EAST WANSHIP IRRIGATION COMPANY

DITCH PIPING WATER& ENERGY CONSERVATION PROJECT

FY2016 WATERSMART: WATER & ENERGY EFFICIENCY GRANTS

FOA # R16-FOA-D0004

January 20, 2016

APPLICANT
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Applicant Info

The date, applicant name, city, county, and state

» Date: January 20, 2016

» Applicant name: East Wanship Irrigation Company (EWIC)

» City, County, State: Coalville, Summit, Utah

» Project Manager

- Name: Brian Deeter, PE
- Title: Project Manager/Engineer
- Telephone: (801) 547- 0393
- E-mail: brd@jub.com

» Project funding request: $300,000

Project Summary

The East Wanship Ditch Piping Water & Energy Conservation Project will include piping approximately 17,000 feet of open ditch. In a water loss study performed by NRCS, it was determined that segments of the ditch were losing up to 68% of the ditch flow. This project will combine, enclose and pressurize the gravity-flow ditch. By enclosing the ditches, water seepage, evaporation and waste out the end of the ditches will be eliminated. The project includes replacing 3.1 miles of open ditch with 3.2 miles of 16" pressurized pipe. A few of the shareholders on the canal currently use pumps to pressurize their water for irrigation. All of these pumps will be removed with the development of this project and associated energy costs will be reduced.

This project will conserve a total of 915 acre-feet annually

- 650 acre-feet in conveyance losses
- 36 acre-feet lost as spill water at the end of the ditches
- 229 acre-feet lost due to inefficiencies of flood irrigation vs sprinkler irrigation

By eliminating pumps, **9,900 kWh per year of energy will be saved at a cost savings to users of $377 each year.**

Schedule

State the length of time and estimated completion date for the project

The East Wanship Ditch Piping Project will be completed over a period of two years. Environmental and design will begin in October 2016 and will be completed by July of 2017. Following design, construction will begin in October of 2017 and be completed by May of 2018. The project will be put into service and final reporting will be done in April and May 2018.

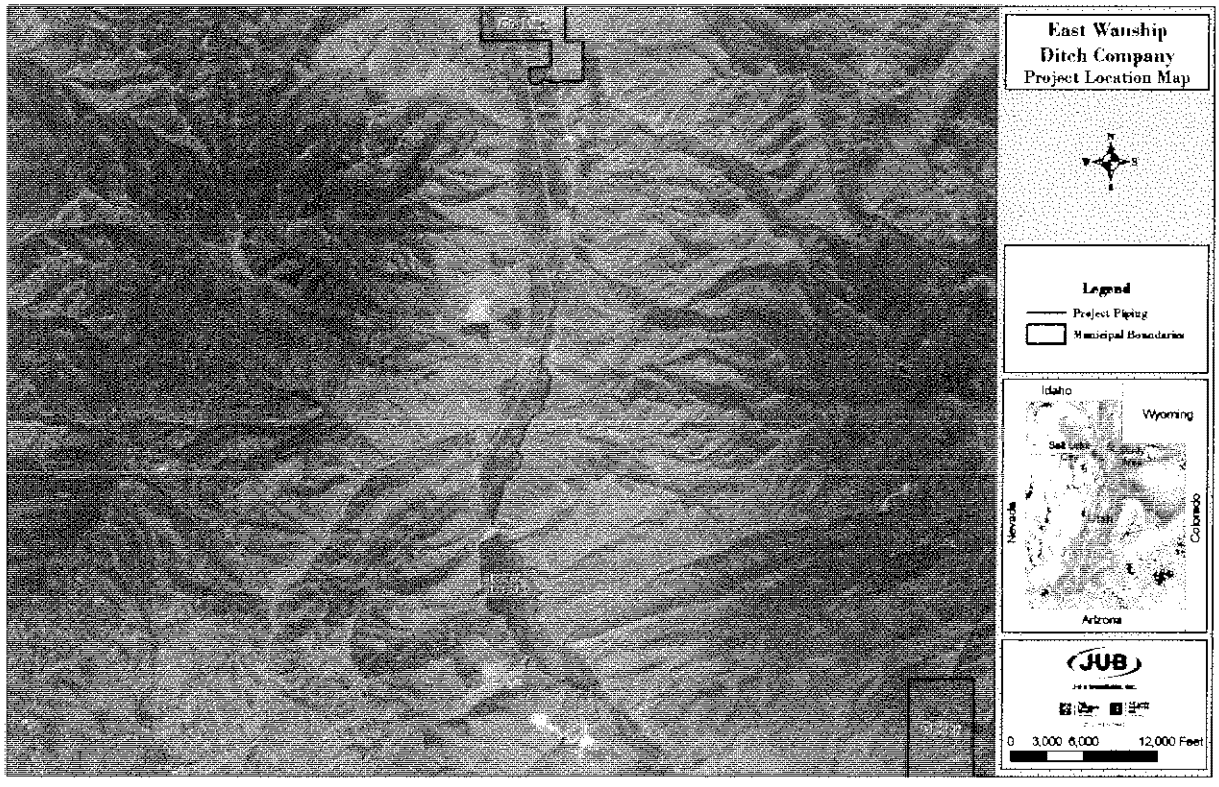
Federal Facility

Water conserved by this project will directly benefit Rockport Reservoir and Echo Reservoir downstream.

The Wanship Ditch receives water directly from the Rockport Reservoir and has storage rights to water in Rockport Reservoir – part of Reclamation's Weber River Project. The water from the ditch travels into the Weber River and then into Echo Reservoir, which is also a Reclamation facility.

BACKGROUND DATA

The East Wanship Irrigation Company serves 298 acres of agricultural land in Summit County, Utah about 40 miles east of Salt Lake City. The service area is bordered by the cities of



Hoytsville and Peoa. Agricultural industry is vital to this community as 90% of the acreage in the EWIC service area is used primarily for agriculture. (Please see Attachment A for larger Project Location Map)

Need

The East Wanship Ditch was constructed in 1861 to serve the needs of local farmers. EWIC must take action now to ensure that it can continue to meet the needs of farmers and of future residents to the area. The proposed project will conserve water and energy, reduce conflict, stop breach disasters and prevent maintenance issues.

Water Losses

The EWIC service area has very porous soil and cobble contributing to significant water losses in the unlined ditch. An NRCS Water Loss Study completed in 2015 determined that EWIC is losing up to 68% of its ditch flow in the delivery system.

Because there is not a pressurized system, 95% of the EWIC users flood irrigate their land. This is not only an inefficient use of water but also contributes to the nutrient and sediment loads in the impaired Weber River and Echo Reservoir.

Energy Consumption

Pumps are used by about 5% of EWIC's water users. This project will eliminate the need for those pumps. The current electrical load on all of the user pumps is 4 kW. The elimination of those pumps will save $377 and 9,900 kWh annually.

Unlined ditches create water loss through seepage and continual maintenance issues.

Maintenance

Maintenance of ditch is primarily the responsibility of the irrigation company. At the beginning of the season, they must use heavy equipment to clean out to ditch to allow for water delivery. During the season, chemical treatments to kill moss must be put into the ditch to keep them clear.

Individual users also perform maintenance on sections of the ditch on their property to remove overgrowth. Some manually clean them out and some apply weed killing chemicals.

The required maintenance for open ditches is costly and environmentally detrimental. An enclosed system would eliminate the need for this continual maintenance.

Breach Risk

In 2015 the banks of the ditch broke in two locations, one at the head of the ditch and one about three-quarters of the way down. The bank completely washed out damaging adjacent fields. Water delivery was interrupted for five to six days to make repairs.

In 2014, 120 feet of culvert was installed to mitigate the consistent seepage of the ditch.

Conflict

The EWIC currently uses a system wherein each user takes their turn to deliver the entire flow of the ditch onto their property. There is significant tension between the users on the higher part of the system and those on the lower part. This tension arises from the perception that the upper users get all the irrigation water they need while those on the lower parts lose much of the water through seepage before it arrives. As land uses change from agricultural to residential, it is anticipated that these types of conflicts will increase with the population growth.

Inadequate maintenance also creates conflict because maintenance issues have contributed to past breach events which interrupt water delivery and cause damage to fields.

Water Supply

Describe the source of water supply, the water rights involved, current water uses (i.e., agricultural, municipal, domestic, or industrial), the number of water users served, and the current and projected water demand. Also, identify potential shortfalls in water supply. If water is primarily used for irrigation, describe major crops and total acres served.

The Wanship Ditch receives water directly from the Rockport Reservoir. Roughly 95% of the service area is currently flood irrigated with the remaining small percentage relying on pumping to provide the required pressure. The development of this project will conserve 915 acre-feet of water per year, mostly due to seepage and inefficient irrigation practices. There will also be some energy savings through the elimination of pumps currently used to pressurize for sprinklers.

- *Source of water supply:*
  The East Wanship Ditch is supplied directly from the Rockport Reservoir which is located on the Weber River.
- *Water Rights:*
  The East Wanship Ditch holds the following water right: 35-8533 - 3.64822 cfs (Weber River Decree No. 533). Rockport Reservoir Storage rights are held by individuals.

- *Current water uses:*
  East Wanship Ditch has 25 shareholders and 298 shares. The nature of the water use is 100% agricultural.

- *Current and projected water demand:*
  The average annual water demand is 1,568 acre-feet. The following tables show the water deliveries over the last five years.

EAST WANSHIP DITCH Natural Flow and Storage Water Deliveries

Year	Decree (acre-feet)	Storage (acre-feet)	Total (acre-feet)
2010	1585	631	2216
2011	1952	0	1952
2012	977	296	1273
2013	1231	38	1269
2014	1071	58	1129
5-yr Average	1363	205	1568

The State of Utah Governor's Office of Planning and Budget created an Economic and Demographic Projections Report which shows Summit County as the 3rd fastest growing county in the State with a growth rate of 2.2% over the last 10 years. This significant growth has already begun to impact the area and will place additional demands on the water supply as more residential and commercial development comes to this area.

The East Wanship area has recently seen this population trend affecting their service area as a local farm developed into a small residential subdivision and the water shares were divided among the new residents. EWIC wants to be proactive in preparing for growth so their system can both accommodate the growth and conserve water and energy.

- *Potential shortfalls in water supply:*
  Because of losses in the system, individuals often face water shortages at the end of the irrigation season. This is especially true for irrigators at the lower end of the ditch.

- *Crops and total acres served:*
  The East Wanship Ditch serves approximately 298 acres. Major crops include hay, alfalfa, grasses and grains. The land also supports livestock such as cattle, sheep and horses. Approximately 90% of the irrigated acreage is farm land that provides the livelihood for these local farmers.

Water Delivery System

Describe the applicant's water delivery system as appropriate. For agricultural systems, please include the miles of canals, miles of laterals, and existing irrigation improvements (i.e., type, miles, and acres). For municipal systems, please include the number of connections and/or number of water users served and any other relevant information describing the system.

The East Wanship Ditch begins at the base of the Rockport Reservoir and is fed directly from the dam. The ditch consists of 3.2 miles of open ditch which supplies irrigation water to approximately 298 acres of land. None of the ditch is currently piped other than through culverts at two road crossings. The ditch is unlined and in some areas it follows the contours across hillsides and is elevated above adjacent homes, roads and other infrastructure. These areas are made up of highly porous soils and cobble and experience significant leakage.

Energy Efficiency

If the application includes renewable energy or energy efficiency elements, describe existing energy sources and current energy uses.

Pumps are used by about 5% of EWIC's water users. This project will eliminate the need for those pumps. The current electrical load on all of the user pumps is 4 kW. The elimination of those pumps will save $377 and 9,900 kWh annually.

Relationship with Reclamation

Identify any past working relationships with Reclamation. This should include the date(s), description of prior relationships with Reclamation, and a description of the projects(s).

East Wanship Ditch receives Reclamation project water from Rockport Reservoir – part of Reclamation's Weber River Project.

Water conserved by this project will directly benefit Rockport Reservoir and Echo Reservoir downstream, both of which are all Reclamation projects.

TECHNICAL PROJECT DESCRIPTION

Describe the work in detail, including specific activities that will be accomplished as a result of this project. This description shall have sufficient detail to permit a comprehensive evaluation of the proposal.

The proposed project will replace 3.2 miles of open ditch with pressurized pipe. See Attachment A for a map of the project location.

The ditches will be piped with 16-inch HDPE pipe over the length of the project. The pipe will be installed within the existing ditches. At street crossings, the pipe will be installed in existing culverts or by an open cut across the pavement depending on existing conditions. As the pipeline is constructed, any existing pumps will be eliminated as the project will provide sufficient pressure at all turnouts for sprinklers. **It is estimated that by eliminating pumps $377 and 9,900 kWh will be saved annually.**

The 915 acre-feet of water conserved will help meet the demands during drought years and will allow irrigators to have sufficient supply for their crops throughout the season. It will also leave water in the Rockport Reservoir to be available to users outside East Wanship Ditch Company.

EVALUATION CRITERIA

Evaluation Criteria A: Water Conservation

Subcriterion A.1: Quantifiable Water Savings

Describe the amount of water saved. *For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project. Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations.*

By piping the ditches and creating a pressurized irrigation system that allows irrigators to sprinkle, 915 acre-feet of water will be conserved. The 915 acre-feet is based on the following calculations.

CONVEYANCE LOSSES

A 2015 study conducted by the NRCS of the East Wanship Ditch took measurements within 3 ditch segments. (See Attachment B for NRCS Water Loss Study.) The following table summarizes those findings and also contains seepage loss calculations. Those calculations were made as follows:

- **Summarize the total number of shares within each segment and calculate the corresponding percentage of total annual diversion volume per segment.**
- **Calculate the annual seepage losses for each segment based on the annual diversion volume and the NRCS measured ditch loss for each segment**

NRCS WATER LOSS STUDY				**ANNUAL VOLUME LOSS**			
Ditch Segment	Flow (CFS)	Distance (FT)	% Loss	Ditch Shares	%	Volume (AF)	Volume Loss (AF)
	3.85						
Upper	3.4	8900	11.7%	85.6	28.7%	450.6	52.7
Middle	2.3	3200	32.4%	87.5	29.4%	460.6	149.0
Lower	0.73	6800	68.3%	124.8	41.9%	656.9	448.4
TOTALS				**297.9**	**100.0%**	**1568.1**	**650.1**

There is also 1 cfs flowrate of "carry water" that is required to get the water in the ditch to the end users. Approximately 10% of the year this water spills at the end and is also lost to the system. These losses are calculated as follows.

"Carry Water" x 10% x irrigation season = "carry water" spilled at end of ditch

1 cfs x 1.98 acre-feet per day/cfs x 180 days = **36 acre-feet**

Total Conveyance Losses = 650 + 36 = 686 acre-feet

LOSSES DUE TO IRRIGATION INEFFICIENCIES

Annual Volume Diverted	1568	AF
Annual Volume Delivered	918	AF
Assumed Flood Irrigation Efficiency	50%	
Assumed Sprinkler Irrigation Efficiency	75%	
Post Project Increased Irrigation Efficiency	25%	
Water Saved (25% x 916 AF)	**229**	**AF**

TOTAL WATER LOSSES = 686 + 229 = 915 acre-feet

- *Average annual acre-feet of water supply.*

The average annual water supply for the East Wanship Ditch is 1,568 acre-feet.

- *Where is the water currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground, etc.)?*

Most of the water is lost through seepage into the underlying gravels, root uptake, evaporation and back into the Weber River. 1 cfs of "carry water" is also spilled at times at the end of the ditch. This is required to "carry" water to the end users. Also, tailwater running off the bottom of flood irrigated fields generally flows directly back to the Weber River.

- *Where will the conserved water go?*

Conserved water will remain in Rockport Reservoir and will be available to allow shareholders their full allocation of water and will also be available for other users of Rockport Reservoir who may not be East Wanship Ditch stockholders. Rockport Reservoir is also well-used for fishing and recreation.

(1) Canal Lining/Piping

a) How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.

A 2015 study conducted by the NRCS of the East Wanship Ditch took measurements within 3 ditch segments. (See Attachment B for NRCS Water Loss Study and Calculation Spreadsheets.) The following table summarizes those findings and also contains seepage loss calculations. Those calculations were made as follows:

1. **Summarize the total number of shares within each segment and calculate the corresponding percentage of total annual diversion volume per segment.**
2. **Calculate the annual seepage losses for each segment based on the annual diversion volume and the NRCS measured ditch loss for each segment**

NRCS WATER LOSS STUDY				ANNUAL VOLUME LOSS			
Ditch Segment	Flow (CFS)	Distance (FT)	% Loss	Ditch Shares	%	Volume (AF)	Volume Loss (AF)
	3.85						
Upper	3.4	8900	11.7%	85.6	28.7%	450.6	52.7
Middle	2.3	3200	32.4%	87.5	29.4%	460.6	149.0
Lower	0.73	6800	68.3%	124.8	41.9%	656.9	448.4
TOTALS				**297.9**	**100.0%**	**1568.1**	**650.1**

There is also 1 cfs flowrate of "carry water" that is required to get the water in the ditch to the end users. Approximately 10% of the year this water spills at the end and is also lost to the system. These losses are calculated as follows.

