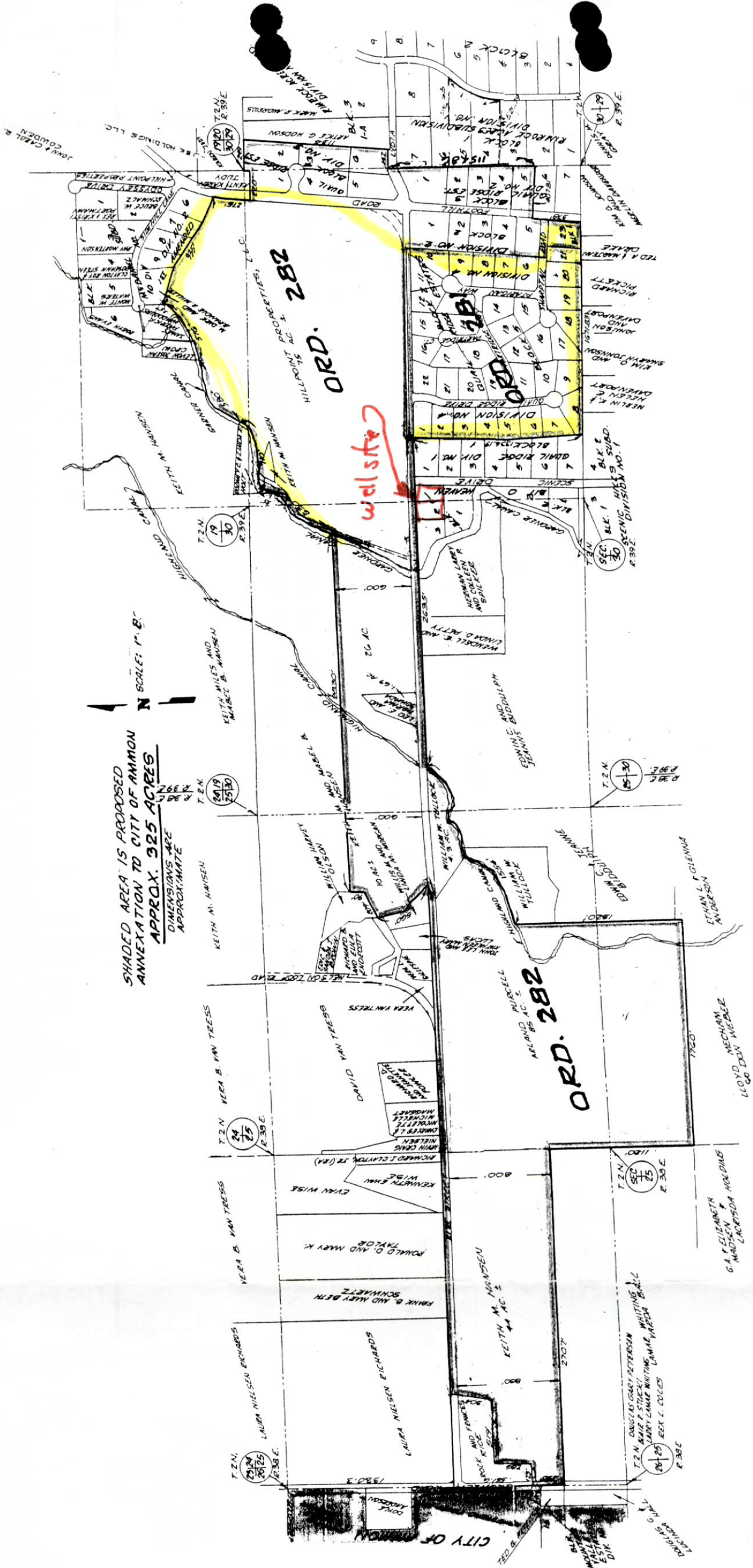


Drawn By: E.L.D.	REVISED: JULY 17, 1980
200 E Lincoln Road	(208) 524-8175

Drawn By: E.L.D.	REVISED: JULY 17, 1980	581
200 E Lincoln Road	(208) 524-8175	

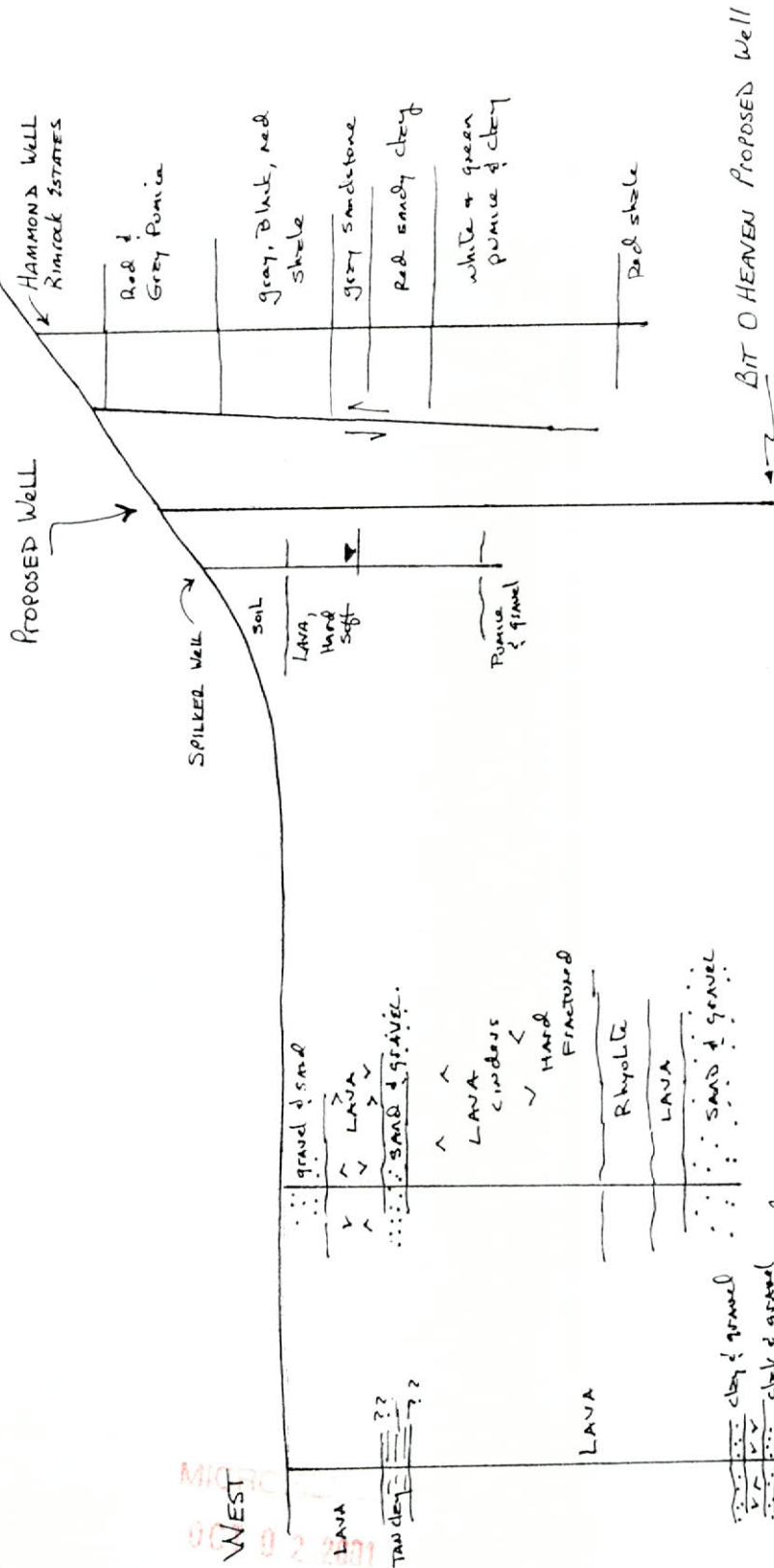




OCT 02 2001

GEOLOGIC CROSS SECTION

EAST



JOB BIT O' HEAVEN Well

SHEET NO RHEA 00-0070

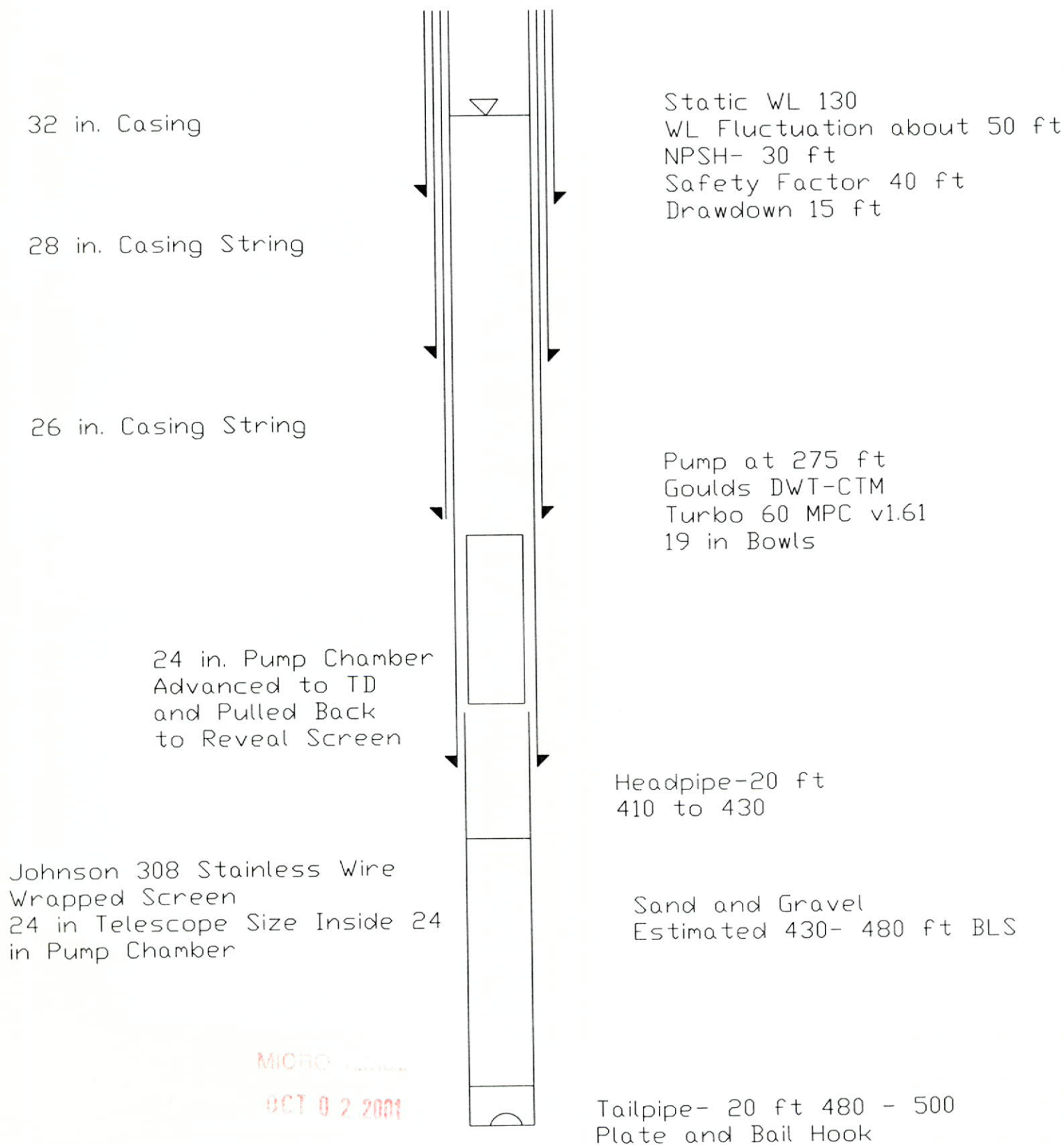
CALCULATED BY

CHECKED BY

SCALE



Well Design For Stainless Steel Screen Bit O'Heaven Well



Proof of Publication

RECEIVED

MAR 30 2001

Department of Water Resources
Eastern Region

The Post Register

State of Idaho
County of Bonneville

I, ~~Danae Jacobsen~~ or Robert Park, first being duly sworn, depose and say: That I am the ~~Production Supervisor~~ or Asst. Prod. Supervisor of The Post Company, a corporation of Idaho Falls, Bonneville County, Idaho, publishers of The Post Register, a newspaper of general circulation, published daily at Idaho Falls, Idaho; said Post Register being a consolidation of the Idaho Falls Times, established in the year 1890, The Idaho Register, established in the year 1880 and the Idaho Falls Post, established in 1903, such consolidation being made on the First day of November, 1931, and each of said newspapers have been published continuously and uninterrupted, prior to consolidation, for more than twelve consecutive months and said Post Register having been published continuously and uninterrupted from the date of such consolidation, up to and including the last publication of notice hereinafter referred to.

