

AMENDED

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR PERMIT
To appropriate the public waters of the State of Idaho

Ident. No.

57-11807

1. Name of applicant(s) Shenk Livestock Phone 208-249-1718
Name connector (check one): ☐ and ☐ or ☐ and/or

Mailing address: 3993 Market Road City Homedale

State ID Zip 83628 Email: shenklivestock@frontier.net

2. Source of water supply Unnamed Drain which is a tributary of Jump Creek

3. Location of point(s) of diversion:

Twp	Rge	Sec	Govt Lot	1/4	1/4	1/4	County	Source	Local name or tag #
3N	5W	14			SE	SW	Owyhee	Unnamed Drain	

4. Water will be used for the following purposes:

Amount 1.02 cfs for Irrigation purposes from 3/1 to 11/15 (both dates inclusive)
(cfs or acre-feet per year)

Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per year)

Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per year)

Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per year)

5. Total quantity to be appropriated is (a) 1.02 cubic feet per second (cfs) and/or (b) _____ acre-feet per year (af).

6. Proposed diverting works:

a. Describe type and size of devices used to divert water from the source. Lift pump and pipe

b. Height of storage dam _____ feet; active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet. If the reservoir will be filled more than once each year, describe the refill plan in Item 11.
For dams 10 feet or more in height OR reservoirs with a total storage capacity of 50 acre-feet or more, submit a separate Application for Construction or Enlargement of a New or Existing Dam. Application required? ☐ Yes ☐ No

c. Proposed well diameter is _____ inches; proposed depth of well is _____ feet.

d. Is ground water with a temperature of greater than 85°F being sought? ☐ Yes ☐ No

e. If well is already drilled, when? _____; drilling firm _____;

Well was drilled for (well owner) _____; Drilling Permit No. _____

7. Description of proposed uses (if irrigation only, go to item 8):

a. Hydropower; show total feet of head and proposed capacity in kW. _____

b. Stockwatering; list number and kind of livestock. _____

c. Municipal; show name of municipality or the applicant's qualifications as a municipal provider. _____

d. Domestic; show number of households _____

e. Other; describe fully. _____

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MAY 09 2012

WATER RESOURCES
WESTERN REGION

8. Description of place of use:

- a. If water is for irrigation, indicate acreage in each subdivision in the tabulation below.
- b. If water is used for other purposes, place a symbol of the use (example: D for Domestic) in the corresponding place of use below. See instructions for standard symbols.

TWP	RGE	SEC	NE				NW				SW				SE				TOTALS
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
3N	5W	14									17								17

Total number of acres to be irrigated: 17

9. Describe any other water rights used for the same purposes as described above. Include water delivered by a municipality, canal company, or irrigation district. If this application is for domestic purposes, do you intend to use this water, water from another source, or both, to irrigate your lawn, garden, and/or landscaping? None

10. a. Who owns the property at the point of diversion? Ron Cammack
- b. Who owns the land to be irrigated or place of use? Applicant
- c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing: Verbal agreement & authorization

11. Describe your proposal in narrative form, and provide additional explanation for any of the items above. Attach additional pages if necessary. The proposed source is under the control of South Board of Control. Attached is an authorization in the form of a questionnaire that has been completed and signed by Ron Kiester, Manager of South Board of Control. Surrounding lands that receive irrigation water from South Board of Control, via Gem Irrigation District, are recognized for their sandy, highly permeable characteristics and are allowed delivery of "excess" water (~3 miners inches or 0.06 cfs per acre). To allow for effective gravity irrigation in accordance to the District's delivery rate to surrounding lands, diversion of 3-inches/acre has been proposed. Attached is an excerpt from Gem Irrigation District's contract with South Board of Control noting the need for delivery of excess water.

12. Time required for completion of works and application of water to proposed beneficial use is 5 years (minimum 1 year).
13. **MAP OF PROPOSED PROJECT REQUIRED** - Attach an 8½" x 11" map clearly identifying the proposed point of diversion, place of use, section #, township & range. A photocopy of a USGS 7.5 minute topographic quadrangle map is preferred.

The information contained in this application is true to the best of my knowledge. I understand that any willful misrepresentations made in this application may result in rejection of the application or cancellation of an approval.

David Shenk
Signature of Applicant
DAVID SHENK (owner)
Print Name (and title, if applicable)

Shelley Shenk
Signature of Applicant
Shelley Shenk
Print Name (and title, if applicable)

For Department Use:

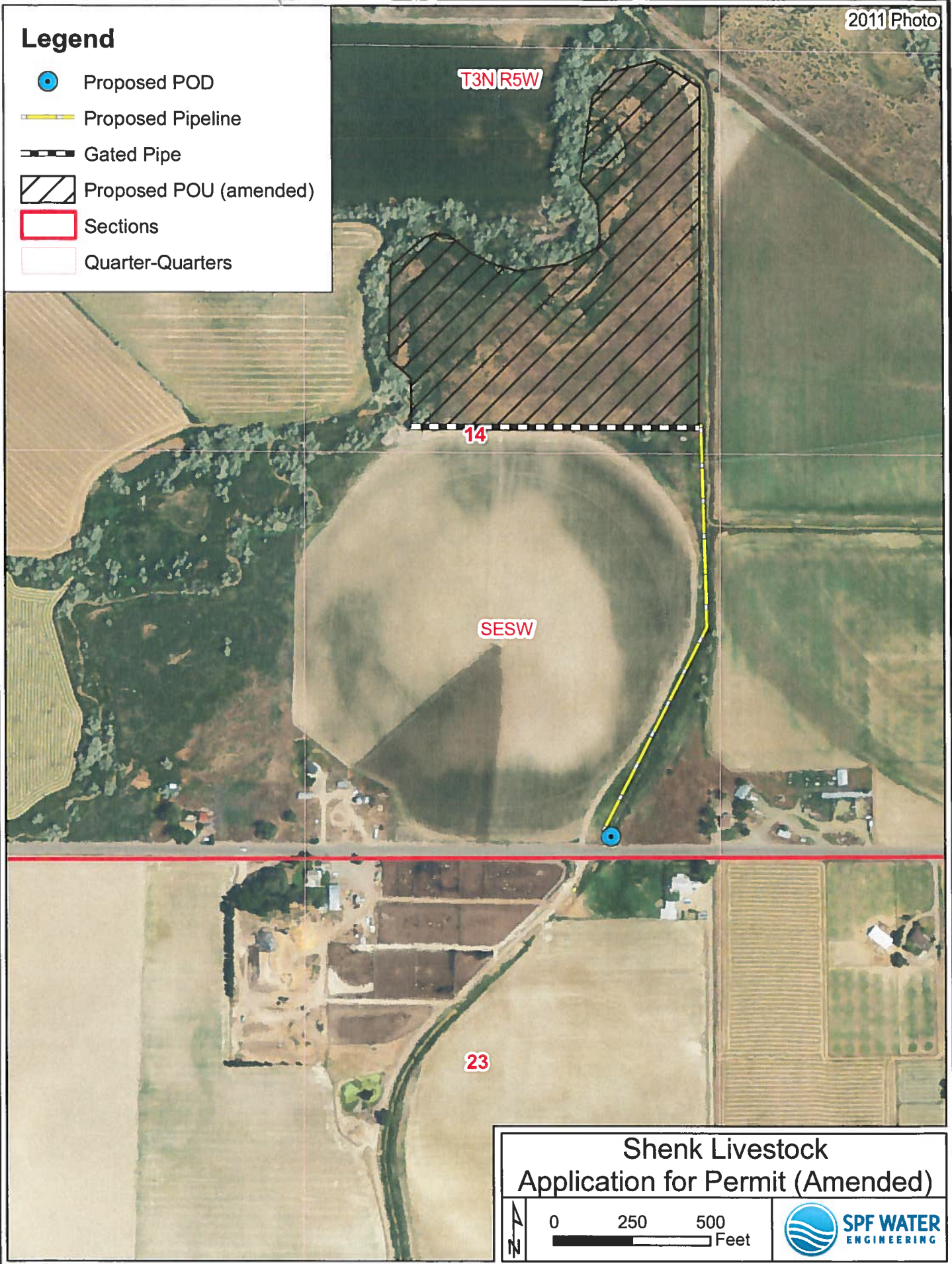
Received by RS Date 5-9-12 Time 11:00 am Preliminary check by J. MUSIC
Fee \$ 40- Receipted by RS Receipt No. W040160 Date 5-9-12

Original application filed 3-13-12
pd. \$ 250.- receipt # W039980 by RS

2011 Photo

Legend

-  Proposed POD
-  Proposed Pipeline
-  Gated Pipe
-  Proposed POU (amended)
-  Sections
-  Quarter-Quarters



Shenk Livestock
Application for Permit (Amended)



0 250 500
Feet



Sommer, Rachel

From: Sommer, Rachel
Sent: Thursday, March 14, 2013 1:58 PM
To: JENNIFER@OWYHEEAVALANCHE.COM
Subject: Legal Ad
Attachments: Owyhee Cover Letter.docx; Owyhee Combined Legal Ad.docx
Categories: Legal Ad Confirmed

Jennifer Stutheit,

Please see the attached ad for publication on 3/20/2013 & 3/27/2013.

Please confirm these are okay to publish as shown.

Thank you very much,

Rachel Sommer

Administrative Assistant I
IDWR, Western Region
Office: 208-334-2190
Fax: 208-334-2348
rachel.sommer@idwr.idaho.gov

Local Irrigation District Questionnaire

(For water right application)

- 1- Does the tract of land desiring to be irrigated have a water right NO ?
- 2- Is the water source (location) identified on attached map from a waste drain/waste ditch YES ?
- 3- If water source is in waste drain/ ditch is there an official name for waterway used by the Irrigation district NO ? If yes please state name of waterway N/A.
- 4- Is the water in the drain comingled with water from a natural stream NO ?
- 5- Can the point of diversion be located within applicant's property boundaries YES ?
- 6- Is the point of diversion (shown on attached map) being sought by applicant beyond any district recognized delivery point and free from any further delivery obligations to any landowners YES ?
- 7- Would the quantity if proportionate to irrigation district contract/historical use be acceptable YES ?
- 8- Does the irrigation district have any reason from a legal or policy standpoint to object to the application NO ?
- 9- Is the location for point of diversion and method used as shown and described in attached map and plan deemed acceptable YES ?

Name of Applicant DAVID SHENK.

Name of local irrigation district: South Board Control.

Manager of local irrigation district: Ron Keister.

Manager's signature: Ron Keister Date 1-5-2012

MINIMUM OPERATION AND MAINTENANCE CHARGE TO
BE ESTABLISHED; CHARGE FOR EXCESS WATER

26. (a) The provisions of this article are made with the object, among other things, of encouraging the economical use of water and of distributing the operation and maintenance charges equitably among the lands of the Districts.

(b) The Boards of Control, in establishing their per-acre charges, and the Districts in collecting them, shall levy a minimum annual operation and maintenance charge against each irrigable acre within each district, and the payment of such minimum charge shall be required whether or not water is used. The amount of water in acre-feet per acre which is to be delivered each year on payment of the minimum annual charge shall be determined by the Boards of Control, but it shall not exceed four (4) acre-feet. The amount of water not to exceed four (4) acre-feet shall be determined by the Boards of Control after estimating the supply of water to be available for that year for distribution to the lands of the Districts. For water to be delivered each year in excess of the minimum amounts, the landowners or water users involved shall pay to the Districts to be forwarded to the Board of Control an excess charge as follows:

For each additional acre-foot, or fraction thereof,
at a rate per acre-foot not less than twenty-five
per cent (25%) more than the rate charged per acre-
foot for water made available for the year under the
annual minimum charge for each unit.

*Excess water
charge*

(c) To carry out the provisions of this article, the Boards of Control shall measure the water delivered to each farm turnout and shall keep individual farm water delivery records. With respect to those lands within the pumping area of the Gem Irrigation District, where it is impracticable to install a measuring device, the South Board of Control shall make water measurements at the measuring devices closest to the point of delivery of the water, in some cases a single device serving as the measuring point for several water users. The excess charge provided for in paragraph (b) of this article shall be computed upon the basis of these water measurements and shall be assessed to and paid by the individual landowners receiving the excess water, except that as to lands in the pumping area of the Gem Irrigation District, the individual charges for excess water computed in the manner provided in this article may be collected, at the option of the Gem Irrigation District, by means of a uniform per acre charge applied to all the lands of such pumping area and be paid by that district on account of the excess water delivered to such lands. With respect to the lands within the pumping area of the Gem Irrigation District, being sandy lands now served in part by gravity water from drains, which water would otherwise be lost to the project, said lands being designated in color on the attached Exhibit A, the charge for excess water will be computed upon the basis of the average per acre excess charge obtaining for the remaining land of the pumping area of the Gem Irrigation District for that year, and such charge shall be paid by the Gem Irrigation District for such lands as a group.

