

Attorneys for Claimant and Objector
Pioneer Irrigation District

Scott L. Campbell, ISB No. 2251
Andrew J. Waldera, ISB No. 6608
Dylan B. Lawrence, ISB No. 7136
MOFFATT, THOMAS, BARRETT, ROCK &
FIELDS, CHARTERED
101 S. Capitol Blvd., 10th Floor
Post Office Box 829
Boise, Idaho 83701
Telephone (208) 345-2000
Facsimile (208) 385-5384
18946.0137

11-22
RECEIVED

NOV 22 2010

Department of Water Resources

IN THE DISTRICT COURT OF THE FIFTH JUDICIAL DISTRICT
OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF TWIN FALLS

In Re SRBA

Case No. 39576

Subcase Nos. 63-00166A 63-00166B
63-00167A 63-00167B
63-00179A 63-00179C
63-32580

**PIONEER IRRIGATION DISTRICT'S
SUPPLEMENTAL RESPONSES TO
MASON CREEK DITCH COMPANY'S
SECOND SET OF DISCOVERY
REQUESTS**

COMES NOW Pioneer Irrigation District, by and through undersigned counsel,
and hereby provides its supplemental responses to Mason Creek Ditch Company's Second Set of
Interrogatories, Requests for Admission and Requests for Production, as follows:

**PIONEER IRRIGATION DISTRICT'S SUPPLEMENTAL
RESPONSES TO MASON CREEK DITCH COMPANY'S
SECOND SET OF DISCOVERY REQUESTS - 1**

**I.
GENERAL OBJECTIONS**

Pioneer has not completed its own investigations and/or discovery. Accordingly, the responses that follow are based upon the best knowledge, information, and belief of Pioneer at this time. Pioneer reserves the right to make any further responses if it appears that any omission or error has been made in connection with these responses or that more accurate information is or has become available. These responses are made without prejudice to Pioneer's rights to use in later discovery or to present at trial, such evidence as may later be discovered or evaluated.

Pioneer objects to the definitions and instructions to the extent they purport to require discovery requests beyond that required under the Idaho Rules of Civil Procedure. These responses are provided in accordance with the Idaho Rules of Civil Procedure irrespective of any definitions and instructions that may accompany these discovery requests.

These responses are made subject to all objections as to competence, relevance, materiality, and admissibility. These responses are subject to all objections that would require the exclusion of any statement, material, or information herein provided if such interrogatory were asked of or any statement, material, or information provided were made by witnesses present and testifying in court. All such objections are reserved and may be interposed at the time of trial.

Pioneer specifically objects to these discovery requests to the extent they seek information protected by the attorney-client privilege, the attorney work product doctrine, and the rules governing the discovery of facts of experts as set forth in Rule 26(b)(4), Idaho Rule of Civil Procedure. This objection is intended to apply to all of the discovery requests that seek

such information and will not necessarily be repeated for each request to which it applies.

Pioneer has, to the extent possible, construed each request as requesting only information and/or documents not subject to any applicable protection.

No incidental or implied admissions are intended. The fact that Pioneer has responded to any discovery request, or part thereof, should not be taken as an admission that Pioneer accepts that the discovery request or the response or objection thereto constitutes admissible evidence. Pioneer's answers to any discovery requests herein do not constitute a waiver of their rights to object to any future, additional, or supplemental discovery requests regarding the same or similar matter.

RESPONSES TO REQUESTS FOR PRODUCTION OF DOCUMENTS

REQUEST FOR PRODUCTION NO. 12: Please produce all documents supporting or relating in any way to your objection to the priority date recommended for Water Right No. 63-32580.

SUPPLEMENTAL RESPONSE TO REQUEST NO. 12: On October 20, 2010, Pioneer produced documents responsive to request no. 12, including but not limited to documents marked as Bates Numbers PID000417 and PID000421. Additional documents responsive to this request are attached hereto and marked as Bates Numbers PID000748 – PID000753.

REQUEST FOR PRODUCTION NO. 14: Please produce all measurements or calculations in your possession or control, or that of your expert, SPF Water Engineering, of the capacity of the Highline Canal

SUPPLEMENTAL RESPONSE TO REQUEST NO. 14: Additional documents

responsive to this request are attached hereto and marked as Bates Numbers PID000754 – PID000769.

REQUEST FOR PRODUCTION NO. 16: Please produce the results of any

“Hubble analysis” (as that term was used by your attorney in the 30(6)(b) deposition of the IDWR in these subcases) in your possession of control, or that of your expert, SPF Water Engineering, for any lands in Pioneer Irrigation District and any land in or adjacent to Mason Creek or Franklin Ditch Company boundaries and any “bottom lands” (as that term is used in the Stewart decree) along the Boise River.

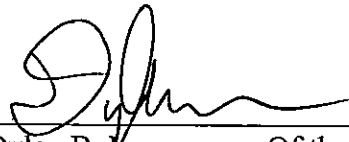
SUPPLEMENTAL RESPONSE TO REQUEST NO. 16: Additional documents

responsive to this request are attached hereto and marked as Bates Numbers PID000770 – PID000796.

DATED this 19th day of November 2010.

MOFFATT, THOMAS, BARRETT, ROCK &
FIELDS, CHARTERED

By



Dylan B. Lawrence – Of the Firm
Attorneys for Pioneer Irrigation District

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 19th day of November, 2010, I caused a true and correct copy of the foregoing **PIONEER IRRIGATION DISTRICT'S SUPPLEMENTAL RESPONSES TO MASON CREEK DITCH COMPANY'S SECOND SET OF DISCOVERY REQUESTS** to be served by the method indicated below, and addressed to the following:

Mason Creek Ditch Company

Represented by:

Albert P Barker

BARKER ROSHOLT & SIMPSON LLP

1010 W. Jefferson, STE 102

P.O. Box 2139

Boise, ID 83701-2139

☒ U.S. Mail, Postage Prepaid

☐ Hand Delivered

☐ Overnight Mail

☐ Facsimile

Director

IDAHO DEPARTMENT OF WATER RESOURCES

322 E. Front Street, 6th Floor

P.O. Box 83720

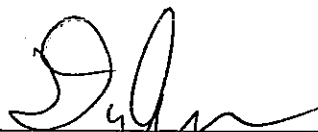
Boise, ID 83720

☒ U.S. Mail, Postage Prepaid

☐ Hand Delivered

☐ Overnight Mail

☐ Facsimile



Dylan B. Lawrence

No. 16861.

APPLICATION FOR PERMIT 13-2276
TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF IDAHO

1. Name of applicant: Pioneer Irrigation District

Postoffice address: Caldwell

County: Canyon

State: Idaho

I. If applicant is a corporation, give

(a) Date and place of incorporation: {An irrigation district, organized under the
 (b) The amount of capital stock: {Irrigation District laws of the State of Idaho,
 (c) The amount paid in: on July 8th, 1901.

(d) Names and addresses of directors: L. C. Greenslet, Nampa, Idaho, W.A. Shupe

and A.C. Street, Caldwell, Idaho.

(United States of America has agreed by contract to expend \$350,000 in constructing drainage ditch within said district, which will develop and accumulate said water and the amount so expended to be paid back, 2% each year for 1st 4 years;
 II. The financial resources of the applicant are: (a) Cash on hand: 4% each year for next 2
 (b) Treasury stock: (c) Bonds to be issued: years and 6% each year
 (d) Other resources: (See remarks) for next 14 years.

2. The quantity of water claimed is

86

cubic feet per second.

3. Source of water supply: {Mason Creek Drainage System (See blue print marked Exhibit "A")
 {Drains into Mason Creek, a tributary to Boise River. A portion by
 {pumping at intersection of Caldwell Highline Canal & Drainage Ditch

4. Location of point of diversion: in SE $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 29, Twp. 4, N. R. 2 W.B.M.

County of Canyon

5. To be used for: Irrigation and domestic purpose.

I. Irrigation and domestic use: all within the Pioneer Irrigation Dist.
 (a) Amount of land to be irrigated: 4216.68 acres
 (b) In the following legal subdivisions: See Lists "A" and "B".

II. Mining, milling, power, manufacturing, transportation or other purposes:

(a) At what point:

(b) Amount of power to be generated:

H. P. under ft. head

(c) Is water to be returned to any stream?
 point of return:

(d) If so, name stream and locate

6. Estimated cost of works: \$see remarks.

7. Description of works for diversion:

I. Kind of works: see remarks

II. Dimensions of works: see remarks

(a) Height of dam feet, length of dam at top feet,
 length of dam at bottom feet. Material used in construction:

(b) Capacity of reservoir acres feet. (c) Size of headgate, width feet,

Height feet. (d) Conduit Phyllis Canal width at bottom 32 feet,

width at water line 40 feet, depth of water 4 feet; diameter of pipe

inches; average grade per mile is 1 $\frac{3}{4}$ feet. Length of conduit is 35.3 miles,
 and it crosses the following quarter sections: See List "C"

Conduit Caldwell Highline Canal, width at bottom 16 feet, width at water
 line 22 feet, depth of water 3 $\frac{1}{2}$ feet; average grade per mile 1 $\frac{3}{4}$ feet,
 length of conduit 16 miles, See List "D".

8. The time required for the completion of the construction of such work is three years.

9. Time required for the complete application of the water to the proposed use is five additional years.

BE IT KNOWN That the undersigned hereby makes application for a permit to appropriate the
 public waters of the State of Idaho as herein set forth.

PIONEER IRRIGATION DISTRICT

Applicant.

By L. E. Greenslet.

Agent.

Date of first receipt at office of State Engineer 3:00 P.M. Sept. 8, 1915

Returned to applicant for correction September 8, 1915

Corrected application received November 5, 1915.

APPROVAL OF STATE ENGINEER

The number of this permit is 11897

Recorded in Book 40 Page 11897 Approved January 10, 1916.

This is to certify that I have examined the within application for a permit to appropriate the public waters of the State of Idaho, and hereby approve the same, subject to the following limitations and conditions:

Bond in the sum of \$ 1000.00 to be filed on or before March 10, 1916.

Work to begin on or before and to continue diligently and uninterruptedly to completion, unless temporarily interrupted by circumstances over which permit holder has no control.

One-fifth of the work above specified to be completed on or before July 10, 1917.

The whole of said work to be completed on or before January 10, 1918.

Beneficial use of water appropriated in accordance herewith, to be made on or before January 10, 1924.

Witness my hand this 10th day of January, 1916.

J. H. SMITH.

State Engineer.

Remarks: 50 second feet to be pumped at Pumping Plant No. 1, see remarks "B".

The Pioneer Irrigation District entered into a contract with the United States of America, in which contract the United States of America agrees to expend \$350,000 in digging and constructing drainage systems, known as the Mason Creek Drainage and the Wilson Slough Drainage Systems, and also another named the Dixie Drainage System, within said District, which systems are outlined on the blue prints marked Exhibit "A" and Exhibit "B", annexed hereto and made a part hereof, for the purpose of draining water-soaked lands of the District, on condition that the District return said money, so expended, in twenty installments, as hereinafter stated.

Prior to the execution of said contract by said District, a resolution was adopted by its Board of Directors, on September 14, 1912, in which resolution said Board formulated a general plan of its proposed drainage and increased water supply for said District, in which it declared the necessity of drainage and also the necessity of an increased water supply for irrigation, and stated that in the construction of said Drainage Systems water would be developed, accumulated and waste waters collected, which would be developed, accumulated and waste waters collected, which would be diverted or pumped into the canals of the District and used by the District in increasing its water supply. Copies of the maps, the above mentioned contract, plans and resolution were filed in the office of the State Engineer of the State of Idaho on September 16, 1912, to which reference is hereby made. Said resolution, contract and plans were approved by the said State Engineer, by report to said District, on September 27, 1912, after which the same were approved by vote of the District, by a special election held for that purpose; and that thereafter another contract was prepared and by a special election authorized and entered into by the District, in which the payments to the United States of America may be made as follows: Two per cent each year for the first four years; four per cent each year for the next two years and six per cent each year for the next fourteen years.

On or about November 1, 1913, the Reclamation Service of the United States of America commenced the construction of the said Drainage Systems, the Mason Creek Drainage System being included within said Systems, in which said system there has been expended about \$105,000 and about 26 miles of drainage ditch has been constructed, of about ten feet in depth and from five to eight in width at the base.

