

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 61-7727

Exam Date: 9/17/2012

1. Current Owner: CARL F REYNOLDS & SONS
PO BOX 99
MOUNTAIN HOME ID 83647

2. Accompanied by: Steve Reynolds

Phone No: Cell – 590-2990 Office – 587-2810

Address: Same as above.

Relationship to Permit Holder: Co-Owner

3. **SOURCE**

BENNETT CREEK

TRIBUTARY

SNAKE RIVER

B. OVERLAP REVIEW

1. Other water rights with the same place of use: 61-277, 61-278, 61-279, 61-359, 61-360, 61-2034, 61-2092, 61-2225, 61-2236C, 61-2236D, 61-7244, 61-7273, and 61-7561
2. Other water rights with the same point of diversion: 61-2236D, 61-7244, 61-7273, 61-7561

C. DIVERSION AND DELIVERY SYSTEM**1. LOCATION OF POINT(S) OF DIVERSION:**

BENNETT CREEK	SE1/4SW1/4	Sec. 1,	Twp 04S,	Rge 08E, B.M.	ELMORE County	
BENNETT CREEK	NW1/4NW1/4	Sec. 15,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Injection)
BENNETT CREEK	NW1/4NE1/4	Sec. 22,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Rediversion)
BENNETT CREEK	SE1/4SW1/4	Sec. 23,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Injection)
BENNETT CREEK	NW1/4NW1/4	Sec. 26,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Rediversion)
BENNETT CREEK	SE1/4SE1/4	Sec. 27,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Rediversion)
BENNETT CREEK	SE1/4SE1/4	Sec. 27,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Rediversion)
BENNETT CREEK	NW1/4SE1/4	Sec. 34,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Rediversion)
BENNETT CREEK	SW1/4SE1/4	Sec. 34,	Twp 04S,	Rge 08E, B.M.	ELMORE County	(Rediversion)
BENNETT CREEK	L2 NW1/4NE1/4	Sec. 3,	Twp 05S,	Rge 08E, B.M.	ELMORE County	(Rediversion)

Method of Determination: GPS and Visual Inspection

PLACE OF USE: IRRIGATION STORAGE

Twp Rge Sec	NE				NW				SW				SE				Totals
	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
04S 08E 4															X		
04S 08E 9	X	X	X	X					X			X	X	X	X	X	
04S 08E 10							X		X	X	X	X			X		
04S 08E 15					X	X											
04S 08E 16	X	X			X												

PLACE OF USE: IRRIGATION FROM STORAGE

Twp Rge Sec	NE				NW				SW				SE				Totals
	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
04S 08E 22													40.0			40.0	80.0
04S 08E 23			40.0						40.0	40.0	40.0	40.0		40.0	40.0	40.0	320.0
04S 08E 24											40.0	40.0	40.0	40.0	40.0	40.0	240.0
04S 08E 25					35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	420.0
04S 08E 26	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	640.0
04S 08E 27	40.0	40.0	40.0	40.0									40.0	10.0	10.0	40.0	260.0
04S 08E 34	35.0			35.0					35.0	35.0	35.0	35.0	35.0			35.0	280.0
04S 08E 35	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	560.0
04S 08E 36	35.0	35.0	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	525.0
05S 08E 2	40.0 L 1	40.0 L 2			40.0 L 3	40.0 L 4											160.0
05S 08E 3	40.0 L 1				20.0 L 3	40.0 L 4											100.0

Total Acres: 3585

Method of Determination: GIS and Visual Inspection

3. YES Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.

YES Aerial Photo Attached (required for irrigation of 10+ acres).

YES Photo of Diversion and System Attached

4.

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
Please See System Diagram Memo for list of point of Diversion, Points of Injections, and Points of Re-diversion identification information					

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date

2. Measurements: Used Manings Flow measurement calculations. Please see Diversion Rate and Overlap Analysis memo for additional information.

E. FLOW CALCULATIONS

X Additional Computation Sheets Attached

Measured Method:

(SEE ATTACHED DIVERSION RATE CALCULATIONS AND COMBINED LIMITATIONS AND OVERLAP ANALYSIS MEMO)

Mannings Canal Capacity Measurement = 236 cfs

Previous Field Exam Canal Capacity Measurement = 372 cfs

Existing licenses allow 122.25 cfs

This Permit Requests = 4.90 cfs

License recommended for 4.09 cfs (permit and existing licensed amount is less than calculated capacity of canal).

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} =$$

2. Volume Calculations for Other Uses:

(SEE ATTACHED STORAGE CAPACITY AND VOLUME RECOMMENDATION MEMO)

Reservoir Capacity = 5,334 acre feet

Existing Rights Allowed Storage = 4,880 acre feet

Permit Requests = 454 acre feet

License recommended for 454 acre feet.

G. NARRATIVE/REMARKS/COMMENTS

Due to the complexity of this system, I wrote 3 separate memos to describe this water right and the recommendations I made for this water right. Please see the following attached memos:

System Description for Field Exam 61-7727

Storage Capacity and Volume recommendation

Diversion Rate Calculations, Combined Condition Limitations and Overlap Analysis

The above memos should provide adequate information for the licensing of this permit in an order that is fairly reasonable to follow.

One issue not covered in this memo is the need for an amendment of permit for this water right. The aerial photos show a portion of Bennett Creek that has been channelized and looks more like an extension of the canal from Hot Springs Reservoir #3, but this channelized section was described as Bennett Creek in the Snake River Basin Adjudication. Therefore, we were obligated to follow suit and call this channel Bennett Creek, which required an additional Point of Injection and three additional points of Re-Diversion. The application for permit also stated that the place of use for the storage was the same as the irrigation, but this reservoir is not within the place of use boundary described in the permit. Therefore, an amendment of permit is necessary.

The applicant also neglected to file the proper Proof of Beneficial Use fee. Therefore, we will need to seek an upgrade fee of \$180.00. I will seek this fee upgrade at the time I seek the licensing amendment.

The applicant hadn't installed a measurement device at the point of diversion from Bennett Creek, but after working with the applicant, they have installed all the proper devices required under the conditions of their permit.

Have conditions of permit approval been met? X Yes No

H. RECOMMENDATIONS**1. Recommended Amounts**

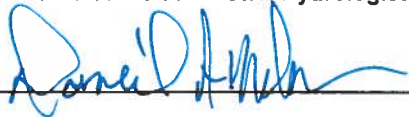
<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
DIVERSION TO STORAGE	11/01 to 03/31	4.900 CFS	
IRRIGATION STORAGE	01/01 to 12/31		454.00 AF
IRRIGATION FROM STORAGE	04/01 to 10/31		454.00 AF
<u>Totals:</u>		4.900 CFS	454.00 AF