That the notice, of which a copy is hereto attached and made a part of this affidavit, was published in said Post Register for 2 consecutive (days) weeks, first publication having been made on the 15TH day of MARCH, 2001, last publication having been made on the 22ND day of MARCH 2001 at the said notice was published in the regular and entire issue of said paper on the respective dates of publication, and that such notice was published in the newspaper and not in a supplement.

Robert Park

Subscribed and sworn to before me, this 28TH day of MARCH, 2001

John Denny
Notary Public

My commission expires January 1st, 2003

LEGAL NOTICE

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

25-13964

CITY OF AMMON
2135 S AMMON RD
AMMON ID 83406
Point(s) of Diversion SWNE S30 T02N
R39E BONNEVILLE County
Source GROUND WATER
Use: MUNICIPAL 01/01 To 12/31

6.7 CFS
6.7 CFS

Total Diversion:
Date Filed: 03/08/2001
Place Of Use: MUNICIPAL
T02N R39E S30

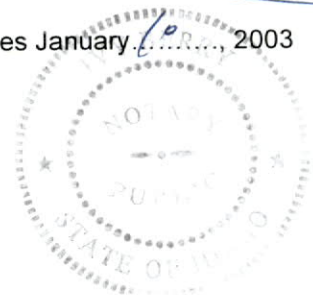
Permits will be subject to all prior water rights. Protests may be submitted based on the criteria of Sec 42-203A, Idaho Code.

Any protest against the approval of this application must be filed with the Director, Dept. of Water Resource, Eastern Region, 900 N Skyline Dr Ste A, Idaho Falls ID 83402 together with a protest fee of \$25.00 for each application on or before April 2, 2001. The protestant must also send a copy of the protest to the applicant.

KARL J DREHER, Director
Published: March 15, 22, 2001

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OCT 02 2001



State of Idaho
Department of Water Resources
Permit to Appropriate Water

NO. 25-13964

Priority: 03/08/2001

Maximum Diversion Rate: 6.70 CFS

This is to certify, that CITY OF AMMON
2135 S AMMON RD
AMMON ID 83406

has applied for a permit to appropriate water from:

Source: GROUND WATER

and a permit is APPROVED for development of water as follows:

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>RATE OF DIVERSION</u>
MUNICIPAL	01/01 to 12/31	6.70 CFS

LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 30, Twp 02N, Rge 39E, B.M. BONNEVILLE County

CONDITIONS OF APPROVAL

1. Proof of application of water to beneficial use shall be submitted on or before **June 1, 2004**.
2. Subject to all prior water rights.
3. Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which permit holder had no control.
4. The issuance of this right does not grant any right-of-way or easement across the land of another.
5. Right holder shall comply with the drilling permit requirements of Section 42-235, Idaho Code.
6. After specific notification by the department, the right holder shall install a suitable measuring device or shall enter into an agreement with the department to determine the amount of water diverted from power records and shall annually report the information to the department.
7. The use of water under this right shall not give rise to any claim against the holder of a senior water right based upon the theories of forfeiture, abandonment, adverse possession, waiver, equitable estoppel, estoppel by laches or customary preference.
8. The Director retains jurisdiction of the right to incorporate the use into a water district, require streamflow augmentation or other action needed to protect prior surface water and groundwater rights.
9. The daily diversion volume for non-domestic uses under this municipal right shall not exceed 2,500 gallons per use and the daily diversion volume for domestic uses under this right shall not exceed 13,000 gallons per dwelling in accordance with Section 42-111, Idaho Code.
10. Irrigation of large projects such as parks, golf courses, or sports activities fields is not authorized under this right.
11. The right holder shall not provide water diverted under this right for the irrigation of land having appurtenant surface water rights as a primary source of irrigation water except when the surface water rights are not available for use. This condition applies to all land with appurtenant surface water rights, including land converted from irrigated agricultural use to other land uses but still requiring water to irrigate lawns and landscaping.

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OCT 02 2001

State of Idaho
Department of Water Resources
Permit to Appropriate Water

NO. 25-13964

CONDITIONS OF APPROVAL

12. The right holder shall not assign or sell the permit without first securing the written approval of the Department of Water Resources.
13. The full system capacity necessary to provide water for the reasonably anticipated future needs authorized under this right must be constructed by the end of the designated planning horizon.
14. Point of diversion is located within Lot 2, Blk. 1, Bit O Heaven Subdivision.
15. Place of use is within the service area of the City of Ammon.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the signature of the Director, affixed at Boise, this 12th day of June, 2001.



KARL J DREHER, Director

for

MICROFILMED
OCT 02 2001

Ident. No. 25-13964
68948STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

RECEIVED

APR 19 2001

APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

Department of Water Resources

1. Name of Applicant City of Ammon c/o David Wadsworth Phone 208-529-4211
Mailing address 2135 South Ammon Road, Ammon, Idaho 83406
2. Source of water supply Groundwater which is a tributary of _____
3. Location of point of diversion is Township 2N Range 39E Sec. 30, in the _____ 1/4,
SW 1/4, N12 1/4, Govt. Lot _____, B.M., Bonneville County;
additional points of diversion if any: AKA L-2, Node 1, Bit O Heaven Subdivision
4. Water will be used for the following purposes:
- | |
|---|
| Amount <u>6.70 cfs</u> for <u>Municipal</u> purposes from <u>1-1</u> to <u>12-31</u> (both dates inclusive) |
| (cfs or acre-feet per annum) |
| Amount _____ for _____ purposes from _____ to _____ (both dates inclusive) |
| (cfs or acre-feet per annum) |
| Amount _____ for _____ purposes from _____ to _____ (both dates inclusive) |
| (cfs or acre-feet per annum) |
| Amount _____ for _____ purposes from _____ to _____ (both dates inclusive) |
| (cfs or acre-feet per annum) |
| Amount _____ for _____ purposes from _____ to _____ (both dates inclusive) |
| (cfs or acre-feet per annum) |
5. Total quantity to be appropriated is (a) 6.70 cubic feet per second and/or (b) _____ acre feet per annum
6. Proposed diverting works:
- a. Describe type and size of devices used to divert water from the source Well + pump which will tie in to existing city line
- b. Height of storage dam _____ feet; active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet
- c. Proposed well diameter is 30 inches; proposed depth of well is 500 feet
- d. Is ground water with a temperature of greater than 85°F being sought? NO
- e. If well is already drilled, when? _____; Drilling firm _____
Well was drilled for (well owner) _____; Drilling Permit No. _____
7. Time required for completion of works and application of water to proposed beneficial use is 2 years (minimum 1 year)
8. Description of proposed uses (if irrigation only, go to item 9):
- a. Hydropower; show total feet of head and proposed capacity in kW.
- b. Stockwatering; list number and kind of livestock.
- c. Municipal; show name of municipality. City of Ammon
- d. Domestic; show number of households.
- e. Other; describe fully. _____

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OCT 02 2001

9. Description of place of use:

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

City of Amman

TWP	RGE	SEC	NE				NW				SW				SE				TOTALS
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	

Total number of acres to be irrigated _____

10. Describe any other water rights used for the same purposes as described above. See attached

11. a. Who owns the property at the point of diversion? See attached sheet

b. Who owns the land to be irrigated or place of use? Applicant

c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing: _____

12. Remarks: This well is initially intended for use in the
Quail Ridge Subdivision which is or will be annexed into
the city of Amman. Also future needs are addressed in the
cfs request and additional data will be submitted.

13. MAP OF PROPOSED PROJECT REQUIRED - Attach an 8½"x11" map clearly identifying the proposed point of diversion, place of use, section #, township & range. (A photocopy of a USGS 7.5 minute topographic quadrangle map is preferred.)

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

Dawn Warburton P.A.D.
 Signature of Applicant (and title, if applicable)

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 OCT 02 2001

Received by HWJ Date 3-8-01 Time _____ Preliminary check by _____

Fee \$ 490.00 Received by HWJ # EO26525 Date 3-8-01

Publication prepared by SC Date 3/15 & 3/22/01 Published in Post Register

Publication approved SC Date 3/30/01

Information for Department of Water Resources Application for Permit:

Item No. 10 - Water Rights of City used for the same purposes

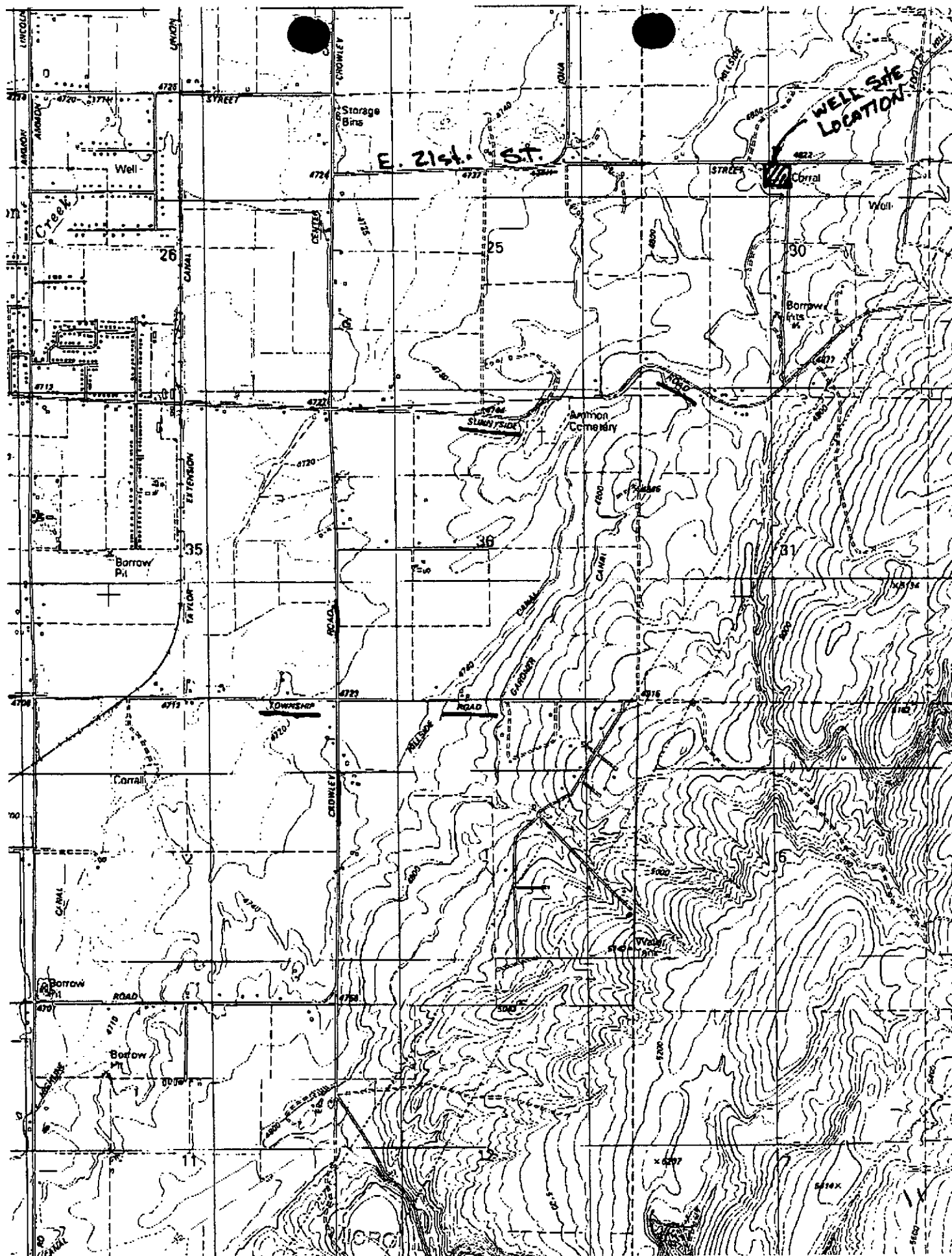
Well No. 1	0.78 cfs	Claim No. 25 4297	(2950 Romrell Lane)
Well No. 2	0.67 cfs	Claim No. 25 4295	(2951 Targhee Street)
Well No. 3	1.5 cfs	Claim No. 25 4294	(2755½ Sawtooth Street)
Well No. 4	1.0 cfs	Claim No. 25 4298	(3245½ Dal Avenue - Abandoned Well)
Well No. 5	2.32 cfs	Claim No. 25 7498	(3855½ Brookfield Lane)
Well No. 6	2.79 cfs	Claim No. 25 7023	(2260 Williams Street)
Well No. 7	3.34 cfs	Claim No. 25 7168	(3201 E. 17th Street)
Well No. 8	6.69 cfs	Claim No. 25 7634	(900 Tie Breaker Drive)