The water is being developed by the construction of the Mason Creek Drainage System, which comprises the drainage ditches in the Mason Creek Drainage System, as shown on the map accompanying this application, comprising the Mason Creek Drain, the Purdam Gulch Drainage Ditch, Noble Slough Drainage Ditch and the Solomon Slough Drainage Ditch, which Mason Creek Drain develops 40 second feet; the Purdam Gulch Drainage Ditch 20 second feet; Noble Slough Drainage Ditch 20 second feet; Solomon Slough Drainage Ditch 20 second feet; and a portion thereof, to-wit: 30 second feet, developed by the Mason Creek Drain, and 20 second feet developed by the Purdam Slough Drainage Ditch is to be pumped at pumping plant No. 1, located where the said Mason Creek Drain crosses the Caldwell Highline Canal, at a point 785 feet North, 73° West of the Southeast corner of Section 29, in Township 4, North of Range 2, West of Boise Meridian, in the Southeast quarter of the Southeast quarter of Section 29, Township and Range aforesaid, and to be used in the irrigation of the lands described in "List A", hereto attached.

There are within the Pioneer Irrigation District, this applicant, more than 34,800 acres of land, and the irrigation of said lands requires, in addition to the amount asked in the cases on file in the courts of this State and the amount contracted for with the Government, a copy of which contract is on file in the office of the State Engineer and was approved by said State Engineer September 25, 1912, the amount of water which is being developed by the construction of the drainage systems on the blue print hereto attached and included in the above application and also in application No. 16860 to irrigate 3597.92 acres, as shown by "List A", under the Caldwell Canal, a portion of which has not yet been reclaimed, and to supply additional water for 26,130 acres, as shown on List "B", about 6,000 acres of which has not been reclaimed. It is the intention of this application to file on the waters to the amount of the application developed by means of the drainage system constructed by the applicant, as in this application set forth.

LIST A.

In Township 4 North, Range 2, West of Boise Meridian:

Subdivision	Section	Acres	Total Acres.
NW $\frac{1}{4}$	31	158.00	
W $\frac{1}{2}$ of NE $\frac{1}{4}$	31	80.00	
Lots 3 and 4	31		
NE $\frac{1}{4}$ of SW $\frac{1}{4}$	31		
SE $\frac{1}{4}$ of SW $\frac{1}{4}$	31	157.00	
	30	637.46	
S $\frac{1}{2}$	29		
W $\frac{1}{2}$ of NW $\frac{1}{4}$	29	400.00	
Lot 2	19	38.78	
Lot 3	19	39.08	
Lot 4	19	39.38	
E $\frac{1}{2}$ of SW $\frac{1}{4}$	19		
S $\frac{1}{2}$ of SE $\frac{1}{4}$	19		
NW $\frac{1}{4}$ of SE $\frac{1}{4}$	19		
SE $\frac{1}{4}$ of NW $\frac{1}{4}$	19	240.00	1789.68

In Township 3 North, Range 2, West of Boise Meridian.

Subdivision	Section	Acres	Total Acres.
NW $\frac{1}{4}$	6	157.00	157.00

In Township 4 North, Range 3, West of Boise Meridian:

Subdivision	Section	Acres	
S $\frac{1}{2}$	24		
NW $\frac{1}{4}$	24		
W $\frac{1}{2}$ of NE $\frac{1}{4}$	24		
SE $\frac{1}{4}$ of NE $\frac{1}{4}$	24	600.00	
E $\frac{1}{2}$ of NE $\frac{1}{4}$	23		
SE $\frac{1}{4}$ of NE $\frac{1}{4}$	23		
SE $\frac{1}{4}$ of SW $\frac{1}{4}$ of NW $\frac{1}{4}$	23		
E $\frac{1}{2}$ of SW $\frac{1}{4}$ of NE $\frac{1}{4}$	23		
E $\frac{1}{2}$ of NE $\frac{1}{4}$ of NW $\frac{1}{4}$	23		
NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of SE $\frac{1}{4}$	23		
E $\frac{1}{2}$ of SE $\frac{1}{4}$	23	250.00	
E $\frac{1}{2}$	25		
NW $\frac{1}{4}$ of NW $\frac{1}{4}$	25		
E $\frac{1}{2}$ of W $\frac{1}{2}$	25		
E $\frac{1}{2}$ of SW $\frac{1}{4}$ of NW $\frac{1}{4}$	25		
E $\frac{1}{2}$ of NW $\frac{1}{4}$ of SW $\frac{1}{4}$	25		
S $\frac{1}{2}$ of SW $\frac{1}{4}$ of SW $\frac{1}{4}$	25		
NW $\frac{1}{4}$ of SW $\frac{1}{4}$ of NW $\frac{1}{4}$	25	610.00	1460.00

Carried forward 3406.68

Total Acres.

Brought forward3406.68

In Township 4 North, Range 3, West of
Boise Meridian: (Continued)

Subdivision	Section	acres.	
NE $\frac{1}{4}$ of NE $\frac{1}{4}$	26	30.00	
	36	640.00	670.00

In Township 3 North, Range 3 West of
Boise Meridian:

Subdivision	Section	Acres.	
NE $\frac{1}{4}$	1		
SE $\frac{1}{4}$ of NW $\frac{1}{4}$	1	240.00	240.00

Total number of acres.. 4316.68

* * *

The Caldwell Highline Canal, as now constructed, from Boise River, of sufficient size to carry water to irrigate all the lands under said canal, within the Pioneer Irrigation District, heads at Boise River, 2500 feet North, 16° West of the East Quarter corner, Section 24, in Township 4 North of Range 2, West of Boise Meridian, in the SW $\frac{1}{4}$ of Section 18, in Township 4, North of Range 1, West of Boise Meridian, and crosses the following quarter sections:

SW $\frac{1}{4}$ of Section 18, Township and Range last above stated;
NW $\frac{1}{4}$ of Section 19;

In Township 4, North of Range 2, West of Boise
Meridian:

NE $\frac{1}{4}$ and NW $\frac{1}{4}$ of Section 24;
NE $\frac{1}{4}$ and NW $\frac{1}{4}$ of Section 23;
NE $\frac{1}{4}$, NW $\frac{1}{4}$ and SE $\frac{1}{4}$ of Section 22;
NW $\frac{1}{4}$ of Section 21;
NE $\frac{1}{4}$, NW $\frac{1}{4}$ and SW $\frac{1}{4}$ of Section 20;
NE $\frac{1}{4}$, SE $\frac{1}{4}$ and SW $\frac{1}{4}$ of Section 19;
NW $\frac{1}{4}$ of Section 18;
NE $\frac{1}{4}$, NW $\frac{1}{4}$ and SW $\frac{1}{4}$ of Section 17;

In Township 3, North of Range 2, West of Boise
Meridian:

NW $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ and SW $\frac{1}{4}$ of Section 6;

In Township 3, North of Range 3, West of Boise
Meridian:

NE $\frac{1}{4}$, SE $\frac{1}{4}$ and SW $\frac{1}{4}$ of Section 1;
SE $\frac{1}{4}$, NE $\frac{1}{4}$ of Section 2;

In Township 4, North of Range 3, West of Boise
Meridian:

SE $\frac{1}{4}$, SW $\frac{1}{4}$ and NW $\frac{1}{4}$ of Section 35;
NE $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ and NW $\frac{1}{4}$ of Section 34;
NE $\frac{1}{4}$, NW $\frac{1}{4}$ of Section 33;
SW $\frac{1}{4}$ of Section 28;

The laterals from the Caldwell Highline Canal cross
the following quarter sections, to-wit:

Lateral 8.06

In Township 4, North of Range 2, West of Boise
Meridian:

SW $\frac{1}{4}$ of Section 29;
SE $\frac{1}{4}$ and NE $\frac{1}{4}$ and NW $\frac{1}{4}$ of Section 30;

Lateral 8.8

In Township 4, North of Range 2, West of Boise Meridian;

NW $\frac{1}{4}$ of Section 31;
SW $\frac{1}{4}$ of Section 30;

In Township 4, North of Range 3, West of Boise Meridian;

SE $\frac{1}{4}$ and NE $\frac{1}{4}$ of Section 25;

Gowon Lateral.

In Township 4, North of Range 3, West of Boise Meridian:

NE $\frac{1}{4}$ of Section 34;
SE $\frac{1}{4}$ and SW $\frac{1}{4}$ of Section 27;

EXTENSION OF TIME.

Upon proper request of Fred L. Evans, Secy. Pioneer Irrigation District, holder of Permit No. 11897, I have this 3rd day of May, 1917, extended the time for completion of works thereunder to the 10th day of January, 1921.

J. H. Smith,
State Engineer.

APPLICATION FOR AMENDMENT

TO PERMIT TO APPROPRIATE THE PUBLIC WATERS
OF THE STATE OF IDAHO, NO. 11897

Comes now the Pioneer Irrigation District and represents to the State Engineer of the State of Idaho,

That he is the owner and holder of Permit to appropriate the Public Waters of the State of Idaho, No. 11897, and requests that the list of lands to be irrigated, as described in said permit, be changed to read as follows:

Twp	Range	Sec.	N E 1/4				N W 1/4				S W 1/4				S E 1/4				Totals
			NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	
4	N	3	10								10				20				30
"	"	"	15	30	40	40	40	11		3					40	20		40	264
"	"	"	14						15		10	40	40	10					115
"	"	"	22	20		20								20					60
"	"	"	23	40	40	35	40	40	40	40	40	40	40	40	40	40	40	40	635
"	"	"	24		40	40	40	40	40	40	40	40	40	40	40	40	40	40	600
"	"	"	25	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	640
"	"	"	26	40	40	20	40	15						30					195
"	"	"	36	40	40	40	40	40	20	20			20	40	20	20	40		380
3	N	3	1	40	40	40	40	40		40									240
"	"	"	5					39.39	39.50	39.11	40								157.50
4	N	2	19								39.38								39.38
"	"	"	30	40	40	40	40	40	39.31	39.36	40	40	39.33	39.42	40	40	40	40	637.46
"	"	"	31		40	40		40	40	40	38	40	39	39	40				396.00

making a total of 4,389.34 acres.

That an additional amount of water is not asked for, and that the rights of others will not be adversely affected by such change.

Signed at Caldwell, Idaho, this 11th day of May, 1918.

A. G. STREET
Pres. Pioneer Irr. Dist.

Date of receipt at Office of State Engineer May 13th, 1918.

APPROVAL OF STATE ENGINEER

I, FRED A. WILKIE, State Engineer of the State of Idaho, hereby approve the above and foregoing application for amendment to Permit to appropriate the Public Waters of the State of Idaho, No. 11897. This approval constitutes a new permit and is issued as an amendment to the original permit, to which it refers and of which it becomes a part, and said application is approved only insofar as the rights of others will not be adversely affected thereby.

WITNESS my hand this 14th day of May, 1918.

FRED A. WILKIE, State Engineer.

Proof of Completion of Works made July 20, 1922.
Certificate of Completion of Works issued September 14, 1923.

Permit No. 11897

CERTIFICATE OF COMPLETION OF WORKS

To All Whom It May Concern:

This is to certify that The Pioneer Irrigation District of Caldwell, County of Canyon, and State of Idaho, the holder of Permit No. 11897, issued upon Application No. 16861, bearing date of priority of September 8, 1916, authorizing the diversion of 86 second feet of the waters of Mason Creek Drainage System; County of Canyon, State of Idaho, for irrigation and domestic purposes, has fully complied with the provisions of the laws of the State of Idaho relating to the proof of completion of the works of diversion set out and described in said Permit; that said works are adequate for diverting and conveying to the place of intended use 43 second feet of the waters of Mason Creek Drainage System; that the point of diversion of said waters is in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 33, Twp. 4 North, Range 2 West, B. M., and that the lands proposed to be irrigated by the use of said water are described as follows, to-wit: SE $\frac{1}{4}$ SW $\frac{1}{4}$, SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 10; NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 15; SW $\frac{1}{4}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 14; E $\frac{1}{2}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 22; all of Section 23; W $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 24; all of Section 25; NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 26; NE $\frac{1}{4}$, N $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 36, Twp. 4 North, Range 3 West, B. M., NE $\frac{1}{4}$, E $\frac{1}{2}$ NW $\frac{1}{4}$ Sec. 1, T. 3 N., R. 3 W., B. M., NW $\frac{1}{4}$ Sec. 6, T. 3 North, Range 2 West, B. M., SW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 19, all of Section 30; W $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ of Sec. 31, T. 4 N., R. 2 W., B. M., making a total of 4,369 acres.

