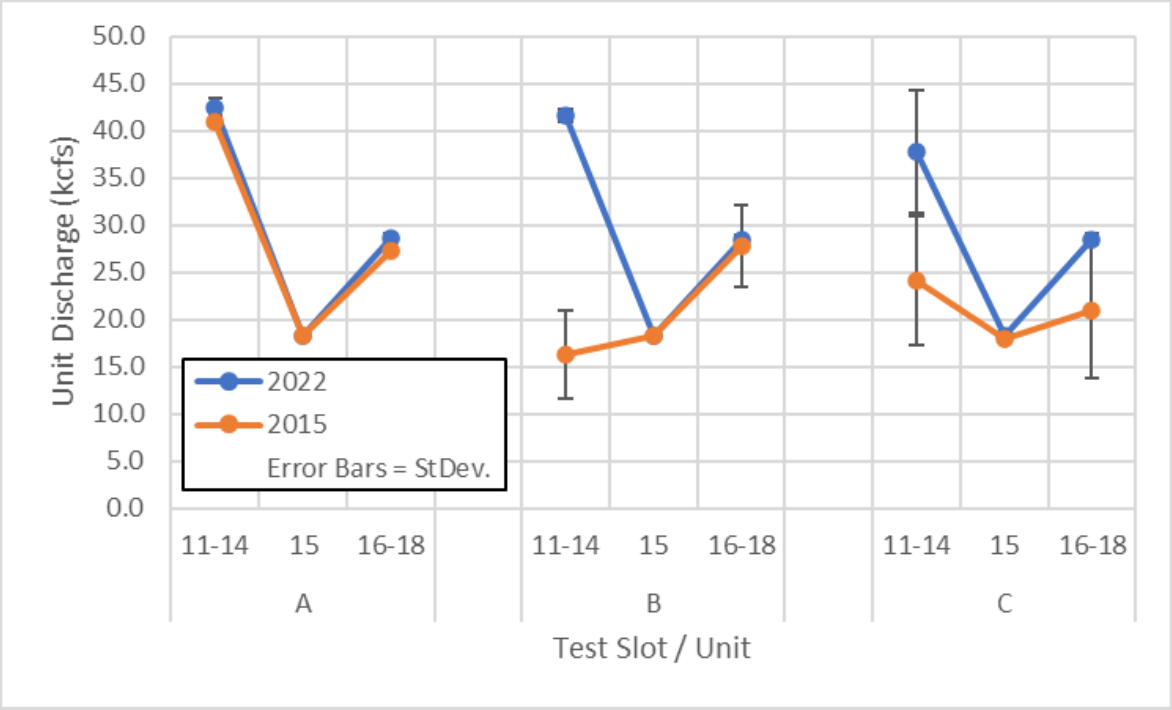


Figure 4-8 Comparison of Unit Operations between Test Years

5.0 Conclusions and Recommendations

The objective of the field program was to collect velocity and pressure data to facilitate the evaluation of the hydraulic conditions present with corbels installed in Slots A and B of Unit 15 relative to previous gatewell configurations. This objective was met upon the completion of field testing in June 2022. Ultimately, the results of this study will be evaluated by CENWP for indications of the effectiveness of the flow control corbels in producing gatewell flow conditions conducive to fish passage.

The following conclusions are drawn based on the pressure tests:

- When compared to a no-corbel configuration (Unit 14A), the corbel in Unit 15A resulted in a decrease in gatewell discharge and a smaller change in HGL between operational and non-operational states of the unit.
- During operation, high-frequency pressure fluctuations at the gatewell exit are marginally larger with the corbel in place and a bias in flow to the north of the gatewell exit was indicated.
- In general, pressure fluctuations at the gatewell exit were dictated by fluctuation in the forebay level and the governor on the turbine units at the 1-to-2-minute time scale irrespective of the gatewell beam configuration (corbel versus no corbel).
- Conducting frequency analyses of the 200 Hz pressure data may provide additional insights into the performance characteristics of the corbels in Slot A.
- As no measurements of pressure were made in Slots B of Units 14 and 15, no conclusions can be made regarding the relative hydraulic performance of the Slot B corbel design.

The following conclusions are drawn based on the velocity measurements:

- The turbine discharge does not have significant influence on the gatewell flow patterns in the 15 to 18 kcfs range.
- Lower turbine discharges produce smaller screen approach velocity components and decreased turbulence.
- The measured screen approach velocity components are sensitive to the attainable accuracy and precision of velocity probe alignment. The 2022 data indicate, however, that screen approach velocity component magnitudes may reach maxima in the range of 1.4 fps at 18 kcfs and 1.1 fps at 15 kcfs.
- The flow control corbels may be the source of the apparent change in flow split between gatewell slots between the 2015 and 2022 test programs. However, there is also evidence that circulation patterns within the forebay, generated by unit operations, influence the gatewell flow field, and by extension, may influence the flow split between the gatewell slots of any particular turbine unit.

The following recommendations are made if additional testing is conducted in the future or design revisions are considered:

- During gatewell velocity mapping, measurements should be made to confidently quantify the gatewell discharge. This would provide a means to validate the measured screen approach velocity components.

- If the screen approach velocity component is of primary interest, measurements should be made over a plane where it is the primary contributor to the total velocity magnitude, such as downstream of the VBS, to maximize certainty in the test results.
- The heading (direction) of the screen approach velocity (X-Z) vectors and distance from the measurement plane to the VBS should be accounted for if changes to the VBS backing plate porosities are considered.

6.0 References

Donoho, D.L. and Johnstone, I.M. 1994. Ideal spatial adaptation by wavelet shrinkage. *Biometrika* 81: 425-455

Duong, D.L., and Hazelton, M.L. 2003 "Plug-in bandwidth matrices for bivariate kernel density estimation." *Journal of Nonparametric Statistics,* 15(1), 17-30

Goring, D.G., and Nikora, V.I. 2002. Despiking Acoustic Doppler Velocimeter Data. *Journal of Hydraulic Engineering,* 2013. *2002.128:117-126*

Harbor Consulting Engineers & Alden Research Laboratory (Harbor/Alden), Data Collection Report for Water Velocity Measurements on Vertical Barrier Screens with and without Proof-of-Concept Turbulence Reduction Devices at Bonneville Dam Second Powerhouse. June 2013.

Harbor Consulting Engineers & Alden Research Laboratory (Harbor/Alden), Data Collection Report, B2 VBS Velocity Profiles at Bonneville Dam Second Powerhouse. December 2014.

Harbor Consulting Engineers & Alden Research Laboratory (Harbor/Alden), Data Collection Report, B2 VBS Velocity Profiles at Bonneville Dam Second Powerhouse. August 2015.

Islam, M.R., and Zhu, D.Z. 2013. Kernel Density-Based Algorithm for Despiking ADV Data. *Journal of Hydraulic Engineering,* 2013. July: 785-795.

NMFS (National Marine Fisheries Service) 2022, NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual, NMFS, WCR, Portland, Oregon 2022.

Pacific Northwest National Laboratory (PNNL), Water Velocity Measurements on a Vertical Barrier Screen at the Bonneville Dam Second Powerhouse. September 2011.

Appendix A Traversing Beam Motion Control Code

List of Common Commands

RESET	Reset Motion Controller
MEMCLR	Clear Motion Controller memory
DRIVE	Enable driver (DRIVE 1 = Enable, DRIVE 0 = Disable)
D	Distance (52,458 counts = 14”)
V	Traverse velocity (V 0.500 used)
A	Acceleration (not used)
MA	Set relative or absolute motion (MA0 = Relative, MA1 = Absolute)
PSET	Set position (PSET 0 sets home position)
AXSDEF	Defines the type of drive (AXSDEF 0 sets stepper motor)
DRES	Drive resolution (DRES 25,000 used)
TDIR	Displays # and name of programs stored in Motion Controller memory
!K	Kills program during execution
GO	Begins motion (GO1 drives Channel 1)

Motion Control Programs

BEFORE (Initializes system)
DRIVE 0
WRITE “Set the traverse to home position”
WRITE “Execute the ‘PSET 0’ command”
WRITE “Then run the ‘SOFT’ program”
END

SOFT (Configures traverse)
DRIVE 0
LH 0 (disable “hard limits”)
V 0.500
LS POS 900000 (motion control limits “soft” limit)
LS NEG -90000
LS AD 10 (soft limit deceleration)
DRIVE 1
MA 1
WRITE “The drive is enabled and in absolute position”
END

B2120SEC (Traverse to 4 lateral positions)
POS 1
POS 2
POS 3
POS 4
POS 0
END

B2120XTRA (Traverse to 5 lateral positions)
POS 1
POS 2
POS 3
POS 4
POS 5
POS 0
END

POS 0 (Drives traverse to home position, when in absolute positioning)
D 0
Write “Going Home”
GO 1
WAIT (MOV = B0)
WRITE “Back Home”
END

POS 1 (Drives traverse to position 1 and holds for data collection)
D 78546
(Similar for Pos 2 – 5: POS 2 = 26088, POS 3 = -26370, POS 4 = -78825, POS 5 = -131286)

```
        WRITE “Moving to Position 1”
        GO 1
        WAIT (MOV = B0)
        WRITE “Arrived at Position 1”
        CNTDN (Program to count down for 120 sec during data acquisition – ALT: Use T120)
        END

CNTDN (Program to count down for 120 sec during data acquisition)
        DEL CNTDN
        DEF CNTDN
        VAR5 = -120
        L12 (12 loops)
        VAR5 (Displays variable 5 value)
        T10 (10 second delay)
        VAR5 = VAR5 +10
        LN (End loop)
        VAR5
        END
```

Appendix B Tabulated Velocity Data

List of Tables

Table B-1 Test 1 – Unit 15A – 18kcfs – Vx (fps)

Vx																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	-0.08	0.04	0.09	0.17	0.23	0.19	0.19	0.12	0.65	0.43	0.48	0.17	0.77	0.50	0.38	0.10
70	0.04	-0.14	-0.13	-0.01	-0.22	-0.31	-0.19	-0.17	-0.40	-0.48	-0.20	-0.30	-0.30	-0.15	-0.15	-0.02
68	-0.07	-0.14	-0.18	-0.27	-0.13	-0.19	-0.16	-0.11	-0.20	-0.19	-0.18	-0.09	-0.18	-0.14	-0.22	-0.11
66	-0.08	-0.11	-0.09	0.01	-0.06	-0.09	-0.09	0.00	-0.01	-0.07	-0.10	-0.11	-0.03	-0.15	-0.15	-0.25
64	-0.18	0.05	0.02	-0.05	-0.02	0.10	-0.01	-0.08	0.10	0.03	0.00	-0.01	0.19	0.05	-0.05	-0.07
62	-0.20	0.11	0.02	0.02	-0.03	-0.05	0.03	-0.01	0.00	0.04	0.00	0.02	0.05	0.07	0.10	-0.02
60	0.05	-0.03	0.07	-0.01	0.00	-0.12	-0.04	0.01	-0.02	-0.05	0.04	-0.02	0.06	0.08	0.10	0.08
58	-0.01	0.08	0.09	0.14	0.04	-0.07	-0.03	0.01	0.11	-0.03	0.04	0.05	0.17	0.19	0.20	0.10
56	0.41	0.48	0.57	0.53	0.36	0.44	0.44	0.67	0.57	0.62	0.65	0.57	0.79	0.68	0.55	0.47
55	0.40	0.45	0.45	0.38	0.20	0.27	0.44	0.47	0.45	0.45	0.48	0.35	0.68	0.61	0.66	0.46
54	0.46	0.43	0.42	0.34	0.35	0.32	0.47	0.58	0.56	0.50	0.48	0.41	0.62	0.60	0.71	0.45
53	0.44	0.57	0.61	0.50	0.32	0.43	0.70	0.72	0.65	0.71	0.58	0.53	0.75	0.69	0.54	0.67
52	0.27	0.31	0.36	0.36	0.33	0.38	0.54	0.59	0.52	0.53	0.51	0.46	0.64	0.58	0.51	0.39
51	0.54	0.49	0.44	0.45	0.44	0.61	0.64	0.76	0.67	0.67	0.64	0.54	0.80	0.74	0.70	0.48
50	0.58	0.52	0.58	0.74	0.66	0.80	0.92	0.86	0.82	0.80	0.72	0.68	0.87	0.88	0.83	0.70
49	0.42	0.51	0.40	0.48	0.46	0.66	0.70	0.66	0.58	0.60	0.46	0.51	0.70	0.61	0.48	0.43
48	0.53	0.58	0.61	0.66	0.60	0.67	0.83	0.83	0.73	0.71	0.66	0.57	0.80	0.66	0.78	0.53
47	0.63	0.80	0.81	0.82	0.67	0.83	0.94	0.92	0.83	0.79	0.68	0.64	0.88	0.97	0.87	0.64
46	0.27	0.44	0.55	0.55	0.54	0.59	0.69	0.70	0.61	0.65	0.56	0.53	0.69	0.74	0.70	0.42
45	0.60	0.64	0.70	0.72	0.67	0.71	0.84	0.82	0.74	0.73	0.65	0.63	0.85	0.86	0.81	0.60
44	0.81	0.84	0.82	0.85	0.74	0.83	0.98	0.95	0.81	0.83	0.77	0.66	0.94	0.97	0.92	0.79
43	0.41	0.64	0.58	0.56	0.52	0.55	0.63	0.62	0.59	0.62	0.48	0.44	0.71	0.74	0.69	0.66
42	0.75	0.77	0.71	0.69	0.58	0.68	0.77	0.71	0.63	0.65	0.57	0.49	0.74	0.79	0.78	0.71
41	0.88	0.88	0.84	0.80	0.63	0.81	0.82	0.87	0.67	0.70	0.61	0.54	0.88	0.87	0.93	0.91
40	0.71	0.82	0.68	0.52	0.42	0.48	0.56	0.58	0.47	0.50	0.44	0.40	0.60	0.65	0.65	0.62
39	0.87	0.97	0.84	0.65	0.53	0.62	0.69	0.63	0.52	0.58	0.53	0.48	0.78	0.80	0.78	0.66
38	0.75	0.84	0.82	0.70	0.53	0.62	0.81	0.75	0.63	0.68	0.61	0.55	0.81	0.86	0.84	0.71
37	0.31	0.63	0.65	0.47	0.28	0.48	0.58	0.51	0.41	0.50	0.49	0.42	0.66	0.70	0.76	0.51
36	0.59	0.87	0.84	0.74	0.51	0.67	0.78	0.81	0.67	0.67	0.61	0.59	0.84	0.93	0.93	0.65
35	0.51	0.94	1.05	0.72	0.64	0.87	1.01	0.97	0.89	0.92	0.79	0.73	0.97	1.08	1.17	0.71
34	0.28	0.60	0.68	0.47	0.51	0.59	0.70	0.75	0.68	0.67	0.60	0.58	0.75	0.73	1.04	0.61

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-2 Test 1 – Unit 15A – 18kcfs – Vx RMS (fps)

Probe	OR1				OR2				WA2				WA1			
Vx RMS																
EL.	OR															WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
							Y-Position (ft)									
72	0.54	0.43	0.41	0.47	0.49	0.47	0.50	0.48	0.63	0.69	0.57	0.63	0.70	0.61	0.51	0.41
70	0.35	0.41	0.40	0.40	0.45	0.48	0.45	0.45	0.47	0.50	0.49	0.46	0.48	0.47	0.42	0.38
68	0.35	0.39	0.43	0.59	0.50	0.51	0.49	0.59	0.53	0.55	0.58	0.64	0.52	0.46	0.41	0.38
66	0.41	0.47	0.50	0.43	0.54	0.57	0.57	0.49	0.54	0.57	0.57	0.50	0.47	0.44	0.47	0.40
64	0.41	0.53	0.55	0.49	0.60	0.51	0.52	0.54	0.53	0.48	0.52	0.45	0.47	0.54	0.51	0.42
62	0.54	0.56	0.64	0.61	0.55	0.56	0.59	0.56	0.53	0.47	0.49	0.52	0.58	0.60	0.65	0.53
60	0.47	0.46	0.51	0.52	0.55	0.54	0.60	0.55	0.52	0.54	0.45	0.55	0.55	0.56	0.48	0.55
58	0.49	0.41	0.48	0.56	0.58	0.51	0.49	0.53	0.53	0.47	0.50	0.48	0.47	0.47	0.53	0.60
56	0.39	0.43	0.55	0.63	0.44	0.59	0.52	0.47	0.51	0.44	0.42	0.44	0.47	0.56	0.68	0.60
55	0.39	0.48	0.60	0.44	0.58	0.50	0.50	0.41	0.52	0.52	0.44	0.41	0.48	0.58	0.64	0.64
54	0.42	0.51	0.40	0.57	0.54	0.53	0.55	0.49	0.44	0.47	0.43	0.44	0.51	0.59	0.55	0.63
53	0.40	0.51	0.54	0.54	0.54	0.60	0.44	0.43	0.50	0.41	0.45	0.44	0.38	0.65	0.62	0.57
52	0.44	0.50	0.48	0.46	0.55	0.53	0.49	0.42	0.53	0.46	0.42	0.41	0.46	0.57	0.56	0.60
51	0.43	0.46	0.49	0.52	0.54	0.54	0.54	0.43	0.47	0.41	0.40	0.39	0.40	0.49	0.57	0.60
50	0.51	0.48	0.49	0.53	0.52	0.53	0.41	0.42	0.42	0.40	0.36	0.40	0.44	0.45	0.54	0.58
49	0.54	0.56	0.56	0.56	0.53	0.40	0.39	0.37	0.40	0.37	0.40	0.46	0.49	0.56	0.62	0.56
48	0.52	0.50	0.50	0.49	0.48	0.44	0.41	0.41	0.42	0.37	0.36	0.42	0.44	0.57	0.47	0.59
47	0.51	0.59	0.58	0.53	0.52	0.49	0.39	0.38	0.40	0.42	0.42	0.43	0.43	0.48	0.49	0.52
46	0.52	0.51	0.51	0.56	0.50	0.48	0.42	0.39	0.42	0.40	0.40	0.45	0.51	0.51	0.52	0.53
45	0.55	0.51	0.57	0.56	0.54	0.48	0.41	0.38	0.47	0.41	0.41	0.49	0.46	0.51	0.53	0.49
44	0.48	0.56	0.61	0.59	0.56	0.46	0.48	0.41	0.47	0.43	0.42	0.48	0.50	0.55	0.54	0.52
43	0.59	0.63	0.63	0.60	0.52	0.46	0.43	0.45	0.48	0.48	0.53	0.53	0.56	0.63	0.66	0.62
42	0.80	0.68	0.66	0.62	0.59	0.47	0.46	0.43	0.52	0.48	0.50	0.58	0.62	0.61	0.62	0.70
41	0.90	0.71	0.70	0.63	0.62	0.55	0.49	0.45	0.54	0.51	0.54	0.59	0.65	0.67	0.69	0.73
40	0.91	0.91	0.87	0.73	0.62	0.59	0.59	0.49	0.56	0.55	0.61	0.63	0.72	0.69	0.77	0.79
39	0.91	0.85	0.84	0.79	0.67	0.62	0.59	0.55	0.59	0.53	0.59	0.67	0.68	0.70	0.77	0.87
38	1.07	1.05	0.84	0.79	0.72	0.66	0.61	0.56	0.61	0.61	0.62	0.68	0.72	0.77	0.80	0.86
37	1.05	1.04	0.98	0.83	0.75	0.72	0.70	0.60	0.62	0.62	0.74	0.74	0.75	0.82	0.92	0.89
36	0.99	1.02	0.98	0.85	0.75	0.70	0.60	0.55	0.61	0.60	0.66	0.76	0.84	0.92	0.96	0.88
35	0.87	1.01	0.99	0.88	0.71	0.71	0.64	0.51	0.52	0.58	0.59	0.74	0.76	0.95	0.97	0.82
34	0.94	1.05	1.07	0.77	0.65	0.62	0.57	0.53	0.49	0.52	0.56	0.72	0.75	0.98	1.11	0.99

Table B-3 Test 1 – Unit 15A – 18kcfs – Vy (fps)

Vy																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.34	0.43	0.49	0.01	0.65	0.59	0.59	-0.03	0.61	0.24	0.15	-0.15	-0.27	-0.24	-0.43	-0.11
70	0.11	0.27	0.40	0.47	0.60	0.83	0.67	0.62	0.33	0.29	0.26	0.41	-0.20	-0.43	-0.18	0.26
68	0.24	0.45	0.52	0.82	0.91	1.03	0.85	0.50	0.84	0.62	0.44	-0.50	0.16	-0.05	-0.07	-0.33
66	0.37	0.57	0.79	0.48	0.97	1.03	1.26	0.61	0.91	0.50	0.57	-0.01	0.13	-0.41	-0.27	-0.39
64	0.42	0.76	0.85	0.76	1.11	1.05	1.01	1.12	0.75	-0.24	0.10	0.15	-0.34	-0.79	-0.59	-0.45
62	0.64	0.66	1.02	1.00	0.36	0.81	1.21	1.31	-0.75	-0.35	-0.19	-0.32	-1.04	-1.12	-0.98	-0.64
60	0.62	0.55	0.75	0.39	0.84	0.94	1.26	0.77	0.57	0.05	0.38	-0.38	-0.54	-0.90	-0.64	-0.88
58	0.61	0.38	0.45	0.58	0.95	0.39	0.65	0.79	0.44	-0.04	-0.43	-0.50	-0.64	-0.69	-0.92	-0.77
56	0.17	0.15	0.41	0.68	0.14	0.02	0.32	0.44	-0.51	-0.49	-0.67	-0.94	-1.14	-0.68	-1.01	-0.36
55	0.12	0.04	0.22	-0.17	0.36	-0.11	-0.01	-0.33	-0.44	-0.74	-0.72	-1.19	-0.83	-1.08	-0.92	-0.30
54	0.12	-0.01	-0.28	-0.35	0.00	0.15	-0.47	-0.11	-0.55	-0.55	-0.78	-0.86	-0.66	-0.45	-1.11	-0.51
53	-0.07	-0.16	-0.01	0.00	-0.30	-0.19	-0.15	-0.30	-0.91	-0.58	-0.87	-1.11	-1.01	-0.60	-0.60	-0.59
52	-0.58	-0.09	-0.61	-0.37	-0.24	-0.52	-0.53	-0.44	-1.00	-1.08	-1.03	-1.12	-1.43	-1.25	-0.86	-0.59
51	-0.42	-0.48	-0.48	-0.29	-0.39	-0.49	-0.58	-0.24	-0.97	-0.85	-1.04	-0.93	-0.92	-0.93	-0.90	-0.14
50	-0.19	-0.24	-0.17	-0.23	0.12	-0.35	-0.26	-0.36	-0.87	-0.91	-0.57	-1.23	-0.73	-1.03	-0.17	-0.46
49	-0.20	0.35	-0.10	-0.01	-0.19	-0.09	-0.22	-0.04	-0.72	-0.66	-0.79	-0.73	-0.69	-0.68	-0.49	-0.03
48	-0.30	-0.04	0.06	0.03	-0.16	-0.34	-0.48	-0.22	-0.91	-0.66	-0.85	-0.69	-0.64	-0.36	-0.51	-0.16
47	0.12	0.21	0.17	0.21	-0.01	-0.45	-0.34	-0.08	-0.95	-0.83	-0.75	-0.89	-0.75	-0.54	-0.64	0.14
46	0.15	0.15	0.09	0.25	-0.04	-0.29	-0.23	0.07	-0.86	-0.79	-0.65	-0.67	-0.65	-0.59	-0.46	-0.05
45	0.37	0.43	0.11	0.20	0.09	-0.38	-0.24	0.06	-0.91	-0.70	-0.58	-0.54	-0.86	-0.49	-0.41	0.15
44	0.24	0.27	0.34	0.24	0.07	-0.26	-0.10	0.01	-0.98	-0.75	-0.72	-0.85	-0.92	-0.69	-0.58	-0.43
43	0.35	0.54	0.40	0.20	0.13	0.31	0.24	-0.06	-0.84	-0.37	-0.59	-1.01	-0.93	-0.65	-0.62	-0.58
42	0.63	0.45	0.32	0.17	0.17	0.21	-0.08	-0.04	-0.89	-0.54	-0.76	-0.83	-1.12	-0.66	-0.80	-0.62
41	0.84	0.31	0.44	0.14	0.49	-0.23	0.07	-0.30	-0.69	-1.11	-0.85	-1.47	-1.01	-1.14	-0.82	-0.94
40	0.86	0.87	0.89	0.34	0.58	0.36	0.35	0.04	-0.54	-0.67	-0.57	-1.16	-0.84	-0.92	-0.69	-0.88
39	0.88	0.55	0.64	0.80	0.29	0.00	0.11	0.25	-0.81	-0.76	-0.71	-0.91	-1.09	-1.04	-1.10	-0.80
38	0.87	1.08	0.83	0.63	0.65	0.36	0.30	0.13	-0.58	-0.61	-0.67	-1.10	-0.97	-1.00	-1.03	-0.89
37	0.73	0.98	0.90	0.64	0.68	0.46	0.28	0.31	-0.62	-0.52	-0.47	-1.06	-1.01	-0.97	-0.94	-0.75
36	0.75	0.67	0.75	0.72	0.77	0.32	0.45	0.18	-0.50	-0.54	-0.53	-0.97	-0.84	-0.85	-0.63	-0.47
35	0.20	0.56	0.66	0.67	0.65	0.34	0.29	0.50	-0.65	-0.67	-0.73	-0.86	-0.98	-0.92	-0.67	0.12
34	-0.47	-0.05	0.48	0.47	0.57	0.35	0.40	0.31	-0.78	-0.72	-0.66	-1.00	-1.12	-0.86	-0.57	-0.07

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-4 Test 1 – Unit 15A – 18kcfs – Vy RMS (fps)

Vy RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.34	0.39	0.32	0.59	0.33	0.38	0.40	0.63	0.69	0.90	0.74	0.53	0.52	0.69	0.36	0.45
70	0.43	0.43	0.36	0.31	0.45	0.52	0.38	0.38	0.50	0.43	0.49	0.67	0.49	0.50	0.53	0.46
68	0.35	0.36	0.40	0.52	0.44	0.45	0.50	0.60	0.56	0.61	0.57	0.54	0.45	0.56	0.53	0.33
66	0.42	0.48	0.45	0.51	0.58	0.49	0.49	0.48	0.54	0.62	0.45	0.60	0.54	0.57	0.55	0.45
64	0.40	0.47	0.60	0.45	0.60	0.49	0.52	0.56	0.58	0.56	0.79	0.61	0.58	0.62	0.54	0.49
62	0.61	0.47	0.58	0.59	0.57	0.68	0.58	0.63	0.54	0.59	0.49	0.57	0.60	0.67	0.59	0.46
60	0.44	0.37	0.42	0.58	0.63	0.73	0.62	0.69	0.87	0.64	0.56	0.73	0.65	0.55	0.58	0.53
58	0.50	0.39	0.62	0.62	0.84	0.84	0.94	0.87	0.66	0.78	0.70	0.60	0.65	0.73	0.54	0.61
56	0.38	0.43	0.62	0.72	0.50	0.75	0.82	0.88	0.75	0.64	0.51	0.71	0.70	0.74	0.64	0.86
55	0.51	0.46	0.65	0.62	0.96	0.82	0.84	0.68	0.80	0.68	0.59	0.51	0.70	0.75	0.76	0.96
54	0.40	0.75	0.50	0.67	0.79	0.90	0.84	0.74	0.74	0.70	0.58	0.70	0.73	0.93	0.68	0.71
53	0.47	0.59	0.72	0.80	0.71	0.83	0.72	0.73	0.66	0.64	0.52	0.56	0.54	0.95	0.98	0.70
52	0.47	0.71	0.59	0.85	0.57	0.64	0.73	0.56	0.58	0.59	0.66	0.55	0.53	0.64	0.72	0.82
51	0.49	0.65	0.60	0.71	0.77	0.72	0.71	0.59	0.55	0.52	0.48	0.49	0.54	0.65	0.76	0.69
50	0.75	0.84	0.97	0.79	0.77	0.56	0.50	0.49	0.52	0.50	0.47	0.41	0.60	0.56	0.85	0.78
49	0.62	0.63	0.83	0.87	0.59	0.45	0.51	0.43	0.47	0.46	0.48	0.44	0.60	0.82	0.67	0.80
48	0.69	0.86	0.63	0.74	0.62	0.50	0.45	0.43	0.53	0.43	0.37	0.49	0.56	0.74	0.61	0.83
47	0.74	0.64	0.63	0.62	0.67	0.49	0.43	0.41	0.43	0.48	0.49	0.47	0.53	0.56	0.65	0.77
46	0.79	0.69	0.74	0.64	0.59	0.56	0.51	0.46	0.52	0.45	0.41	0.47	0.67	0.56	0.63	0.74
45	0.69	0.57	0.71	0.66	0.53	0.51	0.51	0.46	0.44	0.44	0.49	0.52	0.56	0.59	0.60	0.70
44	0.61	0.69	0.66	0.66	0.58	0.47	0.51	0.45	0.50	0.50	0.49	0.51	0.56	0.59	0.62	0.65
43	0.65	0.62	0.67	0.76	0.59	0.56	0.41	0.50	0.50	0.50	0.54	0.51	0.61	0.67	0.64	0.63
42	0.80	0.72	0.77	0.57	0.73	0.52	0.51	0.46	0.55	0.47	0.51	0.63	0.59	0.72	0.64	0.71
41	0.73	0.74	0.75	0.73	0.65	0.59	0.59	0.50	0.59	0.53	0.56	0.59	0.70	0.73	0.71	0.68
40	0.75	0.73	0.79	0.72	0.75	0.53	0.62	0.53	0.59	0.58	0.65	0.62	0.77	0.74	0.76	0.69
39	0.73	0.73	0.81	0.83	0.72	0.67	0.64	0.64	0.58	0.53	0.60	0.66	0.68	0.76	0.75	0.74
38	0.82	0.80	0.82	0.82	0.76	0.75	0.64	0.60	0.63	0.64	0.62	0.69	0.73	0.81	0.76	0.78
37	0.71	0.83	0.90	0.86	0.75	0.74	0.75	0.68	0.64	0.63	0.76	0.70	0.79	0.89	0.88	0.82
36	0.81	1.00	0.99	0.91	0.66	0.73	0.67	0.60	0.64	0.68	0.70	0.76	0.87	0.95	1.00	0.89
35	0.95	1.05	1.01	0.79	0.77	0.73	0.69	0.55	0.48	0.58	0.56	0.70	0.78	0.90	1.01	0.96
34	1.08	1.13	1.07	0.90	0.65	0.60	0.56	0.51	0.49	0.50	0.53	0.70	0.61	1.00	0.99	1.13

Table B-5 Test 1 – Unit 15A – 18kcfs – Vz (fps)

Vz																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.01	0.04	0.06	0.06	0.04	0.17	0.09	0.08	0.05	0.10	0.07	0.03	-0.01	-0.01	-0.02	0.01
70	-0.34	-0.25	-0.17	-0.34	0.08	0.55	0.13	-0.12	0.82	1.12	-0.03	-0.22	0.49	0.66	-0.05	-0.68
68	-0.78	-0.39	-0.18	0.68	0.29	0.77	0.40	1.52	1.46	1.54	1.16	0.92	1.19	0.64	0.65	-0.15
66	-0.86	-0.31	-0.15	-0.06	0.23	0.73	1.07	0.85	1.54	1.80	1.95	1.36	2.02	1.86	1.36	1.26
64	-0.67	-0.23	-0.37	-0.27	0.28	1.31	1.01	1.08	1.75	2.14	2.03	1.70	2.32	1.19	1.31	1.39
62	0.37	-0.68	-0.06	-0.13	1.87	1.10	1.82	2.10	1.71	2.44	2.21	2.10	0.60	1.23	0.70	0.55
60	-1.22	-0.55	-1.05	-0.60	-0.25	1.11	0.42	1.70	1.95	1.92	2.35	2.15	1.86	1.33	2.20	1.16
58	-2.00	-2.30	-1.60	-1.01	-0.19	-0.55	0.52	1.93	2.51	3.17	2.54	2.74	2.27	2.43	1.64	0.95
56	-2.21	-2.06	-2.18	-0.77	-0.65	0.67	2.24	2.75	2.78	3.01	3.20	3.00	2.72	1.69	0.41	-0.57
55	-1.83	-1.25	-0.96	-0.75	-0.08	1.11	2.63	2.68	3.00	3.18	3.07	3.36	2.79	2.01	1.40	-0.15
54	-1.50	-1.51	-1.47	-1.25	0.82	2.49	2.03	3.34	3.24	3.16	3.25	3.32	2.52	1.78	1.82	0.06
53	-1.60	-1.47	0.48	0.32	0.20	2.82	2.78	2.59	3.29	3.37	3.01	3.15	2.97	1.78	0.58	0.83
52	-0.40	-0.51	-0.55	0.21	1.40	2.22	2.65	2.93	3.01	3.31	3.50	3.08	3.00	2.39	1.63	0.86
51	-1.22	-0.69	-0.54	0.39	1.61	2.28	2.74	3.23	3.24	3.28	3.44	3.48	2.84	2.42	1.88	0.14
50	-0.25	-0.31	0.43	0.84	2.08	2.82	3.27	3.11	3.18	3.22	3.28	3.27	2.76	2.52	1.03	0.99
49	-0.10	0.88	0.90	1.97	2.67	3.16	3.36	3.42	3.47	3.33	3.40	3.15	2.73	2.13	1.31	0.56
48	-0.13	0.64	0.37	1.74	2.36	2.86	2.75	3.23	3.26	3.19	3.22	3.07	2.81	2.00	1.93	0.32
47	0.14	0.67	1.08	2.34	2.72	3.09	3.19	3.30	3.43	3.36	3.33	3.21	2.97	2.56	2.23	0.47
46	0.34	0.88	1.51	2.93	2.97	3.31	3.49	3.68	3.59	3.55	3.55	3.35	3.13	2.73	2.01	0.73
45	0.32	0.65	1.77	2.79	2.97	3.13	3.19	3.35	3.32	3.34	3.37	3.24	3.05	2.66	1.83	0.32
44	0.36	1.38	1.95	2.92	3.26	3.33	3.36	3.42	3.45	3.41	3.38	3.37	3.25	2.77	2.30	1.27
43	1.09	2.29	2.75	3.02	3.44	3.64	3.82	3.70	3.70	3.60	3.97	3.75	3.53	2.72	2.10	1.65
42	0.71	1.88	2.21	2.96	3.59	3.50	3.37	3.64	3.73	3.55	3.57	3.68	3.40	2.65	2.48	1.06
41	0.99	1.75	2.76	2.90	3.96	3.52	3.84	3.61	4.06	3.79	3.79	3.95	3.13	3.06	1.91	1.70
40	1.16	1.81	2.71	3.22	3.97	3.84	4.03	3.92	4.12	4.01	3.88	4.07	3.58	3.45	2.37	1.50
39	0.57	1.59	2.56	3.75	3.85	3.78	3.57	4.13	3.95	3.84	3.85	3.85	3.52	3.28	2.46	0.79
38	0.18	0.98	2.81	3.56	4.01	4.04	3.89	4.09	4.17	4.05	4.08	4.09	3.53	3.47	2.61	1.21
37	-0.80	1.55	3.28	3.78	4.77	4.36	4.04	4.56	4.65	4.33	4.11	4.51	3.90	3.59	2.55	1.25
36	-0.31	1.46	3.39	3.91	4.61	4.43	4.55	4.69	4.46	4.56	4.55	4.46	3.85	3.56	2.40	0.45
35	-0.09	1.90	3.54	5.13	4.96	4.53	4.70	5.33	4.99	4.61	5.00	4.57	4.56	3.93	2.64	0.92
34	0.49	1.84	3.97	5.11	5.27	5.22	5.31	5.59	5.31	5.23	5.30	5.18	4.86	4.40	2.60	1.38

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-6 Test 1 – Unit 15A – 18kcfs – Vz RMS (fps)

Vz RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.34	0.34	0.35	0.34	0.38	0.48	0.41	0.37	0.44	0.52	0.45	0.38	0.43	0.40	0.36	0.36
70	0.45	0.52	0.57	0.53	0.44	0.79	0.77	0.73	0.88	0.79	0.88	0.64	0.75	0.72	0.68	0.56
68	0.67	0.54	0.71	0.90	0.80	0.82	0.65	0.88	1.06	0.74	1.01	0.96	0.95	0.94	0.88	0.64
66	0.67	0.72	0.69	0.67	0.88	1.06	0.85	0.97	1.11	1.00	0.79	0.92	0.78	0.80	0.94	0.78
64	0.71	0.79	1.05	0.86	1.08	1.04	1.50	0.99	0.99	0.81	0.87	0.96	0.78	1.27	0.97	0.84
62	1.04	0.76	0.97	0.93	0.88	1.34	0.96	1.05	0.96	0.78	0.74	0.90	0.93	1.09	1.00	1.05
60	0.73	0.83	0.82	1.15	0.93	1.02	1.12	1.15	1.21	1.17	0.86	1.07	0.92	1.03	0.74	1.26
58	0.92	0.58	0.87	0.96	1.06	1.16	1.32	1.32	1.15	0.82	0.85	0.86	0.88	0.82	1.01	0.98
56	0.72	0.86	0.73	1.51	1.25	1.06	1.18	0.83	0.97	0.95	0.75	0.71	0.81	1.14	1.48	1.02
55	0.85	0.89	0.92	1.06	1.09	1.68	0.98	0.88	0.89	0.80	0.72	0.70	0.73	1.34	1.13	1.39
54	0.93	1.23	0.80	1.02	1.31	0.97	1.24	0.86	0.74	0.96	0.92	0.60	0.80	1.19	0.97	1.09
53	0.94	1.17	0.97	1.19	0.82	1.01	0.94	1.14	0.78	0.83	0.73	0.71	0.61	1.11	1.35	1.06
52	0.97	1.14	1.06	0.83	1.31	1.20	1.11	0.70	0.93	0.91	0.73	0.68	0.68	1.00	1.10	1.09
51	0.71	1.01	1.02	1.09	1.16	1.11	0.95	0.80	0.67	0.69	0.66	0.56	0.69	0.78	0.90	1.02
50	1.07	1.06	1.10	1.26	1.00	1.01	0.75	0.71	0.72	0.68	0.60	0.53	0.82	0.75	1.00	0.92
49	0.72	1.09	1.11	1.19	0.85	0.67	0.61	0.60	0.56	0.60	0.60	0.67	0.74	0.99	1.05	1.10
48	0.99	0.98	1.05	1.15	0.82	0.75	0.75	0.71	0.61	0.55	0.52	0.61	0.73	0.96	0.68	1.06
47	1.05	0.88	1.04	0.81	0.93	0.77	0.65	0.61	0.55	0.52	0.56	0.56	0.67	0.75	0.70	0.94
46	1.10	1.10	1.11	0.79	0.91	0.70	0.58	0.54	0.56	0.52	0.50	0.57	0.75	0.68	0.84	0.97
45	0.85	1.05	0.97	0.81	0.80	0.64	0.61	0.58	0.57	0.53	0.57	0.72	0.60	0.66	0.86	1.11
44	0.96	1.01	1.12	0.76	0.75	0.67	0.64	0.54	0.59	0.52	0.53	0.64	0.62	0.78	0.72	0.92
43	0.91	0.85	0.81	0.89	0.79	0.61	0.61	0.61	0.60	0.60	0.67	0.64	0.68	0.85	0.83	0.74
42	1.02	0.99	0.91	0.86	0.91	0.70	0.65	0.69	0.67	0.68	0.65	0.77	0.76	0.89	0.80	1.02
41	1.00	0.97	0.93	1.02	0.93	0.78	0.72	0.73	0.76	0.76	0.76	0.80	0.80	0.77	0.86	0.89
40	0.99	1.04	1.21	0.95	0.85	0.85	0.79	0.72	0.76	0.78	0.84	0.82	0.85	0.84	0.99	1.01
39	0.96	1.06	1.12	1.06	0.94	0.89	0.83	0.84	0.84	0.82	0.82	0.84	0.86	0.87	0.97	1.06
38	1.05	1.16	1.09	1.25	1.04	0.94	0.92	0.95	0.91	0.85	0.89	0.92	0.94	0.95	0.97	1.18
37	1.21	1.18	1.26	1.09	1.00	1.00	1.10	0.93	0.90	0.85	1.07	0.98	1.04	1.04	1.14	1.12
36	1.04	1.28	1.33	1.24	1.12	1.09	0.98	0.92	0.92	0.94	1.02	1.07	1.13	1.23	1.14	1.30
35	1.31	1.14	1.36	1.29	1.00	1.16	1.09	0.81	0.79	0.94	0.89	1.14	1.10	1.23	1.29	1.14
34	1.24	1.34	1.58	1.15	1.03	0.95	0.91	0.80	0.70	0.79	0.83	1.08	1.16	1.32	1.28	1.19