"Carry Water" x 10% x irrigation season = "carry water" spilled at end of ditch

1 cfs x 1.98 acre-feet per day/cfs x 180 days = 36 acre-feet

b) *How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow tests been conducted to determine seepage rates under varying conditions? If so, please provide detailed descriptions of testing methods and all results. If not, please provide an explanation of the method(s) used to calculate seepage losses. All estimates should be supported with multiple sets of data/measurements from representative sections of canals.*

The NRCS conducted an inflow/outflow test to determine the seepage losses in the ditch. The NRCS used an Acoustic Doppler Current Profiler (ADCP) – StreamPro to measure the canal at multiple locations. Soil and geology data was also reviewed in the water loss study.

c) *What are the expected post-project seepage/leakage losses and how were these estimates determined (e.g., can data specific to the type of material being used in the project be provided)?*

Conveyance water losses and losses at the end of the system will be eliminated by the proposed project. The water system will be piped and enclosed with fused HDPE so no seepage, evaporation or spills will occur in the delivery system. With a closed system, no surplus "carry" water will be needed and no water will spill out the end of the ditches.

d) What are the anticipated annual transit loss reductions in terms of acre-feet per mile for the overall project and for each section of canal included in the project?

Annual transit losses are 215 acre-feet per mile (688 acre-feet/3.2 miles) which is consistent for the entire project.

e) How will actual canal loss seepage reductions be verified?

Seepage loss reductions will be verified through monthly meter readings in the new pipeline. This data will then be analyzed and compared monthly to the historical meter reading and to the 2014 NRCS Water Loss Study. This comparison will determine the amount of water conserved.

f) Include a detailed description of the materials being used:

- 16,700 feet of 16 inch HDPE pipe
- 17 turnouts

Subcriterion A.2: Percentage of Total Supply

Provide the percentage of total water supply conserved:
State the applicant's total average annual water supply in acre-feet.

Please use the following formula:

$$\frac{\text{915 acre-feet}}{\text{1568 acre-feet}} = \textbf{58\%}$$

Evaluation Criteria B: Energy-Water Nexus

Subcriterion No. B.2: Increasing Energy Efficiency in Water Management

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water management project (e.g., reduced pumping).

• Please provide sufficient detail supporting the calculation of any energy savings expected to result from water conservation improvements. If quantifiable energy savings are expected to result from water conservation improvements, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.

Pumps are used by less than 5% of the East Wanship Ditch water users. This project will eliminate those pumps. The current electrical load on these pumps is 4 kW. This project will save $377 and 9,900 kWh per year. This 9,900 kWh per year is shown in the following calculations.

(98 gpm x 150 ft)/(3960 x 70%) *.746 = 4 kW

4 kW x 2,476 hrs/season = 9,900 kWh

9,900 kWh x $0.03813/kWh = $377

Please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements?

Of the 298 acres irrigated, 10 are irrigated using pumped water. Piping the canal will allow for the elimination of these pumps saving $377 and 9,900 kWh in energy savings.

Please indicate whether you energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.

The energy savings estimates are based on the existing point of diversion at the base of Rockport Reservoir.

Does the calculation include the energy required to treat the water?

The water supply is untreated irrigation water.

Will the project result in reduced vehicle miles driven, in turn reducing carbon emissions? Please provide supporting details and calculations. Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).

This project will help the East Wanship Ditch manage their water more efficiently. They will no longer need to drive the ditches to conduct visual inspections as the system will now be enclosed. There will be savings in emissions/fuel but not substantial enough to calculate.

Evaluation Criterion C: Benefits to Endangered Species

For projects that will directly benefit federally-recognized candidate species, please include the following elements:

What is the relationship of the species to water supply?

The U.S. Fish and Wildlife Service lists endangered species known to or believed to occur in Summit County. These species are listed as part of the Upper Colorado River Endangered Fish Recovery Program.

Humpback Chub (*Gila cypha*) - Endangered

Colorado pikeminnow (*Ptychocheilus Lucius)* – Endangered

Razorback sucker *(Xyrauchen texanus)* – Endangered

Bonytail (*Gila elegans)* - Endangered

This project enhances the flows in the Weber River and will therefore benefit the habitat of these sensitive species.

The Humpback Chub Recovery Plan identifies stream alteration for irrigation as a possible cause in the decline of the species: "The decline of the humpback chub may be due to a combination of factors such as: stream alteration (dams, irrigation, dewatering, and channelization)... Reductions in flows may have altered river hydraulics to the extent that humpback chub habitat has been reduced or altered significantly."

Colorado pikeminnow need high spring flows to "maintain channel and habitat diversity, flush sediments from spawning areas, rejuvenate food production, form gravel and cobble deposits used for spawning, and rejuvenate backwater nursery habitats".

This project will directly improve two factors found to contribute to the decline of the Colorado pikeminnow: water diverted from rivers and flood irrigation contributing to poor water quality.

The Utah Department of Natural Resources/Division of Wildlife Resources identifies the Bonneville cutthroat trout and Bluehead sucker as native fish species found in the Weber River. These species are covered by conservation agreements with the U.S. Fish and Wildlife Service. UDWR's approach to conserving and managing these species focuses on removing unnecessary barriers to fish migration. Stable and connecting flows are necessary for migration.

Based upon information obtained from UDWR, there are recent documented occurrences of the Bonneville Cutthroat Trout within a 2-mile radius of the Weber River in the area near Echo Reservoir. As well as recent occurrences for the bald eagle and bluehead sucker within ½ mile of the Echo reservoir all of which are included on the Utah Sensitive Species List. Although this project does not directly enhance the habitats for the species listed above, it is proven and documented that by allowing for more available water to stay within the habitat areas for longer periods of time, these species are benefited.

By conserving water and allowing for less flood irrigation the water will remain in the Weber River and local reservoirs which provide the habitat for these species.

•What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of these species?

This project enhances the flows in the Weber River and will therefore benefit the habitat of these sensitive species. The Weber River has been kept at the minimal fish load since the end of the 2014 irrigation season to conserve water in reservoirs due to low precipitation. When the projected annual water savings are realized by this project, approximately 75% of the water saved will remain in the reservoirs to enhance the fish and wildlife habitat and protect against drought and low river flows.

"The do-nothing option in protecting these waters is not viable. Our population growth will not allow these water bodies to recuperate and sustain their uses if we do not take action. So we've got to be vigilant, we've got to make an investment, and we have to take action to protect our waters,"

- Walt Baker,
Director of the Utah Division of Water Quality

For projects that will directly accelerate the recovery of threatened or endangered species or address designated critical habitats, please include the following elements:

(1) *How is the species adversely affected by a Reclamation project?*

Echo Reservoir was listed in the 2010 303(d) list for impairment to its class 3A cold water fishery. The cause for impairment is low levels of dissolved oxygen due to elevated levels of phosphorus. This project will eliminate flood irrigation in the EWIC service area which improve the quality of the Weber River by preventing excess nutrients and contaminants from entering the River and contributing to this impairment.

While it is unknown how these species are affected by the Reclamation projects in the basin, the *Upper Colorado River Endangered Fish Recovery Program* generally identifies the need to "manage water to provide adequate instream flows". The proposed project will conserve 915 acre-feet of water annually that can instead contribute to stream flows to enhance the fish habitat.

(2) *Is the species subject to a recovery plan or conservation plan under the ESA?*

Yes. The species listed are part of the Upper Colorado River Endangered Fish Recovery Program.

(3) What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?

It is unknown whether the project will reduce the likelihood of list the species, but diverting less water from the Weber River and nearby reservoirs will make more water available to maintain the habitat of these species.

Evaluation Criterion D: Water Marketing

- *Estimated amount of water to be marketed*

EWIC's water right is a flow right, not a specified volume of water. Their current flood right is 11 cfs, but a pressurized system will be significantly more efficient and will be designed to deliver the maximum flow of 8 cfs. During peak runoff, EWIC is able to take a flood flow of 14 cfs per day. These operational efficiencies allow the **369 acre-feet of water** to remain in Rockport Reservoir where it can be used to maintain flows in the Weber River or delivered to Echo Reservoir.

- *A detailed description of the mechanism through which water will be marketed (e.g., individual sale, contribution to an existing market, the creation of a new water market, or construction of a recharge facility)*

This 369 acre-feet of water saved be piping the system will be made available to others with water rights along the Weber River. EWIC plans to make this water available specifically to Weber Basin Water Conservancy District which provides irrigation and drinking water to much of the Wasatch Front population.

- *A description of any legal issues pertaining to water marketing(e.g., restrictions under Reclamation law or contracts, individual project authorities, or State water laws)*

Utah State Law does not allow for water marketing or banking at this time. However, the proposed scenario would be a lease of water to an existing system, which is allowed under law.

Evaluation Criterion E: Other Contributions to Water Supply Sustainability

Subcriterion E.1: Addressing Adaptation Strategies in a WaterSMART Basin Study

The East Wanship Ditch service area has not yet been specifically addressed in a WaterSMART Basin Study. The East Wanship Ditch is located in the Weber River Basin and falls under the 2009 Utah State Water Plan *Weber River Basin: Planning for the Future.* This plan identifies strategies to meet the State goal of reducing per capita water demand by at least 25% before

2050. These strategies include: "Implement best management practices" such as those proposed by EWIC. A pressurized secondary water system will allow EWIC to reduce its water usage by 58%, a significant contribution to the state goal.

Subcriterion E.2: Expediting Future On-Farm Irrigation Improvements

- *Include a detailed listing of the fields and acreage that may be improved in the future.*

  Upon completion of this project, the East Wanship Ditch will require users to convert from flood irrigation to efficient sprinkler systems. 288 acres that are currently flooded will be converted to sprinklers which will save approximately 229 AF of water.

- *Describe in detail the on-farm improvements that can be made as a result of this project. Include discussion of any planned or ongoing efforts by farmers/ranchers that receive water from the applicant.*

  About 288 acres on the ditch are currently flood-irrigated which wastes water and lowers water quality in the Weber River.

  Converting from flood to sprinkler systems will greatly reduce nutrient, bacterial and sediment rich irrigation return flows through this reach of the Weber River which flows into Echo Reservoir. Echo Reservoir was listed in the 2010 303(d) list for impairment to its class 3A cold water fishery. The cause for impairment is low levels of dissolved oxygen due to elevated levels of phosphorus.

  The project will allow users to make application to NRCS funding programs for converting from flood irrigation to sprinkler systems.

- *Provide a detailed explanation of how the proposed WaterSMART Grant project would help to expedite such on-farm efficiency improvements.*

  Piping the system will create the pressures necessary to operate an on-farm sprinkling system on the acreage that is currently flood-irrigated. Many water users have shown interest in pursuing NRCS funding for on-farm improvements when the proposed piping project is completed.

- *Fully describe the on-farm water conservation or water use efficiency benefits that would result from the enabled on-farm component of this project. Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*

  Paul W. Brown, in a paper presented at the 2008 UC Davis Alfalfa & Forage Symposium entitled "Flood vs. Pivot Irrigation for Forage Crops: What are the Advantages and Disadvantages" stated: "the potential annual savings associated with switching from flood

to center pivot irrigation should fall in the range of 1.5 – 3.0 acre-feet/acre". **If 288 acres within East Wanship Ditch service area used sprinklers rather than flood irrigation, it would result in approximately 432 to 864 acre-feet saved per year.**

- *Projects that include significant on-farm irrigation improvements should demonstrate the eligibility, commitment, and number or percentage of shareholders who plan to participate in any available NRCS funding programs. Applicants should provide letters of intent from farmers/ranchers in the affected project areas.*

The proposed project will allow users to convert from flood irrigation to sprinkler systems apply for NRCS funding to make the improvements. Letters of Intent have been gathered from 28% of shareholders and are included as Attachment C.

- *Describe the extent to which this project complements an existing or newly awarded NRCS funded project.*

There are no know NRCS funded projects within or adjacent to the EWIC service area.

Subcriterion E.3: Building Drought Resiliency

- *Explain in detail the existing or recent drought conditions in the project area. Describe the severity and duration of drought conditions in the project area. Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by drought.*

Utah is the second driest state in the United States. Compounding the limited availability of water has been three years of below-average precipitation. The lowest-elevation snowpack had melted by May 1st, and most of the higher altitudes quickly followed. Streams and reservoirs were running between 10% and 40% of normal. Drought has continued to impact the water supply and will continue to have an effect on how EWIC plans for the future.

Reservoirs fed by the Weber River have also been impacted. As of October 1, 2015 the following reservoirs showed below-average storage amounts.

East Canyon Reservoir: 33% of average capacity

Rockport Reservoir: 41% of average capacity

"If the Weber River does not come up and flow so that the rights of the water come up to a certain level, there will not be water in the Kamas and Oakley area for farmers to water their cattle,"

- Dave Ure Summit County Council

Echo Reservoir: 41% of average capacity

- *Describe the impacts that are occurring now or are expected to occur as a result of drought conditions. Provide a detailed explanation of how the proposed WaterSMART Grant project will improve the reliability of water supplies during times of drought. For example, will the proposed project prevent the loss of permanent crops and/or minimize economic losses from drought conditions? Will the project improve the reliability of water supplies for people, agriculture, and/or the environment during times of drought?*

Drought is always a concern in a water-short basin. It is especially a concern for EWIC users as 90% of the acreage in the service area is used for agricultural industry. They are absolutely reliant upon a consistent water supply for irrigating crops and supporting livestock.

By keeping nearly 915 acre-feet of water in Rockport Reservoir, that water can be available as storage to mitigate against drought. Climate change increases the variability of water supply. Drought conditions could be more severe in length or intensity partially due to climate change, but the effects climate change and of future drought will be heightened by the increased demands on the system that will come from future population growth.

Subcriterion E.4: Other Water Supply Sustainability Benefits

- *Will the project make water available to address a specific concern? For example:*

Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?

The State of Utah Governor's Office of Planning and Budget created an Economic and Demographic Projections Report which shows Summit County as the 3rd fastest growing county in the State with a population growth rate of 2.2% over the last 10 years. This significant growth has already began to impact the East Wanship service area and will place additional demands on the system as more residential and commercial development comes to this area.

This project will better manage the water available by preventing waste and conserving energy which will allow the EWIC to provide water to more residents without needing more water in the system.

Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by climate variation.

Variation in the climate has caused four years of below-average precipitation. In October 2015, both Echo and Rockport Reservoirs were only at 41% of capacity. The Weber River which feeds

those reservoirs, and hence the EWIC ditches, produced only 8.5% of its normal April to July stream flow according to an NRCS report.

Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved?

Water conservation in the East Wanship Ditch service area will allow water to remain in the Weber River and local reservoirs. This can act as a buffer against climate variability, drought, and shortages.

The East Wanship Ditch runs along a hillside near residences.

Sections of the open ditch run along the hillside very close to the edge. At times the ditch has become blocked with debris, water spills over the side of the ditch bank and the bank has breached. This causes flooding in the land below and impacting agricultural land and local residents. The ditch runs along a hillside within 20 to 30 feet of homes and structures. A closed system reduces the risk of catastrophic breaches.

Will the project make additional water available for Indian tribes?

There are no known Indian tribes in the service area. The Environmental Review conducted as part of this project will investigate tribal or cultural assets in the area.

Will the project make water available for rural or economically disadvantaged communities?

Yes this project will make water more available in a rural, economically disadvantaged community. The East Wanship service area is located in unincorporated Summit County, this rural area has a population of approximately 400 people. The per capita income is $26,235 compared with the national average of $28,555.

Does the project promote and encourage collaboration among parties?

Yes. This project is a collaborative effort with the NRCS. Their Water Loss Study identified the significant water losses occurring in the system. This project will also be a collaborative effort with the Utah State Board of Water Resources and the Utah Department of Environmental Quality.

Is there widespread support for the project?

Yes. A stock holders meeting was held on December 17, 2015 in which 100% in attendance voted in support of this project. An Official Resolution is included in with this application.

What is the significance of the collaboration/support? Is there frequently tension or litigation over water in the basin?

The EWIC currently uses a system wherein each user takes their turn to deliver the entire flow of the ditch onto their property. There is significant tension between the users on the higher part of the system and those on the lower part. This tension arises from the perception that the upper users get all the irrigation water they need while those on the lower parts lose much of the water through seepage before it arrives. As land uses change from agricultural to residential, it is anticipated that these types of conflicts will increase with the population growth.

Limited maintenance also creates conflict because maintenance issues have contributed to past breach events which interrupt water delivery and cause damage to the ditch and fields.

This project represents meaningful collaboration between the two parties as it represents a willingness of those higher on the system to incur and expense that benefits the lower users.

Will the project help to prevent a water-related crisis or conflict?

As stated above, enclosing the system will allow all stockholders to benefit from using their water. Conserving and better managing the water will prevent conflict between water users as the supply will be sufficient to water crops through the entire irrigation season.

This project will also eliminate the possibility of the ditch breaching. In 2015 alone the banks of the ditch broke in two locations, one at the head of the ditch and one about three-quarters of the way down. The bank completely washed out damaging adjacent fields. Water delivery was interrupted for five to six days to make repairs.

In 2014, 120 feet of culvert was installed to mitigate the consistent seepage of the ditch.

Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?