Witness my hand this 14th day of September, A. D. 1923.

W. G. SWENDSEN,
Commissioner of Reclamation

By: Geo. N. Carter,
Assistant.

License issued for 43 second feet

Page 3053



Earth D_{20}
 irreg minor 0.005
 Variation 0.002
 Obstructions 0.012 ? too large
 Veg Low ($0.005 \times 80\%$)
 High ($0.03 \times 30\%$) 0.013
 Meander minor $\times 1.00$

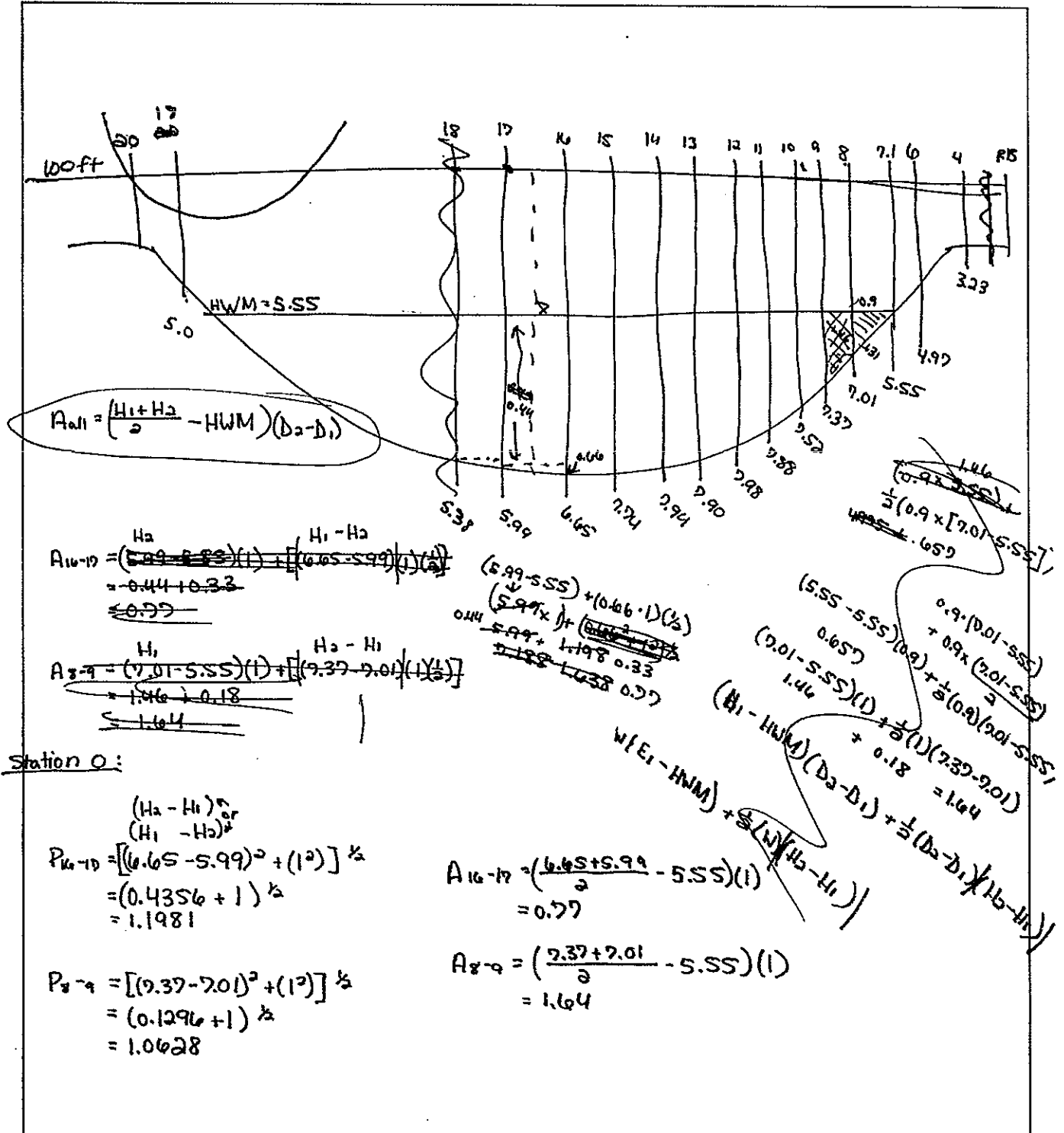
0.052

Fits clean bottom brush on sides
 0.05

0.04 to 0.045

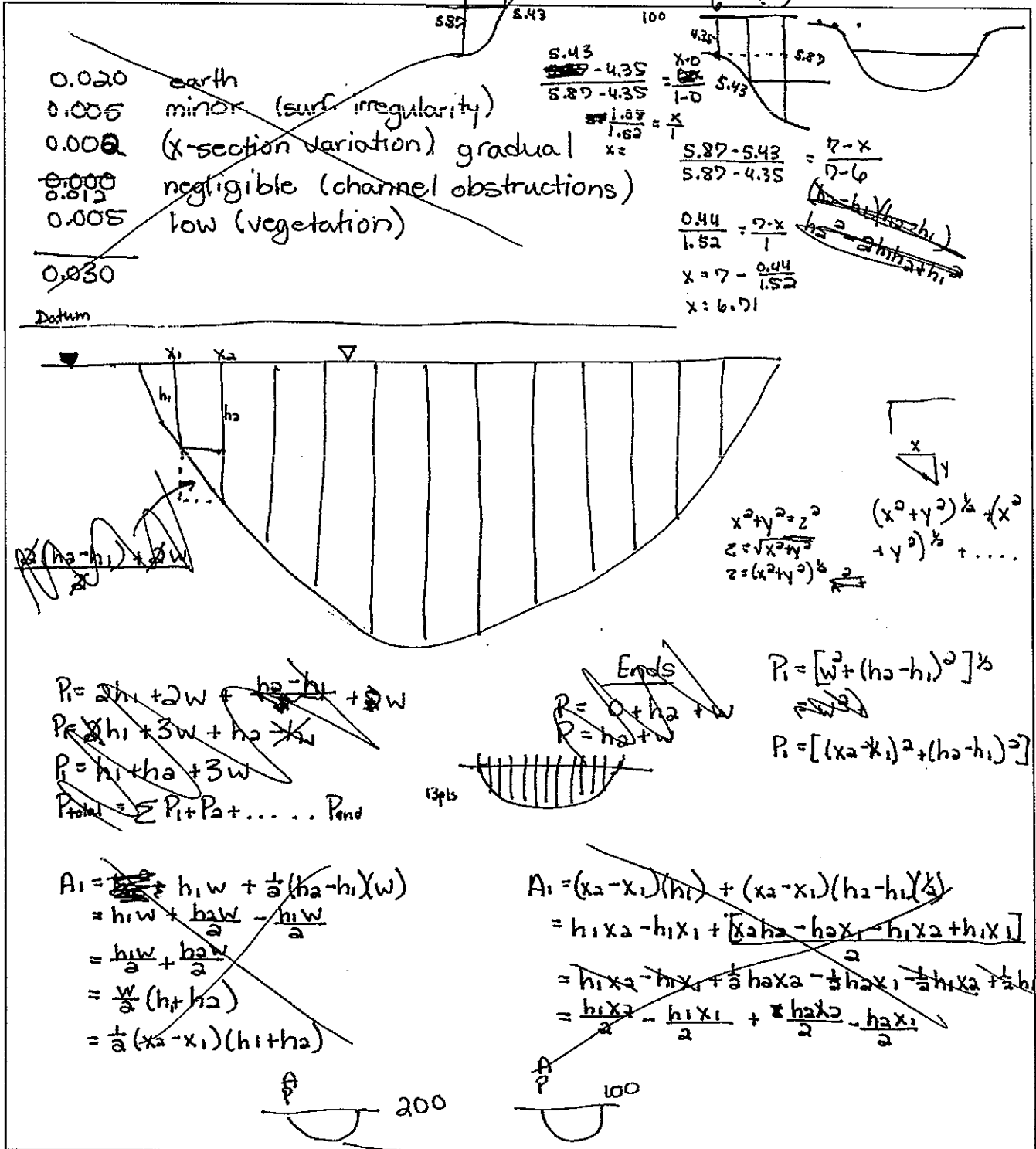


Chkd By _____ Description _____ Job No _____





By _____ Date _____ Plant X Sheet _____ of _____
Chkd By _____ Description _____ Job No _____



Pioneer ID

P1/7
11-9-2010 SNRHighline Canal Survey
Above Rd- 12.00
- 11.00 Flow

Nov 9 2010

12:45 pm begin

x - 0
- 100
- 200

Station	Dist from RB	HT	Note
0	4.	3.23	Top of break
6		4.97	
7.1		5.55	HWM canal
8.		7.01	
9		7.37	
10		7.88 7.52	
11		7.88	
12		7.98	
13		7.90	Grassy laying on bottom
14		7.94	"
15		7.74	"
16		6.65	Grass rooted below HWM
17		5.99	thick, flow difficult
18		5.38	" to find
20		5.0	2 up ↑

Station up 100 ft. below Hedgepote and bridge 11/9/2010 p2/7

Dist	HT	HWM: 5.43	diff to measure on x sec
4	3.11	TOB	
5			4.19
6	4.35		4.69
7	5.87	5.22	5.50
8	7.13		9.26.50
9	7.84		
10	gase 0.9	drop from 4.69 to 5.53	
11			5.28
12			5.38
13			5.56
14		grass	5.61
15		grass	5.98
16		grass roofed	7.19
17		6.04	
18	5.26		
20	5.20		
22	5.36		
24	3.7		

No. 352

J. L. DARLING CORP. INCOIMA, WA 98421-1617
www.River.com

By: [Signature]
Date: [Signature]

Station 4/5 100'

11/9/2010 S.N.K.

HW M = 5.36'

Handwritten to: 5.18

P3/T

$\Delta + 0.07$ w/s

$\Delta - 0.09$ d/s

Dist HT

4.5 3 To Break

6 3.65

7 4.31

8 5.77

9 6.55

10 7.76

11 $9' = (5.64 - 4.69)$

12 5.63

13 5.67

14 5.87

15 5.87

16 5.84

17 6.45

18 6.37

19 5.86

20 5.43

22 5.35

Toe of slope
up.

grass

grass rooted

"

Station 0/6		100'	11/9/2010	AS/7
		HWM = 5.46		
Dist	EL	Note		
4.5	3.35	top of bank		
5.5	3.86	TD Stone		
6.0	5.67			
7	6.58			
8		9.0 - (6.54 - 4.69)		
9		6.13		
10		5.72		
11		5.55		
12		5.55		
13		5.48		
14		5.55		
15		5.82		
16		6.67 grass		
17	5.82	grass mowed		
18	5.26	1-		
19	5.21			
20	5.11			
22	5.14			
23	4.61			
24	3.92			