Item No. 11 - Carolyn Nielsen is currently the owner of the property at the point of diversion. It is under contract to the developers, George McDaniel and Brad Pickett. Onwership is to eventually be transferred to the City of Ammon to be part of the City system.

Item No. 13 - Map attached.

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OCT 02 2001



OCT 02 2001



State of Idaho

DEPARTMENT OF WATER RESOURCES

1301 North Orchard Street, Boise, ID 83706 - P.O. Box 83720, Boise, ID 83720-0098
Phone: (208) 327-7900 Fax: (208) 327-7866 Web Site: www.idwr.state.id.us

June 13, 2001

DIRK KEMPTHORNE
Governor

KARL J. DREHER
Director

CITY OF AMMON
2135 S AMMON RD
AMMON ID 83406

RE: Permit No. 25-13964

Permit Approval Notice

Dear Permit Holder:

The Department of Water Resources has issued the enclosed permit authorizing you to establish a new water right. Please be sure to thoroughly review the conditions of approval and remarks listed on your permit.

The permit is a PRELIMINARY ORDER issued by the Department pursuant to Section 67-5243, Idaho Code. It can and will become a final order without further action by the Department unless a party petitions for reconsideration or files an exception and/or brief within fourteen (14) days of the service date as described in the enclosed information sheet.

As a permit owner you must commence the excavation or construction of the diverting works within one year of the date the permit was issued, and you must proceed diligently until the project is completed. The date shown under condition no. 1 is the date when the project must be completed.

The Department will send you a 'Proof Due Notice' approximately 60 days prior to the above referenced date requesting you to file either a Proof of Beneficial Use form or a Request for Extension of Time form.

The right to drill a well is not a part of this permit to appropriate water. Beginning in July of 1987, a statute was enacted which requires a drilling permit for new well construction and deepening of existing wells. If the well(s) proposed for use under this water right permit were drilled or deepened after July 1, 1987, a separate drilling permit must be obtained from this Department. Please contact the Ground Water Protection Section located here at this office or our regional office nearest you.

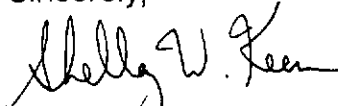
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OCT 02 2001

Also, please note that water right owners are required to report any change of water right ownership and/or mailing address to the Department within 120 days of the change. Failure to report these changes could result in a \$100 late filing fee. Contact any office of the Department or visit the Department's homepage on the Internet to obtain the proper forms and instructions.

If you have any questions, please contact me at 208-327-7946.

Sincerely,

A handwritten signature in cursive script, appearing to read "Shelley W. Keen".

Shelley W. Keen

Water Rights Supervisor

SWK:klt

Enclosure(s)

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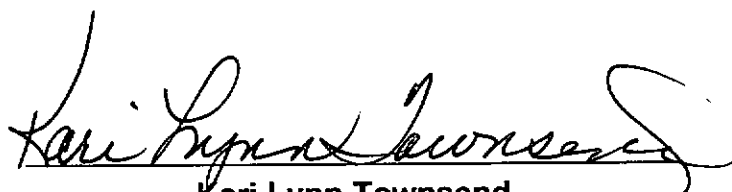
OCT 02 2001

CERTIFICATE OF MAILING

I hereby certify that on June 13, 2001 I mailed a true and correct copy, postage prepaid, of the foregoing PRELIMINARY ORDER(Approved Permit) to the person(s) listed below:

RE: WATER RIGHT NO. 25-13964

CITY OF AMMON
2135 S AMMON RD
AMMON ID 83406



Kari Lynn Townsend
Secretary

MICROFILMED
OCT 02 2001

**EXPLANATORY INFORMATION
TO ACCOMPANY A
PRELIMINARY ORDER**

The accompanying order or approved document is a "Preliminary Order" issued by the department pursuant to section 67-5243, Idaho Code. It can and will become a final order without further action of the Department of Water Resources (department) unless a party petitions for reconsideration, files an exception and brief, or requests a hearing as further described below:

PETITION FOR RECONSIDERATION

Any party may file a petition for reconsideration of a preliminary order with the department within fourteen (14) days of the service date of this order. The department will act on a petition for reconsideration within twenty-one (21) days of its receipt, or the petition will be considered denied by operation of law. See Section 67-5243(3) Idaho Code.

EXCEPTIONS AND BRIEFS

Within fourteen (14) days after (a) the service date of a preliminary order, (b) the service date of a denial of a petition for reconsideration from this preliminary order, or (c) the failure within twenty-one (21) days to grant or deny a petition for reconsideration from this preliminary order, any party may in writing support or take exceptions to any part of a preliminary order and may file briefs in support of the party's position on any issue in the proceeding with the Director. Otherwise, this preliminary order will become a final order of the agency.

REQUEST FOR HEARING

Unless a right to a hearing before the department or the Idaho Water Resource Board (Board) is otherwise provided by statute, any person aggrieved by any final decision, determination, order or action of the Director of the department and who has not previously been afforded an opportunity for a hearing on the matter may request a hearing pursuant to section 42-1701A(3), Idaho Code. A written petition contesting the action of the Director and requesting a hearing shall be filed within fifteen (15) days after receipt of the denial or conditional approval.

ORAL ARGUMENT

If the Director grants a petition to review the preliminary order, the Director shall allow all parties an opportunity to file briefs in support of or taking exceptions to the preliminary order and may schedule oral argument in the matter before issuing a final order. If oral arguments are to be heard, the Director will within a reasonable time period notify each party of the place, date and hour for the argument of the case. Unless the Director orders otherwise, all oral arguments will be heard in Boise, Idaho.

CERTIFICATE OF SERVICE

All exceptions, briefs, requests for oral argument and any other matters filed with the Director in connection with the preliminary order shall be served on all other parties to the proceedings in accordance with IDAPA Rules 37.01.01302 and 37.01.01303 (Rules of Procedure 302 and 303).

FINAL ORDER

The Director will issue a final order within fifty-six (56) days of receipt of the written briefs, oral argument or response to briefs, whichever is later, unless waived by the parties or for good cause shown. The Director may remand the matter for further evidentiary hearings if further factual development of the record is necessary before issuing a final order. The department will serve a copy of the final order on all parties of record.

Section 67-5246(5), Idaho Code, provides as follows:

Unless a different date is stated in a final order, the order is effective fourteen (14) days after its issuance if a party has not filed a petition for reconsideration. If a party has filed a petition for reconsideration with the agency head, the final order becomes effective when:

- (a) the petition for reconsideration is disposed of; or
- (b) the petition is deemed denied because the agency head did not dispose of the petition within twenty-one (21) days.

APPEAL OF FINAL ORDER TO DISTRICT COURT

Pursuant to sections 67-5270 and 67-5272, Idaho Code, if this preliminary order becomes final, any party aggrieved by the final order or orders previously issued in this case may appeal the final order and all previously issued orders in this case to district court by filing a petition in the district court of the county in which:

- i. A hearing was held,
- ii. The final agency action was taken,
- iii. The party seeking review of the order resides, or
- iv. The real property or personal property that was the subject of the agency action is located.

The appeal must be filed within twenty-eight (28) days of this preliminary order becoming final. See section 67-5273, Idaho Code. The filing of an appeal to district court does not itself stay the effectiveness or enforcement of the order under appeal.

MICROFILMED

OCT 02 2001

MEMORANDUM

To: File 25-13964

From: Sharla

Date: June 6, 2001

Re: Large Diversion Documentation

Information concerning large diversions as required by Water Appropriation Rule 40.05.c. was solicited from the applicant. The information supplied by the applicant has been reviewed and found acceptable for processing. The plat map identifies the locations of all surrounding wells and the design and construction plan in its entirety has been submitted.

I spoke with Skip Jones concerning the planning horizon and anticipated future needs in connection with this filing. Skip spoke to Mr. Wadsworth and found that the rate of diversion asked for is based specifically on the growth rate occurring in Ammon. Their pumps are running at maximum capacity and at current growth, the 6.70 cfs requested under this application will be completely utilized within 3 years. Since the planning horizon is so short, it's reasonable to delay the date for proof of beneficial use for the 3 years rather than the 2 years requested.

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OCT 02 2001

**APPLICATION FOR PERMIT
STATE OFFICE ANALYSIS**
Reviewed by Sharla Curtis on 4/24/01

No. 25-13964 Name: City of Ammon Corp. Officers _____ Ad ok ☒ Govt Lots _____

AREA OF CONCERN: No/Yes SR Moratorium _____ CWMA _____ TRUST/NON-TRUST _____

GROUNDWATER: (✓Flow Chart)

DRILLING PERMIT

All wells - 046
Basin 74 - 084 (if necessary)
WMD - North/East/West
≤ 0.24 cfs/5 acres - No MD
> 0.24 cfs/5 acres - 067

~~WMD~~

Supp irr (irr = only use) - 065-104
Supp irr (+ other uses) - 100-105
≤ 0.24 cfs/5 acres - No MD
> 0.24 cfs/5 acres - 01M

LOCATION:

Boise Front LoGeo - 058 (<85 GW)
Mitigation - 121

Trust - 051 (consumptive uses)
Non-Trust - 048-049 (consumptive uses or non-cons. > 1.0 cfs)

USES:

STORAGE - 18A-01H-01P-18B-NA
IRR ≤ 5 ac - R66/R67/R68/R69 (0.03 cfs/ac)
> 5 ac - R62/R63/R64/R65 (0.02 cfs/ac)
STOCK WATER - R37 (BLM/FS)
MINING - 054-106
FISH PROP - 029 (70's only)-007-042-106
HEAT/COOL - R07 (injection well)
FIRE PROT - 077
COMMERCIAL/
INDUSTRIAL - 106-R07
DAIRY - 082-WD8

BENEFICIAL USE DUE: 6 / 01 / 2003

MISC CONDITIONS/REMARKS:

~~Protested~~ - 020-W19
Development Period
> 1 yr - 26A
Ownership - 004
Non-consumptive - 027
Water Quality - 106-R07

SURFACE WATER: (✓Flow Chart)

