

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 92-7231

Exam Date: 7/23/2007

1. Current Owner: FERNWOOD WATER DIST
C/O HENRY LEWIS
PO BOX 215
FERNWOOD ID 83830
(208) 245.3554
2. Accompanied by: Gidget McQueen, Darril Hindman
Phone No: (208) 245.3554
Address: PO Box 215 Fernwood, ID 83830
Relationship to Permit Holder: Gidget McQueen (2007) FWS Employee, Darril Hindman (2008) (Operator)

3. SOURCE TRIBUTARY
GROUND WATER

B. OVERLAP REVIEW

1. Other water rights with the same place of use: 92.2027, 92-7171,
2. Other water rights with the same point of diversion: NONE

C. DIVERSION AND DELIVERY SYSTEM

1. LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER NW1/4SE1/4, Sec. 6, Twp 43N, Rge 01E, B.M., BENEWAH County

Method of Determination: Garmin, GPS Coordinates obtained in 2007 and 2008, DEQ Spatial data also confirms location. USGS 'Clarkia' 7.5' Quadrangle (Topographic).

2.

PLACE OF USE: MUNICIPAL

Within the Service Area of the Fernwood Water and Sewer District as provided for under Idaho Code.

Method of Determination:

3. ☒ Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.
- ☒ Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.
- ☒ Aerial Photo Attached (required for irrigation of 10+ acres).
- ☒ Photo of Diversion and System Attached

92-7231

4.

Well or Diversion ID No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
E0005557	NA	NA	NA	NA	NA
(POD ID 721947) (47° 06' 00" N 116° 22' 00" W) (POD ID 721947)					

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

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
Flowmeter	-	Sensus	W-350	NA	100 Gallon Sweep	Unknown
-	-	-	-	-	High Speed Pickup	-

2. Measurements: Flowmeter Readings 12,636,500 gallons
 15 min apart 12,633,400 gallons
 $3100 \div 15 = 206.66 = 207 \text{ GPM} = .47 \text{ cfs}$

E. FLOW CALCULATIONS

Measured Method:

Additional Computation Sheets Attached

PUMP EQUATION		W.R. No. 92-7231				
	HP	H in feet	Efficiency as a decimal	Pumping lift in feet	System pressure in PSI	
Q = HP*8.8*Eff/H	10	59.823129	0.7	2	25	
Q =	1.031	cfs				

PUMP EQUATION		W.R. No. 92-7231				
	HP	H in feet	Efficiency as a decimal	Pumping lift in feet	System pressure in PSI	
Q = HP*8.8*Eff/H	20	59.823129	0.7	2	25	
Q =	2.063	cfs				

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation: Not Applicable

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

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

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

2. Volume Calculations for Other Uses: Municipal

(From Proof of Beneficial Use - 200 homes)

200 homes @ individual lawns/irrigation
 $200 \times (.6 \text{ domestic}) + 200 \times (.6 \text{ irrigation}) =$

$$200 \times (1.2 \text{ AF}) = 240 \text{ AF}$$

92-7231

G. NARRATIVE/REMARKS/COMMENTS

The Fernwood Water and Sewer District (FWS) system uses interconnected facilities for both surface water and ground water. A surface water diversion dam is located East of Fernwood on Adams Creek with a pipeline leading to a sand trap (North 47 Degrees 06.960 Minutes, West 116 degrees 21.526 minutes) at Finn Creek. FWS Well 3 is the groundwater Point of Diversion (POD) for this water right (92-7231) and is located South of Fernwood on the West side of the St. Maries River. The well is located in the NW 1/4 of the SE 1/4 of Section 6, Township 43 N, Range 1 E.

Adams Creek water or Well 3 is used to fill a reservoir next to the sand trap on Finn Creek and the Crystal Creek Storage Reservoir. Water from the Finn Creek Storage Reservoir (FCSR) passes down a 10 inch diameter pipeline through Fernwood and up Crystal Creek to the East before reaching the Crystal Creek Storage Reservoir (CCSR) (North 47 Degrees 07.286 Minutes, West 116.22.853 Minutes). Both storage reservoirs are covered, built from concrete, and are at the same elevation.

Water from FWS Well 3 travels via a six -inch pipeline to a building where sampling, water treatment, and telemetry equipment is installed before continuing West to connect to a pipeline on Old County Road. The pipeline runs North along Old County Road across the St. Maries River to connect in Fernwood to the pipeline between the Finn Creek Storage Reservoir and the Crystal Creek Storage Reservoir. Telemetry equipment monitors the reservoir water levels and signals the well to begin pumping when water levels fall to 12 feet. Well 3 is used to refill both reservoirs when the Sand Trap is undergoing maintenance, when surface water is insufficient to fill both reservoirs, or when turbidity and other water quality requirements limit the amount of Adams Creek water that can be allowed to enter the reservoirs.

Well pump horsepower could not be determined due to FWS personnel changes and records currently available at FWS. A Pump Test Analysis in a 1997 draft engineering report by Ruen-Yeager and Associates indicates that a 20 Horsepower pump must be used in Well 3 to meet all requirements.