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MAR 13 2012

WATER RESOURCES
WESTERN REGIONSTATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR PERMIT
To appropriate the public waters of the State of IdahoIdent. No. 57-118071. Name of applicant(s) Shenk Livestock Phone 208-249-1718
Name connector (check one): ☐ and ☐ or ☐ and/orMailing address: 3993 Market Road City HomedaleState ID Zip 83628 Email: shenklivestock@frontier.net2. Source of water supply Unnamed Drain which is a tributary of Jump Creek

3. Location of point(s) of diversion:

Twp	Rge	Sec	Govt Lot	1/4	1/4	1/4	County	Source	Local name or tag #
3N	5W	~~23~~			~~NE~~	~~NW~~	Owyhee	Unnamed Drain	
		<u>14</u>			<u>SE</u>	<u>SW</u>			

4. Water will be used for the following purposes:

Amount 0.90 cfs for Irrigation purposes from 3/1 to 11/15 (both dates inclusive)
(cfs or acre-feet per year)Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per year)Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per year)Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per year)5. Total quantity to be appropriated is (a) 0.90 cubic feet per second (cfs) and/or (b) _____ acre-feet per year (af).

6. Proposed diverting works:

a. Describe type and size of devices used to divert water from the source. Pipe to gravel pit to buried lateral to poolLIFT PUMP + PIPE

b. Height of storage dam _____ feet; active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet. If the reservoir will be filled more than once each year, describe the refill plan in item 11.

For dams 10 feet or more in height OR reservoirs with a total storage capacity of 50 acre-feet or more, submit a separate Application for Construction or Enlargement of a New or Existing Dam. Application required? ☐ Yes ☐ No

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d. Is ground water with a temperature of greater than 85°F being sought? ☐ Yes ☐ No

e. If well is already drilled, when? _____; drilling firm _____;

Well was drilled for (well owner) _____; Drilling Permit No. _____

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b. Stockwatering; list number and kind of livestock. _____

c. Municipal; show name of municipality or the applicant's qualifications as a municipal provider. _____

d. Domestic; show number of households _____

e. Other; describe fully. _____

AMENDED

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3N	5W	14									15								15

Total number of acres to be irrigated: 15

9. Describe any other water rights used for the same purposes as described above. Include water delivered by a municipality, canal company, or irrigation district. If this application is for domestic purposes, do you intend to use this water, water from another source, or both, to irrigate your lawn, garden, and/or landscaping? None

10. a. Who owns the property at the point of diversion? Applicant RON CAMMACK
b. Who owns the land to be irrigated or place of use? Applicant
c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing: VERBAL AGREEMENT + AUTHORIZATION

11. Describe your proposal in narrative form, and provide additional explanation for any of the items above. Attach additional pages if necessary. The proposed source is under the control of South Board of Control. Attached is an authorization in the form of a questionnaire that has been completed and signed by Ron Kiester, Manager of South Board of Control. Surrounding lands that receive irrigation water from South Board of Control, via Gem Irrigation District, are recognized for their sandy, highly permeable characteristics and are allowed delivery of "excess" water (~3 miners inches or 0.06 cfs per acre). To allow for effective gravity irrigation in accordance to the District's delivery rate to surrounding lands, diversion of 3-inches/acre has been proposed. Attached is an excerpt from Gem Irrigation District's contract with South Board of Control noting the need for delivery of excess water.

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The information contained in this application is true to the best of my knowledge. I understand that any willful misrepresentations made in this application may result in rejection of the application or cancellation of an approval.

David Sherk

Signature of Applicant

David Sherk Owner
Print Name (and title, if applicable)

Shelley Sherk

Signature of Applicant

Shelley Sherk
Print Name (and title, if applicable)

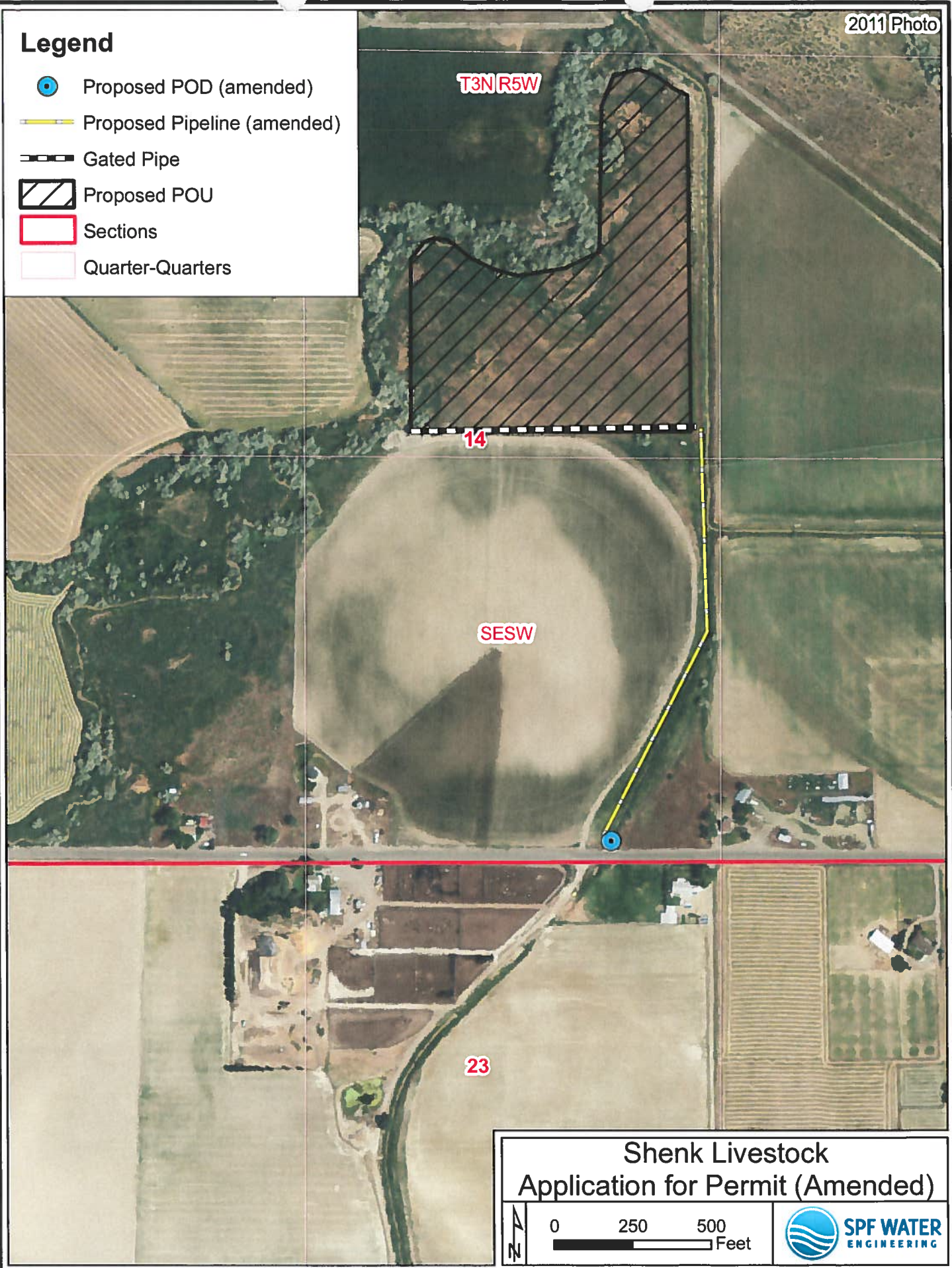
For Department Use:

Received by RS Date 3-13-12 Time 11:00 pm Preliminary check by _____
Fee \$ 250.00 Received by RS Receipt No. W039980 Date 3-13-12

2011 Photo

Legend

-  Proposed POD (amended)
-  Proposed Pipeline (amended)
-  Gated Pipe
-  Proposed POU
-  Sections
-  Quarter-Quarters



Shenk Livestock
Application for Permit (Amended)



0 250 500
Feet



57-11807

March 14, 2013

LEGAL NOTICE DEPARTMENT
OWYHEE AVALANCHE
PO BOX 97
HOMEDALE, ID 83628

RE: Application for Permit No. 57-11807
Application for Transfer No. 78259

Dear Legal Notice Department:

Please publish the enclosed legal notice on the dates indicated (once a week for two consecutive weekly issues). If you cannot publish the notice on the proposed dates, please contact us immediately.

An affidavit of publication must be submitted to the Department along with the publication bill. Please send the affidavit and bill to this office before 4/8/2013. Your cooperation is appreciated.

Sincerely,

Rachel Sommer
Administrative Assistant

Enclosures

The following application(s) have been filed to appropriate the public waters of the State of Idaho:

57-11807

SHENK LIVESTOCK

3993 MARKET RD

HOMEDALE, ID 83628

Point of Diversion SESW S14 T03N R05W OWYHEE County Source UNNAMED DRAIN Tributary JUMP CREEK

Use: IRRIGATION 03/01 to 11/15 1.02 CFS

Total Diversion: 1.02 CFS

Date Filed: 5/9/2012

Place Of Use: IRRIGATION

T03N R05W S14 NESW

Total Acres: 17

This application proposes an excess diversion rate of 0.06 cfs per acre based on analysis provided by consultant for applicant.

PROPOSED CHANGE OF WATER RIGHT(S)

Jackie P. Post of P.O.Box 298, Mountain Home, ID 83647 filed Application No. **78259** to transfer one water right with a 1970 priority date from the Snake River totaling 1.6 cfs. The purpose of the transfer is to create a 160-acre permissible place of use on lands owned by the applicant. Water will continue to be diverted at the original point of diversion and the right shall be limited to the irrigation of 80 acres in a single irrigation season. The general location of the place of use is the south side of 20 Mile Rd. approximately ¾ mile west of Shoofly Rd.

Permits will be subject to all prior water rights. For additional information concerning the property location, contact Western Region office at (208) 334-2190; or for a full description of the rights &/or proposed transfer, please see www.idwr.idaho.gov/apps/ExtSearch/WRFiling.asp. Protests may be submitted based on the criteria of Sec 42-222 and 42-203A, Idaho Code. Any protest against the approval of this application(s) must be filed with the Director, Dept. of Water Resources, Western Region, 2735 Airport Way, Boise, ID 83705 together with a protest fee of \$25.00 for each application on or before 4/8/2013. The protestant must also send a copy of the protest to the applicant.

GARY SPACKMAN, Director

Published on 3/20/2013 and 3/27/2013

Music, Vicky

From: Music, Vicky
Sent: Thursday, February 28, 2013 9:42 AM
To: 'Scott King'
Subject: RE: Shenk Livestock

Will do.

From: Scott King [<mailto:SKing@spfwater.com>]
Sent: Thursday, February 28, 2013 9:40 AM
To: Music, Vicky
Subject: RE: Shenk Livestock

Thank you.
Please let me know if you have any questions.

From: Music, Vicky [<mailto:Vicky.Music@idwr.idaho.gov>]
Sent: Thursday, February 28, 2013 9:41 AM
To: Scott King
Subject: Shenk Livestock

Hi Scott –

I see that the I received the excess rate analysis but I have not had a chance to look at it. I'll do that next week. I expect that the application will be advertised the 3rd and 4th weeks in March.

Vicky Music
Sr. Water Resource Agent
IDWR Western Region
2735 Airport Way
Boise, ID 83705
208.334.2190



SPF WATER
ENGINEERING

February 20, 2013

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FEB 21 2013

WATER RESOURCES
WESTERN REGION

Vicky Music
Idaho Department of Water Resources
Western Region
2735 Airport Way
Boise, ID 83705

Subject: Field Irrigation Requirement Analysis, Schenk Livestock, 57-11807

Dear Vicky:

Enclosed is a field irrigation requirement analysis prepared for Shenk Livestock in support of the above-referenced application and in response to your January 14, 2013 letter. This analysis supports a required diversion rate of 1.16 cfs, which exceeds the 1.02 cfs diversion rate proposed in the application. The analysis also demonstrates annual diversion water requirements of 9.8 acre-feet per acre, which exceeds the standard volume in this area. We suggest that the higher diversion volume requirement be noted in the file so that it can be accommodated at the time of licensing.

Please let me know if you have any questions.

Sincerely,

Scott N. King, P.E.
Supervising Engineer

cc: Shenk Livestock

File: 952.0010

Irrigation Requirement Analysis Application for Permit 57-11807

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FEB 21 2013

WATER RESOURCES
WESTERN REGION

Prepared for

**Shenk Livestock
3993 Market Rd
Homedale, ID 83628**

Prepared by

**Scott N. King, P.E., CWRE
SPF Water Engineering, LLC
300 East Mallard, Suite 350
Boise, Idaho 83706
(208) 383-4140**



February 19, 2013



**SPF WATER
ENGINEERING**

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- Appendix A: Consumptive Irrigation Requirement (Precipitation Deficit) Data
- Appendix B: Soil Characteristics
- Appendix C: Field Irrigation Requirement Calculations
- Appendix D: FURROW.EXE results

1. BACKGROUND

This report presents a Field Irrigation Requirement (FIR) analysis for a proposed irrigation project south of the Snake River located about two miles southeast of Homedale, ID. Shenk Livestock filed application for permit no. 57-11807 (amended) to appropriate 1.02 cfs from an unnamed drain tributary to Jump Creek for irrigation of 17 acres. The land is located at Township 3N, Range 5W, Section 14, NESW (see Figure 1).