2. Recommended Amendments

☒ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None

☒ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

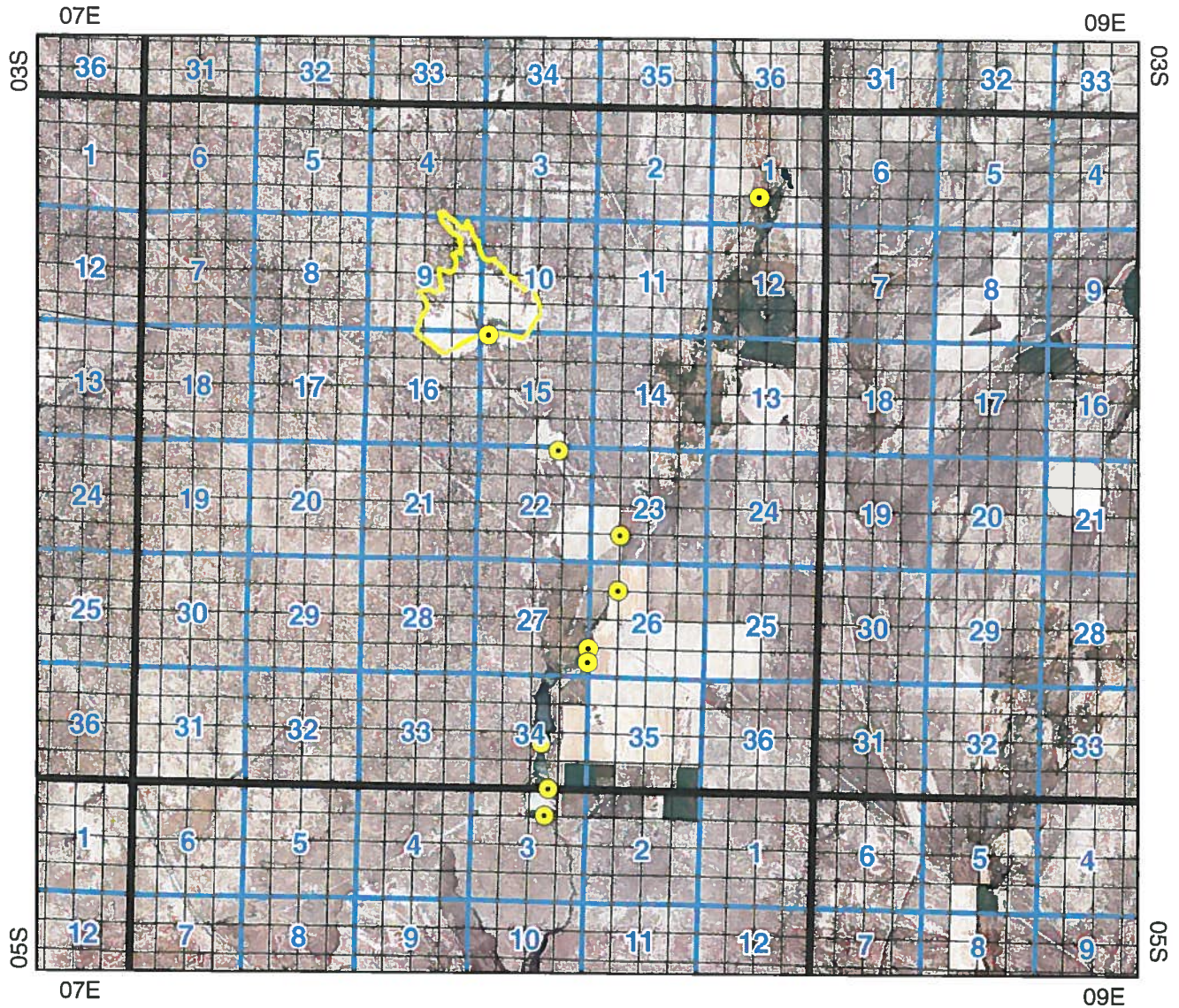
I. AUTHENTICATION Daniel A. Nelson – Staff Hydrologist

Field Examiner's Name  Date 3-21-2013

Reviewer _____ Date _____

State of Idaho
Department of Water Resources
Field Exam
61-7727

This map depicts the IRRIGATION STORAGE place of use boundary for this water right at the time of this approval and is attached to the approval document solely for illustrative purposes.



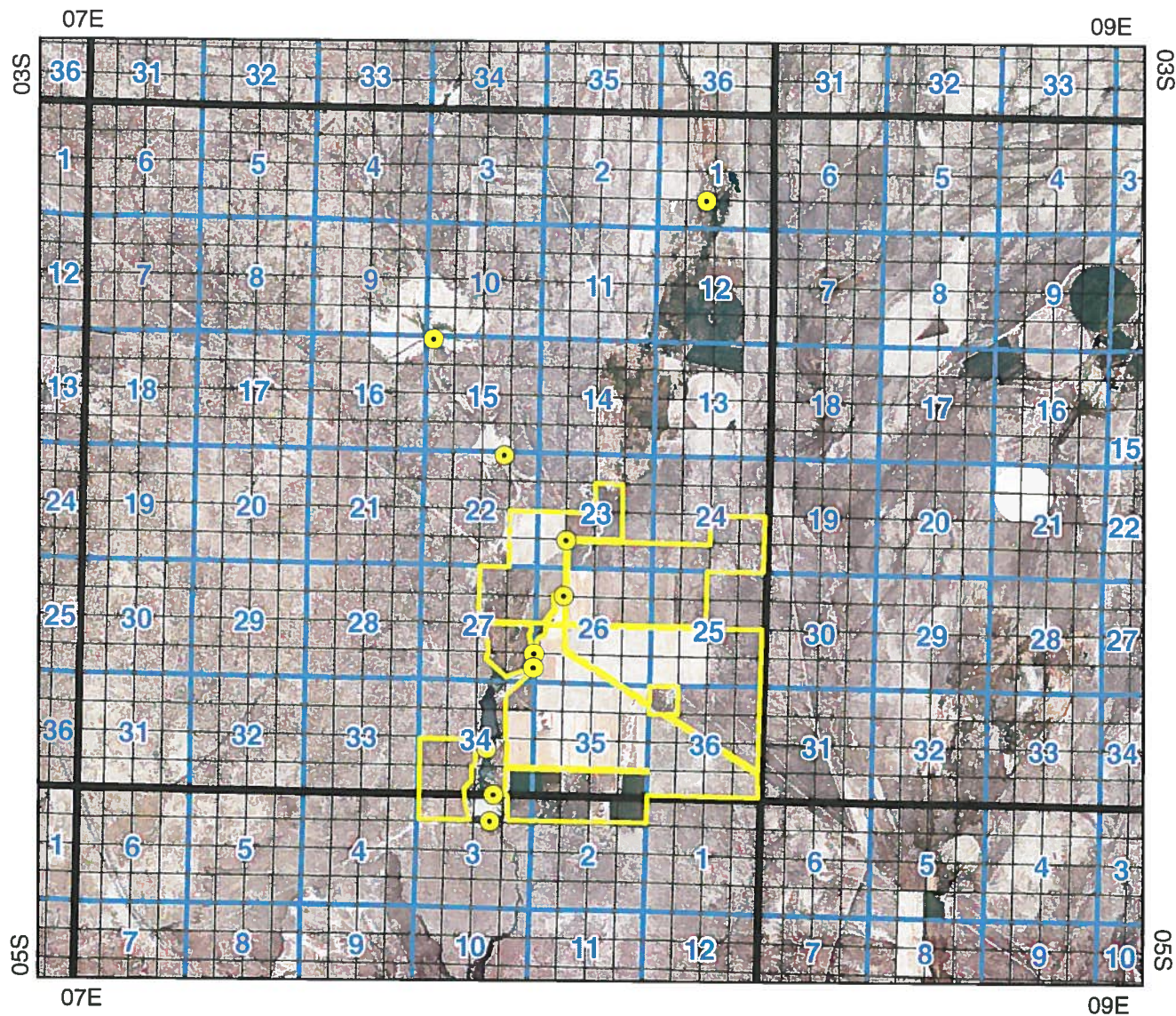
-  Point of Diversion
-  Place Of Use Boundary
-  Townships
-  PLS Sections
-  Quarter Quarters

0 1 2 4 Miles



State of Idaho
Department of Water Resources
Field Exam Map
61-7727

This map depicts the IRRIGATION FROM STORAGE place of use boundary for this water right at the time of this approval and is attached to the approval document solely for illustrative purposes.