Piping and enclosing the ditches opens the possibility for on-farm improvements in converting about 288 acres from flood irrigation to sprinkler systems. It also makes it possible for EWIC to add meters in the future to measure water usage.

Will the project increase awareness of water and/or energy conservation and efficiency efforts?

Yes, the implementation of the project will eliminate and reduce the need for pumps so water users will directly realize the benefits of this project.

Will the project serve as an example of water and/or energy conservation and efficiency within a community?

The East Wanship Ditch Company is a small entity but these improvements to their system will have a large impact on their crop yield, efficiency in their water use, opportunity for energy savings, and the cost of doing business that can be an example for other small irrigation companies. In fact, East Wanship was further motivated to enclose their system when they saw

the improved water conservation demonstrated by the nearby North Summit Pressurized Irrigation System Project that was funded by the Bureau of Reclamation. Other small entities and municipalities can look to the East Wanship Ditch Company's approach to water conservation and implement similar methods.

Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?

Yes. In addition to reducing flood irrigation in the area, this project will also allow for individual pumps on the system to be eliminated.

Does the project integrate water and energy components?

Yes. Both water and energy will be conserved through less pumping.

Evaluation Criterion F: Implementation and Results

Subcriterion No. F.1: Project Planning

(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Basin Study, drought contingency plan, or other planning efforts done to determine the priority of this project in relation to other potential projects.

The East Wanship Ditch is located in the Weber River Basin and fall under the 2009 Utah State Water Plan *Weber River Basin: Planning for the Future.*

(2) Describe how the project conforms to and meets the goals of any applicable planning efforts, and identify any aspect of the project that implements a feature of an existing water plan(s).

The Plan states: "Increasing the water supply in the Snyderville Basin and Park City area is a top priority of Summit County officials" because the current supply cannot endure emergencies or accommodate new growth. The Bureau of Reclamation completed a study to analyze alternative and recommended importing water from the Weber River near the Rockport Reservoir. The study states: "in order to meet the projected deficit, both the Rockport Reservoir andEast Canyon Reservoir importation projects (5,000 acre-feet and 12,100 acre-feet, respectively) be constructed."

The proposed project will allow more water to be kept in Rockport Reservoir which will contribute to the water supply in the Snyderville Basin and Park City.

The proposed piping project will also implement best practices for water conservation as outlined in the plan and contribute to the goal of decreasing water usage by 25% per capita.

Subcriterion No. F.2: Readiness to Proceed

Describe the implementation plan of the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.

The East Wanship Ditch Company is ready to proceed with the project. Preliminary project planning has been completed, a hydraulic model has been created to calculate pressures and determine pipe alignments, and EWIC will be providing matching funds for the project. The environmental will be completed by January 2017 and engineering design will be completed by May 2017. The actual construction will take place September 2017 to May 2018.

The East Wanship Ditch Piping Water Conservation Project will be completed over a period of just over two years.

FY2016													
MILESTONES	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Sign WaterSMART Contracts													
Environmental Document													
Permitting													
Design													
Bidding													
Award													
Materials Procurement													
Mobilization													

FY2017													
MILESTONES	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct
Install Pipe													

Please explain any permits that will be required, along with the process for obtaining such permits. Identify and describe any engineering or design work performed specifically in support of the proposed project.

A Summit County Excavation Permit will be obtained by the contractor from the County Road Department.

The preliminary planning has been completed for this project. A hydraulic model identifying pressures and a possible pipe alignment has been created. The engineer has determined the piping material and given opinions of probable construction and design costs.

Subcriterion No. F.3: Performance Measures

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved, marketed, or better managed, or energy saved).

Water Savings

EWIC will generally follow the methodology used by NRCS in determining the water losses. The NRCS conducted an inflow/outflow test to determine the seepage losses in the ditch. Following the completion of the project, EWIC will measure the amount of water coming into their system, but because it is a closed system, measurements will not be needed along the system and there will be no tail water to measure at the end. EWIC will compare the water entering their system with what was needed for conveyance pre-project.

Energy Saved

The pumps needed pre-project can be eliminated once a pressurized system is in place. Therefore, EWIC users will realize 100% energy savings upon completion of the project.

Subcriterion No. F.4: Reasonableness of Costs

Please include information related to the total project cost, annual acre-feet conserved, energy capacity, or other project benefits and the expected life of the improvement(s).

Total project cost: $942,842

Annual acre-feet conserved: 915 acre-feet/year

Energy savings: 9,900 kWh/year

Cost Savings $377/year

For all projects involving physical improvements, specify the expected life of the improvement in number of years and provide support for the expectation (e.g., manufacturer's guarantee, industry accepted life-expectancy, description of corrosion mitigation for ferrous pipe and fittings, etc.).

Expected life of the improvements: The manufacturer of the HDPE pipe estimates their product to have a 50-year life-expectancy. (Please see Attachment D for manufacturer documentation.)

Evaluation Criterion G: Additional Non-Federal Funding

$$\frac{\$642,842.32 \text{ Non-Federal Funding}}{\$942,842.32 \text{ Total Project Cost}} = \mathbf{68.2\%}$$

Evaluation Criterion H: Connection to Reclamation Project Activities

(1) How is the proposed project connected to Reclamation project activities?

This project is in the Weber River Basin wherein many Reclamation facilities are located. The water conserved will directly benefit Echo Reservoir and Rockport Reservoir.

(2) Does the applicant receive Reclamation project water?

Yes. The EWIC receives their water directly from Rockport Reservoir which is part of Reclamation's Weber River Project.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

No.

(4) Is the project in the same basin as a Reclamation project or activity?

Yes. This project is in the Weber River Basin which contains many Reclamation projects including:

- East Canyon Reservoir
- Rockport Reservoir
- Lost Creek Reservoir
- Echo Reservoir
- Arthur V. Watkins Reservoir (formerly Willard)
- Causey Dam
- Pineview Reservoir

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

Yes. This project will result 915 acre-feet saved annually. This water will remain in the basin in Rockport Reservoir.

(6) Will the project help Reclamation meet trust responsibilities to Tribes?

There are no known Tribal Lands near the EWIC service area.

ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

1. *Will the project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.*

   The work will include the installation of pipe which will be along the existing ditch alignment, excluding one small section where the pipe will follow a more practical alignment. Construction will take place after the irrigation season so there will not be water in the ditch.

   Best practices will be employed for dust control and noxious weed management. Surface vegetation will be restored upon completion of the project.

2. *Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?*

   There are no known threatened or endangered species in the direct project area. An assessment of threatened or endangered species will be conducted as part of the environmental document. There are state sensitive species that will benefit from the improved water quality and additional water available.

3. *Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.*

   The EWIC is unaware of any wetlands in the project area. However, the environmental document will include an assessment of wetlands and biology.

4. *When was the water delivery system constructed?*
   The ditch was originally constructed in 1861.

5. *Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., head gates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.*

   No. This project will pipe and enclose the existing open ditch.

6. *Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.*

The EWIC is **not** aware of any buildings, structures, or features that would be eligible for listing on the National Register of Historic Places. A cultural resource inventory will be conducted as part of the environmental document.

7. *Are there any known archeological sites in the proposed project area?*

   The EWIC is unaware of any archeological sites in the project area. The environmental document will include an archeological inventory.

8. *Will the project have a disproportionately high and adverse effect on low income or minority populations?*

   No, this project will **not** have an adverse effect on low income or minority populations. But will instead increase water supply sustainability in this rural, economically distressed community.

9. *Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?*

   The EWIC is unaware of Indian tribal lands or sacred sites in the project area. The environmental document will include an inventory.

10. *Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?*

    No. A closed irrigation system will help control noxious weeks and invasive trees. Best practices will be employed during construction to prevent the spread of noxious weeds.

REQUIRED PERMITS OR APPROVALS

Applicants must state in the application whether any permits or approvals are required and explain the plan for obtaining such permits or approvals.

A Summit County Excavation Permit will be obtained by the contractor from the County Road Department.

LETTERS OF PROJECT SUPPORT

Letters of Support have been received from:

- Kari Lundeen, the Weber River Basin Coordinator from of the Utah Department of Environmental Quality: Division of Water Quality

State of Utah
GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

January 15, 2016

Bureau of Reclamation
Attn: Ms. Janeen Koza
Denver Federal Center, Bldg. 67, Rm. 152
6th Avenue and Kipling Street
Denver, CO 80225

Dear Ms. Koza,

The Utah Division of Water Quality (DWQ) is pleased to write in support of the East Wanship Irrigation Company's grant application being submitted to the Bureau of Reclamation Water and Energy Efficiency Grants Program. We applaud the Company's efforts to increase the efficiency of their system to conserve valuable water and energy.

DWQ recognizes the importance of water conservation in our often water-short basin. The water saved through these improvement projects will provide benefit to water users and the regional environment. Enclosing the East Wanship Ditch will make it possible for users to convert from inefficient flood irrigation to pressurized sprinkler systems. The tail water from the East Wanship Ditch re-enters the Weber River carrying with it nutrients and sediments. The Weber River between the Rockport and Echo Reservoirs contributes to the high phosphorous loads in the Echo Reservoir. This project will reduce the loading of sediments and nutrients to Echo Reservoir in direct support of non-point source load reductions called for in the 2014 Rockport Reservoir and Echo Reservoir TMDL study.

We strongly support your grant application and appreciate the advancements it will make in improving efficiency and reducing nutrient loading for the East Wanship Irrigation Company.

Sincerely,

Kari A. Lundeen

Kari Lundeen
Weber River Basin Coordinator
Watershed Protection Section

195 North 1950 West • Salt Lake City, UT
Mailing Address: P.O. Box 144870 • Salt Lake City, UT 84114-4870
Telephone (801) 536-4300 • Fax (801) 536-4301 • T.D.D. (801) 903-3978
www.deq.utah.gov

OFFICIAL RESOLUTION

RESOLUTION NO. 2015 - 001

EAST WANSHIP IRRIGATION COMPANY

WHEREAS, The East Wanship Irrigation Company must maintain, provide for, and service the Water System,

WHEREAS, The Company sees the need to **pipe the open ditch and create a pressurized irrigation system** to improve water and energy conservation and efficiency,

WHEREAS, The Company desires to obtain grant funding from the Bureau of Reclamation through the **WaterSMART: Water and Energy Efficiency Grant Program.**

NOW THEREFORE, BE IT RESOLVED that the Board of Directors, agrees and authorizes that:

1. The Board of Directors supports the submittal of the WaterSMART: Water and Energy Efficiency Grant application prepared by J-U-B Engineers, Inc.

2. The East Wanship Irrigation Company is capable of providing the amount of funding specified in the funding plan; and

3. If selected for a WaterSMART grant, the Company will work with the Bureau of Reclamation to meet established deadlines for entering into a cooperative agreement.

DATED: Dec 17, 2015

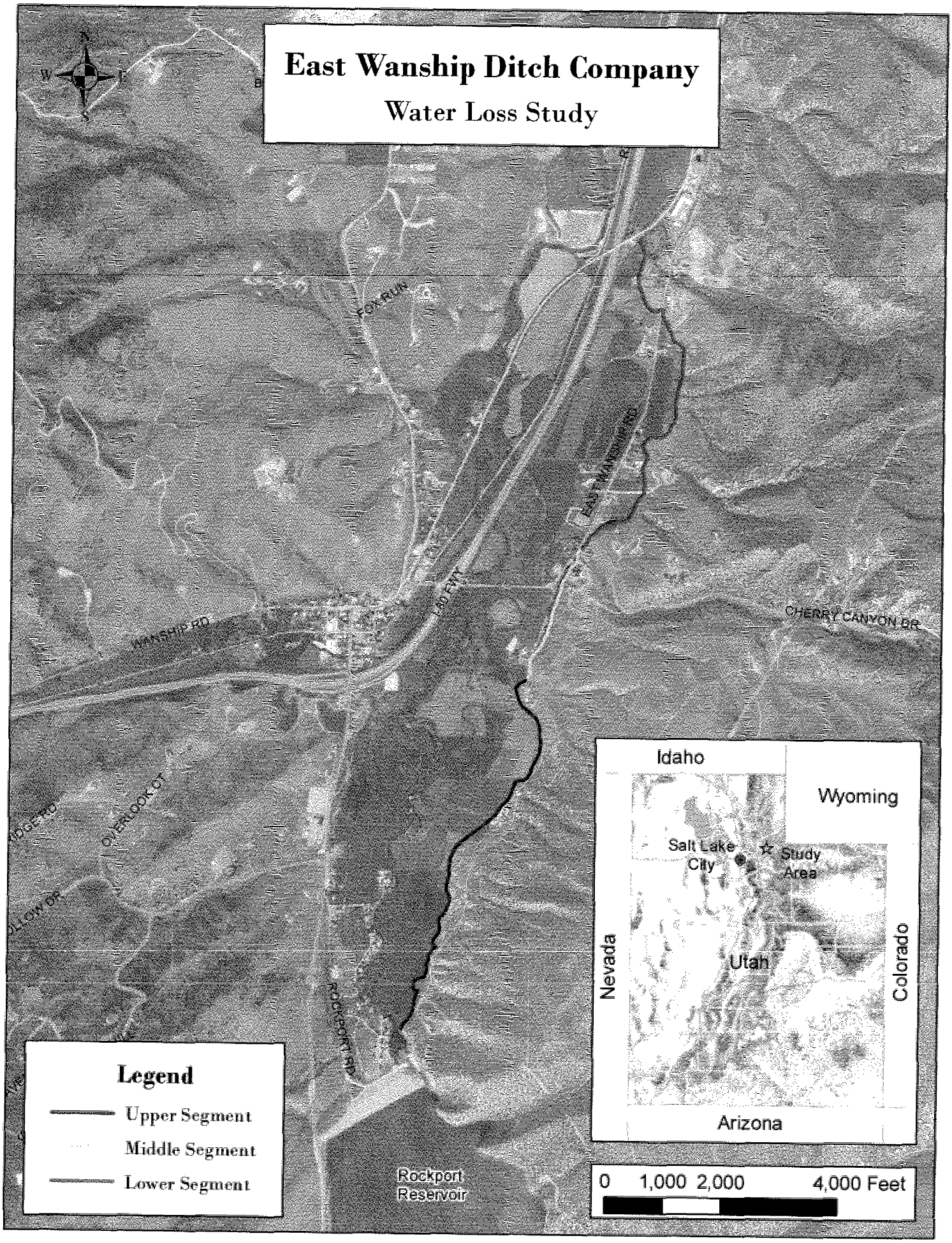
Donald A. Pace Pres
Authorized Signature(s)

ATTEST:

Michelle L Williams

ATTACHMENT A
PROJECT LOCATION MAP

ATTACHMENT B
WATER LOSS STUDY


East Wanship Ditch Company
Water Loss Study
N
W
E
S
FOX RUN
EAST WANSHIP RD
WANSHIP RD
CHERRY CANYON DR
RIDGEWOOD
OVERLOOK CT
ELLIOTT DR
ROCKPORT AVE
Rockport Reservoir
Legend
Upper Segment
Middle Segment
Lower Segment
Idaho
Wyoming
Nevada
Colorado
Utah
Arizona
Salt Lake City
Study Area
0 1,000 2,000 4,000 Feet

Wanship Water Loss Study

Nathaniel Todea, USDA NRCS Utah Hydraulic Engineer
September 28, 2015

Contents

A water loss study was completed for the Wanship Ditch. Nathaniel Todea (Utah NRCS State Hydraulic Engineer), Ryan Pierce (Utah NRCS GIS Specialist), and Corey Pace (Wanship Irrigation Company water master) met on August 28, 2015 to determine measurement locations and canal to be studied. As part of this study an Acoustic Doppler Current Profiler (ADCP) – StreamPro was used to measure canal flows at four different locations. It should be noted that the ADCP limits were exceded by depth being less than 0.5 feet. However, the estimated flows from the ADCP seem to be accurate through observation and experience of users.

Discharge measurements and losses in canal system

In short the upper most section had a discharge of ~3.85 cfs (Upper measurement site). The second measurement site is approximately 8900 feet downstream of the Upper measurement site and had a discharge of 3.4 cfs. The third location approximately 3200 feet downstream of the second measurement site at Cherry Creek Road had a discharge of 2.3 cfs. And the last location approximately 6800 feet downstream of the Cherry Creek Road measurement has a discharge of 0.73 cfs.

For the purposes of this study it is assumed that the Wanship ditch is losing 3.12 cfs or 19% efficient in delivering water. At the 3.12 cfs being lose that is 6.18 acre-feet/day. If the canal was piped the savings for 135 days from mid-April through mid-august at 3.85 cfs is 835 acre-feet.

Located in Figure 1 are the location of the measurement sites and located in Table 1 are the discharges measured, distance between measurement sites, and losses per length. Finally WinRiver out from the ADCP measurements are located in the Appendix

Upper Measurement Site. The measurement was difficult and reached the limitation of the ADCP. Many measurements were taken and the best matches such as time to survey (data acquisition), total area, top width, and total Q were extracted and were determined to be reasonable and valid.

Second Measurement Site: This measurement was taking at an existing check gate that acted like a flume. The readings in this area were very consistent and 3.4 cfs is determined to be valid. The discharge difference between the Upper Measurement Site and Second Measurement site is 0.45 cfs or 5.06e-5 cfs/ft. The relative losses in this area is very low.