Table B-7 Test 1 – Unit 15A – 18kcfs – Vs (fps)

Vs																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.34	0.43	0.49	0.06	0.65	0.62	0.60	0.09	0.61	0.26	0.16	0.16	0.27	0.24	0.43	0.11
70	0.36	0.37	0.43	0.59	0.60	1.00	0.68	0.63	0.88	1.15	0.26	0.47	0.53	0.78	0.18	0.72
68	0.82	0.59	0.55	1.06	0.96	1.28	0.94	1.60	1.68	1.66	1.24	1.05	1.20	0.64	0.65	0.37
66	0.94	0.65	0.80	0.48	1.00	1.26	1.65	1.05	1.79	1.87	2.03	1.36	2.03	1.91	1.39	1.32
64	0.79	0.79	0.93	0.81	1.14	1.68	1.43	1.56	1.91	2.16	2.03	1.71	2.35	1.43	1.43	1.47
62	0.74	0.95	1.03	1.01	1.91	1.37	2.18	2.48	1.87	2.46	2.21	2.12	1.20	1.66	1.20	0.84
60	1.37	0.78	1.29	0.71	0.88	1.46	1.33	1.87	2.03	1.92	2.38	2.18	1.94	1.61	2.29	1.46
58	2.09	2.33	1.67	1.16	0.97	0.68	0.84	2.09	2.55	3.17	2.58	2.78	2.36	2.52	1.88	1.22
56	2.22	2.07	2.22	1.03	0.66	0.67	2.27	2.78	2.82	3.05	3.26	3.15	2.95	1.82	1.09	0.68
55	1.83	1.25	0.98	0.76	0.37	1.12	2.63	2.70	3.03	3.27	3.15	3.56	2.91	2.28	1.68	0.33
54	1.50	1.51	1.50	1.30	0.82	2.49	2.08	3.34	3.28	3.21	3.34	3.43	2.61	1.83	2.13	0.51
53	1.60	1.48	0.48	0.32	0.36	2.82	2.78	2.61	3.41	3.42	3.13	3.34	3.14	1.88	0.84	1.01
52	0.71	0.52	0.83	0.43	1.42	2.28	2.71	2.96	3.17	3.48	3.65	3.28	3.32	2.70	1.84	1.05
51	1.29	0.84	0.72	0.49	1.66	2.33	2.80	3.24	3.38	3.39	3.59	3.60	2.99	2.60	2.09	0.20
50	0.32	0.39	0.47	0.87	2.08	2.84	3.28	3.13	3.30	3.34	3.33	3.50	2.86	2.73	1.04	1.09
49	0.23	0.95	0.90	1.97	2.67	3.16	3.37	3.42	3.54	3.39	3.49	3.23	2.81	2.24	1.40	0.56
48	0.32	0.65	0.38	1.74	2.37	2.88	2.79	3.24	3.38	3.26	3.33	3.15	2.88	2.03	2.00	0.35
47	0.18	0.70	1.10	2.35	2.72	3.12	3.21	3.30	3.56	3.46	3.41	3.33	3.06	2.62	2.32	0.49
46	0.37	0.89	1.51	2.94	2.97	3.33	3.50	3.68	3.69	3.63	3.61	3.41	3.20	2.79	2.07	0.73
45	0.49	0.78	1.78	2.80	2.97	3.15	3.20	3.35	3.44	3.41	3.42	3.28	3.17	2.71	1.87	0.35
44	0.43	1.40	1.98	2.93	3.26	3.35	3.36	3.42	3.59	3.49	3.46	3.47	3.37	2.85	2.37	1.34
43	1.14	2.35	2.78	3.03	3.44	3.66	3.83	3.70	3.79	3.62	4.01	3.88	3.65	2.79	2.18	1.75
42	0.95	1.94	2.23	2.97	3.59	3.51	3.37	3.64	3.83	3.59	3.65	3.77	3.58	2.73	2.61	1.22
41	1.30	1.78	2.79	2.90	3.99	3.53	3.84	3.62	4.11	3.95	3.88	4.21	3.29	3.26	2.08	1.95
40	1.45	2.01	2.85	3.23	4.01	3.86	4.04	3.92	4.15	4.06	3.92	4.24	3.68	3.57	2.47	1.74
39	1.05	1.68	2.64	3.84	3.86	3.78	3.57	4.13	4.03	3.91	3.91	3.96	3.68	3.44	2.69	1.12
38	0.89	1.46	2.93	3.62	4.06	4.06	3.90	4.09	4.21	4.10	4.13	4.24	3.66	3.61	2.80	1.50
37	1.08	1.84	3.40	3.83	4.81	4.38	4.05	4.57	4.69	4.37	4.14	4.63	4.03	3.72	2.71	1.46
36	0.81	1.60	3.47	3.98	4.67	4.45	4.57	4.69	4.49	4.59	4.58	4.57	3.94	3.66	2.48	0.66
35	0.22	1.98	3.60	5.17	5.00	4.54	4.71	5.36	5.04	4.66	5.05	4.65	4.66	4.04	2.72	0.93
34	0.68	1.84	4.00	5.13	5.30	5.23	5.33	5.60	5.37	5.28	5.34	5.27	4.99	4.49	2.66	1.38

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-8 Test 1 – Unit 15A – 18kcfs – Vs RMS (fps)

Vs RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.48	0.51	0.48	0.69	0.50	0.62	0.57	0.73	0.82	1.04	0.87	0.65	0.67	0.80	0.51	0.58
70	0.62	0.68	0.67	0.61	0.63	0.95	0.85	0.82	1.01	0.90	1.01	0.93	0.89	0.87	0.87	0.72
68	0.75	0.65	0.82	1.04	0.91	0.94	0.82	1.06	1.20	0.96	1.16	1.10	1.05	1.10	1.02	0.72
66	0.79	0.87	0.82	0.85	1.06	1.17	0.98	1.08	1.24	1.18	0.91	1.09	0.95	0.98	1.09	0.90
64	0.81	0.92	1.21	0.97	1.23	1.15	1.58	1.14	1.15	0.98	1.18	1.14	0.98	1.42	1.11	0.98
62	1.21	0.90	1.13	1.11	1.05	1.51	1.13	1.23	1.10	0.97	0.89	1.07	1.10	1.28	1.16	1.15
60	0.85	0.91	0.93	1.28	1.12	1.26	1.27	1.34	1.49	1.33	1.02	1.29	1.13	1.17	0.94	1.37
58	1.04	0.71	1.07	1.14	1.35	1.44	1.62	1.58	1.32	1.13	1.10	1.05	1.09	1.10	1.15	1.16
56	0.81	0.97	0.96	1.67	1.35	1.29	1.44	1.21	1.23	1.14	0.91	1.00	1.07	1.36	1.61	1.34
55	0.99	1.00	1.13	1.22	1.45	1.87	1.29	1.11	1.20	1.06	0.94	0.87	1.01	1.54	1.36	1.69
54	1.01	1.44	0.94	1.22	1.53	1.33	1.50	1.14	1.05	1.19	1.08	0.93	1.08	1.51	1.19	1.30
53	1.05	1.31	1.20	1.43	1.08	1.30	1.19	1.35	1.03	1.05	0.90	0.91	0.81	1.46	1.67	1.27
52	1.08	1.34	1.21	1.18	1.43	1.36	1.33	0.90	1.10	1.08	0.98	0.88	0.86	1.19	1.32	1.36
51	0.86	1.19	1.18	1.30	1.40	1.32	1.19	0.99	0.86	0.87	0.82	0.74	0.87	1.01	1.18	1.23
50	1.30	1.35	1.47	1.49	1.26	1.15	0.90	0.87	0.89	0.84	0.76	0.67	1.02	0.93	1.31	1.20
49	0.95	1.26	1.39	1.48	1.04	0.81	0.80	0.74	0.73	0.75	0.77	0.81	0.95	1.29	1.24	1.36
48	1.21	1.30	1.22	1.36	1.02	0.90	0.87	0.83	0.81	0.70	0.64	0.79	0.92	1.21	0.92	1.35
47	1.28	1.09	1.21	1.02	1.14	0.92	0.78	0.73	0.70	0.71	0.75	0.73	0.85	0.93	0.96	1.21
46	1.36	1.30	1.33	1.02	1.09	0.90	0.77	0.71	0.76	0.69	0.65	0.74	1.01	0.88	1.05	1.22
45	1.09	1.19	1.20	1.05	0.96	0.82	0.80	0.74	0.72	0.69	0.75	0.89	0.81	0.89	1.05	1.31
44	1.14	1.23	1.30	1.01	0.95	0.82	0.82	0.70	0.77	0.72	0.72	0.82	0.83	0.98	0.95	1.13
43	1.12	1.05	1.05	1.17	0.98	0.83	0.74	0.79	0.78	0.78	0.86	0.82	0.91	1.09	1.05	0.97
42	1.30	1.22	1.19	1.03	1.16	0.87	0.83	0.83	0.87	0.82	0.83	1.00	0.96	1.14	1.03	1.24
41	1.23	1.22	1.19	1.25	1.13	0.98	0.93	0.88	0.96	0.93	0.95	0.99	1.06	1.06	1.11	1.12
40	1.24	1.27	1.45	1.19	1.13	1.00	1.00	0.89	0.96	0.97	1.06	1.03	1.15	1.12	1.25	1.22
39	1.21	1.29	1.38	1.35	1.19	1.11	1.05	1.05	1.02	0.98	1.01	1.07	1.10	1.15	1.23	1.30
38	1.34	1.41	1.36	1.50	1.29	1.20	1.12	1.12	1.11	1.07	1.08	1.15	1.19	1.25	1.23	1.42
37	1.40	1.44	1.55	1.39	1.25	1.24	1.33	1.15	1.10	1.06	1.31	1.20	1.31	1.37	1.44	1.38
36	1.32	1.63	1.66	1.54	1.31	1.31	1.19	1.10	1.12	1.16	1.24	1.31	1.43	1.55	1.52	1.57
35	1.62	1.55	1.70	1.51	1.27	1.37	1.29	0.98	0.93	1.11	1.05	1.34	1.35	1.52	1.64	1.49
34	1.64	1.75	1.91	1.46	1.22	1.12	1.07	0.94	0.85	0.94	0.99	1.29	1.31	1.65	1.62	1.64

Table B-9 Test 1 – Unit 15A – 18kcfs – Vt (fps)

Vt																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.35	0.43	0.50	0.18	0.69	0.64	0.63	0.15	0.89	0.50	0.51	0.23	0.82	0.55	0.58	0.15
70	0.36	0.40	0.45	0.59	0.64	1.05	0.71	0.66	0.97	1.25	0.33	0.55	0.61	0.80	0.24	0.72
68	0.82	0.61	0.58	1.10	0.97	1.29	0.96	1.60	1.70	1.67	1.25	1.05	1.21	0.66	0.69	0.38
66	0.94	0.66	0.81	0.48	1.00	1.26	1.65	1.05	1.79	1.87	2.04	1.36	2.03	1.91	1.39	1.35
64	0.81	0.79	0.93	0.81	1.14	1.69	1.43	1.56	1.91	2.16	2.03	1.71	2.36	1.43	1.43	1.47
62	0.77	0.96	1.03	1.01	1.91	1.37	2.18	2.48	1.87	2.46	2.21	2.12	1.20	1.67	1.21	0.84
60	1.37	0.78	1.29	0.71	0.88	1.46	1.33	1.87	2.03	1.92	2.38	2.18	1.94	1.61	2.29	1.46
58	2.09	2.33	1.67	1.17	0.97	0.68	0.84	2.09	2.55	3.17	2.58	2.78	2.37	2.53	1.89	1.23
56	2.25	2.12	2.29	1.15	0.75	0.80	2.31	2.86	2.88	3.12	3.33	3.20	3.05	1.95	1.22	0.82
55	1.88	1.33	1.08	0.85	0.41	1.15	2.66	2.74	3.06	3.30	3.19	3.58	2.98	2.36	1.80	0.57
54	1.57	1.57	1.55	1.34	0.89	2.51	2.14	3.39	3.33	3.25	3.38	3.46	2.68	1.93	2.24	0.68
53	1.66	1.58	0.78	0.60	0.48	2.86	2.87	2.71	3.47	3.49	3.19	3.38	3.22	2.00	1.00	1.22
52	0.76	0.61	0.90	0.56	1.46	2.32	2.76	3.02	3.21	3.52	3.68	3.31	3.39	2.76	1.91	1.12
51	1.40	0.97	0.85	0.67	1.71	2.41	2.87	3.33	3.45	3.45	3.65	3.64	3.09	2.70	2.20	0.52
50	0.66	0.65	0.74	1.14	2.18	2.95	3.40	3.25	3.40	3.44	3.40	3.56	2.99	2.86	1.33	1.30
49	0.48	1.08	0.99	2.03	2.71	3.23	3.44	3.49	3.59	3.45	3.52	3.27	2.90	2.32	1.48	0.70
48	0.62	0.86	0.72	1.86	2.44	2.95	2.91	3.35	3.46	3.34	3.39	3.20	2.99	2.13	2.14	0.63
47	0.65	1.06	1.36	2.49	2.80	3.23	3.34	3.43	3.65	3.55	3.48	3.39	3.19	2.79	2.48	0.80
46	0.45	0.99	1.61	2.99	3.02	3.38	3.57	3.74	3.74	3.69	3.65	3.45	3.27	2.88	2.18	0.84
45	0.78	1.01	1.91	2.89	3.05	3.23	3.31	3.45	3.52	3.49	3.48	3.34	3.28	2.84	2.04	0.70
44	0.91	1.63	2.14	3.05	3.34	3.45	3.50	3.55	3.68	3.59	3.54	3.53	3.50	3.01	2.54	1.55
43	1.21	2.44	2.84	3.08	3.48	3.70	3.88	3.75	3.84	3.67	4.04	3.91	3.72	2.89	2.29	1.87
42	1.21	2.08	2.34	3.05	3.64	3.57	3.46	3.71	3.88	3.65	3.69	3.80	3.65	2.85	2.72	1.42
41	1.57	1.98	2.92	3.01	4.04	3.62	3.93	3.73	4.17	4.01	3.93	4.25	3.41	3.38	2.28	2.15
40	1.61	2.17	2.93	3.27	4.03	3.89	4.08	3.97	4.18	4.09	3.94	4.25	3.73	3.63	2.56	1.85
39	1.37	1.94	2.77	3.89	3.90	3.83	3.64	4.18	4.06	3.96	3.95	3.99	3.77	3.54	2.81	1.30
38	1.16	1.69	3.05	3.68	4.09	4.11	3.98	4.16	4.25	4.15	4.18	4.27	3.75	3.71	2.93	1.66
37	1.12	1.94	3.46	3.86	4.82	4.40	4.09	4.60	4.71	4.39	4.17	4.65	4.08	3.79	2.82	1.54
36	1.00	1.83	3.57	4.04	4.70	4.50	4.64	4.76	4.54	4.64	4.62	4.60	4.03	3.77	2.65	0.92
35	0.55	2.19	3.75	5.22	5.04	4.63	4.82	5.44	5.11	4.75	5.11	4.71	4.76	4.18	2.96	1.17
34	0.74	1.93	4.05	5.15	5.32	5.26	5.38	5.65	5.41	5.33	5.38	5.30	5.04	4.54	2.86	1.51

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-10 Test 1 – Unit 15A – 18kcfs – Vt RMS (fps)

Vt RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.73	0.67	0.63	0.83	0.70	0.77	0.76	0.87	1.03	1.25	1.04	0.91	0.97	1.01	0.72	0.71
70	0.71	0.80	0.78	0.73	0.78	1.06	0.97	0.94	1.12	1.03	1.12	1.04	1.01	0.99	0.96	0.81
68	0.83	0.75	0.92	1.19	1.04	1.07	0.96	1.22	1.31	1.10	1.29	1.27	1.17	1.19	1.10	0.81
66	0.89	0.99	0.96	0.95	1.19	1.30	1.13	1.18	1.35	1.31	1.07	1.20	1.06	1.08	1.19	0.99
64	0.91	1.06	1.33	1.09	1.37	1.26	1.67	1.26	1.27	1.09	1.29	1.22	1.09	1.52	1.22	1.07
62	1.33	1.06	1.29	1.26	1.19	1.61	1.27	1.35	1.22	1.08	1.02	1.18	1.24	1.42	1.33	1.26
60	0.97	1.02	1.06	1.38	1.25	1.37	1.41	1.45	1.58	1.44	1.12	1.41	1.26	1.30	1.06	1.47
58	1.15	0.82	1.17	1.27	1.47	1.53	1.69	1.66	1.42	1.23	1.21	1.15	1.19	1.20	1.26	1.31
56	0.90	1.06	1.11	1.79	1.42	1.42	1.53	1.30	1.33	1.22	1.00	1.09	1.17	1.47	1.75	1.46
55	1.07	1.11	1.28	1.30	1.56	1.94	1.38	1.18	1.31	1.17	1.03	0.96	1.12	1.64	1.51	1.81
54	1.09	1.53	1.02	1.35	1.62	1.43	1.59	1.24	1.14	1.28	1.16	1.03	1.20	1.62	1.31	1.45
53	1.12	1.40	1.32	1.53	1.21	1.43	1.27	1.41	1.14	1.13	1.01	1.01	0.90	1.60	1.78	1.39
52	1.17	1.44	1.30	1.27	1.53	1.46	1.42	0.99	1.22	1.18	1.07	0.97	0.98	1.32	1.43	1.49
51	0.96	1.28	1.27	1.40	1.50	1.43	1.31	1.08	0.98	0.96	0.91	0.84	0.96	1.13	1.31	1.37
50	1.40	1.43	1.55	1.59	1.37	1.27	0.99	0.96	0.98	0.93	0.84	0.78	1.11	1.04	1.42	1.34
49	1.09	1.38	1.50	1.58	1.16	0.90	0.89	0.83	0.83	0.84	0.87	0.93	1.07	1.40	1.39	1.47
48	1.31	1.40	1.32	1.45	1.13	1.00	0.97	0.93	0.91	0.79	0.74	0.89	1.02	1.34	1.03	1.47
47	1.38	1.24	1.35	1.15	1.25	1.04	0.87	0.82	0.81	0.82	0.86	0.85	0.96	1.05	1.08	1.32
46	1.45	1.40	1.43	1.16	1.20	1.02	0.88	0.81	0.87	0.80	0.76	0.87	1.13	1.02	1.17	1.34
45	1.22	1.30	1.33	1.19	1.10	0.95	0.90	0.83	0.86	0.80	0.85	1.02	0.94	1.02	1.18	1.40
44	1.24	1.35	1.43	1.17	1.10	0.94	0.95	0.81	0.90	0.84	0.83	0.95	0.97	1.12	1.09	1.24
43	1.27	1.22	1.23	1.32	1.12	0.95	0.85	0.91	0.92	0.91	1.01	0.98	1.07	1.26	1.24	1.16
42	1.52	1.40	1.36	1.20	1.31	0.99	0.95	0.94	1.01	0.95	0.97	1.16	1.14	1.29	1.20	1.42
41	1.52	1.41	1.38	1.40	1.29	1.12	1.05	0.99	1.10	1.06	1.09	1.15	1.24	1.26	1.31	1.33
40	1.54	1.56	1.69	1.39	1.29	1.16	1.16	1.02	1.12	1.12	1.22	1.21	1.35	1.31	1.47	1.45
39	1.51	1.54	1.62	1.56	1.36	1.27	1.20	1.19	1.17	1.11	1.17	1.26	1.29	1.35	1.45	1.56
38	1.71	1.76	1.60	1.69	1.47	1.37	1.28	1.26	1.26	1.23	1.25	1.33	1.39	1.47	1.47	1.66
37	1.75	1.78	1.84	1.62	1.46	1.44	1.50	1.30	1.26	1.23	1.51	1.41	1.51	1.59	1.71	1.64
36	1.65	1.92	1.93	1.76	1.51	1.49	1.33	1.23	1.27	1.31	1.41	1.52	1.65	1.80	1.80	1.80
35	1.83	1.85	1.96	1.75	1.45	1.54	1.44	1.11	1.06	1.25	1.21	1.53	1.55	1.80	1.91	1.70
34	1.89	2.04	2.19	1.65	1.38	1.28	1.21	1.08	0.98	1.08	1.13	1.48	1.51	1.92	1.97	1.91

Table B-11 Test 2 – Unit 15A – 15kcfs – Vx (fps)

Vx																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.11	-0.05	0.07	0.08	0.24	0.08	0.30	0.20	0.19	0.40	0.75	0.53	0.10	0.27	0.44	0.26
70	-0.12	-0.10	-0.03	-0.13	-0.07	-0.26	-0.10	-0.20	-0.23	-0.30	-0.21	-0.24	-0.03	-0.09	-0.11	-0.07
68	-0.16	-0.19	-0.21	-0.13	-0.12	-0.19	-0.17	-0.16	-0.07	-0.21	-0.15	-0.31	-0.12	-0.11	-0.05	-0.07
66	-0.05	-0.07	-0.01	-0.08	-0.04	-0.02	-0.05	-0.04	0.01	0.03	-0.01	-0.03	-0.02	-0.06	-0.13	-0.02
64	-0.08	-0.08	-0.05	0.01	0.02	-0.02	0.03	0.04	-0.01	0.02	0.08	0.04	0.06	0.02	0.01	-0.15
62	-0.05	0.05	-0.04	-0.03	0.01	0.00	-0.02	0.01	0.03	0.04	0.01	0.03	0.04	0.11	0.06	-0.01
60	0.02	-0.04	0.06	-0.05	-0.04	-0.01	0.00	0.01	0.08	0.00	0.01	0.04	0.12	0.05	0.09	0.09
58	0.03	-0.02	0.05	0.00	-0.09	-0.06	0.01	0.01	0.06	0.03	0.06	0.06	0.17	0.09	0.12	0.03
56	0.41	0.31	0.48	0.41	0.31	0.36	0.57	0.61	0.43	0.52	0.56	0.45	0.68	0.63	0.46	0.35
55	0.30	0.48	0.38	0.36	0.27	0.31	0.32	0.33	0.37	0.39	0.35	0.32	0.58	0.36	0.48	0.44
54	0.34	0.40	0.54	0.37	0.33	0.37	0.35	0.57	0.40	0.45	0.43	0.37	0.59	0.61	0.53	0.50
53	0.32	0.38	0.29	0.43	0.42	0.35	0.61	0.57	0.51	0.56	0.48	0.43	0.61	0.49	0.46	0.38
52	0.27	0.28	0.22	0.27	0.25	0.32	0.46	0.52	0.40	0.40	0.38	0.39	0.50	0.55	0.43	0.32
51	0.34	0.51	0.48	0.49	0.37	0.45	0.57	0.64	0.54	0.53	0.51	0.47	0.59	0.66	0.67	0.36
50	0.36	0.41	0.37	0.51	0.56	0.57	0.68	0.70	0.61	0.63	0.54	0.49	0.69	0.71	0.62	0.50
49	0.26	0.31	0.45	0.41	0.42	0.44	0.53	0.52	0.47	0.48	0.41	0.33	0.49	0.55	0.39	0.37
48	0.37	0.53	0.62	0.61	0.51	0.57	0.70	0.67	0.59	0.60	0.53	0.45	0.64	0.61	0.63	0.44
47	0.56	0.47	0.62	0.65	0.56	0.58	0.72	0.72	0.61	0.64	0.54	0.46	0.70	0.72	0.62	0.46
46	0.28	0.42	0.43	0.43	0.43	0.46	0.54	0.55	0.47	0.48	0.40	0.36	0.56	0.58	0.57	0.48
45	0.53	0.57	0.56	0.58	0.50	0.56	0.67	0.69	0.60	0.57	0.50	0.44	0.66	0.67	0.66	0.50
44	0.57	0.67	0.67	0.67	0.55	0.65	0.74	0.76	0.61	0.63	0.57	0.48	0.72	0.73	0.75	0.67
43	0.37	0.48	0.53	0.47	0.40	0.44	0.54	0.51	0.45	0.42	0.39	0.36	0.52	0.51	0.52	0.45
42	0.65	0.61	0.61	0.54	0.40	0.54	0.58	0.60	0.48	0.52	0.47	0.40	0.60	0.61	0.61	0.59
41	0.75	0.65	0.69	0.61	0.50	0.60	0.64	0.64	0.54	0.57	0.52	0.43	0.65	0.68	0.75	0.68
40	0.58	0.68	0.53	0.41	0.35	0.33	0.42	0.39	0.34	0.33	0.30	0.31	0.48	0.51	0.54	0.53
39	0.74	0.73	0.62	0.54	0.37	0.41	0.54	0.51	0.41	0.43	0.37	0.35	0.55	0.61	0.66	0.56
38	0.57	0.72	0.69	0.56	0.39	0.50	0.58	0.59	0.51	0.46	0.43	0.36	0.62	0.67	0.66	0.52
37	0.30	0.61	0.49	0.40	0.25	0.37	0.45	0.42	0.32	0.35	0.34	0.32	0.49	0.60	0.62	0.35
36	0.42	0.72	0.69	0.58	0.42	0.52	0.59	0.64	0.51	0.53	0.48	0.42	0.69	0.74	0.81	0.62
35	0.42	0.68	0.81	0.61	0.44	0.66	0.74	0.75	0.60	0.66	0.59	0.57	0.73	0.82	0.97	0.59
34	0.16	0.59	0.51	0.42	0.37	0.50	0.56	0.58	0.48	0.52	0.46	0.42	0.56	0.60	0.68	0.57

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-12 Test 2 – Unit 15A – 15kcfs – Vx RMS (fps)

Vx RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.35	0.37	0.41	0.33	0.41	0.42	0.47	0.36	0.50	0.60	0.47	0.40	0.35	0.47	0.54	0.35
70	0.32	0.31	0.32	0.39	0.43	0.43	0.35	0.39	0.43	0.35	0.41	0.43	0.31	0.40	0.39	0.35
68	0.39	0.34	0.40	0.38	0.54	0.43	0.44	0.42	0.45	0.44	0.42	0.38	0.47	0.37	0.39	0.30
66	0.37	0.34	0.50	0.51	0.46	0.45	0.39	0.53	0.38	0.45	0.47	0.42	0.37	0.40	0.40	0.37
64	0.45	0.45	0.51	0.50	0.50	0.51	0.46	0.49	0.39	0.41	0.41	0.41	0.44	0.49	0.41	0.36
62	0.40	0.46	0.44	0.47	0.47	0.45	0.47	0.50	0.45	0.39	0.39	0.37	0.44	0.51	0.40	0.38
60	0.44	0.49	0.41	0.50	0.51	0.49	0.49	0.54	0.39	0.46	0.40	0.37	0.39	0.48	0.41	0.49
58	0.33	0.44	0.48	0.53	0.48	0.41	0.43	0.48	0.40	0.38	0.38	0.46	0.42	0.44	0.53	0.50
56	0.24	0.35	0.60	0.49	0.45	0.44	0.39	0.36	0.41	0.42	0.37	0.44	0.35	0.45	0.46	0.43
55	0.33	0.39	0.54	0.38	0.49	0.42	0.44	0.36	0.47	0.34	0.44	0.40	0.38	0.56	0.53	0.50
54	0.34	0.42	0.39	0.46	0.39	0.52	0.42	0.34	0.49	0.38	0.33	0.40	0.39	0.48	0.46	0.50
53	0.35	0.35	0.45	0.41	0.40	0.48	0.36	0.41	0.45	0.34	0.36	0.32	0.36	0.51	0.43	0.46
52	0.37	0.47	0.42	0.45	0.51	0.49	0.41	0.32	0.37	0.41	0.33	0.36	0.40	0.37	0.48	0.45
51	0.44	0.44	0.43	0.47	0.39	0.43	0.39	0.33	0.33	0.34	0.33	0.37	0.41	0.41	0.42	0.49
50	0.41	0.43	0.51	0.48	0.35	0.39	0.37	0.36	0.37	0.34	0.35	0.35	0.33	0.40	0.43	0.44
49	0.40	0.39	0.44	0.55	0.39	0.35	0.34	0.32	0.32	0.33	0.33	0.36	0.42	0.41	0.53	0.45
48	0.41	0.46	0.45	0.42	0.36	0.39	0.32	0.32	0.34	0.31	0.35	0.42	0.40	0.44	0.43	0.47
47	0.44	0.50	0.43	0.50	0.40	0.47	0.33	0.31	0.36	0.35	0.32	0.38	0.44	0.41	0.44	0.51
46	0.49	0.47	0.49	0.48	0.43	0.41	0.37	0.34	0.38	0.38	0.37	0.39	0.40	0.39	0.45	0.46
45	0.44	0.46	0.50	0.45	0.45	0.38	0.37	0.33	0.40	0.35	0.37	0.40	0.42	0.44	0.42	0.46
44	0.54	0.54	0.49	0.48	0.44	0.42	0.38	0.37	0.41	0.37	0.38	0.42	0.45	0.44	0.45	0.44
43	0.58	0.58	0.54	0.54	0.48	0.44	0.40	0.40	0.41	0.40	0.41	0.45	0.47	0.48	0.54	0.52
42	0.63	0.56	0.56	0.53	0.51	0.48	0.40	0.40	0.44	0.39	0.42	0.47	0.51	0.50	0.54	0.51
41	0.60	0.60	0.62	0.54	0.55	0.49	0.44	0.40	0.47	0.44	0.45	0.50	0.51	0.56	0.56	0.60
40	0.72	0.80	0.68	0.61	0.55	0.48	0.47	0.44	0.51	0.48	0.51	0.53	0.56	0.56	0.62	0.70
39	0.91	0.78	0.71	0.67	0.61	0.49	0.45	0.47	0.48	0.50	0.50	0.54	0.57	0.63	0.67	0.69
38	0.88	0.85	0.77	0.70	0.60	0.53	0.49	0.47	0.52	0.50	0.53	0.60	0.65	0.66	0.71	0.71
37	0.90	0.92	0.84	0.78	0.64	0.56	0.56	0.50	0.51	0.55	0.58	0.63	0.62	0.72	0.76	0.75
36	0.77	0.92	0.86	0.75	0.65	0.55	0.55	0.46	0.52	0.50	0.57	0.61	0.74	0.77	0.75	0.75
35	0.75	0.79	0.90	0.78	0.69	0.58	0.54	0.42	0.49	0.52	0.47	0.62	0.65	0.79	0.84	0.76
34	0.69	0.89	0.93	0.67	0.61	0.51	0.46	0.42	0.48	0.51	0.44	0.60	0.69	0.77	0.88	0.85

Table B-13 Test 2 – Unit 15A – 15kcfs – Vy (fps)

Vy																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.16	0.28	0.46	0.40	0.17	0.60	0.72	0.52	-0.17	0.55	0.39	0.13	-0.25	-0.38	-0.56	-0.35
70	-0.09	0.34	0.39	0.40	0.17	0.66	0.61	0.39	0.05	0.30	0.69	0.01	-0.04	-0.25	0.18	-0.07
68	0.25	0.28	0.59	0.56	1.08	0.94	1.01	0.91	0.64	0.60	0.42	0.41	-0.24	-0.05	-0.25	0.09
66	0.43	0.40	0.73	0.73	0.85	0.72	0.72	0.84	0.88	0.19	-0.02	0.02	0.06	-0.27	-0.32	-0.19
64	0.47	0.64	0.84	0.73	0.98	0.99	0.95	1.08	0.65	0.41	0.06	0.10	-0.35	-0.23	-0.57	-0.20
62	0.45	0.63	0.61	0.68	0.76	0.97	0.86	1.07	0.46	0.00	0.24	0.15	-0.54	-0.82	-0.48	-0.60
60	0.62	0.65	0.46	0.83	0.97	1.03	0.88	1.20	0.69	0.10	0.25	-0.03	-0.32	-0.57	-0.64	-0.73
58	0.30	0.48	0.51	0.60	0.61	0.70	0.82	0.58	-0.09	-0.15	-0.37	-0.65	-0.60	-0.60	-0.80	-0.52
56	0.23	0.01	0.77	0.41	0.35	-0.20	0.73	0.24	-0.34	-0.61	-0.33	-0.70	-0.83	-0.98	-0.48	-0.44
55	0.14	0.02	0.55	0.08	-0.05	-0.07	0.25	-0.13	-0.62	-0.73	-0.50	-0.86	-0.86	-0.84	-0.91	-0.38
54	-0.33	0.02	-0.07	-0.11	-0.32	-0.26	-0.30	0.11	-0.97	-0.78	-0.51	-0.67	-1.05	-1.06	-0.50	-0.04
53	-0.17	-0.17	0.16	-0.35	-0.36	-0.26	0.03	-0.38	-0.88	-0.56	-0.44	-0.95	-0.92	-0.63	-0.42	-0.12
52	-0.22	-0.14	-0.39	-0.32	-0.34	-0.39	-0.48	-0.03	-0.77	-0.81	-0.90	-0.53	-0.78	-1.01	-0.74	-0.02
51	-0.41	-0.20	-0.03	-0.34	-0.04	-0.53	-0.40	-0.24	-0.59	-0.68	-0.71	-0.88	-0.48	-0.82	-0.98	-0.28
50	-0.39	-0.21	0.08	-0.18	0.03	-0.34	-0.07	-0.20	-0.89	-0.63	-0.50	-0.71	-0.68	-0.58	-0.35	0.04
49	-0.02	0.02	0.18	-0.10	0.09	-0.34	-0.07	-0.18	-0.60	-0.74	-0.51	-0.68	-0.56	-0.61	-0.34	0.02
48	-0.11	0.03	0.21	0.17	-0.01	-0.27	-0.30	0.10	-0.59	-0.55	-0.54	-0.43	-0.50	-0.41	-0.34	-0.14
47	0.25	-0.14	0.11	0.04	0.27	-0.48	-0.20	-0.21	-0.45	-0.84	-0.46	-0.88	-0.53	-0.61	-0.30	-0.31
46	0.19	0.09	0.31	0.00	0.06	-0.27	-0.11	-0.23	-0.76	-0.69	-0.51	-0.82	-0.64	-0.47	-0.35	-0.20
45	0.30	0.40	0.16	0.17	-0.04	-0.19	-0.25	0.04	-0.77	-0.56	-0.66	-0.47	-0.72	-0.58	-0.47	-0.06
44	0.49	0.35	0.31	0.06	0.12	-0.08	-0.19	-0.19	-0.74	-0.64	-0.62	-0.89	-0.78	-0.49	-0.40	-0.35
43	0.30	0.47	0.19	0.25	0.29	-0.09	-0.02	0.03	-0.53	-0.73	-0.59	-0.77	-0.55	-0.75	-0.47	-0.27
42	0.51	0.43	0.36	0.29	0.24	-0.15	0.12	-0.02	-0.64	-0.68	-0.45	-0.80	-0.78	-0.71	-0.48	-0.47
41	0.28	0.28	0.46	0.34	0.21	-0.12	0.20	0.08	-0.68	-0.74	-0.51	-0.82	-0.88	-0.83	-0.70	-0.63
40	0.51	0.77	0.56	0.53	0.32	0.23	0.09	0.20	-0.54	-0.54	-0.70	-0.78	-0.73	-0.68	-0.92	-0.61
39	0.68	0.81	0.39	0.44	0.41	0.36	0.05	0.03	-0.56	-0.39	-0.65	-0.98	-0.84	-0.71	-0.87	-0.80
38	0.63	0.77	0.74	0.53	0.50	0.17	0.38	0.09	-0.49	-0.59	-0.47	-0.95	-0.77	-0.87	-0.87	-0.74
37	0.65	0.83	0.69	0.65	0.49	0.21	0.30	0.27	-0.50	-0.62	-0.57	-0.82	-0.85	-0.91	-0.86	-0.63
36	0.53	0.90	0.52	0.52	0.46	0.26	0.27	0.13	-0.48	-0.66	-0.49	-0.92	-0.70	-0.83	-0.61	-0.49
35	0.40	0.10	0.30	0.52	0.40	0.17	0.33	0.21	-0.61	-0.63	-0.54	-0.80	-1.04	-0.92	-0.67	0.09
34	-0.35	-0.08	0.47	0.46	0.38	0.19	0.28	0.25	-0.65	-0.64	-0.60	-0.85	-0.82	-0.85	-0.43	-0.24

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-14 Test 2 – Unit 15A – 15kcfs – Vy RMS (fps)