No. 352

Station d/s 200' 11/9/2010 P5/7

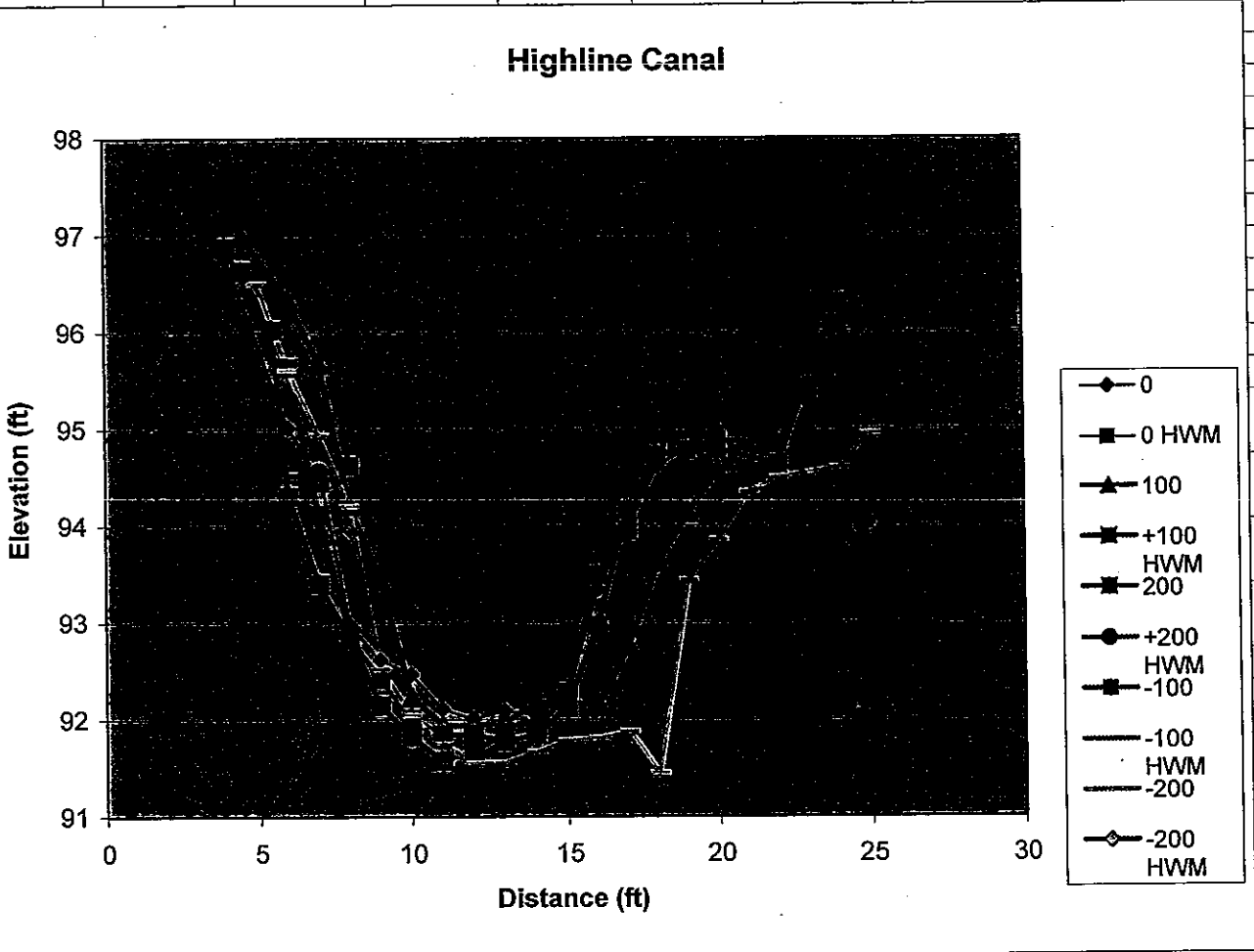
HW M = 105'

Dist	EL	
5.0	3.49	TOS 10'
6	4.38	
7	5.06	
8	5.79	
9	7.47	
10		9.0 - (5.75 - 4.69)
11		5.45 "
12		5.25 "
13		5.25 "
14		5.36
15		5.48
16		5.50
17		5.57
18		5.14 grass
19	6.60 also	7.13
20	6.14	
21	5.65	
22	5.50	
24	5.40	
26	5.05	
26	↑	

J. L. DARLING CORP. 7000 N. W. 56th St. 33117
www.Riceland.com

John P. Darling
JL Darling Corp.

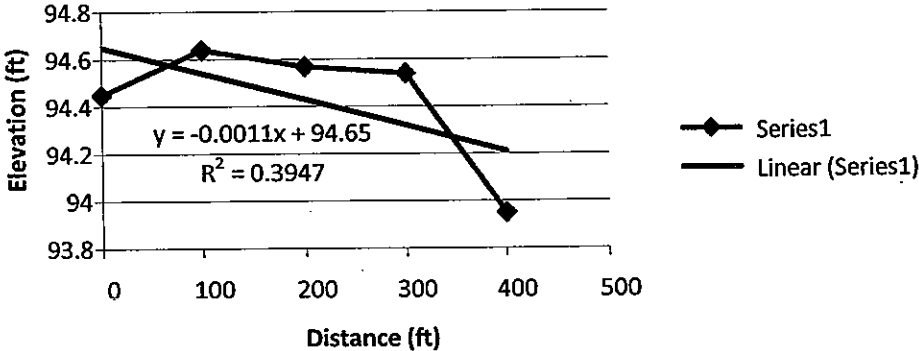
Pioneer Irrigation District					
Highline Canal Survey of November 9, 2010					
Above Lateral 8					
		Datum	100 ft		
Station	0 ft	Distance	Rod Ht	Note	Elevation
		4	3.23	Top of break	96.77
		6	4.97		95.03
		7.1	5.55	HWM	94.45
		8	7.01		92.99
		9	7.37		92.63
		10	7.52		92.48
		11	7.88		92.12
		12	7.98		92.02
		13	7.9	grass laying on bed	92.1
		14	7.94	grass laying on bed	92.06
		15	7.74	grass laying on bed	92.26
		16	6.65	grass rooted below	
		17	5.99	HWM	93.35
				Thick grass rooted	94.01
		18	5.38	Thick grass rooted, difficult to find HWM on LB	94.62
		20	5	and up from here	95
Station	100 ft	Distance	Rod Ht	Note	Elevation
		4.5	3	Top of break	97
		6	3.65		96.35
		7	4.31		95.69
		8	5.78		94.22
		9	6.55		93.45
HWM :	5.36	10	7.76		92.24
Elevation	94.64	11	8.05		91.95
		12	8.06		91.94
		13	8.02		91.98
		14	7.82		92.18
		15	7.82		92.18



Ft. along channel	HWM	Avg. slope (ft/ft)
0	94.45	0.00125
100	94.64	

			16	7.85	grass	92.15				200	94.57						
			17	7.24	grass	92.76				300	94.54						
			18	6.37	grass rooted	93.63				400	93.95						
			19	5.86	grass rooted	94.14							0.0011	Use this slope from Trend			
			20	5.43		94.57											
			22	5.35	Toe of slope up	94.65											
Station	200 ft																
		Distance	Rod Ht	Note	Elevation												
		4	3.11	Top of break	96.89												
		6	4.35	steep	95.65												
		7	5.87	"	94.13												
		8	7.13	"	92.87												
		9	7.84		92.16												
HWM:	5.43	10	8.16		91.84												
Elevation	94.57	11	8.41		91.59												
		12	8.31		91.69												
		13	8.13		91.87												
		14	8.08	grass	91.92												
		15	7.71	grass	92.29												
		16	6.5	grass rooted	93.5												
		17	6.04		93.96												
		18	5.26		94.74												
		20	5.2		94.8												
		22	5.36		94.64												
		24	3.7		96.3												
Station	-100 ft																
		Distance	Rod Ht	Note	Elevation												
		4.5	3.35	Top of break	96.65												
		5.5	3.96	TO slope	96.04												
		6	5.67		94.33												
		7	6.58		93.42												
		8	7.15		92.85												
HWM:	5.46	9	7.56		92.44												
Elevation	94.54	10	7.97		92.03												
		11	8.14		91.86												
		12	8.14		91.86												
		13	8.21		91.79												
		14	8.14		91.86												
		15	7.87		92.13												
		16	7.02	grass	92.98												
		17	5.82	grass rooted	94.18												

Water Surface Slope (estimated from
observed water marks)



			18	5.26	grass rooted	94.74											
			19	5.21		94.79											
			20	5.11		94.89											
			22	5.14		94.86											
			23	4.61		95.39											
			24	3.92		96.08											
Station	-200 ft																
			Distance	Rod Ht	Note	Elevation											
			5	3.49	Top of break	96.51											
			6	4.38		95.62											
			7	5.06		94.94											
			8	5.79		94.21											
			9	7.47		92.53											
HWM:	6.05		10	7.94		92.06											
Elevation	93.95		11	8.24		91.76											
			12	8.44		91.56											
			13	8.44		91.56											
			14	8.33		91.67											
			15	8.21		91.79											
			16	8.19		91.81											
			17	8.12		91.88											
			18	8.55	grass	91.45											
			19	6.56	grass	93.44											
			20	6.14	grass	93.86											
			21	5.65	grass	94.35											
			22	5.5		94.5											
			24	5.4		94.6											
			25	5.05		94.95											

Mannings Equation:

$Q=(1.49/n)AR^{2/3}S_0^{1/2}$ (US customary units)

n = 0.040, 0.042, or 0.052 (depending on interpretation of tables, location within meas. Area, etc)
R = hydraulic radius = A/P (x-sectional area/wetted perimeter)
S₀=slope of channel

S₀ = 0.0011

Station	200 ft	Distance	Rod Ht	Elevation	A _{sec}	P _{sec}
	REW	6.71	5.43	94.57		
		7	5.87	94.13	0.0638	0.526972
HWM:	5.43	8	7.13	92.87	1.07	1.608602
Elevation	94.57	9	7.84	92.16	2.055	1.226418
		10	8.16	91.84	2.57	1.049952
		11	8.41	91.59	2.855	1.030776
		12	8.31	91.69	2.93	1.004988
		13	8.13	91.87	2.79	1.016071
		14	8.08	91.92	2.675	1.001249
		15	7.71	92.29	2.465	1.066255
		16	6.5	93.5	1.675	1.569745
		17	6.04	93.96	0.84	1.100727
	LEW	17.78	5.43	94.57	0.2379	0.990202
Total A & P					22.2267	13.19196
R ₊₂₀₀ =					1.684867	

$A_{sec} = ((h_1+h_2)/2-HWM)(x_2-x_1)$ $A = \sum A_{sec}$

$P_{sec} = [((x_2-x_1)^2+(h_2-h_1)^2)^{1/2}]$ $P = \sum P_{sec}$

R_{avg} = 1.56

A_{avg} = 21.57

Q =	36	if n=0.040
Q =	34	if n=0.042
Q =	28	if n=0.052

Station	100 ft	Distance	Rod Ht	Elevation	A _{sec}	P _{sec}
HWM : Elevation	5.36 94.64	REW	7.71	5.36	94.64	
			8	5.78	94.22	0.0609 0.510392
			9	6.55	93.45	0.805 1.262101
			10	7.76	92.24	1.795 1.569745
			11	8.05	91.95	2.545 1.041201
			12	8.06	91.94	2.695 1.00005
			13	8.02	91.98	2.68 1.0008
			14	7.82	92.18	2.56 1.019804
			15	7.82	92.18	2.46 1
			16	7.85	92.15	2.475 1.00045
			17	7.24	92.76	2.185 1.171367
			18	6.37	93.63	1.445 1.325481
			19	5.86	94.14	0.755 1.122542
			20	5.43	94.57	0.285 1.088531
		LEW	21.75	5.36	94.64	0.06125 1.751399
Total A & P					22.80715	15.86386
R ₊₁₀₀ =					1.437679	

Station	0 ft	Distance	Rod Ht	Elevation	A _{sec}	P _{sec}
HWM: Elevation	5.55 94.45	REW	7.1	5.55	94.45	
			8	7.01	92.99	0.657 1.715109
			9	7.37	92.63	1.64 1.062826
			10	7.52	92.48	1.895 1.011187
			11	7.88	92.12	2.15 1.062826
			12	7.98	92.02	2.38 1.004988
			13	7.9	92.1	2.39 1.003195
			14	7.94	92.06	2.37 1.0008
			15	7.74	92.26	2.29 1.019804