Third Measurement site at Cherry Creek Road: This measurement was taking at an existing check gate that acted like a flume. The readings in this area were very consistent and 2.3 cfs is determined to be valid. The discharge difference between the Second Measurement site and Cherry Creek Road is 1.1 cfs or 0.00034 cfs/ft. The losses are increased in this area. Note that the canal is outside the floodplain and on the alluvial banks of the valley.

Fourth and Last Measurement site: The measurement was very difficult and reached the limitation of the ADCP. A lot vegetation was observed in the canal and nearly prohibited conveyance through the canal. Many measurements were taken and the best matches such as time to survey (data acquisition), total area, top width, and total Q were extracted and were determined to be reasonable and valid. This produced a discharge of 0.73 cfs. The discharge difference between the Fourth and Last Measurement site and Cherry Creek Road is 1.57 cfs or 0.00023 cfs/ft. The losses are large in this area. Note that the canal is outside the flood plain and on the alluvial banks of the valley.

Geology interpretation

To be included later

Soils interpretation

To be included later

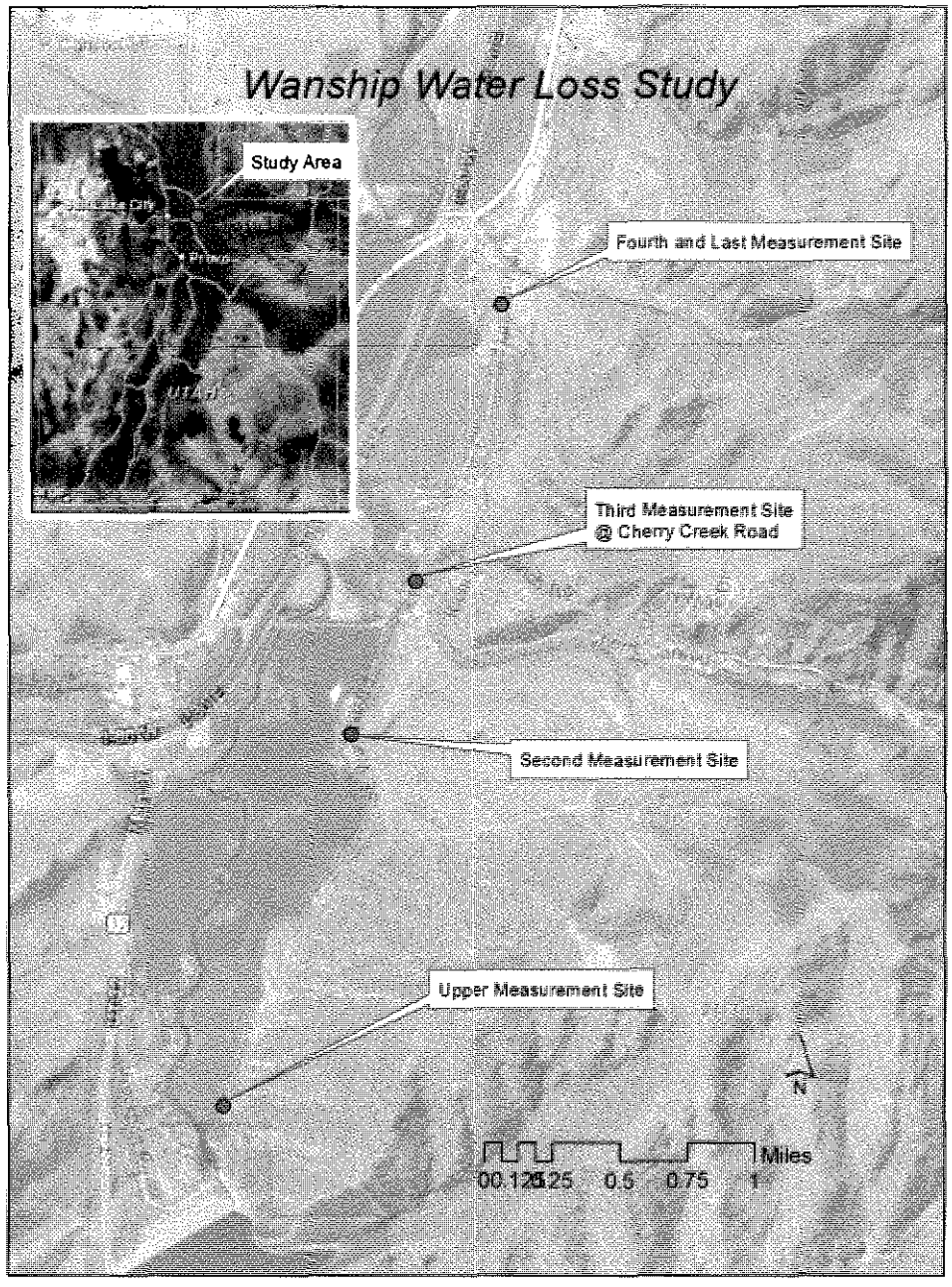
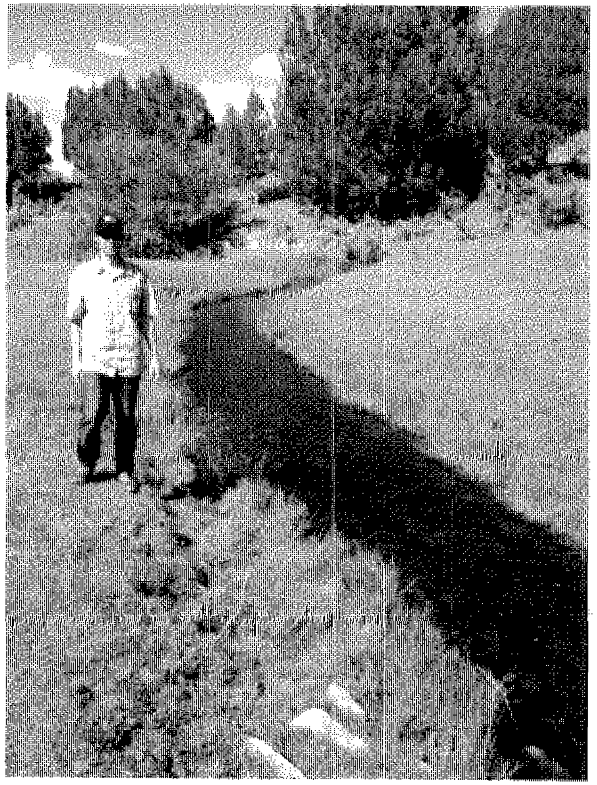


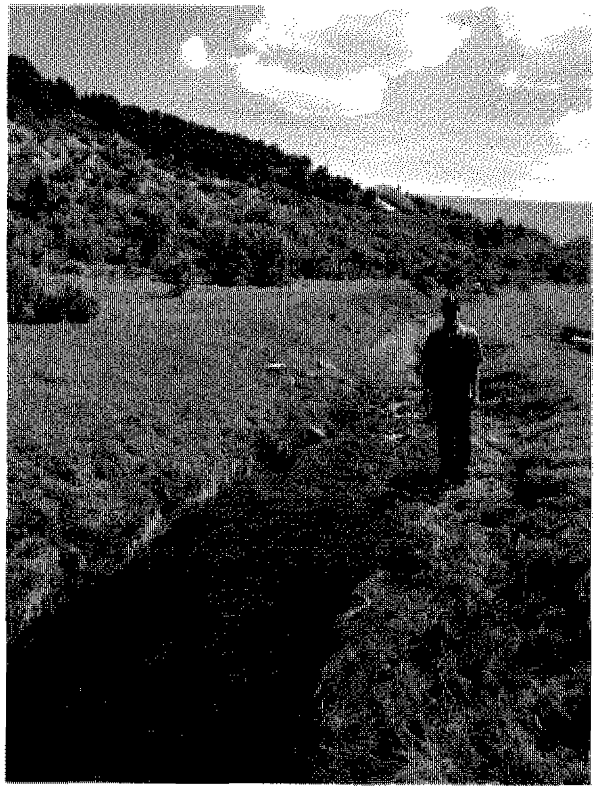
Figure 1. Location map and location of measurement sites

Table 1. Associated discharges, distances and losses per length of study sites.

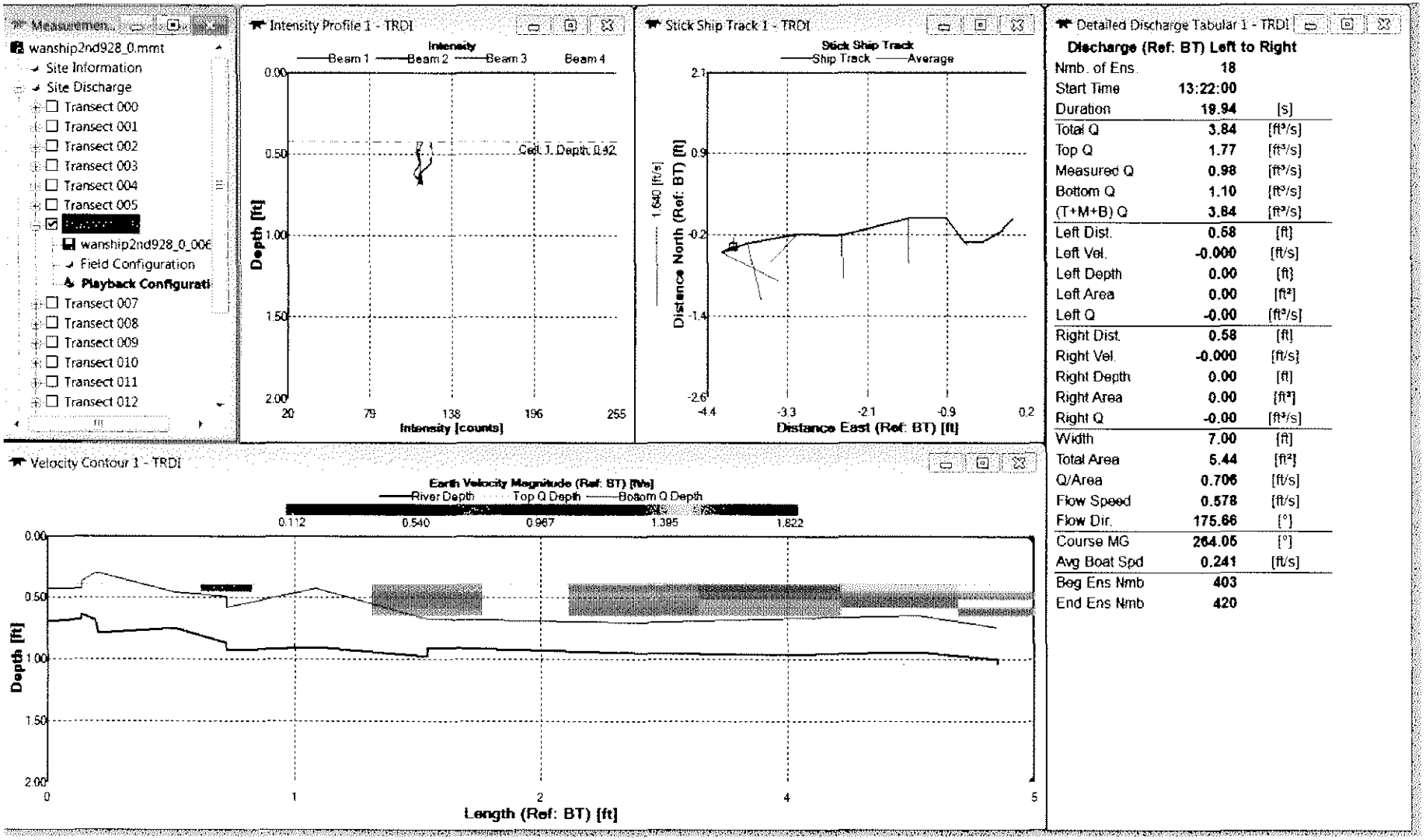
MEASUREMENT SITE	AVERAGE DISCHARGE (CFS)	DISTANCE BETWEEN MEASURMENT SITES	LOSSES PER LENGTH * 1000
• **UPPER MEASUREMENT SITE**	• 3.85	• 0	• -
• **SECOND MEASUREMENT SITE**	• 3.4	• 8900	• 0.05 cfs/feet
• **THIRD MEASUREMENT SITE (CHERRY CREEK ROAD)**	• 2.3	• 3200	• 0.34 cfs/feet
• **FOURTH AND LAST MEASUREMENT SITE**	• 0.73	• 6800	• 0.23 cfs/feet