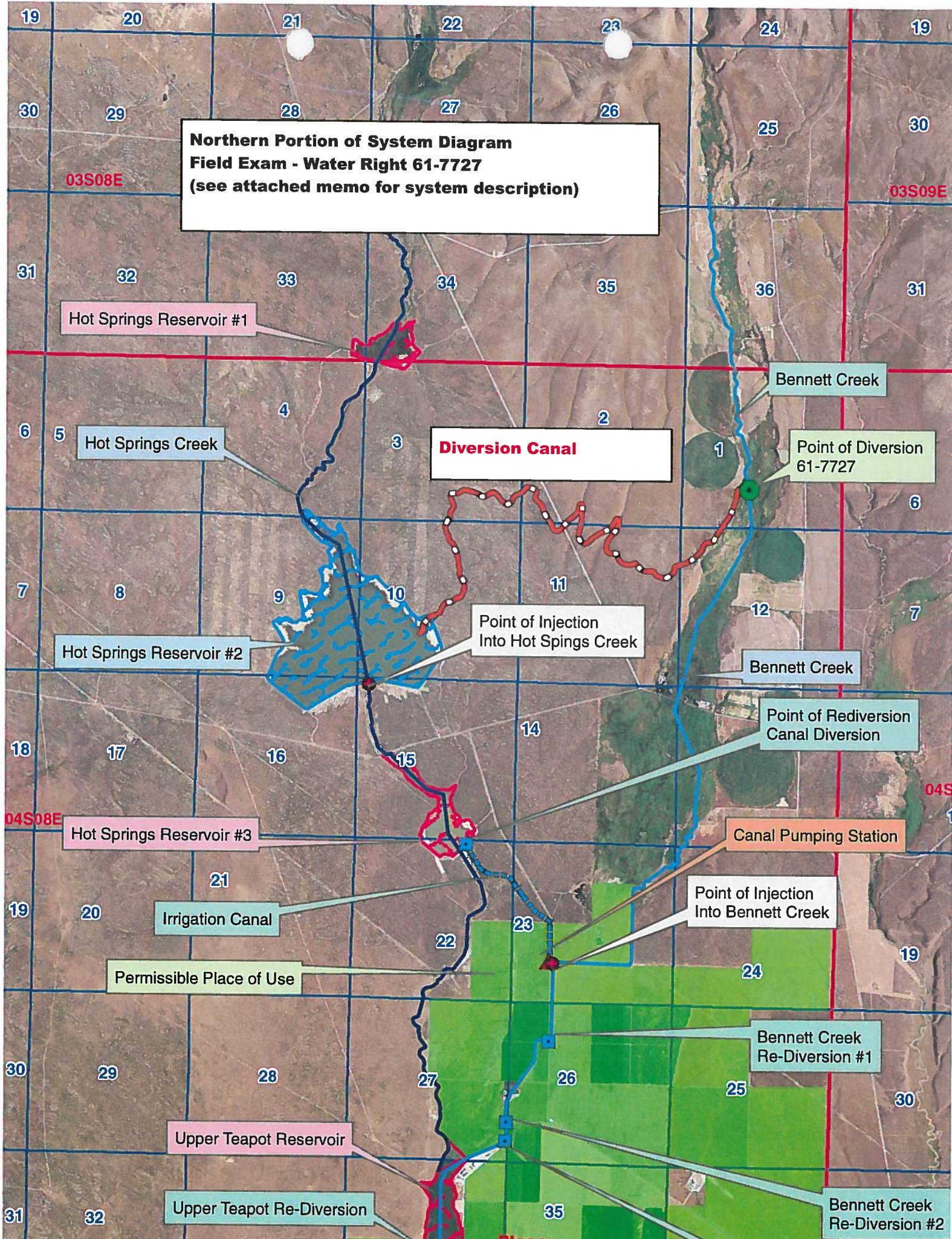


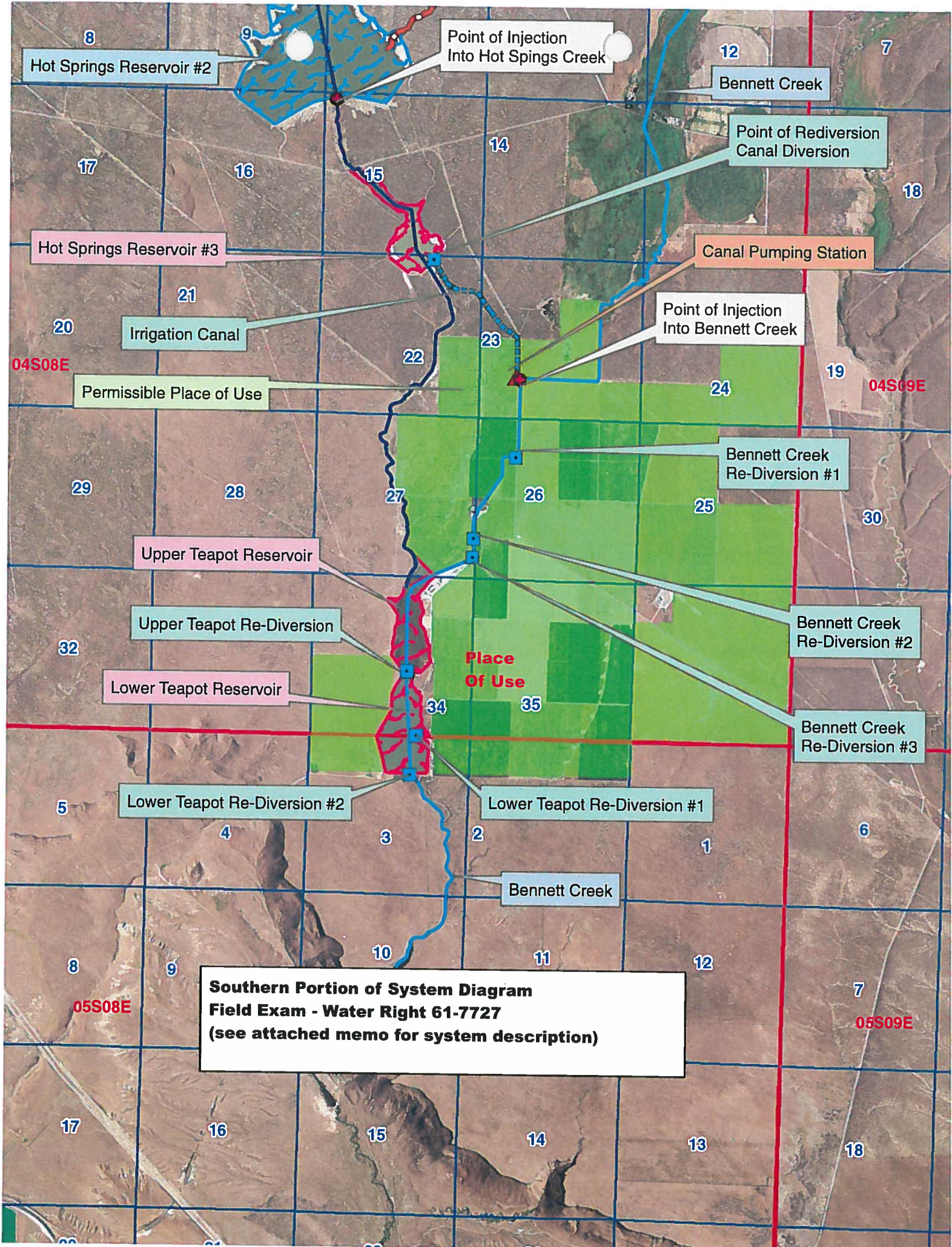
-  Point of Diversion
-  Place Of Use Boundary
-  Townships
-  PLS Sections
-  Quarter Quarters

0 1 2 4 Miles



Northern Portion of System Diagram
Field Exam - Water Right 61-7727
(see attached memo for system description)





Southern Portion of System Diagram
Field Exam - Water Right 61-7727
(see attached memo for system description)

MEMORANDUM

TO: File 61-7727

FROM: Daniel Nelson – Staff Hydologist

DATE: 3/5/2013

SUBJECT: System Description for field exam 61-7727

Water for this water right is diverted from Bennett Creek in the SESW quarter of Section 1, Township 4 South, Range 8 East. The water is diverted into a canal that travels southwest to Hot Springs Reservoir #2. The system supplies approximately 454 acre feet of water to fill the top portion of the reservoir, that was not decreed in the Snake River Basin Adjudication. At the mid-point of the reservoir dam, the water from this reservoir is injected into Hot Springs Creek in the NWNW quarter of Section 15, Township 4 South, Range 8 East.

The water in Hot Springs Creek travels south to Hot Springs Reservoir #3. The water in Hot Springs Reservoir #3 is diverted into a canal in the NWNW Corner of Section 15, Township 4 South, Range 8 East. The canal travels in a southeasterly direction to the canal pump diversion. This is not a point of re-diversion, since it is located on a canal and not a known stream channel. The pump station is located in the NWSW of quarter of Section 23, Township 4 South, Range 8 East. The water is then re-injected into Bennett Creek in the SESW quarter of Section 23, Township 4 South, Range 8 East,

The water in Bennett Creek travels south approximately ½ miles and then turns west. Just after Bennett Creek turns west, the water is re-diverted through a pump station at Bennett Creek Re-Diversion point #1. Re-diversion point #1 is located in the NWNW quarter of Section 26, Township 4 South, Range 8 East. Bennett Creek continues west for approximately 1/16th of a mile and turns south again for an 1/8th of a mile before it heads in a southwesterly for 1/3 of mile before turning south.

Approximately 1/8th of mile after Bennett Creek turns south, water is re-diverted out of Bennett Creek again at Re-Diversion point #2. Re-Diversion point #2 is located in the SESE quarter of Section 27, Township 4 South, Range 8 East.

Bennett Creek travels another 1/8th of a mile south to the final re-diversion point out of Bennett Creek, Re-Diversion point #3. Re-Diversion point #3 is located in the SESE quarter of Section 27, Township 4 South, Range 8 East. After Re-Diversion point #3, Bennett Creek travels a ¼ of a mile in a southwesterly direction to the Upper Teapot Reservoir.

Water is re-diverted at the base of the Upper Teapot Reservoir through a pumping plant described as Upper Teapot Re-Diversion. The Upper Teapot Re-Diversion point is located in the NWSE quarter of Section 34, Township 4 South, Range 8 East. There is an overflow channel out of Upper Teapot Reservoir on the east side of the dam that allows excess water to flow into Lower Teapot Reservoir.