F&G contacted - Yes/No Response _____
In/Above MSF - WB9

PLANNING REVIEW/RESPONSE

WD - R04 (WD# _____)
≤ 0.20 cfs/others - 01H(P01), 01P or No MD
> 0.20 cfs - 01J

SPRINGS/SINK, INACTIVE WD or WD

≤ 0.24 cfs/5 acres - No MD
> 0.24 cfs/5 acres - 01M or No MD

RIVER BASINS: (SW special considerations)

SNAKE R (01) - W22, N/A
(02,03) - 007 (w/ remark WB9 if above Weiser)
PAYETTE R (65) - 047 (Payette Lake)
SALMON R (70's) - 029 (fish screens)
WEISER R (67) - 086-087

USES:

~~POWER~~

- 17H or 17K (+uses)-17G (not under FERC)
or 17M (FERC regulated >25 cfs or 500hp)
08A-025-027-01N-106-W13 (if dewatering stream)

MUNICIPAL

Restricted area - 022,075
Irr., GW supp to SW - 102

DOMESTIC

Surface water - WB5 (Big Wood or Boise above Star Bridge)
27A (Payette R)
> 1 in restricted area - 070-071-075 (no parks/common areas, etc)
Irr use listed separate
or none allowed - WB5
Moratorium approvable - W03 (2500 gpd - meets domestic definition
i.e. D/convenience store)

~~Multiple p/d's per 1/4~~

Subd lot desc (pd) - W32
Subd lot desc (pu) - W59 Lt 2, Blk 1, Bit of Heaven Subd.
Use definitions - W60
Pre-1987 development - W02 example - S/50 range
Single p/d intended - 068-074 (allow 120 days for proof due)
- 076

IRRIGATION SEASON _____ - _____ (Per updated map)

IRR VOLUME/ACRE _____

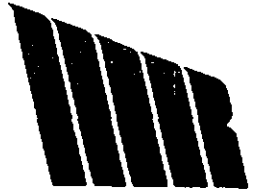
OTHER CONDITIONS/REMARKS _____

COMMENTS _____

RECEIVED

MAY 21 2001

Mountain River, Inc.
CONSULTING ENGINEERS AND LAND SURVEYORS



Department of Water Resources

May 15, 2001

Mr. Harold W. Jones
State of Idaho
Department of Water Resources
900 N. Skyline Drive Suite A
Idaho Falls, Idaho 83402-1718

Ref: City of Ammon Water Rights Application

Dear Harold,

Please find enclosed the information and data you requested in regards to the Water Appropriation Rules.

c.ii. See attached drawing for location of existing wells in relation to the proposed well site.

d.i. Water diversion rate is 3000 gpm (6.70cfs)

Average use period will be year round.

Peak use would be 3000 gpm.

d.ii. See attached Well design by Rocky Mountain Environmental for properties of the aquifer

f.ii. See attached cost estimate by Andrew Well Drilling Services Inc.

If you have any further questions Please call.

SINCERELY,

BRIAN CUNNINGHAM

**WELL DESIGN AND SPECIFICATIONS
AMMON MUNICIPAL WELL**

RMEA 00-0070

1 BACKGROUND:

This Well was designed by Rocky Mountain EnvironmentalSM (RMEA), and below is a summary of important terms under which this design was completed:

<i>CLIENT:</i>	Mountain River Engineering
<i>USER[s] of this Design:</i>	Mountain River Engineering
<i>Proposed Well Site:</i>	NW/4, Section 30, T 2 N, R 39 E
<i>Description of Well [provided by CLIENT]</i>	Municipal Well installed by developer of Bit O' Heaven, but transferred to the City of Ammon for its municipal water supply.

2 DESIGN CRITERIA

When CLIENT retained Rocky Mountain EnvironmentalSM, CLIENT indicated that well must meet the following requirements:

- 2.1 The well and associated equipment and structures must be constructed to standards for public water systems.
- 2.2 Well must be designed for a 3,000 gpm discharge.
- 2.3 The well should be designed for a closed bowl pump with 19-in. diameter bowls.
- 2.4 Total dynamic head is estimated at 300 ft.
- 2.5 Water should be withdrawn from deeper aquifer(s) to prevent contamination from surface source(s).

3 DEFINITIONS

Unless the context otherwise requires, the following definitions govern these specifications:

- 3.1 *Abandoned Well.* Any well which has been filled or plugged so that it is rendered unproductive and will prevent contamination of the ground water. A properly abandoned well will not produce water nor serve as a channel for movement of water from the well or between water-bearing zones.

¹ Rocky Mountain Environmental is a registered service mark of Rocky Mountain Environmental Associates, Inc.



WELL DESIGN AND SPECIFICATIONS
AMMON MUNICIPAL WELL

RMEA 00-0070

- one of which surrounds the other, such as the space between the walls of a drilled hole (well bore) and a casing or between a temporary surface casing and a permanent casing.
- 3.3 *Aquifer*. Any geologic formation that will yield water to a well in sufficient quantities to make the production of water from this formation feasible for beneficial use.
- 3.4 *Artesian Water*. Any water that is confined in an aquifer under pressure so that the water will rise in the well casing or drilled hole above the elevation where it was first encountered. This term includes water of flowing wells and water under pressure in wells that do not flow.
- 3.5 *Artificial Gravel Pack*. The placement of gravel or other permeable material in the annular space around a perforated well casing or well screen. A gravel pack is frequently used to prevent the movement of finer material into the well casing and to increase the ability of the well to yield water.
- 3.6 *Bore Diameter*. The diameter of the hole in the formation made by the drill bit or reamer.
- 3.7 *Bottom Hole Temperature Of An Existing Or Proposed Well*. The temperature of the ground water encountered in the bottom of a well.
- 3.8 *Casing*. The conduit to maintain the well opening and to prevent waste and contamination of the ground water as required by these standards, or as otherwise used in the construction of a well. It does not include well screens or liners used in the construction of a well.
- 3.9 *Cathodic Protection Well*. Any artificial excavation in excess of eighteen (18) feet in vertical depth constructed for the purpose of protecting certain metallic equipment in contact with the ground. Commonly referred to as cathodic protection.
- 3.10 *Cement Grout*. A mixture of water and cement in the ratio of not more than six (6) gallons of water to a ninety-four (94) pound sack of portland cement which is fluid enough to be pumped through a small-diameter pipe. To obtain a better flowing mixture, three (3) to five (5) pounds of bentonite may be added per sack of cement and the water increased to not more than six and one-half (6.5) gallons per sack of cement. Other cement grout or neat cement mixes may be used. These mixes shall be mixed and installed in accordance with the American Petroleum Institute Standards - API Class A through H. As found in API RP10B "Recommended Practice for Testing Oil Well Cements and Cement Additives," current edition or other approved standards.
- 3.11 *Conductor Pipe*. The first and largest diameter string of casing to be installed in a low temperature geothermal resource well. This casing extends from land surface to a depth great enough to keep surface waters

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- from entering and loose earth from falling in the hole prior to setting surface casing.
- 3.12 *Consolidated Formations.* Naturally-occurring geologic formations that have been lithified (turned to stone). The term is sometimes used interchangeably with the word "bedrock" and includes rocks such as basalt, rhyolite, sandstone, limestone and shale. Commonly, these formations will stand at the edges of a bore hole without caving.
- 3.13 *Contamination.* The introduction into the natural ground water of any physical, chemical, biological or radioactive material which may:
- 3.13.1 Cause a violation of State Drinking Water Standards; or
 - 3.13.2 Adversely affect the health of the public; or
 - 3.13.3 Adversely affect a designated and protected use of the State's ground water.
 - 3.13.4 Contamination includes the introduction of heated water or cooled water into the ground water if the alteration of ground water temperature renders the ground water less suitable for beneficial use. (7-1-93)
- 3.14 *Department.* The Idaho Department of Water Resources.
- 3.15 *Hydraulic Fracturing.* A process whereby water or other fluid is pumped under high pressure into a well to fracture and clean-out the reservoir rock surrounding the well bore thus increasing the flow into the well.
- 3.16 *Injection Well.* Any excavation or artificial opening into the ground which meets the following three (3) criteria:
- 3.16.1.1 It is a bored, drilled or dug hole, or is a driven mine shaft or driven well point; and
 - 3.16.1.2 It is deeper than its largest straight-line surface dimension; and
 - 3.16.1.3 It is used for or intended to be used for subsurface placement of fluids.
- 3.17 *Intermediate String Or Casing.* The casing installed within a low temperature geothermal resource well to seal out brackish water, caving zones, etc., below the bottom of the surface casing. Such strings may either be lapped into the surface casing or extend to land surface.
- 3.18 *Mineralized Water.* Any naturally-occurring ground water that has an unusually high amount of chemical constituents dissolved within the water. Water with above five thousand (5000) ppm total dissolved solids is considered mineralized.
- 3.19 *Monitoring Well.* Any well more than eighteen (18) feet in vertical depth constructed to evaluate, observe or determine the quality, quantity, temperature, pressure or other characteristics of the ground water or aquifer.
- 3.20 *Pitless Adaptor Or Pitless Unit.* An assembly of parts designed for attachment to a well casing which allows buried pump discharge from the well and

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- allows access to the interior of the well casing for installation or removal of the pump or pump appurtenances, while preventing contaminants from entering the well.
- 3.21 *Production String.* The casing or tubing through which a low temperature geothermal resource is produced. This string extends from the producing zone to land surface.
- 3.22 *Puddling Clay.* A mixture of bentonite, other expansive clays, fine-grained material and water, in a ratio of not less than seven (7) pounds of bentonite or expansive clay per gallon of water. Puddling clay must be composed of not less than fifty (50%) percent expansive clay with the maximum size of the remaining portion not exceeding that of coarse sand.
- 3.23 *Seal Or Seal Material.* The impermeable material, such as cement grout, bentonite grout, or puddling clay, placed in the annular space between the borehole wall and the permanent casing, to prevent the downhole movement of water or the vertical movement and mixing of artesian waters. Seals may not be installed dry unless in granular form and above the water table.
- 3.24 *Surface Casing.* The first string of casing in a low temperature geothermal resource well which is run after the conductor pipe to anchor blow out prevention equipment and to seal out all existing cold ground water zones.
- 3.25 *Telescoping.* A method of filling or placing one casing inside another, or of introducing screen through a casing diameter larger than the diameter of the screen.
- 3.26 *Unconsolidated Formation.* A naturally-occurring earth formation that has not been lithified. Alluvium, soil, sand, gravel, clay, and overburden are some of the terms used to describe this type of formation.
- 3.27 *Well.* An artificial excavation or opening in the ground more than eighteen (18) feet in vertical depth below land surface by which ground water of any temperature is sought or obtained. Well also means any injection well more than eighteen (18) feet in vertical depth below land surface and any test well, monitoring well, cathodic protection well, observation well or exploratory well more than eighteen (18) feet in vertical depth below land surface that is constructed to evaluate the ground water resource or to evaluate contamination of the resource. Well does not mean a hole drilled for mineral exploration, oil and gas exploration (for which a permit has been issued pursuant to Section 47-320, Idaho Code) for dam or building foundation dewatering, for foundation geotechnical evaluations, for the installation of standpipes or piezometers installed near dams, buildings or other construction sites for the sole purpose of measuring uplift forces caused by water or for the purpose of collecting soil samples above the water table.

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- 3.28 *Well Driller Or Driller.* Any person who excavates or opens a well or wells for compensation or otherwise upon any land of the well driller or upon other land. Well driller does not include those persons who construct a well on their own property for their own use without the aid of any power driven mechanical equipment.
- 3.29 *Well Drilling Or Drilling.* The act of constructing a new well or deepening or modifying an existing well by any percussion, rotary, boring, digging, jetting or auguring method.
- 3.30 *Well Owner.* The owner of the land on which the well is located unless a deed, covenant, contract, easement, or other documentation acceptable to the director is provided to demonstrate that the well is owned by another.
- 3.31 *Well Rig.* Any power driven percussion, rotary, boring, digging, jetting or auguring machine used in the construction of a well.