Vy RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.25	0.31	0.28	0.22	0.50	0.30	0.32	0.25	0.44	0.57	0.40	0.34	0.19	0.35	0.29	0.27
70	0.28	0.28	0.26	0.29	0.56	0.38	0.20	0.37	0.59	0.34	0.43	0.40	0.50	0.42	0.52	0.37
68	0.42	0.33	0.41	0.31	0.49	0.46	0.39	0.37	0.41	0.40	0.45	0.46	0.49	0.47	0.43	0.32
66	0.33	0.28	0.48	0.50	0.36	0.46	0.49	0.60	0.41	0.51	0.45	0.59	0.36	0.44	0.59	0.43
64	0.43	0.39	0.46	0.45	0.49	0.58	0.50	0.51	0.35	0.44	0.45	0.43	0.48	0.56	0.37	0.41
62	0.40	0.42	0.44	0.38	0.52	0.49	0.61	0.51	0.49	0.51	0.43	0.42	0.50	0.52	0.46	0.41
60	0.35	0.43	0.45	0.44	0.47	0.67	0.64	0.54	0.55	0.54	0.49	0.40	0.50	0.53	0.47	0.49
58	0.34	0.53	0.42	0.57	0.70	0.70	0.62	1.01	0.58	0.57	0.45	0.53	0.54	0.68	0.52	0.63
56	0.21	0.37	0.68	0.91	0.63	0.52	0.67	0.91	0.65	0.52	0.51	0.51	0.42	0.51	0.63	0.52
55	0.34	0.47	0.71	0.53	0.59	0.67	0.91	0.80	0.54	0.49	0.52	0.48	0.45	0.60	0.50	0.65
54	0.43	0.51	0.45	0.80	0.50	0.73	0.69	0.42	0.51	0.48	0.45	0.63	0.46	0.47	0.56	0.74
53	0.44	0.46	0.78	0.63	0.71	0.67	0.70	0.61	0.53	0.48	0.66	0.36	0.51	0.58	0.90	0.64
52	0.36	0.53	0.48	0.76	0.70	0.65	0.55	0.44	0.44	0.47	0.42	0.47	0.63	0.46	0.70	0.61
51	0.49	0.54	0.70	0.77	0.65	0.51	0.52	0.44	0.44	0.44	0.41	0.49	0.59	0.59	0.58	0.71
50	0.53	0.59	0.68	0.83	0.46	0.52	0.78	0.47	0.41	0.43	0.66	0.40	0.42	0.51	0.55	0.65
49	0.53	0.66	0.59	0.76	0.46	0.49	0.44	0.38	0.40	0.40	0.43	0.44	0.55	0.58	0.55	0.62
48	0.61	0.70	0.60	0.51	0.47	0.41	0.44	0.39	0.41	0.39	0.43	0.62	0.52	0.46	0.53	0.63
47	0.59	0.68	0.50	0.56	0.48	0.50	0.37	0.34	0.45	0.43	0.37	0.35	0.59	0.52	0.54	0.61
46	0.62	0.61	0.52	0.52	0.37	0.45	0.35	0.32	0.37	0.42	0.40	0.38	0.42	0.46	0.53	0.60
45	0.57	0.54	0.62	0.50	0.50	0.45	0.45	0.35	0.40	0.39	0.42	0.44	0.49	0.49	0.50	0.60
44	0.59	0.68	0.59	0.49	0.48	0.45	0.43	0.34	0.42	0.38	0.39	0.37	0.48	0.53	0.51	0.49
43	0.62	0.53	0.59	0.50	0.47	0.45	0.43	0.44	0.44	0.39	0.42	0.46	0.51	0.54	0.53	0.61
42	0.62	0.59	0.52	0.62	0.63	0.53	0.45	0.48	0.46	0.35	0.44	0.46	0.56	0.57	0.59	0.55
41	0.66	0.64	0.67	0.58	0.58	0.55	0.42	0.47	0.44	0.43	0.48	0.49	0.55	0.55	0.58	0.56
40	0.64	0.69	0.61	0.60	0.54	0.52	0.42	0.48	0.50	0.50	0.50	0.52	0.61	0.58	0.62	0.59
39	0.70	0.71	0.74	0.68	0.44	0.52	0.54	0.43	0.50	0.44	0.53	0.52	0.57	0.67	0.65	0.62
38	0.60	0.70	0.74	0.72	0.62	0.47	0.56	0.49	0.55	0.51	0.56	0.58	0.68	0.71	0.72	0.66
37	0.63	0.74	0.81	0.82	0.63	0.63	0.55	0.48	0.54	0.58	0.58	0.64	0.67	0.75	0.79	0.70
36	0.68	0.83	0.89	0.79	0.66	0.59	0.52	0.44	0.55	0.52	0.57	0.62	0.78	0.82	0.88	0.72
35	0.61	0.89	0.95	0.78	0.73	0.54	0.55	0.46	0.49	0.52	0.46	0.60	0.57	0.82	0.89	0.91
34	0.78	1.00	0.95	0.72	0.57	0.53	0.47	0.43	0.46	0.52	0.45	0.60	0.69	0.82	0.96	0.87

Table B-15 Test 2 – Unit 15A – 15kcfs – Vz (fps)

Vz																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	-0.03	0.00	0.00	-0.01	0.02	0.06	0.01	-0.07	0.07	0.14	0.11	0.04	0.02	0.11	-0.10	-0.07
70	-0.35	-0.06	-0.41	0.00	-0.10	0.54	-0.19	0.23	0.20	1.19	-0.05	0.62	-0.12	0.34	-0.19	-0.31
68	-0.61	-0.34	-0.10	-0.09	0.68	0.62	0.83	0.87	1.69	1.40	1.54	1.28	1.38	0.70	0.47	-0.48
66	-0.72	-0.25	0.12	0.22	0.25	0.70	1.06	1.17	1.54	1.46	1.49	1.38	1.88	1.03	0.86	0.17
64	-0.81	-0.32	-0.02	-0.12	0.34	0.50	1.25	1.08	1.97	1.63	1.94	1.92	1.63	1.29	1.20	0.86
62	-0.83	-0.28	-0.39	-0.43	0.00	0.82	0.75	0.91	1.70	1.81	1.60	1.97	1.86	1.50	1.46	1.58
60	-1.29	-0.65	-1.36	-0.35	-0.02	0.58	0.31	1.30	1.92	1.88	2.40	2.33	2.25	1.26	1.91	1.07
58	-1.13	-1.34	-1.24	-0.73	0.29	0.56	1.63	2.00	1.88	2.29	2.30	2.32	1.46	1.10	0.64	0.17
56	-1.47	-1.77	-0.52	-0.40	-0.67	0.42	2.29	2.35	2.21	2.45	1.92	1.65	2.13	1.78	-0.04	-0.41
55	-1.45	-0.96	-0.51	-1.02	0.18	1.80	2.37	2.47	2.70	2.81	2.11	2.71	2.34	0.74	0.82	0.53
54	-0.81	-0.75	-1.48	0.19	-0.09	1.54	2.30	2.74	2.24	2.54	2.85	2.39	2.34	1.93	1.33	-0.51
53	-0.79	-1.35	0.05	-0.33	0.35	2.41	2.26	2.43	2.49	2.88	2.53	2.77	2.51	1.86	0.97	0.19
52	-0.69	-0.69	-0.41	0.93	1.36	1.68	2.24	2.90	2.67	2.68	2.90	2.59	2.27	2.55	1.65	0.01
51	-0.69	-0.44	0.10	0.94	1.72	2.02	2.00	2.88	2.79	2.64	2.40	2.74	2.08	2.05	1.75	-0.18
50	-0.18	0.21	0.34	1.06	1.32	2.39	2.56	2.75	2.81	2.79	2.75	2.77	2.51	1.92	1.66	0.17
49	0.40	0.13	1.35	1.24	2.40	2.18	2.84	2.80	2.89	2.71	2.71	2.80	2.32	2.20	1.10	0.48
48	-0.08	0.20	0.96	2.05	2.22	2.41	2.57	2.72	2.65	2.72	2.66	2.44	2.43	1.69	1.32	-0.01
47	0.76	0.27	1.00	1.57	2.49	2.38	2.77	2.75	2.76	2.85	2.76	2.72	2.09	2.38	1.42	0.34
46	0.21	0.66	1.55	1.98	2.55	2.77	2.98	3.12	3.00	2.96	2.97	2.92	2.65	2.37	1.77	1.00
45	0.17	0.69	1.22	2.36	2.34	2.54	2.74	2.84	2.76	2.72	2.77	2.76	2.64	2.29	1.84	0.28
44	0.73	1.35	1.79	2.32	2.73	2.78	2.84	2.89	2.90	2.86	2.91	2.85	2.70	2.37	1.88	1.36
43	0.59	1.23	1.92	2.60	3.14	2.94	3.13	3.15	3.26	3.04	3.11	3.09	2.82	2.66	2.09	1.24
42	0.57	1.12	2.04	2.45	3.16	2.83	2.88	2.97	3.28	2.83	2.99	3.03	2.71	2.57	1.54	1.15
41	0.71	1.41	2.16	2.64	2.96	3.07	3.22	3.12	3.07	3.06	3.10	3.22	2.99	2.69	1.89	0.95
40	0.89	1.32	2.04	2.94	3.09	3.37	3.13	3.38	3.36	3.31	3.21	3.23	2.97	2.66	2.35	1.09
39	0.35	1.64	2.19	2.77	3.35	3.21	2.89	3.18	3.37	3.24	3.27	3.28	3.00	2.40	2.14	1.09
38	0.16	1.27	2.63	2.91	3.51	3.30	3.48	3.46	3.61	3.48	3.37	3.57	3.12	2.93	1.73	0.92
37	-0.47	1.36	2.64	3.49	3.76	3.73	3.62	3.89	3.79	3.78	3.68	3.66	3.38	3.06	2.21	0.79
36	-0.26	1.25	2.47	3.53	3.89	3.62	3.84	3.90	3.84	3.71	3.65	3.78	3.07	3.15	2.06	1.09
35	-0.34	1.21	2.85	3.87	4.19	4.03	4.18	4.30	4.30	4.06	4.10	3.96	3.69	3.24	2.24	1.02
34	-0.31	1.60	3.35	3.89	4.25	4.39	4.61	4.45	4.57	4.43	4.66	4.39	4.11	3.90	1.88	1.22

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-16 Test 2 – Unit 15A – 15cfs – Vz RMS (fps)

Vz RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.25	0.34	0.34	0.26	0.33	0.42	0.41	0.29	0.42	0.46	0.45	0.34	0.34	0.48	0.37	0.26
70	0.33	0.42	0.45	0.50	0.64	0.61	0.55	0.64	0.86	0.58	0.86	0.62	0.52	0.71	0.61	0.46
68	0.63	0.45	0.62	0.53	0.84	0.83	0.84	0.83	0.68	0.93	0.62	0.69	0.85	0.94	0.92	0.40
66	0.64	0.53	0.84	0.96	0.69	0.90	1.04	1.04	0.64	0.66	0.74	0.89	0.69	0.93	0.75	0.62
64	0.82	0.61	0.89	0.74	0.87	0.97	0.83	0.95	0.66	0.89	0.74	0.71	0.89	0.72	0.94	0.98
62	0.56	0.58	0.66	0.71	0.74	0.91	0.89	0.88	0.78	0.69	0.88	0.53	0.79	0.74	0.75	0.60
60	0.66	0.73	0.70	0.61	0.89	1.11	0.93	0.81	0.63	0.97	0.64	0.59	0.60	0.87	0.57	0.76
58	0.47	0.72	0.77	0.81	0.78	1.12	0.94	0.86	0.66	0.71	0.63	0.76	0.68	1.21	0.95	0.77
56	0.32	0.60	0.98	0.94	0.94	1.08	0.69	0.67	0.90	0.84	0.64	0.76	0.60	0.85	1.06	0.95
55	0.46	0.64	0.85	0.64	0.94	0.94	0.80	0.92	0.76	0.56	0.77	0.58	0.64	1.16	1.01	1.00
54	0.55	0.82	0.64	0.96	0.72	1.09	0.92	0.58	0.88	0.66	0.63	0.65	0.72	0.76	0.71	0.98
53	0.60	0.87	0.97	0.66	1.08	0.84	0.88	0.75	0.68	0.77	0.51	0.54	0.65	0.78	1.15	0.86
52	0.60	0.83	0.58	1.19	0.95	1.04	0.71	0.52	0.59	0.78	0.53	0.65	0.64	0.56	0.80	0.84
51	0.99	0.73	0.98	1.09	0.97	0.64	0.80	0.60	0.67	0.67	0.57	0.58	0.77	0.63	0.62	0.83
50	0.85	1.05	1.09	1.02	0.81	0.55	0.86	0.66	0.56	0.53	0.55	0.48	0.49	0.68	0.66	1.18
49	0.68	0.72	0.92	0.90	0.57	0.82	0.49	0.54	0.46	0.55	0.56	0.51	0.60	0.65	0.90	0.77
48	0.86	0.88	0.90	0.75	0.62	0.62	0.55	0.56	0.58	0.51	0.50	0.74	0.62	0.73	0.73	0.96
47	0.87	0.92	0.87	0.95	0.72	0.68	0.47	0.50	0.52	0.49	0.41	0.54	0.79	0.62	0.72	1.04
46	0.80	0.87	0.79	0.71	0.67	0.60	0.55	0.44	0.48	0.49	0.52	0.46	0.49	0.58	0.63	0.78
45	0.74	0.87	0.87	0.66	0.68	0.60	0.58	0.44	0.52	0.51	0.47	0.55	0.52	0.59	0.60	0.97
44	0.79	0.77	0.66	0.72	0.68	0.53	0.49	0.45	0.53	0.49	0.52	0.51	0.59	0.69	0.61	0.64
43	1.14	0.71	0.82	0.68	0.73	0.61	0.51	0.51	0.49	0.49	0.47	0.55	0.70	0.60	0.64	0.73
42	0.81	0.73	0.74	0.81	0.81	0.63	0.53	0.59	0.60	0.52	0.53	0.62	0.62	0.68	0.74	0.72
41	0.83	0.79	0.80	0.78	0.80	0.69	0.64	0.59	0.59	0.58	0.65	0.70	0.67	0.68	0.77	0.74
40	0.82	0.93	0.90	0.79	0.81	0.69	0.65	0.68	0.66	0.63	0.64	0.65	0.69	0.67	0.77	0.81
39	0.90	0.93	0.99	0.88	0.79	0.69	0.72	0.67	0.71	0.68	0.63	0.72	0.78	0.83	1.05	0.87
38	1.06	0.92	0.95	0.93	0.90	0.81	0.76	0.76	0.77	0.76	0.77	0.77	0.85	0.87	0.98	0.94
37	0.96	1.03	1.04	0.99	0.94	0.88	0.85	0.76	0.73	0.82	0.76	0.83	0.89	0.89	0.95	0.99
36	0.93	1.12	1.18	1.03	1.00	0.85	0.92	0.77	0.83	0.76	0.86	0.87	0.98	1.05	0.98	0.94
35	0.91	1.09	1.33	1.14	1.03	0.88	0.79	0.73	0.69	0.80	0.77	0.83	0.96	1.14	1.07	1.02
34	0.98	1.07	1.35	1.15	1.00	0.79	0.68	0.66	0.71	0.74	0.69	0.94	1.03	1.08	1.26	0.99

Table B-17 Test 2 – Unit 15A – 15kcfs – Vs (fps)

Vs																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.16	0.28	0.46	0.40	0.17	0.60	0.72	0.52	0.18	0.57	0.40	0.14	0.25	0.40	0.57	0.36
70	0.37	0.35	0.56	0.40	0.20	0.85	0.64	0.45	0.21	1.23	0.70	0.62	0.13	0.42	0.26	0.31
68	0.66	0.44	0.59	0.57	1.27	1.12	1.31	1.26	1.81	1.52	1.60	1.35	1.40	0.70	0.53	0.49
66	0.84	0.47	0.74	0.76	0.88	1.00	1.28	1.44	1.77	1.47	1.49	1.38	1.88	1.06	0.92	0.25
64	0.93	0.71	0.84	0.74	1.04	1.11	1.57	1.53	2.07	1.68	1.94	1.92	1.66	1.31	1.33	0.89
62	0.94	0.68	0.72	0.80	0.76	1.26	1.15	1.40	1.76	1.81	1.62	1.98	1.94	1.71	1.54	1.69
60	1.43	0.92	1.43	0.90	0.97	1.18	0.93	1.77	2.04	1.88	2.41	2.33	2.27	1.38	2.01	1.29
58	1.17	1.42	1.34	0.95	0.67	0.89	1.82	2.09	1.88	2.30	2.33	2.41	1.57	1.25	1.03	0.55
56	1.49	1.77	0.93	0.57	0.75	0.46	2.40	2.37	2.24	2.53	1.95	1.79	2.28	2.03	0.48	0.60
55	1.46	0.96	0.75	1.02	0.19	1.80	2.38	2.47	2.77	2.90	2.17	2.84	2.49	1.12	1.23	0.65
54	0.87	0.75	1.48	0.22	0.33	1.56	2.32	2.74	2.44	2.65	2.89	2.48	2.56	2.21	1.42	0.51
53	0.81	1.36	0.16	0.48	0.50	2.43	2.26	2.46	2.65	2.93	2.57	2.92	2.67	1.96	1.05	0.23
52	0.73	0.71	0.56	0.98	1.40	1.72	2.29	2.90	2.78	2.80	3.03	2.64	2.40	2.75	1.81	0.02
51	0.80	0.48	0.10	1.00	1.72	2.08	2.04	2.89	2.85	2.73	2.50	2.88	2.14	2.21	2.01	0.33
50	0.42	0.29	0.35	1.08	1.32	2.41	2.56	2.76	2.95	2.86	2.79	2.86	2.60	2.01	1.69	0.18
49	0.40	0.13	1.36	1.24	2.41	2.21	2.84	2.80	2.95	2.81	2.76	2.88	2.39	2.28	1.15	0.48
48	0.13	0.20	0.98	2.05	2.22	2.42	2.59	2.73	2.72	2.78	2.71	2.48	2.48	1.74	1.36	0.14
47	0.80	0.31	1.00	1.57	2.50	2.43	2.78	2.76	2.79	2.97	2.80	2.86	2.16	2.46	1.46	0.46
46	0.28	0.67	1.58	1.98	2.55	2.79	2.98	3.13	3.09	3.04	3.01	3.03	2.73	2.42	1.81	1.02
45	0.35	0.79	1.24	2.37	2.34	2.54	2.75	2.84	2.86	2.78	2.84	2.80	2.73	2.36	1.89	0.29
44	0.88	1.39	1.81	2.32	2.73	2.78	2.84	2.90	2.99	2.93	2.97	2.98	2.81	2.42	1.92	1.40
43	0.66	1.32	1.93	2.61	3.15	2.94	3.13	3.15	3.30	3.13	3.17	3.18	2.87	2.76	2.14	1.27
42	0.77	1.20	2.07	2.47	3.17	2.83	2.88	2.97	3.34	2.92	3.02	3.13	2.81	2.66	1.62	1.24
41	0.77	1.43	2.21	2.66	2.97	3.08	3.23	3.12	3.15	3.15	3.14	3.32	3.11	2.81	2.02	1.14
40	1.02	1.53	2.12	2.99	3.11	3.38	3.13	3.39	3.40	3.35	3.28	3.32	3.06	2.74	2.52	1.25
39	0.77	1.83	2.23	2.81	3.37	3.23	2.89	3.18	3.42	3.27	3.33	3.42	3.12	2.51	2.31	1.35
38	0.65	1.48	2.74	2.95	3.55	3.30	3.50	3.46	3.64	3.53	3.40	3.69	3.21	3.06	1.94	1.18
37	0.80	1.59	2.73	3.55	3.79	3.74	3.63	3.90	3.82	3.83	3.72	3.75	3.49	3.19	2.37	1.01
36	0.59	1.54	2.52	3.57	3.92	3.63	3.85	3.91	3.87	3.76	3.69	3.89	3.15	3.26	2.15	1.19
35	0.53	1.22	2.87	3.91	4.20	4.03	4.19	4.30	4.34	4.11	4.14	4.04	3.83	3.36	2.34	1.03
34	0.47	1.60	3.38	3.91	4.27	4.39	4.62	4.45	4.61	4.48	4.69	4.48	4.19	3.99	1.93	1.25

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-18 Test 2 – Unit 15A – 15kcfs – Vs RMS (fps)

Vs RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.35	0.46	0.44	0.34	0.60	0.52	0.52	0.38	0.61	0.73	0.60	0.48	0.39	0.60	0.47	0.37
70	0.44	0.50	0.52	0.57	0.85	0.72	0.58	0.74	1.04	0.67	0.96	0.74	0.72	0.83	0.80	0.59
68	0.76	0.56	0.74	0.61	0.97	0.95	0.93	0.91	0.79	1.01	0.77	0.83	0.99	1.05	1.02	0.52
66	0.72	0.60	0.97	1.08	0.78	1.01	1.15	1.20	0.76	0.84	0.87	1.07	0.77	1.03	0.95	0.75
64	0.92	0.72	1.00	0.87	1.00	1.13	0.97	1.08	0.74	0.99	0.87	0.83	1.01	0.92	1.01	1.06
62	0.69	0.71	0.79	0.81	0.90	1.04	1.08	1.01	0.92	0.86	0.98	0.68	0.93	0.90	0.88	0.72
60	0.75	0.85	0.84	0.75	1.00	1.29	1.13	0.97	0.84	1.11	0.81	0.71	0.78	1.02	0.74	0.91
58	0.58	0.90	0.87	0.99	1.05	1.32	1.13	1.32	0.88	0.91	0.78	0.93	0.87	1.39	1.09	0.99
56	0.39	0.70	1.20	1.31	1.13	1.20	0.97	1.13	1.11	0.99	0.82	0.92	0.73	0.99	1.24	1.09
55	0.57	0.79	1.11	0.83	1.11	1.15	1.22	1.22	0.93	0.74	0.93	0.75	0.78	1.31	1.13	1.19
54	0.70	0.97	0.78	1.25	0.87	1.31	1.15	0.71	1.02	0.82	0.77	0.90	0.85	0.89	0.91	1.23
53	0.74	0.98	1.25	0.91	1.29	1.07	1.12	0.97	0.87	0.91	0.83	0.65	0.83	0.97	1.46	1.08
52	0.70	0.99	0.75	1.41	1.18	1.23	0.90	0.69	0.73	0.91	0.68	0.80	0.89	0.72	1.06	1.04
51	1.11	0.91	1.20	1.33	1.16	0.82	0.96	0.74	0.80	0.80	0.70	0.76	0.97	0.86	0.85	1.09
50	1.00	1.21	1.28	1.32	0.93	0.75	1.16	0.81	0.70	0.68	0.85	0.63	0.65	0.84	0.86	1.35
49	0.86	0.98	1.10	1.17	0.74	0.96	0.66	0.66	0.61	0.67	0.70	0.67	0.81	0.87	1.05	0.99
48	1.05	1.13	1.08	0.90	0.77	0.75	0.70	0.68	0.72	0.64	0.66	0.97	0.81	0.86	0.90	1.15
47	1.05	1.14	1.00	1.10	0.86	0.84	0.60	0.60	0.69	0.65	0.55	0.65	0.98	0.81	0.90	1.20
46	1.01	1.07	0.94	0.88	0.76	0.75	0.65	0.54	0.61	0.65	0.65	0.60	0.65	0.74	0.83	0.99
45	0.93	1.03	1.07	0.82	0.84	0.75	0.73	0.57	0.65	0.64	0.63	0.70	0.71	0.76	0.78	1.15
44	0.99	1.03	0.89	0.87	0.84	0.70	0.65	0.56	0.68	0.62	0.65	0.63	0.76	0.87	0.80	0.80
43	1.29	0.89	1.01	0.84	0.87	0.76	0.67	0.68	0.66	0.63	0.63	0.72	0.86	0.81	0.83	0.95
42	1.02	0.94	0.90	1.02	1.03	0.82	0.70	0.76	0.75	0.62	0.69	0.77	0.84	0.89	0.94	0.90
41	1.06	1.01	1.05	0.97	0.99	0.88	0.77	0.75	0.74	0.72	0.81	0.86	0.87	0.88	0.96	0.93
40	1.04	1.16	1.08	0.99	0.97	0.86	0.78	0.83	0.83	0.81	0.81	0.83	0.92	0.89	0.98	1.00
39	1.14	1.17	1.23	1.12	0.90	0.87	0.90	0.80	0.87	0.81	0.82	0.89	0.97	1.06	1.24	1.07
38	1.22	1.15	1.21	1.18	1.09	0.93	0.95	0.90	0.95	0.92	0.95	0.97	1.08	1.12	1.22	1.15
37	1.15	1.26	1.32	1.28	1.13	1.08	1.01	0.90	0.91	1.01	0.96	1.05	1.11	1.16	1.24	1.21
36	1.16	1.39	1.48	1.30	1.20	1.04	1.05	0.88	0.99	0.92	1.03	1.07	1.25	1.33	1.32	1.18
35	1.10	1.40	1.63	1.38	1.26	1.03	0.96	0.86	0.85	0.96	0.90	1.02	1.12	1.41	1.39	1.37
34	1.26	1.47	1.65	1.35	1.16	0.95	0.83	0.79	0.85	0.91	0.83	1.11	1.24	1.35	1.58	1.31

Table B-19 Test 2 – Unit 15A – 15kcfs – Vt (fps)

Vt																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.19	0.29	0.47	0.41	0.30	0.61	0.78	0.56	0.26	0.69	0.85	0.55	0.27	0.48	0.72	0.44
70	0.38	0.36	0.56	0.42	0.21	0.89	0.65	0.50	0.31	1.26	0.73	0.66	0.13	0.43	0.28	0.32
68	0.68	0.48	0.63	0.58	1.28	1.14	1.32	1.27	1.81	1.54	1.60	1.38	1.40	0.71	0.54	0.49
66	0.84	0.47	0.74	0.76	0.88	1.00	1.28	1.44	1.77	1.47	1.49	1.38	1.88	1.06	0.93	0.25
64	0.93	0.72	0.84	0.74	1.04	1.11	1.57	1.53	2.07	1.68	1.94	1.92	1.67	1.31	1.33	0.90
62	0.95	0.69	0.72	0.80	0.76	1.26	1.15	1.40	1.76	1.82	1.62	1.98	1.94	1.71	1.54	1.69
60	1.43	0.92	1.43	0.90	0.97	1.18	0.93	1.77	2.04	1.88	2.41	2.33	2.27	1.38	2.01	1.29
58	1.17	1.42	1.34	0.95	0.68	0.90	1.82	2.09	1.88	2.30	2.33	2.41	1.58	1.25	1.03	0.55
56	1.54	1.80	1.05	0.71	0.81	0.59	2.47	2.44	2.28	2.58	2.03	1.85	2.38	2.13	0.67	0.70
55	1.49	1.07	0.84	1.08	0.33	1.83	2.40	2.49	2.79	2.93	2.20	2.86	2.56	1.17	1.32	0.79
54	0.94	0.85	1.58	0.43	0.47	1.61	2.34	2.80	2.47	2.69	2.92	2.51	2.63	2.29	1.52	0.71
53	0.87	1.42	0.33	0.64	0.66	2.45	2.34	2.53	2.69	2.99	2.61	2.96	2.74	2.02	1.15	0.44
52	0.77	0.76	0.61	1.02	1.42	1.75	2.34	2.95	2.81	2.83	3.06	2.67	2.45	2.80	1.86	0.32
51	0.87	0.70	0.49	1.12	1.76	2.13	2.12	2.96	2.90	2.78	2.56	2.91	2.22	2.30	2.11	0.49
50	0.56	0.50	0.51	1.19	1.43	2.48	2.65	2.85	3.01	2.93	2.85	2.90	2.69	2.13	1.80	0.53
49	0.48	0.34	1.43	1.31	2.44	2.25	2.89	2.85	2.98	2.85	2.79	2.90	2.44	2.35	1.22	0.61
48	0.39	0.56	1.16	2.14	2.28	2.49	2.68	2.81	2.78	2.84	2.76	2.52	2.56	1.85	1.50	0.47
47	0.98	0.56	1.18	1.70	2.57	2.49	2.87	2.85	2.86	3.04	2.85	2.90	2.27	2.56	1.58	0.65
46	0.40	0.79	1.64	2.02	2.58	2.83	3.03	3.18	3.13	3.08	3.04	3.06	2.78	2.48	1.89	1.13
45	0.63	0.98	1.36	2.44	2.40	2.61	2.83	2.92	2.93	2.84	2.89	2.84	2.81	2.46	2.01	0.57
44	1.05	1.54	1.93	2.41	2.79	2.85	2.94	3.00	3.06	3.00	3.03	3.02	2.90	2.53	2.06	1.55
43	0.76	1.40	2.00	2.66	3.18	2.98	3.17	3.19	3.33	3.16	3.19	3.20	2.91	2.81	2.20	1.35
42	1.01	1.34	2.16	2.53	3.20	2.88	2.94	3.03	3.37	2.96	3.06	3.16	2.88	2.73	1.73	1.37
41	1.07	1.58	2.32	2.73	3.01	3.14	3.29	3.19	3.19	3.20	3.18	3.35	3.18	2.89	2.15	1.33
40	1.18	1.67	2.18	3.02	3.13	3.39	3.16	3.41	3.42	3.37	3.30	3.34	3.10	2.79	2.58	1.36
39	1.07	1.97	2.31	2.86	3.39	3.26	2.94	3.22	3.44	3.30	3.35	3.44	3.16	2.58	2.41	1.46
38	0.86	1.65	2.82	3.01	3.57	3.34	3.55	3.51	3.67	3.56	3.43	3.71	3.27	3.13	2.05	1.29
37	0.86	1.71	2.77	3.58	3.80	3.76	3.66	3.92	3.83	3.84	3.73	3.77	3.52	3.24	2.45	1.07
36	0.72	1.70	2.62	3.61	3.94	3.67	3.90	3.96	3.90	3.80	3.72	3.91	3.22	3.34	2.29	1.34
35	0.67	1.39	2.98	3.95	4.23	4.08	4.26	4.37	4.38	4.16	4.18	4.08	3.90	3.46	2.53	1.18
34	0.49	1.70	3.42	3.94	4.28	4.42	4.65	4.49	4.64	4.51	4.72	4.49	4.23	4.04	2.05	1.37

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-20 Test 2 – Unit 15A – 15kcfs – Vt RMS (fps)

Vt RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.50	0.59	0.60	0.48	0.73	0.67	0.70	0.52	0.79	0.94	0.77	0.63	0.52	0.76	0.72	0.51
70	0.54	0.59	0.61	0.69	0.95	0.84	0.68	0.84	1.13	0.76	1.05	0.86	0.78	0.92	0.89	0.69
68	0.85	0.65	0.84	0.72	1.11	1.04	1.02	1.00	0.91	1.10	0.88	0.91	1.09	1.11	1.09	0.60
66	0.81	0.69	1.09	1.20	0.91	1.11	1.21	1.31	0.85	0.95	0.99	1.15	0.86	1.11	1.03	0.84
64	1.03	0.85	1.12	1.00	1.12	1.24	1.08	1.18	0.84	1.07	0.96	0.93	1.11	1.04	1.09	1.12
62	0.80	0.85	0.91	0.93	1.02	1.13	1.18	1.13	1.02	0.94	1.05	0.77	1.03	1.03	0.97	0.82
60	0.87	0.98	0.93	0.90	1.12	1.38	1.24	1.11	0.92	1.20	0.90	0.81	0.88	1.13	0.85	1.03
58	0.67	1.00	1.00	1.12	1.15	1.39	1.21	1.41	0.96	0.98	0.87	1.03	0.96	1.46	1.21	1.11
56	0.45	0.79	1.34	1.40	1.21	1.28	1.04	1.19	1.18	1.07	0.90	1.02	0.81	1.09	1.32	1.17
55	0.66	0.88	1.23	0.91	1.21	1.23	1.29	1.27	1.04	0.81	1.03	0.85	0.86	1.43	1.25	1.29
54	0.78	1.06	0.87	1.33	0.96	1.41	1.22	0.79	1.13	0.90	0.84	0.99	0.94	1.01	1.02	1.32
53	0.82	1.05	1.32	1.00	1.36	1.18	1.18	1.06	0.98	0.97	0.91	0.72	0.91	1.10	1.52	1.17
52	0.79	1.09	0.86	1.48	1.29	1.32	0.99	0.76	0.82	0.99	0.76	0.88	0.98	0.81	1.16	1.13
51	1.19	1.01	1.28	1.41	1.23	0.93	1.03	0.81	0.87	0.86	0.78	0.85	1.06	0.95	0.95	1.19
50	1.08	1.28	1.38	1.40	0.99	0.85	1.22	0.89	0.79	0.76	0.92	0.72	0.72	0.94	0.96	1.42
49	0.95	1.05	1.18	1.29	0.83	1.02	0.74	0.73	0.69	0.75	0.78	0.76	0.91	0.96	1.18	1.08
48	1.13	1.22	1.17	0.99	0.85	0.84	0.77	0.76	0.79	0.71	0.75	1.06	0.90	0.97	1.00	1.24
47	1.14	1.25	1.09	1.21	0.95	0.97	0.68	0.68	0.77	0.74	0.64	0.75	1.08	0.91	1.00	1.31
46	1.13	1.17	1.06	1.00	0.87	0.86	0.75	0.64	0.71	0.75	0.75	0.72	0.76	0.84	0.94	1.09
45	1.03	1.12	1.18	0.94	0.95	0.84	0.81	0.65	0.77	0.73	0.73	0.81	0.82	0.88	0.89	1.23
44	1.13	1.16	1.01	0.99	0.95	0.82	0.75	0.67	0.80	0.72	0.75	0.76	0.88	0.98	0.91	0.91
43	1.41	1.06	1.15	1.00	0.99	0.88	0.78	0.79	0.78	0.75	0.75	0.85	0.98	0.94	0.99	1.08
42	1.20	1.09	1.06	1.15	1.15	0.95	0.80	0.86	0.87	0.74	0.81	0.90	0.98	1.02	1.08	1.04
41	1.21	1.18	1.22	1.11	1.13	1.01	0.88	0.85	0.87	0.85	0.93	0.99	1.01	1.04	1.11	1.11
40	1.27	1.41	1.28	1.16	1.12	0.98	0.91	0.94	0.98	0.94	0.96	0.99	1.08	1.05	1.16	1.22
39	1.46	1.40	1.42	1.30	1.09	0.99	1.01	0.93	1.00	0.95	0.97	1.04	1.12	1.24	1.41	1.27
38	1.50	1.44	1.43	1.37	1.24	1.07	1.07	1.01	1.08	1.04	1.09	1.14	1.26	1.30	1.41	1.35
37	1.46	1.57	1.56	1.50	1.30	1.22	1.16	1.03	1.04	1.15	1.12	1.22	1.27	1.37	1.45	1.42
36	1.39	1.67	1.71	1.50	1.36	1.18	1.19	0.99	1.12	1.05	1.18	1.23	1.45	1.54	1.52	1.40
35	1.33	1.61	1.86	1.59	1.44	1.18	1.10	0.96	0.98	1.09	1.01	1.20	1.29	1.62	1.63	1.56
34	1.43	1.72	1.89	1.51	1.31	1.08	0.94	0.89	0.97	1.04	0.94	1.26	1.42	1.56	1.81	1.57

Table B-21 Test 3 – Unit 15B – 18kcfs – Vx (fps)

Vx																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	-0.06	-0.02	-0.03	-0.18	-0.26	-0.15	-0.25	-0.28	-0.44	-0.35	-0.39	-0.31	-0.03	-0.16	-0.06	-0.12
68	-0.06	-0.22	-0.11	0.03	-0.10	-0.03	-0.05	0.03	-0.14	-0.15	-0.08	-0.17	-0.29	-0.17	-0.08	-0.23
66	-0.15	-0.06	-0.04	-0.13	-0.06	-0.03	-0.07	-0.04	0.01	0.02	-0.08	-0.14	-0.05	-0.07	-0.10	-0.22
64	-0.08	-0.03	-0.15	-0.04	-0.06	-0.02	0.00	0.00	0.04	0.02	-0.08	-0.04	0.10	0.06	0.00	-0.19
62	-0.13	-0.05	-0.02	0.00	0.00	-0.01	-0.06	-0.05	0.01	-0.03	-0.08	-0.10	0.04	0.06	0.07	0.00
60	-0.02	0.07	0.02	-0.03	0.01	-0.01	-0.10	-0.06	0.06	-0.02	-0.02	-0.08	0.14	0.09	0.09	-0.01
58	0.03	0.11	0.12	0.02	0.10	0.13	0.04	-0.03	-0.08	0.05	0.05	0.04	0.04	0.15	0.23	0.08
56	0.23	0.45	0.55	0.55	0.43	0.52	0.76	0.72	0.63	0.61	0.65	0.51	0.69	0.65	0.60	0.41
55	0.23	0.33	0.52	0.48	0.37	0.32	0.54	0.57	0.42	0.51	0.46	0.40	0.64	0.59	0.54	0.39
54	0.42	0.56	0.54	0.66	0.49	0.51	0.68	0.69	0.57	0.62	0.50	0.48	0.78	0.67	0.45	0.55
53	0.56	0.76	0.54	0.54	0.55	0.57	0.70	0.75	0.67	0.67	0.69	0.52	0.80	0.49	0.63	0.61
52	0.48	0.40	0.45	0.44	0.37	0.48	0.62	0.65	0.59	0.54	0.47	0.43	0.67	0.59	0.55	0.34
51	0.65	0.61	0.68	0.75	0.66	0.71	0.91	0.84	0.72	0.81	0.73	0.55	0.87	0.75	0.64	0.67
50	0.78	0.63	0.68	0.82	0.61	0.85	0.97	1.02	0.90	0.89	0.69	0.59	0.97	0.88	0.85	0.61
49	0.48	0.48	0.50	0.66	0.46	0.59	0.65	0.69	0.60	0.62	0.55	0.52	0.77	0.62	0.54	0.51
48	0.58	0.63	0.66	0.76	0.70	0.71	0.87	0.91	0.77	0.81	0.71	0.61	0.89	0.87	0.85	0.69
47	0.67	0.83	0.80	0.84	0.71	0.83	0.94	0.94	0.84	0.84	0.76	0.61	0.97	0.95	0.80	0.73
46	0.55	0.60	0.60	0.61	0.56	0.60	0.70	0.69	0.63	0.64	0.51	0.46	0.75	0.73	0.67	0.60
45	0.80	0.84	0.81	0.80	0.71	0.80	0.91	0.87	0.76	0.80	0.76	0.61	0.92	0.93	0.87	0.78
44	0.82	0.78	0.89	0.89	0.74	0.84	0.94	0.97	0.85	0.85	0.75	0.59	0.97	1.01	0.93	0.83
43	0.65	0.70	0.58	0.57	0.50	0.53	0.61	0.59	0.52	0.50	0.47	0.44	0.66	0.67	0.72	0.54
42	0.74	0.91	0.78	0.72	0.55	0.62	0.76	0.72	0.64	0.64	0.58	0.46	0.78	0.86	0.77	0.85
41	0.35	0.85	0.90	0.76	0.60	0.59	0.81	0.78	0.66	0.76	0.64	0.49	0.89	1.00	0.99	0.96
40	0.56	0.73	0.72	0.57	0.42	0.44	0.51	0.53	0.43	0.46	0.40	0.36	0.64	0.68	0.77	0.80
39	0.86	1.00	0.88	0.70	0.52	0.66	0.70	0.70	0.61	0.58	0.54	0.48	0.83	0.95	0.98	0.99
38	0.75	0.86	0.92	0.80	0.61	0.70	0.76	0.77	0.66	0.72	0.64	0.56	0.84	0.97	1.01	0.92
37	0.59	0.77	0.79	0.55	0.38	0.48	0.54	0.55	0.48	0.49	0.44	0.40	0.64	0.82	0.77	0.56
36	0.70	0.99	1.10	0.75	0.65	0.70	0.82	0.85	0.76	0.78	0.71	0.61	0.89	1.13	1.15	0.74
35	1.12	1.12	1.12	1.12	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	1.27	1.27	1.27	1.27
34	0.97	0.97	0.97	0.97	0.66	0.66	0.66	0.66	0.92	0.92	0.92	0.92	1.04	1.04	1.04	1.04

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-22 Test 3 – Unit 15B – 18kcfs – Vx RMS (fps)