Dave Shenk, owner this property, provided information necessary to complete this analysis including proposed gravity irrigation methods and crop patterns.

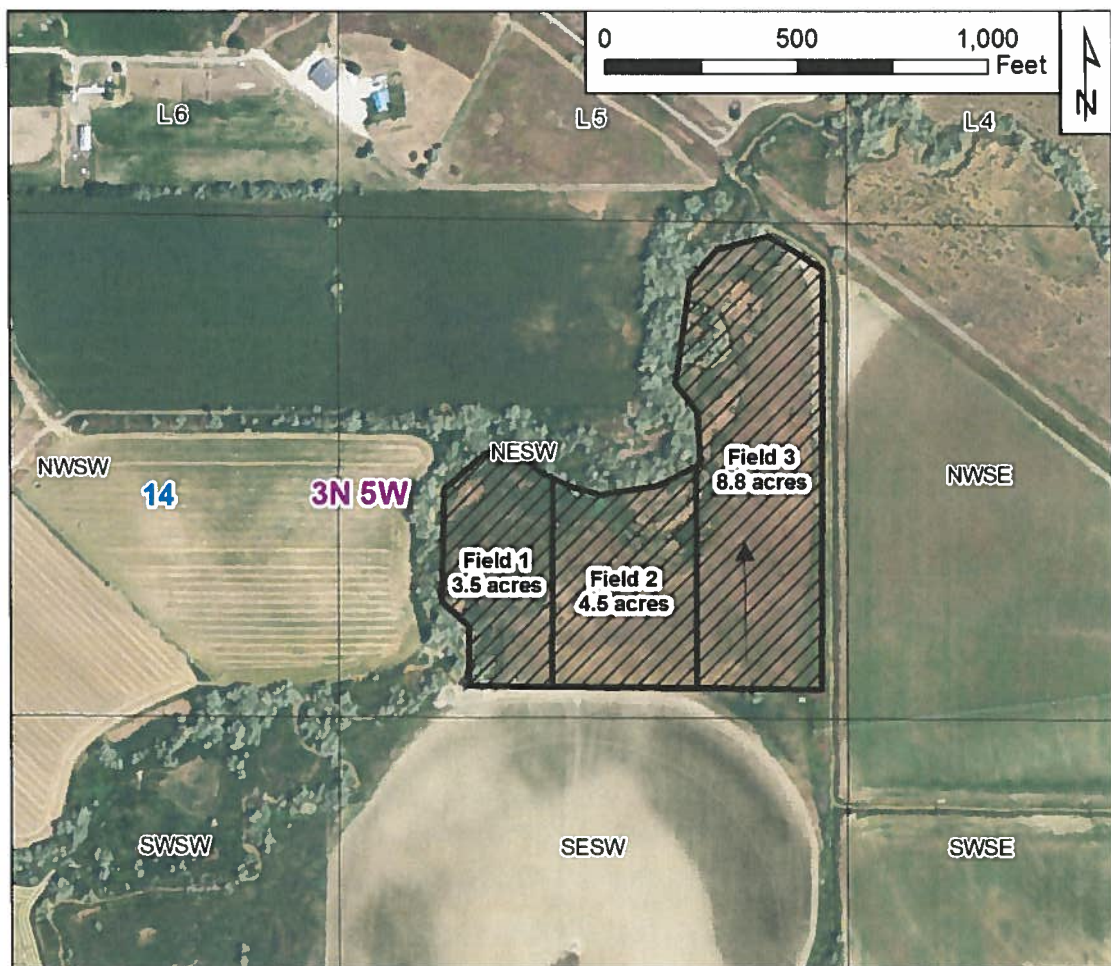


Figure 1. Proposed place of use (2011 NAIP Imagery).

2. IRRIGATION REQUIREMENT ANALYSIS

2.1. Fields

Field boundaries are based on the application for permit, furrow lengths and soil types (see Figure 2). Field 1 is composed primarily of the Bram Silt Loam (BsA) soil type, while fields 2 and 3 are composed of Feltham-Quincy Complex (FuD) and BsA soil types. Fields 1 and 2 have furrow lengths of approximately 550 feet while field 3 has furrow lengths of approximately 1150 feet. Furrow direction is south to north. Slope is 0.007 ft/ft based on USGS Quadrangle maps. Based on Dreher and Tuthill (1999), field irrigation requirements are estimated using the NRCS Furrow program together with soil characteristics, field conditions, and weather station records. For fields with mixed soils (fields 2 and 3), the lower efficiency condition is selected for analysis.

2.2. Soils

Soil information is provided by the Natural Resource Conservation Service digital SSURGO soil database. Table 1 presents the soils for the proposed project. Soil analyses, including determination of Management Allowed Deficit (MAD) are included in Appendix B. These soils have furrow intake family values of 0.3 to 0.7. Water infiltrates slowly into low intake family soils, and quickly into high intake family soils (heavy clay = 0.3; sand = 0.8). Soils are deep and have an available water holding capacity (AWC) of at least 0.06 inches of water per inch of soil in the upper layer. The Bram Silt Loam (BsA) has high pH values that are expected to limit the infiltration rate when compared to silt loams with lower pH values (calculations in soils spreadsheets).

Table 1. Properties of predominant soils.

<i>Field</i>	<i>Soil Properties</i>			
	<i>MUSYM Code</i>	<i>Name</i>	<i>Slope (percent)</i>	<i>Furrow Intake Family</i>
1, 2, 3	BsA	Bram Silt Loam	0 to 1	0.30
2, 3	FuD	Feltham-Quincy Complex	0 to 12	0.70

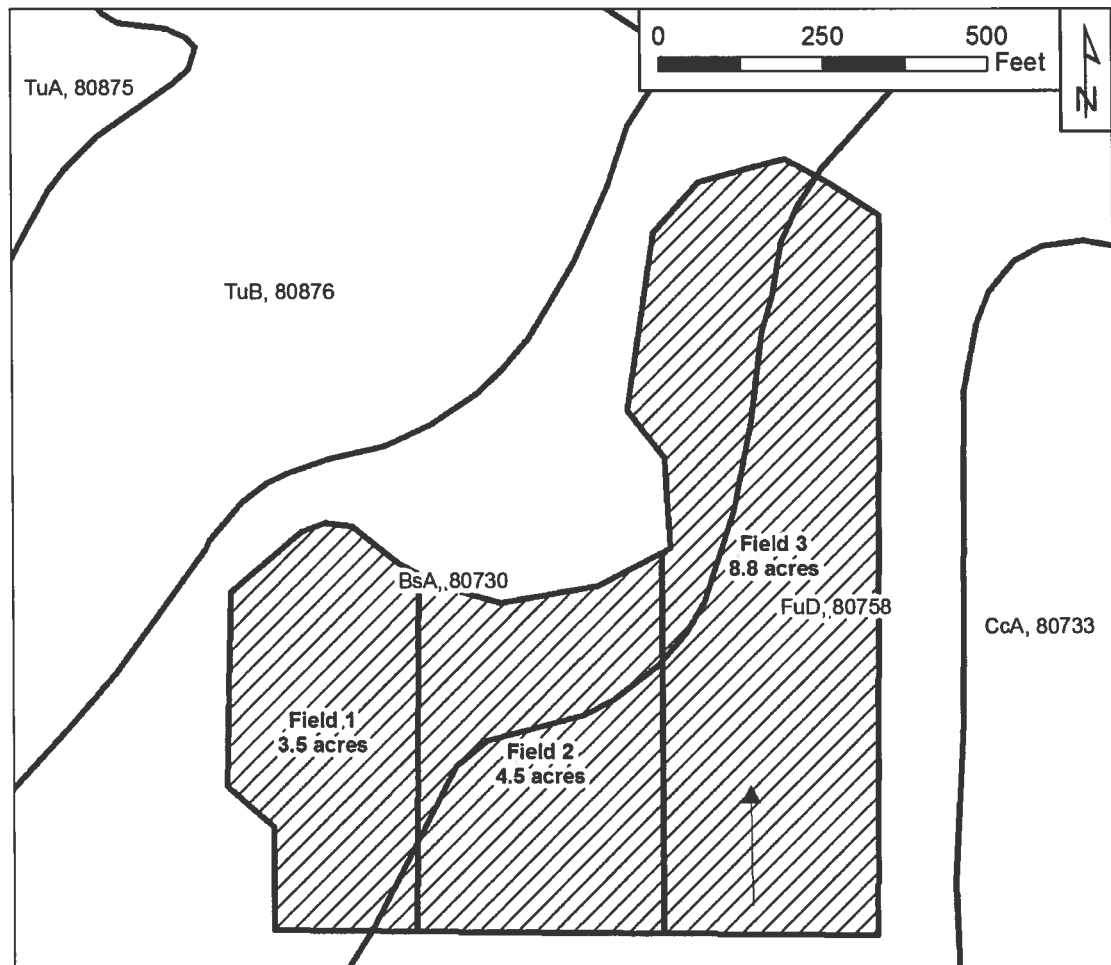


Figure 2: Field boundaries and soils.

2.3. Crops

Crops included in this analysis include those commonly grown by Shenk Livestock in this area on other properties. These crops include alfalfa hay, field corn, grain, grass hay and sweet corn.

2.4. Climate

The ET_{Idaho} 2012 data from the Deer Flat Dam climate station is used as the basis for crop precipitation-deficit irrigation requirements for this farm (Allen & Robison, 2012). This station is approximately eight miles east of the property. Data sheets are presented in Appendix A.

2.5. Irrigation Efficiency

Per IDWR guidelines (Dreher & Tuthill, 1999), the FURROW program written by the NRCS is used to estimate irrigation efficiency. In this analysis, input parameters include:

- Irrigation application depths ranging from 1.37 to 3.03 inches of water, equivalent to MAD found in Soil Characteristics (Appendix B)
- Corrugate irrigation for alfalfa, grass hay and grain; furrows for corn.
- Furrow length ranging from 550 to 1150 ft
- Furrow spacing of 2.5 ft for all crops
- Furrow slope of 0.007
- Soil intake family as listed in Table 1, and per Soil Characteristics in Appendix B
- Furrow inflow rates range from 3 to 11.5 gpm and application time varies between 12 and 36 hours, depending on highest efficiency. Maximum corrugate flow is generally limited to 10 gpm. The most efficient combination of flow and application time is selected for analysis.

Inflow rate is adjusted for application times of 12, 18, 24, 30 or 36 hours in order to determine the optimum irrigation efficiency. Peak efficiency varied by fields and crop type. Irrigation efficiency below 15% and above 70% is limited to 15% and 70%, respectively, for FIR determination per Dreher and Tuthill (1999).

2.6. Field Irrigation Requirement

Field Application Efficiency (FAE) values are the result of Furrow program runs. Appendix D presents FURROW.EXE program results for each crop based on furrow spacing and length, soil type, crop, irrigation application depth, irrigation method, and the most efficient inflow time / flow rate combination.

Appendix C includes spreadsheet used to determine the Field Irrigation Requirement (FIR) based on crop evapotranspiration requirements, net irrigation application (equivalent to MAD values from the soil analysis spreadsheets, Appendix B), and FAE from Furrow runs (Appendix D). Table 2 presents field irrigation requirements, both peak flow and annual volume, for the anticipated crops. The total maximum on-farm irrigation requirement is 1.16 cfs for 17 acres based on a grain crop. This exceeds the application's proposed diversion rate of 1.02 cfs, thereby demonstrating that the proposed diversion rate is justifiable for the planned irrigation project. The maximum annual volume is 166.5 acre-feet for 17 acres based on alfalfa.

Table 2: Field Irrigation Requirements

Crop	FIR (cfs/acre)	Total IR (cfs)	Irrigation Diversion Volume (ft/yr)	Total Irrigation Diversion Volume (af/yr)
Sweet Corn	0.05	0.84	4.2	71.0
Field Corn	0.06	1.07	8.7	148.0
Alfalfa	0.05	0.84	9.8	166.5
Grain	0.07	1.16	6.9	118.1
Pasture	0.05	0.88	9.5	162.3

3. RESULTS AND CONCLUSIONS

This analysis indicates a peak field irrigation requirement of 1.16 cfs for the proposed irrigation project using reasonable gravity flow application methods. This quantity exceeds the proposed diversion rate of 1.02 cfs and provides a technically sound justification for the application.

The analysis also indicates annual diversion volume requirements of 9.8 acre-feet per acre. This duty exceeds the standard 4.5 afa volume typically applied to water rights in this area. The standard volume is insufficient based on this analysis and a minimum 9.8 acre-feet per acre volume should be applied at the time of licensing.