4 HYDROLOGIC SETTING AND SUBSURFACE CONDITIONS.

- 4.1 The Eastern Snake River Plain [ESRP] is a flat depression, 50 to 100 km wide, that cuts an arcuate swath across southern Idaho. This volcanic province extends from Payette, Idaho, near the Oregon border, 250 km southeast to Twin Falls and thence 300 km northeast to Ashton, Idaho (located about 50 mi south of West Yellowstone). The Snake River Plain is bounded on the southeast by mountains of the Basin and Range province. These mountains consist of upper Precambrian through lower Mesozoic sedimentary rocks; these units were uplifted along normal faults during Neogene and Quaternary tectonism. Southwest of the Snake River Plain are mid-Miocene rhyolitic and basaltic rocks of the Owyhee Plateau. On the northeast end of the Snake River Plain are Quaternary rhyolitic and basaltic rocks of the Yellowstone Plateau².
- 4.2 Eastern Snake River Plain [ESRP] aquifer³ is a layered sequence of volcanic rocks [basalt flows and cinder beds] sandwiched between fluvial [river-lain] and lacustrine [lake bed] sedimentary deposits. Rubble, clinker zones, fractures, and vesicular zones [i.e., holes in the lava formed by gas bubbles

² Kuntz, M. A., Covington, H. R., and Schorr, L. J., 1992, An overview of basaltic volcanism of the eastern Snake River Plain, Idaho in *Regional Geology of Eastern Idaho and Western Wyoming*, Link, P. K. et. al., ed., Geol. Soc. Am. Memoir 179, p. 227-267..

³ Ackerman, D.J., 1991, Transmissivity of the Snake River Plain Aquifer at the Idaho National Engineering Laboratory, Idaho: U.S. Geological Survey WRI-91-4058.

as the lava cooled] are common at the top of individual flows. Subsequent [i.e., younger flows that overlie the older flows] may partly filled the fractures and vesicles. The centers of individual flows may be dense and massive, but may have vertical fractures. This framework results in a complex, heterogeneous aquifer.

- 4.3 Vertical and horizontal flow within ESRP aquifer is largely controlled by the areal distribution of interbedded sand or gravel and the contacts between basalt flows. The transmissivity of the ESRP aquifer ranges from $9.29 \times 10^4 \text{ m}^2/\text{d}$ to $5.57 \times 10^5 \text{ m}^2/\text{d}$ ($1 \times 10^6 \text{ ft}^2/\text{d}$ to $5 \times 10^6 \text{ ft}^2/\text{d}$)⁴.

- 4.4 Whereas there are significant amounts of hydrogeologic data for the ESRP aquifer, there are several factors that make drilling at any one specific location unpredictable:

4.4.1 The physical and structural characteristics of the basalt, as individual flows and as a unit, are geographically diverse and unpredictable. This means that it is not possible to predict, in advance, the depth at which water-yielding sediments, cinders, rubble, joints and fractures will be penetrated.

4.4.2 The well site is located on the eastern side of the ESRP, and it is possible that sand and gravel may be encountered at depth. If, but only if, sand and gravel are encountered, the driller will install stainless steel, wire-wrapped screen designed to prevent sand-pumping.

- 4.5 Rocky Mountain EnvironmentalSM examined Well Driller's Reports on file at the Eastern Idaho Regional Office, Idaho Department of Water Resources [IDWR] and Engineering Reports for public water systems [PWS] on file at Idaho's Department of Environmental Quality [IDEQ]. The following provides some information on subsurface conditions important for well design, installation, and completion:

- 4.5.1 The City of Ammon drilled a municipal well in Section 22, about 3.5 miles north-northwest of the proposed well⁵. Examination of the Well Driller's Report [attached] reveals:

⁴ Dunnivant, F. M., et. al., 1998, Water and radioactive tracer flow in a heterogeneous field-scale system: Ground Water, Vol. 36, No 6., November-December 1998.

⁵ Well Driller's Report, Permit No. 25-96-E-0030-00, on file at IDWR.

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- 4.5.1.1 Total depth [TD] is 371 ft.
- 4.5.1.2 Static water was 84 ft bls, but well site elevation is about 100 ft lower than proposed drill location.
- 4.5.1.3 Well was drilled with cable tool, and four casing strings [24 in. OD, 20-in. OD, 16-in. OD, and 12-in. OD] were installed.
- 4.5.1.4 The 16-in. casing extends from +2 ft to 221 ft below land surface [bls], but the drill hole is open from 221 ft bls to 328 ft bls.
- 4.5.1.5 From 328 ft to 370 ft bls, the driller installed a torch cut screen [1100 perforations, each 0.25 in. x 4 in.]. This interval, 328 ft to 370 ft, contains "soft gray sandstone and gravel."
- 4.5.1.6 The Well Report records a well test. The well discharged 3400 gpm for 6 hours. Drawdown was 76 ft.
- 4.5.1.7 Analysis of the Well Driller's Report for this well leads to the following conclusions:
- 4.5.1.7.1 The specific capacity of the well [yield/drawdown] is 45 gpm per ft of draw down.
- 4.5.1.7.2 The regression equation⁶ between specific capacity and transmissivity based on 37 pumping tests at 26 wells at the INEEL was applied to the pump test results for the 1996 Ammon well. Below is a summary of the calculations:

Regression Equation	$T = (Q/s)1.1.853 \times 40.62$ [from Ackerman, 1991, p. 26]	
T	Transmissivity	
s	specific capacity [gpm per ft drawdown]	
Q	3400	gpm
Drawdown	76	measured drawdown at Q
Specific capacity	45	gpm per ft of drawdown
T	3,675	ft ² per day

⁶ Ackerman, *op. cit.*

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- 4.5.1.7.3 The specific capacity of this well [45 gpm/ft of drawdown] and the inferred transmissivity [T, i.e., 3,675 ft²/d] are lower than values reported at others wells installed in the ESRP aquifer. The low specific capacity [i.e., low volume per ft of drawdown] and low T may be the result of inefficient openings in the pump chamber. This inefficiency will consume excessive electricity and may result in sand pumping.
- 4.5.1.7.4 The driller cut 1,100 openings, each 1/4 in. x 4 in. in the pump chamber⁷. These openings [1100 sq in. or 7.64 sq ft] means that 3,400 gpm [454 cu ft/min] must pass through the openings at an entrance velocity equal to about 0.99 ft/sec, almost 10 times greater than the design goal of 0.1 ft/sec⁸.
- 4.5.2 About ½ mile west of the proposed well, a domestic well⁹ was drilled in NE/4, NW/2, Section 30 for Larry Spilker.
- 4.5.2.1 The driller reported 70 ft of topsoil and then penetrated 210 ft of basalt, pumice and gravel.
- 4.5.2.2 Static water was 130 ft bls.
- 4.5.3 About ½ mile east of the proposed well is an irrigation well. Installed prior to 1977¹⁰, this well reportedly discharges 2,000 gpm. The yield of this well, located east of the proposed well location, suggests that the ESRP aquifer underlies the proposed drilling location in Section 30.
- 4.5.4 The City of Ammon reports that one of its wells was abandoned due to excessive sand pumping¹¹. The well filled with sand to about 37 ft bls.

⁷ According to Mr. Wadsworth, City of Ammon, the driller did not make torch-cut perforations. Rather, a down-hole perforator was used. David Wadsworth, personal communication, December 13, 2000.

⁸ Driscoll, F. G., 1979, Groundwater and Wells, Johnson Screens, St. Paul, MN.

⁹ Well Driller's Report, prepared by Andrew's Well Drilling and dated December 17, 1976.

¹⁰ Prior to 1977, submission of Well Driller's Reports was not required [Dennis Dunn, IDWR, personal communication].

¹¹ Dave Wadsworth, Public Works Supervision, City of Ammon, personal communication, December 13, 2000.

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- 4.5.5 About 1 mile east of the proposed well location, the ESRP aquifer is faulted, and a normal fault brings Tertiary Salt Lake Formation to the surface. Rimrock Estates is located on the hillside created by this faulting. The fault is important, as it is a boundary condition that restricts radial flow to the proposed well. Therefore, a longer pump test is specified, to evaluate this boundary condition on the drawdown in the well.
- 4.5.6 The U.S. Geological Survey measures depth to water in selected wells in Idaho and measures water depth in five [5] wells in Bonneville County¹². The wells are located at least 6 miles west of the proposed drilling location in Section 30. The elevation of static water fluctuates over a range from 10 ft to 50 ft during the year. This means that the pump should be set deep enough to ensure that it remains submerged during annual water table fluctuations.

5 DESIGN PARAMETER AND INSTALLATION PROCEDURES

- 5.1 The exact depth to and yield of water-bearing zones in the subsurface are unknown and can only be predicted in general terms. Therefore, the following general procedures will be followed:
- 5.1.1 To provide subsurface information regarding water-bearing zones [i.e., depth to each zone, estimated yield of each zone, etc.], the driller will keep an accurate and complete record of lithologies encountered and presence of water, and an estimate of yield.
 - 5.1.2 Specifically, every 5 ft [or when the cuttings are bailed], driller will collect representative samples of cuttings and place each sample of cuttings in Ziplock® bag labeled with the depth of collection.
 - 5.1.3 To provide clean, potable water, the driller will disinfect all equipment, pipe, tools, etc. with a solution of 500 ppm chlorine [Cl] before any tool, pipe, equipment, etc. is placed into the well bore.
 - 5.1.4 To protect water quality, driller will install a 4 in. grout seal from 130 ft below grade to the surface. Installation by tremie pipe or mud shoe is required. Installation of dry bentonite chips or pellets using the "pour down" method is prohibited.
 - 5.1.5 The design herein is based upon installation of a stainless-steel, wire-wrapped screen. The screen will be installed in water-bearing sand or

¹² U.S. Geological Survey, 1998, Water resources data, Idaho Water Year 1998: Vol. 1, Great Basin and Snake River Basin above King Hill: Water-data report ID-98-1.

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gravel [if present]. The screen's slot size and length will be determined based on drill cuttings collected by driller. The consulting hydrogeologist will assist driller in the slot size determination and the screen depth and length.

- 5.1.6 Rocky Mountain EnvironmentalSM will be
 - 5.1.6.1 on-site during grouting of the surface seal;
 - 5.1.6.2 on-site to observe draw down during pump tests;
 - 5.1.6.3 consult with driller concerning subsurface conditions and water-bearing zones;
 - 5.1.6.4 direct and advise driller regarding slot size, screen length, and depth of placement, if water-bearing sand or gravel are encountered.

5.2 WELL LOG

In addition to records required DESIGN PARAMETERS below, Driller will record the following information:

- 5.2.1 Reference point for all depth measurements.
- 5.2.2 Depth at which each change in formation or lithology occurs.
- 5.2.3 Depth at which first water and subsequent dry and wet intervals are encountered.
- 5.2.4 Depth at which hole diameters [bit sizes] change.
- 5.2.5 Depth at which each casing string is set and the length of casing.
- 5.2.6 Driller will complete and file the Well Driller's Report with the Department.
- 5.2.7 Driller will collect samples of cuttings every 5 ft and at change in lithology from surface to total depth [TD]. Driller will retained samples in Ziploc® bag, each marked with sample depth.

- 5.3 **INSTALLATION OF CASING.** Driller will install casing by lowering, driving with a drive shoe, driving with a well point, or jacking. Casing length shall be joined water-tight welding, and weld shall penetrate full thickness of the casing wall. Driller will ensure that the resulting joint shall have the same structural integrity as the casing itself.

5.4 WELDING

Driller will ensure that all welding shall be full, continuous, running weld and shall conform to the American Welding Society of American Petroleum Institute specifications. Welding stainless steel casing to mild steel casing

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will not be permitted. Welds for connecting stainless steel sections shall be made using AWS Type E308-15 lime-coated or Type E308-16 titanium-coated rods. Reverse polarity d.c. current shall be used with E308-16 rods. with E308-15 rods and a.c. or d.c. reverse polarity with Type E308-16 rods.