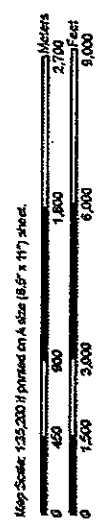
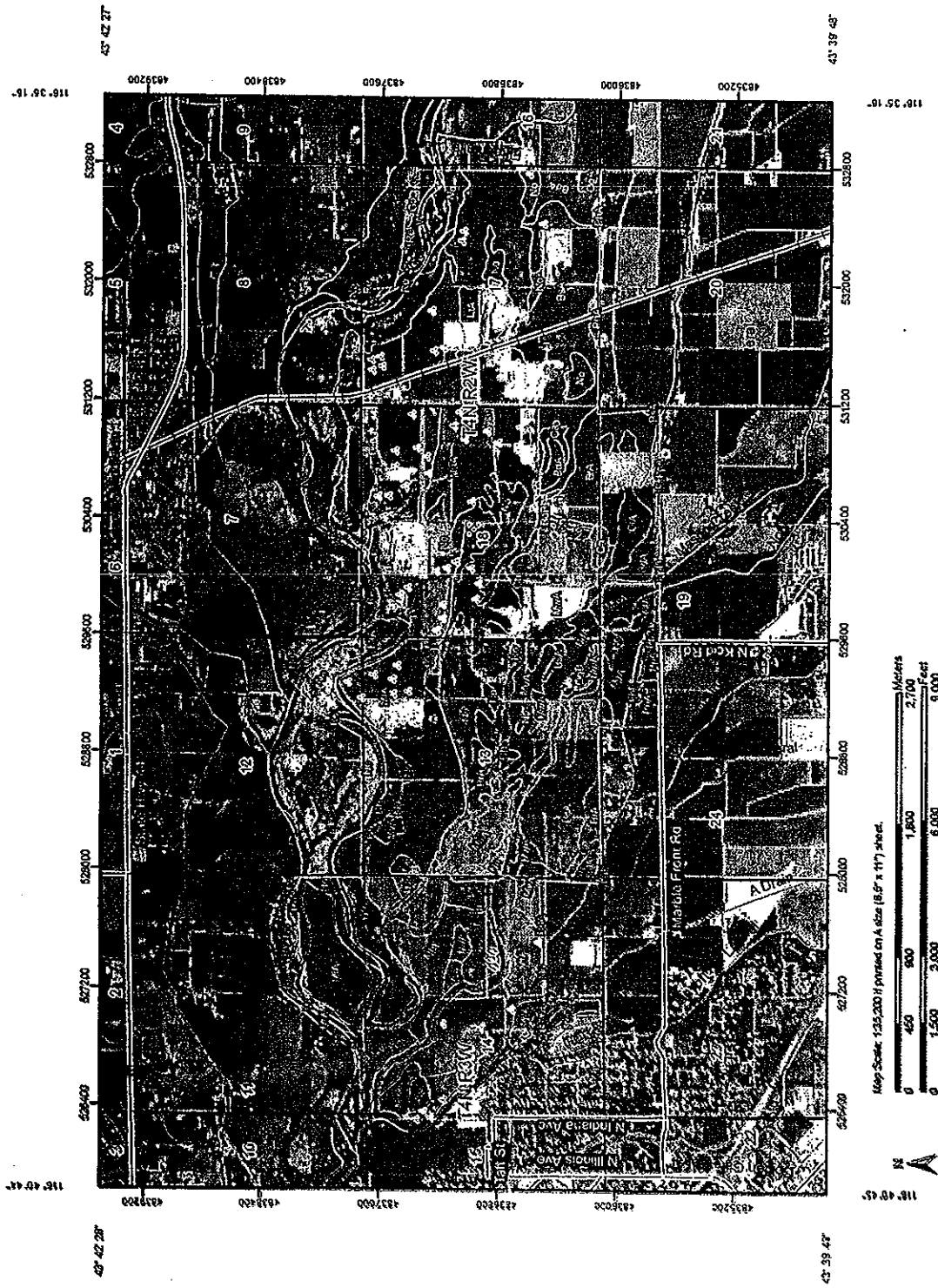
	16	6.65	93.35	1.645	1.479223
	17	5.99	94.01	0.77	1.198165
LEW	17.72	5.55	94.45	0.1584	0.843801
Total A & P				18.3454	12.40192
R ₀ =				1.479238	

Station	-100 ft	Distance	Rod Ht	Elevation	A _{sec}	P _{sec}
	REW	5.94	5.46	94.54		
		6	5.67	94.33	0.0063	0.218403
HWM:	5.46	7	6.58	93.42	0.665	1.352072
Elevation	94.54	8	7.15	92.85	1.405	1.151043
		9	7.56	92.44	1.895	1.080787
		10	7.97	92.03	2.305	1.080787
		11	8.14	91.86	2.595	1.014347
		12	8.14	91.86	2.68	1
		13	8.21	91.79	2.715	1.002447
		14	8.14	91.86	2.715	1.002447
		15	7.87	92.13	2.545	1.035809
		16	7.02	92.98	1.985	1.31244
		17	5.82	94.18	0.96	1.56205
	LEW	17.64	5.46	94.54	0.1152	0.734302
Total A & P				22.5865	13.54694	
R ₊₁₀₀ =				1.667278		

Station	-200 ft	Distance	Rod Ht	Elevation	A _{sec}	P _{sec}
	REW	8.15	6.05	93.95		

HWM:	6.05	9	7.47	92.53	0.6035	1.654962
Elevation	93.95	10	7.94	92.06	1.655	1.104943
		11	8.24	91.76	2.04	1.044031
		12	8.44	91.56	2.29	1.019804
		13	8.44	91.56	2.39	1
		14	8.33	91.67	2.335	1.006032
		15	8.21	91.79	2.22	1.007174
		16	8.19	91.81	2.15	1.0002
		17	8.12	91.88	2.105	1.002447
		18	8.55	91.45	2.285	1.088531
		19	6.56	93.44	1.505	2.227128
		20	6.14	93.86	0.3	1.08462
LEW		20.18	6.05	93.95	0.0081	0.201246
				Total A & P	21.8866	14.44112
				R ₊₂₀₀ =	1.515575	

Soil Map—Canyon Area, Idaho



USDA
Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

10/27/2010
Page 1 of 4

Report—Chemical Soil Properties

Chemical Soil Properties—Canyon Area, Idaho										
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio		
	In	meq/100g	meq/100g	pH	Pd	Pd	mmhos/cm			
BdA—Baldock loam, 0 to 1 percent slopes										
Baldock	0-10	8.5-15	—	7.9-8.4	5-15	0	2.0-8.0	0		
	16-27	6.8-15	—	7.4-9.0	5-15	0	2.0-8.0	0		
	27-60	2.5-9.2	—	7.9-8.4	5-15	0	2.0-8.0	0		
BdB—Baldock loam, 1 to 2 percent slopes										
Baldock	0-16	6.5-15	—	7.9-8.4	5-15	0	2.0-8.0	0		
	16-27	6.8-15	—	7.4-9.0	5-15	0	2.0-8.0	0		
	27-60	2.5-9.2	—	7.9-8.4	5-15	0	2.0-8.0	0		
BtA—Bram silt loam, 0 to 1 percent slopes										
Bram	0-17	9.0-19	—	7.9-8.4	0-5	0	4.0-8.0	5-8		
	17-62	7.0-15	—	7.9-8.4	15-25	0	4.0-8.0	5-8		
	62-65	7.0-15	—	7.9-8.4	0-5	0	4.0-8.0	5-8		
BsA—Bram silt loam, saline-alkali, 0 to 1 percent slopes										
Bram, saline-alkali	0-17	9.0-19	—	8.5-9.6	0-5	0	8.0-16.0	10-20		
	17-62	7.0-15	—	8.5-9.6	15-25	0	8.0-16.0	10-20		
	62-65	7.0-15	—	8.5-9.6	0-5	0	8.0-16.0	10-20		

Chemical Soil Properties—Canyon Area, Idaho

Chemical Soil Properties—Canyon Area, Idaho									
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio	
	In	meq/100g	meq/100g	pH	Pct	Pct	mmhos/cm		
MuA—Moulton fine sandy loam, 0 to 1 percent slopes									
Moulton	0-3	10-25	—	6.6-7.8	0	0	0	0	
	3-21	5.0-15	—	6.6-7.8	0	0	0	0	
	21-60	5.0-10	—	6.6-7.8	0	0	0	0	
MuA—Moulton fine sandy loam, saline, 0 to 1 percent slopes									
Moulton, saline	0-3	10-25	—	6.6-7.8	0	0	2.0-4.0	0	
	3-21	5.0-15	—	6.6-7.8	0	0	2.0-4.0	0	
	21-60	5.0-10	—	6.6-7.8	0	0	0	0	
MuA—Moulton loam, 0 to 1 percent slopes									
Moulton	0-3	10-25	—	6.6-7.8	0	0	0	0	
	3-21	5.0-15	—	6.6-7.8	0	0	0	0	
	21-60	5.0-10	—	6.6-7.8	0	0	0	0	
MuA—Moulton loam, saline, 0 to 1 percent slopes									
Moulton, saline	0-3	10-25	—	6.6-7.8	0	0	2.0-4.0	0	
	3-21	5.0-15	—	6.6-7.8	0	0	2.0-4.0	0	
	21-60	5.0-10	—	6.6-7.8	0	0	0	0	
Mo—Notus soils									
Notus	0-1	5.0-10	—	6.1-8.4	0-5	0	0	0	
	1-14	5.0-10	—	6.1-8.4	0-5	0	0	0	
	14-60	1.0-5.0	—	6.1-8.4	0-5	0	0	0	

Engineering Properties—Canyon Area, Idaho													
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—					Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200			
	In				Pct	Pct					Pct		
BsA—Bram silt loam, saline-alkali, 0 to 1 percent slopes													
Bram, saline-alkali	0-17	*Silt loam	CL	A-4	0	0-5	90-95	90-95	90-95	75-90	24-33	7-12	
	17-52	*Silt loam, Loam, very fine sandy loam	CL	A-4	0	0-5	90-95	90-95	90-95	75-90	22-30	7-12	
	52-65	*Fine sandy loam, Gravelly loam	SC	A-2, A-4	0	0	55-100	50-100	45-70	25-40	22-30	7-12	
Ca—Catherine silt loam													
Catherine	0-23	*Silt loam	OH, ML	A-6, A-7	0	0	100	100	95-100	90-99	38-58	11-18	
	23-42	*Silty clay loam, Silt loam	CL, CL-ML	A-6, A-7	0	0	100	100	89-100	84-100	29-52	12-24	
	42-57	*Loam	SC-SM, SM, CL	A-4, A-6	0	0	100	100	83-93	58-68	20-32	6-13	
	57-61	*Fine sandy loam	SC-SM	A-4	0	0	100	100	87-97	41-51	16-27	2-10	
Ch—Chance fine sandy loam													
Chance	0-1	*Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	—	—	
	1-2	*Moderately decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	—	—	
	2-14	*Fine sandy loam	SC	A-4	0	0	100	100	70-85	40-50	22-35	6-13	
	14-26	*Sandy loam, Fine sandy loam	SC	A-4, A-2	0	0-5	80-100	80-100	60-85	30-50	20-30	6-12	
	26-62	*Sand, gravel	GP-GM, SM, SP, SM, GM	A-1, A-2, A-3	0	0-20	25-90	25-90	15-75	5-25	0-19	NP-2	

Engineering Properties-Canyon Area, Idaho

Engineering Properties- Canyon Area, Idaho													
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—					Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200			
	In				Pct	Pct					Pct		
MVA—Moulton fine sandy loam, 0 to 1 percent slopes													
Moulton	0-3	*Fine sandy loam	SC	A-4	0	0	90-100	90-100	65-85	35-55	25-39	6-13	
	3-21	*Fine sandy loam, Sandy loam	SC	A-4	0	0	90-100	90-100	75-90	40-60	22-35	6-13	
	21-60	*Very gravelly sand, Very gravelly loamy sand	GW	A-1	0	0	30-60	30-50	15-35	0-15	17-24	2-6	
MVA—Moulton fine sandy loam, saline, 0 to 1 percent slopes													
Moulton, saline	0-3	*Fine sandy loam	SC	A-4	0	0	90-100	90-100	65-85	35-55	25-39	6-13	
	3-21	*Fine sandy loam, Sandy loam	SC	A-4	0	0	90-100	90-100	75-90	40-60	22-35	6-13	
	21-60	*Very gravelly sand, Very gravelly loamy sand	GW	A-1	0	0	30-60	30-50	15-35	0-15	17-24	2-6	
MVA—Moulton loam, 0 to 1 percent slopes													
Moulton	0-3	*Loam	CL	A-4	0	0	90-100	90-100	75-95	55-75	25-39	6-13	
	3-21	*Fine sandy loam, Sandy loam	SC	A-4	0	0	90-100	90-100	75-90	40-60	22-35	6-13	
	21-60	*Very gravelly sand, Very gravelly loamy sand	GW	A-1	0	0	30-60	30-50	15-35	0-15	17-24	2-6	

