

SOUTH IDAHO PRESS

BURLEY, IDAHO

AFFIDAVIT OF PUBLICATION

County of Cassia,)
) ss.
STATE OF IDAHO)

Donna Fitzhugh being first
duly sworn, deposes and says that she is the

clerk of the South Idaho
Press, a daily newspaper published at Bur-
ley Idaho, in the county aforesaid and that
the paper is of general circulation therein.
Deponent further states that the printed no-
tice attached hereto was duly published
according to law in the regular editions of

The South Idaho Press for three
consecutive weeks, commencing with the issue

dated Jan 22 1980, and ending

with the issue dated Feb 5, 1980

Donna Fitzhugh
Subscribed and sworn to before me

this 6th day of Feb

1980.

Norma M. Peterson Notary Public

Cost of Publication 12.88

Notary Fee

Total Cost 12.88

NOTARY PUBLIC RESIDING AT
RUPERT, IDAHO. MY COMMISSION
EXPIRES JUNE 21, 1981

RECEIVED

FEB 11 1980

Department of Water Resources
Southern District Office

80-17

**NOTICE OF CLAIMS
TO WATER RIGHTS**

Notice is hereby given that the following
claim(s) to water right(s) have been established by
diversion and application to beneficial use:

43-4095

TOWN & COUNTRY GARDENS, A PARTNERSHIP,
P.O. BOX 641, MALTA, ID 83342, Source:
GROUNDWATER, Priority Date: 07/26/1949,
Amount: 1.71 CFS, Diversion Point: SESE Sec 23 T
15S R 26E, CASSIA Co., Use: HEATING (1.71 CFS)
from 01/01 to 12/31, Place of Use: SESE Sec 23 T
15S R 26E, Diversion Means: DIVERSION FROM
TWO WELLS THEN DELIVERED TO P/U

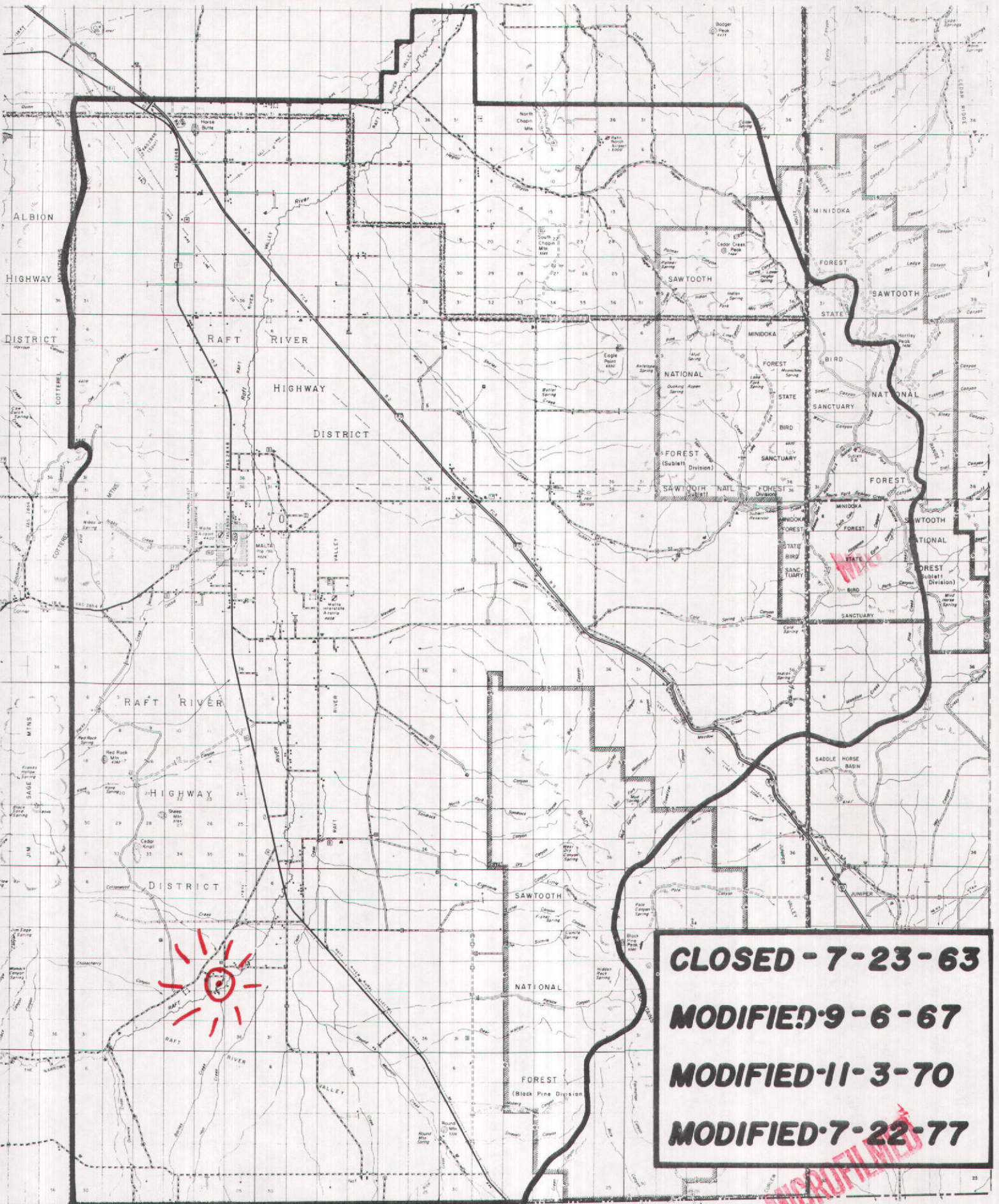
Any exception to any claim of water right may
be filed with the Director of the Idaho Department
of Water Resources, 1041 Blue Lakes Blvd. North,
Twin Falls, Idaho 83301.

C. STEPHEN ALLRED
Director

Published in the South Idaho Press on January
22, 29 and February 5, 1980.

OK
2/11/80
ADm
MICROFILMED

Raft River Critical Groundwater Area



CLOSED - 7-23-63
MODIFIED - 9-6-67
MODIFIED - 11-3-70
MODIFIED - 7-22-77

SCALE - 1/4" = 1 mile

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

CLAIM TO A WATER RIGHT

Department of Water Resources
Southern District Office

Under the provisions of Section 42-243, Idaho Code, any person using or claiming rights to the public waters of Idaho established by diversion and application to a beneficial use must file a claim with the Department of Water Resources on or before June 30, 1983. Exempted from this filing are single family domestic uses as defined in Section 42-230(d), Idaho Code. Also exempted are rights represented by a permit, license, decree, adjudicated right, or a previously filed claim.

The filing of this claim does not confirm the water right claimed but failure to file may result in forfeiture of a water right.

Notice is hereby given that Town & Country Gardens, a partnership
(Name of Claimant)
P. O. Box 641 - Malta, Idaho 83342 Telephone No. 645-2335
(Mailing Address) (Zip Code)

claims a right to the diversion and beneficial use of the surface or ground water. The extent and nature of said claim is as follows:

(1) Date of priority: (When was the water first applied to a beneficial use) July 26, 1949

A claim is not acceptable on a ground water source with a priority later than March 25, 1963 or on a surface water source with a priority later than May 20, 1971. An exception is that a claim may be filed on single family domestic use from a ground water source.

(2) Describe the source of water: (Name of stream, lake, spring, etc., or ground water)
groundwater tributary to _____

(3) Describe the purpose for which the water has been used and the time during the year when you have used the right claimed:

	(cfs, gpd, AFA)	(Domestic, Irrigation, Stock, Etc.)	(Both dates inclusive)	
			(Mo., Day)	(Mo., Day)
Quantity <u>1.71</u>	Use <u>heating</u>	Period of Use From <u>Jan 1</u>	To <u>Dec. 31</u>	
Quantity _____	Use _____	Period of Use From _____	To _____	
Quantity _____	Use _____	Period of Use From _____	To _____	
Quantity _____	Use _____	Period of Use From _____	To _____	
Quantity _____	Use _____	Period of Use From _____	To _____	

(4) TOTAL QUANTITY USED.

(5) A) Point of diversion: (Location of point where water is diverted from its source)
SE ¼ SE ¼, Sec. 23 Twp. 15S Rge. 26E B.M., County of Cassia
Additional points of diversion: _____

B) Describe means of diversion of water: (Pump and pipeline, well, diversion dam, reservoir, length of ditch and field, etc.). Give sizes and capacities: be as specific as possible. Describe any changes in the system and give the date of the change. 2 wells

(6) A) Describe location of use by listing number of irrigated acres within each 40-acre tract in appropriate box. If use is not for irrigation, place an "X" in appropriate box to show location.