Driller will ensure welders shall be qualified in accordance with "Welding Procedures," ASME Boiler Construction Code or AWS Standard Qualification Procedure.

5.5 DRILL SITE SECURITY AND SAFETY

Driller is responsible for all setup, layout, security fencing, and tanks required for this project. Driller will ensure that all holes, pits, equipment, chemicals are stored in accordance with state and federal regulations [including OSHA]. Drill will ensure that discharge waters from pumping, bailing, or development do not contaminate soil at drill site or adjoining properties or discharge into navigable waters of the United States.

At completion, Driller will remove all debris, equipment, structures, and fill excavations or pits built or constructed by Driller. Driller will remove all soil, cuttings, and debris resulting from drilling operations and will regrade the site to conform to original topography. Driller will leave site clean and neat.

Driller will assume responsible for the safety of its employees and subcontractors and for security of Driller's equipment and supplies.

5.6 WELL INSTALLATION SPECIFICATIONS

Driller will install the well in accordance with the following design parameters and specifications:

<i>Well Characteristic</i>	<i>Specification</i>	<i>Comment</i>
Yield Objective:	3,000 gpm	
Estimated Total Depth	500 ft	
Pump	Goulds® 60 Hz Turbine, E641BBPCI	• Pump set at 275 ft below grade • Bowl Diameter: 19 in. • NPSH is 30.4 ft.

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<i>Well Characteristic</i>	<i>Specification</i>	<i>Comment</i>
Estimate Pump Depth	275 ft below surface	Static water 130 ft. WL fluctuations 50 ft NPSH 31 ft Drawdown 15 ft Safety Factor 40 ft Total 266 ft
Temporary Surface Casing	32 in. OD steel, set to 130 ft bls	• Removed and annulus filled with grout.
Surface Seal	• Grout seal, 4 in. around 28 in. casing string. • Installed when 32- in. surface casing is withdrawn • Set from 130 ft below grade to surface. • Installed by tremie pipe. • "Pour down" method is prohibited . • Grout will comply with IDWR requirements at IDAPA 30.03.09.010.12. • It is estimated that volume of annulus outside of 26 in. casing is at least 681 cu ft. • Driller will have at least 25% additional grout on site during grouting.	
Casing Strings	Four [4] casing strings were installed in other municipal wells drilled by cable tool in Ammon and eastern Idaho Falls. Therefore, the following casing strings are recommended:	
1	32 in. OD, Sch. 80, Wall thickness 0.500 in.	Surface casing, set from surface to 130 bls. Removed and annulus outside 28 in. casing filled with grout.
2	28 in. OD. Sch. 80, Wall thickness 0.500 in.	Set from surface to a depth determined by driller and subsurface conditions

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<i>Well Characteristic</i>	<i>Specification</i>	<i>Comment</i>
3	26 in. OD. Sch. 80, Wall thickness 0.500 in.	Set from surface to a depth determined by driller and subsurface conditions
Pump Chamber	• 24 in. OD. • Meets ASTM A53B/API 5L-B. • Wall thickness 0.500 in.	• Set from +3 ft through casing strings to Total Depth. Pulled back to reveal <i>open hole</i> or pulled back to reveal screen. • At 3000 gpm, up hole velocity is < 5 ft/sec.
Drilling Method	• Cable Tool	
Drilling Fluid	• Potable water • Driller will be responsible for supplying potable water when drilling above water table.	
Disposal of Fluids and Cutting	• Driller will remove all drill cuttings from site and properly dispose of same. • Driller will provide piping to discharge water from pump test to canal approximately 300 ft south of drill site. • Driller will ensure that discharged water does not erode canals, or in any way damage adjoining properties.	
Disinfection	• All tools, pipe, equipment, etc. must be cleaned and disinfected in 500 ppm chlorine solution prior to being installed or inserted in the borehole.	
Perforations/Screen	This well is designed to be completed using one of the following methods: 1. <i>Open Hole</i>. Driller will complete well as an open hole if and only if sand or gravel is not encountered. 2. <i>Wire-wrapped stainless steel screen</i>. Driller will complete well using a wire-wrapped screen, if sand or gravel is encountered at depth.	

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<i>Well Characteristic</i>	<i>Specification</i>	<i>Comment</i>
OPTION #1: Open Hole	If the well will be completed as an <i>open hole</i> , Driller will pull back pump chamber from TD [estimated at 500 ft] to 300 ft, exposing the bottom 200 ft of the hole. This length of open hole may provide 3,000 gpm from the basalt.	
OPTION #2: Wire-wrapped stainless steel screen	If sand and gravel is encountered, driller will install a wire wrapped, stainless steel screen. • Wire-wrapped stainless steel, 24-in. TS [telescoped size] telescoped inside 24 in. pump chamber. • TS ["telescope size"] manufactured by US Filter [Johnson Well Screen]. • Intake Area: 429 sq. in./ft at 0.04 in. slot size. • Transmitting capacity: 133 gpm/ft at 0.1 ft/sec. • For bidding purposes, minimum length: 50 ft. • Driller will install tail pipe, screen, and headpipe through pump chamber and then "pull back" chamber to expose screen.	
Headpipe	• 20 ft, 24 in. steel TS pipe, welded on screen using Weld Ring. • Neoprene "K" packer set on head pipe above of screen, • 24 in. TS K Packer to seal 24 in. pump chamber.	
Tail pipe	• 20 ft, 24 in. steel TS pipe, welded on screen bottom using Weld Ring. • Bottom plate with bail hook at bottom of tail pipe. NOTE: The slot size, length of screen, and vertical placement in the well bore will be based upon sieve analysis of subsurface samples. Therefore, driller will take extreme care to accurately and diligently collect, record, and preserve accurate and representative samples of subsurface lithologies. Driller will install screen of appropriate length and slot size under direction of consulting hydrogeologist.	
Sand Filter	• <i>Natural sand pack</i> developed by surging and over-pumping.	
Well Development	• Prior to pump test, Driller will develop well by mechanical surging.	

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AMMON MUNICIPAL WELL

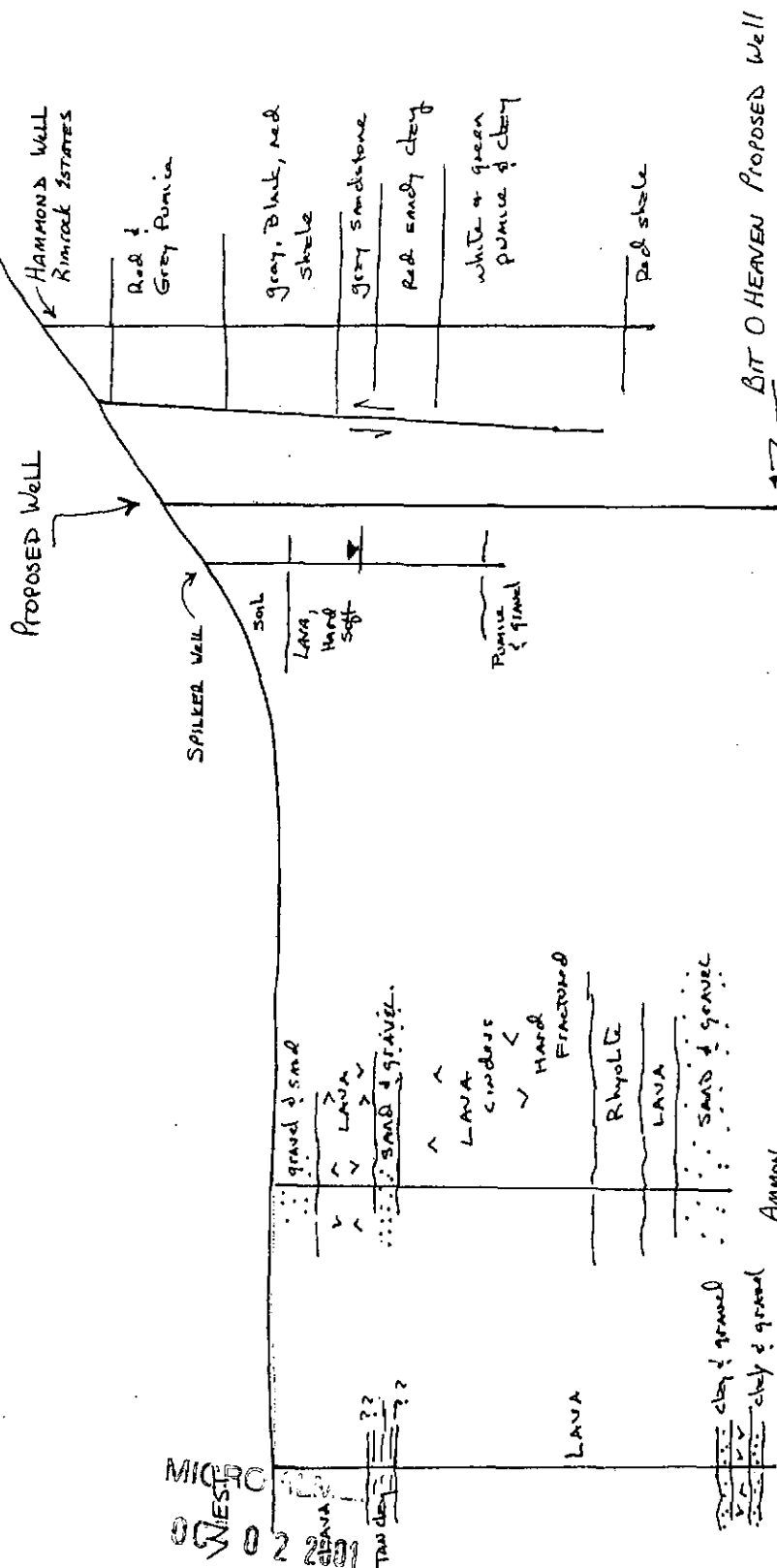
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<i>Well Characteristic</i>	<i>Specification</i>	<i>Comment</i>
Plumbness and Alignment	Driller will take great care to ensure that the completed borehole and pump chamber are plumb and aligned. This will ensure that pump and screen assembly [if any] can be installed to appropriate depth. Prior to installing the well screen, Driller will ensure that a 40-ft long cylinder, that is one-pipe size smaller than the pump chamber, will pass from the surface to TD.	
Down Hole Inspection	After completion of pump test, driller will record well completion using a down-hole television camera and will provide three [3] copies of the inspection on VHS-format videotape.	
Pump Test	• Driller will perform a step-drawdown aquifer test. Specifically: 3 hr at 3000 gpm 3 hr at 3500 gpm 24 hr at 3750 gpm • Driller will provide pump for pump test. • Driller will install discharge piping [est. 300 ft] for pump test and remove piping at completion of test. • Driller will operate pump continuously during each step and during the 24-hr test. If pump fails, driller will restart test at his own expense. • Driller will ensure discharged fluids do not injure or erode adjoining properties, structures, or canals. • Driller will record drawdown from surface at 10 minute intervals for the first hour and at hourly intervals thereafter. Precision will be ± 0.10 foot.	