Engineering Properties-- Canyon Area, Idaho													
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--					Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200			
	<i>In</i>				<i>Pct</i>	<i>Pct</i>						<i>Pct</i>	
MwA--Moulton loam, saline, 0 to 1 percent slopes													
Moulton, saline	0-3	*Loam	CL	A-4	0	0	90-100	90-100	75-95	55-75	25-38	6-13	
	3-21	*Fine sandy loam, Sandy loam	SC	A-4	0	0	90-100	90-100	75-90	40-60	22-35	6-13	
	21-60	*Very gravelly sand, Very gravelly loamy sand	GW	A-1	0	0	30-60	30-50	15-35	0-15	17-24	2-6	
Ng--Notus soils													
Notus	0-1	*Sandy loam	SM	A-2, A-4	0	0	95-100	90-100	55-85	25-50	17-24	2-6	
	1-14	*Fine sandy loam	SM	A-4, A-2	0	0	95-100	90-100	55-85	25-50	17-24	2-6	
	14-60	*Stratified sand to gravel	GP-GM	A-1	0	0-25	30-50	25-45	15-30	5-10	--	NP	
OgA--Ollaga loam, 0 to 1 percent slopes													
Ollaga	0-8	*Loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-95	60-75	22-41	6-17	
	8-35	*Loam, Fine sandy loam	CL-ML, ML	A-4	0	0	100	100	70-95	50-75	16-31	2-12	
	35-60	*Sand, gravel	GP, SP	A-1	0	0-5	30-60	10-30	5-20	0-5	0-14	NP	
OgB--Ollaga loam, 1 to 3 percent slopes													
Ollaga	0-8	*Loam	CL, CL-ML	A-6, A-4	0	0	100	100	85-95	60-75	22-41	6-17	
	8-35	*Loam, Fine sandy loam	CL-ML, ML	A-4	0	0	100	100	70-95	50-75	16-31	2-12	
	35-60	*Sand, gravel	GP, SP	A-1	0	0-5	30-60	10-30	5-20	0-5	0-14	NP	

Physical Soil Properties—Canyon Area, Idaho

Physical Soil Properties—Canyon Area, Idaho														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kt	T		
BsA—Bram silt loam, saline-alkali, 0 to 1 percent slopes														
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct					
Bram, saline-alkali	0-17	-14-	-71-	12-15-18	1.25-1.35	4.00-14.11	0.14-0.17	0.0-2.9	1.0-2.0	.43	.49	5	4L	86
	17-62	-14-	-71-	12-15-18	1.50-1.60	1.41-4.23	0.08-0.11	0.0-2.9	0.0-0.5	.43	.49			
	62-66	-65-	-20-	12-15-18	1.50-1.60	14.11-42.34	0.07-0.10	0.0-2.9	0.0-0.5	.24	.43			
Ca—Catherine silt loam														
Catherine	0-23	-10-	-68-	18-23-27	1.25-1.35	4.00-14.11	0.19-0.21	0.0-2.9	4.0-10.0	.28	.28	5	5	48
	23-42	-9-	-64-	18-28-35	1.25-1.40	4.00-14.11	0.19-0.21	0.0-2.9	1.0-4.0	.37	.37			
	42-57	-44-	-41-	10-15-20	1.50-1.60	4.00-14.11	0.16-0.21	0.0-2.9	0.0-0.5	.43	.43			
	57-61	-64-	-27-	5-10-15	1.35-1.50	14.11-42.34	0.09-0.15	0.0-2.9	0.0-0.5	.10	.10			
Ch—Chance fine sandy loam														
Chance	0-1	-35-	-50-	0-15-25	0.10-0.30	42.00-705.00	0.30-0.60	—	60.0-95.0			4	8	0
	1-2	-35-	-50-	0-15-25	0.10-0.30	42.00-705.00	0.30-0.60	—	60.0-95.0					
	2-14	-65-	-20-	10-15-20	1.60-1.70	14.11-42.34	0.13-0.15	0.0-2.9	1.0-2.0	.28	.28			
	14-25	-66-	-20-	10-14-18	1.60-1.70	14.11-42.34	0.11-0.15	0.0-2.9	0.0-0.5	.28	.32			
	25-62	—	—	0-3-5	1.70-2.00	42.34-141.14	0.03-0.07	0.0-2.9	0.0-0.5	.10	.10			

Physical Soil Properties-Canyon Area, Idaho

Physical Soil Properties-Canyon Area, Idaho													
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group
										Kw	Kf	T	
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct				
MuA-Moulton fine sandy loam, 0 to 1 percent slopes													
	0-3	-65-	-20-	10-15-20	1.50-1.70	14.11-42.34	0.13-0.15	0.0-2.9	2.0-4.0	.24	.24	.4	3
	3-21	-65-	-20-	10-15-20	1.50-1.70	14.11-42.34	0.11-0.15	0.0-2.9	1.0-2.0	.32	.32		
	21-60	-81-	-2-	5-8-10	1.40-1.60	42.34-141.14	0.04-0.08	0.0-2.9	0.5-1.0	.05	.17		
MuA-Moulton fine sandy loam, saline, 0 to 1 percent slopes													
	0-3	-65-	-20-	10-15-20	1.50-1.70	14.11-42.34	0.13-0.15	0.0-2.9	2.0-4.0	.24	.24	.4	3
	3-21	-65-	-20-	10-15-20	1.50-1.70	14.11-42.34	0.11-0.15	0.0-2.9	1.0-2.0	.32	.32		
	21-60	-81-	-2-	5-8-10	1.40-1.60	42.34-141.14	0.04-0.08	0.0-2.9	0.5-1.0	.05	.17		
MuA-Moulton loam, 0 to 1 percent slopes													
	0-3	-44-	-41-	10-15-20	1.40-1.50	4.00-14.11	0.16-0.18	0.0-2.9	2.0-4.0	.37	.37	.4	5
	3-21	-65-	-20-	10-15-20	1.50-1.70	14.11-42.34	0.11-0.15	0.0-2.9	1.0-2.0	.32	.32		
	21-60	-81-	-2-	5-8-10	1.40-1.60	42.34-141.14	0.04-0.08	0.0-2.9	0.5-1.0	.05	.17		
MuA-Moulton loam, saline, 0 to 1 percent slopes													
	0-3	-44-	-41-	10-15-20	1.40-1.50	4.00-14.11	0.16-0.18	0.0-2.9	2.0-4.0	.37	.37	.4	5
	3-21	-65-	-20-	10-15-20	1.50-1.70	14.11-42.34	0.11-0.15	0.0-2.9	1.0-2.0	.32	.32		
	21-60	-81-	-2-	5-8-10	1.40-1.60	42.34-141.14	0.04-0.08	0.0-2.9	0.5-1.0	.05	.17		

Physical Soil Properties—Canyon Area, Idaho

Physical Soil Properties—Canyon Area, Idaho														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility Index
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct	Kw	Kf	T		
No—Notus soils														
Notus	0-1	-69-	-24-	5-8-10	1.60-1.70	14.11-42.34	0.11-0.13	0.0-2.9	0.5-1.0	28	28	3	4	86
	1-14	-69-	-24-	5-8-10	1.60-1.70	14.11-42.34	0.11-0.13	0.0-2.9	0.5-1.0	28	28			
	14-60	—	—	2-5-7	1.60-1.70	141.14	0.03-0.06	0.0-2.9	0.0-0.5	.05	.24			
OgA—Ollaga loam, 0 to 1 percent slopes														
Ollaga	0-8	-43-	-40-	10-18-25	1.25-1.40	4.00-14.11	0.16-0.18	0.0-2.9	1.0-3.0	24	24	4	4L	86
	8-35	-45-	-43-	5-12-18	1.30-1.45	4.00-14.11	0.13-0.18	0.0-2.9	0.0-1.0	20	20			
	35-60	—	—	0-5-10	1.30-1.60	141.14	0.03-0.06	0.0-2.9	0.0-0.5	.10	.20			
OgB—Ollaga loam, 1 to 3 percent slopes														
Ollaga	0-8	-43-	-40-	10-18-25	1.25-1.40	4.00-14.11	0.16-0.18	0.0-2.9	1.0-3.0	24	24	4	4L	86
	8-35	-45-	-43-	5-12-18	1.30-1.45	4.00-14.11	0.13-0.18	0.0-2.9	0.0-1.0	20	20			
	35-60	—	—	0-5-10	1.30-1.60	141.14	0.03-0.06	0.0-2.9	0.0-0.5	.10	.20			
OIA—Ollaga loam, saline-alkali, 0 to 1 percent slopes														
Ollaga, saline-alkali	0-8	-43-	-40-	10-18-25	1.25-1.40	4.00-14.11	0.16-0.18	0.0-2.9	1.0-3.0	24	24	4	4L	86
	8-35	-45-	-43-	5-12-18	1.30-1.45	4.00-14.11	0.13-0.18	0.0-2.9	0.0-1.0	20	20			
	35-60	—	—	0-5-10	1.30-1.60	141.14	0.03-0.06	0.0-2.9	0.0-0.5	.10	.20			

ET Idaho 2009: Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho

Please send suggestions for improving this site to robinson@kimberly.uidaho.edu Copyright 2010, University of Idaho.

Caldwell (NWS --101380)

Statistics based on thirty

For a different land cover or crop click on the above link.

You can highlight this table and copy via the clipboard to a Microsoft Excel or OpenOffice spreadsheet to plot or otherwise work with this data.

Grass Pasture - high management															
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	mm/day												mm		
Monthly ^c	0.16	0.14	0.97	3.98	5.70	6.55	7.17	5.58	3.40	1.63	0.57	0.40	1069	-36	1033
15-Day Moving Average ^d	0.15	0.07	0.91	4.04	5.80	6.58	7.25	5.49	3.32	1.62	0.55	0.38			
7-Day Moving Average ^e	0.15	0.12	0.94	4.00	5.72	6.54	7.26	5.56	3.33	1.62	0.58	0.38			
3-Day Moving Average ^f	0.15	0.14	0.97	4.00	5.70	6.54	7.20	5.59	3.37	1.63	0.56	0.39			
Standard Deviation	mm/day												mm		
Monthly	0.41	0.33	1.26	1.04	1.34	0.84	0.92	1.10	0.76	0.97	0.63	0.60	87	29	95
15-Day Moving Average	0.39	0.40	1.09	1.19	1.34	1.16	0.69	1.16	1.08	0.96	0.74	0.60			
7-Day Moving Average	0.52	0.57	1.39	1.69	1.86	1.79	0.89	1.47	1.45	1.32	1.11	0.85			
3-Day Moving Average	0.71	0.76	1.81	2.35	2.52	2.47	1.38	1.86	1.95	1.71	1.63	1.18			
20% Exceedance	mm/day												mm		
Monthly	0.02	0.20	1.67	4.64	6.38	7.48	7.62	5.89	3.94	2.23	0.01	0.02	1131	-3	1109
15-Day Moving Average	0.14	0.37	2.87	5.78	7.86	8.11	8.21	6.88	4.98	3.14	0.45	0.15			
7-Day Moving Average	0.24	0.73	3.96	7.04	8.94	9.19	8.73	7.90	5.88	4.18	0.94	0.28			
3-Day Moving															

<http://www.kimberly.uidaho.edu/ETIdaho/stcvtstats.php?station=101380&cover=15&stats...> 11/1/2010

Average	0.41	1.02	4.90	8.32	9.85	10.12	9.79	8.91	7.44	5.27	1.34	0.42			
80% Exceedance	mm/day												mm		
Monthly	0.43	-0.01	0.08	2.90	4.94	5.80	6.55	5.11	2.94	1.12	1.08	0.80	973	-61	929
15-Day Moving Average	0.81	-0.22	-0.34	2.12	3.70	4.51	5.76	3.84	1.77	0.12	2.05	1.59			
7-Day Moving Average	1.69	-0.57	-1.67	0.34	2.04	2.02	5.17	2.33	0.47	1.55	3.19	2.69			
3-Day Moving Average	3.54	-1.43	-3.94	3.36	-1.28	-1.57	3.36	0.09	2.67	3.90	5.48	4.78			
Ave Highest P_{def}	mm/day												--		
15-Day Moving Average ^a	0.08	0.37	1.82	4.96	6.77	7.64	7.71	6.34	4.17	2.49	0.22	0.06			
7-Day Moving Average ^b	0.18	0.72	2.66	6.19	7.82	8.56	8.24	7.20	5.20	3.37	0.61	0.21			
3-Day Moving Average ^c	0.33	0.96	3.54	7.37	9.16	9.67	9.34	8.35	6.58	4.17	1.09	0.35			
Ave Lowest P_{def}	mm/day												--		
15-Day Moving Average ^a	0.40	-0.12	0.12	3.12	4.74	5.52	6.63	4.67	2.45	0.81	1.16	0.85			
7-Day Moving Average ^b	0.67	-0.45	-0.64	1.75	3.08	3.84	5.90	3.57	1.46	0.08	2.13	1.59			
3-Day Moving Average ^c	1.50	-1.17	-2.09	0.44	0.55	1.33	4.24	2.24	0.01	1.59	3.93	3.01			
Special normal distribution parameters for monthly, seasonal, and annual intervals													--		
Skew	0.51	2.06	0.30	0.51	-0.15	-0.08	0.19	0.01	0.59	0.22	0.10	0.32	-0.29	-0.27	-0.04
Kurtosis	0.97	11.42	0.96	3.20	0.78	1.92	0.67	1.10	3.53	0.78	2.34	0.67	2.50	2.14	2.67

^a Growing Season: This is usually the time from green up or planting in the spring to a killing frost or harvest in the fall. It is not applicable for entries without a growing season and will be blank.