Vx RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.37	0.38	0.47	0.45	0.51	0.48	0.52	0.52	0.58	0.53	0.64	0.57	0.44	0.46	0.48	0.42
68	0.29	0.54	0.55	0.32	0.36	0.47	0.55	0.40	0.50	0.58	0.60	0.43	0.42	0.56	0.41	0.39
66	0.46	0.40	0.61	0.54	0.56	0.46	0.54	0.58	0.58	0.54	0.57	0.53	0.55	0.48	0.52	0.41
64	0.40	0.45	0.59	0.59	0.49	0.55	0.54	0.57	0.51	0.51	0.55	0.48	0.50	0.48	0.56	0.47
62	0.54	0.37	0.35	0.52	0.55	0.51	0.44	0.50	0.52	0.50	0.45	0.56	0.54	0.48	0.46	0.53
60	0.56	0.40	0.43	0.44	0.66	0.45	0.51	0.51	0.50	0.50	0.52	0.52	0.63	0.52	0.57	0.57
58	0.53	0.57	0.51	0.60	0.54	0.55	0.56	0.56	0.65	0.52	0.52	0.47	0.63	0.65	0.63	0.67
56	0.45	0.43	0.44	0.49	0.55	0.51	0.48	0.47	0.45	0.56	0.48	0.49	0.61	0.65	0.72	0.66
55	0.31	0.60	0.56	0.46	0.48	0.58	0.42	0.45	0.55	0.50	0.50	0.45	0.49	0.51	0.66	0.70
54	0.41	0.41	0.54	0.64	0.54	0.42	0.46	0.46	0.59	0.46	0.50	0.52	0.55	0.63	0.67	0.60
53	0.41	0.54	0.52	0.46	0.45	0.48	0.48	0.45	0.48	0.50	0.39	0.43	0.50	0.67	0.66	0.71
52	0.54	0.45	0.52	0.48	0.49	0.52	0.44	0.39	0.51	0.43	0.48	0.46	0.52	0.61	0.57	0.64
51	0.54	0.63	0.58	0.57	0.55	0.46	0.40	0.45	0.52	0.41	0.43	0.47	0.46	0.56	0.65	0.63
50	0.50	0.68	0.53	0.58	0.45	0.48	0.44	0.42	0.45	0.42	0.43	0.55	0.53	0.61	0.60	0.66
49	0.68	0.67	0.66	0.63	0.63	0.47	0.44	0.40	0.47	0.39	0.46	0.47	0.50	0.67	0.64	0.66
48	0.57	0.64	0.57	0.62	0.54	0.52	0.45	0.38	0.45	0.37	0.43	0.44	0.44	0.55	0.55	0.54
47	0.64	0.49	0.62	0.56	0.54	0.41	0.40	0.38	0.43	0.39	0.43	0.51	0.50	0.58	0.60	0.56
46	0.56	0.53	0.56	0.55	0.48	0.46	0.44	0.40	0.41	0.44	0.43	0.46	0.49	0.56	0.57	0.59
45	0.75	0.65	0.62	0.57	0.53	0.52	0.45	0.42	0.47	0.43	0.43	0.53	0.54	0.61	0.59	0.61
44	0.71	0.60	0.61	0.59	0.62	0.56	0.44	0.43	0.50	0.47	0.47	0.51	0.54	0.57	0.63	0.55
43	0.76	0.73	0.69	0.62	0.61	0.57	0.49	0.46	0.54	0.50	0.51	0.57	0.56	0.61	0.64	0.64
42	0.83	0.91	0.72	0.70	0.60	0.59	0.51	0.49	0.46	0.53	0.54	0.59	0.66	0.62	0.67	0.76
41	0.93	0.84	0.76	0.75	0.69	0.56	0.57	0.50	0.58	0.55	0.55	0.62	0.63	0.70	0.72	0.73
40	0.97	0.93	0.86	0.83	0.70	0.67	0.58	0.55	0.56	0.56	0.59	0.63	0.71	0.76	0.80	0.89
39	1.08	0.95	0.92	0.81	0.73	0.66	0.60	0.57	0.60	0.60	0.59	0.65	0.77	0.83	0.89	0.94
38	1.06	0.93	0.92	0.89	0.76	0.73	0.64	0.59	0.63	0.61	0.60	0.67	0.73	0.85	0.92	1.03
37	1.12	1.05	1.02	0.93	0.80	0.70	0.61	0.61	0.60	0.58	0.59	0.66	0.77	0.93	1.05	1.05
36	1.07	1.05	1.07	0.98	0.77	0.67	0.67	0.57	0.59	0.56	0.57	0.64	0.78	1.04	1.03	1.01
35	1.17	1.17	1.17	1.17	0.57	0.57	0.57	0.57	0.46	0.46	0.46	0.46	1.09	1.09	1.09	1.09
34	1.26	1.26	1.26	1.26	0.62	0.62	0.62	0.62	1.50	1.50	1.50	1.50	1.18	1.18	1.18	1.18

Table B-23 Test 3 – Unit 15B – 18kcfs – Vy (fps)

Vy																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.23	0.38	0.50	0.54	0.75	0.82	0.86	0.57	0.51	0.99	0.68	0.38	0.13	0.29	0.25	0.12
68	-0.04	0.44	0.64	0.36	0.47	0.48	0.87	0.48	0.75	-0.44	0.06	0.21	0.21	-0.69	-0.16	0.12
66	0.48	0.44	0.56	0.67	0.92	0.80	0.43	1.13	0.48	0.54	-0.55	0.30	-0.32	-0.37	-0.63	-0.18
64	0.32	0.52	0.62	0.83	0.70	0.95	0.79	1.02	0.96	0.53	-0.11	-0.08	0.07	-0.52	-0.80	-0.40
62	0.30	0.30	0.13	0.52	0.63	0.56	0.39	0.23	0.38	0.36	0.10	-0.79	-0.47	-0.48	-0.55	-0.76
60	0.66	0.36	0.13	0.25	1.11	0.47	0.39	0.35	0.53	0.24	-0.29	-0.64	-0.71	-0.70	-1.09	-0.91
58	0.53	0.66	0.27	0.54	0.38	0.72	0.64	0.99	-0.84	-0.52	-0.45	-0.54	-1.17	-1.21	-1.05	-1.09
56	0.07	-0.04	-0.06	0.15	0.06	-0.25	0.04	-0.26	-0.41	-0.93	-1.00	-1.23	-0.89	-1.00	-1.32	-0.83
55	-0.10	0.37	-0.29	-0.08	-0.28	0.35	0.15	-0.06	-0.82	-0.61	-0.89	-1.15	-1.36	-0.99	-0.62	-0.83
54	-0.32	-0.17	-0.09	-0.02	-0.02	-0.04	-0.08	-0.08	-0.81	-0.69	-0.83	-1.02	-1.11	-1.20	-0.66	-0.43
53	-0.42	0.33	-0.47	-0.20	-0.22	0.25	-0.37	-0.27	-0.86	-0.52	-0.66	-1.22	-1.40	-0.41	-0.47	-0.97
52	-0.40	-0.29	0.15	0.08	0.01	-0.30	0.09	-0.34	-0.73	-1.04	-0.43	-1.18	-1.39	-1.16	-0.41	-0.04
51	-0.27	0.14	0.48	0.10	-0.12	0.15	0.08	-0.15	-0.83	-0.46	-0.73	-0.98	-1.06	-0.33	-0.70	-0.05
50	-0.04	0.40	-0.31	0.87	0.14	-0.02	-0.30	0.33	-0.73	-0.59	-0.73	-0.71	-1.13	-0.26	-0.25	-0.10
49	-0.08	-0.12	-0.07	0.36	0.02	-0.11	-0.11	-0.05	-0.82	-0.55	-0.62	-0.84	-0.83	-0.43	-0.43	-0.39
48	-0.68	0.33	0.14	0.15	-0.24	-0.01	-0.36	0.00	-1.08	-0.40	-0.83	-0.75	-0.98	-0.37	-0.61	0.04
47	-0.01	0.26	0.42	0.43	0.19	-0.11	0.15	0.18	-0.76	-0.67	-0.38	-0.63	-0.73	-0.53	-0.20	0.16
46	0.41	0.42	0.35	0.31	0.27	-0.08	-0.24	-0.19	-0.62	-0.84	-0.75	-1.10	-0.77	-1.06	-0.48	-0.19
45	0.96	0.61	0.55	0.33	0.51	0.04	0.20	0.36	-0.58	-0.41	-0.27	-0.50	-0.93	-0.47	-0.32	-0.31
44	0.45	0.33	0.39	0.43	0.12	-0.26	0.28	0.14	-0.90	-0.86	-0.36	-0.93	-0.96	-0.82	-0.60	-0.28
43	0.71	0.68	0.29	0.48	0.32	-0.04	-0.03	0.33	-0.77	-0.79	-0.77	-0.81	-1.08	-0.79	-0.70	-0.37
42	1.15	0.89	0.69	0.31	0.70	0.15	0.27	0.07	-0.32	-0.56	-0.52	-0.94	-0.63	-0.75	-0.51	-0.76
41	0.97	0.86	0.69	0.51	0.71	0.59	0.17	0.33	-0.54	-0.33	-0.72	-0.82	-0.91	-0.58	-0.86	-0.72
40	1.07	1.09	0.75	0.67	0.56	0.30	0.43	0.39	-0.71	-0.62	-0.66	-0.95	-1.12	-0.87	-0.89	-0.84
39	1.13	0.96	0.87	0.57	0.67	0.30	0.34	0.29	-0.56	-0.66	-0.73	-1.13	-1.02	-1.11	-1.06	-1.02
38	1.12	0.94	0.59	0.65	0.59	0.45	0.42	0.36	-0.74	-0.50	-0.73	-1.18	-1.18	-1.04	-1.11	-1.17
37	0.59	0.87	0.70	0.73	0.55	0.41	0.57	0.35	-0.58	-0.77	-0.75	-1.09	-1.29	-1.09	-1.05	-1.13
36	1.05	0.74	0.57	0.60	0.56	0.18	0.34	0.42	-0.69	-0.77	-0.56	-1.00	-1.09	-1.02	-0.99	-0.89
35	0.41	0.41	0.41	0.41	0.39	0.39	0.39	0.39	-0.66	-0.66	-0.66	-0.66	-0.98	-0.98	-0.98	-0.98
34	0.48	0.48	0.48	0.48	0.34	0.34	0.34	0.34	-0.71	-0.71	-0.71	-0.71	-0.97	-0.97	-0.97	-0.97

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-24 Test 3 – Unit 15B – 18kcfs – Vy RMS (fps)

Vy RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.26	0.35	0.38	0.38	0.53	0.48	0.45	0.40	0.52	0.50	0.74	0.48	0.46	0.45	0.55	0.39
68	0.33	0.39	0.51	0.27	0.30	0.46	0.56	0.42	0.48	0.61	0.81	0.35	0.46	0.49	0.53	0.51
66	0.39	0.34	0.51	0.50	0.60	0.51	0.66	0.56	0.62	0.55	0.64	0.60	0.51	0.60	0.47	0.57
64	0.40	0.36	0.53	0.55	0.59	0.56	0.59	0.72	0.57	0.56	0.94	0.75	0.62	0.48	0.65	0.62
62	0.43	0.41	0.35	0.67	0.56	0.70	0.40	0.69	0.98	0.67	0.66	0.59	0.83	0.51	0.60	0.52
60	0.48	0.44	0.44	0.46	0.73	0.71	0.77	0.66	0.66	0.83	0.59	0.65	0.83	0.63	0.57	0.61
58	0.65	0.54	0.65	0.61	0.91	0.94	0.89	0.80	0.90	0.68	0.78	0.58	0.61	0.64	0.53	0.63
56	0.57	0.47	0.51	0.62	0.64	0.54	0.74	0.85	0.73	0.74	0.60	0.59	0.84	0.74	0.62	0.64
55	0.14	0.71	0.75	0.57	0.53	1.04	0.70	0.86	0.72	0.70	0.66	0.67	0.58	0.74	1.13	0.65
54	0.58	0.46	0.89	0.80	0.98	0.61	0.65	0.80	0.73	0.63	0.65	0.66	0.73	0.77	0.68	0.87
53	0.49	0.88	0.79	0.72	0.66	0.61	0.76	0.62	0.55	0.88	0.51	0.59	0.56	1.08	1.13	0.73
52	0.41	0.64	0.80	0.76	0.90	0.67	0.68	0.54	0.72	0.48	0.75	0.54	0.54	0.86	1.00	0.86
51	0.65	0.84	0.74	0.68	0.84	0.56	0.52	0.61	0.64	0.58	0.54	0.58	0.68	0.97	1.02	0.90
50	0.72	0.98	0.93	0.78	0.59	0.70	0.57	0.81	0.55	0.61	0.54	0.80	0.71	0.83	0.95	0.96
49	0.91	0.91	1.06	0.77	0.67	0.62	0.64	0.56	0.55	0.51	0.56	0.56	0.64	0.81	0.92	1.01
48	0.73	0.82	0.76	0.95	0.69	0.61	0.62	0.52	0.51	0.45	0.51	0.54	0.55	0.68	0.73	0.75
47	0.81	0.60	0.77	0.64	0.73	0.40	0.46	0.40	0.49	0.50	0.54	0.63	0.60	0.69	0.94	0.82
46	0.67	0.57	0.53	0.57	0.51	0.48	0.46	0.47	0.36	0.50	0.44	0.45	0.60	0.76	0.70	0.85
45	0.74	0.64	0.72	0.67	0.53	0.55	0.51	0.42	0.52	0.48	0.49	0.57	0.65	0.75	0.70	0.85
44	0.80	0.75	0.68	0.67	0.66	0.63	0.48	0.44	0.53	0.49	0.47	0.52	0.61	0.63	0.73	0.69
43	0.65	0.81	0.80	0.68	0.65	0.61	0.50	0.47	0.56	0.52	0.50	0.61	0.61	0.70	0.67	0.74
42	0.67	0.86	0.70	0.72	0.61	0.62	0.50	0.48	0.48	0.53	0.55	0.65	0.67	0.68	0.79	0.76
41	0.75	0.82	0.72	0.78	0.74	0.63	0.56	0.50	0.59	0.63	0.56	0.55	0.67	0.79	0.76	0.75
40	0.77	0.78	0.80	0.82	0.68	0.76	0.56	0.60	0.62	0.57	0.62	0.61	0.62	0.75	0.78	0.73
39	0.75	0.81	0.85	0.82	0.70	0.64	0.60	0.64	0.65	0.54	0.62	0.60	0.75	0.83	0.79	0.76
38	0.71	0.86	0.77	0.81	0.76	0.78	0.65	0.61	0.61	0.51	0.63	0.65	0.75	0.88	0.83	0.75
37	0.98	0.91	0.98	0.77	0.76	0.75	0.63	0.66	0.59	0.54	0.46	0.65	0.66	0.93	0.92	0.78
36	0.84	1.14	1.14	0.97	0.77	0.66	0.69	0.53	0.57	0.57	0.52	0.57	0.83	1.14	1.12	0.84
35	1.20	1.20	1.20	1.20	0.63	0.63	0.63	0.63	0.43	0.43	0.43	0.43	1.18	1.18	1.18	1.18
34	1.28	1.28	1.28	1.28	0.62	0.62	0.62	0.62	0.57	0.57	0.57	0.57	1.24	1.24	1.24	1.24

Table B-25 Test 3 – Unit 15B – 18kcfs – Vz (fps)

Vz																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	-0.36	-0.16	-0.13	0.34	0.43	0.18	0.24	0.55	0.72	0.52	0.14	0.62	0.04	0.01	-0.55	-0.12
68	-0.86	0.20	0.21	-0.11	0.05	1.34	1.08	0.31	0.81	1.59	1.57	0.53	1.32	0.66	0.39	0.68
66	-0.24	-0.51	0.62	-0.08	0.81	0.46	1.86	1.07	1.65	1.58	1.31	1.85	1.05	1.62	0.33	1.38
64	-1.08	-0.70	0.05	-0.08	-0.26	0.47	1.12	1.44	1.05	1.82	2.13	2.30	2.33	2.12	1.57	1.36
62	-0.91	-0.88	-1.12	0.23	0.20	-0.07	-0.20	1.59	1.56	2.08	1.87	1.67	2.15	1.77	2.15	0.68
60	-1.28	-1.69	-1.46	-0.69	0.11	-0.67	0.22	1.03	2.79	2.29	2.69	2.08	2.04	2.38	2.04	1.09
58	-0.11	-0.78	-0.75	-1.38	1.61	0.85	0.93	2.15	2.12	2.30	2.22	2.76	0.39	1.27	1.00	1.10
56	-1.19	-0.70	-1.30	-0.86	0.69	0.71	0.76	1.99	2.35	2.11	2.47	2.79	1.53	0.47	1.15	-0.05
55	-1.15	-2.12	-0.78	-0.45	-0.36	1.05	2.76	2.65	2.73	3.21	2.92	3.21	3.28	2.43	0.10	0.34
54	-0.77	-0.73	-0.04	0.33	0.32	2.20	3.01	2.53	2.48	2.69	2.98	3.13	2.47	1.51	-0.61	-0.06
53	-0.26	0.87	-0.46	0.16	0.82	2.72	2.54	2.34	2.40	3.02	3.30	3.08	2.69	0.11	0.72	0.46
52	-0.59	-0.25	0.60	0.62	1.90	2.17	3.15	2.87	2.81	3.25	3.13	3.49	2.91	2.14	0.48	-0.14
51	-0.67	-0.31	0.69	0.53	1.13	2.87	2.72	2.76	3.06	3.19	3.08	3.21	3.01	1.76	0.61	0.05
50	0.68	0.26	0.42	2.22	2.54	3.05	3.09	3.34	2.82	3.74	3.58	2.92	2.61	1.73	1.13	-0.06
49	-0.15	-0.16	1.03	1.52	2.35	3.48	3.40	3.46	3.77	3.90	3.73	3.51	3.42	2.04	1.48	0.64
48	-0.24	0.01	0.47	2.24	1.47	3.20	2.71	3.57	3.23	3.74	3.37	3.72	3.49	2.05	1.93	0.01
47	0.32	0.96	1.49	2.56	2.80	3.08	3.44	3.49	3.66	3.53	3.61	3.51	3.33	2.23	1.42	0.29
46	1.07	1.59	1.55	2.07	3.16	3.27	3.54	3.50	3.67	3.68	3.89	3.67	3.58	2.93	2.08	1.29
45	1.12	1.44	2.22	2.90	2.99	3.42	3.55	3.65	3.51	3.77	3.69	3.66	3.30	2.52	1.50	0.88
44	0.30	1.30	2.49	2.69	3.42	3.53	3.69	3.72	3.92	3.79	3.78	3.99	3.82	3.17	1.74	1.19
43	1.03	1.78	2.33	3.17	3.50	3.66	3.90	4.07	3.96	4.11	4.23	4.08	3.94	3.56	2.79	1.53
42	1.31	1.53	2.70	2.97	3.71	3.89	3.87	3.90	4.04	4.11	4.04	4.10	3.53	3.40	2.15	1.55
41	0.47	2.46	2.81	3.37	4.19	4.16	3.99	4.20	4.29	4.03	4.31	4.33	3.97	2.93	2.69	1.59
40	1.08	2.38	3.13	3.66	4.15	4.31	4.41	4.62	4.46	4.46	4.50	4.59	4.38	3.53	2.84	1.67
39	1.06	2.39	3.23	3.46	4.35	4.17	4.27	4.35	4.55	4.70	4.71	4.51	4.24	3.49	2.44	1.21
38	0.67	2.72	3.13	3.85	4.22	4.38	4.63	4.77	4.59	4.85	4.73	4.89	4.66	3.64	2.71	1.26
37	0.92	2.22	3.57	4.27	4.65	4.74	4.89	5.02	4.98	5.25	5.11	5.34	4.66	4.12	2.44	1.33
36	0.20	2.11	3.50	4.43	4.77	4.87	4.94	5.35	5.15	5.46	5.39	5.28	5.08	4.14	2.70	0.96
35	2.81	2.81	2.81	2.81	5.48	5.48	5.48	5.48	5.72	5.72	5.72	5.72	3.82	3.82	3.82	3.82
34	2.94	2.94	2.94	2.94	5.78	5.78	5.78	5.78	5.55	5.55	5.55	5.55	3.94	3.94	3.94	3.94

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-26 Test 3 – Unit 15B – 18kcfs – Vz RMS (fps)

Vz RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.38	0.41	0.61	0.64	0.80	0.69	0.88	0.64	0.95	0.91	0.95	0.86	0.72	0.50	0.54	0.63
68	0.36	0.71	0.75	0.50	0.55	0.83	1.15	0.64	0.83	0.96	0.94	0.75	0.90	0.83	0.76	0.72
66	0.67	0.61	0.77	0.76	0.88	0.97	0.77	1.04	0.96	0.94	1.12	0.82	1.09	0.94	1.06	0.94
64	0.63	0.63	0.98	0.80	0.90	0.91	1.20	1.08	1.28	0.83	0.95	0.81	0.76	0.74	1.08	1.13
62	0.78	0.61	0.52	0.95	1.35	1.10	0.92	1.23	0.97	1.03	0.77	1.14	1.01	0.78	0.83	1.42
60	0.92	0.59	0.65	0.61	1.47	0.90	1.17	1.21	0.84	1.01	1.00	1.13	1.01	0.84	0.96	0.90
58	1.45	0.76	0.80	1.06	1.62	1.26	1.53	1.08	1.23	0.98	1.19	0.79	1.79	1.12	1.13	1.09
56	0.89	0.80	0.60	1.25	1.49	1.14	1.12	0.97	1.17	1.09	0.95	1.03	1.47	1.80	1.10	1.02
55	0.31	1.03	1.06	0.76	1.11	1.45	1.16	0.82	1.00	1.08	0.79	0.71	0.66	0.98	1.41	1.14
54	0.97	0.86	0.93	1.43	1.21	0.78	1.13	0.91	1.02	0.90	0.88	0.87	0.91	1.15	1.34	1.16
53	1.07	1.22	0.95	0.94	1.26	0.81	1.10	0.97	0.94	0.90	0.72	0.77	0.82	1.39	1.23	1.19
52	1.08	0.86	1.46	1.23	1.42	1.00	0.93	0.85	0.93	0.76	1.02	0.71	0.88	1.10	1.62	1.17
51	0.96	1.09	1.21	1.25	1.26	0.89	0.76	0.93	0.87	0.68	0.74	0.81	0.75	1.10	1.31	1.11
50	0.83	1.45	1.22	1.25	0.89	0.99	0.87	0.89	0.78	0.63	0.67	1.04	0.87	1.21	1.24	1.30
49	1.13	1.24	1.34	1.17	1.16	0.86	0.86	0.74	0.72	0.57	0.66	0.66	0.64	1.24	1.14	1.01
48	1.17	1.28	1.19	1.05	1.14	0.96	0.82	0.65	0.75	0.55	0.64	0.61	0.57	1.27	0.90	1.17
47	1.10	0.77	1.10	0.93	0.91	0.60	0.71	0.56	0.64	0.54	0.56	0.68	0.73	1.00	1.08	1.12
46	0.96	0.84	0.95	0.91	0.67	0.64	0.64	0.56	0.53	0.55	0.58	0.57	0.60	0.82	0.88	0.86
45	1.02	1.02	0.88	0.84	0.81	0.65	0.72	0.59	0.64	0.56	0.59	0.67	0.67	0.98	1.02	1.06
44	1.27	1.18	0.92	0.79	0.86	0.79	0.62	0.56	0.64	0.60	0.66	0.67	0.77	0.74	1.28	0.94
43	1.23	1.07	1.12	0.86	0.81	0.77	0.65	0.65	0.68	0.63	0.62	0.65	0.69	0.73	0.76	1.05
42	1.06	1.28	0.89	0.94	0.74	0.82	0.69	0.72	0.65	0.72	0.73	0.76	0.82	0.86	1.11	1.04
41	1.39	1.20	0.90	0.89	0.89	0.71	0.80	0.72	0.76	0.73	0.73	0.82	0.79	1.11	0.94	1.06
40	1.23	1.16	0.98	1.02	0.91	0.91	0.80	0.76	0.72	0.73	0.78	0.79	0.89	0.85	0.96	0.93
39	1.23	1.13	1.04	0.99	0.94	0.90	0.91	0.79	0.82	0.82	0.80	0.83	0.95	0.98	1.10	1.09
38	1.18	1.07	1.00	1.10	1.06	1.03	0.87	0.83	0.87	0.79	0.84	0.88	0.93	1.00	1.09	1.21
37	1.41	1.19	1.13	1.18	1.05	0.96	0.90	0.92	0.85	0.78	0.80	0.81	0.98	1.06	1.22	1.37
36	1.29	1.34	1.37	1.26	1.18	1.07	1.05	0.87	0.92	0.85	0.83	0.85	1.03	1.41	1.27	1.37
35	1.34	1.34	1.34	1.34	0.96	0.96	0.96	0.96	0.65	0.65	0.65	0.65	1.40	1.40	1.40	1.40
34	1.57	1.57	1.57	1.57	0.96	0.96	0.96	0.96	1.64	1.64	1.64	1.64	1.62	1.63	1.63	1.63

Table B-27 Test 3 – Unit 15B – 18kcfs – Vs (fps)

Vs																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.42	0.41	0.51	0.64	0.87	0.84	0.89	0.79	0.89	1.12	0.69	0.72	0.13	0.29	0.60	0.17
68	0.86	0.48	0.67	0.38	0.47	1.42	1.39	0.57	1.11	1.65	1.57	0.57	1.33	0.95	0.42	0.69
66	0.54	0.67	0.84	0.68	1.23	0.92	1.91	1.56	1.72	1.67	1.42	1.87	1.10	1.67	0.71	1.40
64	1.12	0.87	0.62	0.83	0.75	1.06	1.37	1.77	1.43	1.90	2.13	2.30	2.33	2.18	1.76	1.42
62	0.96	0.93	1.13	0.57	0.66	0.56	0.44	1.60	1.60	2.11	1.87	1.85	2.20	1.83	2.22	1.02
60	1.44	1.73	1.47	0.73	1.12	0.82	0.45	1.08	2.84	2.30	2.71	2.18	2.16	2.48	2.31	1.42
58	0.54	1.02	0.79	1.48	1.65	1.11	1.13	2.37	2.28	2.36	2.27	2.82	1.24	1.75	1.45	1.55
56	1.19	0.71	1.30	0.87	0.70	0.75	0.77	2.01	2.39	2.31	2.67	3.04	1.77	1.10	1.75	0.83
55	1.15	2.16	0.83	0.46	0.46	1.10	2.77	2.65	2.85	3.27	3.06	3.41	3.55	2.62	0.63	0.90
54	0.84	0.75	0.10	0.33	0.32	2.20	3.01	2.53	2.61	2.78	3.09	3.29	2.71	1.93	0.90	0.43
53	0.49	0.93	0.65	0.25	0.85	2.74	2.56	2.35	2.55	3.06	3.36	3.31	3.04	0.42	0.86	1.07
52	0.71	0.38	0.62	0.63	1.90	2.19	3.15	2.89	2.90	3.41	3.16	3.68	3.22	2.44	0.63	0.15
51	0.73	0.34	0.84	0.54	1.14	2.87	2.72	2.76	3.17	3.23	3.17	3.36	3.19	1.79	0.93	0.07
50	0.68	0.48	0.52	2.38	2.54	3.05	3.11	3.36	2.91	3.79	3.65	3.01	2.84	1.75	1.15	0.12
49	0.17	0.20	1.03	1.57	2.35	3.48	3.40	3.46	3.86	3.94	3.78	3.61	3.52	2.08	1.54	0.75
48	0.72	0.33	0.49	2.25	1.49	3.20	2.73	3.57	3.41	3.77	3.47	3.80	3.62	2.08	2.02	0.04
47	0.32	1.00	1.55	2.59	2.81	3.09	3.44	3.49	3.74	3.59	3.63	3.57	3.40	2.30	1.44	0.33
46	1.15	1.64	1.59	2.10	3.17	3.27	3.55	3.50	3.72	3.77	3.96	3.83	3.66	3.11	2.14	1.30
45	1.47	1.56	2.28	2.92	3.03	3.42	3.56	3.66	3.56	3.79	3.70	3.69	3.43	2.56	1.53	0.93
44	0.54	1.34	2.52	2.73	3.43	3.54	3.70	3.72	4.02	3.88	3.80	4.09	3.94	3.28	1.84	1.22
43	1.25	1.91	2.34	3.21	3.51	3.66	3.90	4.09	4.04	4.18	4.30	4.16	4.08	3.65	2.87	1.57
42	1.74	1.77	2.79	2.98	3.78	3.90	3.87	3.90	4.06	4.15	4.08	4.20	3.58	3.48	2.21	1.73
41	1.07	2.60	2.90	3.41	4.25	4.20	3.99	4.21	4.33	4.04	4.36	4.41	4.08	2.98	2.82	1.75
40	1.52	2.61	3.22	3.72	4.18	4.32	4.43	4.64	4.51	4.51	4.54	4.69	4.52	3.64	2.97	1.86
39	1.55	2.57	3.35	3.51	4.40	4.18	4.29	4.36	4.58	4.75	4.77	4.65	4.36	3.66	2.66	1.58
38	1.31	2.88	3.18	3.91	4.26	4.40	4.65	4.79	4.65	4.88	4.79	5.03	4.81	3.78	2.93	1.72
37	1.09	2.38	3.63	4.33	4.68	4.76	4.92	5.03	5.01	5.30	5.16	5.45	4.84	4.26	2.66	1.74
36	1.06	2.24	3.55	4.47	4.81	4.87	4.95	5.37	5.20	5.51	5.42	5.37	5.19	4.26	2.88	1.31
35	2.84	2.84	2.84	2.84	5.50	5.50	5.50	5.50	5.76	5.76	5.76	5.76	3.95	3.95	3.95	3.95
34	2.98	2.98	2.98	2.98	5.79	5.79	5.79	5.79	5.60	5.60	5.60	5.60	4.06	4.06	4.06	4.06

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-28 Test 3 – Unit 15B – 18kcfs – Vs RMS (fps)

Vs RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.47	0.54	0.72	0.74	0.96	0.84	0.98	0.76	1.09	1.04	1.21	0.99	0.85	0.67	0.77	0.74
68	0.49	0.81	0.91	0.57	0.63	0.95	1.28	0.76	0.96	1.14	1.24	0.83	1.01	0.97	0.93	0.89
66	0.78	0.70	0.92	0.91	1.07	1.09	1.02	1.18	1.14	1.09	1.29	1.02	1.21	1.12	1.15	1.10
64	0.74	0.73	1.12	0.97	1.07	1.06	1.34	1.30	1.40	1.00	1.34	1.10	0.98	0.89	1.26	1.28
62	0.89	0.73	0.62	1.16	1.47	1.30	1.00	1.42	1.37	1.23	1.01	1.29	1.31	0.93	1.02	1.52
60	1.04	0.74	0.78	0.76	1.64	1.14	1.40	1.38	1.07	1.30	1.16	1.30	1.31	1.05	1.12	1.08
58	1.59	0.93	1.03	1.22	1.86	1.57	1.77	1.35	1.53	1.19	1.42	0.98	1.89	1.29	1.25	1.26
56	1.06	0.93	0.79	1.40	1.62	1.27	1.34	1.29	1.38	1.32	1.13	1.19	1.69	1.95	1.26	1.20
55	0.34	1.26	1.30	0.95	1.23	1.78	1.36	1.19	1.24	1.28	1.03	0.98	0.88	1.23	1.80	1.31
54	1.13	0.97	1.29	1.64	1.56	0.99	1.31	1.21	1.25	1.10	1.09	1.09	1.16	1.38	1.51	1.45
53	1.18	1.51	1.23	1.19	1.42	1.01	1.34	1.15	1.09	1.26	0.88	0.97	0.99	1.77	1.67	1.40
52	1.16	1.07	1.66	1.45	1.68	1.21	1.15	1.01	1.17	0.90	1.27	0.90	1.03	1.39	1.90	1.45
51	1.16	1.37	1.42	1.42	1.51	1.05	0.92	1.12	1.09	0.89	0.91	1.00	1.01	1.47	1.66	1.43
50	1.10	1.75	1.54	1.47	1.07	1.21	1.04	1.21	0.95	0.88	0.86	1.31	1.12	1.47	1.56	1.62
49	1.45	1.54	1.70	1.40	1.35	1.06	1.07	0.93	0.91	0.76	0.87	0.86	0.91	1.49	1.47	1.43
48	1.37	1.52	1.42	1.41	1.33	1.14	1.03	0.84	0.90	0.71	0.82	0.81	0.80	1.44	1.16	1.39
47	1.36	0.97	1.34	1.13	1.17	0.72	0.85	0.69	0.81	0.74	0.78	0.93	0.95	1.22	1.43	1.38
46	1.17	1.01	1.09	1.07	0.84	0.80	0.79	0.73	0.64	0.74	0.73	0.72	0.85	1.12	1.13	1.21
45	1.26	1.20	1.13	1.07	0.97	0.85	0.88	0.72	0.83	0.74	0.77	0.89	0.94	1.23	1.23	1.36
44	1.50	1.39	1.15	1.03	1.08	1.01	0.79	0.71	0.83	0.78	0.81	0.85	0.98	0.97	1.47	1.16
43	1.40	1.34	1.38	1.09	1.04	0.98	0.82	0.80	0.88	0.81	0.80	0.89	0.92	1.01	1.01	1.28
42	1.26	1.55	1.13	1.19	0.96	1.02	0.85	0.86	0.81	0.89	0.92	1.00	1.06	1.09	1.36	1.29
41	1.58	1.46	1.15	1.18	1.15	0.95	0.98	0.87	0.96	0.97	0.92	0.99	1.03	1.36	1.21	1.30
40	1.45	1.40	1.27	1.31	1.13	1.19	0.98	0.97	0.95	0.93	1.00	1.00	1.09	1.14	1.24	1.18
39	1.44	1.39	1.35	1.28	1.17	1.11	1.09	1.02	1.05	0.98	1.01	1.02	1.21	1.29	1.36	1.33
38	1.38	1.37	1.26	1.37	1.30	1.29	1.08	1.03	1.07	0.94	1.05	1.09	1.20	1.33	1.37	1.42
37	1.71	1.50	1.49	1.41	1.29	1.22	1.10	1.13	1.04	0.95	0.92	1.04	1.18	1.41	1.53	1.57
36	1.54	1.76	1.78	1.59	1.41	1.26	1.26	1.02	1.08	1.02	0.98	1.02	1.32	1.82	1.69	1.61
35	1.80	1.80	1.80	1.80	1.15	1.15	1.15	1.15	0.77	0.77	0.77	0.77	1.83	1.83	1.83	1.83
34	2.03	2.03	2.03	2.03	1.14	1.14	1.14	1.14	1.73	1.73	1.73	1.73	2.04	2.05	2.05	2.05

Table B-29 Test 3 – Unit 15B – 18kcfs – Vt (fps)

Vt																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.43	0.41	0.52	0.66	0.91	0.85	0.93	0.84	0.99	1.17	0.80	0.78	0.14	0.34	0.60	0.21
68	0.86	0.53	0.68	0.38	0.48	1.42	1.39	0.57	1.12	1.66	1.57	0.59	1.36	0.97	0.42	0.73
66	0.56	0.67	0.84	0.69	1.23	0.92	1.91	1.56	1.72	1.67	1.42	1.87	1.10	1.67	0.72	1.41
64	1.13	0.87	0.64	0.83	0.75	1.06	1.37	1.77	1.43	1.90	2.13	2.30	2.33	2.18	1.76	1.43
62	0.97	0.93	1.13	0.57	0.66	0.56	0.45	1.60	1.60	2.11	1.88	1.85	2.20	1.83	2.22	1.02
60	1.44	1.73	1.47	0.73	1.12	0.82	0.46	1.08	2.84	2.30	2.71	2.18	2.17	2.48	2.31	1.42
58	0.54	1.03	0.80	1.48	1.65	1.12	1.13	2.37	2.28	2.36	2.27	2.82	1.24	1.76	1.47	1.55
56	1.22	0.84	1.41	1.03	0.82	0.92	1.08	2.13	2.47	2.38	2.74	3.09	1.90	1.28	1.85	0.93
55	1.17	2.18	0.98	0.66	0.59	1.15	2.82	2.71	2.88	3.31	3.09	3.43	3.61	2.68	0.83	0.98
54	0.94	0.93	0.55	0.74	0.59	2.26	3.09	2.62	2.67	2.85	3.13	3.33	2.82	2.05	1.01	0.70
53	0.74	1.20	0.85	0.59	1.01	2.79	2.66	2.47	2.63	3.14	3.43	3.35	3.14	0.65	1.06	1.24
52	0.86	0.55	0.76	0.77	1.94	2.24	3.21	2.96	2.96	3.45	3.19	3.71	3.29	2.51	0.83	0.37
51	0.97	0.70	1.08	0.93	1.31	2.96	2.87	2.89	3.25	3.33	3.25	3.40	3.31	1.94	1.13	0.67
50	1.04	0.79	0.86	2.52	2.62	3.17	3.26	3.51	3.04	3.89	3.72	3.07	3.00	1.96	1.43	0.62
49	0.51	0.52	1.15	1.70	2.40	3.53	3.46	3.52	3.90	3.99	3.82	3.64	3.60	2.17	1.63	0.91
48	0.93	0.71	0.82	2.37	1.64	3.27	2.86	3.69	3.49	3.85	3.54	3.85	3.73	2.26	2.19	0.69
47	0.74	1.29	1.74	2.73	2.90	3.20	3.57	3.62	3.83	3.69	3.71	3.62	3.54	2.48	1.65	0.80
46	1.27	1.75	1.71	2.18	3.22	3.33	3.62	3.57	3.77	3.83	4.00	3.86	3.73	3.20	2.24	1.43
45	1.68	1.77	2.42	3.03	3.11	3.51	3.67	3.77	3.64	3.87	3.78	3.74	3.55	2.72	1.76	1.22
44	0.98	1.55	2.67	2.87	3.51	3.64	3.82	3.84	4.11	3.98	3.87	4.14	4.05	3.43	2.06	1.48
43	1.41	2.03	2.42	3.26	3.55	3.70	3.95	4.13	4.07	4.21	4.33	4.18	4.13	3.71	2.96	1.66
42	1.89	1.99	2.90	3.07	3.82	3.94	3.95	3.97	4.11	4.20	4.12	4.23	3.67	3.58	2.34	1.92
41	1.13	2.74	3.03	3.50	4.29	4.24	4.07	4.28	4.38	4.11	4.41	4.43	4.17	3.14	2.99	1.99
40	1.62	2.71	3.30	3.77	4.20	4.34	4.46	4.66	4.53	4.53	4.56	4.70	4.56	3.70	3.07	2.03
39	1.77	2.76	3.46	3.58	4.43	4.23	4.34	4.41	4.62	4.78	4.80	4.67	4.44	3.78	2.84	1.86
38	1.51	3.01	3.31	3.99	4.31	4.45	4.72	4.85	4.70	4.93	4.83	5.06	4.88	3.90	3.10	1.95
37	1.24	2.50	3.72	4.37	4.70	4.78	4.95	5.06	5.03	5.33	5.18	5.47	4.88	4.34	2.77	1.83
36	1.27	2.45	3.72	4.53	4.85	4.92	5.02	5.44	5.26	5.57	5.47	5.41	5.27	4.41	3.10	1.50
35	3.05	3.05	3.05	3.05	5.57	5.57	5.57	5.57	5.83	5.83	5.83	5.83	4.15	4.15	4.15	4.15
34	3.13	3.13	3.13	3.13	5.82	5.82	5.82	5.82	5.67	5.67	5.67	5.67	4.19	4.19	4.19	4.19

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-30 Test 3 – Unit 15B – 18kcfs – Vt RMS (fps)