T	R	SEC.	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
15S	26E	23																X	

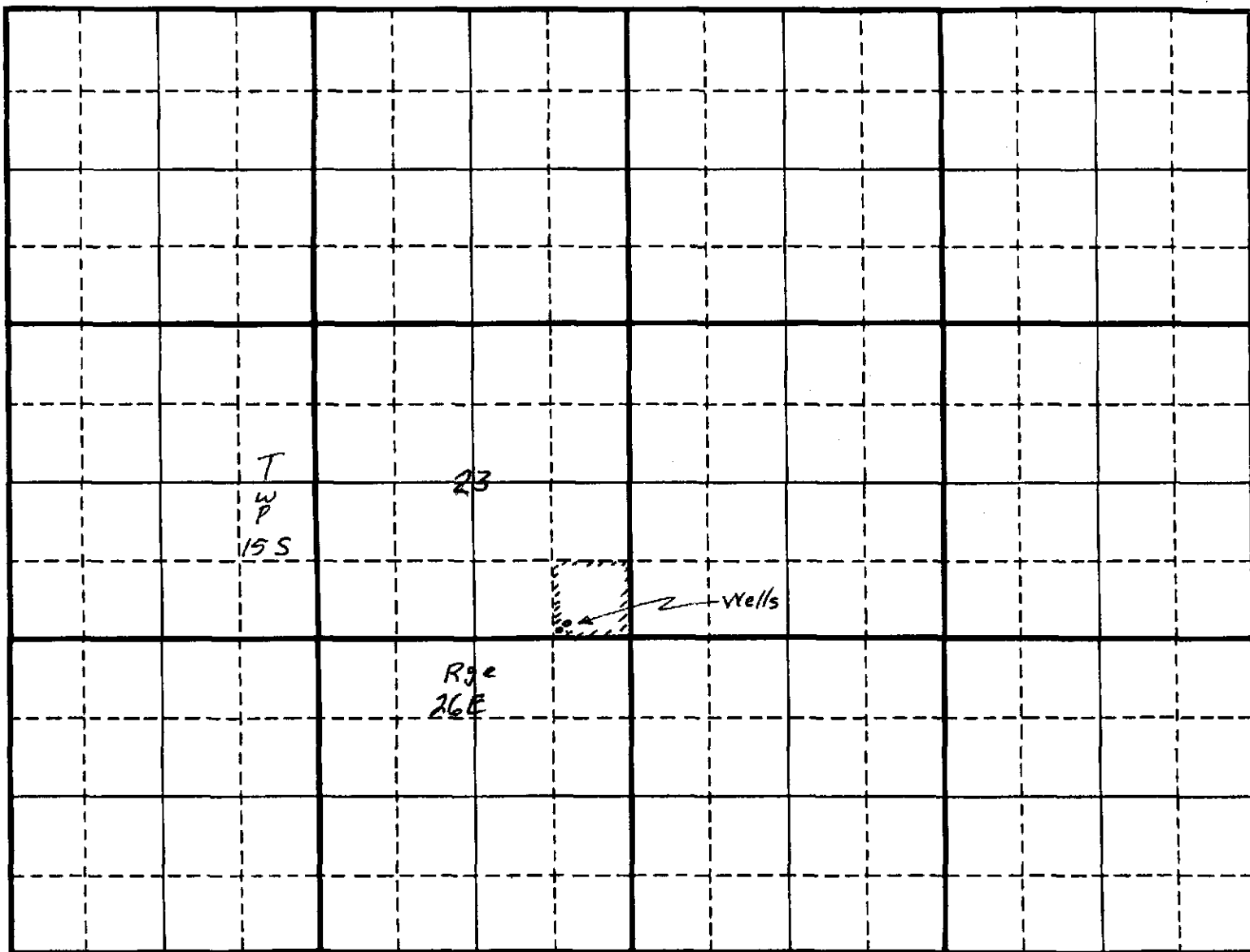
No. of acres _____

B) If water is used for other than irrigation, fully describe that use, being as specific as possible:
Water has been used for heating poultry raising facilities and greenhouses. Water is used for heating greenhouses at the present time.

NOTE: Include here the type and number of stock watered: _____

(7) If you are claiming water as a member of an organization, list name of organization: _____

(8) Remarks The water from these wells is diverted for irrigation under licenses
43-2327 and 43-2461



Scale: 2 inches equal 1 mile.

Map should show the location of the point of diversion and the place of use of the water by 40-acre subdivisions, section, township and range of the public land survey system.

State of Idaho)
County of Twin Falls) ss.

Be it known that the undersigned, being duly sworn, deposes and says that he, she, they subscribed the foregoing claim to a water right, together with all attached information, and that the matters and facts therein are true to the best of the affiant's knowledge.

Harry C. Crook (Pantner)
(Claimant)

Sworn to before me this 4th day of January, 1980.

Loren O. Hudson
Notary Public
Residing at Twin Falls, ID

My commission expires Life

FOR DEPARTMENT USE ONLY

Received by LD Date 1-4-80 Exception filed by: _____ Date _____
Prelim. check by JD Date 1-8-80 Forwarded to claimant by: _____ Date _____
\$20.00 fee received by Spencer Date 1-4-80 # 17051
Published in South Idaho Press
Dates 1/22 + 1/29/80

1 CONTRACT TO SELL REAL ESTATE

2 THIS AGREEMENT, made and entered into this 11 day
3 of March, 1977, between HARRIETT P. CRANK, a single
4 woman, herein called the "Seller" and HOWARD CROOK, GARY E. CROOK,
5 and JOHN F. CROOK, a partnership, d/b/a TOWN AND COUNTRY GARDENS,
6 of Route #3, Box 475, Idaho Falls, Idaho, herein called the
7 "Buyer".

8 W I T N E S S E T H

9 For and in consideration of the payment by the Buyer to
10 the Seller of the sum of SEVENTY THOUSAND DOLLARS (\$70,000.00),
11 lawful money of the United States of America, together with
12 interest thereon, as hereinafter provided, and in consideration
13 of the mutual covenants, stipulations and agreements herein set
14 forth, to be kept and performed by the parties hereto, the Seller
15 does hereby agree to sell and convey unto the Buyer and the Buyer
16 agrees to purchase of and from the Seller, according to the terms
17 and conditions hereof, that certain real estate situated in the
18 County of Cassia, State of Idaho, to-wit:

19 TOWNSHIP 15 SOUTH, RANGE 26 EAST, BOISE MERIDIAN,

20 Section 23: Starting at a point at the Southwest
21 corner of the SE $\frac{1}{4}$ SE $\frac{1}{4}$ of said Section 23;
22 Thence East 40 rods;
23 Thence North 40 rods;
24 Thence West 40 rods;
25 Thence South 40 rods to the Point
26 of Beginning, being the SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$.

27 ALL IN CASSIA COUNTY, STATE OF IDAHO.

28 { TOGETHER WITH ALL AND SINGULAR the tenements,
29 hereditaments, and appurtenances thereto
30 belonging and all water rights and heat rights
31 appurtenant;

32 upon the following terms, covenants and agreements mutually
agreed upon by the parties hereto, to-wit:

1. PURCHASE PRICE: The total purchase price of the
real estate and improvements shall be the sum of SEVENTY THOUSAND
DOLLARS (\$70,000.00), lawful money of the United States of America,
which purchase price, together with interest thereon, the Buyer

RECORDED

WARRANTY DEED

REVENUE STAMP

For Value Received

LUCINE B. ERICKSON and KATHLEEN ERICKSON, husband and wife
the grantors, do hereby grant, bargain, sell and convey unto

PAUL W. CRANK, a single man,
the grantee, the following described premises, to-wit:

Starting at a point at the Southwest corner of the Southeast Quarter of the Southeast Quarter (SE $\frac{1}{4}$ SE $\frac{1}{4}$) of Section Twenty-three (23), Township Fifteen (15) South, Range Twenty-six (26) East, Boise Meridian; Thence East forty (40) rods; thence North forty (40) rods; thence West forty (40) rods; thence South forty (40) rods to point of beginning, containing ten acres of land; and, together with the tenements, hereditaments and appurtenances thereunto belonging or in anywise appertaining, subject to the right of the prior owner to drill a cold water well on said premises, with ingress and egress.

The Grantors do further grant, bargain, sell and convey all of their interest in that certain agreement for the use of hot water from the "Hot Well" as contained in that agreement recorded as instrument no. 32393 on November 22, 1966, in the office of the County Recorder of Cassia County, Idaho.

TO HAVE AND TO HOLD the said premises, with their appurtenances unto the said Grantee, his heirs and assigns forever. And the said Grantors do hereby covenant to and with the grantee that they are the owners in fee of said premises, that said premises are free from all encumbrances.

and that they will warrant and defend the same from all lawful claims whatsoever.
Dated: July 31st, 1968.

Lucine B. Erickson
Kathleen Erickson

CALIFORNIA
STATE OF IDAHO, COUNTY OF San Mateo
on this 4th day of August, 1968,
before me, a notary public in and for said State, personally appeared Lucine B. Erickson and Kathleen Erickson
Known to me to be the person whose name is subscribed to the within instrument, and acknowledged to me that they executed the same.

Elizabeth Hastings
Notary Public

STATE OF IDAHO, COUNTY OF Cassia
I hereby certify that this instrument was filed for record at the request of Cassia County Abstract at 32 minutes past 2 o'clock P.M. this 4th day of March 1971, in my office, and duly recorded in Book 26m by Deeds at page met # 50099
By Paul W. Crank
Ex-Officio Recorder
Deputy

INSTRUMENT NO.

DEED RECORD No. 52X CASSIA COUNTY, IDAHO

SHEPHERD COMPANY, BOISE 22005

#198673

(\$1.10 Revenue Stamps Attached)

WARRANTY DEED

THIS INDENTURE, Made this 21st. day of June, in the year of Lord one thousand nine hundred and 57, between W. Floyd Knight and Adora M. Knight, husband and wife, of Almo, Cassia County, Idaho, County of _____, State of _____, the parties of the first part, and Lucine Erickson and Kathleen Erickson, husband and wife, of Emancipau, County of _____, State of _____, the parties of the second part: WITNESSETH, That the said parties of the first part, for and in consideration of the sum of One and 00/100 of the United States of America, and of other in hand paid by the said parties of the first part, the receipt whereof is hereby acknowledged, has granted, bargained and sold, and by these presents do sell, convey, and confirm unto the said parties of the second part, and to their heirs and assigns forever, all the following described real estate, situated in Cassia, County of _____, Idaho, to-wit:

Starting at a point at the south west corner of the south east quarter of the south east quarter in section 23, township 15, range 26, E:B.M. Going east 40 rods, (forty) thence north 40 rds, (forty), thence west 40 rds, (forty), thence thence south 40 rds, (forty) to point of beginning, containing 10 (ten) acres, of land also then use of the hot well located above said premises for heating purposes only; and the parties of the first part are hereby granted the privilege by the parties of the second part to drill a cold well above the described premises and an easement to egress and ingress at any time and to divert waters from and to any point on the above described land.

Use

P.O. Box 610
White Sulphur Springs,
Montana 59645



APPROPRIATE
TECHNOLOGIES INC.

255 "B" Street
P.O. Box 1016
Idaho Falls,
Idaho 83401
Phone (208) 529-1611

ENERGY DEVELOPMENT • MANAGEMENT • PLANNING

January 5, 1980

Mr. Loren Holmes
Department of Water Resources
1041 Blue Lakes Blvd. North
Twin Falls, Idaho 83301

Dear Mr. Holmes:

Here is the affidavit we discussed in your office Friday,
January 4, 1980.