Upper

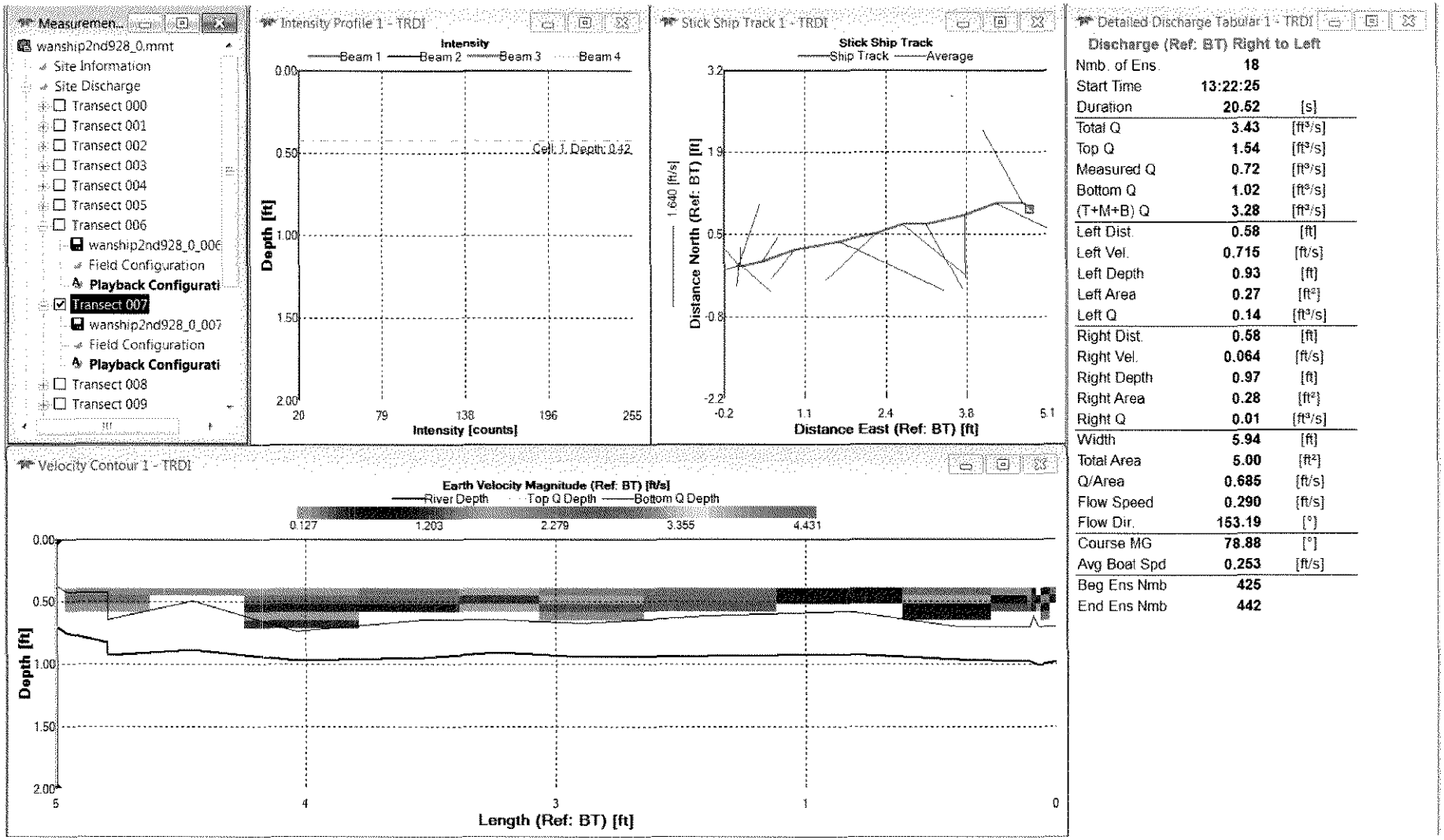


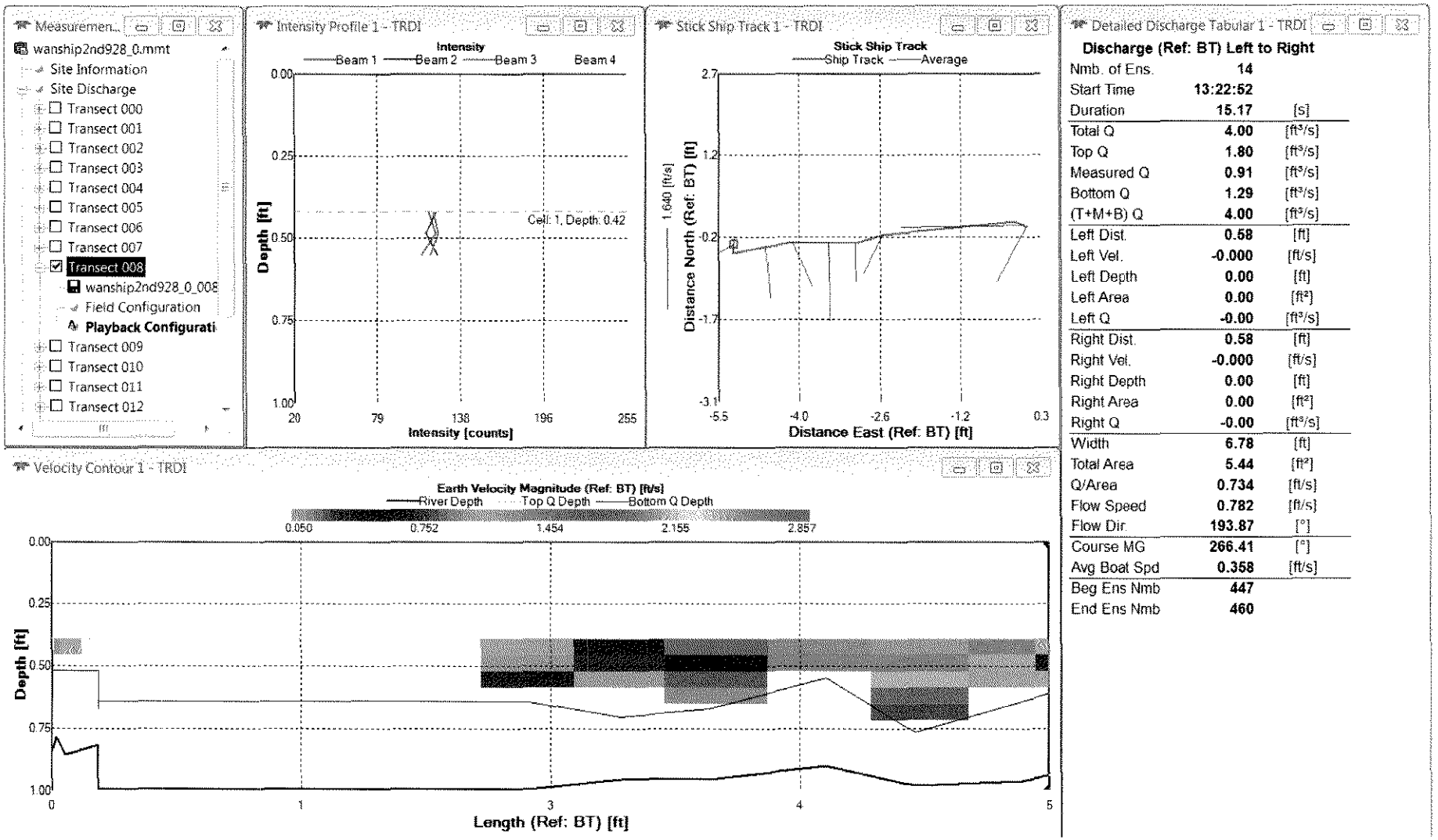


Transect	Start Bank	# Ens.	Start Time	Total Q ft³/s	Delta Q %	Top Q ft³/s	Meas. Q ft³/s	Bottom Q ft³/s	Left Q ft³/s
wanship2nd928006	**Left**	**18**	**13:22:00**	**3.849**	**2.61**	**1.768**	**0.989**	**1.095**	**-0.000**
wanship2nd928007	Right	18	13:22:26	3.426	-8.78	1.519	0.706	1.024	0.141
wanship2nd928008	Left	14	13:22:52	3.991	6.27	1.801	0.918	1.271	-0.000
Average		**16**		**3.756**	**0.00**	**1.696**	**0.871**	**1.130**	**0.047**
Std Dev.		**2**		**0.294**	**7.83**	**0.164**	**0.147**	**0.127**	**0.082**
Std./| Avg.|		**0.13**		**0.08**	**0.00**	**0.09**	**0.17**	**0.11**	**1.73**



Nmb. of Ens.	18	
Start Time	13:22:00	
Duration	19.94	[s]
Total Q	3.84	[ft³/s]
Top Q	1.77	[ft³/s]
Measured Q	0.98	[ft³/s]
Bottom Q	1.10	[ft³/s]
(T+M+B) Q	3.84	[ft³/s]
Left Dist.	0.58	[ft]
Left Vel.	-0.000	[ft/s]
Left Depth	0.00	[ft]
Left Area	0.00	[ft²]
Left Q	-0.00	[ft³/s]
Right Dist.	0.58	[ft]
Right Vel.	-0.000	[ft/s]
Right Depth	0.00	[ft]
Right Area	0.00	[ft²]
Right Q	-0.00	[ft³/s]
Width	7.00	[ft]
Total Area	5.44	[ft²]
Q/Area	0.706	[ft/s]
Flow Speed	0.578	[ft/s]
Flow Dir.	175.66	[°]
Course MG	264.05	[°]
Avg Boat Spd	0.241	[ft/s]
Beg Ens Nmb	403	
End Ens Nmb	420	


Measuremen...
wanship2nd928_0.mmt
Site Information
Site Discharge
Transect 000
Transect 001
Transect 002
Transect 003
Transect 004
Transect 005
Transect 006
wanship2nd928_0_006
Field Configuration
Playback Configurati
Transect 007
wanship2nd928_0_007
Field Configuration
Playback Configurati
Transect 008
Transect 009
Intensity Profile 1 - TRDI
Intensity
Beam 1
Beam 2
Beam 3
Beam 4
Cell 1, Depth: 0.42
Depth [ft]
0.00
0.50
1.00
1.50
2.00
20
79
138
196
255
Intensity [counts]
Stick Ship Track 1 - TRDI
Stick Ship Track
Ship Track
Average
1.640 [ft/s]
Distance North (Ref: BT) [ft]
3.2
1.9
0.5
-0.8
-2.2
-0.2
1.1
2.4
3.8
5.1
Distance East (Ref: BT) [ft]
Detailed Discharge Tabular 1 - TRDI
Discharge (Ref: BT) Right to Left
Nmb. of Ens. 18
Start Time 13:22:25
Duration 20.52 [s]
Total Q 3.43 [ft³/s]
Top Q 1.54 [ft³/s]
Measured Q 0.72 [ft³/s]
Bottom Q 1.02 [ft³/s]
(T+M+B) Q 3.28 [ft³/s]
Left Dist. 0.58 [ft]
Left Vel. 0.715 [ft/s]
Left Depth 0.93 [ft]
Left Area 0.27 [ft²]
Left Q 0.14 [ft³/s]
Right Dist. 0.58 [ft]
Right Vel. 0.064 [ft/s]
Right Depth 0.97 [ft]
Right Area 0.28 [ft²]
Right Q 0.01 [ft³/s]
Width 5.94 [ft]
Total Area 5.00 [ft²]
Q/Area 0.685 [ft/s]
Flow Speed 0.290 [ft/s]
Flow Dir. 153.19 [°]
Course MG 78.88 [°]
Avg Boat Spd 0.253 [ft/s]
Beg Ens Nmb 425
End Ens Nmb 442
Velocity Contour 1 - TRDI
Earth Velocity Magnitude (Ref: BT) [ft/s]
River Depth
Top Q Depth
Bottom Q Depth
0.127
1.203
2.279
3.355
4.431
Depth [ft]
0.00
0.50
1.00
1.50
2.00
5
4
3
1
0
Length (Ref: BT) [ft]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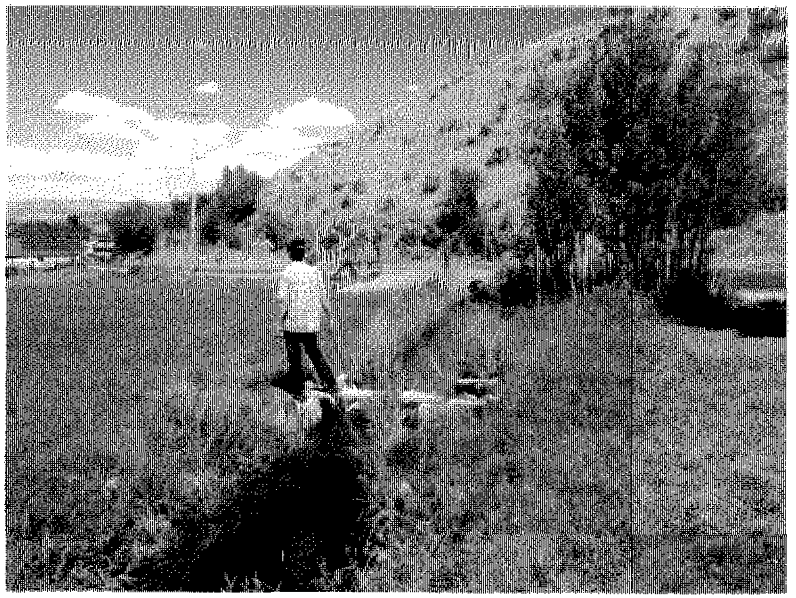
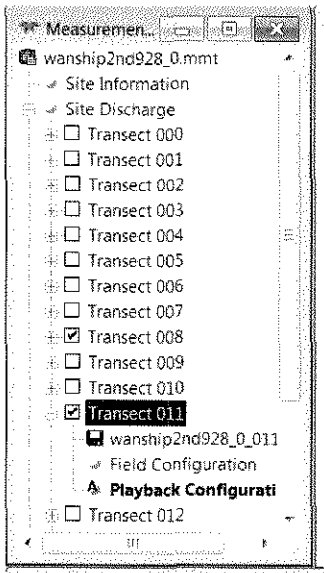
wanship2nd928_0.mmt
Site Information
Site Discharge
Transect 000
Transect 001
Transect 002
Transect 003
Transect 004
Transect 005
Transect 006
Transect 007
Transect 008
wanship2nd928_0_008
Field Configuration
Playback Configurati
Transect 009
Transect 010
Transect 011
Transect 012
Intensity Profile 1 - TRDI
Intensity
Beam 1
Beam 2
Beam 3
Beam 4
Depth [ft]
Cell: 1, Depth: 0.42
Intensity [counts]
Stick Ship Track 1 - TRDI
Stick Ship Track
Ship Track
Average
Distance North (Ref: BT) [ft]
Distance East (Ref: BT) [ft]
Detailed Discharge Tabular 1 - TRDI
Discharge (Ref: BT) Left to Right
Nmb. of Ens. 14
Start Time 13:22:52
Duration 15.17 [s]
Total Q 4.00 [ft³/s]
Top Q 1.80 [ft³/s]
Measured Q 0.91 [ft³/s]
Bottom Q 1.29 [ft³/s]
(T+M+B) Q 4.00 [ft³/s]
Left Dist. 0.58 [ft]
Left Vel. -0.000 [ft/s]
Left Depth 0.00 [ft]
Left Area 0.00 [ft²]
Left Q -0.00 [ft³/s]
Right Dist. 0.58 [ft]
Right Vel. -0.000 [ft/s]
Right Depth 0.00 [ft]
Right Area 0.00 [ft²]
Right Q -0.00 [ft³/s]
Width 6.78 [ft]
Total Area 5.44 [ft²]
Q/Area 0.734 [ft/s]
Flow Speed 0.782 [ft/s]
Flow Dir 193.87 [°]
Course MG 266.41 [°]
Avg Boat Spd 0.358 [ft/s]
Beg Ens Nmb 447
End Ens Nmb 460
Velocity Contour 1 - TRDI
Earth Velocity Magnitude (Ref: BT) [ft/s]
River Depth
Top Q Depth
Bottom Q Depth
Depth [ft]
Length (Ref: BT) [ft]

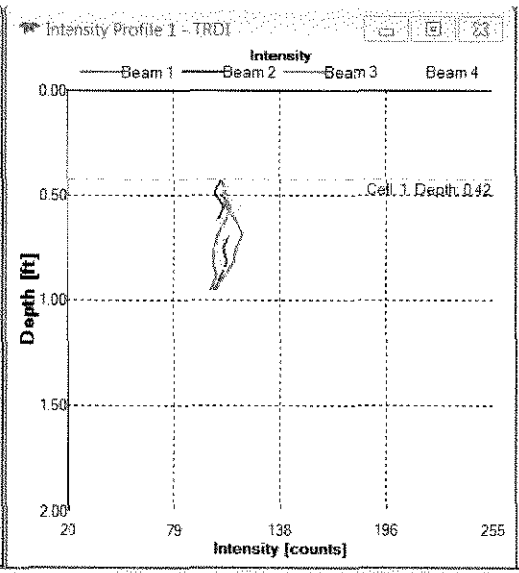
Second Measurement Site

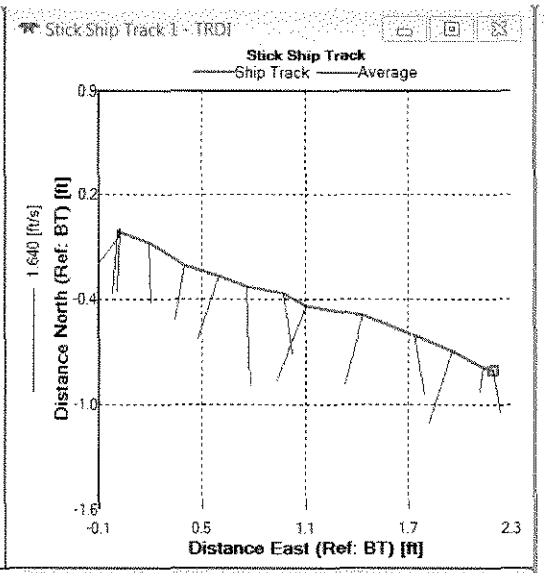


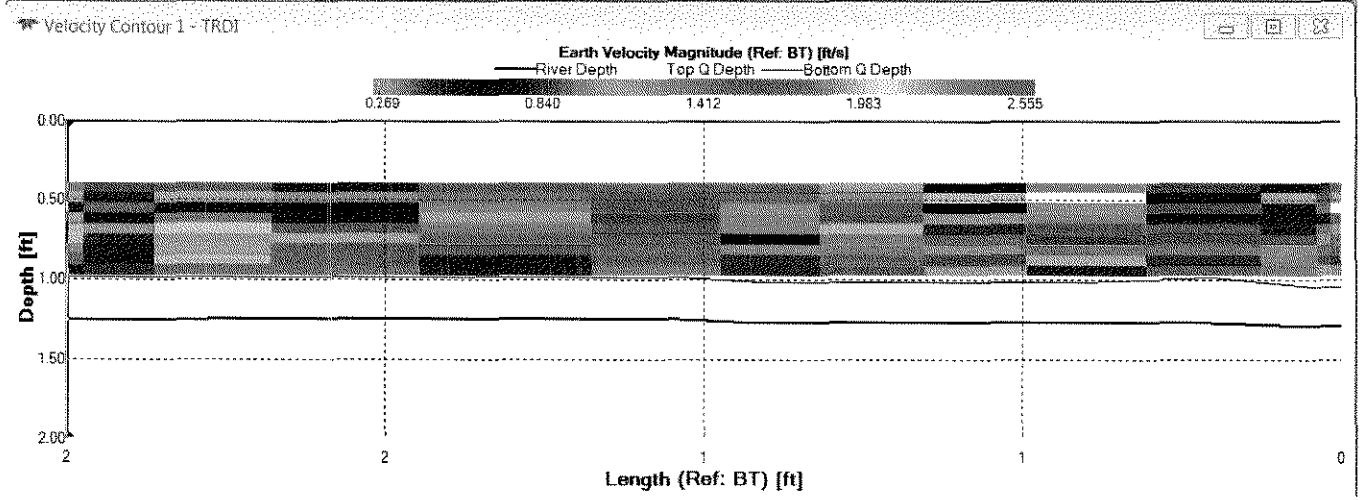
Transect	Start Bank	# Ens.	Start Time	Total Q ft³/s	Delta Q %	Top Q ft³/s	Meas. Q ft³/s	Bottom Q ft³/s	Left Q ft³/s
wanship2nd928011	Right	14	14:03:09	3.390	-6.19	1.024	1.377	0.494	0.247
wanship2nd928012	Left	14	14:03:37	3.637	0.66	1.130	1.483	0.565	0.212
wanship2nd928013	Right	14	14:04:03	3.814	5.54	1.166	1.589	0.565	0.247
Average		14		3.614	0.00	1.107	1.483	0.541	0.235
Std Dev.		0		0.213	5.89	0.074	0.106	0.041	0.020
Std./ Avg./		0.00		0.06	0.00	0.07	0.07	0.08	0.09