Vt RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.59	0.66	0.86	0.87	1.09	0.97	1.11	0.92	1.23	1.17	1.36	1.14	0.96	0.82	0.90	0.85
68	0.57	0.97	1.06	0.65	0.72	1.06	1.39	0.86	1.08	1.28	1.38	0.93	1.09	1.12	1.02	0.97
66	0.90	0.81	1.11	1.05	1.21	1.18	1.15	1.32	1.28	1.22	1.41	1.15	1.33	1.21	1.26	1.17
64	0.84	0.86	1.27	1.14	1.18	1.20	1.44	1.42	1.49	1.13	1.45	1.20	1.10	1.01	1.38	1.37
62	1.04	0.82	0.71	1.27	1.56	1.39	1.10	1.50	1.47	1.33	1.11	1.40	1.42	1.05	1.12	1.61
60	1.18	0.84	0.89	0.88	1.77	1.23	1.49	1.47	1.18	1.40	1.27	1.40	1.45	1.17	1.25	1.23
58	1.68	1.09	1.15	1.36	1.93	1.66	1.86	1.46	1.66	1.30	1.51	1.09	1.99	1.44	1.40	1.43
56	1.15	1.03	0.90	1.48	1.71	1.36	1.43	1.37	1.46	1.44	1.22	1.29	1.80	2.05	1.45	1.37
55	0.46	1.39	1.41	1.06	1.32	1.87	1.42	1.27	1.35	1.37	1.15	1.08	1.01	1.34	1.92	1.49
54	1.21	1.05	1.40	1.76	1.65	1.08	1.38	1.29	1.38	1.19	1.20	1.21	1.29	1.52	1.65	1.57
53	1.25	1.60	1.34	1.27	1.49	1.12	1.42	1.24	1.19	1.36	0.96	1.06	1.11	1.89	1.80	1.57
52	1.28	1.16	1.74	1.52	1.75	1.31	1.23	1.08	1.28	0.99	1.35	1.01	1.15	1.52	1.99	1.59
51	1.28	1.51	1.53	1.53	1.61	1.15	1.00	1.20	1.20	0.98	1.01	1.10	1.11	1.57	1.78	1.56
50	1.21	1.88	1.62	1.58	1.16	1.30	1.13	1.28	1.06	0.97	0.96	1.42	1.24	1.59	1.67	1.75
49	1.60	1.68	1.83	1.53	1.49	1.16	1.16	1.01	1.02	0.86	0.98	0.99	1.03	1.63	1.60	1.57
48	1.49	1.65	1.53	1.54	1.44	1.25	1.12	0.92	1.01	0.80	0.92	0.92	0.91	1.54	1.28	1.49
47	1.51	1.09	1.47	1.26	1.28	0.83	0.94	0.78	0.92	0.84	0.89	1.06	1.07	1.35	1.55	1.49
46	1.29	1.14	1.23	1.21	0.97	0.92	0.90	0.84	0.76	0.86	0.85	0.85	0.98	1.25	1.26	1.34
45	1.46	1.37	1.29	1.21	1.10	1.00	0.99	0.84	0.95	0.86	0.88	1.03	1.08	1.37	1.37	1.49
44	1.66	1.52	1.30	1.19	1.25	1.15	0.90	0.83	0.97	0.91	0.94	0.99	1.12	1.13	1.60	1.29
43	1.59	1.53	1.54	1.26	1.21	1.13	0.96	0.93	1.03	0.96	0.94	1.06	1.08	1.18	1.20	1.44
42	1.50	1.80	1.34	1.38	1.13	1.18	0.99	0.99	0.93	1.03	1.06	1.16	1.25	1.26	1.52	1.50
41	1.83	1.68	1.38	1.40	1.35	1.10	1.13	1.01	1.12	1.11	1.08	1.17	1.21	1.53	1.41	1.49
40	1.74	1.68	1.53	1.55	1.33	1.36	1.14	1.12	1.11	1.09	1.16	1.18	1.30	1.37	1.48	1.48
39	1.80	1.68	1.63	1.52	1.38	1.29	1.25	1.17	1.21	1.15	1.17	1.21	1.43	1.53	1.62	1.63
38	1.74	1.65	1.56	1.63	1.51	1.48	1.25	1.19	1.24	1.12	1.21	1.28	1.40	1.58	1.64	1.75
37	2.05	1.83	1.81	1.69	1.52	1.41	1.26	1.29	1.20	1.11	1.09	1.23	1.41	1.68	1.86	1.89
36	1.87	2.05	2.08	1.87	1.61	1.42	1.43	1.17	1.24	1.16	1.14	1.20	1.54	2.10	1.98	1.90
35	2.15	2.15	2.15	2.15	1.28	1.28	1.28	1.28	0.90	0.90	0.90	0.90	2.13	2.13	2.13	2.13
34	2.39	2.39	2.39	2.39	1.30	1.30	1.30	1.30	2.29	2.29	2.29	2.29	2.36	2.36	2.36	2.36

Table B-31 Test 4 – Unit 15B – 15kcfs – Vx (fps)

Vx																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	-0.15	-0.07	-0.18	-0.05	-0.09	-0.17	-0.22	-0.10	-0.18	-0.33	-0.29	-0.12	-0.17	-0.08	0.00	-0.02
68	-0.13	-0.03	-0.15	-0.05	-0.10	-0.13	-0.09	-0.14	-0.16	-0.14	-0.08	-0.27	-0.20	-0.10	-0.09	-0.15
66	-0.06	-0.11	-0.17	-0.05	-0.06	-0.09	-0.03	-0.11	-0.07	-0.07	-0.08	-0.19	-0.05	-0.02	-0.07	-0.12
64	0.01	-0.18	-0.18	-0.05	-0.02	-0.06	0.04	-0.08	0.01	0.01	-0.08	-0.12	0.10	0.07	-0.05	-0.09
62	-0.15	0.03	-0.02	-0.01	-0.01	-0.11	0.02	0.02	-0.04	-0.11	-0.01	-0.11	0.00	0.06	0.04	-0.05
60	0.09	-0.09	-0.07	0.04	-0.15	-0.09	-0.11	0.10	-0.02	-0.13	-0.01	-0.04	0.08	0.10	0.00	-0.03
58	-0.05	-0.06	0.07	0.06	-0.02	-0.01	-0.01	0.01	0.02	0.02	0.07	0.00	0.13	0.11	0.04	0.08
56	0.24	0.32	0.45	0.56	0.38	0.26	0.51	0.59	0.47	0.56	0.48	0.42	0.62	0.57	0.55	0.40
55	0.23	0.43	0.39	0.38	0.21	0.34	0.43	0.49	0.38	0.38	0.36	0.28	0.51	0.53	0.38	0.18
54	0.41	0.42	0.50	0.49	0.47	0.37	0.58	0.62	0.51	0.59	0.50	0.41	0.57	0.65	0.48	0.49
53	0.50	0.55	0.59	0.53	0.48	0.47	0.58	0.68	0.61	0.58	0.57	0.41	0.64	0.63	0.58	0.36
52	0.33	0.46	0.45	0.44	0.32	0.40	0.55	0.52	0.47	0.49	0.36	0.31	0.52	0.40	0.31	0.32
51	0.47	0.59	0.45	0.58	0.48	0.57	0.64	0.67	0.65	0.66	0.57	0.51	0.64	0.61	0.66	0.56
50	0.53	0.60	0.57	0.67	0.50	0.64	0.77	0.78	0.73	0.70	0.65	0.52	0.75	0.61	0.64	0.56
49	0.46	0.39	0.49	0.49	0.43	0.48	0.54	0.57	0.50	0.47	0.43	0.36	0.49	0.38	0.46	0.36
48	0.66	0.57	0.60	0.60	0.57	0.64	0.74	0.73	0.67	0.69	0.61	0.50	0.76	0.74	0.72	0.61
47	0.63	0.64	0.66	0.58	0.62	0.62	0.80	0.79	0.70	0.70	0.59	0.53	0.82	0.82	0.84	0.61
46	0.36	0.51	0.51	0.48	0.45	0.48	0.53	0.53	0.50	0.55	0.45	0.39	0.59	0.53	0.52	0.42
45	0.59	0.70	0.68	0.63	0.54	0.56	0.70	0.70	0.62	0.62	0.57	0.41	0.72	0.72	0.63	0.67
44	0.60	0.71	0.66	0.72	0.57	0.64	0.75	0.77	0.65	0.64	0.56	0.47	0.76	0.79	0.76	0.80
43	0.43	0.48	0.55	0.50	0.41	0.46	0.42	0.48	0.40	0.43	0.37	0.31	0.53	0.60	0.56	0.51
42	0.66	0.72	0.70	0.56	0.44	0.50	0.61	0.56	0.53	0.50	0.42	0.38	0.69	0.66	0.70	0.69
41	0.65	0.79	0.76	0.58	0.47	0.51	0.63	0.62	0.55	0.57	0.49	0.44	0.68	0.76	0.79	0.74
40	0.67	0.57	0.57	0.43	0.29	0.35	0.39	0.43	0.37	0.36	0.30	0.29	0.52	0.60	0.59	0.59
39	0.67	0.80	0.70	0.58	0.45	0.45	0.55	0.56	0.50	0.48	0.43	0.36	0.65	0.69	0.81	0.74
38	0.58	0.88	0.69	0.57	0.42	0.51	0.64	0.60	0.49	0.53	0.47	0.44	0.66	0.81	0.83	0.63
37	0.47	0.76	0.65	0.48	0.33	0.38	0.39	0.43	0.38	0.36	0.33	0.30	0.53	0.68	0.71	0.50
36	0.64	0.87	0.82	0.60	0.50	0.53	0.61	0.68	0.54	0.60	0.56	0.46	0.71	0.87	0.92	0.61
35	0.57	0.92	0.84	0.53	0.51	0.62	0.71	0.75	0.69	0.72	0.61	0.53	0.80	0.99	0.96	0.69
34	0.47	0.54	0.58	0.39	0.47	0.49	0.59	0.60	0.57	0.57	0.51	0.43	0.65	0.72	0.90	0.52

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-32 Test 4 – Unit 15B – 15kcfs – Vx RMS (fps)

Vx RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.40	0.36	0.40	0.35	0.38	0.42	0.40	0.41	0.54	0.56	0.45	0.47	0.52	0.46	0.37	0.38
68	0.30	0.28	0.55	0.33	0.29	0.28	0.49	0.40	0.36	0.39	0.49	0.38	0.35	0.36	0.42	0.36
66	0.27	0.29	0.37	0.27	0.28	0.28	0.34	0.29	0.30	0.29	0.36	0.32	0.32	0.33	0.33	0.28
64	0.40	0.49	0.54	0.41	0.49	0.48	0.42	0.44	0.48	0.46	0.55	0.51	0.53	0.55	0.50	0.45
62	0.53	0.25	0.55	0.48	0.51	0.37	0.44	0.40	0.46	0.41	0.53	0.50	0.49	0.48	0.59	0.41
60	0.39	0.31	0.22	0.54	0.48	0.35	0.38	0.45	0.46	0.53	0.44	0.56	0.57	0.56	0.51	0.46
58	0.29	0.31	0.53	0.55	0.42	0.40	0.50	0.46	0.46	0.46	0.45	0.43	0.49	0.50	0.55	0.49
56	0.41	0.48	0.39	0.45	0.39	0.53	0.41	0.40	0.51	0.38	0.38	0.43	0.53	0.52	0.55	0.55
55	0.40	0.48	0.48	0.44	0.52	0.41	0.37	0.43	0.45	0.46	0.39	0.49	0.47	0.58	0.58	0.49
54	0.38	0.42	0.56	0.53	0.38	0.44	0.39	0.32	0.41	0.40	0.38	0.50	0.62	0.51	0.53	0.58
53	0.45	0.41	0.39	0.49	0.48	0.40	0.39	0.36	0.40	0.40	0.38	0.40	0.46	0.58	0.59	0.59
52	0.49	0.41	0.51	0.52	0.46	0.35	0.34	0.33	0.37	0.35	0.38	0.47	0.47	0.61	0.60	0.42
51	0.48	0.46	0.43	0.49	0.42	0.38	0.40	0.35	0.38	0.36	0.34	0.40	0.46	0.53	0.49	0.54
50	0.47	0.44	0.41	0.52	0.45	0.37	0.35	0.33	0.37	0.37	0.35	0.42	0.46	0.61	0.60	0.57
49	0.46	0.50	0.50	0.49	0.42	0.43	0.33	0.34	0.35	0.37	0.43	0.43	0.53	0.59	0.52	0.55
48	0.52	0.44	0.57	0.53	0.48	0.30	0.36	0.35	0.38	0.36	0.36	0.39	0.42	0.53	0.55	0.50
47	0.50	0.44	0.50	0.48	0.44	0.38	0.41	0.33	0.37	0.38	0.40	0.43	0.49	0.48	0.46	0.52
46	0.61	0.47	0.54	0.51	0.44	0.34	0.31	0.37	0.38	0.45	0.39	0.43	0.47	0.57	0.52	0.50
45	0.46	0.48	0.48	0.51	0.42	0.38	0.34	0.31	0.38	0.40	0.41	0.43	0.49	0.54	0.59	0.52
44	0.53	0.55	0.53	0.54	0.45	0.44	0.37	0.36	0.40	0.41	0.42	0.47	0.49	0.49	0.53	0.51
43	0.69	0.60	0.51	0.54	0.46	0.45	0.33	0.41	0.44	0.44	0.43	0.48	0.51	0.55	0.53	0.56
42	0.57	0.62	0.58	0.53	0.47	0.46	0.44	0.41	0.46	0.44	0.44	0.47	0.57	0.58	0.56	0.57
41	0.76	0.70	0.72	0.56	0.50	0.46	0.46	0.44	0.46	0.45	0.47	0.52	0.58	0.60	0.62	0.62
40	0.79	0.72	0.68	0.62	0.58	0.52	0.45	0.44	0.50	0.48	0.50	0.53	0.64	0.65	0.66	0.70
39	0.84	0.78	0.76	0.71	0.61	0.53	0.56	0.52	0.52	0.50	0.52	0.54	0.60	0.67	0.76	0.78
38	0.93	0.81	0.83	0.74	0.63	0.57	0.50	0.47	0.54	0.52	0.50	0.57	0.66	0.74	0.81	0.84
37	0.87	0.86	0.82	0.82	0.65	0.60	0.44	0.47	0.52	0.49	0.54	0.54	0.68	0.82	0.86	0.88
36	0.90	0.93	0.91	0.83	0.67	0.65	0.55	0.47	0.52	0.46	0.50	0.56	0.71	0.78	0.91	0.86
35	0.93	0.98	0.99	0.82	0.71	0.62	0.51	0.38	0.46	0.45	0.47	0.51	0.67	0.93	0.93	0.86
34	0.97	1.01	1.09	0.84	0.60	0.60	0.49	0.33	0.39	0.40	0.45	0.47	0.66	0.93	1.02	0.83

Table B-33 Test 4 – Unit 15B – 15kcfs – Vy (fps)

Vy																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.21	0.33	0.44	0.34	0.56	0.62	0.55	0.35	0.92	0.56	0.26	0.20	0.35	-0.09	0.14	0.11
68	0.18	0.19	0.69	0.38	0.44	0.36	1.05	0.78	0.78	0.20	0.24	0.54	0.36	-0.07	-0.34	0.28
66	0.20	0.43	0.57	0.39	0.47	0.66	0.64	0.52	0.22	0.14	-0.29	0.12	-0.28	-0.37	-0.59	-0.11
64	0.21	0.67	0.45	0.40	0.49	1.01	0.23	0.26	-0.36	0.11	-0.81	-0.35	-0.91	-0.67	-0.84	-0.48
62	0.62	0.00	0.67	0.40	0.77	0.12	0.25	-0.22	0.10	-0.17	-0.86	-0.85	-0.45	-0.66	-0.89	-0.47
60	0.30	-0.01	-0.16	0.76	0.37	0.16	-0.05	-0.04	-0.45	-0.45	-0.37	-0.96	-1.04	-0.97	-0.76	-0.67
58	0.08	-0.05	0.54	0.49	0.32	0.27	0.44	0.42	-0.17	-0.27	-0.60	-0.71	-0.69	-0.83	-0.70	-0.62
56	0.17	0.42	-0.02	0.25	0.45	0.73	0.04	-0.10	-0.52	-0.04	-0.66	-0.93	-0.98	-0.93	-0.77	-0.57
55	0.14	0.10	-0.02	0.52	0.22	0.10	0.05	0.13	-0.36	-0.73	-0.77	-0.69	-0.71	-0.88	-0.66	-0.33
54	-0.17	0.01	0.33	0.13	0.20	0.02	0.31	-0.10	-0.65	-0.47	-0.40	-1.10	-1.10	-0.91	-0.08	-0.58
53	0.01	-0.20	-0.35	0.10	0.17	-0.10	-0.15	-0.06	-0.18	-0.79	-0.74	-0.89	-0.49	-1.23	-1.07	-0.35
52	-0.11	-0.06	0.39	0.59	0.02	-0.25	-0.05	0.33	-0.67	-0.78	-0.56	-0.24	-0.99	-1.05	-0.49	0.16
51	-0.33	0.07	-0.26	0.18	0.15	-0.02	-0.48	-0.24	-0.36	-0.59	-0.70	-0.88	-0.30	-0.53	-0.61	-0.57
50	0.05	0.13	0.03	0.26	0.18	-0.07	-0.17	0.04	-0.51	-0.70	-0.73	-0.78	-0.60	-1.19	-0.52	-0.01
49	-0.10	-0.04	0.38	0.40	0.15	-0.11	0.22	0.16	-0.37	-0.49	-0.20	-0.42	-0.35	-0.27	-0.16	-0.02
48	-0.07	0.19	0.40	0.02	0.00	-0.20	0.08	-0.22	-0.65	-0.61	-0.42	-0.76	-0.61	-0.60	-0.35	-0.03
47	0.35	0.25	0.25	0.14	0.13	-0.10	-0.37	0.03	-0.63	-0.59	-0.85	-0.69	-0.88	-0.63	-0.69	-0.07
46	0.34	0.34	0.53	0.30	0.13	0.49	0.30	0.31	-0.63	0.03	-0.24	-0.42	-0.68	-0.28	-0.29	0.02
45	0.35	0.49	0.35	0.51	0.32	0.23	0.01	0.07	-0.38	-0.21	-0.51	-0.65	-0.55	-0.26	-0.46	-0.27
44	0.50	0.66	0.29	0.33	0.25	-0.17	0.01	-0.02	-0.62	-0.73	-0.55	-0.89	-0.69	-0.70	-0.50	-0.40
43	0.72	0.51	0.39	0.18	0.44	0.00	0.13	0.02	-0.44	-0.70	-0.55	-0.79	-0.64	-0.76	-0.51	-0.40
42	0.56	0.63	0.27	0.34	0.67	-0.03	-0.09	0.07	-0.11	-0.52	-0.66	-0.80	-0.40	-0.61	-0.64	-0.53
41	0.73	0.89	0.42	0.58	0.45	0.29	0.21	0.40	-0.51	-0.48	-0.51	-0.62	-0.76	-0.69	-0.66	-0.42
40	0.71	0.72	0.68	0.47	0.49	0.39	0.23	0.15	-0.46	-0.44	-0.70	-1.02	-0.81	-0.80	-0.89	-0.75
39	0.86	0.66	0.63	0.27	0.30	0.17	0.15	0.03	-0.57	-0.57	-0.62	-0.98	-1.02	-0.86	-1.04	-0.88
38	0.80	0.90	0.48	0.42	0.52	0.26	0.30	0.33	-0.47	-0.55	-0.66	-0.94	-0.91	-1.00	-1.02	-0.88
37	0.48	0.81	0.56	0.38	0.48	0.44	0.56	0.33	-0.52	-0.47	-0.52	-1.00	-0.92	-0.99	-1.04	-1.02
36	0.53	0.62	0.55	0.45	0.56	0.36	0.31	0.34	-0.42	-0.34	-0.46	-0.88	-0.81	-0.91	-0.83	-0.69
35	0.11	0.49	0.62	0.42	0.56	0.34	0.45	0.39	-0.55	-0.52	-0.51	-0.91	-0.87	-0.91	-0.59	-0.18
34	-0.34	0.06	0.61	0.45	0.50	0.24	0.43	0.52	-0.59	-0.67	-0.54	-0.74	-0.84	-0.87	-0.60	0.27

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-34 Test 4 – Unit 15B – 15kcfs – Vy RMS (fps)

Vy RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.25	0.27	0.33	0.24	0.36	0.38	0.36	0.38	0.47	0.49	0.44	0.56	0.48	0.54	0.39	0.37
68	0.26	0.27	0.44	0.25	0.26	0.26	0.41	0.32	0.46	0.43	0.53	0.46	0.40	0.45	0.43	0.37
66	0.24	0.25	0.33	0.23	0.26	0.27	0.38	0.29	0.33	0.30	0.41	0.37	0.31	0.34	0.27	0.33
64	0.42	0.39	0.43	0.39	0.42	0.44	0.50	0.51	0.44	0.56	0.62	0.63	0.46	0.61	0.45	0.49
62	0.40	0.25	0.56	0.59	0.60	0.40	0.48	0.53	0.58	0.40	0.60	0.51	0.62	0.47	0.53	0.40
60	0.46	0.36	0.23	0.81	0.71	0.55	0.47	0.62	0.58	0.55	0.50	0.53	0.59	0.53	0.54	0.43
58	0.35	0.41	0.57	0.67	0.61	0.45	0.88	0.94	0.57	0.57	0.62	0.58	0.51	0.60	0.56	0.46
56	0.51	0.62	0.42	0.54	0.85	0.86	0.70	0.64	0.69	0.67	0.55	0.53	0.60	0.53	0.67	0.60
55	0.47	0.67	0.51	0.67	0.82	0.60	0.79	0.71	0.64	0.55	0.58	0.84	0.63	0.61	0.60	0.64
54	0.37	0.47	0.89	0.70	0.59	0.72	0.76	0.42	0.66	0.60	0.55	0.69	0.91	0.70	0.85	0.61
53	0.64	0.53	0.60	0.82	1.03	0.46	0.51	0.48	0.65	0.51	0.54	0.51	0.69	0.66	0.70	0.82
52	0.60	0.58	0.78	0.63	0.67	0.45	0.67	0.59	0.48	0.47	0.57	0.83	0.61	0.76	1.09	0.53
51	0.53	0.61	0.77	0.67	0.69	0.48	0.57	0.41	0.54	0.44	0.43	0.48	0.73	0.97	0.63	0.68
50	0.66	0.60	0.55	0.63	0.51	0.45	0.42	0.38	0.41	0.42	0.43	0.54	0.64	0.74	0.89	0.82
49	0.59	0.79	0.73	0.70	0.52	0.55	0.43	0.46	0.40	0.45	0.57	0.42	0.61	0.97	0.77	0.81
48	0.74	0.51	0.83	0.65	0.62	0.37	0.38	0.45	0.43	0.40	0.44	0.41	0.51	0.64	0.81	0.76
47	0.59	0.52	0.64	0.66	0.49	0.46	0.52	0.29	0.38	0.46	0.42	0.56	0.55	0.65	0.56	0.86
46	0.72	0.55	0.65	0.64	0.54	0.45	0.42	0.48	0.41	0.45	0.35	0.48	0.58	0.67	0.56	0.73
45	0.55	0.60	0.52	0.68	0.48	0.43	0.39	0.41	0.41	0.44	0.46	0.43	0.62	0.66	0.87	0.60
44	0.58	0.69	0.54	0.59	0.50	0.45	0.42	0.45	0.41	0.38	0.42	0.42	0.53	0.54	0.64	0.64
43	0.54	0.69	0.50	0.53	0.49	0.44	0.39	0.42	0.42	0.43	0.42	0.48	0.54	0.58	0.60	0.62
42	0.60	0.70	0.67	0.53	0.47	0.46	0.51	0.44	0.46	0.44	0.45	0.43	0.70	0.61	0.64	0.58
41	0.69	0.65	0.67	0.60	0.55	0.49	0.50	0.48	0.46	0.49	0.51	0.50	0.62	0.65	0.66	0.61
40	0.68	0.68	0.65	0.61	0.50	0.47	0.48	0.45	0.49	0.49	0.48	0.48	0.70	0.66	0.68	0.66
39	0.66	0.68	0.75	0.75	0.55	0.57	0.56	0.58	0.49	0.50	0.53	0.50	0.62	0.71	0.69	0.68
38	0.74	0.71	0.84	0.74	0.68	0.62	0.57	0.57	0.53	0.50	0.54	0.55	0.70	0.79	0.78	0.68
37	0.82	0.79	0.72	0.84	0.66	0.48	0.46	0.45	0.50	0.51	0.52	0.47	0.71	0.81	0.76	0.68
36	0.87	0.83	0.89	0.93	0.66	0.68	0.69	0.52	0.53	0.47	0.50	0.52	0.72	0.87	0.94	0.86
35	1.07	0.86	0.99	0.89	0.71	0.57	0.54	0.41	0.45	0.42	0.40	0.50	0.67	0.95	1.03	0.99
34	1.21	1.11	1.09	0.87	0.56	0.59	0.50	0.33	0.37	0.39	0.44	0.46	0.63	0.94	1.04	0.98

Table B-35 Test 4 – Unit 15B – 15kcfs – Vz (fps)

Vz																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	-0.33	-0.19	0.11	-0.03	-0.03	0.10	0.49	-0.06	0.02	0.45	0.57	0.11	0.01	0.04	-0.20	-0.41
68	-0.64	-0.29	0.26	-0.29	-0.02	0.14	1.25	0.30	0.56	0.29	1.59	0.69	0.61	0.04	0.73	0.08
66	-0.60	-0.12	0.28	-0.13	0.36	0.70	1.24	0.44	1.07	1.12	1.53	1.04	0.88	0.67	0.66	0.55
64	-0.56	0.04	0.29	0.04	0.73	1.17	1.24	0.17	1.58	1.95	1.47	1.42	1.16	1.29	0.59	1.00
62	-0.09	-0.82	0.34	0.09	0.78	-0.12	1.71	1.68	1.47	0.89	1.84	1.07	0.45	1.56	0.51	-0.13
60	-0.89	-0.40	-0.32	0.75	0.63	0.43	0.60	1.55	2.11	1.13	0.96	1.21	1.39	1.64	1.21	0.09
58	-1.01	-1.06	-0.62	-0.66	-0.36	0.03	1.47	1.73	1.38	1.68	2.18	2.56	1.89	1.54	0.37	0.26
56	-0.98	-1.78	-1.22	-0.60	-0.19	1.15	0.39	1.60	1.58	2.44	2.27	1.99	1.89	1.20	1.04	0.14
55	-1.42	-0.37	-0.36	2.20	0.29	2.08	2.19	2.83	2.83	2.46	2.76	1.02	2.54	0.97	0.20	-1.36
54	-0.06	-1.05	-0.58	0.91	1.45	1.56	2.64	2.43	2.19	2.60	2.63	2.35	1.04	1.91	-0.03	-1.13
53	-0.41	-0.04	-0.27	0.51	1.29	1.56	2.15	2.38	2.65	2.36	2.53	2.76	1.82	1.85	0.90	-0.40
52	-0.17	0.19	0.53	2.01	1.52	2.04	2.51	2.84	2.53	2.59	2.72	1.90	2.53	1.79	0.63	-0.67
51	-0.93	-0.08	-0.27	0.50	1.79	2.21	2.07	2.18	2.82	2.74	2.82	2.41	1.94	1.47	1.42	0.36
50	0.09	0.75	0.47	1.31	2.24	2.39	2.44	2.85	2.85	2.72	2.85	2.79	2.53	1.87	0.99	-0.17
49	0.20	0.29	1.47	1.91	2.42	2.66	3.07	2.94	3.14	3.06	2.86	2.77	2.30	1.95	0.57	0.43
48	-0.08	0.42	1.10	1.28	2.07	2.47	2.55	2.78	2.93	2.74	2.86	2.95	2.64	1.96	1.30	0.46
47	1.14	0.97	0.57	1.98	2.32	2.53	2.50	2.96	2.86	2.83	3.08	2.88	2.80	2.44	2.39	0.74
46	0.11	1.92	1.92	2.45	2.62	3.15	3.09	3.17	3.25	3.17	3.23	3.16	3.06	1.31	1.14	0.47
45	0.98	1.65	1.74	2.35	2.75	2.78	2.84	3.00	3.00	2.89	3.00	3.22	2.65	1.85	1.18	0.97
44	1.24	1.32	1.67	2.17	2.68	2.82	3.01	3.14	3.04	3.16	3.28	3.30	2.93	2.83	2.04	1.56
43	0.69	1.37	2.05	2.38	3.12	3.05	3.15	3.22	3.36	3.42	3.29	3.41	3.18	3.14	2.07	1.48
42	1.68	1.43	1.94	2.30	3.27	2.96	3.01	3.15	3.26	3.24	3.34	3.30	2.56	2.73	2.13	1.45
41	1.01	1.87	2.14	2.85	3.23	3.17	3.29	3.46	3.43	3.38	3.54	3.34	3.33	2.86	2.20	1.13
40	0.91	1.88	2.50	2.76	3.43	3.49	3.48	3.52	3.80	3.77	3.67	3.70	3.53	3.09	2.47	1.43
39	0.84	1.90	2.35	2.96	3.17	3.46	3.49	3.55	3.40	3.54	3.97	3.92	3.55	2.91	2.38	1.20
38	0.45	1.91	2.59	3.01	3.64	3.69	3.78	3.95	3.93	4.02	4.12	3.99	3.72	3.27	2.46	0.89
37	0.65	2.13	2.82	3.45	3.87	3.81	4.08	4.28	4.17	4.35	3.98	4.34	3.97	3.36	2.02	1.23
36	0.87	2.13	2.67	3.46	3.75	3.94	4.07	4.23	4.36	4.30	4.37	4.26	4.12	3.28	2.15	0.83
35	1.91	2.10	3.05	3.86	4.09	4.45	4.63	4.71	4.68	4.74	4.60	4.63	4.34	3.73	2.27	1.53
34	1.49	1.88	3.39	4.26	4.58	4.59	4.99	5.17	5.02	5.10	5.02	4.84	4.85	4.27	2.30	1.23

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-36 Test 4 – Unit 15B – 15cfs – Vz RMS (fps)

Vz RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72																
70	0.40	0.39	0.44	0.42	0.49	0.59	0.60	0.48	0.83	0.84	0.70	0.70	0.74	0.66	0.49	0.46
68	0.38	0.38	0.63	0.40	0.41	0.40	0.74	0.62	0.69	0.57	0.79	0.68	0.66	0.56	0.78	0.72
66	0.43	0.40	0.57	0.45	0.60	0.48	0.74	0.68	0.46	0.43	0.63	0.60	0.52	0.45	0.57	0.53
64	0.66	0.73	1.00	0.76	1.15	0.94	1.22	0.55	0.77	0.79	0.86	0.89	0.86	0.80	1.22	0.60
62	0.63	0.34	1.15	0.57	0.93	0.46	0.78	0.75	0.92	0.98	0.67	1.04	1.02	0.74	0.75	0.79
60	0.65	0.57	0.30	0.85	1.33	0.84	0.78	0.94	0.77	0.97	0.87	1.05	1.10	0.94	0.83	1.05
58	0.71	0.55	0.67	0.90	0.82	0.86	0.82	0.99	1.03	0.84	0.80	0.73	0.78	0.79	0.75	0.85
56	0.63	0.86	0.52	0.78	0.76	1.25	1.00	0.87	1.00	0.82	0.85	0.86	0.96	1.16	1.00	0.86
55	0.66	1.04	0.93	0.72	1.27	0.75	1.12	0.79	0.85	0.79	0.79	1.70	0.72	1.33	1.21	0.70
54	0.88	0.74	1.05	1.02	1.03	0.91	0.66	0.74	0.67	0.72	0.66	0.82	1.23	0.83	0.99	0.97
53	1.04	0.78	0.76	1.00	1.10	0.74	0.82	0.68	0.69	0.81	0.77	0.65	1.01	0.93	1.02	1.02
52	0.78	0.61	1.21	0.83	1.00	0.54	0.67	0.67	0.74	0.63	0.64	0.91	0.79	1.09	1.07	0.80
51	1.14	0.74	0.86	0.90	1.23	0.70	0.79	0.50	0.65	0.65	0.56	0.68	0.98	1.17	0.89	0.88
50	1.18	0.77	0.74	0.95	0.77	0.60	0.51	0.59	0.59	0.62	0.52	0.63	0.74	0.96	1.05	1.07
49	0.90	1.35	0.94	1.05	0.74	0.69	0.42	0.54	0.45	0.58	0.70	0.70	0.81	1.12	0.99	0.86
48	0.84	0.73	0.83	1.03	0.83	0.51	0.63	0.60	0.58	0.54	0.50	0.54	0.66	0.87	0.94	0.75
47	0.77	0.78	1.02	0.69	0.74	0.61	0.74	0.55	0.53	0.61	0.56	0.62	0.67	0.66	0.68	0.95
46	0.95	0.65	0.74	0.70	0.72	0.50	0.46	0.59	0.57	0.57	0.54	0.58	0.65	1.03	0.81	0.88
45	0.89	0.67	0.67	0.87	0.61	0.56	0.49	0.47	0.51	0.56	0.55	0.60	0.75	0.86	0.86	0.78
44	0.77	0.83	0.90	0.79	0.64	0.61	0.55	0.57	0.51	0.53	0.59	0.57	0.70	0.63	0.78	0.75
43	1.22	0.94	0.68	0.69	0.68	0.63	0.53	0.51	0.59	0.55	0.55	0.58	0.63	0.69	0.71	0.77
42	0.77	0.96	0.82	0.69	0.70	0.63	0.62	0.61	0.61	0.60	0.65	0.67	0.83	0.88	0.82	0.75
41	0.90	0.84	0.97	0.77	0.71	0.65	0.62	0.60	0.62	0.64	0.67	0.66	0.82	0.85	0.96	0.79
40	0.93	1.11	0.83	0.80	0.73	0.68	0.67	0.60	0.64	0.66	0.66	0.69	0.82	0.86	0.83	0.81
39	0.92	0.98	1.03	0.95	0.85	0.77	0.75	0.75	0.78	0.74	0.70	0.73	0.82	0.93	0.92	0.98
38	1.09	0.94	1.00	0.91	0.89	0.84	0.80	0.75	0.74	0.72	0.75	0.74	0.88	0.95	1.06	1.00
37	1.07	1.00	0.96	1.06	0.91	0.84	0.75	0.72	0.74	0.72	0.80	0.71	0.98	1.05	1.12	1.07
36	1.40	0.93	1.17	1.14	1.05	0.95	0.89	0.77	0.75	0.64	0.75	0.79	0.97	1.10	1.09	1.30
35	1.33	1.05	1.24	1.21	1.10	0.91	0.66	0.61	0.68	0.68	0.73	0.77	0.95	1.19	1.10	1.07
34	1.30	1.26	1.49	1.28	1.04	0.98	0.75	0.56	0.56	0.53	0.56	0.68	0.93	1.24	1.23	1.04

Table B-37 Test 4 – Unit 15B – 15kcfs – Vs (fps)

Vs																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.39	0.38	0.45	0.34	0.56	0.63	0.74	0.36	0.92	0.71	0.62	0.23	0.35	0.10	0.25	0.42
68	0.66	0.34	0.74	0.48	0.44	0.39	1.64	0.84	0.96	0.35	1.61	0.88	0.71	0.08	0.81	0.29
66	0.63	0.45	0.63	0.41	0.59	0.96	1.40	0.68	1.09	1.13	1.56	1.04	0.93	0.76	0.89	0.56
64	0.60	0.67	0.54	0.41	0.88	1.54	1.26	0.31	1.62	1.95	1.68	1.46	1.47	1.45	1.03	1.11
62	0.63	0.82	0.75	0.41	1.10	0.17	1.73	1.70	1.47	0.91	2.02	1.36	0.64	1.69	1.02	0.49
60	0.94	0.40	0.35	1.07	0.73	0.46	0.60	1.55	2.16	1.22	1.03	1.55	1.74	1.90	1.43	0.67
58	1.01	1.06	0.82	0.82	0.48	0.28	1.54	1.78	1.39	1.70	2.26	2.65	2.01	1.75	0.79	0.67
56	0.99	1.83	1.22	0.65	0.49	1.37	0.40	1.60	1.66	2.45	2.36	2.20	2.13	1.52	1.30	0.59
55	1.43	0.38	0.36	2.26	0.36	2.08	2.19	2.83	2.86	2.57	2.86	1.23	2.64	1.31	0.69	1.40
54	0.18	1.05	0.67	0.91	1.46	1.56	2.65	2.43	2.28	2.64	2.66	2.60	1.51	2.11	0.09	1.27
53	0.41	0.20	0.44	0.52	1.30	1.57	2.15	2.38	2.66	2.49	2.64	2.90	1.89	2.22	1.39	0.53
52	0.21	0.20	0.66	2.10	1.52	2.06	2.51	2.86	2.62	2.70	2.78	1.91	2.72	2.08	0.80	0.69
51	0.99	0.11	0.38	0.53	1.79	2.21	2.13	2.19	2.85	2.80	2.90	2.57	1.96	1.56	1.54	0.68
50	0.10	0.76	0.47	1.34	2.25	2.39	2.45	2.85	2.90	2.81	2.94	2.90	2.60	2.21	1.12	0.17
49	0.23	0.30	1.52	1.95	2.43	2.66	3.08	2.94	3.17	3.10	2.86	2.80	2.33	1.96	0.59	0.43
48	0.10	0.46	1.17	1.28	2.07	2.47	2.55	2.79	3.00	2.81	2.89	3.04	2.71	2.05	1.35	0.46
47	1.20	1.00	0.62	1.99	2.33	2.54	2.53	2.96	2.93	2.89	3.20	2.96	2.93	2.52	2.49	0.74
46	0.35	1.95	1.99	2.47	2.63	3.19	3.10	3.19	3.31	3.17	3.24	3.19	3.13	1.34	1.18	0.47
45	1.04	1.72	1.77	2.40	2.77	2.79	2.84	3.01	3.02	2.89	3.04	3.29	2.70	1.87	1.27	1.00
44	1.34	1.48	1.70	2.20	2.69	2.83	3.01	3.14	3.10	3.25	3.33	3.42	3.01	2.92	2.10	1.61
43	0.99	1.46	2.09	2.38	3.15	3.05	3.15	3.22	3.39	3.49	3.33	3.50	3.25	3.23	2.13	1.53
42	1.77	1.56	1.96	2.32	3.34	2.96	3.01	3.15	3.26	3.28	3.41	3.39	2.59	2.80	2.23	1.54
41	1.25	2.07	2.18	2.91	3.26	3.18	3.30	3.48	3.47	3.42	3.58	3.40	3.42	2.94	2.29	1.20
40	1.16	2.01	2.60	2.80	3.46	3.51	3.49	3.53	3.83	3.80	3.74	3.84	3.62	3.19	2.62	1.62
39	1.20	2.01	2.44	2.98	3.18	3.47	3.50	3.55	3.45	3.58	4.02	4.04	3.69	3.03	2.60	1.49
38	0.92	2.12	2.63	3.04	3.68	3.70	3.79	3.96	3.96	4.06	4.17	4.10	3.83	3.42	2.66	1.25
37	0.80	2.28	2.88	3.47	3.90	3.83	4.12	4.29	4.20	4.38	4.01	4.45	4.07	3.50	2.27	1.60
36	1.01	2.22	2.72	3.49	3.79	3.95	4.08	4.24	4.38	4.32	4.39	4.35	4.20	3.40	2.30	1.08
35	1.92	2.16	3.11	3.88	4.13	4.46	4.66	4.73	4.71	4.77	4.63	4.72	4.43	3.84	2.34	1.55
34	1.53	1.88	3.44	4.29	4.61	4.60	5.00	5.19	5.06	5.14	5.05	4.89	4.93	4.35	2.37	1.26