4. REFERENCES

Allen, Richard G. and Clarence W. Robison, 2012. Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho: Supplement updating the Time Series through December 2008, Research Technical Completion Report, Kimberly Research and Extension Center, University of Idaho, Moscow, ID.

Dreher and Tuthill, 1999. Report Regarding Evaluation of Irrigation Diversion Rates. Idaho Department of Water Resources, January 14, 1999.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database [Online at <http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/>].

APPENDIX A
Consumptive Irrigation Requirement
(Precipitation Deficit) Data

Alfalfa - frequent cuttings															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ^l	mm/day												mm		
Monthly ^f	-0.29	0.18	0.81	3.98	4.75	5.48	5.88	5.13	4.16	2.16	0.08	-0.48	995	-22	973
15-Day Moving Average ^d	-0.36	0.05	0.75	4.05	4.92	5.84	6.35	5.38	4.24	2.15	0.05	-0.48			
7-Day Moving Average ^e	-0.33	0.13	0.8	4.01	4.79	5.67	6.15	5.27	4.21	2.16	0.03	-0.47			
3-Day Moving Average ^g	-0.29	0.17	0.8	3.99	4.74	5.56	5.95	5.16	4.18	2.16	0.08	-0.48			
Standard Deviation ^k	mm/day												mm		
Monthly ^f	0.62	0.3	1.28	0.88	1.25	0.73	0.66	0.93	0.7	1.01	0.56	0.74	62	20	72
15-Day Moving Average ^d	0.7	0.5	1.2	1.19	1.53	1.46	1.19	1.42	1.3	1.03	0.74	0.73			
7-Day Moving Average ^e	0.98	0.77	1.42	1.67	2.01	2.26	1.85	1.96	1.7	1.38	1.14	0.96			
3-Day Moving Average ^g	1.33	1.08	1.85	2.34	2.5	2.9	2.26	2.36	2.08	1.8	1.57	1.39			
20% Exceedance ^l	mm/day												mm		
Monthly ^f	-0.02	0.37	1.44	4.63	5.69	6.19	6.25	5.7	4.58	2.71	0.44	-0.03	1047	0	1031
15-Day Moving Average ^d	0.44	0.71	2.81	5.88	7.33	7.82	8.05	7.34	6.12	3.76	1.35	0.3			
7-Day Moving Average ^e	0.79	1.37	3.78	6.81	8.27	9.18	8.81	8.05	6.87	4.61	1.73	0.71			
3-Day Moving Average ^g	1.1	2.27	4.46	8.1	9.16	9.91	9.47	8.5	7.45	5.26	2.31	0.99			
80% Exceedance ^m	mm/day												mm		
Monthly ^f	-0.49	0.01	0.05	3.41	3.77	4.68	5.6	4.77	3.67	1.66	-0.51	-1.03	939	-43	920
15-Day Moving Average ^d	-1.32	-0.46	-0.52	1.96	2.79	3.06	4.01	3.19	2.23	0.51	-1.48	-1.71			
7-Day Moving Average ^e	-2.73	-1.69	-1.8	-0.44	0.82	0.94	2.31	1.76	1.07	-0.62	-2.46	-3.48			
3-Day Moving Average ^g	-5.06	-3.31	-4.08	-3.76	-1.99	-3.56	1.23	-0.31	-1.06	-2.47	-5.31	-5.44			
Ave Highest P _{def}	mm/day												--		
15-Day Moving Average ^h	0.26	0.48	1.73	5.09	6.18	7.25	7.63	6.72	5.33	3.09	0.72	0.16			
7-Day Moving Average ^h	0.64	1.09	2.58	6.09	7.31	8.5	8.39	7.61	6.25	4.05	1.4	0.44			
3-Day Moving Average ^h	0.94	1.67	3.41	7.12	8.41	9.37	9.02	8.11	6.85	4.75	1.85	0.77			
Ave Lowest P _{def}	mm/day												--		
15-Day Moving Average ^h	-0.81	-0.26	-0.11	2.92	3.43	4.21	4.75	3.8	3.03	1.32	-0.61	-0.98			
7-Day Moving Average ^h	-1.72	-0.91	-0.82	1.65	1.81	1.94	2.81	2.18	1.83	0.37	-1.53	-1.69			
3-Day Moving Average ^h	-3.29	-1.83	-2.29	-0.52	-0.04	-0.33	1.84	0.85	0.52	-1.18	-3.36	-3.33			

Sweet Corn - early plant															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ^l	mm/day												mm		
Monthly ^f	-0.18	0.17	-0.02	0.09	0.76	4.57	7.25	2.34	-0.01	-0.11	-0.32	-0.35	457	-25	434
15-Day Moving Average ^g	-0.21	0.04	-0.03	0.06	0.71	4.55	7.49	2.14	-0.03	-0.08	-0.27	-0.32			
7-Day Moving Average ^g	-0.2	0.11	-0.01	0.09	0.69	4.56	7.41	2.22	-0.03	-0.09	-0.29	-0.31			
3-Day Moving Average ^g	-0.18	0.16	-0.02	0.1	0.73	4.57	7.3	2.32	-0.02	-0.11	-0.3	-0.34			
Standard Deviation ^k	mm/day												mm		
Monthly ^f	0.46	0.24	0.22	0.13	1.02	1.33	0.91	2.18	0.11	0.33	0.33	0.68	27	19	27
15-Day Moving Average ^g	0.45	0.45	0.34	0.26	0.87	1.61	0.72	2.29	0.26	0.32	0.49	0.73			
7-Day Moving Average ^g	0.73	0.78	0.64	0.52	1.14	2.12	1.05	2.82	0.5	0.6	0.8	0.93			
3-Day Moving Average ^g	1.08	1.15	1.14	1.06	1.72	2.67	1.52	3.18	0.94	1.1	1.24	1.32			
20% Exceedance ^l	mm/day												mm		
Monthly ^f	0.04	0.3	0.06	0.2	0.99	5.67	7.76	3.64	0.03	0	0	0.04	480	-11	455
15-Day Moving Average ^g	0.44	0.75	0.63	0.51	1.8	7.21	8.29	6.4	0.37	0.38	0.48	0.49			
7-Day Moving Average ^g	0.81	1.36	1.43	1.68	2.79	8.37	8.81	7.52	0.83	0.97	0.75	0.71			
3-Day Moving Average ^g	1.14	2.12	3.08	3.17	5.06	9.33	9.53	8.13	1.8	1.73	1.41	0.96			
80% Exceedance ^m	mm/day												mm		
Monthly ^f	-0.36	0.03	-0.1	0	0.29	3.25	6.86	0.41	-0.01	-0.23	-0.66	-0.99	432	-40	411
15-Day Moving Average ^g	-1.09	-0.57	-0.66	-0.65	-0.48	1.74	6.24	-0.16	-0.28	-0.94	-1.53	-1.79			
7-Day Moving Average ^g	-1.87	-1.51	-1.93	-1.44	-1.96	0.6	4.45	-0.51	-1.2	-1.57	-2.43	-2.14			
3-Day Moving Average ^g	-3.54	-3.31	-4.05	-3.97	-6.01	-2.14	1.27	-1.23	-2.8	-4.69	-4.14	-4.78			
Ave Highest P _{def}	mm/day												—		
15-Day Moving Average ^g	0.28	0.49	0.35	0.41	1.38	6.03	7.97	4.26	0.2	0.22	0.21	0.24			
7-Day Moving Average ^g	0.62	1.12	0.92	1.16	2.15	7.17	8.46	5.69	0.59	0.68	0.56	0.54			
3-Day Moving Average ^g	0.94	1.8	2.01	2.34	3.95	8.42	9.2	6.63	1.28	1.23	1.06	0.8			
Ave Lowest P _{def}	mm/day												—		
15-Day Moving Average ^g	-0.58	-0.28	-0.42	-0.29	0.14	3.16	6.66	0.37	-0.22	-0.42	-0.81	-0.86			
7-Day Moving Average ^g	-1.26	-1.03	-1.05	-0.8	-0.76	1.81	5.6	-0.26	-0.64	-1.03	-1.66	-1.59			
3-Day Moving Average ^g	-2.65	-2.26	-2.22	-2.26	-2.71	0.24	3.84	-0.86	-1.54	-2.44	-3.43	-3.14			

Grass Hay															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ⁱ	mm/day												mm		
Monthly ^c	-0.18	0.03	0.63	3.52	5.7	6.05	6.09	5.23	3.74	1.8	-0.33	-0.41	1006	-33	979
15-Day Moving Average ^d	-0.19	-0.04	0.6	3.62	5.76	6.19	6.21	5.15	3.62	1.87	-0.34	-0.43			
7-Day Moving Average ^e	-0.19	0	0.61	3.57	5.71	6.11	6.16	5.2	3.66	1.84	-0.36	-0.41			
3-Day Moving Average ^f	-0.18	0.02	0.63	3.55	5.69	6.07	6.11	5.23	3.71	1.8	-0.33	-0.41			
Standard Deviation ^k	mm/day												mm		
Monthly ^c	0.41	0.25	1	0.85	1.11	0.71	0.54	0.89	0.6	0.95	0.54	0.66	52	21	50
15-Day Moving Average ^d	0.41	0.36	0.89	1.05	1.24	1.19	0.6	1.02	0.91	0.88	0.68	0.63			
7-Day Moving Average ^e	0.61	0.53	1.19	1.54	1.77	1.75	0.92	1.34	1.26	1.26	1.07	0.82			
3-Day Moving Average ^f	0.85	0.71	1.6	2.22	2.31	2.4	1.32	1.76	1.71	1.7	1.51	1.18			
20% Exceedance ^l	mm/day												mm		
Monthly ^c	0.03	0.14	0.92	4.1	6.13	6.67	6.41	5.59	4.14	2.23	0.15	-0.02	1041	-17	1021
15-Day Moving Average ^d	0.16	0.35	1.83	5.2	7.74	7.84	7.02	6.34	4.74	3.05	0.49	0.05			
7-Day Moving Average ^e	0.28	0.59	2.72	5.84	8.67	8.67	7.61	7.02	5.56	3.87	1.43	0.19			
3-Day Moving Average ^f	0.41	0.86	4.15	7.18	9.66	9.63	8.66	7.78	6.85	4.63	1.6	0.34			
80% Exceedance ^m	mm/day												mm		
Monthly ^c	-0.42	-0.03	0.17	2.83	5	5.52	5.78	4.88	3.42	1.35	-0.95	-1	959	-54	936
15-Day Moving Average ^d	-0.77	-0.34	-0.48	1.27	3.76	4.35	5.02	3.74	2.3	0.19	-1.56	-1.74			
7-Day Moving Average ^e	-1.6	-0.94	-1.32	-0.4	1.28	1.98	3.99	2.26	0.57	-0.79	-2.51	-2.17			
3-Day Moving Average ^f	-2.95	-1.98	-4.37	-3.43	-1.31	-1.99	1.89	-0.43	-1.19	-3.58	-5.59	-4.51			
Ave Highest P _{def}	mm/day												--		
15-Day Moving Average ^g	0.09	0.22	1.35	4.56	6.81	7.22	6.75	5.92	4.4	2.61	0.3	0.05			
7-Day Moving Average ^g	0.21	0.54	2.04	5.54	7.81	8.16	7.28	6.65	5.24	3.4	0.71	0.16			
3-Day Moving Average ^g	0.33	0.73	2.84	6.5	8.85	9.09	8.32	7.55	6.29	4.03	1.09	0.3			
Ave Lowest P _{def}	mm/day												--		
15-Day Moving Average ^h	-0.41	-0.22	-0.06	2.6	4.6	5.17	5.53	4.49	2.89	1.03	-0.93	-0.81			
7-Day Moving Average ^h	-0.78	-0.61	-0.84	1.33	3.01	3.37	4.65	3.44	1.96	0.1	-1.82	-1.32			
3-Day Moving Average ^h	-1.79	-1.29	-2.24	-0.61	0.85	0.88	3.46	1.78	0.49	-1.55	-3.54	-2.6			