Sincerely,

Loyd E. Donovan

I, W. Floyd Knight, certify that the water and geothermal resource which served as the process energy for ^a ~~an~~ vegetable greenhouse in Cassia County, Idaho during the period 1968 to 1976, and which has been since, and is now being used by the Town and Country Gardens industry for similar purposes, was, at the time I purchased the property in 1949 from L. Erickson being used by him as the basis for a poultry industry in the Raft River Valley. This use of the geothermal resource was for purposes of environmental temperature control necessary to brooding, hatching, and processing.

W. Floyd Knight
W. Floyd Knight
DATED: 12/27/79

STATE OF IDAHO)
 : ss.
County of Cassia)

On this 27th day of Dec., 1979, before me, the undersigned, a Notary Public in and for said state, personally appeared W. Floyd Knight and acknowledged to me the above declaration.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

(seal)

Gene Baxter
Notary Public for State of Idaho
Residing at: Malta, Idaho
My Commission Expires: life term

BURLEY, IDAHO

County of Cassia,

)
) SS.

STATE OF IDAHO

Wanna get high being first

duly sworn, deposes and says that She is the

..... of the South Idaho Press, a daily newspaper published at Burley Idaho, in the county aforesaid and that the paper is of general circulation therein. Deponent further states that the printed notice attached hereto was duly published according to law in the regular editions of

The South Idaho Press for Will

consecutive weeks, commencing with the issue

dated Jan 22 1980, and ending

with the issue dated July 5, 1980

Subscribed and sworn to before me

this 6 day of Feb

1980

Thomas H. Johnson Notary Public

Cost of Publication 2.88

Notary Fee

Total Cost	2.88
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NOTARY PUBLIC RESIDING AT
RUPERT, IDAHO. MY COMMISSION
EXPIRES JUNE 21, 1981

80-17

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P.O. BOX 641, MALTA, ID 83342, Source:
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Amount: 1.71 CFS, Diversion Point: SESE Sec 23 T
15S R 26E, CASSIA Co., Use: HEATING (1.71 CFS)
from 01/01 to 12/31, Place of Use: SESE Sec 23 T
15S R 26E, Diversion Means: DIVERSION FROM
TWO WELLS THEN DELIVERED TO P/U

Any exception to any claim of water right may be filed with the Director of the Idaho Department of Water Resources, 1041 Blue Lakes Blvd. North, Twin Falls, Idaho 83301.

C. STEPHEN ALLRED
Director

Published in the South Idaho Press on January 22, 29 and February 5, 1980.

OK
ZMB
ADM

February 3, 1981

Mr. David Tuthill
Supervisor, Water Allocation Section
Dept. of Water Resources
Statehouse
Boise, ID 83720

RE: Request for permit

Dear Dave:

As per our telephone conversation of January 28, I am submitting this letter of permit request to conduct a flow test of a geothermal well at Raft River. The geothermal well is located on the SE 1/4 of the SE 1/4 of section 23, township 15E, range 26E BM, Cassia County.

The geothermal well was drilled to a depth of 540 ft. The intended flow test will last approximately seven days. In that time period, water will be pumped from the well at a rate of 250 gpm continuous. The reason for this test is to ascertain data that will prove the reliability of the resource.

Please accept this letter as a formal written request for our compliance to regulations according to permits and claims now being held by Mar-Bil Enterprises.

Please hold this letter and include it in the Mar-Bil Enterprises' file.

Sincerely,

Bill Munger

Bill Munger
Boise Representative
Mar-Bil Enterprises

✓ No Response necessary
DET

km

November 17, 1980

Mr. Lloyd Donovan
Appropriate Technologies Inc.
P. O. Box 1016
Idaho Falls, Idaho 83401

Dear Lloyd:

The question about these water rights that I alluded to in our conversation earlier this week has been resolved. Here is your copy.

Please let me know if I can be of assistance to you.

Sincerely,

DAVID R. TUTHILL JR., P. E.
Supervisor, Water Allocation Section

DRT:jg

Enclosure

MICROFILMED

Dave Tuthill

INTER-DEPARTMENT MEMO — 1

FROM

Dave T. *DT*

DATE November 6, 1980

TO

Norm Y. *(NY)*

SUBJECT

From the water balance (in 43-4095) the total input water needed, including water for the swine complex, the dairy herd, the dairy, the calf/cow complex and the alcohol process is 64,596 gal/day = 44.8 gal/min. = .10 cfs*. Even if the maximum instantaneous rate of flow is ten times this rate, or 1.0 cfs, this rate seems reasonable in light of the filings of claims.

An option for verifying existing use would be to have the region make a field exam. Then we could analyze the water rights in detail, and determine a reasonable flow for the claims. I have been reluctant to do this to date because it would constitute more regulation on one system than on the neighboring systems.

*(Note that the rate of .10 cfs would be continuous flow).

Dave

MICROFILMED

SIGNATURE

October 16, 1980

Mr. Bill Munger
P. O. Box 485
Boise, Idaho 83701

RE: Water Rights for Agricultural Growth Industries, Inc.

Dear Bill:

Pursuant to your request we will send to you further correspondence regarding the proposed ethanol plant in the Raft River Drainage Basin, with the intent that you will appraise Dr. Matherson of the correspondence.

Yesterday I received from Mr. Verl King his analysis of Dr. Matherson's water balance. Enclosed is a copy of the water balance sheet as modified by Mr. King. Note that there was ten-fold error in the number of cubic feet provided by the seven acre-foot reservoir - the balance sheet shows 3,049,200 cubic feet whereas the actual volume of a seven acre-foot reservoir (at 43,560 cubic feet per acre-foot) is 304,920 cubic feet.

This error, however, is not significant because the water that must be provided by the reservoir is only that water to be used in the alcohol production process, since the other water rights provide for stockwater. If only 913 gallons per day are needed for this process, then only 1.02 acre-feet per year need be provided by the reservoir. The size of the reservoir will be determined in part by the amount of seepage and evaporation. We refer you to the local U.S. Soil Conservation Service for assistance in determining these parameters, and for assistance in the design of the reservoir.

For the remainder of the analysis Mr. King was in concurrence. I can see only one additional item to be clarified at this time. On Mr. Matherson's listing of water rights; water right no. 43-2268 is shown for 3.2 cubic feet per second. Enclosed is a copy of the cancellation order for this water right, which shows that the right is no longer valid. As you are aware, Bill, the new claim no. 43-4097 in the name of Ivan and Barbara Darrington has replaced the lapsed permit.

Mr. Bill Munger
October 16, 1980
Page 2

I trust this answers your questions regarding the status of the water rights in question. When we receive the application for permit for the storage reservoir the water rights will be properly filed.

Sincerely,

DAVID R. TUTHILL JR., P. E.
Supervisor, Water Allocation Section

DRT:jg

Enclosure

September 26, 1980

Town & Country Gardens
P. O. Box 641
Malta, Idaho 83342

Attn: Dr. Richard Matheson

Dear Dr. Matheson:

Re: Ethanol Plant in Raft River Drainage Basin

I am writing in response to our discussion last week regarding the status of water rights related to your proposed ethanol plant in the Raft River Drainage Basin. At that time I indicated that we would be able to complete our assessment of the total water right needs of the proposed project by this date.

To date this Department has received three (3) water right filings related to the project. These filings include: Claim No. 43-4095 in the name of Town and Country Gardens for 1.71 cubic feet per second for heating use; Claim No. 43-4097 in the name of Ivan & Barbara Darrington for 8.4 cubic feet per second for irrigation and stockwater use; and application for permit no. 43-7146 in the name of Town and Country Gardens for 1.71 cubic feet per second for heating use.

The two claims have been advertised and will be filed with the Department's records with no further action taken. No judgement will be made as to the validity of the claimed rights until an adjudication procedure takes place at some time in the future.

You indicated in our conversation that in light of the other water right considerations you may wish to withdraw Application for Permit No. 43-7146. This application must be withdrawn by one of the partners in the Town & Country Gardens Partnership. Enclosed is a form for this purpose.

As we discussed, to complete the water rights recording you will need to file an Application for Permit for a storage right for the planned reservoir. Our regional office or state office personnel can assist in this filing. You may wish to apply for enough water for a 20 acre-foot reser-

Dr. Mattheson
Town & Country Gardens
September 26, 1980
Page 2

voir at this time, since (1) the minimum filing fee of \$30.00 is adequate for this volume, and (2) the 7 acre-feet size originally anticipated may be modified based on future water balance analyses.

I am not today able to respond definitively on the Department's reaction to your water input-output flow diagram since Mr. Verl King, the engineer who is analyzing the diagram, did not return to the office today as expected. He has been working on the analysis, however, and I expect to be able to inform you of the results soon.

In summary, your group has provided to this Department all needed information and forms to date, with the exception of the storage application. Your willingness to comply with our regulations in an effort to protect the other waterusers in the Raft River Critical Groundwater Area is much appreciated.

Sincerely,

DAVID R. TUTHILL JR., P. E.
Supervisor, Water Allocation Section

DRT:jg

cc. Southern Region

Enclosure

AGRICULTURAL GROWTH INDUSTRIES, INC.

RECEIVED

~~2020 State Lane, Suite 112, Columbia, CA 94327~~

(415) 676-2326

AUG 1 1980

7671 Hansom Drive, Oakland, California 94605

Department of Water Resources

DEPARTMENT OF WATER RESOURCES
STATEHOUSE
Boise, Idaho 83720

July 25th, 1980

SUBJECT: Position Letter and Data

Water Usage - 160 Acres

Township 15 S, Range 26 E

Section 23 SE $\frac{1}{4}$ SE $\frac{1}{4}$ 40 Acre Tract	1) 43-0046 (2.0 cfs Nov - Mch)	0.8
24 NW $\frac{1}{4}$ SW $\frac{1}{4}$ 40 Acre Tract	2) 43-2268 (3.2 cfs Nov - Mch)	0.8 1.6
24 SW $\frac{1}{4}$ SW $\frac{1}{4}$ 40 Acre Tract	3) 43-2327 (0.21 cfs Apr - Oct)	0.8
24 SE $\frac{1}{4}$ SW $\frac{1}{4}$ 40 Acre Tract	4) 43-2461 (1.5 cfs Apr - Oct)	0.8 1.6

6.91

Dear Sirs:

Thank you for the time and cooperation of your entire office staff at our meeting yesterday. We were extremely appreciative of the sincere help and advise that you have provided.