^b Nongrowing Season: This is usually the time from a killing frost or harvest in the fall to the of green up in the spring. It is not applicable for entries without a growing season.

^c Mean of the average daily value for month

^d Mean of the fourteen 15-day period averages contained in the month

^e Mean of the twenty three 7-day period averages contained in the month

^f Mean of the twenty seven 3-day period averages contained in the month

^g Mean of the highest/lowest 15-day period average in month

^h Mean of the highest/lowest 7-day period average in month

ⁱ Mean of the highest/lowest 3-day period average in month

This work and report were prepared by the University of Idaho Research and Extension Center at Kimberly, Idaho under contract with the Idaho Department of Water Resources. Work was supported by funding from IDWR and the Idaho Agricultural Experiment Station and Idaho Engineering Experiment Station. The authors gratefully acknowledge the long-term evapotranspiration data collection and long-standing advice provided by Dr. James L. Wright, USDA-ARS Kimberly (ret.), the more than two decades of high quality agricultural weather data collection by the U.S. Bureau of Reclamation AgriMet system, and the very long-standing, routine data collection by the hundreds of cooperative weather station volunteers across the state who, for more than one-hundred years, have faithfully observed daily air temperature and precipitation.

The citation for the evapotranspiration data used from this site should be: *Allen, Richard G. and Clarence W. Robison, 2009. 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.*

Questions regarding the data should be addressed to Clarence W. Robison or Richard G. Allen, University of Idaho, Kimberly Research and Extension Center, 3793 North 3600 East, Kimberly, ID 83341. Telephone (208)-423-6610

University of Idaho
A LEGACY OF LEADING
Copyright 2010, University of Idaho.

Assumptions: Pasture, corrugations, 2 ft. corrugate spacing, 12 hour set times, furrow length based on average of furrow lengths in fields containing primarily that soil type.

	Pct of total area	IF	MAD (in)	Pct Eff. (0.5, 1% slopes)	Irr. Req. (cfs/ac)
MtA, MuA:	44.6%	0.7	1.83	27%, 28%	0.052, 0.050
No	15.4%	.55	1.28	27%, 27%	0.053, 0.053
BsA	<u>9.8%</u>	.35	2.22	64%, 72%	0.022, 0.019
	69.8%				

FIELD IRRIGATION REQUIREMENT

Initials: MP
 date: 11/01/10
 Claimant = Pioneer - Franklin Ditch Co. (M/A & M/A soil types)
 Weather Station = Caldwell (0.5% slope)

crop	acres	irrig. system	eff. (%)	Monthly ET (mm/day)												net irrig. app. (in)		ET ratio	Irrig. freq. (days)	Gross Irrigation Application (peak period ET/eff. in mm/day)												season (mm/yr)
				1	cor	27	1.67	mar	apr	may	jun	jul	aug	sep	oct	2.23	1.83			1.12	5.4	mar	apr	may	jun	jul	aug	sep	oct	9.25		
pasture																																

pasture 1 cor 27 1.67 4.64 6.38 7.48 7.62 5.89 3.94 2.23 1.83 1.12 5.4 6.83 19.25 28.47 31.03 31.61 24.43 16.34 9.25

Summary 1

Peak Gross Irrigation Application (mm/day) = 31.61
 On-Farm Irrigation Requirement (cfs/acre) = 0.052
 Total On-Farm Irrigation Requirement (cfs) = 0.05
 Irrigation Diversion Volume (cfs) = 0.00
 Total Irrigation Diversion Volume (ac-ft/yr) = 0

6.83 19.25 28.47 31.03 31.61 24.43 16.34 9.25

FIELD IRRIGATION REQUIREMENT

Initials: MP Claimant = Pioneer - Franklin Ditch Co. (MVA & MVA soil types)
 date: 11/01/10 Weather Station = Caldwell (1.0% slope)

crop	acres	irrig. system	eff. (%)	Monthly ET (mm/day)												net irrig. app. (mm/yr)	ET ratio	irrig. freq. (days)	Gross Irrigation Application (peak period ET/eff. in mm/day)												season (mm/yr)
				mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb				mar	apr	may	jun	jul	aug	sep	oct	nov	dec			
pasture	1	cor	28	1.67	4.64	6.38	7.48	7.62	5.89	3.94	2.23					1.83	1.12	5.4	6.68	16.56	25.52	29.92	30.48	23.58	15.76	8.92				8.92	

Summary 1

Peak Gross Irrigation Application (mm/day) = 30.48
 On-Farm Irrigation Requirement (cfs/acre) = 0.050
 Total On-Farm Irrigation Requirement (cfs) = 0.05
 Irrigation Diversion Volume (ft³/yr) = 0
 Total Irrigation Diversion Volume (ac-ft/yr) = 0

6.68 16.56 25.52 29.92 30.46 23.58 15.76 8.92

Run 1: Soil types MtA & MuA, pasture, 2 ft. spacing, 0.5% slope

```

S:\RESOUR\INDWR\Hubble\FURROW.EXE
INTAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fn> = 1.83 INCHES
FURROW SLOPE <S> = 0.005 FEET/FOOT
FURROW SPACING <W> = 2.00 FEET
FURROW LENGTH <L> = 850 FEET
INFLOW RATE <Q> = 10.0 GPH/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Tt> = 200.6 MINUTES: OR 3.3 HOURS
GROSS APPLICATION <FG> = 6.79 INCHES
NET APPLICATION <Fx> = 5.58 INCHES
RUNOFF <RO> = 0.13 INCHES
DEEP PERCOLATION <DP> = 4.83 INCHES
EFFICIENCY <E> = 26.94 %
TO CHANGE: PRESS (EXISTING)
    Design Application <1> 1.83 in
    Furrow Slope <2> 0.005 ft/ft
    Furrow Spacing <3> 2.00 ft
    Furrow Length <4> 850 ft
    Furrow Intake Family <5> 0.70
    Inflow Rate <6> 10.0 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>? _
  
```

Run 1: Soil types MtA & MuA, pasture, 2 ft. spacing, 1% slope

```

S:\RESOUR\INDWR\Hubble\FURROW.EXE
INTAKE FAMILY <If> = 0.70
DESIGN APPLICATION <Fn> = 1.83 INCHES
FURROW SLOPE <S> = 0.010 FEET/FOOT
FURROW SPACING <W> = 2.00 FEET
FURROW LENGTH <L> = 850 FEET
INFLOW RATE <Q> = 9.5 GPH/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Tt> = 124.6 MINUTES: OR 2.1 HOURS
GROSS APPLICATION <FG> = 6.45 INCHES
NET APPLICATION <Fx> = 5.66 INCHES
RUNOFF <RO> = 0.21 INCHES
DEEP PERCOLATION <DP> = 4.41 INCHES
EFFICIENCY <E> = 28.35 %
TO CHANGE: PRESS (EXISTING)
    Design Application <1> 1.83 in
    Furrow Slope <2> 0.010 ft/ft
    Furrow Spacing <3> 2.00 ft
    Furrow Length <4> 850 ft
    Furrow Intake Family <5> 0.70
    Inflow Rate <6> 9.5 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>? _
  
```

SOIL CHARACTERISTICS

initials: mp date: October 28, 2010

Soil Type = Moulton fine sandy loam - Mta 0-3" = Fine sandy loam; 3-21" = Fine sandy loam, sandy loam; 21-60" = Ver
Source of Soils Data = Soil Survey of Canyon Area, Idaho, Version 8, June 25, 2008

soil depth (inches)	AWC (in/in)		PH		organic (%)		soil depth (ft)	AWC (inches)		family		intake	
	lower	upper	lower	upper	lower	upper		lower	upper	lower	upper	lower	upper
0	3	0.13	0.15	6.6	7.8	4	1	1.59	3	0.7			
3	21	0.11	0.15				2	2.94					
21	60	0.04	0.08				3	3.66					
							4	4.38		alternate			
							5	5.10		method			
							3						0.7

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	2.55
corn (field or silage)	4	0.5	2.19
grain (winter or spring)	4	0.5	2.19
pasture (or grass hay)	3	0.5	1.83
other (enter below)	1	0.5	0.80
turf	5	0.5	2.55
orchard			

Soil Type = Moulton Fine Sandy Loam (MuA)
0-3" = SC; 3-21" = SC; 21-60" = GW
Source of Soils Data = Soil Survey of Canyon Area, Idaho. Version 8, Jun 25, 2008

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	2.55
corn (field or silage)	4	0.5	2.19
grain (winter or spring)	4	0.5	2.19
pasture (or grass hay)	3	0.5	1.83
other (enter below)			
turf	1	0.5	0.80
orchard	5	0.5	2.55

FIELD IRRIGATION REQUIREMENT

initials: MP Claimant = Pioneer - Franklin Ditch Co. (No soil type)
 date: 11/01/10 Weather Station = Caldwell

crop	acres	irrig. system	elf. (%)	Monthly ET (mm/day)												net AVE IR season (mm/yr)	ET ratio	irrig. freq. (days)	Gross Irrigation Application (peak period ET/eff. in mm/day)												season (mm/yr)
				mar	apr	may	jun	jul	aug	sep	oct	AVE IR season (mm/yr)	ET ratio	irrig. freq. (days)	mar				apr	may	jun	jul	aug	sep	oct						
pasture	1	cor	27	1.57	4.64	6.38	7.48	7.62	5.89	3.94	2.23	1.28	1.13	3.8	6.99	19.42	25.70	31.31	31.89	24.85	16.48	9.33									

Summary 1
 Peak Gross Irrigation Application (mm/day) = 31.89
 On-Farm Irrigation Requirement (cfs/acre) = 0.053
 Total On-Farm Irrigation Requirement (cfs) = 0.05
 Irrigation Diversion Volume (ft/yr) = 0.00
 Total Irrigation Diversion Volume (ac-ft/yr) = 0

Run 3: Soil type No, pasture, 2 ft. spacing, 0.5% slope

```

S:\RESOUR~1\MDWR\Hubble\FURROW.EXE
INTAKE FAMILY <If> = 0.55
DESIGN APPLICATION <Fn> = 1.28 INCHES
FURROW SLOPE <S> = 0.005 FEET/FOOT
FURROW SPACING <W> = 2.00 FEET
FURROW LENGTH <L> = 600 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Tt> = 211.0 MINUTES: OR 3.5 HOURS
GROSS APPLICATION <FG> = 4.81 INCHES
NET APPLICATION <Fx> = 3.87 INCHES
RUNOFF <RO> = 0.14 INCHES
DEEP PERCOLATION <DP> = 3.40 INCHES
EFFICIENCY <E> = 26.60 %
TO CHANGE: PRESS (EXISTING)
    Design Application <1> 1.28 in
    Furrow Slope <2> 0.005 ft/ft
    Furrow Spacing <3> 2.00 ft
    Furrow Length <4> 600 ft
    Furrow Intake Family <5> 0.55
    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>?

```

Run 4: Soil type No, pasture, 2 ft. spacing, 1% slope

```

S:\RESOUR~1\MDWR\Hubble\FURROW.EXE
INTAKE FAMILY <If> = 0.55
DESIGN APPLICATION <Fn> = 1.28 INCHES
FURROW SLOPE <S> = 0.010 FEET/FOOT
FURROW SPACING <W> = 2.00 FEET
FURROW LENGTH <L> = 600 FEET
INFLOW RATE <Q> = 5.0 GPM/FURROW
APPLICATION TIME <Ti> = 12 HOURS
*****
ADVANCE TIME <Tt> = 109.8 MINUTES: OR 1.8 HOURS
GROSS APPLICATION <FG> = 4.81 INCHES
NET APPLICATION <Fx> = 4.13 INCHES
RUNOFF <RO> = 0.32 INCHES
DEEP PERCOLATION <DP> = 3.21 INCHES
EFFICIENCY <E> = 26.60 %
TO CHANGE: PRESS (EXISTING)
    Design Application <1> 1.28 in
    Furrow Slope <2> 0.010 ft/ft
    Furrow Spacing <3> 2.00 ft
    Furrow Length <4> 600 ft
    Furrow Intake Family <5> 0.55
    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>?