Spring Grain - Irrigated															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ⁱ	mm/day												mm		
Monthly ^j	-0.41	-0.03	0.5	2.38	5.43	7.03	2.65	0.02	-0.07	-0.15	-0.5	-0.65	548	-56	503
15-Day Moving Average ^g	-0.41	-0.14	0.5	2.35	5.52	7.16	2.51	-0.01	-0.11	-0.1	-0.49	-0.63			
7-Day Moving Average ^g	-0.41	-0.06	0.49	2.36	5.46	7.14	2.59	0	-0.09	-0.13	-0.51	-0.6			
3-Day Moving Average ^g	-0.4	-0.03	0.49	2.38	5.42	7.08	2.65	0.02	-0.08	-0.15	-0.49	-0.64			
Standard Deviation ^k	mm/day												mm		
Monthly ^j	0.63	0.42	0.68	0.82	1.45	0.92	1.92	0.24	0.22	0.39	0.38	0.85	38	26	52
15-Day Moving Average ^g	0.58	0.61	0.65	0.94	1.65	1.27	1.94	0.29	0.37	0.36	0.55	0.82			
7-Day Moving Average ^g	0.91	0.85	0.92	1.31	2.22	1.72	2.36	0.51	0.6	0.64	0.9	1.06			
3-Day Moving Average ^g	1.31	1.16	1.35	1.92	2.79	2.32	2.59	0.9	0.97	1.15	1.32	1.54			
20% Exceedance ^l	mm/day												mm		
Monthly ^j	-0.07	0.28	0.73	2.9	6.22	7.84	3.72	0.09	0.03	0.01	-0.11	-0.07	581	-35	548
15-Day Moving Average ^g	0.29	0.53	1.35	3.76	8.3	8.79	6.24	0.32	0.35	0.31	0.23	0.23			
7-Day Moving Average ^g	0.54	0.93	2.06	4.92	9.12	9.74	8.13	0.98	0.99	0.72	0.61	0.33			
3-Day Moving Average ^g	0.75	1.74	3.22	6.11	10.16	10.37	8.62	1.98	1.7	1.25	0.94	0.67			
80% Exceedance ^m	mm/day												mm		
Monthly ^j	-0.88	-0.33	0.16	1.67	4.45	6.23	1.43	-0.02	-0.12	-0.32	-0.94	-1.27	521	-84	460
15-Day Moving Average ^g	-1.55	-0.9	-0.46	0.7	2.68	4.98	0.32	-0.31	-0.86	-1.02	-1.98	-2.09			
7-Day Moving Average ^g	-2.47	-1.82	-1.48	-0.3	0.56	2.4	0.1	-1.34	-1.89	-1.96	-2.69	-3.62			
3-Day Moving Average ^g	-4.74	-3.7	-3.81	-2.47	-3.79	-1.34	-0.54	-3.4	-3.4	-5.27	-4.48	-7.66			
Ave Highest P _{def}	mm/day												—		
15-Day Moving Average ^g	0.18	0.32	1.01	3.14	6.99	8.23	4.56	0.26	0.2	0.21	0.11	0.1			
7-Day Moving Average ^g	0.41	0.83	1.58	4.23	8.1	9.1	5.72	0.59	0.53	0.52	0.33	0.31			
3-Day Moving Average ^g	0.62	1.28	2.29	5.43	9.22	9.95	6.8	1.11	1.04	0.92	0.72	0.51			
Ave Lowest P _{def}	mm/day												—		
15-Day Moving Average ^g	-0.82	-0.44	0	1.53	3.92	6.09	0.84	-0.19	-0.35	-0.47	-0.99	-1.2			
7-Day Moving Average ^g	-1.68	-1.16	-0.81	0.68	2.16	4.56	0.34	-0.73	-0.86	-1.12	-1.83	-2			
3-Day Moving Average ^g	-3.36	-2.32	-2.03	-1.13	-0.31	2.27	-0.1	-1.82	-1.85	-2.63	-3.58	-3.8			

Field Corn - moderate season length															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ^l	mm/day												mm		
Monthly ^f	-0.29	0.16	-0.07	0.07	0.81	4.45	7.47	6.02	3.07	0.48	-0.31	-0.55	687	-37	657
15-Day Moving Average ^g	-0.28	0.04	-0.1	0.05	0.78	4.32	7.62	5.99	2.88	0.48	-0.27	-0.5			
7-Day Moving Average ^g	-0.3	0.12	-0.05	0.07	0.76	4.39	7.55	6.01	2.95	0.47	-0.3	-0.48			
3-Day Moving Average ^g	-0.29	0.15	-0.07	0.07	0.78	4.45	7.5	6.02	3.03	0.47	-0.28	-0.54			
Standard Deviation ^k	mm/day												mm		
Monthly ^f	0.5	0.26	0.44	0.15	1.01	1.39	0.78	0.88	1.42	0.75	0.35	0.78	34	19	38
15-Day Moving Average ^g	0.53	0.46	0.54	0.3	0.81	1.7	0.7	0.98	1.63	0.62	0.53	0.78			
7-Day Moving Average ^g	0.86	0.76	0.76	0.57	1.06	2.17	1	1.39	1.91	0.87	0.86	0.99			
3-Day Moving Average ^g	1.24	1.13	1.32	1.12	1.57	2.71	1.41	1.81	2.22	1.27	1.31	1.48			
20% Exceedance ^l	mm/day												mm		
Monthly ^f	-0.05	0.31	0.06	0.17	1.02	5.59	7.89	6.57	4.28	0.88	0	-0.05	716	-26	690
15-Day Moving Average ^g	0.44	0.72	0.67	0.55	1.86	7.4	8.55	7.36	5.22	1.54	0.53	0.4			
7-Day Moving Average ^g	0.8	1.4	1.5	1.6	2.93	8.5	8.97	8.09	6.1	2.01	1.15	0.71			
3-Day Moving Average ^g	1.14	2.1	3.12	3.19	4.92	9.65	9.49	8.54	7.31	2.82	1.42	0.96			
80% Exceedance ^m	mm/day												mm		
Monthly ^f	-0.55	0.03	-0.12	0	0.45	3	6.98	5.43	1.55	0	-0.66	-1.09	668	-57	631
15-Day Moving Average ^g	-1.22	-0.59	-0.9	-0.47	0.04	1.77	6.26	3.82	0.64	-0.41	-1.51	-1.85			
7-Day Moving Average ^g	-2.69	-1.72	-1.95	-1.34	-1.51	0.42	4.78	2.63	0	-0.88	-2.41	-3.28			
3-Day Moving Average ^g	-4.2	-3.31	-4.24	-3.77	-4.53	-2.66	2.16	0.65	-1.18	-3.98	-5.46	-6.19			
Ave Highest P _{def}	mm/day												--		
15-Day Moving Average ^g	0.27	0.46	0.37	0.43	1.38	5.93	8.15	6.92	4.06	0.99	0.23	0.18			
7-Day Moving Average ^g	0.63	1.09	0.98	1.08	2.06	7.09	8.6	7.64	5.02	1.5	0.61	0.45			
3-Day Moving Average ^g	0.97	1.7	2.01	2.17	3.65	8.57	9.2	8.24	5.99	2.06	1.1	0.72			

APPENDIX B

Soil Characteristics

date: February 19, 2013

Soil Type = FuD. Feltham-Quincy Complex
Source of Soils Data = SSURGO

[illegible]

crop

crop	root depth (ft)	stress point	MAD (inche	550 ft				1150 ft			
				corrugate		furrow		corrugate		furrow	
				eff	hrs	eff	hrs	eff	hrs	eff	hrs
alfalfa (hay or seed); sugar b	5	0.5									
			2.85	57	12			24	36		68
corn (field or silage)	4	0.5	2.28	45	12	54	12	18	36	54	12
grain (winter or spring)	4	0.5	2.28	45	12	54	12	18	36	54	12
pasture (or grass hay)	3	0.5	1.71	34	12	41	12	30	12	41	12
other (enter below)											
sweet corn	3	0.4	1.37			33	12			32	12
beans	2	0.4	0.91			22	12			22	12
Onions	1	0.35	0.40			10	12			9	12

APPENDIX C

Field Irrigation Requirement Calculations

FIELD IRRIGATION REQUIREMENT

initials: snk
 date: 02/18/13
 Claimant = Shenk Livestock, 57-11807
 Weather Station = Deer Flat Dam

crop	acres	irrig. system	eff. (%)	Monthly ET (7 day) (mm/day)							AVE IR season (mm/yr)	net irrig. app. (in)	ET ratio	irrig. freq. (days)
				mar	apr	may	jun	jul	aug	sep	oct			
alfalfa	3.5	cor	60	3.78	6.81	8.27	9.18	8.81	8.05	6.87	4.61	995	3.03	1.09
alfalfa	4.5	cor	57	3.78	6.81	8.27	9.18	8.81	8.05	6.87	4.61	995	3.03	1.09
alfalfa	8.8	cor	24	3.78	6.81	8.27	9.18	8.81	8.05	6.87	4.61	995	2.85	1.09

Summary 16.8

Peak Gross Irrigation Application (mm/day) = 30.02
 On-Farm Irrigation Requirement (cfs/acre) = 0.050
 Total On-Farm Irrigation Requirement (cfs) = 0.83
 Irrigation Diversion Volume (ft/yr) = 9.79
 Total Irrigation Diversion Volume (ac-ft/yr) = 164.51

FIELD IRRIGATION REQUIREMENT

initials: snk
 date: 02/18/13
 Claimant = Shenk Livestock, 57-11807
 Weather Station = Deer Flat Dam

crop	acres	irrig. system	eff. (%)	Monthly ET (3-day) (mm/day)						AVE IR season (mm/yr)	net irrig. app. (in)	ET ratio	irrig. freq. (days)
				mar	apr	may	jun	jul	aug	sep	oct		
grass hay	3.5	cor	58	4.15	7.18	9.66	9.63	8.66	7.78	6.85	4.63	1.95	1.11
grass hay	4.5	cor	34	4.15	7.18	9.66	9.63	8.66	7.78	6.85	4.63	1.95	1.11
grass hay	8.8	cor	30	4.15	7.18	9.66	9.63	8.66	7.78	6.85	4.63	1.71	1.12

Summary 16.8

Peak Gross Irrigation Application (mm/day) = 31.19
 On-Farm Irrigation Requirement (cfs/acre) = 0.052
 Total On-Farm Irrigation Requirement (cfs) = 0.87
 Irrigation Diversion Volume (ft/yr) = 9.55
 Total Irrigation Diversion Volume (ac-ft/yr) = 160.42

FIELD IRRIGATION REQUIREMENT

initials: snk
 date: 02/18/13
 Claimant = Shenk Livestock, 57-11807
 Weather Station = Deer Flat Dam

crop	acres	irrig. system	eff. (%)	Monthly ET (3-day) (mm/day)							AVE IR season (mm/yr)	net irrig. app. (in)	ET ratio	irrig. freq. (days)
				mar	apr	may	jun	jul	aug	sep	oct			
corn swee	3.5	fur	62	3.08	3.17	5.06	9.33	9.53	8.13	1.8	1.73	457	1.56	1.12
corn swee	4.5	fur	33	3.08	3.17	5.06	9.33	9.53	8.13	1.8	1.73	457	1.37	1.13
corn swee	8.8	fur	32	3.08	3.17	5.06	9.33	9.53	8.13	1.8	1.73	457	1.37	1.13

Summary 16.8

Peak Gross Irrigation Application (mm/day) = 29.96
 On-Farm Irrigation Requirement (cfs/acre) = 0.050
 Total On-Farm Irrigation Requirement (cfs) = 0.83
 Irrigation Diversion Volume (ft/yr) = 4.18
 Total Irrigation Diversion Volume (ac-ft/yr) = 70.142

FIELD IRRIGATION REQUIREMENT

initials: snk
date: 02/18/13
Claimant = Shenk Livestock, 57-11807
Weather Station = Deer Flat Dam

crop	acres	irrig. system	eff. (%)	Monthly ET (7-day) (mm/day)							AVE IR season (mm/yr)	net irrig. app. (in)	ET ratio	irrig. freq. (days)
				mar	apr	may	jun	jul	aug	sep	oct			
grain, sp:	3.5	cor	50	2.06	4.92	9.12	9.74	8.13	0.98	0.99	0.72	548	2.52	1.10
grain, sp:	4.5	cor	50	2.06	4.92	9.12	9.74	8.13	0.98	0.99	0.72	548	2.52	1.10
grain, sp:	8.8	cor	18	2.06	4.92	9.12	9.74	8.13	0.98	0.99	0.72	548	2.28	1.10

Summary 16.8

Peak Gross Irrigation Application (mm/day) = 41.38
On-Farm Irrigation Requirement (cfs/acre) = 0.068
Total On-Farm Irrigation Requirement (cfs) = 1.15
Irrigation Diversion Volume (ft/yr) = 6.94
Total Irrigation Diversion Volume (ac-ft/yr) = 116.66

FIELD IRRIGATION REQUIREMENT

initials: snk
 date: 02/18/13
 Claimant = Shenk Livestock, 57-11807
 Weather Station = Deer Flat Dam

crop	acres	irrig. system	eff. (%)	Monthly ET (7 day) (mm/day)							AVE IR season (mm/yr)	net irrig. app. (in)	ET ratio	irrig. freq. (days)	
				mar	apr	may	jun	jul	aug	sep					oct
corn fiel.	3.5	fur	50	1.5	1.6	2.93	8.5	8.97	8.09	6.1	2.01	687	2.52	1.10	6.5
corn fiel.	4.5	fur	50	1.5	1.6	2.93	8.5	8.97	8.09	6.1	2.01	687	2.28	1.10	5.9
corn fiel.	8.8	fur	18	1.5	1.6	2.93	8.5	8.97	8.09	6.1	2.01	687	2.28	1.10	5.9

Summary 16.8

Peak Gross Irrigation Application (mm/day) = 38.11
 On-Farm Irrigation Requirement (cfs/acre) = 0.063
 Total On-Farm Irrigation Requirement (cfs) = 1.06
 Irrigation Diversion Volume (ft/yr) = 8.71
 Total Irrigation Diversion Volume (ac-ft/yr) = 146.26