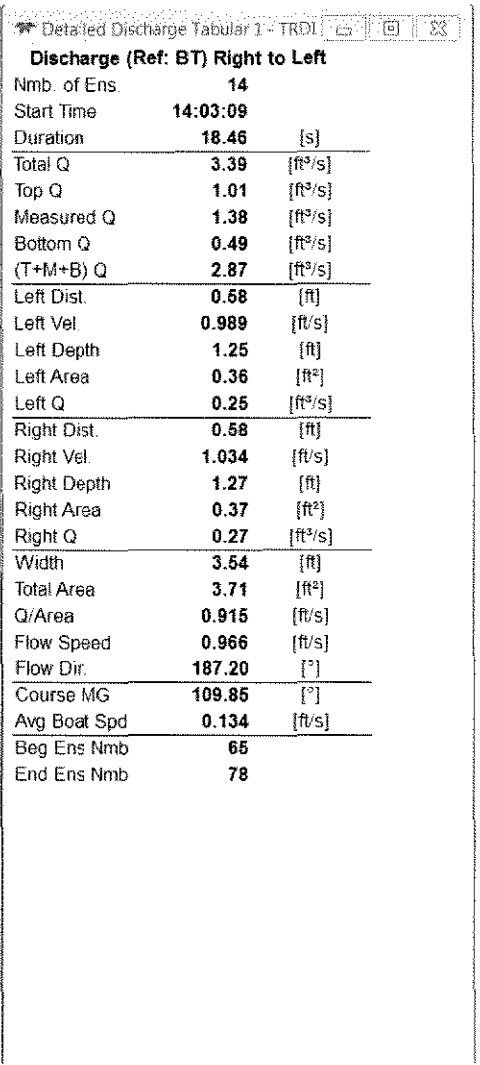
Transect	Left Q ft³/s	Left Dist. ft	Right Q ft³/s	Right Dist. ft	Width ft	Total Area ft²	Q/Area ft/s	Boat Speed ft/s	Flow Speed ft/s
wanship2nd928011	0.247	0.58	0.283	0.58	3.54	3.70	0.916	0.135	0.965
wanship2nd928012	0.212	0.58	0.283	0.58	3.68	3.92	0.932	0.151	0.863
wanship2nd928013	0.247	0.58	0.283	0.58	3.53	3.74	1.020	0.161	0.932
Average	0.235	0.58	0.283	0.58	3.58	3.79	0.956	0.149	0.920
Std Dev.	0.020	0.00	0.000	0.00	0.09	0.12	0.056	0.013	0.052
Std./ Avg./	0.09	0.00	0.00	0.00	0.02	0.03	0.06	0.09	0.06





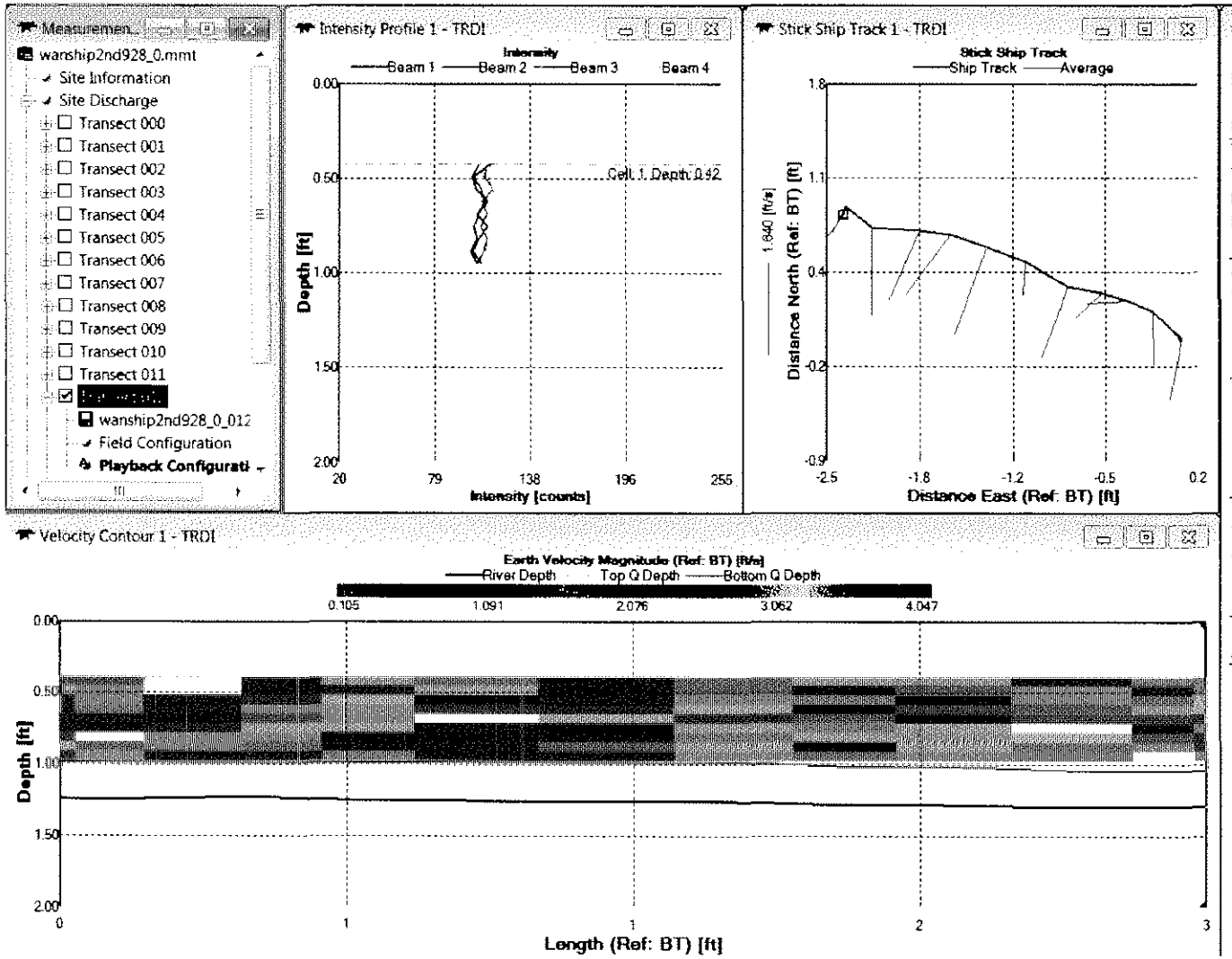






Discharge (Ref: BT) Right to Left

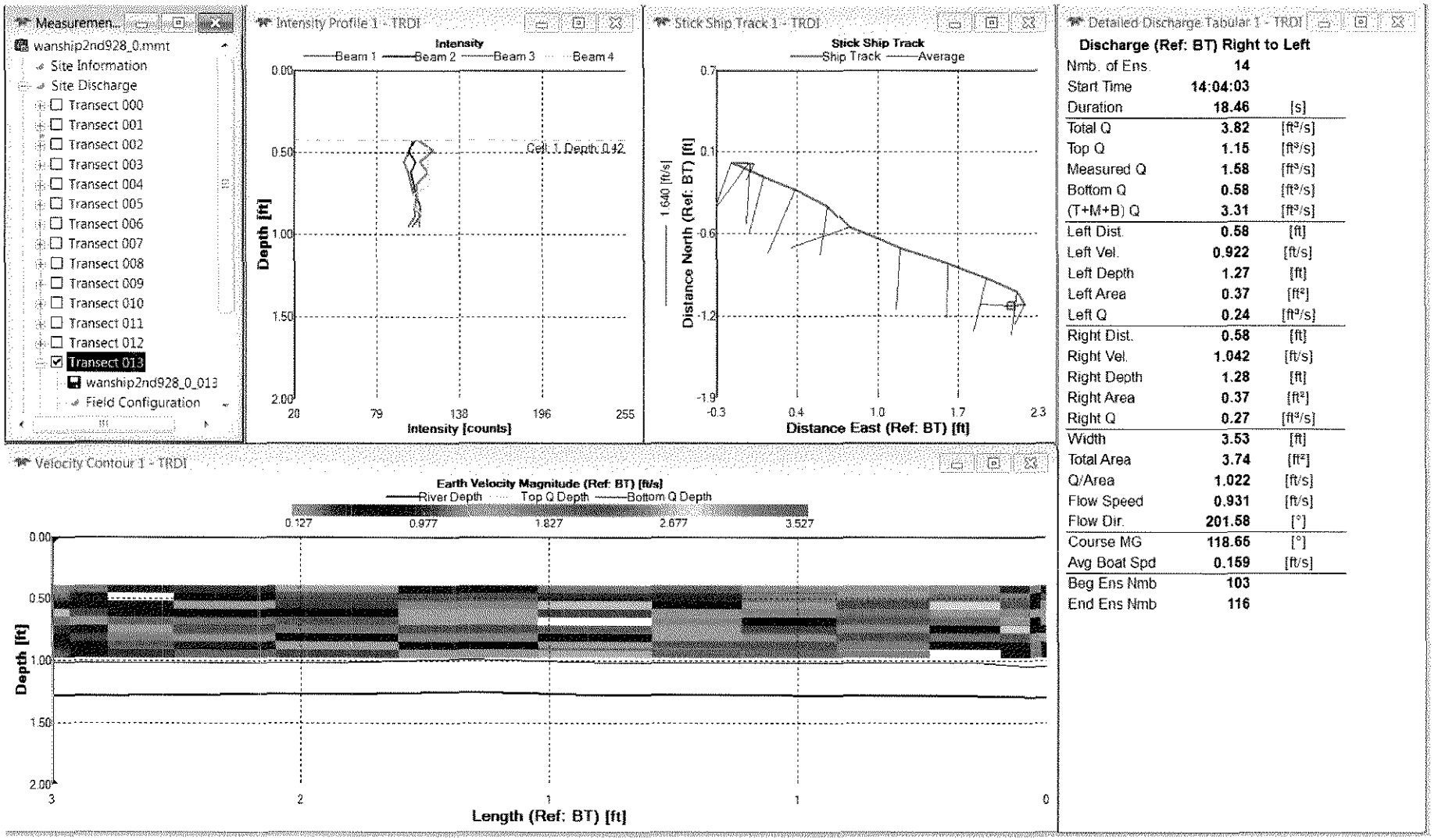
Nmb. of Ens.	**14**	
Start Time	**14:03:09**	
Duration	**18.46**	[s]
Total Q	**3.39**	[ft³/s]
Top Q	**1.01**	[ft³/s]
Measured Q	**1.38**	[ft³/s]
Bottom Q	**0.49**	[ft³/s]
(T+M+B) Q	**2.87**	[ft³/s]
Left Dist.	**0.58**	[ft]
Left Vel.	**0.989**	[ft/s]
Left Depth	**1.25**	[ft]
Left Area	**0.36**	[ft²]
Left Q	**0.25**	[ft³/s]
Right Dist.	**0.58**	[ft]
Right Vel.	**1.034**	[ft/s]
Right Depth	**1.27**	[ft]
Right Area	**0.37**	[ft²]
Right Q	**0.27**	[ft³/s]
Width	**3.54**	[ft]
Total Area	**3.71**	[ft²]
Q/Area	**0.915**	[ft/s]
Flow Speed	**0.966**	[ft/s]
Flow Dir.	**187.20**	[°]
Course MG	**109.85**	[°]
Avg Boat Spd	**0.134**	[ft/s]
Beg Ens Nmb	**65**	
End Ens Nmb	**78**	



Detailed Discharge Tabular 1 - TRDI

Discharge (Ref: BT) Left to Right

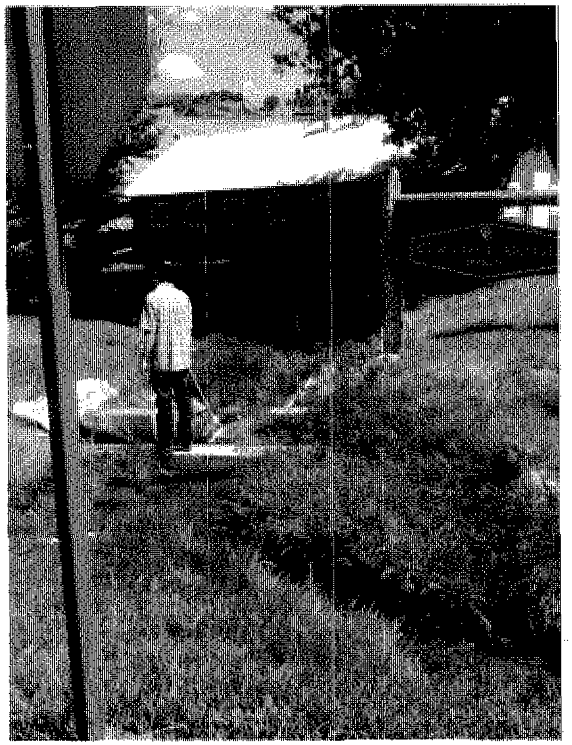
Nmb. of Ens.	**14**	
Start Time	**14:03:37**	
Duration	**18.46**	[s]
Total Q	**3.65**	[ft³/s]
Top Q	**1.13**	[ft³/s]
Measured Q	**1.48**	[ft³/s]
Bottom Q	**0.68**	[ft³/s]
(T+M+B) Q	**3.19**	[ft³/s]
Left Dist.	**0.68**	[ft]
Left Vel.	**0.771**	[ft/s]
Left Depth	**1.26**	[ft]
Left Area	**0.36**	[ft²]
Left Q	**0.20**	[ft³/s]
Right Dist.	**0.68**	[ft]
Right Vel.	**1.024**	[ft/s]
Right Depth	**1.27**	[ft]
Right Area	**0.37**	[ft²]
Right Q	**0.27**	[ft³/s]
Width	**3.68**	[ft]
Total Area	**3.92**	[ft²]
Q/Area	**0.932**	[ft/s]
Flow Speed	**0.863**	[ft/s]
Flow Dir.	**204.75**	[°]
Course MG	**289.61**	[°]
Avg Boat Spd	**0.150**	[ft/s]
Beg Ens Nmb	**85**	
End Ens Nmb	**98**	



Discharge (Ref: BT) Right to Left

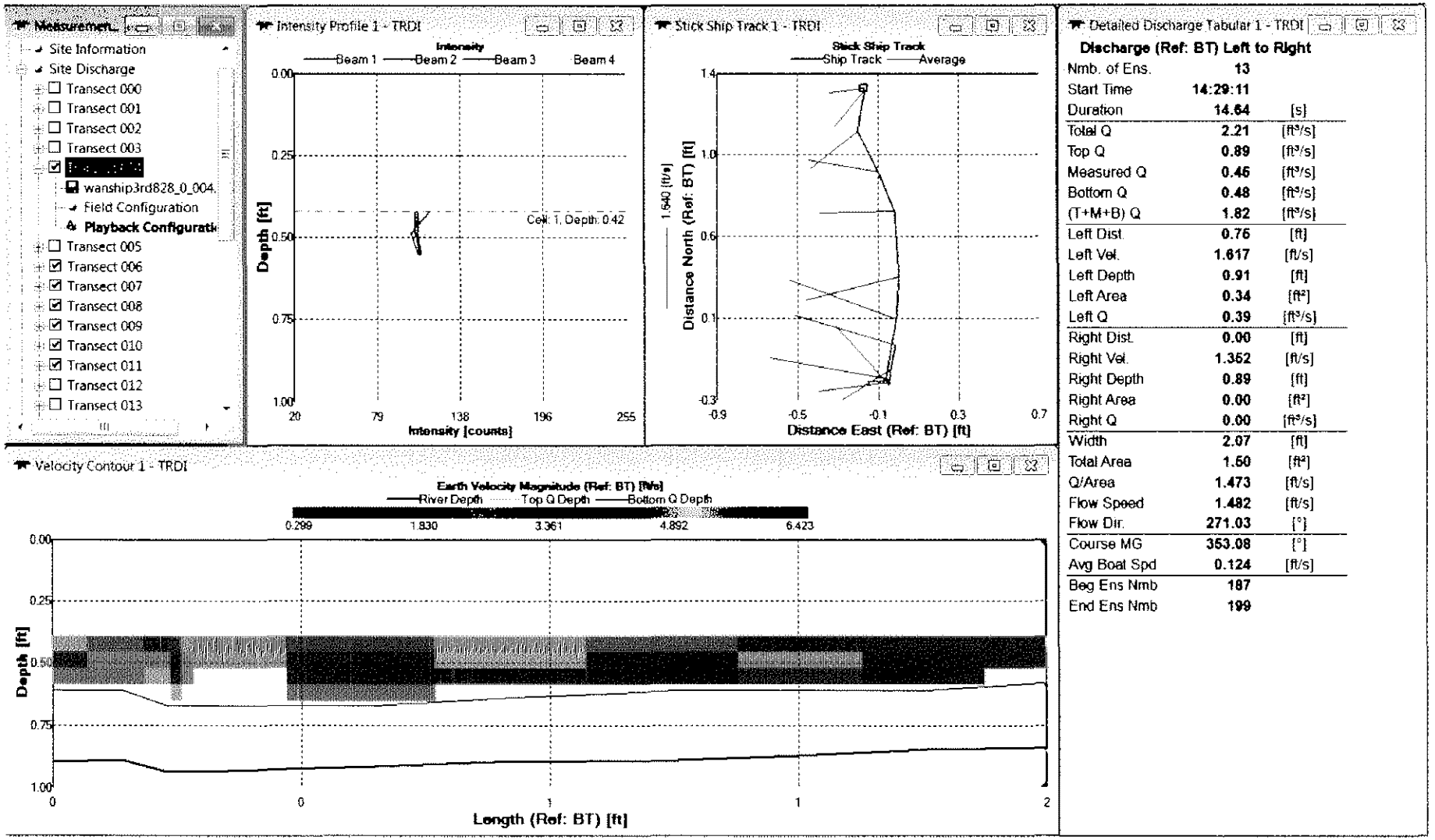
Nmb. of Ens.	**14**	
Start Time	**14:04:03**	
Duration	**18.46**	[s]
Total Q	**3.82**	[ft³/s]
Top Q	**1.15**	[ft³/s]
Measured Q	**1.58**	[ft³/s]
Bottom Q	**0.58**	[ft³/s]
(T+M+B) Q	**3.31**	[ft³/s]
Left Dist.	**0.58**	[ft]
Left Vel.	**0.922**	[ft/s]
Left Depth	**1.27**	[ft]
Left Area	**0.37**	[ft²]
Left Q	**0.24**	[ft³/s]
Right Dist.	**0.58**	[ft]
Right Vel.	**1.042**	[ft/s]
Right Depth	**1.28**	[ft]
Right Area	**0.37**	[ft²]
Right Q	**0.27**	[ft³/s]
Width	**3.53**	[ft]
Total Area	**3.74**	[ft²]
Q/Area	**1.022**	[ft/s]
Flow Speed	**0.931**	[ft/s]
Flow Dir.	**201.58**	[°]
Course MG	**118.66**	[°]
Avg Boat Spd	**0.159**	[ft/s]
Beg Ens Nmb	**103**	
End Ens Nmb	**116**	