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-38 Test 4 – Unit 15B – 15kcfs – Vs RMS (fps)

Vs RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.47	0.47	0.54	0.48	0.61	0.70	0.70	0.61	0.95	0.97	0.83	0.90	0.88	0.85	0.63	0.59
68	0.46	0.47	0.77	0.47	0.49	0.48	0.84	0.70	0.83	0.72	0.95	0.81	0.78	0.72	0.89	0.81
66	0.49	0.47	0.66	0.50	0.65	0.55	0.83	0.74	0.56	0.52	0.75	0.71	0.60	0.56	0.63	0.62
64	0.78	0.83	1.09	0.85	1.22	1.04	1.32	0.75	0.89	0.97	1.06	1.09	0.98	1.01	1.30	0.78
62	0.74	0.42	1.28	0.82	1.11	0.61	0.92	0.92	1.08	1.06	0.90	1.16	1.19	0.88	0.92	0.88
60	0.79	0.68	0.37	1.17	1.51	1.00	0.91	1.13	0.96	1.11	1.00	1.18	1.25	1.08	0.99	1.13
58	0.79	0.68	0.88	1.12	1.02	0.97	1.20	1.37	1.17	1.01	1.01	0.93	0.93	0.99	0.94	0.97
56	0.81	1.06	0.67	0.95	1.14	1.52	1.22	1.08	1.22	1.06	1.02	1.02	1.13	1.28	1.20	1.05
55	0.81	1.24	1.06	0.98	1.51	0.96	1.37	1.06	1.06	0.96	0.98	1.90	0.96	1.46	1.35	0.95
54	0.95	0.87	1.37	1.24	1.18	1.16	1.01	0.85	0.94	0.94	0.86	1.07	1.53	1.08	1.31	1.15
53	1.22	0.94	0.97	1.29	1.51	0.87	0.96	0.83	0.94	0.96	0.94	0.83	1.22	1.15	1.24	1.30
52	0.98	0.85	1.44	1.04	1.20	0.71	0.95	0.89	0.88	0.79	0.86	1.23	1.00	1.33	1.52	0.96
51	1.26	0.96	1.15	1.13	1.41	0.85	0.97	0.64	0.84	0.78	0.70	0.84	1.22	1.52	1.09	1.11
50	1.35	0.97	0.92	1.14	0.92	0.75	0.66	0.70	0.72	0.75	0.68	0.83	0.98	1.21	1.38	1.35
49	1.08	1.57	1.19	1.26	0.91	0.88	0.60	0.71	0.61	0.74	0.91	0.82	1.01	1.48	1.25	1.18
48	1.11	0.89	1.17	1.22	1.03	0.63	0.74	0.75	0.72	0.67	0.67	0.68	0.83	1.08	1.24	1.07
47	0.97	0.94	1.21	0.96	0.88	0.76	0.90	0.62	0.65	0.76	0.70	0.84	0.87	0.92	0.88	1.28
46	1.19	0.85	0.98	0.95	0.90	0.68	0.62	0.75	0.70	0.72	0.64	0.75	0.87	1.22	0.99	1.14
45	1.04	0.90	0.84	1.10	0.77	0.71	0.63	0.63	0.65	0.72	0.72	0.74	0.97	1.08	1.22	0.99
44	0.96	1.08	1.05	0.99	0.81	0.76	0.69	0.72	0.66	0.65	0.72	0.71	0.88	0.83	1.01	0.99
43	1.34	1.16	0.84	0.87	0.84	0.76	0.66	0.66	0.72	0.70	0.69	0.75	0.83	0.90	0.93	0.99
42	0.97	1.19	1.06	0.87	0.84	0.78	0.80	0.75	0.76	0.75	0.79	0.80	1.09	1.08	1.04	0.95
41	1.13	1.06	1.18	0.97	0.90	0.82	0.79	0.77	0.77	0.81	0.84	0.83	1.03	1.07	1.17	1.00
40	1.15	1.30	1.06	1.00	0.88	0.83	0.82	0.75	0.81	0.82	0.81	0.84	1.08	1.09	1.07	1.05
39	1.13	1.19	1.27	1.21	1.01	0.95	0.93	0.94	0.92	0.89	0.88	0.89	1.02	1.17	1.15	1.19
38	1.32	1.18	1.30	1.17	1.12	1.04	0.98	0.95	0.91	0.88	0.93	0.92	1.12	1.24	1.32	1.21
37	1.34	1.27	1.20	1.35	1.13	0.97	0.88	0.85	0.90	0.88	0.96	0.85	1.21	1.33	1.35	1.27
36	1.64	1.25	1.47	1.48	1.24	1.16	1.13	0.93	0.92	0.79	0.90	0.95	1.21	1.40	1.44	1.56
35	1.71	1.36	1.59	1.50	1.31	1.08	0.86	0.74	0.82	0.80	0.83	0.92	1.16	1.52	1.50	1.46
34	1.78	1.68	1.85	1.54	1.18	1.14	0.90	0.64	0.67	0.66	0.71	0.82	1.12	1.56	1.61	1.43

Table B-39 Test 4 – Unit 15B – 15kcfs – Vt (fps)

Vt																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.42	0.39	0.48	0.35	0.56	0.65	0.77	0.37	0.94	0.78	0.69	0.26	0.39	0.13	0.25	0.42
68	0.67	0.34	0.75	0.48	0.45	0.41	1.64	0.85	0.97	0.38	1.61	0.92	0.73	0.13	0.81	0.33
66	0.63	0.46	0.65	0.42	0.59	0.97	1.40	0.69	1.09	1.13	1.56	1.06	0.93	0.76	0.89	0.57
64	0.60	0.69	0.57	0.41	0.88	1.55	1.26	0.32	1.62	1.95	1.68	1.47	1.47	1.45	1.03	1.12
62	0.64	0.82	0.75	0.41	1.10	0.20	1.73	1.70	1.47	0.91	2.02	1.37	0.64	1.69	1.02	0.49
60	0.94	0.41	0.36	1.07	0.74	0.47	0.61	1.55	2.16	1.22	1.03	1.55	1.74	1.91	1.43	0.67
58	1.02	1.06	0.83	0.82	0.48	0.28	1.54	1.78	1.39	1.70	2.26	2.65	2.02	1.75	0.79	0.68
56	1.02	1.86	1.30	0.86	0.62	1.39	0.65	1.70	1.73	2.51	2.41	2.24	2.22	1.63	1.41	0.71
55	1.45	0.58	0.53	2.29	0.42	2.11	2.23	2.87	2.88	2.60	2.89	1.26	2.69	1.41	0.78	1.42
54	0.45	1.14	0.83	1.04	1.53	1.61	2.72	2.51	2.34	2.71	2.71	2.63	1.62	2.21	0.49	1.36
53	0.64	0.59	0.74	0.75	1.39	1.64	2.23	2.48	2.73	2.55	2.70	2.92	1.99	2.31	1.51	0.64
52	0.39	0.50	0.80	2.14	1.55	2.10	2.57	2.91	2.66	2.74	2.80	1.94	2.76	2.11	0.85	0.76
51	1.09	0.60	0.59	0.78	1.86	2.29	2.22	2.29	2.92	2.88	2.96	2.62	2.07	1.67	1.68	0.88
50	0.54	0.97	0.74	1.50	2.30	2.47	2.56	2.95	2.99	2.90	3.01	2.94	2.70	2.30	1.29	0.58
49	0.51	0.49	1.60	2.01	2.46	2.70	3.12	3.00	3.20	3.13	2.90	2.83	2.38	2.00	0.75	0.56
48	0.66	0.73	1.32	1.41	2.15	2.56	2.66	2.89	3.07	2.89	2.95	3.08	2.82	2.17	1.53	0.77
47	1.35	1.19	0.90	2.07	2.41	2.61	2.65	3.06	3.01	2.98	3.25	3.01	3.05	2.65	2.63	0.96
46	0.50	2.02	2.06	2.52	2.66	3.23	3.15	3.23	3.35	3.22	3.27	3.22	3.19	1.44	1.29	0.63
45	1.19	1.85	1.90	2.48	2.82	2.84	2.92	3.09	3.08	2.96	3.09	3.31	2.80	2.00	1.41	1.21
44	1.47	1.64	1.82	2.31	2.75	2.90	3.10	3.23	3.17	3.31	3.38	3.45	3.10	3.02	2.24	1.80
43	1.08	1.54	2.16	2.43	3.18	3.09	3.18	3.26	3.42	3.52	3.35	3.51	3.29	3.29	2.20	1.62
42	1.89	1.72	2.08	2.39	3.37	3.01	3.07	3.20	3.31	3.31	3.43	3.41	2.68	2.87	2.33	1.69
41	1.41	2.21	2.31	2.97	3.29	3.22	3.36	3.54	3.51	3.46	3.61	3.43	3.49	3.04	2.43	1.41
40	1.33	2.09	2.66	2.83	3.47	3.53	3.51	3.55	3.84	3.82	3.75	3.85	3.66	3.25	2.69	1.72
39	1.38	2.16	2.53	3.03	3.21	3.49	3.54	3.60	3.48	3.61	4.04	4.06	3.75	3.11	2.72	1.66
38	1.09	2.29	2.72	3.09	3.71	3.74	3.84	4.01	3.99	4.09	4.20	4.13	3.88	3.51	2.79	1.40
37	0.93	2.40	2.95	3.50	3.91	3.85	4.14	4.31	4.22	4.39	4.03	4.46	4.11	3.56	2.38	1.67
36	1.20	2.39	2.84	3.54	3.82	3.99	4.13	4.30	4.41	4.36	4.43	4.37	4.26	3.51	2.48	1.24
35	2.00	2.35	3.22	3.91	4.16	4.50	4.71	4.79	4.76	4.82	4.67	4.75	4.50	3.96	2.53	1.69
34	1.60	1.96	3.49	4.30	4.63	4.62	5.04	5.23	5.09	5.17	5.08	4.91	4.97	4.41	2.54	1.36

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-40 Test 4 – Unit 15B – 15kcfs – Vt RMS (fps)

Vt RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.61	0.59	0.68	0.60	0.72	0.81	0.81	0.74	1.09	1.12	0.94	1.01	1.02	0.97	0.73	0.70
68	0.55	0.54	0.94	0.58	0.57	0.55	0.97	0.81	0.90	0.81	1.07	0.90	0.85	0.81	0.99	0.88
66	0.56	0.55	0.76	0.57	0.71	0.62	0.90	0.80	0.64	0.60	0.83	0.78	0.68	0.65	0.71	0.68
64	0.87	0.96	1.21	0.94	1.32	1.15	1.38	0.87	1.01	1.07	1.20	1.20	1.11	1.15	1.39	0.90
62	0.91	0.49	1.39	0.95	1.22	0.71	1.02	1.00	1.18	1.13	1.05	1.26	1.29	1.00	1.09	0.98
60	0.88	0.74	0.43	1.29	1.58	1.06	0.99	1.21	1.07	1.23	1.09	1.31	1.38	1.22	1.11	1.22
58	0.84	0.75	1.03	1.25	1.11	1.05	1.30	1.44	1.26	1.11	1.10	1.03	1.05	1.11	1.09	1.09
56	0.91	1.16	0.77	1.05	1.21	1.61	1.29	1.15	1.32	1.12	1.09	1.10	1.25	1.38	1.33	1.18
55	0.90	1.33	1.16	1.07	1.59	1.04	1.42	1.15	1.15	1.07	1.05	1.96	1.07	1.58	1.47	1.07
54	1.02	0.97	1.48	1.35	1.24	1.25	1.08	0.91	1.02	1.02	0.94	1.18	1.65	1.20	1.41	1.28
53	1.30	1.03	1.04	1.38	1.58	0.96	1.04	0.90	1.03	1.04	1.01	0.92	1.30	1.29	1.37	1.43
52	1.10	0.94	1.53	1.16	1.29	0.79	1.01	0.95	0.96	0.86	0.94	1.32	1.11	1.46	1.64	1.05
51	1.35	1.07	1.23	1.23	1.47	0.93	1.05	0.73	0.92	0.86	0.78	0.93	1.31	1.61	1.20	1.24
50	1.43	1.07	1.01	1.25	1.03	0.84	0.75	0.77	0.81	0.83	0.76	0.93	1.09	1.36	1.50	1.47
49	1.17	1.65	1.29	1.36	1.00	0.98	0.68	0.79	0.70	0.83	1.00	0.92	1.15	1.59	1.36	1.30
48	1.23	0.99	1.30	1.33	1.14	0.70	0.82	0.83	0.81	0.76	0.76	0.78	0.94	1.20	1.36	1.18
47	1.09	1.04	1.30	1.07	0.99	0.85	0.99	0.70	0.75	0.85	0.81	0.94	1.00	1.04	0.99	1.38
46	1.34	0.97	1.12	1.07	1.00	0.76	0.69	0.84	0.79	0.85	0.75	0.87	0.99	1.35	1.12	1.25
45	1.14	1.02	0.97	1.22	0.88	0.80	0.71	0.70	0.75	0.82	0.83	0.86	1.09	1.21	1.36	1.12
44	1.10	1.21	1.17	1.13	0.93	0.88	0.78	0.81	0.77	0.76	0.84	0.85	1.00	0.97	1.14	1.11
43	1.50	1.31	0.99	1.02	0.95	0.89	0.73	0.78	0.84	0.82	0.82	0.89	0.98	1.05	1.07	1.13
42	1.13	1.34	1.21	1.02	0.96	0.90	0.92	0.86	0.89	0.87	0.90	0.93	1.23	1.22	1.18	1.10
41	1.36	1.27	1.38	1.12	1.03	0.94	0.92	0.89	0.90	0.93	0.96	0.98	1.18	1.23	1.32	1.17
40	1.39	1.48	1.25	1.18	1.06	0.98	0.94	0.87	0.95	0.95	0.95	0.99	1.25	1.27	1.26	1.26
39	1.41	1.42	1.48	1.40	1.18	1.09	1.09	1.08	1.05	1.02	1.02	1.04	1.19	1.35	1.37	1.43
38	1.61	1.43	1.54	1.39	1.28	1.19	1.10	1.06	1.06	1.02	1.05	1.08	1.30	1.45	1.55	1.47
37	1.60	1.54	1.45	1.58	1.30	1.14	0.98	0.97	1.04	1.01	1.10	1.01	1.39	1.56	1.60	1.54
36	1.87	1.56	1.73	1.69	1.41	1.33	1.26	1.04	1.06	0.92	1.03	1.10	1.40	1.60	1.71	1.78
35	1.94	1.67	1.87	1.71	1.49	1.24	1.00	0.83	0.94	0.92	0.95	1.05	1.35	1.78	1.77	1.70
34	2.02	1.96	2.14	1.76	1.33	1.29	1.02	0.72	0.78	0.77	0.84	0.95	1.30	1.82	1.91	1.65

Table B-41 Test 5 – Unit 15C – 18kcfs – Vx (fps)

Vx																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	-0.02	0.01	0.05	-0.03	0.03	0.03	0.02	-0.03	0.00	0.14	0.15	0.05	0.16	0.17	0.21	0.12
70	-0.08	-0.11	-0.09	-0.08	-0.07	-0.19	-0.07	-0.15	-0.20	-0.15	-0.15	-0.29	-0.20	-0.09	-0.25	-0.09
68	-0.07	-0.06	-0.01	-0.07	-0.04	-0.03	-0.09	-0.09	0.01	0.00	-0.16	-0.16	-0.07	-0.16	-0.26	-0.09
66	-0.01	0.07	-0.06	0.04	0.03	-0.06	-0.07	-0.02	-0.06	0.05	-0.08	-0.07	0.03	-0.01	-0.13	-0.16
64	-0.02	0.01	0.05	-0.03	-0.04	0.03	-0.09	-0.06	-0.04	0.00	0.00	-0.05	-0.03	0.03	0.00	-0.09
62	0.00	-0.02	-0.02	0.02	-0.06	-0.05	0.09	-0.05	0.02	-0.02	-0.05	-0.07	0.07	0.04	0.06	-0.08
60	-0.01	0.06	0.04	-0.07	0.09	-0.11	-0.09	0.03	0.01	-0.02	-0.03	-0.07	0.10	0.04	0.06	0.00
58	-0.02	0.15	-0.04	0.07	0.00	0.11	0.03	0.06	0.03	0.03	0.02	0.09	0.22	0.06	0.08	0.11
56	0.40	0.48	0.42	0.49	0.41	0.51	0.64	0.60	0.57	0.49	0.48	0.42	0.58	0.59	0.56	0.55
55	0.36	0.30	0.35	0.43	0.33	0.43	0.50	0.51	0.42	0.47	0.43	0.44	0.58	0.54	0.44	0.46
54	0.42	0.52	0.46	0.53	0.45	0.47	0.61	0.61	0.55	0.57	0.54	0.42	0.72	0.69	0.65	0.54
53	0.62	0.50	0.61	0.46	0.49	0.57	0.68	0.74	0.64	0.72	0.62	0.53	0.75	0.71	0.65	0.67
52	0.47	0.43	0.50	0.41	0.43	0.43	0.53	0.60	0.52	0.52	0.46	0.44	0.63	0.62	0.56	0.51
51	0.58	0.71	0.66	0.63	0.56	0.59	0.76	0.83	0.66	0.73	0.63	0.57	0.78	0.76	0.78	0.66
50	0.67	0.89	0.81	0.77	0.62	0.76	0.95	0.96	0.86	0.88	0.74	0.66	0.92	0.84	0.85	0.77
49	0.51	0.46	0.55	0.56	0.44	0.54	0.61	0.68	0.59	0.59	0.51	0.45	0.65	0.67	0.70	0.59
48	0.75	0.75	0.75	0.67	0.61	0.73	0.86	0.83	0.78	0.80	0.68	0.59	0.85	0.86	0.80	0.75
47	0.72	0.83	0.83	0.72	0.60	0.82	0.94	0.93	0.84	0.85	0.71	0.61	0.90	0.89	0.91	0.81
46	0.42	0.57	0.51	0.49	0.50	0.53	0.66	0.71	0.64	0.58	0.55	0.47	0.66	0.70	0.67	0.64
45	0.73	0.65	0.64	0.69	0.63	0.74	0.81	0.90	0.76	0.80	0.72	0.57	0.85	0.85	0.84	0.80
44	0.74	0.79	0.77	0.80	0.71	0.77	0.93	0.96	0.83	0.86	0.72	0.62	0.95	0.98	0.96	0.88
43	0.55	0.57	0.52	0.54	0.52	0.53	0.61	0.68	0.54	0.57	0.52	0.48	0.70	0.77	0.78	0.66
42	0.73	0.76	0.71	0.68	0.61	0.67	0.74	0.73	0.65	0.68	0.59	0.54	0.82	0.83	0.88	0.80
41	0.79	0.87	0.85	0.73	0.64	0.70	0.87	0.84	0.71	0.73	0.62	0.57	0.83	0.91	1.02	0.84
40	0.60	0.68	0.58	0.54	0.48	0.49	0.60	0.55	0.51	0.50	0.41	0.43	0.65	0.70	0.81	0.69
39	0.82	0.88	0.76	0.64	0.59	0.61	0.73	0.71	0.62	0.60	0.56	0.47	0.79	0.85	1.03	0.81
38	0.82	1.06	0.93	0.82	0.65	0.69	0.86	0.87	0.73	0.72	0.65	0.56	0.90	0.92	1.13	0.89
37	0.57	0.90	0.68	0.50	0.45	0.54	0.65	0.63	0.59	0.57	0.50	0.45	0.72	0.88	0.98	0.58
36	0.78	1.24	1.03	0.82	0.74	0.82	0.99	1.01	0.88	0.92	0.81	0.61	0.99	1.12	1.23	0.87
35	1.32	1.32	1.32	1.32	1.17	1.17	1.17	1.17	1.03	1.03	1.03	1.03	1.39	1.39	1.39	1.39
34	0.94	0.94	0.94	0.94	0.84	0.84	0.84	0.84	0.77	0.77	0.77	0.77	1.05	1.05	1.05	1.05

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-42 Test 5 – Unit 15C – 18kcfs – Vx RMS (fps)

Vx RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.36	0.33	0.38	0.40	0.37	0.33	0.38	0.42	0.54	0.48	0.49	0.50	0.43	0.45	0.35	0.36
70	0.29	0.33	0.46	0.44	0.41	0.40	0.41	0.40	0.53	0.42	0.45	0.38	0.39	0.32	0.49	0.33
68	0.35	0.40	0.26	0.35	0.38	0.49	0.33	0.40	0.50	0.48	0.46	0.43	0.47	0.47	0.37	0.33
66	0.36	0.31	0.36	0.42	0.45	0.35	0.38	0.45	0.52	0.49	0.41	0.45	0.52	0.46	0.44	0.44
64	0.32	0.43	0.43	0.43	0.37	0.52	0.39	0.45	0.51	0.47	0.43	0.52	0.43	0.50	0.43	0.46
62	0.35	0.32	0.34	0.49	0.38	0.38	0.44	0.42	0.46	0.44	0.48	0.44	0.48	0.46	0.45	0.41
60	0.36	0.24	0.31	0.42	0.42	0.34	0.41	0.40	0.45	0.46	0.45	0.55	0.49	0.45	0.54	0.44
58	0.31	0.41	0.36	0.37	0.38	0.41	0.39	0.43	0.49	0.49	0.44	0.45	0.47	0.55	0.54	0.43
56	0.35	0.39	0.30	0.33	0.43	0.38	0.38	0.36	0.43	0.46	0.48	0.43	0.49	0.48	0.58	0.52
55	0.28	0.36	0.35	0.44	0.34	0.45	0.34	0.38	0.48	0.42	0.42	0.46	0.47	0.53	0.57	0.44
54	0.36	0.44	0.39	0.46	0.39	0.43	0.42	0.38	0.48	0.40	0.39	0.42	0.46	0.50	0.45	0.42
53	0.41	0.37	0.41	0.44	0.41	0.46	0.43	0.40	0.43	0.40	0.41	0.42	0.50	0.50	0.52	0.42
52	0.39	0.43	0.50	0.47	0.45	0.50	0.41	0.34	0.40	0.39	0.42	0.41	0.52	0.48	0.46	0.39
51	0.51	0.44	0.45	0.49	0.48	0.42	0.43	0.37	0.45	0.37	0.41	0.42	0.43	0.48	0.48	0.45
50	0.48	0.46	0.46	0.49	0.47	0.39	0.37	0.37	0.40	0.37	0.39	0.41	0.42	0.50	0.46	0.42
49	0.44	0.48	0.47	0.53	0.41	0.43	0.39	0.36	0.42	0.39	0.38	0.41	0.43	0.45	0.46	0.41
48	0.45	0.48	0.52	0.53	0.46	0.38	0.36	0.37	0.41	0.37	0.38	0.41	0.45	0.47	0.49	0.45
47	0.50	0.51	0.51	0.48	0.44	0.32	0.39	0.32	0.40	0.39	0.42	0.42	0.47	0.48	0.44	0.45
46	0.48	0.48	0.58	0.54	0.42	0.43	0.41	0.34	0.40	0.41	0.40	0.43	0.46	0.47	0.46	0.49
45	0.51	0.51	0.56	0.51	0.36	0.41	0.33	0.37	0.44	0.38	0.41	0.45	0.50	0.50	0.49	0.50
44	0.52	0.52	0.50	0.54	0.45	0.36	0.39	0.35	0.41	0.42	0.41	0.46	0.51	0.50	0.50	0.53
43	0.60	0.59	0.54	0.52	0.49	0.45	0.37	0.37	0.44	0.44	0.46	0.48	0.51	0.51	0.56	0.57
42	0.60	0.56	0.55	0.53	0.47	0.41	0.41	0.33	0.44	0.44	0.44	0.49	0.55	0.57	0.53	0.61
41	0.65	0.61	0.58	0.59	0.48	0.40	0.45	0.37	0.46	0.47	0.47	0.50	0.61	0.59	0.64	0.68
40	0.74	0.66	0.62	0.60	0.48	0.39	0.43	0.32	0.45	0.46	0.48	0.53	0.60	0.64	0.71	0.77
39	0.79	0.71	0.68	0.65	0.52	0.44	0.44	0.43	0.48	0.45	0.49	0.53	0.64	0.71	0.77	0.77
38	0.88	0.80	0.76	0.72	0.47	0.37	0.44	0.37	0.46	0.47	0.50	0.56	0.70	0.77	0.83	0.86
37	0.91	0.91	0.80	0.69	0.51	0.35	0.32	0.34	0.41	0.39	0.48	0.53	0.70	0.87	0.93	0.90
36	0.92	0.96	0.90	0.73	0.50	0.32	0.36	0.29	0.36	0.38	0.40	0.50	0.73	0.88	0.98	0.95
35	1.10	1.10	1.10	1.10	0.28	0.28	0.28	0.28	0.36	0.36	0.36	0.36	1.11	1.11	1.11	1.11
34	1.11	1.11	1.11	1.11	0.29	0.29	0.29	0.29	0.33	0.33	0.33	0.33	1.12	1.12	1.12	1.12

Table B-43 Test 5 – Unit 15C – 18kcfs – Vy (fps)

Vy																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.16	0.18	0.34	0.48	0.58	0.51	0.60	0.64	0.72	0.83	0.57	0.31	0.08	0.39	0.13	-0.09
70	0.14	-0.06	0.39	0.47	0.23	-0.30	0.46	0.41	-0.33	-0.58	-0.29	-0.05	-0.29	-0.37	-0.41	-0.04
68	0.22	0.49	0.28	0.33	0.60	0.93	0.45	0.49	0.67	0.35	0.20	-0.13	0.01	-0.41	0.04	-0.11
66	0.21	0.21	0.00	0.53	0.45	0.41	0.38	0.74	-0.11	0.24	-0.37	-0.12	-0.81	-0.48	-0.61	-0.30
64	0.14	0.57	0.47	0.19	0.44	0.88	0.54	0.35	0.20	0.05	-0.05	-0.38	-0.53	-0.72	-0.59	-0.69
62	0.16	0.11	0.24	0.47	0.29	0.28	0.38	0.80	0.08	0.14	-0.13	-0.08	-0.75	-0.41	-0.72	-0.26
60	0.29	-0.07	0.01	0.22	0.39	-0.03	0.17	0.05	0.40	-0.27	-0.51	-0.86	-0.33	-0.70	-0.86	-0.49
58	0.14	0.26	-0.35	0.06	0.26	0.12	-0.26	0.21	-0.15	-0.87	-0.68	-0.53	-0.79	-0.72	-0.53	-0.45
56	-0.22	-0.31	-0.26	-0.37	0.03	-0.23	-0.25	-0.19	-0.40	-0.47	-0.87	-0.88	-0.43	-0.49	-0.95	-0.54
55	-0.38	-0.28	-0.25	-0.20	-0.28	-0.26	-0.38	-0.07	-0.57	-0.60	-0.65	-0.65	-0.59	-0.38	-0.46	-0.08
54	-0.34	-0.21	-0.48	-0.22	-0.21	-0.16	-0.33	-0.29	-0.60	-0.40	-0.43	-0.50	-0.60	-0.46	-0.27	0.17
53	-0.31	-0.57	-0.07	-0.43	0.04	-0.45	-0.13	-0.28	-0.52	-0.51	-0.46	-0.78	-0.63	-0.30	-0.30	0.04
52	-0.16	-0.36	-0.47	-0.07	0.25	-0.30	-0.34	-0.09	-0.50	-0.57	-0.37	-0.58	-0.60	-0.40	-0.15	0.19
51	-0.48	-0.36	0.05	0.19	-0.19	-0.09	-0.29	-0.11	-0.66	-0.48	-0.52	-0.59	-0.48	-0.24	-0.27	0.12
50	-0.32	-0.33	0.21	0.44	0.07	-0.33	-0.07	-0.11	-0.67	-0.48	-0.32	-0.70	-0.58	-0.24	-0.01	0.07
49	-0.11	-0.19	-0.02	0.25	0.11	-0.27	-0.21	-0.09	-0.73	-0.63	-0.70	-0.61	-0.51	-0.34	-0.31	-0.03
48	-0.16	0.18	0.25	0.28	0.06	-0.11	-0.05	-0.13	-0.65	-0.52	-0.43	-0.70	-0.52	-0.34	-0.17	-0.05
47	0.23	0.34	0.08	0.29	0.24	0.04	-0.13	0.06	-0.57	-0.50	-0.53	-0.57	-0.43	-0.28	-0.20	-0.18
46	0.15	0.15	0.23	0.21	0.30	0.00	-0.09	-0.07	-0.63	-0.57	-0.52	-0.77	-0.55	-0.43	-0.25	-0.21
45	0.20	0.38	0.19	0.25	0.52	-0.10	-0.09	0.00	-0.32	-0.53	-0.53	-0.65	-0.35	-0.32	-0.28	-0.18
44	0.30	0.34	0.15	0.26	0.39	0.16	0.01	0.14	-0.66	-0.59	-0.63	-0.77	-0.60	-0.39	-0.36	-0.21
43	0.35	0.39	0.32	0.35	0.42	0.20	0.15	0.10	-0.57	-0.58	-0.59	-0.86	-0.59	-0.45	-0.40	-0.28
42	0.55	0.51	0.42	0.36	0.44	0.35	0.19	0.10	-0.51	-0.41	-0.44	-0.84	-0.60	-0.39	-0.36	-0.36
41	0.52	0.63	0.26	0.48	0.44	0.44	-0.01	0.16	-0.70	-0.40	-0.73	-0.95	-0.74	-0.43	-0.55	-0.48
40	0.89	0.71	0.48	0.60	0.74	0.49	0.24	0.29	-0.47	-0.58	-0.74	-0.91	-0.68	-0.63	-0.64	-0.54
39	0.88	0.69	0.51	0.54	0.61	0.28	0.22	0.21	-0.56	-0.56	-0.66	-0.84	-0.80	-0.61	-0.66	-0.59
38	0.97	0.88	0.71	0.62	0.79	0.48	0.34	0.26	-0.54	-0.48	-0.63	-0.98	-0.87	-0.71	-0.76	-0.73
37	0.90	0.87	0.81	0.75	0.72	0.51	0.50	0.42	-0.60	-0.64	-0.65	-0.86	-0.89	-0.87	-0.84	-0.78
36	0.69	0.85	0.79	0.64	0.70	0.34	0.34	0.29	-0.63	-0.56	-0.56	-0.93	-0.93	-0.96	-0.99	-0.87
35	1.00	1.00	1.00	1.00	0.55	0.55	0.55	0.55	-0.63	-0.63	-0.63	-0.63	-1.09	-1.09	-1.09	-1.09
34	0.84	0.84	0.84	0.84	0.61	0.61	0.61	0.61	-0.76	-0.76	-0.76	-0.76	-1.02	-1.02	-1.02	-1.02

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-44 Test 5 – Unit 15C – 18kcfs – Vy RMS (fps)

Vy RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.21	0.16	0.25	0.31	0.32	0.23	0.28	0.33	0.47	0.40	0.39	0.40	0.43	0.42	0.34	0.25
70	0.31	0.36	0.43	0.38	0.36	0.36	0.44	0.41	0.38	0.33	0.53	0.42	0.47	0.27	0.43	0.36
68	0.29	0.40	0.18	0.25	0.34	0.46	0.36	0.43	0.42	0.39	0.43	0.42	0.48	0.52	0.47	0.37
66	0.39	0.32	0.28	0.44	0.47	0.38	0.43	0.40	0.54	0.47	0.42	0.48	0.49	0.40	0.43	0.46
64	0.32	0.35	0.44	0.33	0.51	0.50	0.59	0.48	0.51	0.54	0.43	0.54	0.52	0.59	0.44	0.44
62	0.36	0.32	0.31	0.45	0.46	0.48	0.57	0.55	0.57	0.58	0.59	0.53	0.49	0.50	0.42	0.45
60	0.39	0.23	0.28	0.52	0.46	0.37	0.56	0.45	0.64	0.47	0.50	0.54	0.54	0.49	0.48	0.37
58	0.28	0.57	0.29	0.52	0.49	0.45	0.55	0.64	0.60	0.51	0.45	0.54	0.57	0.48	0.50	0.43
56	0.38	0.48	0.39	0.38	0.63	0.51	0.46	0.43	0.55	0.52	0.53	0.47	0.68	0.64	0.55	0.61
55	0.30	0.44	0.43	0.79	0.35	0.63	0.60	0.58	0.55	0.50	0.51	0.50	0.63	0.76	0.65	0.56
54	0.41	0.55	0.48	0.65	0.50	0.70	0.63	0.63	0.56	0.52	0.50	0.53	0.57	0.75	0.67	0.59
53	0.48	0.47	0.66	0.68	0.60	0.56	0.66	0.73	0.54	0.50	0.48	0.50	0.60	0.65	0.73	0.53
52	0.53	0.53	0.64	0.73	0.69	0.62	0.60	0.42	0.50	0.46	0.45	0.48	0.65	0.60	0.67	0.43
51	0.48	0.42	0.65	0.74	0.61	0.52	0.64	0.41	0.49	0.47	0.47	0.48	0.49	0.63	0.66	0.56
50	0.68	0.63	0.66	0.55	0.63	0.53	0.49	0.49	0.46	0.44	0.43	0.44	0.52	0.66	0.65	0.54
49	0.64	0.73	0.72	0.59	0.56	0.41	0.53	0.40	0.44	0.44	0.38	0.46	0.51	0.58	0.59	0.48
48	0.65	0.67	0.68	0.63	0.51	0.48	0.46	0.42	0.48	0.43	0.44	0.48	0.53	0.63	0.58	0.61
47	0.63	0.60	0.73	0.61	0.45	0.40	0.45	0.41	0.46	0.47	0.47	0.49	0.55	0.60	0.58	0.52
46	0.53	0.59	0.75	0.65	0.49	0.50	0.51	0.36	0.40	0.46	0.43	0.43	0.52	0.51	0.54	0.58
45	0.63	0.60	0.70	0.65	0.42	0.44	0.44	0.40	0.49	0.43	0.43	0.48	0.53	0.61	0.55	0.54
44	0.59	0.61	0.72	0.64	0.47	0.47	0.46	0.35	0.44	0.41	0.44	0.47	0.56	0.56	0.54	0.53
43	0.56	0.60	0.65	0.63	0.50	0.45	0.49	0.44	0.47	0.45	0.49	0.47	0.51	0.53	0.54	0.58
42	0.60	0.58	0.59	0.64	0.48	0.40	0.44	0.46	0.48	0.44	0.46	0.48	0.57	0.58	0.55	0.62
41	0.66	0.56	0.56	0.64	0.53	0.41	0.54	0.43	0.48	0.49	0.55	0.50	0.63	0.58	0.61	0.70
40	0.73	0.63	0.62	0.66	0.52	0.42	0.46	0.46	0.43	0.43	0.50	0.53	0.57	0.60	0.64	0.71
39	0.83	0.64	0.70	0.69	0.57	0.36	0.44	0.46	0.51	0.46	0.40	0.53	0.66	0.69	0.72	0.80
38	0.85	0.77	0.75	0.75	0.42	0.45	0.46	0.42	0.45	0.48	0.52	0.56	0.67	0.75	0.77	0.86
37	0.86	0.81	0.78	0.70	0.51	0.37	0.30	0.33	0.34	0.39	0.43	0.48	0.72	0.85	0.83	0.86
36	1.06	0.95	0.88	0.78	0.45	0.41	0.37	0.33	0.37	0.36	0.39	0.47	0.72	0.87	0.92	0.88
35	1.07	1.07	1.07	1.07	0.28	0.28	0.28	0.28	0.31	0.31	0.31	0.31	1.04	1.04	1.04	1.04
34	1.07	1.07	1.07	1.07	0.24	0.24	0.24	0.24	0.31	0.31	0.31	0.31	1.06	1.06	1.06	1.06

Table B-45 Test 5 – Unit 15C – 18kcfs – Vz (fps)

Vz																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	-0.13	-0.08	-0.02	0.08	0.02	-0.02	0.02	0.17	0.08	-0.13	-0.06	0.17	-0.06	-0.16	-0.29	-0.07
70	-0.10	0.45	0.22	0.36	0.60	0.83	0.94	0.83	0.93	0.55	1.17	0.61	0.43	0.02	0.35	-0.14
68	-0.48	-0.01	-0.28	0.10	0.18	0.83	0.38	0.87	1.10	1.71	0.86	1.27	1.58	1.49	0.74	-0.15
66	-0.38	-0.54	-0.01	0.09	0.73	0.20	1.08	1.23	1.62	1.22	1.21	1.79	1.15	1.30	0.80	0.64
64	-0.65	-0.42	-0.14	-0.19	0.06	0.78	0.56	1.06	0.75	1.92	1.39	1.66	1.89	1.40	0.89	1.09
62	-0.59	-0.68	-0.43	-0.33	-0.07	-0.13	0.06	1.32	1.21	1.37	1.92	1.81	1.70	1.61	1.36	0.96
60	-0.97	-0.92	-0.80	0.22	-0.48	-0.24	0.70	1.45	1.58	1.51	2.00	1.32	1.88	1.62	1.06	0.19
58	-1.04	0.16	-0.34	-0.54	-0.11	1.65	0.91	1.74	1.98	1.67	1.54	1.84	1.91	-0.58	0.29	0.03
56	-1.00	-0.38	-0.66	-0.48	0.34	0.26	0.78	0.68	2.60	1.76	2.00	2.11	1.17	0.89	0.48	0.28
55	-0.81	-0.28	-0.25	0.01	-0.04	1.36	1.21	2.00	2.37	2.39	2.32	2.17	2.09	1.15	0.78	0.15
54	-0.75	-0.35	-0.47	-0.02	0.30	1.63	1.43	2.32	2.16	2.20	2.61	2.31	2.31	1.44	0.94	0.04
53	0.76	-0.29	0.08	0.01	1.31	1.65	2.01	2.02	2.21	2.72	2.55	2.68	1.94	1.19	0.69	0.58
52	0.23	0.22	-0.08	0.35	1.88	1.63	2.03	2.68	2.66	2.76	2.61	2.70	2.14	1.48	1.40	0.43
51	-0.18	0.12	0.16	0.66	0.81	2.27	1.94	2.57	2.76	2.58	2.51	2.40	2.44	1.42	1.15	0.23
50	0.55	0.20	0.65	1.22	1.78	2.63	2.67	2.58	3.03	2.92	2.82	2.79	2.53	1.63	0.85	0.81
49	0.85	0.21	0.54	1.08	1.97	2.71	2.76	3.23	3.17	3.25	3.19	3.12	2.66	2.13	1.73	0.92
48	0.64	0.47	0.48	1.17	2.18	2.82	2.84	2.81	2.94	2.94	2.95	2.85	2.38	1.85	1.01	0.92
47	1.02	0.28	1.22	2.22	2.87	3.13	3.14	3.20	3.10	3.25	3.24	2.93	2.54	2.17	1.69	1.27
46	1.26	1.22	1.05	2.16	2.85	3.27	3.35	3.48	3.46	3.25	3.38	3.43	3.02	2.55	2.09	1.79
45	1.50	0.79	1.07	2.25	3.24	3.37	3.23	3.35	3.28	3.33	3.23	3.36	2.60	2.36	1.85	1.54
44	1.54	1.50	1.70	2.61	3.21	3.50	3.42	3.54	3.44	3.44	3.49	3.50	3.08	2.59	2.38	2.00
43	2.03	1.86	2.33	3.04	3.75	3.95	3.84	3.77	3.92	3.85	3.75	3.77	3.24	3.03	2.66	2.10
42	1.72	2.22	2.53	2.98	3.68	3.86	3.78	3.67	3.74	3.60	3.53	3.64	3.22	2.60	2.32	1.94
41	1.81	2.55	2.57	3.32	3.71	4.43	3.82	4.01	3.98	3.90	4.31	3.92	3.65	2.68	2.64	1.98
40	2.28	2.73	2.82	3.59	4.38	4.51	4.25	4.34	4.55	4.49	4.44	4.39	3.45	3.13	2.85	2.12
39	1.99	2.48	2.96	3.54	4.18	4.36	4.27	4.34	4.42	4.38	4.52	4.28	3.76	2.89	2.67	1.87
38	2.10	2.75	3.27	3.75	4.75	4.91	4.72	4.82	4.70	4.54	4.61	4.70	3.79	2.96	2.63	2.05
37	2.18	2.87	3.61	4.20	4.88	5.17	5.18	5.15	5.03	5.17	4.84	4.73	4.17	3.37	2.51	1.85
36	2.00	2.36	3.45	4.12	4.84	5.19	5.04	5.03	5.08	5.02	5.02	4.85	4.25	3.37	2.31	1.84
35	3.48	3.48	3.48	3.48	5.72	5.72	5.72	5.72	5.62	5.62	5.62	5.62	3.01	3.01	3.01	3.01
34	3.84	3.84	3.84	3.84	5.96	5.96	5.96	5.96	5.92	5.92	5.92	5.92	3.42	3.42	3.42	3.42