APPENDIX D
FURROW.EXE results

BsA Bram Silt Loam soil, IF = 0.3

Alfalfa & sugar beets (3.03" design application)

corrugate, 550 ft

12 hr set fails

18 hr

```
S:\VRSOUR-1\VDWRV\ubbleM\FURROW.EXE
INTERNAL FAMILY <If> = 0.30
DESIGN APPLICATION <Fn> = 3.03 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 6.0 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
=====
ADVANCE TIME <Ti> = 60.3 MINUTES; OR 1.0 HOURS
GROSS APPLICATION <Pg> = 7.56 INCHES
NET APPLICATION <Fp> = 3.08 INCHES
RUNOFF <Ro> = 4.48 INCHES
DEEP PERCOLATION <Dp> = 0.13 INCHES
EFFICIENCY <E> = 40.08 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 3.03 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.30
  Inflow Rate <6> 6.0 gpm/furrow
  Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH BLADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

24 hr

```
S:\VRSOUR-1\VDWRV\ubbleM\FURROW.EXE
INTERNAL FAMILY <If> = 0.30
DESIGN APPLICATION <Fn> = 3.03 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <Ti> = 24 HOURS
=====
ADVANCE TIME <Ti> = 165.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <Pg> = 5.04 INCHES
NET APPLICATION <Fp> = 3.12 INCHES
RUNOFF <Ro> = 1.62 INCHES
DEEP PERCOLATION <Dp> = 0.34 INCHES
EFFICIENCY <E> = 60.12 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 3.03 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.30
  Inflow Rate <6> 3.0 gpm/furrow
  Inflow Time <7> 24 hours <ANALYSIS MODE>
TO PRINT: DATA WITH BLADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Alfalfa & sugar beets (3.03" design application)

furrow, 550 ft

12 hr set fails

18 hr

```

S:\RISOUR-1\MDWRV\ubbleM\FURROW.FXI
*****
INFLUX FAMILY <If> = 0.30
DESIGN APPLICATION <Fn> = 3.03 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 13.0 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <It> = 35.1 MINUTES; OR 0.6 HOURS
GROSS APPLICATION <FG> = 16.38 INCHES
NET APPLICATION <Fx> = 3.05 INCHES
RUNOFF <Ro> = 13.29 INCHES
DEEP PERCOLATION <DP> = 0.06 INCHES
EFFICIENCY <E> = 18.50 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 3.03 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.30
Inflow Rate <6> 13.0 gpm/furrow
Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/2>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?

```

24 hr

```

S:\RISOUR-1\MDWRV\ubbleM\FURROW.FXI
*****
INFLUX FAMILY <If> = 0.30
DESIGN APPLICATION <Fn> = 3.03 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 4.5 GPM/FURROW
APPLICATION TIME <Ti> = 24 HOURS
*****
ADVANCE TIME <It> = 84.4 MINUTES; OR 1.4 HOURS
GROSS APPLICATION <FG> = 7.56 INCHES
NET APPLICATION <Fx> = 3.06 INCHES
RUNOFF <Ro> = 4.41 INCHES
DEEP PERCOLATION <DP> = 0.12 INCHES
EFFICIENCY <E> = 40.08 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 3.03 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.30
Inflow Rate <6> 4.5 gpm/furrow
Inflow Time <7> 24 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/2>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?

```

36 hr

```

S:\RISOUR-1\MDWRV\ubbleM\FURROW.FXI
*****
INFLUX FAMILY <If> = 0.30
DESIGN APPLICATION <Fn> = 3.03 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <Ti> = 36 HOURS
*****
ADVANCE TIME <It> = 169.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <FG> = 7.56 INCHES
NET APPLICATION <Fx> = 3.00 INCHES
RUNOFF <Ro> = 3.61 INCHES
DEEP PERCOLATION <DP> = 0.22 INCHES
EFFICIENCY <E> = 40.08 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 3.03 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.30
Inflow Rate <6> 3.0 gpm/furrow
Inflow Time <7> 36 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/2>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _

```

Field / silage corn, spring grain (2.52" design application)

Corrugate, 550 ft

12 hr

```
S:\RISOUR-1\MDWRV\table\MURROW.TXT
*****
INTEGR FAMILY <IF> = 0.30
DESIGN APPLICATION <Fa> = 2.52 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Ti> = 43.1 MINUTES; OR 0.7 HOURS
GROSS APPLICATION <FG> = 2.56 INCHES
NET APPLICATION <FX> = 2.53 INCHES
RUNOFF <RO> = 1.25 INCHES
DEEP PERCOLATION <DP> = 0.02 INCHES
EFFICIENCY <E> = 33.33 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 2.52 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.30
Inflow Rate <6> 3.0 gpm/furrow
Inflow Time <7> 12 hours (ANALYSIS MODE)
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12> _
```

18 hr

```
S:\RISOUR-1\MDWRV\table\MURROW.TXT
*****
INTEGR FAMILY <IF> = 0.30
DESIGN APPLICATION <Fa> = 2.52 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Ti> = 165.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <FG> = 3.78 INCHES
NET APPLICATION <FX> = 2.53 INCHES
RUNOFF <RO> = 1.03 INCHES
DEEP PERCOLATION <DP> = 0.23 INCHES
EFFICIENCY <E> = 66.67 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 2.52 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.30
Inflow Rate <6> 3.0 gpm/furrow
Inflow Time <7> 18 hours (ANALYSIS MODE)
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

24 hr

```
S:\RISOUR-1\MDWRV\table\MURROW.TXT
*****
INTEGR FAMILY <IF> = 0.30
DESIGN APPLICATION <Fa> = 2.52 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <Ti> = 24 HOURS
*****
ADVANCE TIME <Ti> = 165.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <FG> = 5.04 INCHES
NET APPLICATION <FX> = 3.12 INCHES
RUNOFF <RO> = 1.67 INCHES
DEEP PERCOLATION <DP> = 0.85 INCHES
EFFICIENCY <E> = 50.00 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 2.52 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.30
Inflow Rate <6> 3.0 gpm/furrow
Inflow Time <7> 24 hours (ANALYSIS MODE)
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Field / silage corn, spring grain (2.52" design application)
Furrow

12 hr fail

18 hr

```
S:\RISOUR-1\MDWRV\hubble\FURROW.FIX
*****
INTELL FAMILY <I> = 0.30
DESIGN APPLICATION <Pd> = 2.52 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <V> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Tt> = 73.8 MINUTES; OR 1.2 HOURS
GROSS APPLICATION <Pg> = 6.30 INCHES
NET APPLICATION <Px> = 2.53 INCHES
BURNOFF <Ro> = 3.68 INCHES
DEEP PERCOLATION <DP> = 0.10 INCHES
EFFICIENCY <E> = 40.00 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 2.52 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.30
  Inflow Rate <6> 5.0 gpm/furrow
  Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/2>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

24 hr

```
S:\RISOUR-1\MDWRV\hubble\FURROW.FIX
*****
INTELL FAMILY <I> = 0.30
DESIGN APPLICATION <Pd> = 2.52 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <V> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <Ti> = 24 HOURS
*****
ADVANCE TIME <Tt> = 165.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <Pg> = 5.04 INCHES
NET APPLICATION <Px> = 2.78 INCHES
BURNOFF <Ro> = 2.08 INCHES
DEEP PERCOLATION <DP> = 0.44 INCHES
EFFICIENCY <E> = 50.00 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 2.52 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.30
  Inflow Rate <6> 3.0 gpm/furrow
  Inflow Time <7> 24 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/2>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

Pasture, grass hay (1.95" design application)

Corrugates, 550 ft

12 hr

```
S:\RESOUR-1\MDWRV\table\FURROW.EXE
*****
INTEGR FAMILY <F> = 0.30
DESIGN APPLICATION <Fn> = 1.95 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 4.0 GPM/FURROW
APPLICATION TIME <ti> = 12 HOURS
*****
ADVANCE TIME <ti> = 99.9 MINUTES; OR 1.7 HOURS
GROSS APPLICATION <FG> = 3.36 INCHES
NET APPLICATION <Fx> = 2.04 INCHES
RUNOFF <Ro> = 1.42 INCHES
DEEP PERCOLATION <DP> = 0.54 INCHES
EFFICIENCY <E> = 58.04 %
TO CHANGE:
  Design Application <1> PRESS (EXISTING)
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.30
  Inflow Rate <6> 4.0 gpm/furrow
  Inflow Time <7> 12 hours (ANALYSIS MODE)
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

18 hr

```
S:\RESOUR-1\MDWRV\table\FURROW.EXE
*****
INTEGR FAMILY <F> = 0.30
DESIGN APPLICATION <Fn> = 1.95 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <ti> = 18 HOURS
*****
ADVANCE TIME <ti> = 165.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <FG> = 5.28 INCHES
NET APPLICATION <Fx> = 2.53 INCHES
RUNOFF <Ro> = 1.03 INCHES
DEEP PERCOLATION <DP> = 0.80 INCHES
EFFICIENCY <E> = 51.59 %
TO CHANGE:
  Design Application <1> PRESS (EXISTING)
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.30
  Inflow Rate <6> 3.0 gpm/furrow
  Inflow Time <7> 18 hours (ANALYSIS MODE)
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

24 hr

```
S:\RESOUR-1\MDWRV\table\FURROW.EXE
*****
INTEGR FAMILY <F> = 0.30
DESIGN APPLICATION <Fn> = 1.95 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <ti> = 24 HOURS
*****
ADVANCE TIME <ti> = 165.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <FG> = 5.04 INCHES
NET APPLICATION <Fx> = 3.12 INCHES
RUNOFF <Ro> = 1.62 INCHES
DEEP PERCOLATION <DP> = 1.42 INCHES
EFFICIENCY <E> = 38.69 %
TO CHANGE:
  Design Application <1> PRESS (EXISTING)
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.30
  Inflow Rate <6> 3.0 gpm/furrow
  Inflow Time <7> 24 hours (ANALYSIS MODE)
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

Sweet Corn (1.56" design application)

Furrow, 550 ft

12 hr

```
S:\RESOUR-1\IDWRV\table\FURROW.EXE
INTEGR. FAMILY <IF> = 0.30
DESIGN APPLICATION <Pa> = 1.56 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <Q> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 3.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
-----
ADVANCE TIME <Ti> = 165.3 MINUTES; OR 2.8 HOURS
GROSS APPLICATION <TG> = 2.52 INCHES
NET APPLICATION <Tx> = 1.53 INCHES
RUNOFF <Ro> = 0.92 INCHES
DEEP PERCOLATION <DP> = 0.34 INCHES
EFFICIENCY <E> = 61.91 %
TO CHANGE:
  Design Application      <1> 1.56 in
  Furrow Slope            <2> 0.007 ft/ft
  Furrow Spacing          <3> 2.50 ft
  Furrow Length           <4> 550 ft
  Furrow Intake Family    <5> 0.30
  Inflow Rate             <6> 3.0 gpm/furrow
  Inflow Time             <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <R>
NEW DESIGN PRESS <N>, NEW ANALYSIS PRESS <A>, QUIT PRESS <Q>
```

FuD Feltham-Quincy Complex, IF = 0.70

Alfalfa & sugar beets, (2.85" design application)

Corrugate, 550 ft
12 hr

```
S:\RESOUR-1\MDWRV\hubble\MURROW.EXE

INTAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fn> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 6.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS

*****
ADVANCE TIME <Tt> = 110.1 MINUTES; OR 1.8 HOURS
GROSS APPLICATION <Fg> = 5.04 INCHES
NET APPLICATION <Fs> = 4.36 INCHES
RUNOFF <Ro> = 0.38 INCHES
DEEP PERCOLATION <Dp> = 1.91 INCHES
EFFICIENCY <E> = 56.55 %

TO CHANGE:
  Design Application <1> PRESS <EXISTING>
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 6.0 gpm/furrow
  Inflow Time <7> 12 hours <ANALYSIS MODE>

TO PRINT: DATA/WITH READING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\RESOUR-1\MDWRV\hubble\MURROW.EXE

INTAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fn> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS

*****
ADVANCE TIME <Tt> = 154.6 MINUTES; OR 2.6 HOURS
GROSS APPLICATION <Fg> = 6.30 INCHES
NET APPLICATION <Fs> = 5.74 INCHES
RUNOFF <Ro> = 0.05 INCHES
DEEP PERCOLATION <Dp> = 3.40 INCHES
EFFICIENCY <E> = 45.24 %

TO CHANGE:
  Design Application <1> PRESS <EXISTING>
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 5.0 gpm/furrow
  Inflow Time <7> 18 hours <ANALYSIS MODE>