Actions to be taken following your suggestions were as follows:

- 1 - File to clarify the claim on the 3.2 Cfs of winter water rights, namely 43-2268. This is being looked into and the initial notices are being reviewed. As soon as the proper information is researched we will take the appropriate action.
- 2 - File the appropriate documents to obtain permission for water storage from the winter water rights. This is likewise being reviewed and the appropriate filing prepared.
- 3 - Prepare a Water Balance and Flow Chart with appropriate backup calculations, References and Summary. This is attached herewith and is a part of this communication. (5 pages)

I believe that the Flow Diagram and usage information is self explanatory. If there are any further questions please contact us or it would be easier if our local representative, Ms. Gay Hammer were contacted for immediate response.

Please note that this information superceeds the letter of usage of May 14th, 1980 from Dr. W. Darrell Gertsch. The information provided by him at that time was not complete with respect to the water balance of the entire agricultural complex. Hence, this data will provide you further information updated to our present engineering and usage requirements.

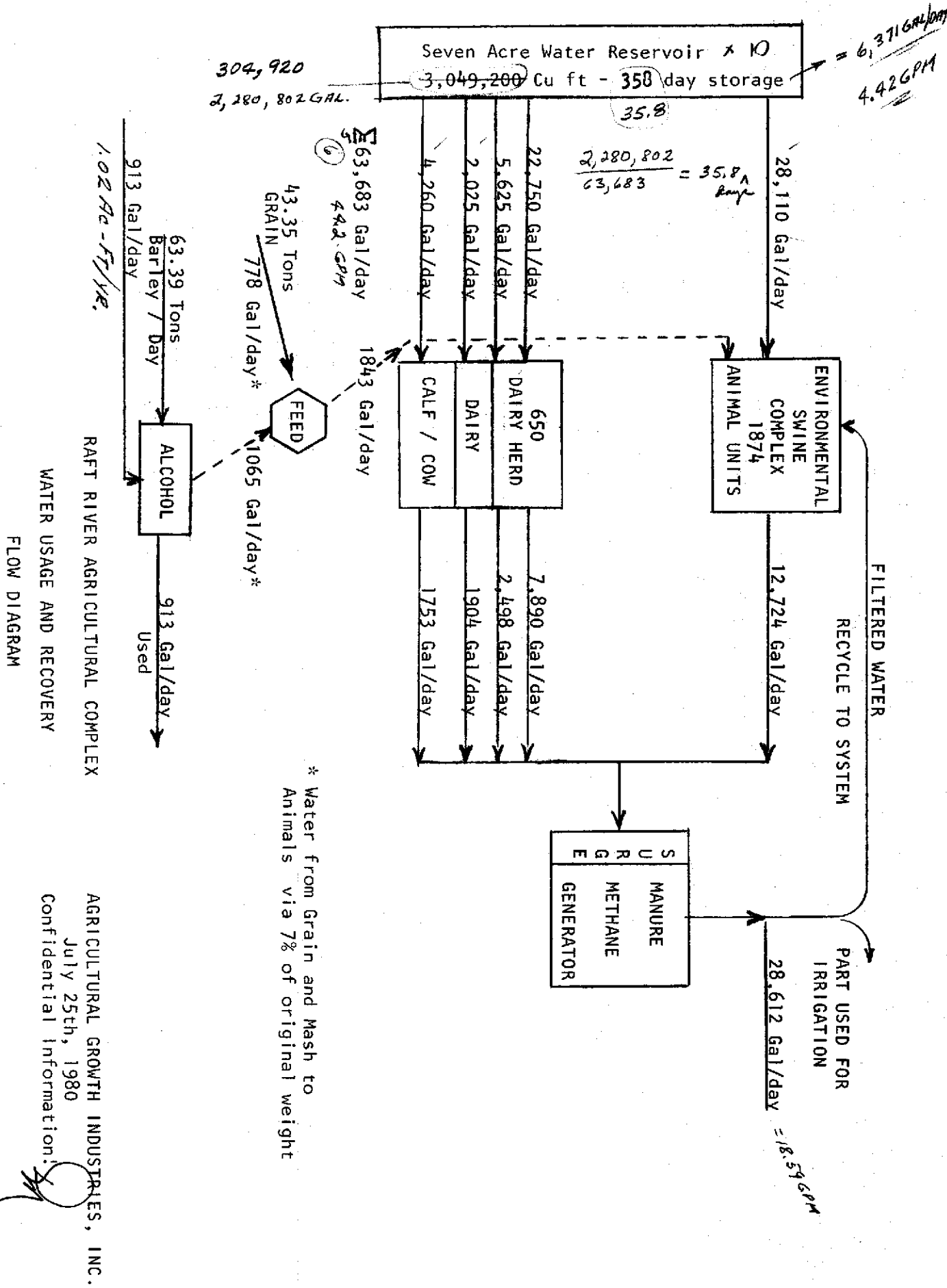
We would also like to call to your attention the balancing fact of the bringing of water and grain onto the complex via the 39,421 tons of grains for processing and usage. This quantity will actually provide a positive water balance instead of a negative usage with regards to the usage of the commercial alcohol portion of the complex. The remaining water usage will comply with animal watering and irrigation as stated in the water permits and usage in the past and at present.

Again, thank you and you staff for their interest and cooperation on our behalf.

Sincerely yours;

Richard H. Matherson
Dr. Richard H. Matherson
President

MICROFILMED



AGRICULTURAL GROWTH INDUSTRIES, INC.
 July 25th, 1980
 Confidential Information

✓ 28
 10/15/80

SUMMARY WATER USAGE & RECOVERY FROM MANURE AND METHANE SYSTEM

(Ref: attached calculation sheets)

	<u>Water</u>	<u>Recover</u>
DAIRY 650 hd Milking ² (35 GPD/hd)	22,750 g/d	7,890 gal/day
375 Dry & Young Stock (15 GPD/hd)	5,625 g/d	2,498 gal/day
Milk Barn	2,025 g/d	1,904 gal/day
CALF/COW x wt 462 lbs	4,260 g/d	1,753 gal/day
SWINE 1,874 animal units (15 GPD/hd)	28,110 g/d	12,724 gal/day
ALCOHOL 22,504 tons barley/ year		
63.39 tons/day		
1/2 of 14% free moisture is recovered as water to animals via feeding of mash		1,065 gal/day ✓
.72 gal water/ cwt consumed	913 gal/day	
FEED MILL 14% moisture grain		
16,917 tons/year		778 gal/day
1/2 or 7 % free moisture to system		

63,683 g/d 28,612 gal/day recovered
44.9%

$$\begin{array}{ll}
 \times 365 = 23,244,295 \text{ gal/yr} & \times 365 = 10,443,380 \text{ gal/yr} \\
 + 7.48 \text{ gal/cu ft} = & \div 7.48 \text{ gal/cu ft} = \\
 3,107,526 \text{ cu ft/yr} & 1,396,174 \text{ cu ft/yr} \\
 \div 43,560 = 71.33 \text{ Acre ft/yr} & \div 43,560 = 32.05 \text{ acre ft/yr} \\
 & \text{recovered}
 \end{array}$$

difference = 35,071 gal/day ✓

ALLOCATION:

2 cfs 5 months (151 days) = 195,696,000 gal/yr ✓

1.71 cfs 7 months (214 days) = 237,129,120 gal/yr ✓

3.2 cfs 5 months (151 days) = 313,113,600 gal/yr ✓ This amount has to be clarified!

therefore;

$$\frac{(63,683 \times 365) 100}{432,825,120} = 5.37 \% \text{ of allotment} = \frac{(35,071 \times 365) 100}{432,825,125} = 2.96 \% \text{ of allotment}$$

$$\frac{(63,683 \times 365) 100}{745,938,720} = 3.12 \% \text{ of allotment} = \frac{(35,071 \times 365) 100}{745,938,720} = 1.72 \% \text{ of allotment}$$

For Idaho Water Resources Board

WATER USAGE

DAIRY: 650 Head Milking x 35 gal / day (Ref; State of Idaho - Water
User's Handbook pg 38)
(Ref: Ensminger - Feed & Nutrition pg 713)

= 22,750 gal/day ✓

375 Dry & Young Animals x 15 gal/day

= 5,625 gal/day ✓

MILK BARN (Ref: Western Farm Planning Handbook)

Bulk Milk Tank 75-125 gal/wash/day = 125 gal/day

Pipe line 75-125 gal/wash x 3 wash/day = 375 gal/day

Misc Equip 30 gal = 60 gal/day

Cow Prep $\frac{1}{2}$ gal/cow/milking x 3 = 975 gal/day

Parlor Floor 300 gal/2 x 3 = 450 gal/day

Milk house floor 30- 40 gal/day = 40 gal/day

2,025 gal/day

5 % loss

101

95 % Recovery in
drain

1,904 gal/day recovered to
waste flush

CALF OPERATION

7.1 gal/day average usage x 600 head per year

average weight 462 lbs.

= 4,260 gal/day

SWINE USAGE

1,874,000 pounds live weight (Ref: Ensminger, Feed & Nutrition) pg 836

1,874 live animal units

$1\frac{1}{2}$ gal/100 lbs live wt

therefore:

15 gal/day/1000 pounds of live weight

1874 x 15 =

= 28,110 gal/day

MANURE PRODUCTION & WATER RECOVERY AFTER METHANE PRODUCTION

DAIRY MANURE: (Ref: Ensminger - Feed & Nutrition pg 543)

1,305,000 pounds liveweight

910,000 x 85 lb/1000 lb live wt. = 77,350 lbs manure/day

395,000 x 62 lb/1000 lb live wt. = 24,490 lbs manure/day

101,840 lbs manure/day

(Ref: Manage Manure for its Value - Walsh page 1)

Moisture of Dairy Manure is 85% water when freshly collected

101,840 x .85 = 86,564 lbs water divided by 8.333 lbs water/gal
= 10,388 gal/day

or - from above!