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-46 Test 5 – Unit 15C – 18kcfs – Vz RMS (fps)

Vz RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.30	0.27	0.32	0.39	0.41	0.35	0.39	0.48	0.63	0.56	0.48	0.56	0.53	0.48	0.32	0.35
70	0.37	0.65	0.61	0.68	0.62	0.77	0.85	0.77	0.67	0.65	0.83	0.70	0.72	0.45	0.64	0.44
68	0.42	0.45	0.36	0.39	0.61	0.78	0.60	0.59	0.79	0.64	0.74	0.68	0.68	0.72	0.73	0.61
66	0.43	0.42	0.48	0.55	0.68	0.58	0.69	0.77	0.71	0.82	0.75	0.72	0.83	0.77	0.63	0.62
64	0.41	0.65	0.53	0.79	0.67	0.91	0.63	0.93	0.96	0.71	0.93	0.75	0.72	0.72	0.69	0.66
62	0.39	0.40	0.49	0.86	0.65	0.71	0.59	0.87	0.84	0.84	0.75	0.74	0.77	0.72	0.67	0.64
60	0.52	0.27	0.38	0.57	0.88	0.50	0.89	1.19	1.10	0.75	0.78	0.78	0.75	0.70	0.94	0.67
58	0.51	0.72	0.55	0.64	0.88	0.81	0.94	0.81	0.86	0.91	1.01	0.72	0.76	0.81	0.87	0.81
56	0.66	0.85	0.51	0.74	0.90	0.93	0.87	0.82	0.82	0.96	0.79	0.78	0.86	0.96	0.86	0.87
55	0.41	0.61	0.58	1.01	0.45	0.91	0.83	0.83	0.75	0.75	0.75	0.76	0.82	0.88	0.77	0.75
54	0.61	0.65	0.84	0.82	1.06	1.05	0.71	0.76	0.89	1.02	0.69	0.78	0.76	0.87	0.73	0.75
53	0.59	0.64	0.89	0.74	0.98	0.80	0.85	0.84	0.75	0.74	0.75	0.71	0.85	0.81	0.98	0.74
52	0.71	0.63	0.82	0.67	0.95	0.94	1.00	0.73	0.73	0.71	0.81	0.64	0.77	0.74	0.79	0.63
51	0.80	0.65	0.73	1.00	0.62	0.79	0.95	0.58	0.77	0.75	0.67	0.82	0.64	0.83	0.81	0.83
50	0.90	0.71	0.93	1.14	0.89	0.73	0.65	0.59	0.67	0.65	0.57	0.61	0.69	0.89	0.64	0.65
49	0.72	0.75	0.84	1.00	0.99	0.69	0.64	0.54	0.62	0.61	0.59	0.60	0.70	0.75	0.72	0.63
48	0.81	0.82	1.01	1.11	0.97	0.67	0.66	0.57	0.62	0.58	0.63	0.63	0.78	0.75	0.81	0.75
47	0.91	0.96	0.99	0.87	0.75	0.46	0.53	0.53	0.56	0.58	0.62	0.64	0.71	0.85	0.85	0.75
46	0.74	0.91	1.13	0.92	0.77	0.66	0.54	0.51	0.51	0.59	0.56	0.61	0.70	0.69	0.71	0.73
45	0.87	1.00	1.13	0.82	0.54	0.48	0.62	0.53	0.64	0.54	0.56	0.71	0.76	0.74	0.74	0.78
44	0.88	0.99	0.95	0.84	0.64	0.65	0.57	0.54	0.54	0.56	0.60	0.65	0.69	0.75	0.69	0.70
43	0.88	0.92	0.85	0.77	0.75	0.68	0.62	0.51	0.65	0.58	0.62	0.66	0.67	0.66	0.73	0.75
42	0.88	0.81	0.77	0.77	0.79	0.65	0.63	0.59	0.66	0.62	0.66	0.74	0.85	0.75	0.71	0.80
41	0.99	0.79	0.82	0.82	0.80	0.63	0.66	0.64	0.70	0.67	0.76	0.69	0.85	0.76	0.79	0.87
40	0.86	0.79	0.83	0.81	0.71	0.71	0.68	0.68	0.63	0.68	0.68	0.71	0.80	0.80	0.78	0.91
39	0.97	0.86	0.92	0.90	0.84	0.73	0.70	0.66	0.72	0.70	0.73	0.81	0.93	0.89	0.83	0.96
38	0.98	0.90	0.99	0.93	0.62	0.64	0.71	0.70	0.69	0.73	0.78	0.85	0.95	0.95	0.88	0.98
37	1.03	0.95	1.04	0.93	0.79	0.53	0.48	0.47	0.64	0.59	0.74	0.77	0.92	1.06	0.95	1.07
36	1.21	1.09	1.20	1.09	0.80	0.61	0.59	0.44	0.51	0.61	0.58	0.77	1.12	1.23	1.17	1.20
35	1.39	1.39	1.39	1.39	0.33	0.33	0.33	0.33	0.48	0.48	0.48	0.48	1.44	1.44	1.44	1.44
34	1.49	1.49	1.49	1.49	0.32	0.32	0.32	0.32	0.37	0.37	0.37	0.37	1.54	1.54	1.54	1.54

Table B-47 Test 5 – Unit 15C – 18kcfs – Vs (fps)

Vs																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.21	0.20	0.34	0.49	0.58	0.51	0.61	0.66	0.73	0.84	0.57	0.35	0.10	0.43	0.31	0.11
70	0.17	0.45	0.45	0.59	0.64	0.89	1.05	0.92	0.98	0.80	1.21	0.61	0.52	0.37	0.54	0.15
68	0.53	0.49	0.39	0.35	0.63	1.25	0.59	1.00	1.29	1.75	0.89	1.28	1.58	1.54	0.74	0.19
66	0.43	0.58	0.01	0.54	0.86	0.45	1.14	1.43	1.62	1.24	1.26	1.80	1.40	1.38	1.00	0.71
64	0.66	0.70	0.49	0.27	0.44	1.17	0.78	1.12	0.78	1.92	1.39	1.70	1.96	1.58	1.07	1.29
62	0.61	0.69	0.49	0.58	0.29	0.31	0.38	1.54	1.21	1.37	1.92	1.81	1.86	1.66	1.53	0.99
60	1.01	0.93	0.80	0.31	0.62	0.25	0.72	1.45	1.63	1.54	2.07	1.58	1.91	1.77	1.37	0.53
58	1.05	0.31	0.49	0.54	0.28	1.65	0.94	1.76	1.98	1.89	1.69	1.92	2.07	0.93	0.61	0.45
56	1.03	0.49	0.71	0.60	0.34	0.35	0.82	0.70	2.63	1.82	2.18	2.28	1.24	1.02	1.07	0.61
55	0.89	0.40	0.35	0.20	0.29	1.38	1.27	2.00	2.44	2.47	2.41	2.27	2.18	1.21	0.90	0.17
54	0.82	0.41	0.67	0.22	0.37	1.64	1.47	2.34	2.25	2.23	2.65	2.37	2.39	1.51	0.98	0.18
53	0.82	0.64	0.10	0.43	1.31	1.71	2.01	2.04	2.27	2.77	2.59	2.79	2.05	1.23	0.75	0.59
52	0.28	0.42	0.48	0.36	1.90	1.66	2.06	2.68	2.71	2.82	2.63	2.76	2.23	1.53	1.40	0.47
51	0.51	0.38	0.17	0.68	0.83	2.28	1.97	2.57	2.84	2.63	2.56	2.47	2.49	1.44	1.18	0.26
50	0.64	0.38	0.68	1.29	1.78	2.65	2.67	2.58	3.10	2.96	2.84	2.88	2.59	1.64	0.85	0.82
49	0.85	0.28	0.54	1.11	1.97	2.72	2.77	3.23	3.25	3.31	3.27	3.18	2.71	2.16	1.76	0.92
48	0.66	0.50	0.54	1.21	2.19	2.82	2.84	2.81	3.01	2.99	2.99	2.93	2.44	1.88	1.03	0.92
47	1.04	0.44	1.22	2.23	2.88	3.13	3.14	3.21	3.16	3.29	3.29	2.98	2.57	2.19	1.70	1.28
46	1.27	1.23	1.07	2.17	2.87	3.27	3.35	3.48	3.51	3.30	3.42	3.52	3.07	2.59	2.10	1.80
45	1.51	0.87	1.09	2.27	3.28	3.37	3.23	3.35	3.30	3.37	3.28	3.43	2.62	2.38	1.87	1.55
44	1.57	1.54	1.71	2.62	3.23	3.51	3.42	3.54	3.50	3.49	3.55	3.58	3.14	2.62	2.41	2.01
43	2.06	1.90	2.35	3.06	3.77	3.95	3.85	3.77	3.96	3.89	3.79	3.86	3.30	3.07	2.69	2.12
42	1.81	2.27	2.57	3.00	3.70	3.88	3.78	3.67	3.77	3.63	3.56	3.74	3.28	2.63	2.35	1.98
41	1.88	2.63	2.58	3.36	3.74	4.45	3.82	4.01	4.04	3.92	4.37	4.03	3.72	2.71	2.70	2.04
40	2.44	2.82	2.86	3.64	4.44	4.53	4.25	4.35	4.57	4.52	4.50	4.48	3.52	3.19	2.92	2.19
39	2.17	2.57	3.00	3.58	4.22	4.36	4.28	4.35	4.45	4.42	4.57	4.36	3.84	2.95	2.75	1.96
38	2.31	2.88	3.34	3.80	4.82	4.93	4.73	4.82	4.73	4.56	4.65	4.80	3.89	3.04	2.74	2.18
37	2.36	3.00	3.70	4.26	4.93	5.20	5.21	5.16	5.07	5.21	4.88	4.81	4.26	3.48	2.64	2.00
36	2.11	2.51	3.54	4.17	4.89	5.20	5.05	5.04	5.12	5.05	5.05	4.94	4.35	3.50	2.52	2.04
35	3.62	3.62	3.62	3.62	5.75	5.75	5.75	5.75	5.65	5.65	5.65	5.65	3.20	3.20	3.20	3.20
34	3.93	3.93	3.93	3.93	5.99	5.99	5.99	5.99	5.97	5.97	5.97	5.97	3.57	3.57	3.57	3.57

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-48 Test 5 – Unit 15C – 18kcfs – Vs RMS (fps)

Vs RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.37	0.32	0.41	0.50	0.52	0.42	0.48	0.58	0.79	0.69	0.62	0.69	0.68	0.64	0.47	0.43
70	0.48	0.74	0.74	0.78	0.72	0.85	0.96	0.88	0.77	0.73	0.98	0.81	0.86	0.53	0.77	0.57
68	0.51	0.60	0.40	0.46	0.70	0.90	0.70	0.73	0.89	0.76	0.86	0.80	0.83	0.88	0.87	0.71
66	0.58	0.53	0.56	0.70	0.83	0.69	0.81	0.87	0.89	0.94	0.86	0.87	0.96	0.87	0.77	0.77
64	0.52	0.74	0.69	0.85	0.85	1.04	0.86	1.05	1.09	0.89	1.02	0.92	0.89	0.93	0.82	0.79
62	0.53	0.51	0.58	0.97	0.80	0.86	0.82	1.03	1.01	1.02	0.96	0.91	0.91	0.88	0.79	0.78
60	0.65	0.36	0.47	0.77	0.99	0.63	1.06	1.27	1.27	0.89	0.93	0.95	0.93	0.85	1.05	0.76
58	0.58	0.92	0.62	0.83	1.00	0.92	1.09	1.03	1.05	1.05	1.10	0.90	0.95	0.94	1.00	0.91
56	0.76	0.97	0.64	0.83	1.10	1.06	0.98	0.92	0.99	1.10	0.95	0.91	1.10	1.15	1.02	1.06
55	0.50	0.75	0.72	1.28	0.58	1.10	1.02	1.02	0.93	0.90	0.91	0.91	1.03	1.16	1.00	0.94
54	0.74	0.85	0.97	1.04	1.18	1.26	0.95	0.99	1.05	1.15	0.86	0.94	0.96	1.15	0.99	0.96
53	0.75	0.80	1.11	1.00	1.15	0.97	1.07	1.12	0.92	0.89	0.89	0.87	1.04	1.04	1.22	0.91
52	0.88	0.83	1.04	0.99	1.17	1.13	1.17	0.84	0.89	0.85	0.93	0.80	1.01	0.96	1.04	0.76
51	0.93	0.77	0.98	1.25	0.87	0.94	1.15	0.71	0.91	0.89	0.82	0.95	0.81	1.04	1.04	1.00
50	1.13	0.95	1.14	1.27	1.09	0.91	0.82	0.77	0.82	0.79	0.71	0.76	0.86	1.10	0.91	0.85
49	0.96	1.05	1.11	1.16	1.13	0.80	0.83	0.67	0.76	0.75	0.70	0.76	0.87	0.95	0.93	0.79
48	1.04	1.06	1.22	1.28	1.10	0.83	0.80	0.71	0.79	0.73	0.77	0.79	0.95	0.98	1.00	0.97
47	1.11	1.13	1.23	1.07	0.88	0.61	0.70	0.67	0.72	0.75	0.78	0.81	0.89	1.04	1.03	0.92
46	0.91	1.09	1.35	1.13	0.91	0.83	0.74	0.63	0.65	0.75	0.71	0.75	0.87	0.86	0.89	0.93
45	1.07	1.17	1.33	1.05	0.69	0.65	0.76	0.67	0.81	0.69	0.70	0.85	0.93	0.96	0.93	0.94
44	1.06	1.17	1.19	1.06	0.80	0.80	0.74	0.64	0.70	0.70	0.74	0.80	0.89	0.93	0.87	0.88
43	1.04	1.10	1.08	1.00	0.91	0.82	0.78	0.67	0.81	0.74	0.79	0.81	0.84	0.84	0.91	0.95
42	1.07	0.99	0.97	1.00	0.92	0.76	0.77	0.75	0.82	0.76	0.81	0.89	1.02	0.95	0.90	1.01
41	1.19	0.97	1.00	1.04	0.96	0.75	0.86	0.77	0.85	0.83	0.94	0.85	1.06	0.96	1.00	1.11
40	1.13	1.01	1.03	1.04	0.88	0.82	0.82	0.83	0.76	0.80	0.85	0.89	0.99	1.00	1.01	1.15
39	1.28	1.07	1.15	1.13	1.02	0.81	0.83	0.81	0.88	0.84	0.83	0.97	1.14	1.13	1.10	1.26
38	1.30	1.18	1.24	1.20	0.75	0.78	0.84	0.82	0.83	0.87	0.94	1.02	1.16	1.22	1.17	1.30
37	1.34	1.25	1.30	1.17	0.94	0.65	0.56	0.57	0.73	0.71	0.85	0.91	1.17	1.36	1.26	1.37
36	1.61	1.44	1.48	1.34	0.92	0.74	0.69	0.55	0.63	0.71	0.70	0.90	1.33	1.50	1.48	1.49
35	1.76	1.76	1.76	1.76	0.43	0.43	0.43	0.43	0.57	0.57	0.57	0.57	1.78	1.78	1.78	1.78
34	1.84	1.84	1.84	1.84	0.40	0.40	0.40	0.40	0.48	0.48	0.48	0.48	1.87	1.87	1.87	1.87

Table B-49 Test 5 – Unit 15C – 18kcfs – Vt (fps)

Vt																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.21	0.20	0.34	0.49	0.58	0.51	0.61	0.66	0.73	0.85	0.59	0.36	0.18	0.46	0.38	0.17
70	0.19	0.47	0.46	0.59	0.64	0.91	1.05	0.94	1.00	0.81	1.22	0.68	0.56	0.38	0.60	0.17
68	0.53	0.49	0.39	0.36	0.63	1.25	0.59	1.00	1.29	1.75	0.90	1.29	1.58	1.55	0.78	0.21
66	0.44	0.58	0.06	0.54	0.86	0.46	1.15	1.43	1.62	1.24	1.27	1.80	1.40	1.38	1.01	0.73
64	0.66	0.70	0.50	0.27	0.44	1.17	0.79	1.12	0.78	1.92	1.39	1.70	1.96	1.58	1.07	1.29
62	0.61	0.69	0.50	0.58	0.30	0.32	0.39	1.55	1.21	1.37	1.92	1.82	1.86	1.66	1.54	1.00
60	1.01	0.93	0.80	0.32	0.63	0.27	0.72	1.45	1.63	1.54	2.07	1.58	1.91	1.77	1.37	0.53
58	1.05	0.34	0.49	0.55	0.28	1.65	0.94	1.76	1.98	1.89	1.69	1.92	2.08	0.93	0.61	0.46
56	1.10	0.69	0.82	0.78	0.54	0.62	1.04	0.92	2.69	1.88	2.23	2.32	1.37	1.17	1.20	0.82
55	0.96	0.50	0.50	0.47	0.44	1.45	1.36	2.06	2.48	2.51	2.45	2.31	2.25	1.33	1.01	0.50
54	0.92	0.66	0.81	0.57	0.58	1.71	1.59	2.42	2.31	2.30	2.70	2.40	2.50	1.66	1.17	0.57
53	1.03	0.82	0.62	0.63	1.40	1.80	2.12	2.17	2.36	2.86	2.66	2.84	2.18	1.42	0.99	0.89
52	0.54	0.60	0.70	0.55	1.95	1.71	2.13	2.75	2.76	2.86	2.67	2.80	2.31	1.65	1.51	0.69
51	0.77	0.81	0.68	0.93	1.01	2.35	2.11	2.70	2.92	2.73	2.64	2.54	2.61	1.63	1.41	0.71
50	0.93	0.97	1.06	1.50	1.89	2.75	2.84	2.75	3.22	3.08	2.93	2.95	2.75	1.85	1.20	1.12
49	1.00	0.54	0.77	1.25	2.02	2.78	2.84	3.30	3.30	3.37	3.31	3.21	2.79	2.26	1.90	1.10
48	1.00	0.90	0.92	1.38	2.27	2.91	2.97	2.93	3.11	3.09	3.06	2.99	2.58	2.07	1.30	1.19
47	1.27	0.94	1.48	2.35	2.94	3.24	3.28	3.34	3.26	3.40	3.36	3.05	2.73	2.36	1.93	1.51
46	1.34	1.35	1.18	2.22	2.91	3.31	3.42	3.55	3.57	3.35	3.47	3.55	3.14	2.68	2.20	1.91
45	1.68	1.09	1.26	2.37	3.34	3.45	3.33	3.47	3.39	3.47	3.36	3.47	2.76	2.53	2.05	1.74
44	1.74	1.73	1.88	2.74	3.31	3.59	3.54	3.67	3.60	3.60	3.62	3.64	3.28	2.80	2.59	2.20
43	2.13	1.98	2.41	3.11	3.80	3.99	3.89	3.83	4.00	3.94	3.83	3.89	3.37	3.16	2.80	2.22
42	1.95	2.40	2.66	3.08	3.75	3.94	3.85	3.74	3.83	3.69	3.61	3.78	3.38	2.76	2.51	2.13
41	2.04	2.77	2.72	3.44	3.79	4.51	3.92	4.10	4.10	3.99	4.41	4.07	3.81	2.86	2.88	2.21
40	2.52	2.90	2.92	3.68	4.47	4.56	4.29	4.39	4.60	4.55	4.52	4.50	3.58	3.27	3.03	2.29
39	2.33	2.72	3.10	3.64	4.26	4.41	4.34	4.40	4.50	4.46	4.61	4.38	3.92	3.07	2.94	2.12
38	2.45	3.07	3.47	3.88	4.86	4.98	4.81	4.90	4.79	4.62	4.69	4.83	3.99	3.18	2.97	2.35
37	2.43	3.13	3.76	4.29	4.95	5.23	5.25	5.20	5.10	5.24	4.90	4.83	4.32	3.59	2.82	2.08
36	2.25	2.80	3.68	4.25	4.95	5.27	5.15	5.14	5.20	5.13	5.11	4.97	4.46	3.67	2.80	2.22
35	3.85	3.85	3.85	3.85	5.86	5.86	5.86	5.86	5.74	5.74	5.74	5.74	3.48	3.48	3.48	3.48
34	4.04	4.04	4.04	4.04	6.05	6.05	6.05	6.05	6.02	6.02	6.02	6.02	3.72	3.72	3.72	3.72

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-50 Test 5 – Unit 15C – 18kcfs – Vt RMS (fps)

Vt RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.51	0.46	0.56	0.64	0.64	0.53	0.61	0.72	0.95	0.84	0.79	0.85	0.80	0.78	0.59	0.56
70	0.56	0.81	0.87	0.90	0.83	0.94	1.04	0.96	0.93	0.84	1.08	0.90	0.94	0.62	0.91	0.66
68	0.62	0.72	0.48	0.58	0.79	1.03	0.78	0.84	1.02	0.90	0.97	0.90	0.95	1.00	0.95	0.79
66	0.68	0.62	0.66	0.82	0.94	0.77	0.90	0.98	1.03	1.06	0.95	0.97	1.10	0.98	0.88	0.89
64	0.61	0.85	0.82	0.95	0.92	1.17	0.95	1.14	1.20	1.01	1.11	1.06	0.99	1.06	0.92	0.91
62	0.64	0.60	0.67	1.09	0.88	0.94	0.93	1.11	1.11	1.11	1.07	1.01	1.03	0.99	0.91	0.88
60	0.74	0.43	0.56	0.88	1.08	0.71	1.13	1.33	1.35	1.00	1.03	1.10	1.05	0.96	1.18	0.88
58	0.66	1.01	0.72	0.91	1.07	1.01	1.16	1.11	1.16	1.16	1.19	1.00	1.06	1.09	1.14	1.01
56	0.84	1.05	0.71	0.89	1.18	1.13	1.05	0.99	1.08	1.19	1.06	1.01	1.20	1.25	1.17	1.18
55	0.58	0.83	0.80	1.35	0.67	1.19	1.08	1.09	1.04	0.99	1.00	1.02	1.13	1.28	1.15	1.04
54	0.82	0.96	1.04	1.14	1.24	1.33	1.04	1.06	1.16	1.21	0.94	1.03	1.06	1.25	1.09	1.04
53	0.86	0.88	1.18	1.09	1.22	1.08	1.15	1.19	1.02	0.98	0.98	0.96	1.15	1.15	1.33	1.00
52	0.96	0.93	1.15	1.10	1.26	1.24	1.24	0.91	0.97	0.93	1.02	0.90	1.13	1.07	1.14	0.85
51	1.06	0.89	1.08	1.34	0.99	1.04	1.22	0.80	1.02	0.96	0.92	1.04	0.91	1.15	1.15	1.10
50	1.23	1.06	1.22	1.36	1.18	0.99	0.89	0.85	0.91	0.87	0.81	0.86	0.96	1.21	1.02	0.94
49	1.06	1.15	1.21	1.28	1.20	0.91	0.92	0.76	0.87	0.84	0.80	0.86	0.97	1.05	1.04	0.89
48	1.13	1.17	1.33	1.38	1.19	0.91	0.88	0.80	0.89	0.81	0.85	0.89	1.05	1.08	1.11	1.06
47	1.22	1.24	1.33	1.17	0.98	0.69	0.80	0.74	0.83	0.84	0.89	0.91	1.01	1.14	1.12	1.02
46	1.03	1.19	1.48	1.25	1.00	0.93	0.85	0.71	0.76	0.86	0.81	0.86	0.99	0.98	1.00	1.05
45	1.19	1.27	1.44	1.16	0.77	0.77	0.83	0.76	0.92	0.79	0.81	0.97	1.06	1.08	1.05	1.07
44	1.18	1.28	1.29	1.19	0.91	0.88	0.83	0.73	0.81	0.81	0.85	0.93	1.03	1.06	1.01	1.02
43	1.20	1.25	1.21	1.13	1.03	0.93	0.87	0.77	0.92	0.86	0.91	0.94	0.99	0.99	1.07	1.11
42	1.23	1.14	1.11	1.13	1.03	0.87	0.87	0.82	0.93	0.88	0.92	1.01	1.16	1.11	1.05	1.18
41	1.35	1.15	1.15	1.20	1.07	0.85	0.97	0.86	0.97	0.95	1.05	0.98	1.23	1.13	1.19	1.30
40	1.35	1.21	1.21	1.20	1.01	0.91	0.93	0.89	0.89	0.92	0.97	1.03	1.15	1.19	1.24	1.39
39	1.50	1.29	1.34	1.31	1.14	0.92	0.94	0.91	1.00	0.95	0.97	1.11	1.31	1.33	1.34	1.48
38	1.57	1.43	1.46	1.40	0.88	0.86	0.95	0.90	0.94	0.99	1.06	1.16	1.36	1.44	1.44	1.56
37	1.62	1.55	1.53	1.36	1.07	0.74	0.65	0.67	0.83	0.81	0.98	1.05	1.37	1.61	1.56	1.64
36	1.86	1.74	1.74	1.53	1.05	0.81	0.78	0.62	0.73	0.80	0.80	1.03	1.52	1.74	1.78	1.77
35	2.07	2.07	2.07	2.07	0.51	0.51	0.51	0.51	0.67	0.67	0.67	0.67	2.10	2.10	2.10	2.10
34	2.14	2.14	2.14	2.14	0.49	0.49	0.49	0.49	0.58	0.58	0.58	0.58	2.18	2.18	2.18	2.18

Table B-51 Test 6 – Unit 15C – 15kcfs – Vx (fps)

Vx																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	-0.08	-0.03	0.00	0.03	-0.02	-0.11	-0.06	-0.06	-0.14	0.00	-0.08	-0.08	-0.04	0.00	0.02	-0.02
70	0.06	-0.16	-0.07	-0.12	-0.05	-0.05	-0.06	-0.17	-0.16	-0.22	-0.10	-0.21	-0.06	-0.10	-0.10	0.02
68	0.01	-0.01	-0.06	-0.01	-0.06	0.02	-0.02	-0.06	-0.11	-0.05	-0.12	-0.13	-0.13	-0.09	-0.17	-0.11
66	0.01	-0.06	0.01	0.06	0.03	0.00	-0.01	-0.04	-0.02	0.03	-0.02	-0.05	-0.01	-0.08	-0.08	-0.14
64	0.02	0.00	-0.02	0.00	-0.03	-0.06	-0.06	-0.03	0.01	-0.02	0.02	-0.05	0.08	0.02	0.00	-0.08
62	-0.02	0.04	0.00	-0.01	-0.02	0.00	-0.08	-0.04	-0.04	0.00	-0.11	-0.03	0.06	0.08	0.05	-0.03
60	0.11	-0.05	0.05	0.04	0.02	-0.03	-0.04	-0.01	0.03	-0.03	0.01	0.00	0.09	0.03	0.04	0.00
58	0.05	0.08	0.07	0.08	-0.07	0.02	0.08	0.06	0.03	0.05	0.07	0.06	0.11	0.06	0.11	0.05
56	0.35	0.39	0.42	0.38	0.40	0.37	0.58	0.53	0.37	0.40	0.41	0.31	0.52	0.52	0.36	0.37
55	0.32	0.28	0.39	0.30	0.31	0.23	0.34	0.30	0.34	0.33	0.31	0.31	0.41	0.47	0.48	0.42
54	0.43	0.40	0.43	0.38	0.27	0.39	0.44	0.44	0.48	0.44	0.39	0.35	0.52	0.53	0.53	0.52
53	0.49	0.51	0.58	0.43	0.31	0.46	0.57	0.57	0.51	0.55	0.49	0.39	0.61	0.61	0.59	0.57
52	0.37	0.41	0.37	0.37	0.28	0.34	0.44	0.43	0.42	0.43	0.36	0.31	0.50	0.45	0.41	0.39
51	0.59	0.58	0.59	0.48	0.42	0.42	0.66	0.68	0.58	0.58	0.52	0.44	0.65	0.63	0.66	0.51
50	0.58	0.69	0.62	0.64	0.48	0.59	0.71	0.72	0.61	0.68	0.60	0.50	0.69	0.69	0.72	0.59
49	0.39	0.51	0.45	0.46	0.33	0.38	0.52	0.50	0.49	0.47	0.44	0.35	0.54	0.56	0.51	0.48
48	0.55	0.60	0.53	0.55	0.47	0.50	0.68	0.67	0.60	0.61	0.51	0.47	0.61	0.67	0.67	0.56
47	0.63	0.56	0.66	0.62	0.51	0.57	0.73	0.71	0.65	0.63	0.55	0.44	0.72	0.71	0.68	0.64
46	0.40	0.40	0.42	0.46	0.38	0.38	0.50	0.55	0.47	0.46	0.41	0.37	0.54	0.55	0.54	0.49
45	0.50	0.62	0.59	0.58	0.49	0.60	0.68	0.70	0.59	0.61	0.52	0.47	0.63	0.69	0.66	0.66
44	0.61	0.63	0.62	0.64	0.55	0.59	0.71	0.72	0.58	0.58	0.54	0.48	0.71	0.73	0.67	0.59
43	0.45	0.45	0.43	0.40	0.35	0.40	0.47	0.45	0.41	0.41	0.36	0.33	0.51	0.51	0.50	0.44
42	0.60	0.61	0.57	0.56	0.49	0.51	0.61	0.63	0.49	0.52	0.50	0.40	0.62	0.65	0.72	0.68
41	0.65	0.68	0.66	0.60	0.51	0.58	0.63	0.66	0.55	0.57	0.53	0.43	0.70	0.73	0.76	0.70
40	0.58	0.53	0.47	0.40	0.34	0.38	0.43	0.43	0.35	0.37	0.32	0.33	0.49	0.54	0.67	0.61
39	0.64	0.75	0.64	0.57	0.43	0.49	0.53	0.53	0.46	0.44	0.42	0.38	0.62	0.70	0.80	0.71
38	0.69	0.84	0.72	0.57	0.50	0.54	0.62	0.62	0.58	0.59	0.51	0.40	0.67	0.77	0.91	0.60
37	0.47	0.72	0.55	0.44	0.34	0.36	0.49	0.51	0.44	0.46	0.38	0.37	0.60	0.68	0.84	0.47
36	0.70	1.03	0.82	0.69	0.59	0.69	0.84	0.82	0.69	0.74	0.66	0.53	0.79	0.91	1.06	0.75
35	0.59	1.10	0.88	0.66	0.61	0.73	0.90	0.88	0.77	0.78	0.69	0.58	0.86	0.98	1.11	0.78
34	0.48	0.76	0.56	0.51	0.47	0.51	0.59	0.60	0.53	0.51	0.49	0.52	0.74	0.69	0.84	0.60

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-52 Test 6 – Unit 15C – 15kcfs – Vx RMS (fps)

Vx RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.26	0.30	0.29	0.26	0.26	0.29	0.29	0.34	0.33	0.37	0.36	0.36	0.28	0.26	0.27	0.28
70	0.27	0.28	0.27	0.38	0.25	0.23	0.21	0.37	0.36	0.33	0.28	0.38	0.36	0.30	0.27	0.27
68	0.24	0.30	0.32	0.27	0.24	0.32	0.32	0.30	0.35	0.38	0.35	0.38	0.36	0.33	0.33	0.34
66	0.24	0.31	0.34	0.25	0.31	0.36	0.37	0.29	0.37	0.37	0.36	0.33	0.34	0.34	0.31	0.31
64	0.28	0.38	0.32	0.25	0.29	0.40	0.35	0.30	0.36	0.38	0.34	0.38	0.35	0.38	0.34	0.37
62	0.22	0.25	0.25	0.30	0.27	0.28	0.34	0.29	0.37	0.36	0.36	0.40	0.37	0.33	0.39	0.41
60	0.41	0.23	0.32	0.37	0.39	0.35	0.37	0.35	0.45	0.41	0.38	0.41	0.48	0.40	0.43	0.41
58	0.26	0.37	0.46	0.35	0.37	0.40	0.39	0.37	0.38	0.36	0.40	0.42	0.39	0.41	0.48	0.45
56	0.26	0.29	0.29	0.33	0.35	0.34	0.35	0.34	0.39	0.43	0.35	0.43	0.37	0.38	0.43	0.47
55	0.25	0.32	0.31	0.28	0.37	0.33	0.38	0.38	0.38	0.39	0.37	0.40	0.40	0.40	0.37	0.39
54	0.37	0.32	0.33	0.30	0.41	0.37	0.35	0.36	0.36	0.37	0.35	0.34	0.40	0.37	0.41	0.37
53	0.39	0.38	0.38	0.34	0.40	0.36	0.36	0.36	0.41	0.33	0.32	0.35	0.38	0.39	0.35	0.39
52	0.39	0.36	0.42	0.38	0.45	0.39	0.31	0.36	0.38	0.34	0.37	0.35	0.36	0.41	0.42	0.35
51	0.40	0.41	0.31	0.42	0.36	0.31	0.32	0.30	0.36	0.33	0.33	0.35	0.37	0.40	0.38	0.36
50	0.36	0.41	0.39	0.41	0.38	0.37	0.33	0.31	0.39	0.34	0.33	0.33	0.36	0.39	0.40	0.35
49	0.40	0.37	0.40	0.43	0.41	0.38	0.29	0.30	0.37	0.33	0.33	0.36	0.37	0.37	0.38	0.39
48	0.39	0.41	0.40	0.43	0.35	0.37	0.35	0.28	0.32	0.36	0.32	0.37	0.36	0.39	0.39	0.37
47	0.42	0.37	0.41	0.39	0.42	0.38	0.29	0.30	0.36	0.33	0.32	0.36	0.38	0.37	0.40	0.39
46	0.42	0.43	0.43	0.46	0.36	0.36	0.29	0.28	0.35	0.34	0.37	0.39	0.41	0.41	0.44	0.41
45	0.42	0.43	0.42	0.43	0.39	0.34	0.29	0.29	0.37	0.35	0.36	0.39	0.39	0.42	0.41	0.42
44	0.45	0.45	0.46	0.43	0.35	0.37	0.31	0.32	0.37	0.35	0.37	0.39	0.42	0.44	0.43	0.44
43	0.49	0.46	0.45	0.46	0.42	0.34	0.32	0.34	0.38	0.39	0.40	0.43	0.44	0.44	0.47	0.51
42	0.47	0.47	0.48	0.46	0.39	0.40	0.33	0.31	0.41	0.42	0.42	0.42	0.48	0.48	0.48	0.51
41	0.55	0.51	0.46	0.47	0.43	0.39	0.37	0.36	0.41	0.40	0.41	0.47	0.48	0.52	0.51	0.56
40	0.59	0.53	0.51	0.52	0.42	0.44	0.35	0.31	0.42	0.40	0.43	0.47	0.51	0.54	0.59	0.64
39	0.67	0.58	0.56	0.55	0.48	0.42	0.35	0.35	0.41	0.41	0.46	0.47	0.56	0.60	0.62	0.62
38	0.70	0.66	0.66	0.55	0.47	0.34	0.31	0.34	0.41	0.42	0.43	0.47	0.59	0.64	0.68	0.69
37	0.77	0.74	0.68	0.60	0.46	0.34	0.31	0.31	0.39	0.41	0.43	0.51	0.60	0.72	0.77	0.75
36	0.75	0.82	0.74	0.64	0.46	0.41	0.29	0.28	0.38	0.33	0.41	0.43	0.61	0.75	0.84	0.78
35	0.80	0.84	0.83	0.63	0.46	0.27	0.29	0.25	0.29	0.30	0.34	0.40	0.59	0.79	0.91	0.82
34	0.92	0.88	0.83	0.57	0.33	0.27	0.26	0.26	0.26	0.28	0.32	0.32	0.54	0.76	0.95	0.93

Table B-53 Test 6 – Unit 15C – 15kcfs – Vy (fps)