There are two re-diversion points out of Lower Teapot Reservoir. The first re-diversion point is located in the SWSE quarter of Section 34, Township 4 South, Range 8 East. This re-diversion point is described at Lower Teapot Diversion #1. Lower Teapot Diversion #1 is very close to the section line, but GPS and Aerial photos show it is clearly located in Section 34.

The final point of re-diversion is located at the base of Lower Teapot Reservoir's dam. This point of diversion is located in the SWNE quarter of Section 3, Township 5 South, Range 8 East. The pumps for this point of diversion were not in place at the time of the exam, but this pumping station is used to irrigate the lands on the west side of Lower Teapot Reservoir. All water that flows out of the Lower Teapot Reservoir goes back into Bennett Creek, and is no longer in control of the owner of this water right.

The creek and reservoir pumps and their booster pumps are listed on the attached page.

System Diagram Memo Attachment
Diversion Specifications

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
Point of Diversion – Site Tag # A0017519	This diversion consists of a headgate directly off of Bennett Creek into the diversion canal. There is no pumping station.				
Point of Injection into Hot Springs Creek	This diversion consists of a headgate from the Hot Springs Reservoir #2 back into Hot Springs Creek. There are no pumping stations.				
Pump 1 - Canal Diversion (this is not a re-diversion point)	General Electric	100	GNJNJ720271	WellLine	45903
Pump 2 - Canal Diversion (this is not a re-diversion point)	General Electric	100	SNJNJ928417	WellLine	45902
Point of Injection – Bennett Creek	This Point of Injection consists of a headgate at the end of the canal. The canal is then piped directly into Bennett Creek. There are two large pipes capable of handling the entire flow of the canal.				
Bennett Creek Point of Re-Diversion #1 Highway Pump	Westinghouse	100	6601	WellLine	10 inch Discharge
Bennett Creek Point of Re-Diversion #1 Far Pump	General Electric	75	GNJ720331	WellLine	45901
Bennett Creek Point of Re-Diversion #1 Booster Pump	Howell Electric	75	2653AB	Cornell	21180
Bennett Creek Point of Re-Diversion #2 Pump #4	Dravo-General Electric	200	EAJ505189	Dravo	DJR7
Bennett Creek Point of Re-Diversion #2 Small Booster	Century	50	24929	Cornell	5208
Bennett Creek Point of Re-Diversion #2 Big Booster	US Electric	100	600389	Unknown	10 inch Discharge
Bennett Creek Point of Re-Diversion #3 Pump	This pump had been removed for service. It had a 10 inch Discharge.				
Bennett Creek Point of Re-Diversion #3 Booster Pump	General Electric	100	HK403309	Cornell	17677

System Diagram Memo Attachment
 Diversion Specifications
 (Continued)

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
Upper Teapot Diversion North Pump	Westinghouse	100	319B522657	Cornell	21179
Upper Teapot Diversion South Pump	Premium Efficiency Motor	100	678585-40941 76R363M	Cornell	105414
Upper Teapot Diversion Small Pump	Century	15	6-323245-01	Unknown	L1104
Upper Teapot Diversion 4 th Pump	This pump has been removed, but it has a 10 inch Discharge pipe available. Water Right 61-7273 showed one 100 Hp pumps and 2 – 50 Hp pumps. The system has now been changed to 2-100 Hp pumps and a small 15 Hp pump.				
Lower Teapot Diversion #1 – East Pump	General Electric	100	FRJ620306	WellLine	45905
Lower Teapot Diversion #1 – West Pump	General Electric	100	JNJ921404	WellLine	45904
Lower Teapot Diversion #2 – No Pumps	The pump at this location has been removed. The power is still there if needed. Water right 61-7273 describes this pump as a Westinghouse 100 Hp pump.				

MEMORANDUM

TO: File 61-7727

FROM: Daniel Nelson – Staff Hydrologist

DATE: March 18, 2013

SUBJECT: Storage Capacity and Volume Recommendation

Water right 61-7727 is for storage in Hot Springs Reservoir #2 owned by Carl Reynolds and Sons. This memo was written to provide an analysis of the storage component in this water right. Permit 61-7727 was filed increase the licensed amount of storage to the capacity of the reservoir. There are no water district records of diversion for Water District 61C, so I needed to rely on the Dam Safety files and other sources to determine the actual volume and use during the development period for this reservoir. Below is history of the reservoir per the Dam Safety files.

- In 1976 - Storage capacity was increased to 5,334 acre feet.
- In 1978 – Storage capacity was reduced to 3,000 acre feet.
- In 1980 – Storage capacity was returned to 5,334 acre feet.
- In 1982 – Storage capacity was reduced to 5,000 acre feet.
- In 1983 – The flash boards were not authorized.
- In 1984 – The dam was raised.
- In 1985 – Capacity reduced to 4,880.
- In 2005 – Capacity was increased to 5,334 acre feet.

When reviewing the above dam safety records, it is difficult to determine the actual capacity of the reservoir. In a conversation with John Falk, Dam Safety Coordinator, Mr. Falk informed me that it is the general practice of the dam safety staff to place the capacity as the water right capacity and not actual capacity. Taking this into account, the capacity listed in 1976, 1980, and 2005 appears to be the actual capacity of the reservoir. From my research it appears as though the difference between the reservoir's yearly capacities listed in the Dam Safety files is dependent on the flash boards. The flash boards were always available, but the use of the flash boards raised the water to an unsafe level on the dam. Once the dam was raised in 1984, the flash boards could be used to the maximum allowing the full volume of 5,334 acre feet to be stored.

Proof of Beneficial use was filed on water right 61-7273 in 1977. Certified Water Right Examiner, Sherl Chapman, performed the licensing exam, and only found a storage capacity of 4,880 acre feet, even though the capacity was determined to be 5,334 acre feet in the Dam Safety file in 1976. Although Mr. Chapman does not provide any documentation on how he came up with the 4,880 acre feet volume, it could be the result of the limitation of not being able to use the flash boards until the dam was raised in 1984. 1984 appears to be the year that the full capacity of 5,334 acre feet could be safely stored.

During the adjudication review of these water rights in 1996, they place the capacity of the reservoir at 5,334 acre feet. Water rights 61-2236D and 61-7273 were recommended with a combined capacity of the reservoir storage of 4,880, since both rights were licensed prior to 1976. A memo to this file from Mel Shulte states that the capacity was increased in 1976 when the dam was raised, but the dam safety file says the dam was raised in 1984. It appears as though the capacity was correctly determined during the adjudication review of the existing rights, but they were unable to add the additional 454 acre feet to the water rights since the additional storage was not available until after 61-7273 was licensed. Therefore, the adjudication staff recommended that the owner file a third water right application to cover the remaining 454 acre feet. Water right 61-7727 is the result of the adjudication recommendation.

The next question to address is whether or not this reservoir was filled to capacity during the development period. There are no watermaster records available for this water district from 1996 through 1998, so there is no way to determine the amount of water diverted during that time period. The only available information for these reservoirs is the 1998 aerial photos available to the Department. The 1998 aerial photo shows water in Hot Spring Reservoir #2, Upper Teapot reservoir, and Lower Teapot reservoir. The practice that has occurred in this system is to fill the Hot Springs Reservoir #2 first, and then begin filling the Hot Springs Reservoir #3 and then Upper and Lower Teapot reservoirs. This practice is the only practical way of using this reservoir system. If the Teapot Reservoirs are filled first, then any runoff water entering the Bennett Creek downstream of the point of diversion for this permit would be lost out the spill ways. Therefore, they would not divert any water out of Hot Springs Reservoir #2 until it was absolutely necessary. I have to assume that at some point during the 1998 season that Hot Springs Reservoir #2 was filled to capacity due to the amount of water shown in Hot Springs Reservoir #2 and the Upper and Lower Teapot Reservoirs.

There are no water district records for this diversion, so I have to depend on aerial photography to determine if the Hot Springs Reservoir #2 was filled during the development period. The available evidence does suggest that the reservoir was filled to capacity in 1998. This permit was filed to ensure that the owner had the full capacity of the reservoir when water is available, so there is little doubt that the reservoir has been completely filled. I recommend that this water right be licensed for 454 acre feet or the difference between the reservoir capacity of 5,334 and the current licensed amount of 4,880 acre feet. When water rights 61-2236D, 61-7273, and 61-7727 are combined, they are limited to a total storage volume in Hot Springs Reservoir # 2 of 5,334 acre feet.