77,350 x .85 = 65,747 ÷ 8.333 = 7,890 gal/day recovered

24,490 x .85 = 20,816 ÷ 8.333 = 2,498 gal/day

CALF OPERATION

average weight calculates to 462 lbs x 62 lb/1000 x 600 head = 17,186 lb manure

17,186 lb manure x .85 = 14,608 ÷ 8.333 lb water/gal = 1,753 gal water/day recovered

SWINE OPERATION (Ref: Ensminger - Feed & Nutrition page 543)

2 1,874 animal units

1,874,000 pounds liveweight x 69 lb manure/1000 lbs = 129,306 lbs/day

(ref: Wisconsin - Manage Manure for its Value Page 1)

Fresh swine manure moisture = 82%
therefore;

129,306 x .82 = 106,031 lbs water/day ÷ 8.333 lbs/gal water

= 12,724 gal water recovered
per day

7.48 Gal/FF3

27

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Lafayette, Indiana

Q
M

FEEDS & NUTRITION —complete

by

M. E. Ensminger
B.S., M.A., Ph.D.

&

C. G. Olentine, Jr.
B.S., M.S., Ph.D.

FIRST EDITION

The Ensminger Publishing Company

3699 East Sierra Avenue

Clovis, California 93612

U.S.A.

MICROFILMED

34

SWINE SCIENCE

(Animal Agriculture Series)

by

M. E. ENSMINGER, B.S., M.A., Ph.D.

Formerly: Assistant Professor in Animal Science
University of Massachusetts

Chairman, Department of Animal Science
Washington State University

Consultant, General Electric Company
Nucleonics Department (Atomic Energy Commission)

Currently: President
Consultants-Agriservices
Clovis, California

President
Agriservices Foundation

Collaborator
U. S. Department of Agriculture

Distinguished Professor
Wisconsin State University

Fourth Edition

THE INTERSTATE
PRINTERS & PUBLISHERS, INC.
Danville, Illinois



vin results in a wide variety of symptoms. In growing swine, a deficiency may cause loss of appetite, stiffness, dermatitis, and eye problems. Poor conception and reproduction have been noted in gilts fed riboflavin-deficient rations. Pigs may be born prematurely, dead, or too weak to survive.

Milk products and other animal proteins, alfalfa meal, and distillers' solubles are good natural sources of riboflavin. Commercial concentrates are also available.

OTHER VITAMINS

Other vitamins that are required by the pig, but that are either present in adequate amounts in practical rations or are synthesized in the body, are vitamin C, thiamin, pyridoxine (B_6), biotin, and folic acid.

UNKNOWN FACTOR OR FACTORS

Some unknown factor or factors may, under certain circumstances, be involved in securing optimum results during the critical periods (early growth and gestation-lactation). Sources of the unknown factor or factors are distillers' dried solubles, fish solubles, dried whey, grass juice concentrate, soil, alfalfa meal, brewers' dried yeast, liver, and pasture.

Water

Water is so common that it is seldom thought of as a nutrient. However, it is the largest single part of nearly all living things. The body of a baby pig is about three-fourths water.

Water performs many tasks in the body. It makes up most of the blood which carries nutrients to the cells and carries waste products away; it is necessary in most of the body's chemical reactions; it is the body's built-in cooling system—it regulates the temperature, and it serves as a lubricant.

Life on earth would not be possible without water. An animal can live longer without feed than without water.

The daily water requirements of swine vary from $\frac{1}{2}$ gallon to $1\frac{1}{2}$ gallons per 100 pounds liveweight. The higher requirements are for young pigs and lactating sows. Also, the higher the temperature, the greater the water consumption. It is preferable that swine have access to automatic waterers, with water available at all times. Otherwise, they should be hand watered at least twice daily. During winter, the drinking water should not be permitted to fall below 40°F.

Additives

Certain feed additives have become somewhat standard ingredients of swine rations, especially for pigs from birth to market weight. They are not nutrients as such; hence, they should not be considered as dietary essentials. Although many different additives are used in swine rations, antibiotics are most common.

Antibiotics are widely used as feed additives to stimulate growth, improve feed efficiency, secure uniformity of performance, and control infections. The response secured from their use depends on (1) the age of the pig, (2) the sanitary conditions, (3) the level fed, (4) the health and environment of the animal, (5) the type of ration, and (6) the season of the year. When fed to young, unthrifty pigs, antibiotics have increased growth rate by over 200%. For growing-finishing hogs under good sanitary conditions, antibiotics generally result in about 10% faster gains on 5% less feed. Pigs up to 100 pounds weight give the greatest response to antibiotic feeding. Experimental results have been inconsistent relative to the value of antibiotics in brood sow rations, but it appears that breeding herds with a high disease level may show a favorable response.

Regardless of the standard of sanitation practiced, within each swine facility there is an "environmental disease level." It may or may not be obvious to the casual observer, depending upon its degree of severity. Just how antibiotics counter these unfavorable conditions and bring about improved performance in growing swine is not exactly known. However, they apparently do have an influence on the intestinal bacteria and improve the health of the animal, as unthrifty pigs respond more to antibiotic feeding than do healthy ones. Antibiotics may function as follows:

1. They favor bacteria that synthesize known or unknown nutrients needed by the animal.
2. They inhibit the growth of nutrient-destroying microorganisms.
3. They improve the availability and/or absorption of certain nutrients.
4. They inhibit the growth of organisms that produce excessive amounts of ammonia and other toxic waste products in the intestine.
5. They prevent or control certain diseases in the intestinal tract and other parts of the body.

Despite what has been said, in no case should antibiotics be used to replace good sanitation and management.

In addition to antibiotics, certain other antimicrobial compounds can be used as feed additives, either (1) at low levels for promotion of growth and

SWINE
15 gal /
1000 lb
live weight

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Vitamin A helps to maintain healthy tissues, thereby safeguarding the animal from many infections and diseases. The tissues which rely on vitamin A for their ability to resist these problems include the skin, the lining of the digestive tract, the lining of the respiratory tract, and the covering over the eye (conjunctiva). In addition, vitamin A is involved in good eyesight, health, reproductive efficiency, and vigor of newborn calves. When vitamin A is deficient in the ration, any one or a combination of these roles may be affected. A deficiency is usually the result of feeding hay or other forages which have been bleached or exposed to oxidation, both of which may contribute to the high carotene losses which may be expected in sun-curing, and to the somewhat smaller losses of vitamin A when the forage is only partially dried in the field.

A deficiency of vitamin A can be alleviated either by (1) being more careful in harvesting forage crops, (2) adding a commercial vitamin A supplement to the grain ration at the rate of 1,000 to 5,000 IU per pound of concentrate mixture, (3) injecting vitamin A according to the manufacturer's directions, or (4) adding about 5 percent dehydrated alfalfa or dehydrated grass to the grain ration. The last practice is not recommended for lactating cows because it reduces the energy level of the high-energy concentrate mix. In order to guard against possible deficiencies, newborn calves are sometimes given an injection of vitamin A (usually in a mixture with vitamins D and E) soon after birth. Some dairymen regularly inject vitamin A into all cows when they go dry, because they feel that it decreases calving difficulties and makes for stronger, healthier calves at birth.



Fig. 20-8. A three-year-old heifer showing typical advanced eye lesions accompanying a vitamin A deficiency. (From Calif. Ag. Exp. Sta. Bull. 560)

Dairy calves kept indoors may suffer from rickets, due to a vitamin D deficiency. Because it is difficult to predict the vitamin D content of forage, since it depends on the length of time it is exposed to the sun's rays while being cured, it is usually well to add vitamin D to most calf rations. It may be added at the rate of 150 IU per pound of concentrate. Calves may also be injected with vitamin D (usually in combination with vitamins A and E) soon after birth. It is very rare to have a vitamin D deficiency in dairy animals after the first 2 to 3 months of life. (See Chapter 5, Nutritional Diseases—Toxins.) However, since vitamin D affects calcium absorption and availability, the addition of vitamin D may reduce the incidence of milk fever in cows with past histories of the disease.

Except for the more likely deficiency of vitamin D because of being kept indoors, the vitamin requirements of dairy cattle and beef cattle are similar; hence, the reader is referred to Chapter 19, Feeding Beef Cattle, including Table 19-11, for further elucidation of each of the vitamins.

Water

Large amounts of water are essential if a cow is to produce to her maximum capacity. Cows drink an average of 100 to 200 pounds of water per day, with heavy producers drinking up to 300 pounds per day (1 gal water = 8.33 lb). The amount of water a cow will drink depends on her size and milk yield, the temperature and relative humidity of the air, the temperature of the water, and the amount of moisture in her feed.

*Maximum
High
= 36 gal/day*

Good-quality, clean water is of the utmost importance in a dairy cattle feeding program—a factor often neglected by many dairymen. Water troughs should be cleaned routinely to ensure that the water is free from dirt and pathogenic bacteria. A common drinking trough provides an excellent means of spreading parasites and disease.

In extremely cold weather, it is a good idea to have a tank heater to keep the water from freezing. Also, frequency of watering is important. Cows stabled in a stanchion-type barn produce $3\frac{1}{2}$ to 4 percent more milk if they have drinking cups available than if they are watered twice daily. Contrary to some opinions, cows do not produce more milk from softened than from hard water.

Additives

Many additives have been used by dairymen in an effort to increase milk production and/or affect its composition; among them, (1) antibiotics, (2)

Q

DAILY MANURE PRODUCTION—STORAGE

Table 17-7 shows the pounds of manure produced daily per 1,000 pounds liveweight by different kinds of animals. These figures can be used to determine the tonnage production on a farm or in a feedlot.

TABLE 17-7 DAILY PRODUCTION OF MANURE (FECES AND URINE)¹

Kind of Animal	Production/Day/1,000 Lb of Liveweight
	(lb)
Beef cattle	62
Dairy cattle	85
Sheep	36
Swine, breeders	50
Swine, feeders	69
Horses	50
Poultry	53
Man	31

¹Adapted by the authors from *Agricultural Waste Management Field Manual*, USDA-SCS, Aug. 1975.

Table 17-8 shows the daily volume of manure produced by different kinds of animals. These figures can be used to determine storage needs. A rule of thumb for under the floor pits is to figure that the pit will fill at the rate of 1 foot per month. Of course, the amount of the excreta is influenced by the composition of the ration; for example, high-silage rations produce more manure than high-grain rations.