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GEOLOGIC CROSS SECTION

EAST



BIT O HEAVEN PROPOSED WELL

Volume 2

IBANO FALLS
#13

100 FT

vertex expansion

2 miles



Rocky Mountain

ENVIRONMENTAL ASSOCIATES, INC.
482 Constitution • Idaho Falls, Idaho 83402-3537
• 800-388-3793 • (208) 524-2353 • FAX (208) 524-1795

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• 800-388-3793 • (208) 524-2353 • FAX (208) 524-1795

BIT O' HEAVEN well

REF ID: A66507

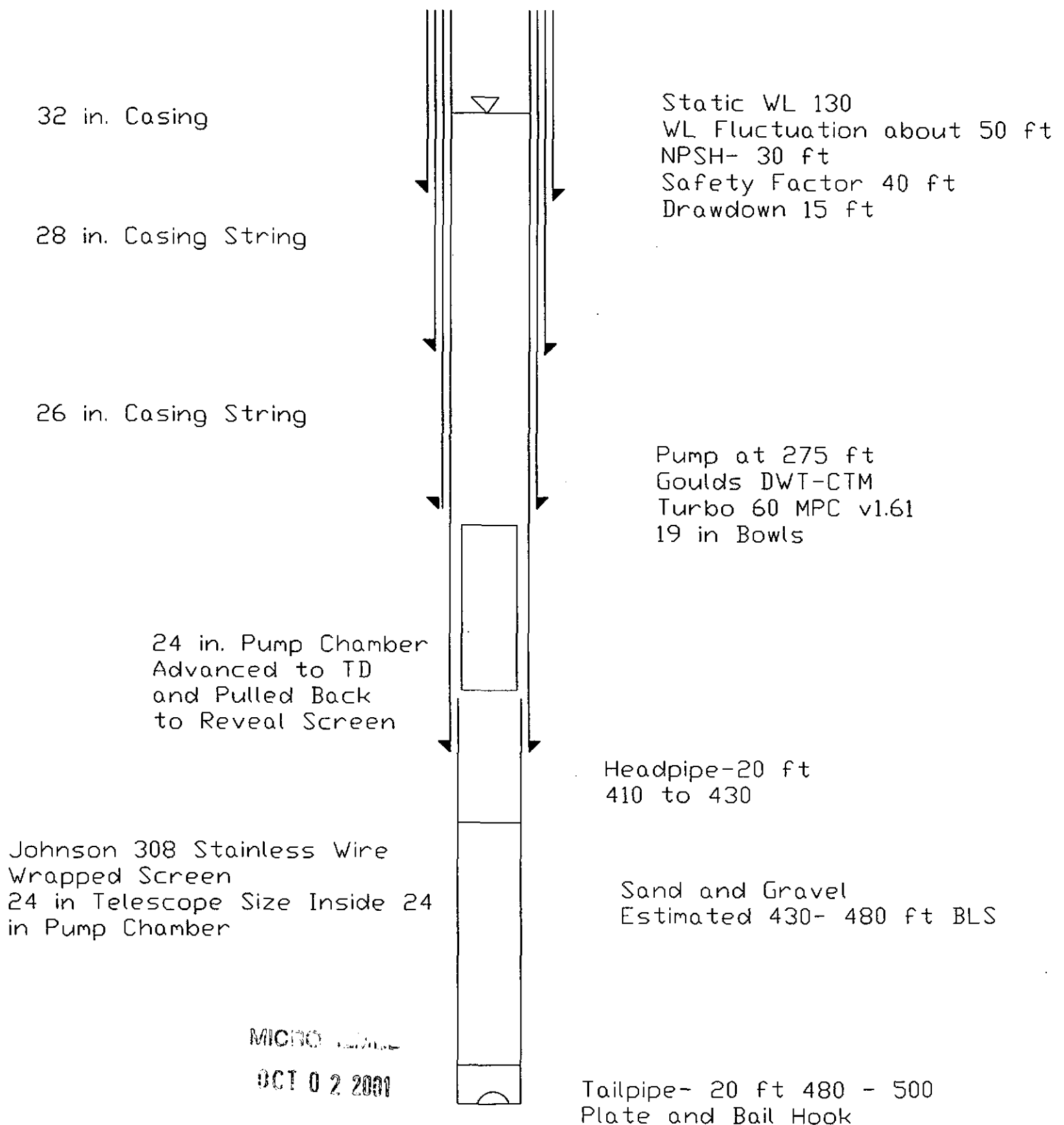
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DATE _____

RECEIVED BY _____

3746

Well Design For Stainless Steel Screen Bit O'Heaven Well



WELL CONSTRUCTION DESIGN CHECKLIST

BIT O' HEAVEN WELL FOR CITY OF AMMON

Project Name: BIT O' HEAVEN

Water System Name: Public Water System for Annexation by City of Ammon

I. ADMINISTRATIVE COMMENTS

- A. All applicable checklist items must be specifically addressed in the plans and specifications, in a manner that clearly shows how each item will be satisfied. If rules or standards are to be used for construction, they must be written on the plans or included in the specifications, not merely referenced.
- B. Written justification must be provided for any cross-hatched areas that are checked.

Yes	No	NA
■		
■		

II. DOCUMENTS REQUIRED FOR A COMPLETE SUBMITTAL

- A. Well Construction Checklist (this checklist).
- B. Three complete sets of stamped plans and specifications. (One set will be kept for DEQ files).
- C. Well Design Engineering Report.
- D. A signed inspection contract.

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III. ADMINISTRATIVE REQUIREMENTS

- A. Was IDWR consulted prior to well design?
- B. Application to Appropriate Water filed with IDWR and an approved Water Appropriation Permit included with submittal.
- C. Application for Drilling Permit filed with IDWR. Note: Water Rights and Drilling Permit must be approved by IDWR prior to construction.
- D. Written approval of the well site received from DEQ
. VERBAL APPROVAL
- E. Professional engineering & inspection services available during well construction?
- F. Are minimum separation distances from sewer mains, septic systems, property lines, surface waters, and other sources of contamination provided?

■		
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IV. MATERIAL AND EQUIPMENT

- A. Specifications for material transportation, handling, storage, and protection.
- B. Equipment and/or materials, including drilling fluids, used in well construction NSF Standard 61 approved or equivalent.

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V. GEOLOGIC SAMPLING

- A. Sampling interval (e.g. every 5 feet or change in lithology), and methods identified.
- B. Need for other logs (i.e., resistivity, gamma, sonic, etc.).
- C. Collect and save samples.

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VI. DRILLING

- A. Separate specification sections for each type of acceptable drilling method.
- B. All "downhole" materials cleaned and disinfected with 500 ppm chlorine solution (per IDWR rules).
- C. NSF approved drilling mud product name(s) or specification.
- D. Location and approximate volume of drilling mud losses.

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VII. CASING

- A. Thickness and grade meet Recommended Standards for Water Works (i.e., 8-inch casing must be at least 0.322 inches thick). RSWW, Table 1.
- B. For steel casing, welding procedures and specifications.
- C. For steel casing, welds penetrate full thickness of the casing wall.

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VII. CASING (continued)

- D. Plastic well casing must be approved per NSF Standards 14 and 61, and approved for site specific use by DEQ and IDWR. The engineer must be present during placement of the casing and any packing material that is required to ensure structural stability.
- E. Instructions for removal of temporary casing (i.e., to prevent separation during extraction).
- F. Depth of penetration of well casing into identified confining layer.
- G. If drive shoes are used to seal casing, describe method for testing shoe seal.

Yes	No	NA
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- H. Plumbness test.
- I. Alignment test.
- J. Top of casing at least 30 inches above finished grade and/or 6 inches above floor, preferably higher.
- K. Finished grade at least 12 inches above natural ground level to provide slope away from well in all directions.
- L. Permanent 1½ inch diameter casing vent (downturned, screened with #24 mesh, and terminating at least 18 inches above floor or ground) or equivalent vented well cap.

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VIII. SEALS

- A. Depth, method of placement, and type of seal.
 - 1. Pumped.
 - 2. Slow and continuous.
 - 3. Volume and type of material recorded and checked against engineering specifications every 5 to 10 feet.
 - 4. Minimum 50% excess seal material on site.
 - 5. Withdraw temporary casing and/or tremie as the seal is placed.
- B. Minimum requirements for annular seal thickness.
- C. Testing method for well seal (regular tagging of top seal, volume calculations, bail down/fill up, other).
- D. Consultant present and IDWR contacted for seal placement.
- E. Intermediate seals to separate aquifers of unequal quality or pressure.
- F. Centralizers at about every 60 feet.
- G. Curing time (before drilling resumes) for cement grout.

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IX. SCREENS AND PERFORATED CASINGS

- A. 304, 304L, 306, or 306L (NSF Standard 61 approved) stainless steel.
- B. Minimum construction requirements and/or acceptable brands.
- C. Casing perforations size, type and spacing specified.
- D. Screen size, length, and placement detail, including blank casing. (Bottom plate or wash down bottom fitting and minimum use of drilling muds).
- E. Centralization of screens in annular space.
- X. FILTER/GRAVEL PACK (Note: All screens and perforated sections shall be filter/gravel packed unless otherwise authorized by DEQ/IDWR)

NATURAL
FILTER PACK

- A. Material description and physical properties.
- B. Screen seal or packer. Make and model shown on the plans and specifications.
- C. Filter/gravel pack designed from aquifer formation sieve analysis evaluated by engineer (and screen manufacturer if requested by engineer).
- D. Detail of filter/gravel pack including placement, tagging, volume checks, and extension above and below screen (typically 3 feet).

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XI. WELL DEVELOPMENT

- A. Development method, equipment, and duration specified.
- B. Passing criteria.
- C. Final cleaning of sump.
- D. A preliminary production test is recommended, especially for air-rotary rigs.

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XII. FINAL PRODUCTION TESTS

- A. Engineer (or a representative of the engineer) present during testing.
- B. Pump rate and duration. (Wells $\leq$ 50 gpm test-pumped at 100% of required design capacity for at least 4 hours or longer if necessary to stabilize drawdown. Wells $>$ 50 gpm test-pumped at 125% of required design capacity for at least 6 hours or longer if necessary to stabilize drawdown).
- C. Flow, time, and depth to water during drawdown and recovery measured and recorded.
- D. If the well is located in a low yield aquifer, an additional 3-day test at average ultimate use may be required - contact DEQ.
- E. Bacterial and chemical water quality testing as required for new sources. Contact DEQ for the specific monitoring requirements for different types of public water systems. Schedule only with owner and/or Engineer.
- F. Final disinfection and flushing to remove all chlorine. (Also see Item XIV.A)
- G. T.V. inspection. (Recommended for all wells, particularly with large wells or where problems are anticipated).
- H. Measurement for sand content (must be $<$ 5 ppm) either by laboratory or as specified in IRPDWS, section 550.03.d.iii.

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XIII. PITLESS ADAPTERS

- A. Pitless adapter approved by NSF, Water Systems Council, or equivalent. Make and model are shown in the plans and specifications.
- B. Field tested per Manual of Individual Water Supply Systems.

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- C. Replacement of upper casing annular seal to the original specifications.

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XIV. SITE CONTROL

- A. Construction wastewater and storm water disposal methods. (If discharged to surface water or canals, proper authorizations obtained)
- B. Runoff shall not contain sediment unless erosion control measures, approved by DEQ, are in place.
- C. Water leaving the site does not contain well drilling chemicals or sealant material.

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XIV. SITE CONTROL (continued)

- D. Well construction waste and/or debris, including drilling fluid waste, disposed of at a sanitary landfill or other site approved by the engineer.
- E. Dust and noise control recommended.
- F. Holes, pits, equipment, and chemicals safely stored and fenced per OSHA standards.

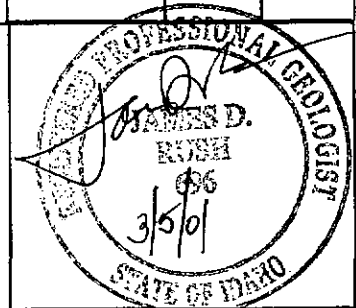
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XV. PROJECT COMPLETION

- A. Site cleanup.
- B. Sufficient casing height to prevent flooding.
- C. Adequate temporary cap per IDWR requirements on well seal.
- D. Submit data and reports to engineer, DEQ, and IDWR. This shall include the well log, production pump specifications and pumping curves, pumping test results, and results of new source monitoring tests.

Yes	No	NA
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Note: This checklist addresses the majority of common items from the Idaho Rules for Public Drinking Water Systems (IRPDWS), the Recommended Standards for Water Works (RSWW), and common engineering practices. However, this checklist is not all-inclusive and users are expected to fully understand the rules and standards, apply them where necessary, and request interpretations from DEQ if there are any questions. DEQ regional offices may have additional written information that will assist in the design/approval process.