TO PRINT: DATA/WITH READING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

24 hr

```
S:\RESOUR-1\MDWRV\hubble\MURROW.EXE

INTAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fn> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 24 HOURS

*****
ADVANCE TIME <Tt> = 154.6 MINUTES; OR 2.6 HOURS
GROSS APPLICATION <Fg> = 8.40 INCHES
NET APPLICATION <Fs> = 7.34 INCHES
RUNOFF <Ro> = 0.58 INCHES
DEEP PERCOLATION <Dp> = 4.92 INCHES
EFFICIENCY <E> = 33.93 %

TO CHANGE:
  Design Application <1> PRESS <EXISTING>
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 5.0 gpm/furrow
  Inflow Time <7> 24 hours <ANALYSIS MODE>

TO PRINT: DATA/WITH READING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Alfalfa & sugar beets, (2.85" design application)

Corrugate, 1150 ft

12 hr (fails, inflow rate exceeds 10 gpm limit)

24 hr (fails, inflow rate exceeds 10 gpm limit)

```
S:\VFESOUR-1\VDWRV\hubble\FURROW.FXI
INTAKE FAMILY <I1> = 0.70
DESIGN APPLICATION <Fn> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 11.5 GPM/FURROW
APPLICATION TIME <Ti> = 24 HOURS
*****
ADVANCE TIME <Ti> = 268.5 MINUTES; OR 4.5 HOURS
GROSS APPLICATION <FG> = 9.24 INCHES
NET APPLICATION <F> = 6.11 INCHES
RUNOFF <RO> = 0.16 INCHES
DEEP PERCOLATION <DP> = 6.23 INCHES
EFFICIENCY <E> = 30.85 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 2.85 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 11.5 gpm/furrow
  Inflow Time <7> 24 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <0/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

30 hr (fails, inflow rate exceeds 10 gpm limit)

```
S:\VFESOUR-1\VDWRV\hubble\FURROW.FXI
INTAKE FAMILY <I1> = 0.70
DESIGN APPLICATION <Fn> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 11.0 GPM/FURROW
APPLICATION TIME <Ti> = 30 HOURS
*****
ADVANCE TIME <Ti> = 292.1 MINUTES; OR 4.9 HOURS
GROSS APPLICATION <FG> = 11.05 INCHES
NET APPLICATION <F> = 7.71 INCHES
RUNOFF <RO> = 0.34 INCHES
DEEP PERCOLATION <DP> = 7.85 INCHES
EFFICIENCY <E> = 25.80 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 2.85 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 11.0 gpm/furrow
  Inflow Time <7> 30 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <0/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

36 hr

```
S:\VFESOUR-1\VDWRV\hubble\FURROW.FXI
INTAKE FAMILY <I1> = 0.70
DESIGN APPLICATION <Fn> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 10.0 GPM/FURROW
APPLICATION TIME <Ti> = 36 HOURS
*****
ADVANCE TIME <Ti> = 354.6 MINUTES; OR 5.9 HOURS
GROSS APPLICATION <FG> = 12.45 INCHES
NET APPLICATION <F> = 10.89 INCHES
RUNOFF <RO> = 0.01 INCHES
DEEP PERCOLATION <DP> = 9.19 INCHES
EFFICIENCY <E> = 23.65 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 2.85 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 10.0 gpm/furrow
  Inflow Time <7> 36 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <0/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

Alfalfa & sugar beets, (2.85" design application)

Furrow, 550 ft

12 hr

```
S:\RISOUR-1\IDWRV\table\FURROW.FIX
*****
INTEGR FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <US> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Tt> = 154.6 MINUTES; OR 2.6 HOURS
GROSS APPLICATION <Tg> = 4.20 INCHES
NET APPLICATION <Tx> = 3.43 INCHES
RUNOFF <Ro> = 0.29 INCHES
DEEP PERCOLATION <DP> = 1.06 INCHES
EFFICIENCY <E> = 67.86 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 2.85 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 5.0 gpm/furrow
Inflow Line <7> 12 hours (ANALYSIS MODE)
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

18 hr

```
S:\RISOUR-1\IDWRV\table\FURROW.FIX
*****
INTEGR FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <US> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 4.5 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Tt> = 193.9 MINUTES; OR 3.2 HOURS
GROSS APPLICATION <Tg> = 5.67 INCHES
NET APPLICATION <Tx> = 4.71 INCHES
RUNOFF <Ro> = 0.41 INCHES
DEEP PERCOLATION <DP> = 2.41 INCHES
EFFICIENCY <E> = 50.27 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 2.85 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 4.5 gpm/furrow
Inflow Line <7> 18 hours (ANALYSIS MODE)
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Alfalfa & sugar beets, (2.85" design application)

Furrow, 1150 ft

12 hr

```
S:\VISOUR-1\MDWRV\table\FURROW.EXE
INTAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fa> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <Sp> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 10.5 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <It> = 320.4 MINUTES; OR 5.3 HOURS
GROSS APPLICATION <FG> = 4.32 INCHES
NET APPLICATION <F> = 2.99 INCHES
RUNOFF <Ro> = 0.04 INCHES
DEEP PERCOLATION <DP> = 1.33 INCHES
EFFICIENCY <E> = 67.57 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 2.85 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 10.5 gpm/furrow
  Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\VISOUR-1\MDWRV\table\FURROW.EXE
INTAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fa> = 2.85 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <Sp> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 9.5 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <It> = 395.2 MINUTES; OR 6.6 HOURS
GROSS APPLICATION <FG> = 5.22 INCHES
NET APPLICATION <F> = 4.36 INCHES
RUNOFF <Ro> = 0.05 INCHES
DEEP PERCOLATION <DP> = 2.83 INCHES
EFFICIENCY <E> = 49.79 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 2.85 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 9.5 gpm/furrow
  Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

Field / silage corn, spring grain (2.28" design application)

Corrugate, 550 ft

12 hr

```
S:\RESOUR-1\MDWRV\hubble\MURROW.EXE
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 6.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Ti> = 110.1 MINUTES; OR 1.8 HOURS
GROSS APPLICATION <FG> = 5.04 INCHES
NET APPLICATION <Fx> = 4.36 INCHES
RUNOFF <Ro> = 0.28 INCHES
DEEP PERCOLATION <DP> = 2.48 INCHES
EFFICIENCY <E> = 45.24 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 2.28 in
Furrow Slope <2> 0.007 Ft/Ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 6.0 gpm/furrow
Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING, PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

18 hr

```
S:\RESOUR-1\MDWRV\hubble\MURROW.EXE
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Ti> = 154.6 MINUTES; OR 2.6 HOURS
GROSS APPLICATION <FG> = 6.30 INCHES
NET APPLICATION <Fx> = 5.74 INCHES
RUNOFF <Ro> = 0.05 INCHES
DEEP PERCOLATION <DP> = 3.97 INCHES
EFFICIENCY <E> = 36.19 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 2.28 in
Furrow Slope <2> 0.007 Ft/Ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 5.0 gpm/furrow
Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING, PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

Field / silage corn, spring grain (2.28" design application)

Corrugate, 1150 ft

12 hr (fail, exceeds 10 gpm limit)

24 hr (fail, exceeds 10 gpm limit)

```
S:\RESOUR-1\DWV\Bubble\FURROW.EXE

INTEGR FAMILY <I> = 0.70
DESIGN APPLICATION <Fn> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 11.5 GPM/FURROW
APPLICATION TIME <Ti> = 24 HOURS

*****
ADVANCE TIME <Tt> = 268.5 MINUTES; OR 4.5 HOURS
GROSS APPLICATION <Fg> = 9.24 INCHES
NET APPLICATION <F> = 8.11 INCHES
RUNOFF <Ro> = 0.16 INCHES
DEEP PERCOLATION <Dp> = 6.80 INCHES
EFFICIENCY <E> = 24.68 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 2.28 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 11.5 gpm/furrow
  Inflow Time <7> 24 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

30 hr (fail, exceeds 10 gpm limit)

```
S:\RESOUR-1\DWV\Bubble\FURROW.EXE

INTEGR FAMILY <I> = 0.70
DESIGN APPLICATION <Fn> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 11.0 GPM/FURROW
APPLICATION TIME <Ti> = 30 HOURS

*****
ADVANCE TIME <Tt> = 292.1 MINUTES; OR 4.9 HOURS
GROSS APPLICATION <Fg> = 11.05 INCHES
NET APPLICATION <F> = 9.71 INCHES
RUNOFF <Ro> = 0.34 INCHES
DEEP PERCOLATION <Dp> = 8.42 INCHES
EFFICIENCY <E> = 20.64 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 2.28 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 11.0 gpm/furrow
  Inflow Time <7> 30 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

36 hr

```
S:\RESOUR-1\DWV\Bubble\FURROW.EXE

INTEGR FAMILY <I> = 0.70
DESIGN APPLICATION <Fn> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 10.0 GPM/FURROW
APPLICATION TIME <Ti> = 36 HOURS

*****
ADVANCE TIME <Tt> = 354.6 MINUTES; OR 5.9 HOURS
GROSS APPLICATION <Fg> = 12.05 INCHES
NET APPLICATION <F> = 10.89 INCHES
RUNOFF <Ro> = 0.01 INCHES
DEEP PERCOLATION <Dp> = 9.76 INCHES
EFFICIENCY <E> = 18.92 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 2.28 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 10.0 gpm/furrow
  Inflow Time <7> 36 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Field / silage corn, spring grain (2.28" design application)

Furrow, 550 ft

12 hr

```
S:\RESOUR-1\MDWRV\table\MURROW.FXI
*****
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <In> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Ti> = 154.6 MINUTES; OR 2.6 HOURS
GROSS APPLICATION <FG> = 4.28 INCHES
NET APPLICATION <Fx> = 3.43 INCHES
RUNOFF <RO> = 0.29 INCHES
DEEP PERCOLATION <DP> = 1.63 INCHES
EFFICIENCY <E> = 54.29 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 2.28 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 5.0 gpm/furrow
Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING: PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

18 hr

```
S:\RESOUR-1\MDWRV\table\MURROW.FXI
*****
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <In> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 4.5 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Ti> = 193.9 MINUTES; OR 3.2 HOURS
GROSS APPLICATION <FG> = 5.67 INCHES
NET APPLICATION <Fx> = 4.71 INCHES
RUNOFF <RO> = 0.41 INCHES
DEEP PERCOLATION <DP> = 2.98 INCHES
EFFICIENCY <E> = 40.21 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 2.28 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 550 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 4.5 gpm/furrow
Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA/WITH HEADING: PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

Field / silage corn, spring grain (2.28" design application)

Furrow, 1150 ft

12 hr

```
S:\RESOUR-1\MDWRV\table\FURROW.TXT
*****
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <Fn> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <US> = 2.50 FEET
FURROW LENGTH <LS> = 1150 FEET
INFLOW RATE <Q> = 10.5 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Ti> = 329.4 MINUTES; OR 5.3 HOURS
GROSS APPLICATION <FG> = 4.22 INCHES
NET APPLICATION <Fx> = 2.22 INCHES
RUNOFF <RO> = 0.04 INCHES
DEEP PERCOLATION <DP> = 1.20 INCHES
EFFICIENCY <E> = 54.05 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 2.28 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 1150 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 10.5 gpm/furrow
Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\RESOUR-1\MDWRV\table\FURROW.TXT
*****
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <Fn> = 2.28 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <US> = 2.50 FEET
FURROW LENGTH <LS> = 1150 FEET
INFLOW RATE <Q> = 9.5 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Ti> = 396.7 MINUTES; OR 6.6 HOURS
GROSS APPLICATION <FG> = 5.22 INCHES
NET APPLICATION <Fx> = 4.36 INCHES
RUNOFF <RO> = 0.05 INCHES
DEEP PERCOLATION <DP> = 3.40 INCHES
EFFICIENCY <E> = 39.83 %
TO CHANGE: PRESS <EXISTING>
Design Application <1> 2.28 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 1150 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 9.5 gpm/furrow
Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Pasture / grass hay (1.71" design application)

Corrugate, 550 ft
12 hr

```
S:\RISOUR-1\MDWRV\hubble\FURROW.EXE
INTEAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fm> = 1.71 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <W> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 6.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Tt> = 119.1 MINUTES; OR 1.9 HOURS
GROSS APPLICATION <FG> = 5.04 INCHES
NET APPLICATION <Fm> = 4.36 INCHES
RUNOFF <Ro> = 0.28 INCHES
DEEP PERCOLATION <DP> = 3.05 INCHES
EFFICIENCY <E> = 33.93 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 1.71 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 6.0 gpm/furrow
  Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/2>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\RISOUR-1\MDWRV\hubble\FURROW.EXE
INTEAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fm> = 1.71 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <W> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Tt> = 154.6 MINUTES; OR 2.6 HOURS
GROSS APPLICATION <FG> = 6.30 INCHES
NET APPLICATION <Fm> = 5.24 INCHES
RUNOFF <Ro> = 0.05 INCHES
DEEP PERCOLATION <DP> = 4.54 INCHES
EFFICIENCY <E> = 27.14 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 1.71 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 5.0 gpm/furrow
  Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/2>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _
```

Pasture / grass hay (1.71" design application)

Corrugate, 1150ft

12 hr (exceeds 10 gpm limit, but deemed acceptable for heavy cover cropping)