```

SOIL CHARACTERISTICS initials: mp date: MAY 6, 2009

Soil Type = Notus (No) 0-1" = SM; 1-14" = SM; 14-60" = GP-GM
 Source of Soils Data = Soil Survey of Canyon Area, Idaho. Version 8, Jun 25, 2008

soil depth (inches)	AWC (in/in)	PH	organic (%)	soil depth (ft)	AWC (inches)	intake family
lower	upper	lower	upper	lower	upper	lower
0	1	0.11	0.13	6.1	8.4	0.5
1	14	0.11	0.13	1	1.44	2
14	60	0.03	0.05	2	2.08	0.55
				3	2.56	
				4	3.04	alternate
				5	3.52	method
						2
						0.55

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point (inches)	MAD
alfalfa (hay or seed)	5	0.5	1.76
corn (field or silage)	4	0.5	1.52
grain (winter or spring)	4	0.5	1.52
pasture (or grass hay)	3	0.5	1.28
other (enter below)			
turf	1	0.5	0.72
orchard	5	0.5	1.76

FIELD IRRIGATION REQUIREMENT

Initials: MP
 date: 11/02/10
 Claimant = Pioneer - Franklin Ditch Co. (BSA soil type)
 Weather Station = Caldwell (0.5% slope)

crop	acres	irrig. system	eff. (%)	Monthly ET (mm/day)												net irrig. app. season (in)	ET ratio	irrig. freq. (days)	Gross Irrigation Application (peak period ET/eff. in mm/day)												season (mm/yr)
				mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb				mar	apr	may	jun	jul	aug	sep	oct	nov	dec			
pasture	1	cor	64	1.57	4.64	6.38	7.48	7.62	5.89	3.94	2.23					2.22	1.11	6.7	2.90	8.05	11.07	12.97	13.22	10.22	6.83	3.87				3.87	

Summary 1

Peak Gross Irrigation Application (mm/day) = 13.22
 On-Farm Irrigation Requirement (cfs/acre) = 0.022
 Total On-Farm Irrigation Requirement (cfs) = 0.02
 Irrigation Diversion Volume (ft³/yr) = 0.00
 Total Irrigation Diversion Volume (ac-ft/yr) = 0

2.90 8.05 11.07 12.97 13.22 10.22 6.83 3.87

FIELD IRRIGATION REQUIREMENT

Initials: MP
 date: 11/02/10
 Claimant = Pioneer - Franklin Ditch Co. (BSA soil type)
 Weather Station = Caldwell (1.0% slope)

crop	acres	irrig. system	eff. (%)	Monthly ET (mm/day)												net irrig. season app. (mm/yr)	irrig. freq. (days)	Gross Irrigation Application (peak period ET/eff. in mm/day)												season (mm/yr)
				cor	1	2	3	4	5	6	7	8	9	10	11			12	mar	apr	may	jun	jul	aug	sep	oct				
pasture	72	1	72		1.67	4.64	6.38	7.48	7.62	5.89	3.94	2.23	2.22	1.11	6.7	2.57	7.15	9.84	11.53	11.75	9.08	6.07	3.44							

Summary 1

Peak Gross Irrigation Application (mm/day) = 11.75
 On-Farm Irrigation Requirement (cfs/acre) = 0.019
 Total On-Farm Irrigation Requirement (cfs) = 0.02
 Irrigation Diversion Volume (ft³/yr) = 0
 Total Irrigation Diversion Volume (ac-ft/yr) = 0

2.57 7.15 9.84 11.53 11.75 9.08 6.07 3.44

Run 5: Soil type BsA, pasture, 2 ft. spacing, 0.5% slope

```

S:\RESOUR-1\MDWR\Hubble\FURROW.EXE
INTAKE FAMILY <IF>      = 0.35
DESIGN APPLICATION <Fn> = 2.22 INCHES
FURROW SLOPE <S>       = 0.005 FEET/FOOT
FURROW SPACING <W>     = 2.00 FEET
FURROW LENGTH <L>      = 750 FEET
INFLOW RATE <Q>        = 4.5 GPM/FURROW
APPLICATION TIME <Ti>   = 12 HOURS
*****
ADVANCE TIME <TT>      = 312.4 MINUTES; OR 5.2 HOURS
GROSS APPLICATION <FG> = 3.46 INCHES
NET APPLICATION <Fx>   = 2.27 INCHES
RUNOFF <RO>           = 0.39 INCHES
DEEP PERCOLATION <DP> = 0.86 INCHES
EFFICIENCY <E>        = 64.07 %
TO CHANGE:             PRESS (EXISTING)
  Design Application    <1>    2.22 in
  Furrow Slope          <2>    0.005 ft/ft
  Furrow Spacing        <3>    2.00 ft
  Furrow Length         <4>    750 ft
  Furrow Intake Family  <5>    0.35
  Inflow Rate           <6>    4.5 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>?

```

Run 6: Soil type BsA, pasture, 2 ft. spacing, 1% slope

```

S:\RESOUR-1\MDWR\Hubble\FURROW.EXE
INTAKE FAMILY <IF>      = 0.35
DESIGN APPLICATION <Fn> = 2.22 INCHES
FURROW SLOPE <S>       = 0.010 FEET/FOOT
FURROW SPACING <W>     = 2.00 FEET
FURROW LENGTH <L>      = 750 FEET
INFLOW RATE <Q>        = 4.0 GPM/FURROW
APPLICATION TIME <Ti>   = 12 HOURS
*****
ADVANCE TIME <TT>      = 193.1 MINUTES; OR 3.2 HOURS
GROSS APPLICATION <FG> = 3.08 INCHES
NET APPLICATION <Fx>   = 2.49 INCHES
RUNOFF <RO>           = 0.17 INCHES
DEEP PERCOLATION <DP> = 0.69 INCHES
EFFICIENCY <E>        = 72.08 %
TO CHANGE:             PRESS (EXISTING)
  Design Application    <1>    2.22 in
  Furrow Slope          <2>    0.010 ft/ft
  Furrow Spacing        <3>    2.00 ft
  Furrow Length         <4>    750 ft
  Furrow Intake Family  <5>    0.35
  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>?

```

SOIL CHARACTERISTICS initials: ntp date: MAY 6, 2009

Soil Type = Bram Silt Loam 0-17" = CL; 17-52" = CL; 52-65" = SC Version 8, Jun 25, 2008

Source of Soils Data = Soil Survey of Canyon Area, Idaho.

soil depth (inches)	AWC (in/in)		PH		organic (%)		soil depth (ft)	AWC (inches)		intake family	
	lower	upper	lower	upper	lower	upper		1	2	flood	furrow
0	17	0.14	0.17	8.5	9.6	1	2	1	1.86	0.5	0.35
17	52	0.08	0.11					2	3.30		
52	65	0.07	0.1					3	4.44		
								4	5.58	alternate	
								5	6.64	method	
										2	0.55

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	3.32
corn (field or silage)	4	0.5	2.79
grain (winter or spring)	4	0.5	2.79
pasture (or grass hay)	3	0.5	2.22
other (enter below)			
turf	1	0.5	0.93
orchard	5	0.5	3.32

Pots in pencil are based on Mason Ct. Ditch Co. boundary, whereas other pots are based on AOI that I plotted in Web Soil Survey. Pots in pencil are more accurate.

Map Unit Legend

Canyon Area, Idaho (ID665)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BdA	Baldock loam, 0 to 1 percent slopes	90.1	3.3% 3.0%
BdB	Baldock loam, 1 to 3 percent slopes	6.2	0.2%
BrA	Bram silt loam, 0 to 1 percent slopes	99.6	25% 3.4%
BsA	Bram silt loam, saline-alkali, 0 to 1 percent slopes	262.9	9.8% 8.9%
Ca	Catherine silt loam	44.8	1.4% 1.5%
Ch	Chance fine sandy loam	141.3	5.0% 4.8%
FaA	Falk fine sandy loam, 0 to 2 percent slopes	14.6	0.3% 0.6%
Gp	Gravel pit	7.6	0.2% 0.3%
LhE	Lankbush-Power complex, 12 to 30 percent slopes	10.4	0.4% 0.4%
LIA	Letha fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	15.8	0.6% 0.5%
MkA	Minidoka silt loam, 0 to 1 percent slopes	2.6	0.1%
MkB	Minidoka silt loam, 1 to 3 percent slopes	27.7	0.3% 0.9%
MIA	Moulton fine sandy loam, 0 to 1 percent slopes	645.5	25.8% 21.8%
MuA	Moulton fine sandy loam, saline, 0 to 1 percent slopes	533.8	19.1% 18.0%
MvA	Moulton loam, 0 to 1 percent slopes	75.0	3.1% 2.5%
MwA	Moulton loam, saline, 0 to 1 percent slopes	115.3	3.2% 3.9%
No	Notus silt	530.7	15.4% 17.9%
OgA	Oilaga loam, 0 to 1 percent slopes	48.7	1.7% 1.6%
OgB	Oilaga loam, 1 to 3 percent slopes	5.6	0.2% 0.2%
OIA	Oilaga loam, saline-alkali, 0 to 1 percent slopes	55.5	0.2% 1.9%
PhA	Power silt loam, 0 to 1 percent slopes	44.1	1.3% 1.5%
PhB	Power silt loam, 1 to 3 percent slopes	16.8	0.5% 0.6%
PhC	Power silt loam, 3 to 7 percent slopes	4.6	0.2% 0.2%
PhD	Power silt loam, 7 to 12 percent slopes	10.6	0.4% 0.4%
PpA	Power-Purdum silt loams, 0 to 1 percent slopes	7.2	0.2% 0.2%
PpC	Power-Purdum silt loams, 3 to 7 percent slopes	5.4	0.2% 0.2%
PpD	Power-Purdum silt loams, 7 to 12 percent slopes	1.5	0.1%
Re	Riverwash	68.8	0.9% 2.3%
Tc	Terrace escarpments	29.2	0.9% 1.0%
W	Water	40.9	0.5% 1.4%
Totals for Area of Interest		2,980.9	100.0%

out of area

out of area

69.8%

not likely irrigated

not irrigated

**SPF**Water Engineering, LLC
water resource consultantsBy _____ Date _____ Client _____ .8-45 Sheet _____ of _____
Chkd By _____ Description _____ Job No _____Elevations within Mason Ck Ditch Co. : 2380 - 2400 ft averageElevation of Caldwell weather station : 2370 ftDistance from Caldwell W.S. to Ditch Co : 0.8 - 4.5 miles (closest one)

Furrow lengths

Mt A	Mt A	MuA	No	BsA
864	455 804	542 766	517	1302
818	111 699	822 1587	591	861
1357	580 657	749 724	419	689
1104	602 1293	879 839	723	468
1030	868	1064	630	484
803	790	569	417	848
1084	1349	822	792	866
1675	622	958	550	813
832	1104	1340		199
1300	888	901		

Avg. = ~~1086~~ $\Rightarrow$ 1100 ft
844 $\Rightarrow$ 850 ftAvg. = 897 $\Rightarrow$ 900 ftAvg. = 580 $\Rightarrow$ 600 ftAvg. = 725 $\Rightarrow$ 750 ft

Slope

Mt A

0-1% $\Rightarrow$ 0.5%

MuA

0-1% $\Rightarrow$ 0.5%

No

not given; assumed 0% - 1% $\Rightarrow$ 0.5% $Q_{max} = 40\% = 40\% \times 80 = 32 \text{ gpm}$ or $Q_{max} = 40\% = 40 \text{ gpm}$ or $Q_{max} = 10 \text{ gpm}$

Eff. = 27% @ 0.5% slope

Eff. = 27% @ 0.5% slope

Eff. = 27% @ 0.5% slope

Eff. = 28% @ 1.0% slope

Eff. = 28% @ 1.0% slope

Eff. = 27% @ 1% slope

Chance soil : 5.0% of total area, but located mostly in strips along edges of fields + non-irrigated lands.

BsA

Eff. = 64% @ 0.5% slope

Eff. = 72% @ 1.0% slope