TABLE 17-8 APPROXIMATE DAILY MANURE PRODUCTION, WITHOUT BEDDING¹

Animal	Cu Ft/Day Solids and Liquids ²	Gallons/Day ³
1,000-lb cow	1½	11
1,000-lb steer	1	7½
10 head of sheep	½	4
10 head of hogs:		
50 lb	¾	5
100 lb	1⅓	10
150 lb	2¼	17
200 lb	2¾	20½
250 lb	3½	26
1,000-lb horse	¾	5½

¹Adapted by the authors from *Michigan State University Circ. Bull.* 231.

²There are about 34 cu ft in a ton of manure.

³One cu ft = 7½ gal.

Manure may be stored in a separate tank, in a nearby earthen dam lagoon, or it may be left to accumulate in a pit under slotted floors.

Storage capacity can be computed as follows:

Storage capacity = number of animals × daily manure production × desired storage time in days + extra water.

Example: 80 cows (1,000 lb each) × 1-1/2 × 120 days = 14,400 cu ft: 7-1/2 gal × 14,400 cu ft = 108,000-gal capacity.

Water should be added to a pit (1) initially, and (2) subsequently to replace evaporation losses from wastes. Thus, if the manure is to be pumped, 1/5 to 2/5 of the storage volume may be needed for the extra water. For irrigation, there should be about 95 percent water and 5 percent manure. Water should be kept to a minimum if the manure is to be field spread with a tank wagon.

Generally 3 to 6 months' storage capacity is desirable.

Manure Gases

When stored inside a building, gases from liquid wastes create a hazard and undesirable odors. Most (95% or more) of the gas produced by manure decomposition is methane, ammonia, hydrogen sulfide, and carbon dioxide. Several have undesirable odors or possible animal toxicity, and some promote corrosion of equipment. Table 17-9 gives some properties of the more abundant gases.

TABLE 17-9 PROPERTIES OF THE MORE ABUNDANT MANURE GASES¹

Gas	Weight Air = 1	Physiologic Affect	Other Properties
CH ₄ Methane	½	Anesthetic	Odorless, explosive.
NH ₃ Ammonia	¾	Irritant	Strong odor, corrosive
H ₂ S Hydrogen sulfide	1+	Poison	Rotten-egg odor, corrosive
CO ₂ Carbon dioxide	1½	Asphyxiant	Odorless, mildly corrosive

¹*Beef Housing and Equipment Handbook*, Midwest Plan Service, Iowa State University, Ames, Iowa, 1968, p. 10.

Animals and people can be killed (asphyxiated) because methane and carbon dioxide displace oxygen.

Most gas problems occur when manure is agitated or when ventilation fans fail.

No one should enter a storage tank, unless (1) the space over the wastes is first ventilated with a fan, (2) another person is standing by to give assistance if needed, and (3) wearing self-contained breathing equipment—the kind used for fire fighting or scuba diving.

It is important that maximum building ventilation be provided when agitating or pumping wastes from

Manage Manure for its Value

L.M. Walsh, R.F. Hensler and E.E. Schulte

About 55 million tons of wet manure are produced by Wisconsin livestock each year. Assuming it's worth about \$5 per ton in terms of fertilizer nutrients the value is \$275 million.

Manure is a valuable by-product of the livestock industry. But only a fraction of its potential crop-producing value is realized. One-third to one-half is dropped on pastures, lots, and lanes—its full fertilizing value is not obtained because of poor distribution.

Even from the remainder which is collected and spread, substantial losses occur through failure to save the liquid portion, through runoff losses from winter applications, through loss of nitrogen and potassium by leaching, and loss of nitrogen by volatilization. As a result, only about one-third of the potential fertilizing value is realized through improved crop yields.

The fertilizing value of manure, the quantity and composition of manure produced by Wisconsin livestock, and the methods of conserving and handling manure are discussed in this publication.

VALUE AS A FERTILIZER AND SOIL CONDITIONER

Manure adds organic matter, nitrogen, phosphorus, potassium and other elements such as calcium, magnesium, sulfur, boron, manganese, copper and zinc to the soil. Table 1 shows the average annual manure production for different kinds of livestock and the average amounts of various plant nutrients in a ton of wet manure.

Manure varies greatly in composition. Some factors affecting composition are the kind of animal, the kind and amount of litter used, digestibility of the feed consumed, and handling and storage procedures. The solid and liquid portions of manure contain varying amounts of plant nutrients. Figure 1 shows the distribution of nitrogen, phosphorus and potassium between the solid and liquid portions of cattle manure. With 50 percent of the nitrogen and 85 percent of the potassium in the liquid portion, the importance of conserving this part of the manure is obvious, because over three-fourths of the dollar value of manure is accounted for by its nitrogen, phosphorus and potassium content. In addition, about 25 percent of the sulfur and 20 percent of the boron is in the liquid portion. Essentially all the calcium, magnesium, zinc, copper manganese and iron are in the solid portion.

Figure 1. Distribution of Nutrients in Solid and Liquid Portions of Manure.

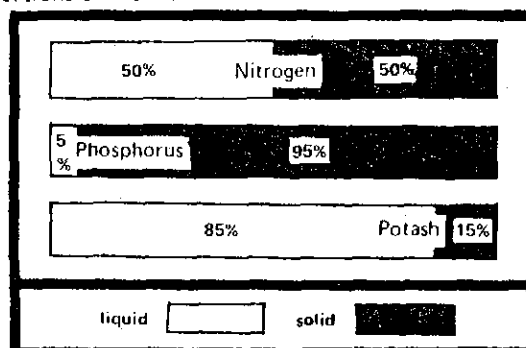


Table 1. Manure Nutrients and Value

Item	Dairy Cattle	Beef Cattle	Poultry	Swine	Sheep
Animal size, lb	1000	1000	5	100	100
Wet manure, tons/yr	11.86	10.95	0.046	1.46	0.73
Moisture	85	85	72	82	77
Nutrients					
Pounds per Ton					
Nitrogen (N)	10.0	14.0	25.0	10.0	28.0
Phosphate (P ₂ O ₅)	5.0	9.0	25.0	6.3	9.7
Potash (K ₂ O)	10.0	11.0	12.0	9.1	24.0
Sulfur (S)	1.5	1.7	3.2	2.7	1.8
Calcium (Ca)	5.0	2.4	36.0	11.4	11.7
Iron (Fe)	0.1	0.1	2.3	0.6	0.3
Magnesium (Mg)	2.0	2.0	6.0	1.6	3.7
Boron (B)	0.01	0.03	0.01	0.09	--
Copper (Cu)	0.01	0.01	0.01	0.04	--
Manganese (Mn)	0.03	--	--	--	--
Zinc (Zn)	0.04	0.03	0.01	0.12	--
Approximate Value per Ton*	\$4.20	\$5.80	\$12.30	\$5.20	\$10.40

*Based on fertilizer nutrient values as of January, 1975.

ESTIMATING RATE OF APPLICATION

To calculate the estimated rate of manure applied per acre use the information in Table 3. If you do not know the bushel rating of your spreader, multiply the length times the width times the depth to learn the cubic feet in the box. Then divide the cubic feet by 1.25 (cubic feet per bushel) to learn the bushel capacity of the box.

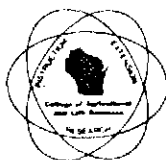
The capacity shown by your calculation will be less than the manufacturer's rating. The manufacturer's rating includes the additional capacity developed by heaping the load. The information in Table 3 is for heaping loads.

Table 3. Converting spreader capacity in bushels to tons of manure.

Bushel rating of manure spreader (heaping full)	Approximate tons of manure per load
75	1%
100	2%
125	3
150	3%

This publication is revised and supersedes Circular 550

COOPERATIVE
EXTENSION
PROGRAMS
WLEX



L. M. Walsh is professor of soil science, College of Agricultural and Life Sciences, University of Wisconsin-Madison, R.F. Hensler is assistant professor of soil science, University of Wisconsin-Stevens Point, and E.E. Schulte is associate professor of soil science, College of Agricultural and Life Sciences, University of Wisconsin-Madison. All are in the Division of Economic and Environmental Development, University of Wisconsin Extension.

MAY 1975

15¢

A1672

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Manage Manure for its Value

Q

DR. RICHARD H. MATHERSON
PRESIDENT

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ENERGY AND AGRIBUSINESS PROJECT DEVELOPMENT
ENGINEERING-MANAGEMENT-MANUFACTURING-MARKETING



APPROPRIATE
TECHNOLOGIES INC.

L. E. DONOVAN Board Chairman

255 "B" Street
P.O. Box 1016
Idaho Falls, Idaho 83401
(208) 529-1611

P.O. Box 610
White Sulphur Springs,
Montana 59645

June 18, 1980

Appropriate Technologies Inc.
P. O. Box 1016
Idaho Falls, Idaho 83401

Attn: Mr. W. Darrell Gertsch
Vice-President Engineering

Dear Mr. Gertsch:

I am writing to you with the intent of reiterating the points made in our June 16, 1980 meeting with Norm Young and L. E. Donovan regarding the approval of Application for Permit No. 43-7146.

The discussion centered on the consumptive use aspect of the ethanol plant proposed by Town and Country Gardens. In your letter of May 14, 1980, you provided information indicating that the consumptive losses in the ethanol plant will total about 9.55 acre feet annually. This consumptive loss must be provided by some type of water right, a requirement which is complicated by the existence of a critical groundwater area in the location of the ethanol plant. Mr. Young listed a number of options for the solution of this consumptive use problem, including:

1. Secure a statement from the Director of the Department of Water Resources which indicates no significant difference in nature of use between (a) current and historical uses, and (b) predicted use in the plant. This statement could be solicited by submitting to the Department a position statement which documents historical uses and explains the anticipated use. Mr. Young was careful to caution that this alternative is unlikely to succeed.
2. Provide an alternative source for consumptively used water, for example:
 - a) Truck water from a source outside the critical groundwater area.
 - b) Pipe water from a source outside the critical groundwater area.
 - c) Create a reservoir to store spring runoff that is available for appropriation.
3. Work toward approval of state legislation that would provide for change in nature of use.

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Mr. W. Darrell Gertsch

Page 2

June 17, 1980

As Mr. Young explained, the Department cannot condone water uses in the anticipated ethanol plant until this matter is resolved. We are at your service to assist in any way toward a mutually acceptable solution to this problem.