Cherry Canyon RD



Transect	Start Bank	# Ens.	Start Time	Total Q ft³/s	Delta Q %	Top Q ft³/s	Meas. Q ft³/s	Bottom Q ft³/s	Left Q ft³/s	Left Dist. ft	Right Q ft³/s
wanship3rd828004	**Left**	**13**	**14:29:11**	**2.226**	**-3.29**	**0.683**	**0.459**	**0.459**	**0.388**	**0.76**	**0.000**
wanship3rd828006	Left	14	14:31:10	2.119	-7.89	0.777	0.318	0.494	0.318	0.76	0.247
wanship3rd828007	Right	13	14:31:45	2.543	10.53	0.989	0.459	0.565	0.283	0.58	0.212
wanship3rd828008	Left	12	14:32:14	2.472	7.46	0.963	0.424	0.566	0.247	0.58	0.247
wanship3rd828009	Right	12	14:32:40	2.084	-9.43	0.812	0.318	0.530	0.212	0.58	0.212
wanship3rd828010	**Left**	**11**	**14:33:01**	**2.190**	**-4.82**	**0.848**	**0.388**	**0.494**	**0.212**	**0.58**	**0.212**
wanship3rd828011	Right	12	14:33:20	2.472	7.46	0.963	0.459	0.565	0.212	0.58	0.247
Average		**12**		**2.300**	**0.00**	**0.888**	**0.404**	**0.525**	**0.267**	**0.63**	**0.197**
Std Dev.		**1**		**0.190**	**8.24**	**0.080**	**0.064**	**0.043**	**0.067**	**0.08**	**0.089**
Std./| Avg.|		**0.08**		**0.08**	**0.00**	**0.09**	**0.16**	**0.08**	**0.25**	**0.13**	**0.45**

Transect	Right Dist. ft	Width ft	Total Area ft²	Q/Area ft/s	Boat Speed ft/s	Flow Speed ft/s	Flow Dir. °	End Time	Duration s
wanship3rd828004	**0.00**	**2.07**	**1.50**	**1.473**	**0.125**	**1.483**	**271.03**	**14:29:25**	**14.64**
wanship3rd828006	0.58	2.46	1.61	1.319	0.112	1.260	270.07	14:31:26	15.86
wanship3rd828007	0.58	2.56	1.74	1.457	0.105	1.312	271.59	14:32:00	14.64
wanship3rd828008	0.58	2.90	2.06	1.198	0.148	1.407	283.73	14:32:28	13.36
wanship3rd828009	0.58	2.88	2.12	0.978	0.141	1.063	293.86	14:32:53	13.33
wanship3rd828010	**0.58**	**2.67**	**1.86**	**1.175**	**0.167**	**1.260**	**265.94**	**14:33:13**	**12.15**
wanship3rd828011	0.58	2.57	1.78	1.391	0.121	1.312	280.74	14:33:33	13.38
Average	**0.50**	**2.60**	**1.81**	**1.284**	**0.131**	**1.300**			
Std Dev.	**0.22**	**0.30**	**0.22**	**0.179**	**0.022**	**0.132**			
Std./| Avg.|	**0.44**	**0.12**	**0.12**	**0.14**	**0.17**	**0.10**			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Transect 002
Transect 003
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Field Configuration
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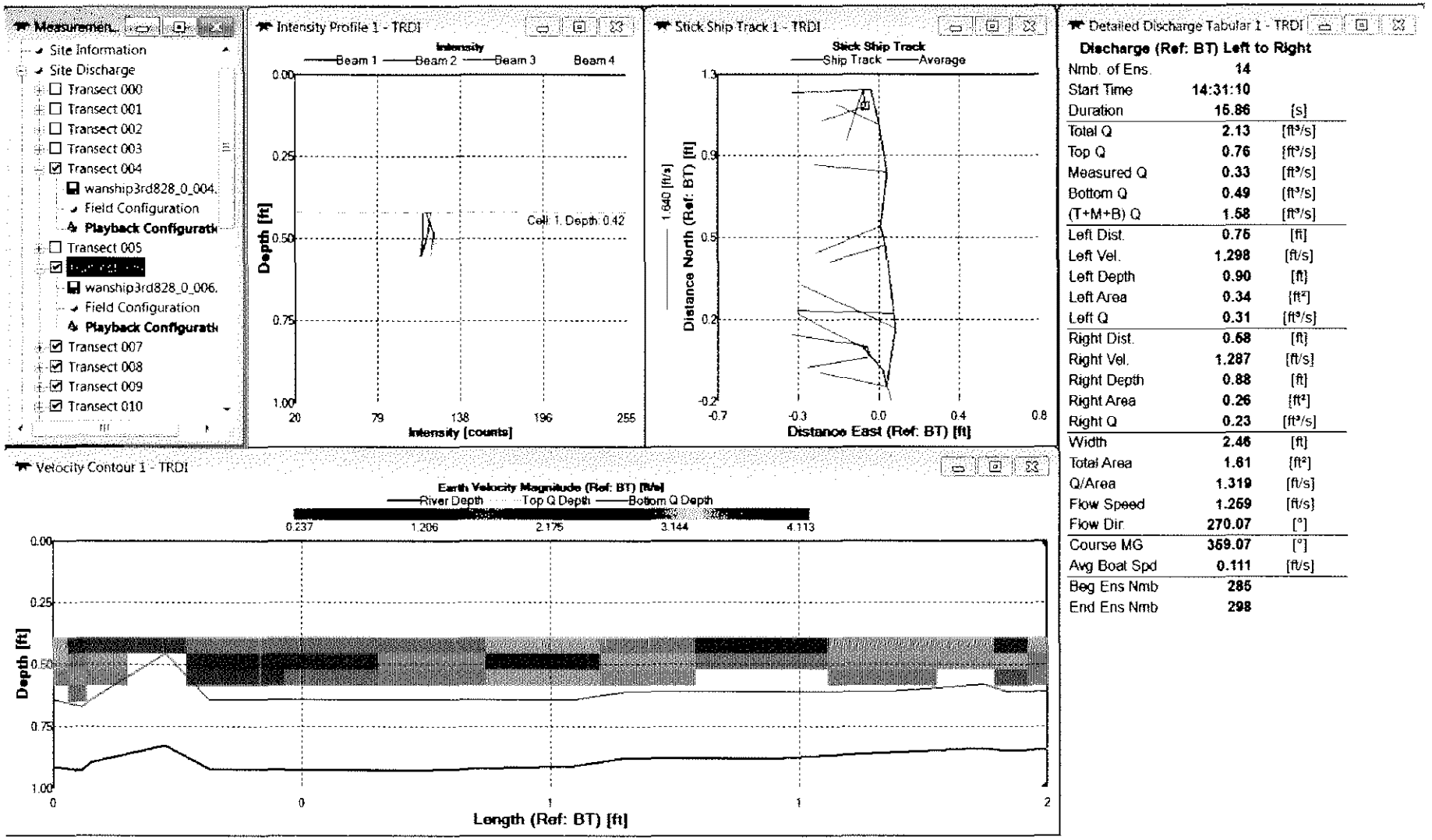
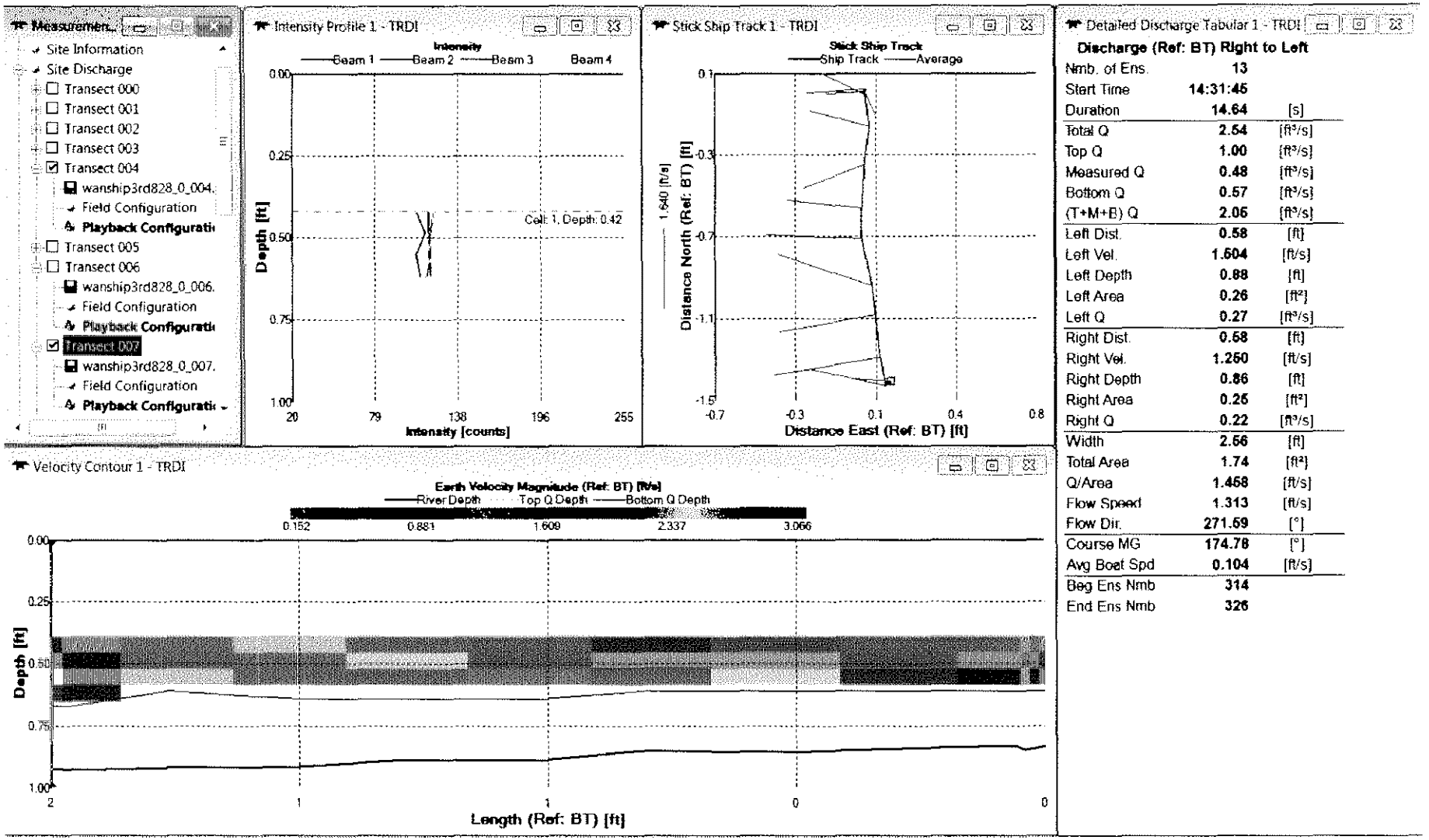
Transect 006
Transect 007
Transect 008
Transect 009
Transect 010
Transect 011
Transect 012
Transect 013
Intensity Profile 1 - TRDI
Intensity
Beam 1
Beam 2
Beam 3
Beam 4
Depth [ft]
Cell 1, Depth: 0.42
Intensity [counts]
Stick Ship Track 1 - TRDI
Stick Ship Track
Ship Track
Average
1.640 (ft/s)
Distance North (Ref: BT) [ft]
Distance East (Ref: BT) [ft]
Velocity Contour 1 - TRDI
Earth Velocity Magnitude (Ref: BT) [ft/s]
River Depth
Top Q Depth
Bottom Q Depth
0.299
1.830
3.361
4.892
6.423
Depth [ft]
Length (Ref: BT) [ft]
Detailed Discharge Tabular 1 - TRDI
Discharge (Ref: BT) Left to Right
Nmb. of Ens. 13
Start Time 14:29:11
Duration 14.64 [s]
Total Q 2.21 [ft³/s]
Top Q 0.89 [ft³/s]
Measured Q 0.45 [ft³/s]
Bottom Q 0.48 [ft³/s]
(T+M+B) Q 1.82 [ft³/s]
Left Dist. 0.76 [ft]
Left Vel. 1.617 [ft/s]
Left Depth 0.91 [ft]
Left Area 0.34 [ft²]
Left Q 0.39 [ft³/s]
Right Dist. 0.00 [ft]
Right Vel. 1.352 [ft/s]
Right Depth 0.89 [ft]
Right Area 0.00 [ft²]
Right Q 0.00 [ft³/s]
Width 2.07 [ft]
Total Area 1.50 [ft²]
Q/Area 1.473 [ft/s]
Flow Speed 1.482 [ft/s]
Flow Dir. 271.03 [°]
Course MG 353.08 [°]
Avg Boat Spd 0.124 [ft/s]
Beg Ens Nmb 187
End Ens Nmb 199