MEMORANDUM

TO: File 61-7727

FROM: Daniel Nelson – Staff Hydrologist

DATE: March 19, 2013

SUBJECT: Diversion Rate Calculations, Combined Condition Limitations and Overlap Analysis

DIVERSION RATE CALCULATION:

The diversion rate for this water right was determined by a measurement of the canal that diverts Bennett Creek water into Hot Springs Reservoir #2. A Manning's measurement was done and we determined that between 236 cfs to 255 cfs are diverted into Hot Springs Reservoir #2 through the canal. A measurement calculation was done by the Certified Field Examiner, Sherl Chapman, for water rights 61-7273 and 61-7561, which found a flow range of the headgate of 372 cfs to 508 cfs.

The diversion canal from Bennett Creek to Hot Springs Reservoir #2 has multiple water rights that can be diverted through this canal. These rights are 61-2236D (20 cfs), 61-7273 (100 cfs), 61-7561 (2.25 cfs) and water right 61-7244 which has no diversion to storage component. When all of these water rights are added together, the total diversion rate allowed out of this point of diversion is 122.25 cfs not including this water right.

This permit was filed for 4.94 cfs which when added to the existing water rights, allows a total of 127.15 cfs to be diverted to the reservoir. The capacity of the of the canal exceeds the amount allowed by all of the water rights diverting out of this point of diversion, therefore, I recommend that the full diversion rate of 4.90 cfs be applied to this permit.

OVERLAPPING WATER RIGHT REVIEW FOR THE POINT OF DIVERSIONS AND DIVERSION RATES:

There are numerous water rights that overlap the point of diversion and place of use for this water right. These overlapping water rights will require special conditions placing limitations on certain aspects of the water right.

This water right shares the point of diversion from Bennett Creek as water rights 61-2236D, 61-7244, 61-7273, 61-7561, and this right. The diversion rate is additive, so the only condition associated with the point of diversion would be the following:

Water rights 61-2236D, 61-7244, 61-7273, 61-7561 are diverted through the same point of diversion as this right.

Water rights 61-2236D and 61-7273 overlap the place of use for the storage component for this water right. When water rights 61-2236D and 61-7273 are combined they are limited to a total storage capacity of 4,880 acre feet of storage, which is not an additive component of the two water rights. Therefore, this water right should also have the following condition:

When water rights 61-2236D, 61-7273, and 61-7727 are combined they are limited to a combined storage of 5,334 acre feet.

It must also be noted that water rights 61-277, 61-278, 61-279, 61-359, 61-360, and 61-2034 when combined are limited to a diversion rate of 14.5 cfs. This is important, because these rights are diverted out of the point of diversion and all of the points of re-diversion associated with this water right. However, since this water right is a storage water right, there should not be any limitations on the rate in which the storage water is diverted from these diversion points. The water rights use these diversion points as points of diversion, and this permit uses these diversion points as points of re-diversion.

OVERLAP REVIEW FOR THE PLACE OF USE:

This water right describes the place of use in the water right permit as the place of use designated as a 3,582 acre permissible place of use for the water rights that were decreed for this farm. The conditions for this water right prevent the development of any new acres. The application asked for the irrigation of 114 acres within the 3,582 acre permissible place of use, but the permit for this water right did provide any acre limitations. Therefore, this water right can be used on any or all of the 3,582 acres, but the total acreage cannot exceed the 3,582 acres. The following condition will be needed:

When water right 61-7727 is combined with the following water rights, it will be limited to the irrigation of 3,582 acres: 61-277, 61-278, 61-279, 61-359, 61-360, 61-2034, 61-2092, 61-2225, 61-2236C, 61-2236D, 61-7244, 61-7273, and 61-7561.

The above conditions should be all of the additional conditions that should be needed. The condition stating that this permit does not authorize additional storage can be removed, because the storage limitation has been quantified in the conditions above. Condition 074 can also be removed because an acre limitation has also been quantified in the conditions above. The remaining conditions on the permit should remain on the license.

Manning's Equation Calculator for Flow Rate in Any Open Channel

S = 0.0075 ft/ft

n = 0.060 manning's coefficient

A = 64.60 area (ft²)

WP = 29.29 wetted perimeter (ft)

R = 2.21 hydraulic radius (ft)

Q = 236.02 flow rate (CFS)

Channel Slope

Slope Options

☐ Manual Entry ☒ Slope Calculator

Slope Calculator

Rise = 0.75 feet

Run = 100 feet

Slope, S = 0.0075 ft/ft

Channel Material, (n): natural channel, very poor condition

READ ME

Manning's Equation (1), is an empirical formula that solves for velocity (v) in a open channel under uniform flow. The continuity equation (2) when combined with equation (1) allows for the computation of the flow rate (Q) in an open channel under uniform flow.

In equations (1) and (3), η refers to Manning's Coefficient of Roughness and can be found in tabulated form for many open channel types. R is the hydraulic radius of the open channel and is equal to the area of the open channel divided by the wetted perimeter, $R = A/P$. S is the slope of the energy grade line which is often assumed to be equal to the slope of the channel.

Because Manning's Equation is empirical the units are not arbitrary. To obtain a velocity in ft/s and a flow rate in ft³/s, area must be reported in ft², hydraulic radius must be reported in ft, and S must be reported in ft/ft. Manning's Coefficient of Roughness is a unitless constant.

$$(1) \quad v = 1.49 \left(\frac{1}{\eta} \right) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$

$$(2) \quad Q = vA$$

$$(3) \quad Q = 1.49 \left(\frac{1}{\eta} \right) (A) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$

Cross Section 1

**Wetted Perimeter and X-Sectional Flow Calculator for
Flow Rate in a User Defined Open Channel**

READ ME

Input No. of Measurement Points Used to Define the Channel

Note: a minimum of four measurement points must be used, with a maximum of 12.

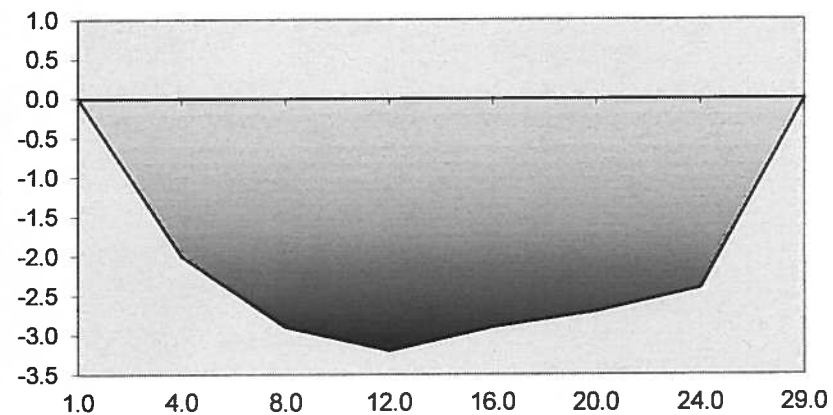
◀ ▶

8 No. of Selected Measurement Points

Input Channel Measurement Points

	X (ft)	Y (-ft)
1st Meas. Point:	1.0	0.0
2nd Meas. Point:	4.0	-2.0
3rd Meas. Point:	8.0	-2.9
4th Meas. Point:	12.0	-3.2
5th Meas. Point:	16.0	-2.9
6th Meas. Point:	20.0	-2.7
7th Meas. Point:	24.0	-2.4
8th Meas. Point:	29.0	0.0

Flow Area



X-Sectional Area of Flow

A = 64.60 square feet

Wetted Perimeter

WP = 29.29 feet

Cross Section 1

Manning's Equation Calculator for Flow Rate in Any Open Channel

S = 0.0075 ft/ft

n = 0.060 manning's coefficient

A = 67.30 area (ft²)

WP = 28.95 wetted perimeter (ft)

R = 2.32 hydraulic radius (ft)

Q = 254.71 flow rate (CFS)

Channel Slope

Slope Options

☐ Manual Entry ☒ Slope Calculator

Slope Calculator

Rise = 0.75 feet

Run = 100 feet

Slope, S = 0.0075 ft/ft

Channel Material, (n): natural channel, very poor condition

READ ME

Manning's Equation (1), is an empirical formula that solves for velocity (v) in a open channel under uniform flow. The continuity equation (2) when combined with equation (1) allows for the computation of the flow rate (Q) in an open channel under uniform flow.

In equations (1) and (3), η refers to Manning's Coefficient of Roughness and can be found in tabulated form for many open channel types. R is the hydraulic radius of the open channel and is equal to the area of the open channel divided by the wetted perimeter, $R = A/P$. S is the slope of the energy grade line which is often assumed to be equal to the slope of the channel.