Sincerely,

DAVID R. TUTHILL JR., P. E.
Supervisor, Water Allocation Section

DRT:jg

Enclosure

cc - Norm Y.

RECEIVED MED

INTER-DEPARTMENT MEMO — 1

FROM Dave Tuthill

DPT

DATE June 9, 1980

TO Glen Saxton

SUBJECT 43-7146

Letter of May 14 indicates a net consumptive requirement of:

Plant losses = 5% of 16,160,000 = 808,000 gal. = 2.48 AF

Mash losses = 2,304,000 gal. = 7.07 AF

9.55 AF total per yr.

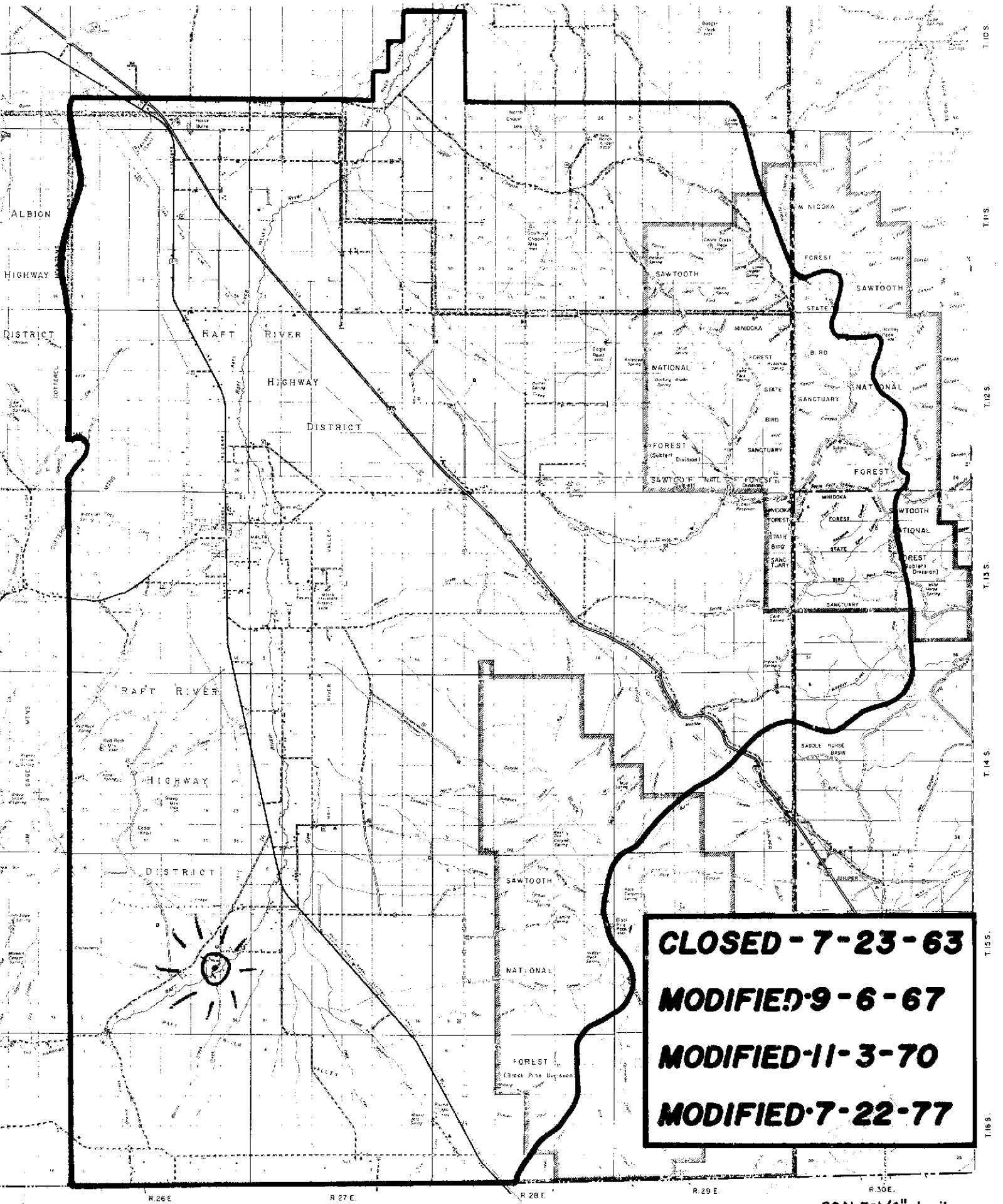
What option does Town & Country, have to obtain this "industrial" water, since they are five miles from the border of the Raft River CGWA (see map)?

Town and Country has argued that this "industrial" use is agricultural in nature, since it involves processing of barley, and therefore no change in nature of use would be required if irrigated lands were taken out of production to compensate for the 9.55 AFA increase in consumptive use. Does this argument have merit?

Might this be a good opportunity to solicit the aid of a private entity for the approval of change in nature of use legislation?

SIGNATURE

Raft River Critical Groundwater Area



CLOSED - 7-23-63
MODIFIED - 9-6-67
MODIFIED - 11-3-70
MODIFIED - 7-22-77

SCALE - 1/4" = 1 mile

P.O. Box 610
White Sulphur Springs,
Montana 59645



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TECHNOLOGIES INC.

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P.O. Box 1016
Idaho Falls,
Idaho 83401
Phone (208) 529-1611

ENERGY DEVELOPMENT • MANAGEMENT • PLANNING

May 14, 1980

REC'D
MAY 16 1980

Mr. David R. Tuthill, Jr.
Supervisor, Water Allocation Section
Idaho Department of Water Resources
Statehouse
Boise, Idaho 83720

Department of Water Resources

Dear Mr. Tuthill:

We have been requested to respond to your letter of April 23 to Town and Country Gardens, Malta, Idaho regarding the application for Permit 43-7146. The proposed use would derive from existing license and uses which include irrigation and a floral industry process application.

In the proposed ethanol project, there would be two sources of consumptive use. Theoretically, there should be no water loss in the alcohol process itself, since the cooking, fermentation, and distillation steps are all closed processes. Practically, however, we would estimate that of the 16,160,000 gal/yr total water requirement (based on 20.2 gal/bushel feed-stock and 800,000 bushel of barley required for the 2 million gal/yr ethanol production) about 5% would be lost. Approximately 2% would be attributed to the starch hydrolysis process and the remaining 3% would simply have to be described as fugitive losses throughout the system, which would include washdown requirements, etc. This would amount to a makeup requirement of 1.68 gpm, assuming a 24 hour operating day through 355 days.

The other agricultural consumptive use of water would be in the wet mash fed to livestock in adjacent controlled environment feeding facilities. For each bushel of grain input to the production process, the waste grain mash from fermentation will consist of about 16 lbs. of solids and 24 lbs. of water. The project envisions using this mash as feed, rather than drying it for marketing elsewhere. This would imply then a loss (and required makeup) of about 2.88 gal/bushel input or 2,304,000 gallons annually. For the operating year stipulated above, the makeup would be about 4.8 gpm.

We hope this information will assist you in the application review process. If you have further questions please let us know.

Yours very truly,

W. Darrell Gertsch
Vice-President Engineering

bm

RECEIVED
MAY 16 1980

ROUTING SLIP

DATE _____	TIME _____
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FROM: (show title) _____	_____

FOR YOUR:

- ☐ Information
- ☐ Approval
- ☐ Signature

REVIEW AND:

- ☐ Call Me ☐ See Me
- ☐ Comment & Return
- ☐ Take Proper Action
- ☐ Draft a Reply for Me

PER:

- ☐ Our Conversation
- ☐ Your Request
- ☐ Boss's Request

ETHANOL production
 requires some
 consumptive use to
 make & evaporate
 the mash. What
 will they use for
 right?

Microfilm

TO _____
DATE _____ WHILE YOU WERE OUT TIME _____

M _____
OF _____

PHONE: _____
AREA CODE NUMBER EXT.

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Mr. David R. Tuthill, Jr.
Supervisor, Water Allocation Section
Idaho Department of Water Resources
Statehouse
Boise, Idaho 83720

April 23, 1980

Town & Country Gardens
P.O. Box 641
Malta, Idaho 83342

RE: Application for Permit 43-7146

Gentlemen:

We are currently reviewing your application for a permit to use 1.71 cfs from groundwater for heating purposes in the Raft River Critical Groundwater Area.

We understand that you intend to use for this system the same water that is currently used for irrigation purposes (licenses 43-2327 and 43-2461). This heating use would be non-consumptive, and thus would not injure any groundwater users in the Raft River Basin. However, the ethanol plant that you propose to construct would also have a consumptive use. The water used in creating the ethanol, and any water lost through evaporation would be consumptively used.

To evaluate your system for approval of this application, I need some information on your source of consumptively used water. Please forward this information to my attention by May 15, 1980, so that we can proceed with the timely processing of your application. If you have any questions, please contact me.

Sincerely,

DAVID R. TUTHILL JR., P. E.
Supervisor, Water Allocation Section

DRT:jg

MAILED

~~2026 Birth Date: 6-6-66 City: CA-94539~~

7671 Hansom Drive, Oakland, California 94605

July 10th, 1980

- 1) 1884 Raft River Water Right 100"
(2.0 cfs Nov - Apr)
- 2) Permit No 17386 Oct 26, 1931
(3.2 cfs Oct - Apr)
- 3) License No G20726 Nov 5, 1948
(0.21 cfs Apr - Nov)
- 4) License No G27029 Aug 2, 1957)
(1.5 cfs Apr - Nov)

Agricultural Growth Industries, Inc., Mar- Bil Enterprises, and Appropriate Technologies, Inc., have formed a Joint Venture for the development of an Agricultural Complex adjacent to the Raft River Geothermal Complex in Cassia County, South Central, Idaho. Specific location as sited above. The development and operations will be through a Limited Partnership of the above entities known as the Raft River Agricultural Project.

HISTORICAL AND PRESENT USAGE

INTENDED WATER USAGE

- Locally purchased grains will be processed through an Alcohol plant to produce 2,000,000 gallons of Ethanol per year - water usage will be 812 gallons per day which is less than is presently used. The water in the process system is recycled.