Vy																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.10	0.15	0.17	0.19	0.13	0.35	0.35	0.28	0.21	0.46	0.53	0.22	0.13	0.36	0.39	0.16
70	-0.04	0.09	0.11	0.52	0.39	0.39	0.30	0.71	0.49	0.65	0.42	0.12	0.12	0.25	0.22	-0.04
68	0.17	0.25	0.38	0.31	0.35	0.57	0.39	0.29	0.28	0.39	0.16	-0.20	0.05	0.03	-0.01	-0.07
66	0.10	0.31	0.39	0.16	0.20	0.48	0.59	0.39	0.19	0.10	0.09	0.12	-0.12	-0.32	-0.27	-0.33
64	0.20	0.42	0.37	0.11	0.27	0.74	0.59	0.30	0.36	0.21	0.16	-0.31	-0.35	-0.35	-0.21	-0.45
62	0.01	0.11	0.08	0.04	-0.04	0.18	0.34	0.19	-0.03	0.16	-0.23	-0.44	-0.56	-0.43	-0.47	-0.53
60	0.32	-0.02	0.22	0.37	0.43	0.17	0.25	0.27	-0.52	-0.33	-0.37	-0.67	-0.72	-0.59	-0.51	-0.54
58	0.01	0.24	0.39	0.25	0.04	0.26	0.75	0.08	-0.22	-0.31	-0.35	-0.73	-0.38	-0.49	-0.38	-0.57
56	-0.01	0.01	-0.13	-0.34	0.24	-0.16	-0.15	-0.08	-0.38	-0.42	-0.56	-0.85	-0.56	-0.51	-0.45	-0.67
55	-0.20	-0.39	-0.06	-0.35	-0.21	-0.32	-0.31	-0.22	-0.40	-0.48	-0.38	-0.59	-0.52	-0.48	-0.39	-0.25
54	-0.51	-0.46	-0.36	-0.19	0.07	-0.36	-0.25	-0.39	-0.37	-0.39	-0.49	-0.63	-0.43	-0.36	-0.30	-0.15
53	-0.32	-0.22	-0.15	-0.27	0.13	-0.25	-0.27	-0.30	-0.43	-0.48	-0.35	-0.65	-0.64	-0.19	-0.01	-0.11
52	-0.46	-0.27	0.15	0.02	-0.02	-0.09	0.16	-0.15	-0.53	-0.42	-0.11	-0.48	-0.55	-0.26	0.31	0.06
51	-0.27	-0.04	0.04	0.46	0.08	-0.20	-0.14	-0.08	-0.54	-0.27	-0.47	-0.48	-0.47	-0.22	-0.21	0.10
50	-0.27	0.04	0.05	0.27	0.07	-0.05	-0.01	-0.08	-0.63	-0.44	-0.26	-0.55	-0.55	-0.20	-0.08	-0.03
49	0.03	-0.16	0.17	0.31	0.32	-0.24	-0.13	0.03	-0.54	-0.54	-0.37	-0.36	-0.51	-0.28	-0.09	-0.05
48	-0.06	0.04	0.21	0.17	0.16	-0.27	-0.18	0.00	-0.52	-0.56	-0.34	-0.43	-0.41	-0.32	-0.22	0.04
47	-0.03	0.17	0.21	0.09	0.17	-0.05	0.04	-0.06	-0.52	-0.59	-0.39	-0.56	-0.49	-0.39	-0.16	-0.09
46	0.16	0.22	0.26	0.17	0.26	0.05	0.13	-0.02	-0.37	-0.34	-0.19	-0.48	-0.30	-0.27	-0.09	-0.16
45	0.09	0.25	0.22	0.28	0.23	-0.04	0.07	0.06	-0.44	-0.35	-0.37	-0.54	-0.36	-0.22	-0.22	-0.21
44	0.22	0.24	0.30	0.28	0.24	-0.03	0.13	0.06	-0.58	-0.49	-0.40	-0.69	-0.58	-0.42	-0.22	-0.18
43	0.32	0.27	0.27	0.25	0.25	0.06	0.24	0.17	-0.52	-0.49	-0.34	-0.59	-0.57	-0.33	-0.23	-0.25
42	0.33	0.43	0.34	0.26	0.30	0.24	0.24	0.00	-0.48	-0.28	-0.33	-0.72	-0.46	-0.26	-0.32	-0.30
41	0.43	0.32	0.38	0.49	0.35	0.09	0.26	0.26	-0.49	-0.61	-0.37	-0.60	-0.59	-0.52	-0.38	-0.33
40	0.59	0.41	0.42	0.44	0.43	0.22	0.27	0.29	-0.54	-0.53	-0.54	-0.68	-0.68	-0.57	-0.51	-0.43
39	0.75	0.56	0.36	0.48	0.54	0.28	0.16	0.26	-0.44	-0.42	-0.52	-0.63	-0.59	-0.49	-0.54	-0.53
38	0.86	0.69	0.64	0.50	0.68	0.39	0.33	0.19	-0.42	-0.45	-0.42	-0.75	-0.70	-0.58	-0.63	-0.55
37	0.73	0.70	0.65	0.68	0.56	0.39	0.40	0.43	-0.52	-0.56	-0.49	-0.70	-0.77	-0.70	-0.71	-0.57
36	0.59	0.75	0.71	0.58	0.53	0.32	0.41	0.23	-0.56	-0.41	-0.40	-0.76	-0.77	-0.74	-0.71	-0.64
35	0.52	0.66	0.67	0.55	0.61	0.31	0.36	0.44	-0.62	-0.65	-0.63	-0.76	-0.81	-0.88	-0.99	-0.66
34	0.40	0.65	0.60	0.54	0.60	0.44	0.49	0.44	-0.63	-0.67	-0.65	-0.85	-0.73	-0.78	-0.83	-0.68

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-54 Test 6 – Unit 15C – 15kcfs – Vy RMS (fps)

Vy RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.18	0.18	0.21	0.20	0.25	0.19	0.25	0.29	0.37	0.31	0.37	0.43	0.28	0.26	0.23	0.33
70	0.26	0.24	0.20	0.36	0.26	0.21	0.21	0.30	0.35	0.36	0.43	0.43	0.35	0.30	0.28	0.25
68	0.22	0.25	0.36	0.27	0.24	0.33	0.23	0.32	0.37	0.36	0.47	0.39	0.52	0.38	0.37	0.35
66	0.21	0.33	0.37	0.22	0.28	0.49	0.42	0.35	0.37	0.36	0.44	0.33	0.35	0.37	0.38	0.40
64	0.28	0.27	0.35	0.24	0.25	0.42	0.41	0.30	0.43	0.38	0.41	0.35	0.38	0.47	0.41	0.34
62	0.20	0.26	0.30	0.37	0.36	0.32	0.46	0.50	0.41	0.40	0.46	0.39	0.40	0.38	0.39	0.37
60	0.42	0.25	0.30	0.35	0.70	0.52	0.48	0.54	0.55	0.44	0.53	0.41	0.41	0.39	0.41	0.41
58	0.24	0.42	0.43	0.37	0.60	0.59	0.49	0.62	0.45	0.44	0.51	0.43	0.48	0.39	0.52	0.40
56	0.28	0.35	0.32	0.40	0.43	0.57	0.55	0.40	0.54	0.54	0.43	0.39	0.47	0.46	0.51	0.47
55	0.26	0.39	0.35	0.36	0.55	0.43	0.61	0.48	0.51	0.47	0.55	0.43	0.53	0.48	0.53	0.47
54	0.36	0.49	0.49	0.36	0.55	0.55	0.40	0.54	0.46	0.45	0.46	0.36	0.60	0.46	0.57	0.47
53	0.40	0.59	0.55	0.53	0.55	0.52	0.56	0.62	0.47	0.43	0.42	0.43	0.49	0.57	0.51	0.49
52	0.46	0.45	0.64	0.53	0.54	0.46	0.43	0.46	0.43	0.42	0.43	0.41	0.40	0.58	0.41	0.49
51	0.49	0.60	0.52	0.48	0.47	0.47	0.42	0.38	0.44	0.45	0.38	0.39	0.44	0.49	0.50	0.47
50	0.47	0.66	0.60	0.57	0.52	0.42	0.42	0.39	0.44	0.37	0.36	0.36	0.43	0.56	0.55	0.50
49	0.47	0.56	0.53	0.52	0.50	0.47	0.38	0.36	0.39	0.36	0.39	0.41	0.43	0.44	0.44	0.46
48	0.57	0.64	0.63	0.58	0.45	0.46	0.44	0.32	0.38	0.39	0.38	0.37	0.42	0.47	0.47	0.47
47	0.53	0.48	0.50	0.56	0.55	0.39	0.32	0.37	0.42	0.37	0.37	0.39	0.44	0.45	0.48	0.45
46	0.48	0.48	0.49	0.47	0.41	0.43	0.33	0.34	0.37	0.38	0.43	0.39	0.44	0.45	0.53	0.44
45	0.54	0.51	0.49	0.52	0.45	0.36	0.37	0.34	0.38	0.37	0.39	0.40	0.41	0.48	0.47	0.45
44	0.46	0.52	0.53	0.50	0.44	0.42	0.36	0.33	0.38	0.42	0.37	0.38	0.48	0.49	0.44	0.44
43	0.49	0.47	0.51	0.49	0.48	0.38	0.36	0.37	0.40	0.39	0.40	0.39	0.45	0.44	0.46	0.50
42	0.47	0.48	0.53	0.52	0.41	0.44	0.40	0.33	0.42	0.43	0.42	0.43	0.50	0.48	0.47	0.54
41	0.55	0.53	0.50	0.53	0.48	0.41	0.34	0.39	0.43	0.41	0.42	0.43	0.48	0.56	0.51	0.55
40	0.54	0.52	0.50	0.54	0.45	0.45	0.41	0.34	0.39	0.43	0.42	0.46	0.49	0.51	0.54	0.59
39	0.61	0.54	0.56	0.57	0.46	0.43	0.46	0.42	0.40	0.43	0.44	0.43	0.56	0.55	0.57	0.59
38	0.66	0.64	0.61	0.58	0.48	0.38	0.33	0.35	0.36	0.38	0.43	0.44	0.61	0.60	0.64	0.65
37	0.74	0.68	0.66	0.61	0.50	0.40	0.35	0.28	0.34	0.41	0.40	0.45	0.62	0.72	0.69	0.70
36	0.79	0.74	0.81	0.69	0.54	0.41	0.29	0.31	0.38	0.30	0.38	0.39	0.62	0.73	0.76	0.75
35	0.83	0.81	0.73	0.67	0.51	0.31	0.28	0.25	0.27	0.27	0.28	0.34	0.58	0.81	0.85	0.82
34	0.99	0.82	0.89	0.62	0.36	0.26	0.25	0.25	0.23	0.24	0.25	0.30	0.50	0.79	0.84	0.85

Table B-55 Test 6 – Unit 15C – 15kcfs – Vz (fps)

Vz																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	-0.21	-0.25	-0.12	-0.16	-0.08	-0.14	0.12	-0.17	-0.04	-0.28	0.00	-0.35	-0.18	-0.43	-0.32	-0.33
70	-0.66	-0.51	-0.30	0.02	-0.17	-0.04	-0.17	0.73	0.39	0.51	0.11	0.73	0.40	0.27	0.05	-0.46
68	-0.57	-0.48	-0.23	-0.11	-0.14	0.13	0.03	0.31	0.54	1.15	1.10	0.89	0.86	1.02	0.62	0.37
66	-0.72	-0.35	-0.27	-0.57	-0.21	0.31	0.54	0.42	0.64	1.10	1.33	1.29	1.38	1.36	1.05	0.87
64	-0.88	-0.36	-0.48	-0.46	-0.24	0.56	0.38	0.52	0.88	1.57	1.38	1.46	1.77	1.11	1.28	0.94
62	-0.79	-0.91	-0.82	-0.42	-0.28	-0.41	0.51	1.10	0.91	1.26	1.63	1.38	1.80	1.67	1.13	0.62
60	-0.07	-0.67	-0.36	0.15	1.42	0.66	1.11	1.63	1.41	1.40	1.70	1.32	0.34	1.00	0.57	0.03
58	-0.85	-0.30	-0.99	-0.42	0.25	1.26	1.79	1.50	2.09	1.54	2.07	1.82	0.94	0.23	0.16	0.14
56	-1.03	-1.14	-0.57	-0.02	-0.41	0.07	1.48	1.16	1.80	1.89	1.79	1.64	1.71	1.39	-0.19	-0.07
55	-0.45	-0.47	-0.80	-0.20	0.06	0.23	1.03	1.44	1.94	2.05	2.00	1.74	1.67	1.51	1.27	0.31
54	0.42	-0.10	-0.09	-0.44	0.50	0.68	0.99	1.36	1.66	1.86	1.84	1.97	1.49	1.33	0.77	0.71
53	0.58	0.13	-0.25	-0.11	0.50	1.13	1.75	1.71	1.70	2.26	2.13	2.10	1.87	1.17	0.79	0.81
52	0.31	0.24	0.09	0.18	0.68	1.39	2.23	2.10	2.13	2.09	2.25	2.18	2.08	1.20	0.34	0.64
51	0.59	0.24	0.08	0.61	0.92	1.71	1.70	1.99	1.99	2.05	2.13	2.00	1.80	1.14	0.83	0.39
50	0.69	0.45	0.14	0.79	0.91	2.00	2.41	2.04	2.19	2.45	2.40	2.24	2.05	1.32	0.75	0.99
49	0.70	0.11	0.44	1.33	1.95	2.02	2.43	2.54	2.40	2.72	2.47	2.42	2.24	1.79	1.10	0.82
48	0.66	0.23	0.36	1.40	1.77	2.22	2.18	2.42	2.34	2.46	2.39	2.40	2.04	1.85	1.23	0.84
47	1.06	0.81	1.08	1.23	2.04	2.26	2.43	2.57	2.59	2.51	2.56	2.61	2.28	1.91	1.19	1.01
46	0.82	0.92	1.60	1.46	2.54	2.77	2.76	2.85	2.82	2.69	2.66	2.89	2.29	1.93	1.19	1.38
45	1.12	0.91	1.32	1.75	2.50	2.62	2.67	2.71	2.59	2.77	2.57	2.69	2.28	1.92	1.56	1.33
44	1.29	1.26	1.66	2.23	2.51	2.77	2.88	2.94	2.89	2.87	2.83	2.82	2.59	2.24	1.93	1.44
43	1.61	1.61	1.95	2.28	2.80	3.14	3.18	3.19	3.06	3.20	3.16	3.01	2.74	2.39	1.97	1.48
42	1.30	1.76	2.04	2.45	2.84	3.08	3.19	3.14	3.11	3.09	2.97	3.28	2.77	2.10	1.96	1.57
41	1.59	1.77	2.21	2.71	2.99	3.08	3.37	3.29	3.26	3.37	3.25	3.20	2.80	2.65	2.04	1.58
40	1.71	1.87	2.41	2.87	3.22	3.52	3.55	3.73	3.48	3.64	3.58	3.47	3.05	2.60	2.28	1.69
39	1.55	1.98	2.22	2.84	3.21	3.43	3.45	3.54	3.69	3.51	3.61	3.29	2.99	2.27	2.19	1.50
38	1.69	2.16	2.76	2.85	3.55	3.97	4.06	3.83	3.86	3.83	3.76	3.67	3.21	2.44	2.15	1.59
37	1.54	2.24	2.85	3.46	3.68	4.11	4.22	4.16	4.11	4.24	4.02	3.85	3.35	2.85	2.13	1.57
36	1.45	1.93	3.07	3.30	3.69	4.26	4.50	4.24	4.16	4.27	4.26	4.13	3.62	2.72	1.95	1.61
35	1.86	2.06	3.31	4.03	4.30	4.36	4.61	4.66	4.50	4.53	4.52	4.36	3.89	3.27	2.14	1.74
34	2.03	1.99	3.47	4.18	4.62	4.67	4.93	4.96	4.86	4.73	4.81	4.71	4.19	3.54	2.18	2.07

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-56 Test 6– Unit 15C – 15cfs – Vz RMS (fps)

Vz RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.27	0.25	0.31	0.33	0.32	0.33	0.50	0.37	0.40	0.36	0.55	0.42	0.40	0.27	0.32	0.30
70	0.31	0.29	0.22	0.55	0.47	0.32	0.30	0.63	0.65	0.51	0.50	0.69	0.62	0.53	0.45	0.29
68	0.26	0.42	0.52	0.49	0.50	0.51	0.34	0.60	0.75	0.64	0.59	0.66	0.75	0.58	0.75	0.53
66	0.30	0.43	0.54	0.31	0.47	0.63	0.91	0.54	0.74	0.65	0.66	0.50	0.55	0.47	0.58	0.69
64	0.40	0.49	0.55	0.34	0.44	0.69	0.55	0.65	0.63	0.71	0.51	0.57	0.61	0.70	0.61	0.51
62	0.27	0.32	0.40	0.46	0.36	0.44	0.61	0.87	0.66	0.71	0.76	0.76	0.60	0.54	0.72	0.74
60	0.81	0.34	0.65	0.81	0.65	0.77	0.77	0.55	0.74	0.78	0.74	0.80	0.65	0.73	0.74	0.44
58	0.46	0.58	0.74	0.53	0.80	0.73	0.72	0.67	0.62	0.57	0.71	0.71	0.67	0.64	0.77	0.75
56	0.55	0.58	0.39	0.65	0.57	0.88	0.80	0.89	0.78	0.71	0.73	0.68	0.63	0.64	0.81	0.60
55	0.50	0.79	0.39	0.42	0.75	0.59	0.88	0.78	0.70	0.70	0.77	0.72	0.62	0.59	0.65	0.81
54	0.68	0.73	0.63	0.46	0.82	0.77	0.92	0.66	0.73	0.82	0.65	0.62	0.70	0.59	0.69	0.52
53	0.88	0.66	0.66	0.69	0.95	0.82	0.76	0.71	0.75	0.69	0.56	0.54	0.60	0.60	0.51	0.71
52	0.73	0.63	0.68	0.69	0.87	0.95	0.59	0.76	0.58	0.63	0.56	0.49	0.58	0.74	0.64	0.54
51	0.61	0.70	0.60	0.78	0.88	0.72	0.62	0.57	0.68	0.59	0.58	0.56	0.66	0.60	0.61	0.58
50	0.61	0.61	0.82	0.77	0.86	0.58	0.55	0.52	0.55	0.48	0.60	0.48	0.53	0.62	0.70	0.57
49	0.61	0.58	0.73	0.81	0.65	0.65	0.48	0.50	0.64	0.46	0.47	0.56	0.51	0.60	0.63	0.53
48	0.59	0.63	0.73	0.77	0.73	0.49	0.47	0.50	0.57	0.54	0.55	0.55	0.62	0.63	0.73	0.63
47	0.66	0.69	0.63	0.87	0.73	0.64	0.46	0.47	0.50	0.50	0.45	0.56	0.54	0.57	0.70	0.65
46	0.82	0.76	0.62	0.81	0.49	0.50	0.45	0.44	0.49	0.43	0.57	0.55	0.58	0.60	0.72	0.64
45	0.73	0.78	0.80	0.86	0.60	0.40	0.43	0.50	0.52	0.51	0.50	0.57	0.57	0.68	0.60	0.57
44	0.71	0.67	0.71	0.66	0.56	0.52	0.48	0.48	0.50	0.54	0.51	0.51	0.59	0.61	0.63	0.62
43	0.66	0.69	0.76	0.65	0.59	0.54	0.47	0.51	0.51	0.54	0.58	0.57	0.59	0.59	0.58	0.62
42	0.68	0.64	0.69	0.67	0.62	0.56	0.55	0.52	0.58	0.60	0.58	0.61	0.68	0.62	0.63	0.63
41	0.80	0.69	0.67	0.63	0.56	0.52	0.59	0.56	0.57	0.63	0.61	0.61	0.65	0.76	0.68	0.73
40	0.69	0.69	0.65	0.68	0.63	0.65	0.62	0.54	0.57	0.59	0.59	0.61	0.68	0.72	0.65	0.72
39	0.82	0.69	0.71	0.74	0.75	0.63	0.60	0.57	0.59	0.65	0.67	0.68	0.78	0.70	0.72	0.72
38	0.81	0.77	0.82	0.78	0.72	0.63	0.45	0.50	0.60	0.62	0.61	0.66	0.81	0.76	0.71	0.82
37	0.97	0.80	0.92	0.80	0.79	0.66	0.53	0.49	0.57	0.59	0.61	0.66	0.82	0.94	0.82	0.88
36	1.03	0.93	1.05	0.94	0.73	0.58	0.40	0.42	0.56	0.50	0.59	0.62	0.90	1.01	0.94	0.97
35	1.14	0.96	1.08	0.92	0.59	0.43	0.41	0.33	0.38	0.40	0.48	0.55	0.82	1.12	1.10	1.07
34	1.16	1.07	1.23	0.96	0.51	0.35	0.33	0.32	0.31	0.33	0.34	0.38	0.75	1.12	1.18	1.20

Table B-57 Test 6 – Unit 15C – 15kcfs – Vs (fps)

Vs																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.23	0.29	0.20	0.25	0.16	0.38	0.37	0.33	0.21	0.54	0.53	0.41	0.22	0.56	0.51	0.37
70	0.66	0.52	0.32	0.52	0.42	0.39	0.35	1.02	0.62	0.83	0.43	0.74	0.42	0.37	0.23	0.46
68	0.59	0.54	0.45	0.33	0.38	0.58	0.39	0.42	0.61	1.21	1.11	0.91	0.87	1.03	0.62	0.38
66	0.73	0.47	0.47	0.60	0.29	0.57	0.80	0.57	0.66	1.10	1.33	1.30	1.38	1.40	1.08	0.93
64	0.90	0.55	0.60	0.47	0.36	0.93	0.70	0.60	0.95	1.58	1.39	1.50	1.80	1.16	1.30	1.04
62	0.79	0.92	0.82	0.42	0.28	0.45	0.62	1.12	0.91	1.27	1.65	1.45	1.88	1.73	1.22	0.81
60	0.32	0.67	0.42	0.40	1.48	0.68	1.13	1.65	1.50	1.43	1.74	1.48	0.79	1.16	0.76	0.54
58	0.85	0.39	1.07	0.48	0.25	1.29	1.94	1.51	2.10	1.57	2.10	1.96	1.02	0.54	0.41	0.58
56	1.03	1.14	0.58	0.34	0.48	0.18	1.49	1.16	1.84	1.93	1.88	1.84	1.79	1.48	0.49	0.67
55	0.49	0.61	0.80	0.40	0.22	0.39	1.08	1.46	1.98	2.10	2.04	1.83	1.75	1.58	1.33	0.40
54	0.66	0.47	0.37	0.48	0.50	0.77	1.02	1.41	1.70	1.90	1.90	2.07	1.55	1.38	0.82	0.72
53	0.66	0.26	0.29	0.29	0.52	1.16	1.77	1.74	1.75	2.31	2.16	2.20	1.98	1.19	0.79	0.82
52	0.56	0.36	0.18	0.18	0.68	1.39	2.23	2.10	2.20	2.13	2.25	2.23	2.15	1.23	0.46	0.65
51	0.65	0.25	0.09	0.76	0.92	1.73	1.70	1.99	2.06	2.07	2.19	2.05	1.86	1.17	0.86	0.40
50	0.75	0.45	0.15	0.84	0.91	2.00	2.41	2.04	2.28	2.49	2.41	2.30	2.13	1.33	0.75	1.00
49	0.70	0.19	0.47	1.37	1.97	2.04	2.43	2.54	2.46	2.77	2.49	2.44	2.29	1.81	1.10	0.82
48	0.66	0.23	0.42	1.41	1.78	2.24	2.19	2.42	2.40	2.52	2.41	2.44	2.08	1.87	1.25	0.85
47	1.06	0.83	1.10	1.23	2.04	2.26	2.43	2.57	2.64	2.58	2.59	2.67	2.33	1.95	1.20	1.01
46	0.83	0.94	1.62	1.47	2.55	2.77	2.76	2.85	2.84	2.71	2.67	2.93	2.31	1.95	1.20	1.39
45	1.12	0.94	1.34	1.78	2.52	2.62	2.67	2.71	2.63	2.79	2.60	2.74	2.31	1.93	1.57	1.35
44	1.31	1.28	1.68	2.25	2.52	2.77	2.88	2.94	2.95	2.91	2.86	2.90	2.65	2.28	1.94	1.45
43	1.64	1.63	1.97	2.30	2.81	3.14	3.19	3.19	3.10	3.24	3.18	3.07	2.79	2.42	1.99	1.50
42	1.34	1.81	2.07	2.47	2.86	3.09	3.20	3.14	3.15	3.11	2.99	3.36	2.81	2.11	1.98	1.60
41	1.65	1.80	2.25	2.75	3.01	3.08	3.38	3.30	3.29	3.42	3.27	3.25	2.86	2.70	2.08	1.61
40	1.81	1.91	2.45	2.91	3.25	3.52	3.56	3.74	3.52	3.68	3.62	3.53	3.13	2.66	2.34	1.74
39	1.73	2.05	2.25	2.88	3.26	3.44	3.45	3.55	3.72	3.54	3.64	3.35	3.04	2.32	2.25	1.59
38	1.90	2.27	2.83	2.90	3.61	3.99	4.07	3.83	3.88	3.86	3.78	3.74	3.28	2.51	2.24	1.69
37	1.71	2.34	2.92	3.53	3.72	4.13	4.24	4.19	4.15	4.27	4.05	3.92	3.44	2.93	2.25	1.67
36	1.56	2.07	3.16	3.35	3.73	4.28	4.51	4.25	4.20	4.29	4.28	4.20	3.71	2.82	2.07	1.74
35	1.93	2.17	3.37	4.07	4.34	4.37	4.62	4.68	4.55	4.57	4.57	4.42	3.98	3.38	2.36	1.86
34	2.07	2.09	3.52	4.21	4.66	4.69	4.95	4.98	4.90	4.78	4.86	4.79	4.25	3.63	2.33	2.18

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-58 Test 6 – Unit 15C – 15kcfs – Vs RMS (fps)

Vs RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.32	0.31	0.37	0.38	0.41	0.38	0.56	0.47	0.54	0.47	0.66	0.60	0.48	0.38	0.40	0.45
70	0.40	0.37	0.30	0.66	0.54	0.38	0.37	0.70	0.74	0.63	0.66	0.81	0.71	0.61	0.52	0.38
68	0.34	0.49	0.63	0.56	0.55	0.61	0.41	0.68	0.84	0.74	0.75	0.77	0.91	0.69	0.84	0.64
66	0.37	0.54	0.66	0.38	0.55	0.79	1.00	0.65	0.82	0.74	0.80	0.60	0.65	0.60	0.69	0.80
64	0.48	0.56	0.65	0.42	0.51	0.81	0.69	0.71	0.77	0.81	0.66	0.67	0.72	0.84	0.73	0.61
62	0.33	0.41	0.50	0.59	0.51	0.54	0.77	1.01	0.78	0.81	0.88	0.85	0.72	0.66	0.82	0.82
60	0.91	0.42	0.71	0.88	0.96	0.93	0.91	0.77	0.92	0.89	0.91	0.90	0.77	0.83	0.84	0.60
58	0.51	0.71	0.86	0.65	1.00	0.93	0.87	0.91	0.76	0.72	0.87	0.83	0.82	0.75	0.92	0.84
56	0.62	0.68	0.50	0.76	0.72	1.05	0.97	0.98	0.94	0.90	0.85	0.78	0.79	0.79	0.96	0.77
55	0.57	0.88	0.52	0.56	0.93	0.73	1.07	0.92	0.87	0.84	0.94	0.84	0.82	0.76	0.84	0.94
54	0.76	0.88	0.80	0.59	0.99	0.94	1.00	0.85	0.86	0.94	0.80	0.72	0.92	0.75	0.90	0.70
53	0.96	0.89	0.86	0.87	1.09	0.97	0.95	0.94	0.89	0.81	0.70	0.69	0.78	0.83	0.73	0.86
52	0.86	0.78	0.94	0.87	1.02	1.06	0.73	0.89	0.72	0.75	0.71	0.64	0.71	0.94	0.76	0.73
51	0.78	0.92	0.79	0.91	0.99	0.86	0.75	0.68	0.81	0.74	0.69	0.68	0.79	0.77	0.79	0.75
50	0.76	0.90	1.01	0.96	1.01	0.71	0.69	0.65	0.71	0.61	0.70	0.60	0.68	0.84	0.89	0.76
49	0.77	0.81	0.90	0.96	0.82	0.81	0.62	0.61	0.75	0.58	0.61	0.69	0.67	0.75	0.77	0.71
48	0.82	0.90	0.97	0.97	0.86	0.67	0.65	0.60	0.69	0.67	0.67	0.67	0.75	0.78	0.86	0.78
47	0.85	0.84	0.80	1.03	0.91	0.75	0.56	0.60	0.65	0.63	0.58	0.68	0.70	0.73	0.85	0.79
46	0.95	0.90	0.79	0.94	0.64	0.66	0.55	0.56	0.62	0.58	0.71	0.68	0.73	0.75	0.89	0.77
45	0.91	0.94	0.94	1.00	0.75	0.54	0.57	0.61	0.64	0.63	0.63	0.70	0.70	0.83	0.76	0.73
44	0.84	0.85	0.89	0.83	0.71	0.67	0.60	0.58	0.63	0.68	0.63	0.64	0.76	0.78	0.77	0.76
43	0.82	0.84	0.92	0.82	0.76	0.66	0.60	0.63	0.65	0.67	0.70	0.69	0.74	0.73	0.74	0.80
42	0.83	0.80	0.87	0.85	0.74	0.72	0.69	0.62	0.72	0.73	0.72	0.74	0.84	0.78	0.78	0.83
41	0.97	0.87	0.84	0.82	0.74	0.66	0.68	0.68	0.71	0.75	0.74	0.75	0.81	0.94	0.85	0.91
40	0.88	0.87	0.82	0.86	0.77	0.79	0.74	0.64	0.69	0.73	0.73	0.76	0.84	0.88	0.85	0.93
39	1.02	0.88	0.90	0.93	0.88	0.76	0.76	0.71	0.71	0.79	0.80	0.80	0.96	0.89	0.92	0.93
38	1.05	1.00	1.02	0.97	0.86	0.74	0.56	0.62	0.70	0.73	0.74	0.79	1.02	0.97	0.96	1.05
37	1.22	1.05	1.13	1.01	0.93	0.77	0.63	0.56	0.66	0.72	0.73	0.80	1.02	1.18	1.07	1.13
36	1.29	1.19	1.33	1.16	0.91	0.71	0.50	0.53	0.68	0.59	0.70	0.73	1.09	1.25	1.21	1.23
35	1.41	1.26	1.31	1.14	0.78	0.53	0.49	0.41	0.46	0.48	0.56	0.65	1.00	1.38	1.39	1.35
34	1.53	1.35	1.52	1.14	0.62	0.44	0.41	0.40	0.39	0.41	0.42	0.48	0.90	1.37	1.45	1.48

Table B-59 Test 6 – Unit 15C – 15kcfs – Vt (fps)

Vt																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.24	0.29	0.20	0.25	0.16	0.39	0.38	0.33	0.25	0.54	0.54	0.42	0.23	0.56	0.51	0.37
70	0.66	0.54	0.33	0.53	0.43	0.40	0.35	1.03	0.65	0.86	0.45	0.77	0.42	0.38	0.25	0.46
68	0.59	0.54	0.45	0.33	0.38	0.58	0.39	0.43	0.62	1.21	1.12	0.92	0.88	1.03	0.65	0.39
66	0.73	0.47	0.47	0.60	0.29	0.57	0.80	0.58	0.67	1.10	1.33	1.30	1.38	1.40	1.09	0.94
64	0.90	0.55	0.60	0.47	0.36	0.93	0.71	0.60	0.95	1.58	1.39	1.50	1.80	1.16	1.30	1.04
62	0.79	0.92	0.82	0.42	0.28	0.45	0.62	1.12	0.91	1.27	1.65	1.45	1.88	1.73	1.22	0.81
60	0.34	0.67	0.43	0.40	1.48	0.69	1.14	1.65	1.50	1.43	1.74	1.48	0.80	1.16	0.76	0.54
58	0.85	0.40	1.07	0.49	0.26	1.29	1.94	1.51	2.10	1.57	2.10	1.96	1.02	0.54	0.43	0.59
56	1.09	1.20	0.72	0.51	0.63	0.41	1.59	1.28	1.87	1.97	1.92	1.87	1.87	1.57	0.61	0.77
55	0.59	0.67	0.89	0.50	0.38	0.45	1.13	1.49	2.01	2.13	2.06	1.86	1.79	1.65	1.42	0.58
54	0.79	0.62	0.57	0.61	0.57	0.86	1.11	1.48	1.77	1.95	1.94	2.10	1.64	1.48	0.98	0.89
53	0.82	0.57	0.65	0.52	0.60	1.25	1.86	1.83	1.83	2.37	2.21	2.24	2.07	1.33	0.98	0.99
52	0.67	0.55	0.41	0.41	0.74	1.43	2.27	2.15	2.24	2.17	2.28	2.26	2.21	1.31	0.62	0.75
51	0.88	0.63	0.60	0.90	1.01	1.78	1.82	2.10	2.14	2.15	2.25	2.10	1.97	1.33	1.08	0.65
50	0.95	0.83	0.64	1.05	1.03	2.08	2.51	2.16	2.36	2.58	2.48	2.36	2.24	1.50	1.04	1.16
49	0.80	0.54	0.65	1.44	2.00	2.07	2.49	2.59	2.51	2.81	2.53	2.47	2.36	1.89	1.21	0.95
48	0.86	0.64	0.68	1.51	1.84	2.29	2.30	2.51	2.47	2.59	2.46	2.48	2.17	1.99	1.42	1.01
47	1.23	1.00	1.28	1.38	2.11	2.33	2.54	2.66	2.72	2.65	2.65	2.71	2.44	2.07	1.38	1.20
46	0.92	1.02	1.67	1.54	2.58	2.80	2.81	2.90	2.88	2.75	2.70	2.96	2.38	2.03	1.32	1.47
45	1.23	1.12	1.46	1.87	2.56	2.69	2.76	2.80	2.69	2.86	2.65	2.78	2.39	2.05	1.70	1.50
44	1.45	1.43	1.80	2.34	2.58	2.83	2.96	3.03	3.00	2.97	2.91	2.94	2.75	2.39	2.06	1.57
43	1.70	1.69	2.01	2.33	2.83	3.17	3.22	3.22	3.13	3.26	3.20	3.08	2.84	2.47	2.05	1.56
42	1.47	1.91	2.15	2.53	2.90	3.13	3.25	3.20	3.19	3.15	3.03	3.38	2.87	2.21	2.11	1.74
41	1.77	1.92	2.34	2.82	3.05	3.14	3.44	3.36	3.34	3.47	3.31	3.28	2.94	2.80	2.22	1.76
40	1.90	1.98	2.49	2.94	3.27	3.54	3.59	3.77	3.54	3.70	3.64	3.55	3.17	2.71	2.43	1.85
39	1.84	2.19	2.34	2.93	3.28	3.48	3.49	3.59	3.75	3.57	3.67	3.37	3.11	2.42	2.39	1.74
38	2.02	2.42	2.92	2.95	3.65	4.02	4.12	3.88	3.92	3.90	3.82	3.76	3.35	2.62	2.42	1.79
37	1.77	2.45	2.97	3.56	3.74	4.14	4.27	4.22	4.17	4.30	4.07	3.93	3.49	3.01	2.40	1.73
36	1.71	2.32	3.26	3.42	3.78	4.33	4.59	4.33	4.25	4.35	4.33	4.23	3.79	2.96	2.33	1.89
35	2.02	2.43	3.49	4.12	4.39	4.43	4.71	4.76	4.61	4.64	4.62	4.46	4.07	3.52	2.60	2.01
34	2.12	2.23	3.57	4.24	4.68	4.71	4.99	5.02	4.93	4.81	4.88	4.82	4.32	3.69	2.48	2.26

Cells shaded grey indicate Vt-RMS value is more than twice the average total velocity magnitude (Vt)
Outlined cells indicate location of duplicate measurmements

Table B-60 Test 6 – Unit 15C – 15kcfs – Vt RMS (fps)

Vt RMS																
EL.	OR	Y-Position (ft)														WA
(ft)	18.57	17.40	16.24	15.07	13.90	12.74	11.57	10.40	9.24	8.07	6.90	5.74	4.57	3.40	2.24	1.07
72	0.41	0.43	0.47	0.46	0.48	0.48	0.63	0.58	0.63	0.60	0.76	0.70	0.56	0.46	0.48	0.53
70	0.48	0.47	0.40	0.76	0.59	0.45	0.43	0.79	0.82	0.71	0.72	0.90	0.80	0.68	0.59	0.47
68	0.42	0.58	0.71	0.62	0.60	0.69	0.52	0.74	0.91	0.83	0.83	0.86	0.98	0.77	0.90	0.73
66	0.44	0.62	0.74	0.45	0.63	0.87	1.07	0.71	0.90	0.83	0.87	0.68	0.73	0.69	0.76	0.86
64	0.56	0.68	0.73	0.49	0.58	0.90	0.77	0.77	0.84	0.89	0.74	0.77	0.80	0.93	0.81	0.71
62	0.40	0.48	0.56	0.66	0.57	0.61	0.84	1.05	0.86	0.89	0.96	0.94	0.81	0.74	0.91	0.92
60	1.00	0.48	0.78	0.96	1.04	0.99	0.98	0.85	1.02	0.98	0.99	0.99	0.90	0.92	0.95	0.73
58	0.57	0.80	0.97	0.73	1.06	1.02	0.95	0.99	0.85	0.81	0.96	0.93	0.91	0.85	1.04	0.96
56	0.67	0.74	0.58	0.83	0.80	1.10	1.03	1.03	1.02	0.99	0.92	0.89	0.87	0.88	1.05	0.90
55	0.62	0.94	0.61	0.62	1.00	0.80	1.14	0.99	0.94	0.93	1.01	0.93	0.91	0.86	0.91	1.01
54	0.85	0.94	0.87	0.66	1.07	1.01	1.06	0.92	0.93	1.01	0.87	0.80	1.01	0.83	0.99	0.79
53	1.04	0.96	0.94	0.93	1.16	1.03	1.01	1.01	0.98	0.88	0.77	0.77	0.87	0.92	0.81	0.94
52	0.94	0.86	1.03	0.95	1.11	1.12	0.80	0.96	0.81	0.83	0.80	0.73	0.79	1.02	0.87	0.81
51	0.88	1.01	0.85	1.01	1.06	0.91	0.82	0.75	0.89	0.81	0.77	0.76	0.87	0.87	0.87	0.83
50	0.85	0.99	1.08	1.04	1.08	0.80	0.77	0.72	0.81	0.69	0.77	0.68	0.77	0.92	0.98	0.84
49	0.86	0.89	0.98	1.05	0.92	0.89	0.68	0.68	0.83	0.67	0.70	0.78	0.77	0.83	0.86	0.80
48	0.90	0.99	1.05	1.06	0.92	0.76	0.73	0.66	0.76	0.75	0.74	0.76	0.83	0.87	0.95	0.87
47	0.94	0.92	0.90	1.11	1.00	0.84	0.63	0.67	0.75	0.71	0.66	0.77	0.79	0.82	0.94	0.88
46	1.04	1.00	0.90	1.04	0.73	0.75	0.62	0.62	0.71	0.67	0.81	0.78	0.83	0.85	1.00	0.87
45	1.00	1.03	1.03	1.09	0.84	0.64	0.64	0.67	0.74	0.72	0.73	0.80	0.80	0.93	0.87	0.84
44	0.96	0.96	1.00	0.93	0.79	0.77	0.67	0.67	0.73	0.76	0.73	0.74	0.87	0.90	0.88	0.88
43	0.95	0.95	1.02	0.94	0.87	0.74	0.67	0.72	0.75	0.78	0.81	0.81	0.86	0.86	0.87	0.95
42	0.95	0.93	0.99	0.97	0.84	0.82	0.76	0.69	0.82	0.84	0.84	0.85	0.97	0.92	0.92	0.98
41	1.12	1.01	0.96	0.95	0.86	0.77	0.77	0.77	0.82	0.85	0.85	0.88	0.94	1.07	0.99	1.07
40	1.06	1.02	0.97	1.01	0.88	0.90	0.82	0.71	0.81	0.84	0.85	0.89	0.99	1.04	1.03	1.13
39	1.22	1.05	1.06	1.08	1.01	0.87	0.84	0.79	0.82	0.88	0.92	0.93	1.11	1.07	1.11	1.12
38	1.26	1.20	1.21	1.12	0.98	0.81	0.64	0.71	0.81	0.84	0.86	0.92	1.17	1.16	1.18	1.25
37	1.44	1.28	1.32	1.17	1.04	0.84	0.70	0.64	0.77	0.83	0.85	0.95	1.19	1.39	1.32	1.35
36	1.50	1.44	1.52	1.33	1.02	0.82	0.58	0.60	0.77	0.67	0.81	0.85	1.25	1.45	1.47	1.45
35	1.62	1.51	1.55	1.30	0.90	0.59	0.57	0.48	0.55	0.57	0.65	0.76	1.16	1.59	1.66	1.58
34	1.78	1.61	1.73	1.27	0.71	0.51	0.49	0.48	0.47	0.49	0.53	0.58	1.05	1.57	1.73	1.74