"I hereby certify that all of the items indicated on the above checklist are accurately reflected in the attached Plans and Specifications."

James D. Rush

Place signed and dated
P.G. stamp in the box
above

OCT 02 2001

QUOTATION

Task Description	Qty	U/M	Unit Price	Extended Price
1. Mobilization to Drill Site This line item includes: *transportation of all equipment and supplies to drill site *all permits and fees *decontamination and sanitization of all equipment, tools and supplies	1	LS	1,500.00	\$1,500.00
2. Install temporary surface casing to 130 ft. After pump test, remove temporary casing and fill 4 in. annulus with grout. Note: Price does not include drilling.	130	FT	156.00	20,280.00
3. Drill to TD using various casing strings. Note: the \$/ft unit rate includes all casing strings and pump chamber. Driller will be paid for the depth to which the 24-in. pump chamber is installed. Estimated depth is 500ft., but driller will be paid for actual footage to which 24-in chamber is installed Note: Price will be charged to total depth drilled	500	FT	310.00	155,000.00
4. Option 1: Open Hole Completion: Driller will pull back 24 in pump chamber to 250ft bls to expose lower 250ft of hole	1	LS	6,000.00	6,000.00
5. Option 2: Install 24in TS stainless steel screen, 50 ft long, with attached head pipe, and tail pipe. Driller will pull back 24in pump chamber to expose screen	1	LS	18,000.00	18,000.00
6. Well Development. Driller will develop well by mechanical surging until produced water runs free of sediment	1	LS	5,000.00	5,000.00
7. Driller will perform Production test, including *Pump, drawdown measurements, discharge piping, etc. *video survey of well after pump test	1	LS	9,500.00	9,500.00
8. Demobilization Driller will remove all equipment, supplies, cuttings, etc., from drill site. Driller will weld temporary, steel cover (½ in thick) over casing(s) at surface to protect well bore	1	LS	1,200.00	1,200.00
Total - Option 1			\$198,480.00	
Total - Option 2			\$210,480.00	

Quotation by:

Date:

Andrew Well Drilling Services, Inc.

March 15, 2001

OCT 02 2001

Dist. for staffing _____
Submitted for advertising _____

Form No. 202
4/87

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATIONS FOR PERMIT ANALYSIS PERMIT

RECEIVED

APR 19 2001

INITIAL REVIEW BY HWT DATE 4-5-01 APPLICATION NO. _____
Department of Water Resources

REQUIRED INFORMATION

- ☒ Name (If applicant is a corporation or partnership, names must be provided for the director, officers, & other partners.)
☒ Address
☒ Source (See USGS Quad for names of water sources)
☒ Point of Diversion (10 acres for spring, lot & block descriptions for subdivisions, local name, flow and/or volume)
☒ County
☒ Quantity (flow and/or volume)
☒ Period of Use
☒ Nature of proposed use (Include description of use.)
☒ Description of diverting works
☒ Time required for beneficial use of water
☒ Place of use or acres irrigated
☒ Map
☒ Signature (If applicant is corp., partnership, or municipality, title of signatory is required)
☒ Fee
☒ Yes _____ No* In form to receipt

ADDITIONAL INFORMATION

- _____ Overlapping place of use (Describe source & relationship to present application on the back.)
_____ Overlapping point of diversion
_____ Yes _____ No Field check required
_____ Yes _____ No Field check by _____
_____ Yes _____ No Field report attached
_____ Yes _____ No Critical groundwater area
_____ Yes _____ No Groundwater management area
_____ Yes _____ No Send dam safety information
_____ Yes _____ No Send power requirement letter
_____ Yes _____ No Send fish farm requirement letter
_____ Yes _____ No Power residency affidavit
_____ Yes _____ No Power efficiency form
_____ Yes _____ No Within trustwater boundary (If yes, attach trust water supplementary analysis sheet.)
☒ Yes _____ No Diversion greater than 5 cfs or 500 acre ft. (If yes, attach large diversion supplementary analysis sheet.)

See reverse side for additional information

*REQUEST THE FOLLOWING ADDITIONAL INFORMATION FROM THE APPLICANT _____

_____ Date Requested _____

PROCESSING ☒ Yes ☒ No In form for advertising
☒ Yes ☒ No Statewide advertising
☒ Yes ☒ No Fee amount, receipt date & No. recorded on application

SEND COPIES TO _____ Idaho Dept. of Health & Welfare _____ U.S. BLM
_____ Idaho Dept. of Fish & Game _____ U.S. Forest Service
_____ Idaho Dept. of Lands _____ Water District
_____ Adjudication Bureau Unit ☒ Other DEQ

FINAL REGIONAL PROCESSING REVIEW

☒ Yes ☒ No Affidavit of publication received
☒ Yes ☒ No Application published correctly. If not, record action taken.

☒ Yes ☒ No Publication dates & paper, recorded on application
☒ Yes ☒ No Protests received
Final date for protest _____
☒ Yes ☒ No Protests, dates, resolution of protest, recorded on application
☒ Yes ☒ No Recommendations, attached
☒ Yes ☒ No Measuring device required
☒ Yes ☒ No Access port required
☒ Yes ☒ No Will water be delivered by watermaster? If yes, what Dist. _____
☒ Yes ☒ No Special conditions of approval or cover letter below. _____

See below for additional information
Date of priority recommended 3-8-01
By Shuf Date 4-5-01

STATE OFFICE REVIEW

See below for additional information
By _____ Date _____

ADDITIONAL INFORMATION

DEQ has approved the well design & distribution system for this application. Andrew Well Drilling was selected to construct the well. Dennis M Dunn 6 April 2001

LOCAL PUBLIC INTEREST

Comments received from

<u> </u> City	<u> </u> Idaho Fish & Game	<u> </u> Irrigation District
<u> </u> County	<u> </u> Idaho Health & Welfare	<u> </u> Canal Company
<u> </u> Reservations	<u> </u> Division of Environment	<u> </u> Other

Project impacts/implications report

COMMENTS

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook or legal pad style. There is no handwriting or other markings on the page.

Proof of Publication

RECEIVED

MAR 30 2001

Department of Water Resources
Eastern Region

The Post Register

State of Idaho
County of Bonneville

I, ~~Dan Jacobsen~~ Robert Park, first being duly sworn, depose and say: That I am the ~~Production Supervisor or Asst. Prod. Supervisor~~ of The Post Company, a corporation of Idaho Falls, Bonneville County, Idaho, publishers of The Post Register, a newspaper of general circulation, published daily at Idaho Falls, Idaho; said Post Register being a consolidation of the Idaho Falls Times, established in the year 1890, The Idaho Register, established in the year 1880 and the Idaho Falls Post, established in 1903, such consolidation being made on the First day of November, 1931, and each of said newspapers have been published continuously and uninterruptedly, prior to consolidation, for more than twelve consecutive months and said Post Register having been published continuously and uninterruptedly from the date of such consolidation, up to and including the last publication of notice hereinafter referred to.

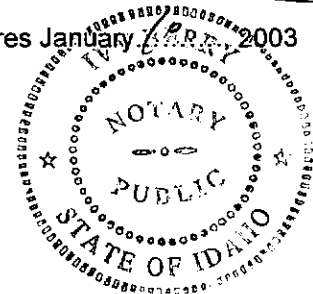
That the notice, of which a copy is hereto attached and made a part of this affidavit, was published in said Post Register for 2 consecutive (days) weeks, first publication having been made on the 15TH day of MARCH, 2001, last publication having been made on the 22ND day of MARCH 2001 at the said notice was published in the regular and entire issue of said paper on the respective dates of publication, and that such notice was published in the newspaper and not in a supplement.

Robert Park

Subscribed and sworn to before me, this 28TH day of MARCH, 2001

John Denny
Notary Public

My commission expires January 1, 2003



LEGAL NOTICE

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

25-13964
CITY OF AMMON
2135 S AMMON RD
AMMON ID 83406
Point(s) of Diversion SWNE S30 T02N
R39E BONNEVILLE County
Source GROUND WATER
Use: MUNICIPAL 01/01 To 12/31

Total Diversion: 6.7 CFS
6.7 CFS

Date Filed: 03/08/2001
Place Of Use: MUNICIPAL
T02N R39E S30

Permits will be subject to all prior water rights. Protests may be submitted based on the criteria of Sec 42-203A, Idaho Code.

Any protest against the approval of this application must be filed with the Director, Dept. of Water Resource, Eastern Region, 900 N Skyline Dr Ste A, Idaho Falls ID 83402 together with a protest fee of \$25.00 for each application on or before April 2, 2001. The protestant must also send a copy of the protest to the applicant.

KARL J DREHER, Director
Published: March 15, 22, 2001

MICROFILMED

OCT 02 2001



State of Idaho

DEPARTMENT OF WATER RESOURCES

900 N. Skyline Dr., Suite A, Idaho Falls, Idaho 83402-1718 - (208) 525-7161- Fax (208) 525-7177

EASTERN REGION

DIRK KEMPTHORNE
GOVERNOR

KARL J. DREHER
DIRECTOR

March 08, 2001

CITY OF AMMON
2135 S AMMON RD
AMMON ID 83406

RE: Application for Permit No 25-13964

Dear Applicant(s):

The Department of Water Resources acknowledges receipt of your water right application. Please refer to the above referenced number in all future correspondence regarding this application.

A legal notice of the application has been prepared and is scheduled for publication in the Post Register on March 15 and 22, 2001. Submittal of protests to this application will be allowed for a period ending ten days after the second publication.>

If the application is protested you will be sent a copy of the protest(s). All protests must be resolved before the application can be considered for approval. If the protest(s) cannot be resolved voluntarily, the Department will conduct a conference and/or hearing on the matter.

Please feel free to contact this office if you have any questions.

Sincerely,

Harold W Jones
Water Right Supervisor

HWJ:sc

MICROFILMED

OCT 02 2001



State of Idaho

DEPARTMENT OF WATER RESOURCES

900 N. Skyline Dr., Suite A, Idaho Falls, Idaho 83402-1718 - (208) 525-7161- Fax (208) 525-7177

EASTERN REGION

DIRK KEMPTHORNE
GOVERNOR

KARL J. DREHER
DIRECTOR

March 08, 2001

Legal Notice Department
POST-REGISTER
PO BOX 1800
IDAHO FALLS ID 83402

RE: Application for Permit No. 25-13964

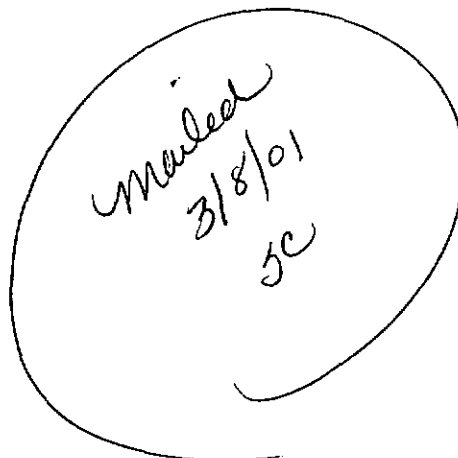
Dear Kathy Von Borstel:

Enclosed you will find a legal notice which we wish to have published in your newspaper on the dates indicated (once a week for two consecutive weekly issues). If you cannot publish the notice on the proposed dates, please contact us immediately.

An affidavit of publication must be submitted to the Department along with the publication bill. Please send the affidavit and bill to this office before April 2, 2001. Your cooperation is appreciated.

Sincerely,

Sharla Cox
Administrative Assistant



MICROFILMED

OCT 02 2001

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

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CITY OF AMMON
2135 S AMMON RD
AMMON ID 83406

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Source GROUND WATER

Use: MUNICIPAL 01/01 To 12/31 6.7 CFS

Total Diversion: 6.7 CFS

Date Filed: 03/08/2001

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T02N R39E S30

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KARL J DREHER, Director

Published on March 15 and 22, 2001

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