Because Manning's Equation is empirical the units are not arbitrary. To obtain a velocity in ft/s and a flow rate in ft³/s, area must be reported in ft², hydraulic radius must be reported in ft, and S must be reported in ft/ft. Manning's Coefficient of Roughness is a unitless constant.

$$(1) \quad v = 1.49 \left(\frac{1}{\eta} \right) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$

$$(2) \quad Q = vA$$

$$(3) \quad Q = 1.49 \left(\frac{1}{\eta} \right) (A) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$

Cross Section 2

**Wetted Perimeter and X-Sectional Flow Calculator for
Flow Rate in a User Defined Open Channel**

READ ME

Input No. of Measurement Points Used to Define the Channel

Note: a minimum of four measurement points must be used, with a maximum of 12.

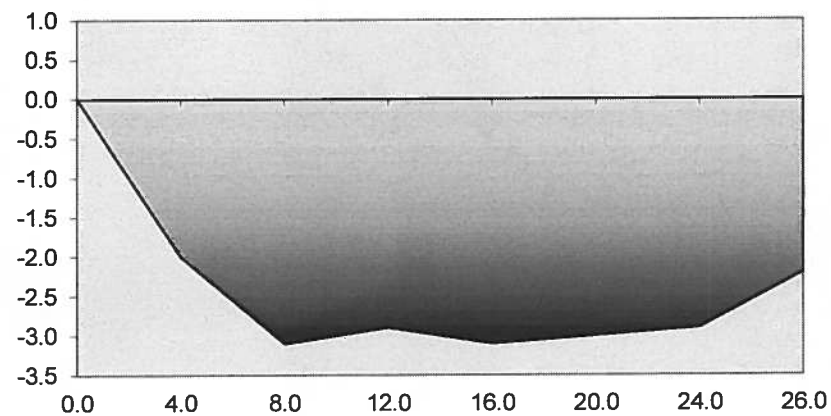
◀ ▶

8 No. of Selected Measurement Points

Input Channel Measurement Points

	X (ft)	Y (-ft)
1st Meas. Point:	0.0	0.0
2nd Meas. Point:	4.0	-2.0
3rd Meas. Point:	8.0	-3.1
4th Meas. Point:	12.0	-2.9
5th Meas. Point:	16.0	-3.1
6th Meas. Point:	20.0	-3.0
7th Meas. Point:	24.0	-2.9
8th Meas. Point:	26.0	-2.2

Flow Area



X-Sectional Area of Flow

A = 67.30 square feet

Wetted Perimeter

WP = 28.95 feet

Cross Section 2

DATE: 7/22/91

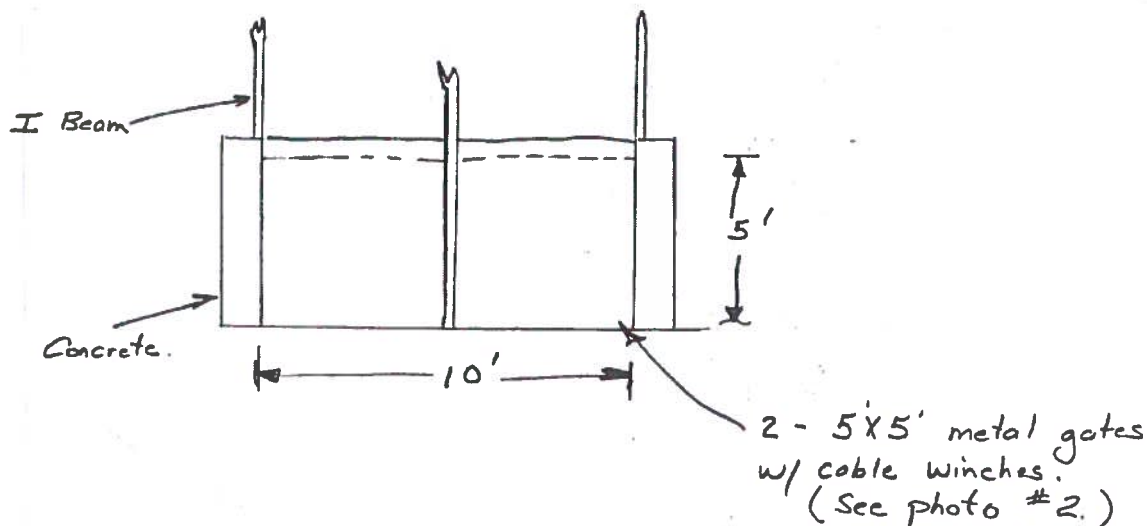
BENNETT CREEK FARMS

WESTRA, Western.

File Nos: 61-7273; 61-7561

CHANNEL Capacity MEASUREMENT.

Channel: Abt Springs #2 Diversion Canal

Calculate flow capacity of the concrete gate structure at the Bennett Creek Diversion.

Assume structure opening 5' x 10', gates are not submerged.

$$Q = C L H^{3/2} \quad - \quad (\text{Rect. Weir equation})$$

$$C = 3.33$$

$$L = 10 \text{ Ft}$$

$$H = 5 \text{ Ft MAX.}$$

$$Q = 3.33 (10 \text{ Ft}) (5 \text{ Ft})^{3/2}$$

$$Q = 372.3 \text{ CFS}$$

Estimated max. discharge through gate structure = 372 CFSEstimated max. discharge through canal = 508 CFS
(per attached Manning Calc.)∴ The gate structure is the capacity limiter.

NOTED

JUN 28 1996

PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012,
2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



These are photos of the point of diversion. The top photo shows the point of diversion looking down the canal. The bottom photo shows the headgate and the diversion dam in Bennett Creek. The diversion dam is on the right and the headgate is on the left. A smaller headgate is in the middle, but is for another water right which was split from the original right 61-2236A



PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012,
2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



These are photos supplied by the owner of the new Ramped Flume or Broad Crested Weir that was installed at the point of diversion.

PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012, 2/21/2013, and 3/1/2013

FILE NUMBER 61-7727

Canal Enters
Reservoir Here



The photos above show Hot Springs Reservoir #2. The in-flow from the canal comes in on the eastern edge of the reservoir.

The bottom photos are of the reservoir spillway. The structure in the right hand picture is the spillway structure. All over flow goes back into Hot Springs Creek through this channel.



Canal Enters
Reservoir Here



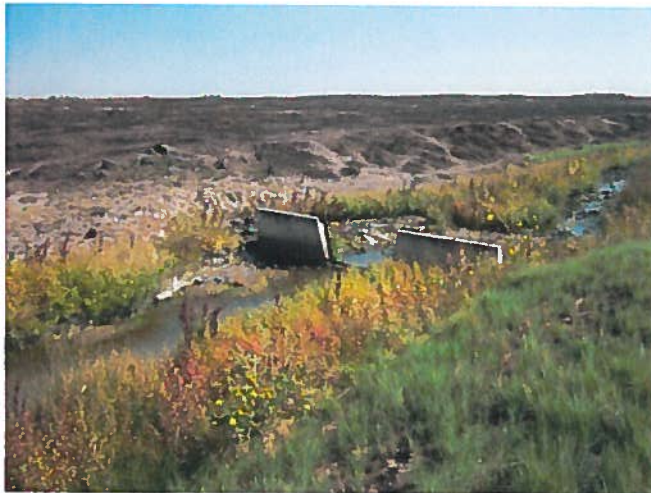
This photo is larger photo of the top right photo. I enlarged it to give a better idea of where the canal comes into the reservoir.

PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012, 2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



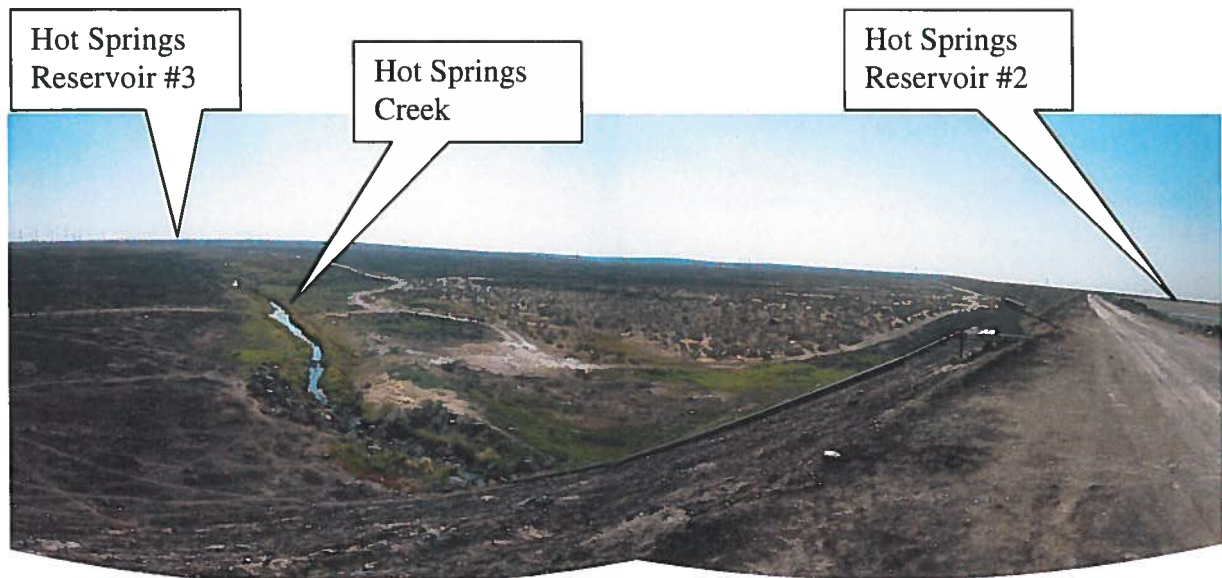
The photos above are photos supplied by the owner of the Cipolletti Weir that was installed on Hot Springs Creek at the point of injection from Hot Springs Reservoir #2.



I took the bottom photo of Cipolletti Weir that was installed on Hot Springs Creek at the point of injection **from Hot Springs Reservoir #2.**

PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012,
2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



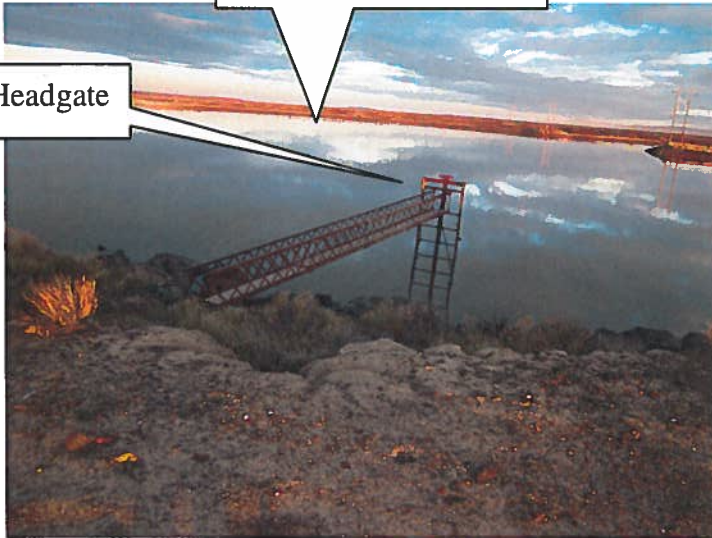
The above photo shows the outlet to Hot Springs Reservoir #2 described on the maps as the Point of Injection into Hot Springs Creek. You can see Hot Springs Reservoir #3 in the distance.

PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012,
2/21/2013, and 3/1/2013

FILE NUMBER 61-7727

Hot Springs Creek
Reservoir #3

Canal Headgate



The photo above shows Hot Springs Reservoir #3. The structure in the center of the photo is the headgate for the canal that diverts that water from the reservoir. This structure is the Point of Canal Re-Diversion shown on the maps.

Hot
Springs
Creek

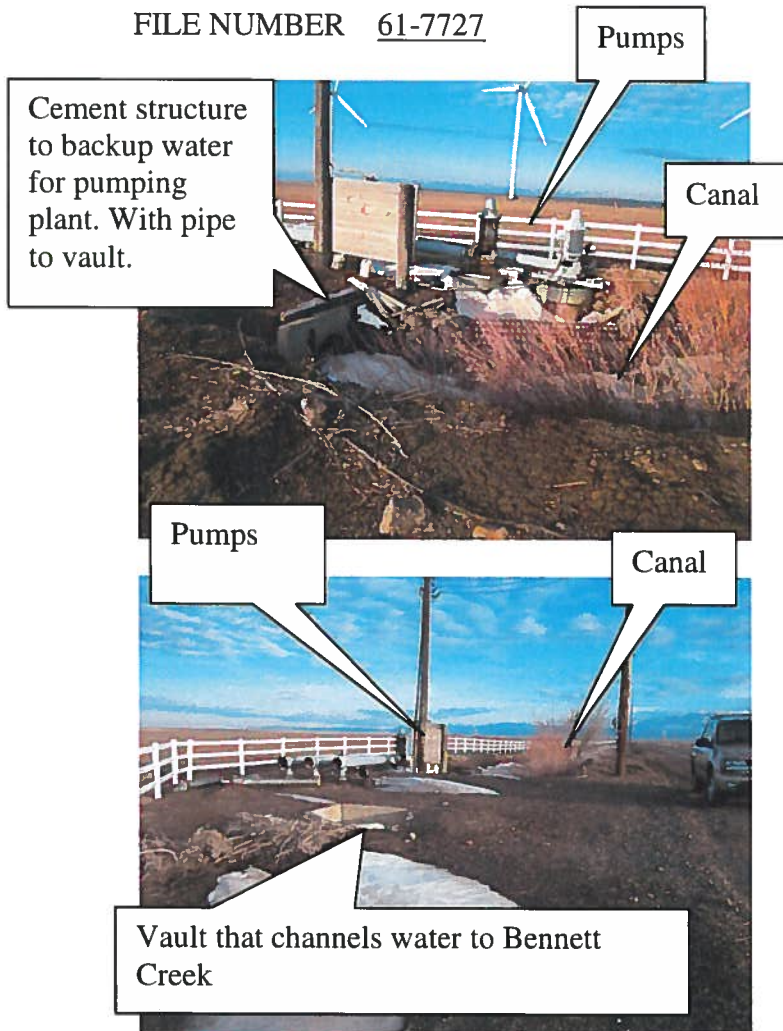
Canal



This bottom photo shows the canal leaving the embankment of Hot Springs Reservoir #3. Hot Springs Creek can be seen on the right hand side of the photo.

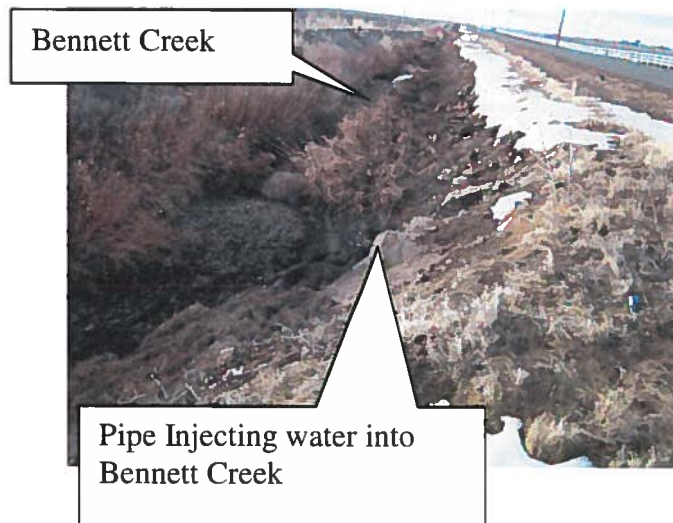
PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012, 2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



This top photo shows the end of the canal from Hot Springs Reservoir #3 Canal Diversion. This diversion consists of two 100 Hp pumps that divert directly out of the canal. The cement structure with the pipeline to the right is where water is backed up for the pumps and delivered to the vault that channels water to Bennett Creek Injection point.