- The Distillers Wet Grain will not be dried further. It will be mixed with local products to produce a ration for feeding Livestock on the site.
- A portion of the presently allocated water from the Raft River will be collected in the winter period into a newly constructed lined four acre reservoir, ten (10) foot deep ($40 \text{ acre feet} \times 43,560 = 1,742,400 \text{ cu ft} \times 7.48 \text{ cu ft/gal} = 13,033,152 \text{ gallons of storage}$).
- Stored water will be used to water 1874 animal units of Swine and 1300 animal units of a Dairy Complex throughout the year. The swine and dairy animals will be in Environmentally Controlled Buildings.
- All manure will be automatically collected daily and enter a Thermophilic Methane generator. The sterile nutrient water will be recycled for wash down purposes with the balance going for irrigation of the remaining 160 acres of land.
- Sterile water from the methane generator will be held in a lined basin to be recycled as mentioned above for irrigation.
- Electricity will be generated from the methane for on site usage as well as peaking power for the Alcohol process. Excess electricity will be provided to the local electrical grid network.
- 42,047 gallons (0.0649 cfs) is the total water consumed for Livestock watering and alcohol distillation. This will be drawn daily from our own reservoir. This represents two percent (2 %) of the total water allocation for the property and provides a better balance and usage.

The designated water usage plan will be within the presently allocated water rights; thus, providing a better balanced usage and control than presently exists on the property. Water quality and control of the flow will be improved.

SUMMARY

Water resources will be controlled through a balanced and cascading water usage.

No new or ammended water permits, licenses or decrees are required.

Present usage will not be altered.

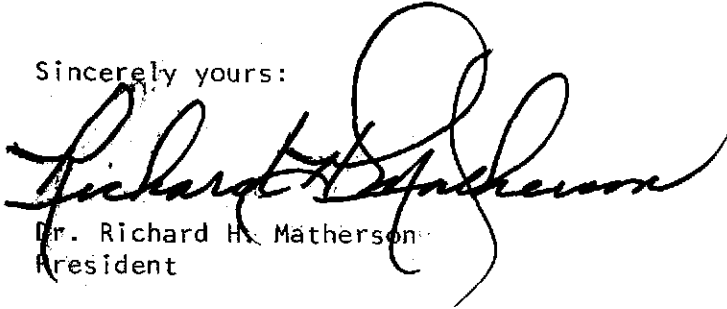
More efficient usage of the hot water will occur with controlled combined irrigation instead of run off to waste.

Locally grown crops will be used for alcohol distillation and animal feed stock, thus accruing advantages for the local agricultural community and the economy of Cassia County and the State of Idaho.

We hope that this information will provide insight into our operation and our concern for compliance with local and state regulations.

If any further questions occur please let us know.

Sincerely yours:

A handwritten signature in cursive script, appearing to read "Richard H. Matherson". The signature is written in dark ink and is positioned over the typed name and title.

Dr. Richard H. Matherson
President

RHM/dm

Almo, Idaho
June 25-1980

Dear Sirs,

I have Operated the Piece of Property known to me to be the Alvin Newbold Property Since 1967 - During that time I have had two Hundred Head of Cattle And five head of Horses on the Property from Nov. 1 to June 1 each year -

The year before I purchased the Property there were forty Head of Young Bulls running on the Property - Before that A farm flock of Sheep were here year around for several years -

Very truly yours
Wray Harrington
Almo Idaho 83312

RECORDED

Please notify Assessor of Any Error in This Statement
Cassia County, Idaho TAXPAYER'S STATEMENT

Cassia County, Idaho

TAXPAYER'S ST

NAME OF OWNER

IN CARE OF.

ADDRESS

NAME OF OCCUPANT AND ADDRESS.

Have any buildings been removed or destroyed, added or remodeled?

Report any changes in land under cultivation.

Refused to list.....State whether occupied by owner.....renter.....purchaser.....

Absent.

If You Were Not Contacted by Assessor, Ple

Statement Mailed.....

Sign and Return This Copy Within Ten Days

Exempt. Why?

School Dist. 131 Hwy. Dist. 11.1 City _____ Cem. Dist _____

REAL PROPERTY SITUATED IN CASSIA									
SUBDIVISION	TAX No.	SEC. OR LOT	TWP. S.	RNGE. E.B.M. BLK.	CLASS				
					1. IRRIGATED AGRICULTURE		2. PUMP		4. GRAZING
NW-SW		34	15	26				11	50
SW-SW		.	.	.	35	6	39	5	6
SE-SW	2197	.	.	.	26.5	2	78	12	15
Here is wrong Description of land to Be irrigated									

NOTICE.—Soldiers and Widows Must Claim Exemptions Each Year Before th
The Board of County Commissioners will meet on the Fourth Monday of June to equalize the
the Real Property Assessment Roll and to allow all exemptions affecting the assessment of such pro

The Board of County Commissioners will meet on the Fourth Monday of June to equalize the the Real Property Assessment Roll and to allow all exemptions affecting the assessment of such pro

I, ...

that, to the best of my knowledge and belief, the above and foregoing is a full, true and correct statement herein named, subject to assessment, by the Assessor of the County herein named, at 12:00 o'clock January last, or on the day of assessment which is not already assessed for this year; that no property concealed, removed, transferred or omitted from the above statement for the purpose of evading described is owned by the person named above as owner in said statement.

21057

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

27029

State of Idaho
Department of Water Resources

CLAIM ANALYSIS SHEET

INITIAL REVIEW BY: J. E. Stanton

Right Number 43-4094 Applicant Town & Country Gardens

NOTE: IF ANY OF THE ITEMS BELOW ARE MISSING, THE CLAIM IS INCOMPLETE AND MUST BE RETURNED IMMEDIATELY TO THE CLAIMANT ALONG WITH THE APPROPRIATE COVER LETTER.

CHECK:

- ☒ Name and address.
- ☒ Date of priority. (Check for a date past the mandatory filing dates.) (One date only.)
- ☒ Source.
- ☒ Quantity, use, period.
- ☒ Point(s) of diversion.
- ☒ Location of use.
- ☒ Signature/notarization/fee.

FINAL REGIONAL PROCESSING REVIEW:

☒ Affidavit of publication received. 2/11/80
☒ Claim published correctly.
☒ Exceptions processed. None
By ADN Date 2/11/80

STATE OFFICE PROCESSING:

☒ Claim review complete.
By J. E. Stanton Date 2/20/80

MICROFILMED

STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES
Southern Region

JOHN V. EVANS
Governor
C. STEPHEN ALLRED
Director

1041 Blue Lakes Blvd. N.
Twin Falls, ID 83301
(208) 734-3578

February 11, 1980

Town & Country Gardens
P.O. Box 641
Malta, Idaho, 83342

RE: Claim 43-4095

Gentlemen:

The Department of Water Resources has completed the advertising of your claim to a water right, and no further action is authorized under Section 42-243 and 42-244, IDAHO CODE. Your claim will be retained in our files and will be available at any time for use by you or the court.

The filing and advertising of the claim does not confirm the water right claimed, but will serve to record and preserve the information and the evidence which you included in your claim.

If, at a later date, you find that you have additional information or supporting evidence that you would like to have included with the claim, you may have that information or evidence added at any time. Please refer to the claim identification number when corresponding with this office.

We are enclosing a copy of your claim for your records. If you have questions, or if this office may be of further assistance, please feel free to contact us.

Yours truly,

LOREN O. HOLMES
Southern Region Supervisor

Enclosure

MICROFILMED

NOTICE OF CLAIMS TO WATER RIGHTS

Notice is hereby given that the following claim(s) to water right(s) have been established by diversion and application to beneficial use:

~~43-4004~~ 4095

TOWN & COUNTRY GARDENS, A PARTNERSHIP

P.O. BOX 641, MALTA, ID 83342

Source: GROUNDWATER

Priority Date: 07/26/1943

Amount: 1.71 CFS

Diversion Point: SESE Sec 23 T 155 R 26E, CASSIA Co.

Use: HEATING (1.71 CFS) from 01/01 to 12/31

Place of Use: SESE Sec 23 T 155 R 26E

Diversion Means: DIVERSION FROM TWO WELLS THEN DELIVERED TO P/U

Any exception to any claim of water right may be filed with the Director of the Idaho Department of Water Resources, 1041 Blue Lakes Blvd. North, Twin Falls, Idaho 83301.

RECEIVED

DATE

DATE 1/22 & 1/23 and Feb. 5

RECEIVED

**NOTICE OF CLAIMS
TO WATER RIGHTS**

Notice is hereby given that the following claim(s) to water right(s) have been established by diversion and application to beneficial use:

43-4094

TOWN & COUNTRY GARDENS, A PARTNERSHIP,
P.O. BOX 641, MALTA, ID 83342, Source:
GROUNDWATER, Priority Date: 07/26/1949,
Amount: 1.71 CFS, Diversion Point: SESE Sec 23 T
15S R 26E, CASSIA Co., Use: HEATING (1.71 CFS)
from 01/01 to 12/31, Place of Use: SESE Sec 23 T
15S R 26E, Diversion Means: DIVERSION FROM
TWO WELLS THEN DELIVERED TO P/U

Any exception to any claim of water right may
be filed with the Director of the Idaho Department
of Water Resources, 1041 Blue Lakes Blvd. North,
Twin Falls, Idaho 83301.

C. STEPHEN ALLRED

Director

Published in the South Idaho Press on January
22, 29, 1980.

*ob
maye
1/11/80*

DEPARTMENT OF WATER RESOURCES
Southern Region

1041 Blue Lakes Blvd N.
Twin Falls, Idaho 83301
(208) 734-3578

JANUARY 10, 1980

South Idaho Press
P.O. Box 190
Burley, Idaho 83318

Gentlemen:

Enclosed you will find a legal notice which we wish to have published on the dates indicated (once a week for two consecutive weekly issues) in your newspaper. We have allowed ample time for you to submit a galley proof to this office for review before the first publication date. 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. Your cooperation is appreciated.

Please send the affidavit of publication and publication billings to this office before FEBRUARY 7, 1980.

Yours truly,

Mary A. Hill
Secretary

Encl.

1

RECEIVED
JAN 14 1980