```
S:\RISOUR-1\IDWRV\table\MURROW.TXT
INTAKE FAMILY <I> = 0.70
DESIGN APPLICATION <Pa> = 1.71 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 14.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
=====
ADVANCE TIME <Ti> = 192.9 MINUTES; OR 3.2 HOURS
GROSS APPLICATION <Pg> = 5.62 INCHES
NET APPLICATION <P> = 4.69 INCHES
RUNOFF <Ro> = 0.10 INCHES
DEEP PERCOLATION <DP> = 3.81 INCHES
EFFICIENCY <E> = 30.40 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 1.71 in
Furrow Slope <2> 0.002 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 1150 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 14.0 gpm/furrow
Inflow Time <7> 12 hours (ANALYSIS MODE)
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\RISOUR-1\IDWRV\table\MURROW.TXT
INTAKE FAMILY <I> = 0.70
DESIGN APPLICATION <Pa> = 1.71 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 12.5 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
=====
ADVANCE TIME <Ti> = 231.5 MINUTES; OR 3.9 HOURS
GROSS APPLICATION <Pg> = 7.53 INCHES
NET APPLICATION <P> = 6.50 INCHES
RUNOFF <Ro> = 0.14 INCHES
DEEP PERCOLATION <DP> = 5.68 INCHES
EFFICIENCY <E> = 22.70 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 1.71 in
Furrow Slope <2> 0.002 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 1150 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 12.5 gpm/furrow
Inflow Time <7> 18 hours (ANALYSIS MODE)
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Pasture / grass hay (1.71" design application)

Furrow, 550 ft

12 hr

```
S:\RISOUR-1\VIDWRV\hubble\FURROW.TXT
*****
INTEGR FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 1.71 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <W> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <ti> = 12 HOURS
*****
ADVANCE TIME <ti> = 154.6 MINUTES; OR 2.6 HOURS
GROSS APPLICATION <FG> = 4.20 INCHES
NET APPLICATION <Fk> = 3.43 INCHES
RUNOFF <Ro> = 0.39 INCHES
DEEP PERCOLATION <DP> = 2.30 INCHES
EFFICIENCY <E> = 40.72 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 1.71 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 5.0 gpm/furrow
  Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\RISOUR-1\VIDWRV\hubble\FURROW.TXT
*****
INTEGR FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 1.71 INCHES
FURROW SLOPE <S> = 0.002 FEET/FOOT
FURROW SPACING <W> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 4.5 GPM/FURROW
APPLICATION TIME <ti> = 18 HOURS
*****
ADVANCE TIME <ti> = 193.9 MINUTES; OR 3.2 HOURS
GROSS APPLICATION <FG> = 5.67 INCHES
NET APPLICATION <Fk> = 4.71 INCHES
RUNOFF <Ro> = 0.41 INCHES
DEEP PERCOLATION <DP> = 3.55 INCHES
EFFICIENCY <E> = 30.16 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 1.71 in
  Furrow Slope <2> 0.002 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 4.5 gpm/furrow
  Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Pasture / grass hay (1.71" design application)

Furrow, 1150 ft

12 hr

```
S:\RESOUR-1\DWVRV\ubble\FURROW.FXE
*****
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 1.71 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 10.5 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Tf> = 320.4 MINUTES; OR 5.3 HOURS
GROSS APPLICATION <FG> = 4.22 INCHES
NET APPLICATION <Fv> = 2.99 INCHES
BUNOFF <Bo> = 0.04 INCHES
DEEP PERCOLATION <DP> = 2.47 INCHES
EFFICIENCY <E> = 40.54 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 1.71 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 1150 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 10.5 gpm/furrow
Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\RESOUR-1\DWVRV\ubble\FURROW.FXE
*****
INTEK FAMILY <IF> = 0.70
DESIGN APPLICATION <Fa> = 1.71 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 9.5 GPM/FURROW
APPLICATION TIME <Ti> = 18 HOURS
*****
ADVANCE TIME <Tf> = 396.2 MINUTES; OR 6.6 HOURS
GROSS APPLICATION <FG> = 5.22 INCHES
NET APPLICATION <Fv> = 4.36 INCHES
BUNOFF <Bo> = 0.05 INCHES
DEEP PERCOLATION <DP> = 3.97 INCHES
EFFICIENCY <E> = 29.87 %
TO CHANGE: PRESS (EXISTING)
Design Application <1> 1.71 in
Furrow Slope <2> 0.007 ft/ft
Furrow Spacing <3> 2.50 ft
Furrow Length <4> 1150 ft
Furrow Intake Family <5> 0.70
Inflow Rate <6> 9.5 gpm/furrow
Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Sweet corn (1.37" design application)

550 ft furrows

12 hr

```
S:\RESOUR-1\DWV\Hubble\FURROW.EXE
INTEGR FAMILY <F> = 0.70
DESIGN APPLICATION <F> = 1.37 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <Q> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <T> = 12 HOURS
=====
ADVANCE TIME <T> = 194.6 MINUTES; OR 3.2 HOURS
GROSS APPLICATION <FG> = 4.20 INCHES
NET APPLICATION <FN> = 3.43 INCHES
BUDGET <R> = 0.29 INCHES
DEEP PERCOLATION <DP> = 2.54 INCHES
EFFICIENCY <E> = 32.62 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 1.37 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 5.0 gpm/furrow
  Inflow Line <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

18 hr

```
S:\RESOUR-1\DWV\Hubble\FURROW.EXE
INTEGR FAMILY <F> = 0.70
DESIGN APPLICATION <F> = 1.37 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <Q> = 2.50 FEET
FURROW LENGTH <L> = 550 FEET
INFLOW RATE <Q> = 4.5 GPM/FURROW
APPLICATION TIME <T> = 18 HOURS
=====
ADVANCE TIME <T> = 193.9 MINUTES; OR 3.2 HOURS
GROSS APPLICATION <FG> = 5.62 INCHES
NET APPLICATION <FN> = 4.71 INCHES
BUDGET <R> = 0.41 INCHES
DEEP PERCOLATION <DP> = 3.89 INCHES
EFFICIENCY <E> = 24.16 %
TO CHANGE: PRESS <EXISTING>
  Design Application <1> 1.37 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 550 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 4.5 gpm/furrow
  Inflow Line <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?
```

Sweet corn (1.37" design application)

Furrows, 1150 ft

12 hr

```

S:\RESOUR-1\DWVR\Hubble\FURROW.TXT
INTEKE FAMILY <F> = 0.70
DESIGN APPLICATION <Fa> = 1.37 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 10.5 GPM/FURROW
APPLICATION TIME <ti> = 12 HOURS
=====
ADVANCE TIME <ti> = 320.4 MINUTES; OR 5.3 HOURS
GROSS APPLICATION <FG> = 4.22 INCHES
NET APPLICATION <F> = 2.99 INCHES
RUNOFF <Ro> = 0.04 INCHES
DEEP PERCOLATION <DP> = 2.81 INCHES
EFFICIENCY <E> = 32.48 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 1.37 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 10.5 gpm/furrow
  Inflow Time <7> 12 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>?

```

18 hr

```

S:\RESOUR-1\DWVR\Hubble\FURROW.TXT
INTEKE FAMILY <F> = 0.70
DESIGN APPLICATION <Fa> = 1.37 INCHES
FURROW SLOPE <S> = 0.007 FEET/FOOT
FURROW SPACING <U> = 2.50 FEET
FURROW LENGTH <L> = 1150 FEET
INFLOW RATE <Q> = 9.5 GPM/FURROW
APPLICATION TIME <ti> = 18 HOURS
=====
ADVANCE TIME <ti> = 396.2 MINUTES; OR 6.6 HOURS
GROSS APPLICATION <FG> = 5.22 INCHES
NET APPLICATION <F> = 4.36 INCHES
RUNOFF <Ro> = 0.05 INCHES
DEEP PERCOLATION <DP> = 4.31 INCHES
EFFICIENCY <E> = 23.93 %
TO CHANGE: PRESS (EXISTING)
  Design Application <1> 1.37 in
  Furrow Slope <2> 0.007 ft/ft
  Furrow Spacing <3> 2.50 ft
  Furrow Length <4> 1150 ft
  Furrow Intake Family <5> 0.70
  Inflow Rate <6> 9.5 gpm/furrow
  Inflow Time <7> 18 hours <ANALYSIS MODE>
TO PRINT: DATA WITH HEADING PRESS <8/9>
NEW DESIGN PRESS <10>, NEW ANALYSIS PRESS <11>, QUIT PRESS <12>? _

```

Music, Vicky

From: Music, Vicky
Sent: Wednesday, February 13, 2013 11:00 AM
To: 'Lori Graves'
Cc: Scott King
Subject: RE: 57-11807 Deadline Extension

Lori and Scott –

Regarding the Shenk Livestock application referenced above, via this reply e-mail, the Department grants your request for an extension. The new deadline for the information I requested is March 18, 2013.

Regards,

Vicky Music
Sr. Water Resource Agent
IDWR Western Region Office

From: Lori Graves [<mailto:LGraves@spfwater.com>]
Sent: Wednesday, February 13, 2013 10:47 AM
To: Music, Vicky
Cc: Scott King
Subject: 57-11807 Deadline Extension

Vicky,

We are currently working on a response to your information request letter dated January 14, 2013. The requested information is currently due February 15, 2013. May we please have an additional 30 days to respond? Thank you for your attention to this matter.

Lori Graves
Water Rights Specialist
300 E. Mallard, Ste 350
Boise, ID 83706
208.383.4140 x219
fax 208.383.4156
e-mail lgraves@spfwater.com
www.spfwater.com



State of Idaho

DEPARTMENT OF WATER RESOURCES

Western Region, 2735 Airport Way, Boise, Idaho 83705-5082

Phone: (208) 334-2190 FAX: (208) 334-2348 www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Interim Director

January 14, 2013

Lori Graves
SPF Water Engineering
300 E. Mallard Dr., Ste 350
Boise, ID 83706

Re: Application for Permit No. 57-11807

Dear Ms. Graves:

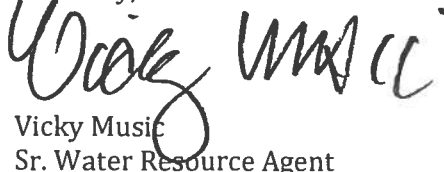
The application referred above has been assigned to me for review and processing. There is additional information required before I can continue my analysis.

The application proposes a diversion rate of 1.02, or 0.06 cfs/ acre, for the irrigation of 17 acres. To justify this excess diversion rate, an excerpt from the Gem Irrigation and South Boise Board of Control contract, entitled *MINIMUM OPERATION AND MAINTENANCE CHARGE TO BE ESTABLISHED; CHARGE FOR EXCESS WATER*, was included with the application.

The excerpt does not state that Gem Irrigation District service delivers 0.06 cfs/acre throughout the entire district or that 0.06 cfs/ acre is required. In fact, the water rights issued by IDWR within the immediate area of the proposed place of use do not exceed a duty of water of 0.02 cfs/acre. Please provide credible, technical evidence that an excess rate is justified, or the diversion rate for a permit, if issued, will be for the statutory limit of 0.02 cfs/acre.

The application will be advertised after I receive the requested information. **The requested information is due in writing by February 15, 2013. Please provide the information, or a request to delay processing for up to six months, by the deadline. Failure to do so may result in the application being voided. Fees are not refunded for voided applications.** Please call me at 208.334.2190 if you have questions. Thank you.

Sincerely,



Vicky Music
Sr. Water Resource Agent

cc : Shenk Livestock



SPF WATER
ENGINEERING

RECEIVED

MAY 09 2012

WATER RESOURCES
WESTERN REGION

May 8, 2012

Steve Lester
IDWR Western Region Office
2735 Airport Way
Boise, ID 83705

Subject: Amended Application for Permit 57-11807

Dear Steve,

Shenk Livestock seeks to amend Application for Permit 57-11807 to include an additional two acres of irrigation, thereby increasing total proposed flow rate to 1.02 cfs.

Check No. 1444 for \$40 is enclosed for the additional filing fee. Thank you very much for your consideration and assistance in this matter. Please call me if you have any questions.

Sincerely,

Lori Graves
Water Rights Specialist

Cc: Dave Shenk

Enclosures

SPF file number: 952.0010



SPF WATER
ENGINEERING

March 12, 2012

Steve Lester
IDWR Western Region Office
2735 Airport Way
Boise, ID 83705

Subject: Application for Permit

Dear Steve,

Enclosed on behalf of Shenk Livestock, is an *Application for Permit* seeking authorization for irrigation from an unnamed drain.

Check No. 1354 for \$250 is enclosed for the filing fee. Thank you very much for your consideration and assistance in this matter. Please call me if you have any questions.

Sincerely,

Lori Graves
Water Rights Specialist

Cc: Dave Shenk
Ron Kiester, Manager, South Board of Control

Enclosures

SPF file number: 952.0010

RECEIVED

MAR 13 2012

WATER RESOURCES
WESTERN REGION