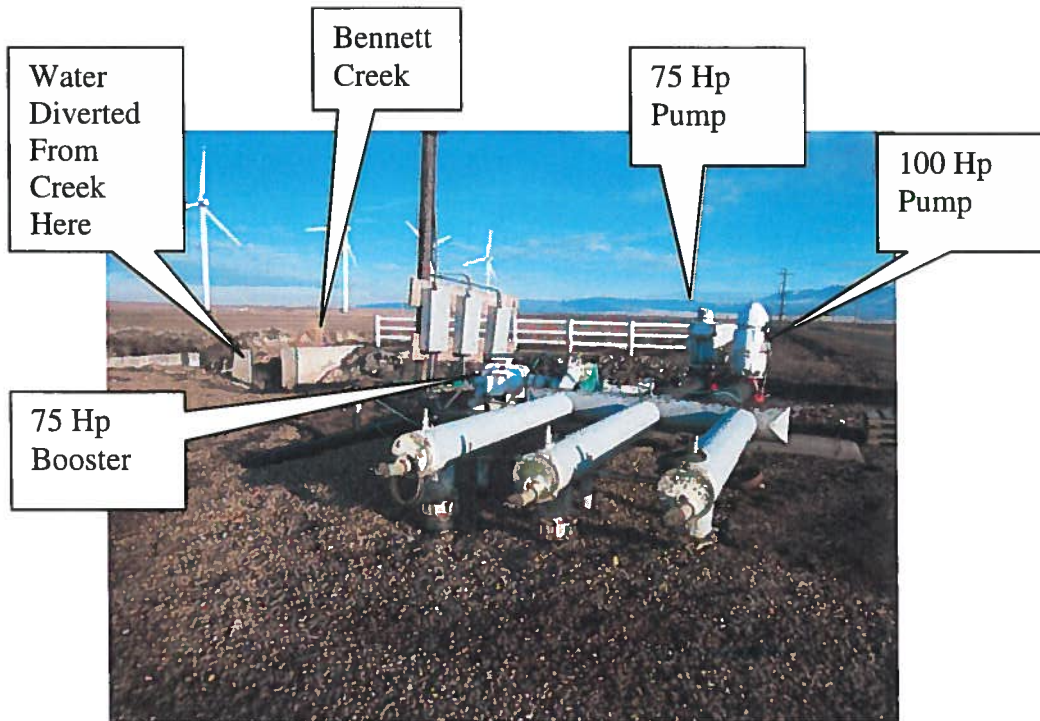
This photo shows the canal and the vault where water is diverted to Bennett Creek. The vault is in the foreground.



This photo shows where the water from the canal is actually diverted into the Bennett Creek channel.

PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012,
2/21/2013, and 3/1/2013

FILE NUMBER 61-7727

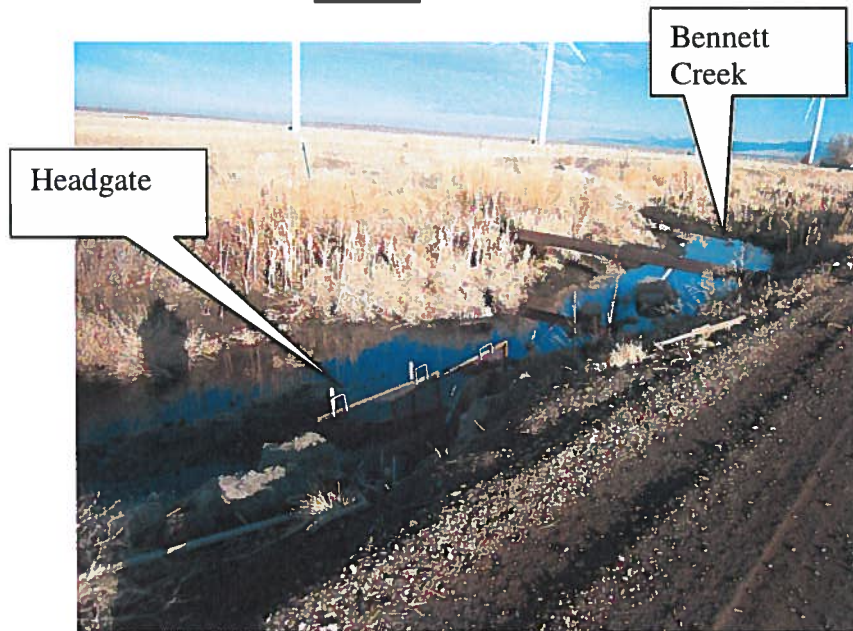


These photos show the pumping plant for the Bennett Creek Re-Diversion Point #1. The water is diverted through the cement structure to a pumping bay where two pumps divert the water into a mainline. A booster pump also pressurizes the water being pumped from the 75Hp Pump.

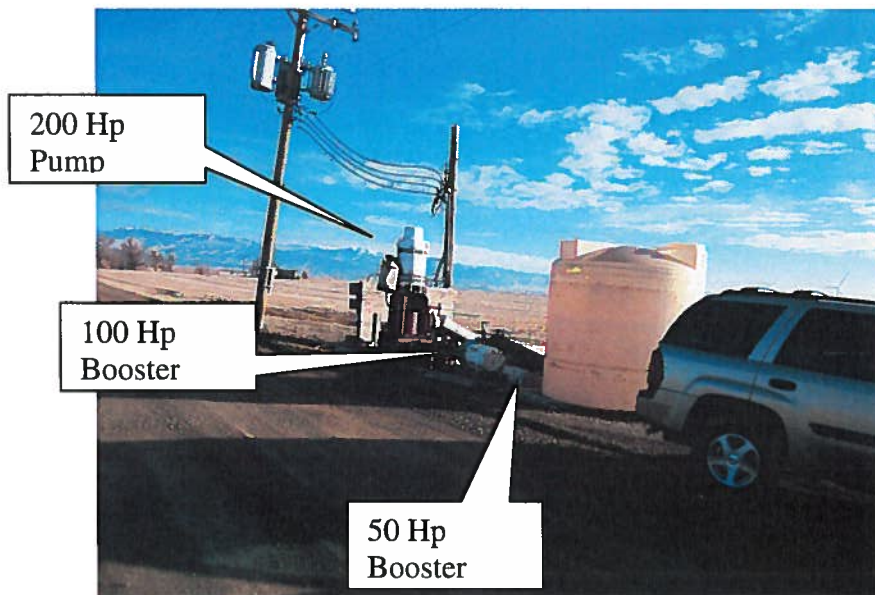


PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012,
2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



The photo above shows Bennett Creek Point of Re-Diversion # 2. This diversion runs water through the headgate under the road to a pumping station. The photo below shows the pumping station. The pumping station consists of a 200 Hp pump and two boosters. One of the boosters has a 50 Hp pump and the other is a 100 Hp pump.

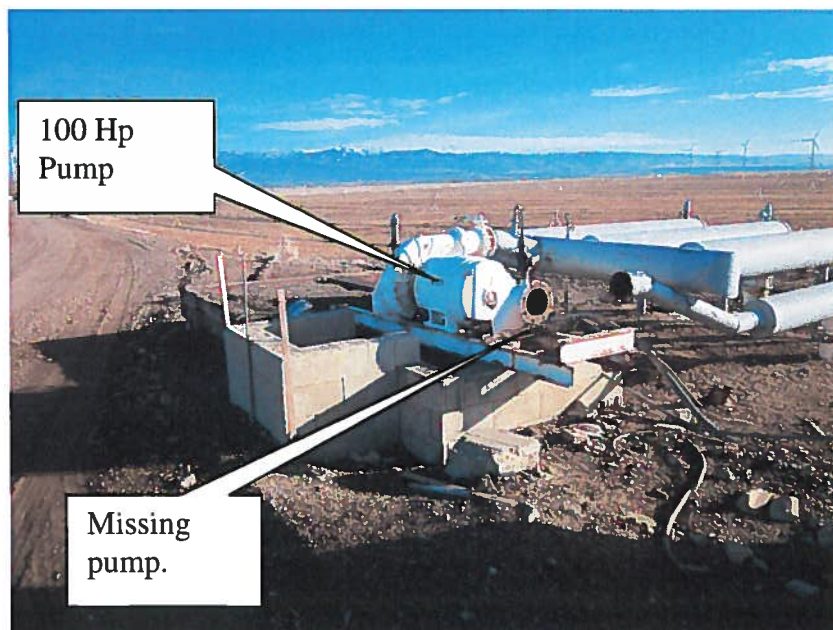


PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012,
2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



The photo above shows the headgate for the Bennett Creeks Point of Re-Diversion #3. The water from the point of diversion is piped under the road to the pumping plant. The photo below shows the pumping plant. The pumping plant has a 100 Hp booster pump that actually diverts water from the pumping plant vault. Another motor is used at this pumping station, but it was out for repairs, so no information was available for this pump.



PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/17/2012, 2/21/2013, and 3/1/2013

FILE NUMBER 61-7727



The above photo shows the Upper Teapot Re-Diversion point. There are 2-100 Hp pumps, and a small 15 Hp booster pump that appears to only be used to fill water trucks.



This photo is the Lower Teapot Re-Diversion point #1. Here are 2 – 100 Hp pumps at this diversion point. You can see Lower Teapot Reservoir in the background.



This final photo is the Lower Teapot Re-Diversion point #2. At the time of the exam, the pumping plant and pipelines had been removed, but the power panel and cement pad were still there. According to previous exams, they had a 100 Hp pump at this location that mainly irrigated the ground west of the Lower Teapot Reservoir.