Detailed Discharge Tabular 1 - TRDI

Discharge (Ref: BT) Left to Right

Nmb. of Ens.	**14**	
Start Time	**14:31:10**	
Duration	**15.86**	[s]
Total Q	**2.13**	[ft³/s]
Top Q	**0.76**	[ft³/s]
Measured Q	**0.33**	[ft³/s]
Bottom Q	**0.49**	[ft³/s]
(T+M+B) Q	**1.58**	[ft³/s]
Left Dist.	**0.76**	[ft]
Left Vel.	**1.298**	[ft/s]
Left Depth	**0.90**	[ft]
Left Area	**0.34**	[ft²]
Left Q	**0.31**	[ft³/s]
Right Dist.	**0.68**	[ft]
Right Vel.	**1.287**	[ft/s]
Right Depth	**0.88**	[ft]
Right Area	**0.26**	[ft²]
Right Q	**0.23**	[ft³/s]
Width	**2.46**	[ft]
Total Area	**1.61**	[ft²]
Q/Area	**1.319**	[ft/s]
Flow Speed	**1.269**	[ft/s]
Flow Dir.	**270.07**	[°]
Course MG	**359.07**	[°]
Avg Boat Spd	**0.111**	[ft/s]
Beg Ens Nmb	**285**	
End Ens Nmb	**298**	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Site Discharge
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Transect 002
Transect 003
Transect 004
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Field Configuration
Playback Configurati
Transect 005
Transect 006
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Field Configuration
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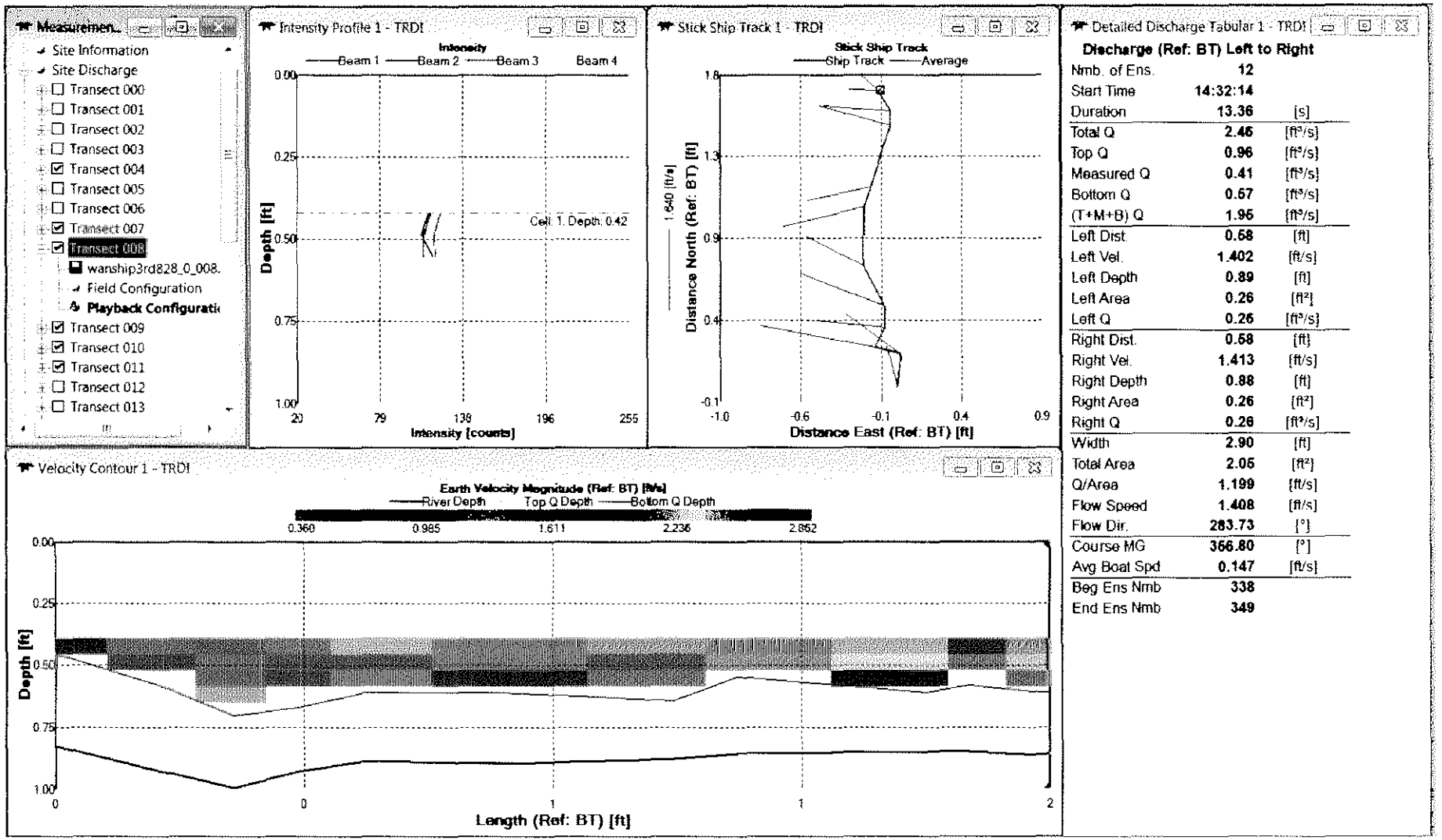
Transect 007
wanship3rd828_0_007.
Field Configuration
Playback Configurati
Intensity Profile 1 - TRDI
Intensity
Beam 1
Beam 2
Beam 3
Beam 4
Depth [ft]
Cell: 1, Depth: 0.42
Intensity [counts]
Stick Ship Track 1 - TRDI
Stick Ship Track
Ship Track
Average
Distance North (Ref: BT) [ft]
Distance East (Ref: BT) [ft]
Detailed Discharge Tabular 1 - TRDI
Discharge (Ref: BT) Right to Left
Nmb. of Ens. 13
Start Time 14:31:45
Duration 14.64 [s]
Total Q 2.54 [ft³/s]
Top Q 1.00 [ft³/s]
Measured Q 0.48 [ft³/s]
Bottom Q 0.57 [ft³/s]
(T+M+B) Q 2.05 [ft³/s]
Left Dist. 0.58 [ft]
Left Vel. 1.604 [ft/s]
Left Depth 0.88 [ft]
Left Area 0.26 [ft²]
Left Q 0.27 [ft³/s]
Right Dist. 0.58 [ft]
Right Vel. 1.250 [ft/s]
Right Depth 0.86 [ft]
Right Area 0.25 [ft²]
Right Q 0.22 [ft³/s]
Width 2.56 [ft]
Total Area 1.74 [ft²]
Q/Area 1.468 [ft/s]
Flow Speed 1.313 [ft/s]
Flow Dir. 271.69 [°]
Course MG 174.78 [°]
Avg Boat Spd 0.104 [ft/s]
Beg Ens Nmb 314
End Ens Nmb 326
Velocity Contour 1 - TRDI
Earth Velocity Magnitude (Ref: BT) [ft/s]
River Depth
Top Q Depth
Bottom Q Depth
Depth [ft]
Length (Ref: BT) [ft]


Measurement...
Site Information
Site Discharge
Transect 000
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Transect 002
Transect 003
Transect 004
Transect 005
Transect 006
Transect 007
Transect 008
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Field Configuration
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Transect 009
Transect 010
Transect 011
Transect 012
Transect 013
Intensity Profile 1 - TRDI
Intensity
Beam 1 Beam 2 Beam 3 Beam 4
Depth [ft]
Cell 1 Depth 0.42
Intensity [counts]
Stick Ship Track 1 - TRDI
Stick Ship Track
Ship Track Average
Distance North (Ref: BT) [ft]
Distance East (Ref: BT) [ft]
Detailed Discharge Tabular 1 - TRDI
Discharge (Ref: BT) Left to Right
Nmb. of Ens. 12
Start Time 14:32:14
Duration 13.36 [s]
Total Q 2.46 [ft³/s]
Top Q 0.96 [ft³/s]
Measured Q 0.41 [ft³/s]
Bottom Q 0.67 [ft³/s]
(T+M+B) Q 1.95 [ft³/s]
Left Dist. 0.58 [ft]
Left Vel. 1.402 [ft/s]
Left Depth 0.89 [ft]
Left Area 0.26 [ft²]
Left Q 0.26 [ft³/s]
Right Dist. 0.58 [ft]
Right Vel. 1.413 [ft/s]
Right Depth 0.88 [ft]
Right Area 0.26 [ft²]
Right Q 0.26 [ft³/s]
Width 2.90 [ft]
Total Area 2.05 [ft²]
Q/Area 1.199 [ft/s]
Flow Speed 1.408 [ft/s]
Flow Dir. 283.73 [°]
Course MG 356.80 [°]
Avg Boat Spd 0.147 [ft/s]
Beg Ens Nmb 338
End Ens Nmb 349
Velocity Contour 1 - TRDI
Earth Velocity Magnitude (Ref: BT) [ft/s]
River Depth Top Q Depth Bottom Q Depth
Depth [ft]
Length (Ref: BT) [ft]

ATTACHMENT C
LETTERS OF INTENT

{Name, Address of author}

East Wanship Irrigation Company
2034 S. East Wanship Road
Coalville, UT 84017

Re: Letter of Intent for On-Farm Improvements

Dear Board of Directors,

As an owner of 32 acres of property and 37.8 shares of water in the East Wanship Irrigation Company (EWIC) service area, I am in full support of their application to the Bureau of Reclamation for a WaterSMART grant. The efforts of EWIC to more efficiently manage and conserve water are consistent with the goals of water users.

Piping the ditches will allow users to receive pressurized water without pumping or power consumption. With the development of a pressurized system an opportunity to consider converting from flood irrigation to a more efficient sprinkler system will now be an option not previously available.

Upon the completion of the piping project, I intend to investigate utilizing a sprinkler application system to irrigate my property and will look into the potential of using NRCS funding for on-farm improvements.

Sincerely, Gibbon / Pace LLC
D.A. Pace

{Typed name}

D.A. Pace

{Name, Address of author}

East Wanship Irrigation Company
2034 S. East Wanship Road
Coalville, UT 84017

Re: Letter of Intent for On-Farm Improvements

Dear Board of Directors,

As an owner of 25 acres of property and 16½ shares of water in the East Wanship Irrigation Company (EWIC) service area, I am in full support of their application to the Bureau of Reclamation for a WaterSMART grant. The efforts of EWIC to more efficiently manage and conserve water are consistent with the goals of water users.

Piping the ditches will allow users to receive pressurized water without pumping or power consumption. With the development of a pressurized system an opportunity to consider converting from flood irrigation to a more efficient sprinkler system will now be an option not previously available.

Upon the completion of the piping project, I intend to investigate utilizing a sprinkler application system to irrigate my property and will look into the potential of using NRCS funding for on-farm improvements.

Sincerely, Jerry Homer

{Typed name} Jerry Homer

{Name, Address of author}

East Wanship Irrigation Company
2034 S. East Wanship Road
Coalville, UT 84017

Re: Letter of Intent for On-Farm Improvements

Dear Board of Directors,

As an owner of 93 acres of property and 48 shares of water in the East Wanship Irrigation Company (EWIC) service area, I am in full support of their application to the Bureau of Reclamation for a WaterSMART grant. The efforts of EWIC to more efficiently manage and conserve water are consistent with the goals of water users.

Piping the ditches will allow users to receive pressurized water without pumping or power consumption. With the development of a pressurized system an opportunity to consider converting from flood irrigation to a more efficient sprinkler system will now be an option not previously available.

Upon the completion of the piping project, I intend to investigate utilizing a sprinkler application system to irrigate my property and will look into the potential of using NRCS funding for on-farm improvements.

Sincerely,
Mark Robertson

{Typed name}
Robertson Ranch LLC
MARK ROBERTSON

{Name, Address of author}

East Wanship Irrigation Company
2034 S. East Wanship Road
Coalville, UT 84017

Re: Letter of Intent for On-Farm Improvements

Dear Board of Directors,

As an owner of 6 acres of property and 10 shares of water in the East Wanship Irrigation Company (EWIC) service area, I am in full support of their application to the Bureau of Reclamation for a WaterSMART grant. The efforts of EWIC to more efficiently manage and conserve water are consistent with the goals of water users.

Piping the ditches will allow users to receive pressurized water without pumping or power consumption. With the development of a pressurized system an opportunity to consider converting from flood irrigation to a more efficient sprinkler system will now be an option not previously available.

Upon the completion of the piping project, I intend to investigate utilizing a sprinkler application system to irrigate my property and will look into the potential of using NRCS funding for on-farm improvements.

Sincerely,

Michael Legge

{Typed name}

Michael Legge

{Name, Address of author}

East Wanship Irrigation Company
2034 S. East Wanship Road
Coalville, UT 84017

Re: Letter of Intent for On-Farm Improvements

Dear Board of Directors,

As an owner of 25 acres of property and 16½ shares of water in the East Wanship Irrigation Company (EWIC) service area, I am in full support of their application to the Bureau of Reclamation for a WaterSMART grant. The efforts of EWIC to more efficiently manage and conserve water are consistent with the goals of water users.

Piping the ditches will allow users to receive pressurized water without pumping or power consumption. With the development of a pressurized system an opportunity to consider converting from flood irrigation to a more efficient sprinkler system will now be an option not previously available.

Upon the completion of the piping project, I intend to investigate utilizing a sprinkler application system to irrigate my property and will look into the potential of using NRCS funding for on-farm improvements.

Sincerely, Edwin G Homer

{Typed name} EDWIN G HOMER
MIRLA HOMER

{Name, Address of author}

East Wanship Irrigation Company
2034 S. East Wanship Road
Coalville, UT 84017

Re: Letter of Intent for On-Farm Improvements

Dear Board of Directors,

As an owner of 75 acres of property and 54½ shares of water in the East Wanship Irrigation Company (EWIC) service area, I am in full support of their application to the Bureau of Reclamation for a WaterSMART grant. The efforts of EWIC to more efficiently manage and conserve water are consistent with the goals of water users.

Piping the ditches will allow users to receive pressurized water without pumping or power consumption. With the development of a pressurized system an opportunity to consider converting from flood irrigation to a more efficient sprinkler system will now be an option not previously available.

Upon the completion of the piping project, I intend to investigate utilizing a sprinkler application system to irrigate my property and will look into the potential of using NRCS funding for on-farm improvements.

Sincerely,

{Typed name}

Vern Williams

{Name, Address of author}

East Wanship Irrigation Company
2034 S. East Wanship Road
Coalville, UT 84017

Re: Letter of Intent for On-Farm Improvements

Dear Board of Directors,

As an owner of 7 acres of property and 6 shares of water in the East Wanship Irrigation Company (EWIC) service area, I am in full support of their application to the Bureau of Reclamation for a WaterSMART grant. The efforts of EWIC to more efficiently manage and conserve water are consistent with the goals of water users.

Piping the ditches will allow users to receive pressurized water without pumping or power consumption. With the development of a pressurized system an opportunity to consider converting from flood irrigation to a more efficient sprinkler system will now be an option not previously available.

Upon the completion of the piping project, I intend to investigate utilizing a sprinkler application system to irrigate my property and will look into the potential of using NRCS funding for on-farm improvements.

Sincerely,

{Typed name}

MARK WAGNER

ATTACHMENT D
MATERIAL USEFUL LIFE

PERFORMANCE PIPE
A Division of Chevron Phillips Chemical Company LP

PerformancePipe.com

HDPE and PVC:

Working Pressure Rating and Fatigue Life

Design Fatigue Life (Years) at Velocity of 4 fps at 1 cycle every 15 minutes ◉ PVC ● PE4710 HDPE

Working Pressure (psi)	DR14 PC305	DR18 PC235	DR21 PC200	DR25 PC165	DR9 PC250	DR11 PC200	DR13.5 PC160	DR17 PC125	DR21 PC100
25	>100	71	64	36	>100	>100	>100	>100	>100
50	86	43	26	17	>100	>100	>100	>100	>100
75	59	31	21	14	>100	>100	>100	>100	>100
100	56	29	17		>100	>100	>100	>100	>100
125	54	27			>100	>100	>100	>100	
150	50	26			>100	>100	>100		
175	46				>100	>100			
200	43				>100	>100			
225	40				>100				
250					>100				

* Pressure exceeds Working Pressure Rating, not suited for use. ■ Design Fatigue Life less than 50 years.

- Most municipal applications have recurring surges that must be accounted for by calculating the pipe's Working Pressure Rating (WPR).
- The Working Pressure Rating for HDPE pipe equals its Pressure Class (see AWWA C906 and M55). For PVC, the Working Pressure Rating is always less than the Pressure Class since the anticipated surge magnitude is subtracted from PVC's Pressure Class.
- BUT Working Pressure Rating is not the only factor that needs to be considered. The Fatigue Life must be evaluated.
- Frequent repetitive surges (common to all Distribution and Force Main pipes) can cause fatigue failure in PVC pipes over time. Studies have shown that HDPE pipes are not susceptible to fatigue under typical municipal field conditions.
- Because of its low fatigue resistance, an important part of design for PVC pipe is an evaluation of fatigue life as given in AWWA C900-07.
- Flow velocity is the most significant factor in fatigue life. Most systems operate at velocities of 2 fps to 4 fps. Normally, velocity will vary throughout a piping system. Prudent engineering suggests using the highest velocity that may occur.
- The chart gives the estimated design fatigue life for PVC and HDPE pipe based on a two-to-one safety factor.
- Light blue indicates an acceptable Working Pressure Rating and more than 50 year fatigue life for PVC.
- All of the HDPE pipe sizes significantly exceed 100 years fatigue service life.

When Performance Matters Rely on *Performance Pipe*

May 2009

Bulletin PP402-4710

Performance Pipe, a division of Chevron Phillips Chemical Company LP | 5085 W. Park Blvd | Suite 500 | Plano, TX 75093 | Phone: 800-527-0662 | Fax: 972-599-7348

HDPE and PVC:

Working Pressure Rating and Fatigue Life

Design Fatigue Life (Years) at Velocity of 4 fps at 1 cycle every 15 minutes — PVC | PE3608 HDPE

Pumping Pressure (psi)	PVC DR14 PC305	PVC DR18 PC235	PVC DR21 PC200	PVC DR25 PC165	HDPE DR9 PC200	HDPE DR11 PC160	HDPE DR13.5 PC128	HDPE DR17 PC100	HDPE DR21 PC80
25	>100	71	64	36	>100	>100	>100	>100	>100
50	86	43	26	17	>100	>100	>100	>100	>100
75	59	31	21	14	>100	>100	>100	>100	>100
100	56	29	17		>100	>100	>100	>100	
125	54	27			>100	>100	>100		
150	50	26			>100	>100			
175	46				>100				
200	43				>100				

Pumping Pressure exceeds Working Pressure Rating, not suited for use. ■ Design Fatigue Life less than 50 years.

- Most municipal applications have recurring surges that must be accounted for by calculating the pipe's Working Pressure Rating (WPR).
- The Working Pressure Rating for HDPE pipe equals its Pressure Class (see AWWA C906 and M55). For PVC, the Working Pressure Rating is always less than the Pressure Class since the anticipated surge magnitude is subtracted from PVC's Pressure Class.
- BUT Working Pressure Rating is not the only factor that needs to be considered. The Fatigue Life must be evaluated.
- Frequent repetitive surges (common to all Distribution and Force Main pipes) can cause fatigue failure in PVC pipes over time. Studies have shown that HDPE pipes are not susceptible to fatigue under typical municipal field conditions.
- Because of its low fatigue resistance, an important part of design for PVC pipe is an evaluation of fatigue life as given in AWWA C900-07.
- Flow velocity is the most significant factor in fatigue life. Most systems operate at velocities of 2 fps to 4 fps. Normally, velocity will vary throughout a piping system. Prudent engineering suggests using the highest velocity that may occur.
- The chart gives the estimated design fatigue life for PVC and HDPE pipe based on a two-to-one safety factor.
- Light blue indicates an acceptable Working Pressure Rating and more than 50 year fatigue life for PVC.
- All of the HDPE pipe sizes significantly exceed 100 years fatigue service life.

When Performance Matters Rely on
Performance Pipe

May 2009
Bulletin PP402-3608

Performance Pipe, a division of Chevron Phillips Chemical Company LP | 5085 W. Park Blvd | Suite 500 | Plano, TX 75093 | Phone: 800-527-0662 | Fax: 972-599-7348