Manufacturer information for the Sensus W-350 totalizing flowmeter (installed at the well building) indicates the meter uses 100 Gallon increments. Flowmeter readings indicate that flow averaged 207 Gallons Per Minute (.47 CFS) over a 15 minute period on June 20, 2008. Readings from this meter are taken and recorded daily by FWS. Recorded readings over a 23 hour period in June 2008 totaled 16,900 gallons for an average flow of 734.78 Gallons Per Hour (735 GPH .027 CFS).

The enclosed calculations for Well 3 indicate that a 10 Horsepower (HP) pump could meet the Permit 92-7231 CFS amount of 1.0 CFS. A 10 HP pump will deliver 1.03 CFS. A 20 HP pump will greatly exceed the Permit CFS amount by delivering 2.063 CFS.

Have conditions of permit approval been met? ☒ Yes ☐ No

H. RECOMMENDATIONS**1. Recommended Amounts**

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
MUNICIPAL	1/01 to 12/31	1.000 CFS	
	<u>Totals:</u>	1.000 CF	

2. Recommended Amendments

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

I. AUTHENTICATION

Field Examiner's Name

Date

6/25/08

Reviewer

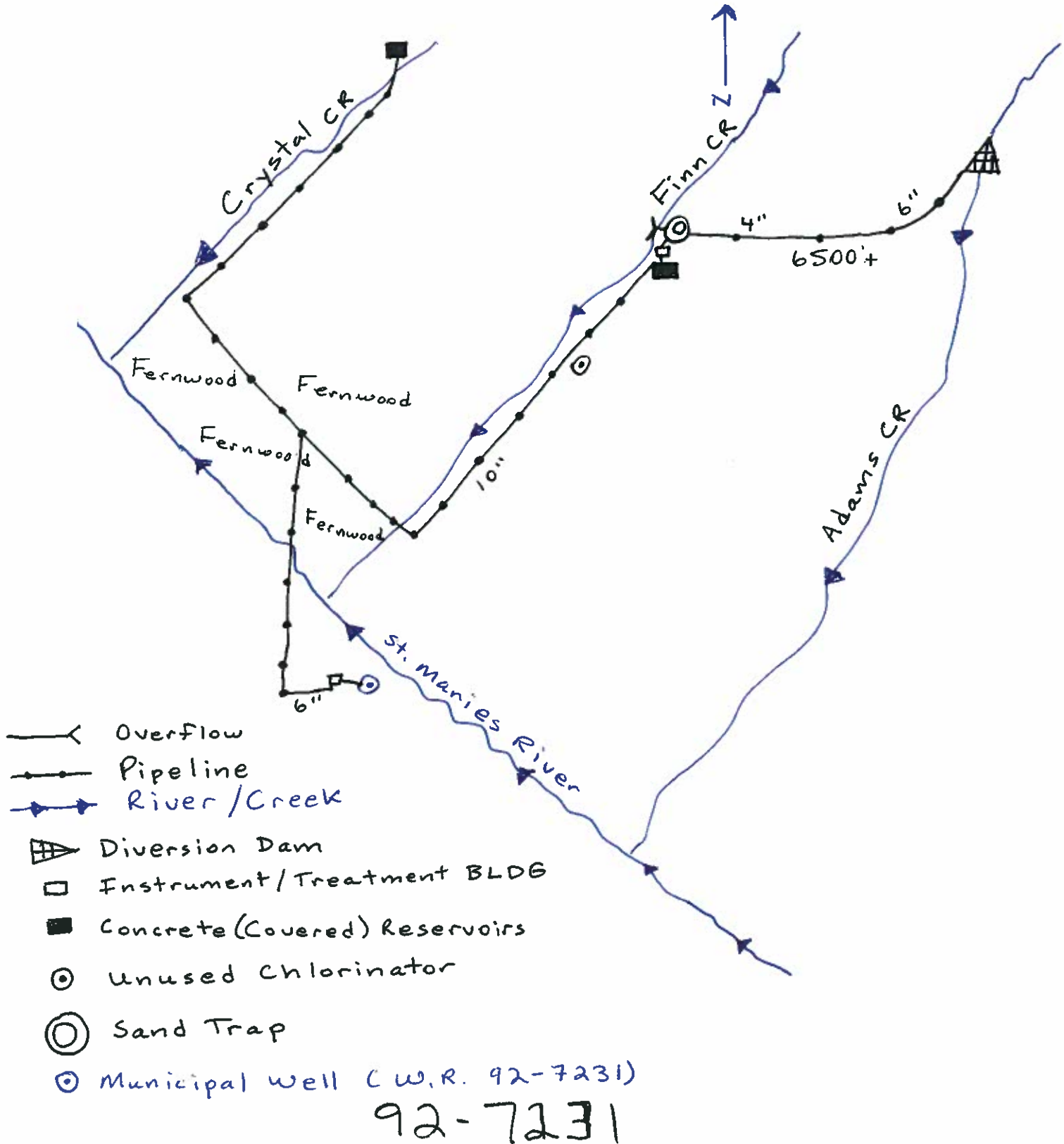
Date

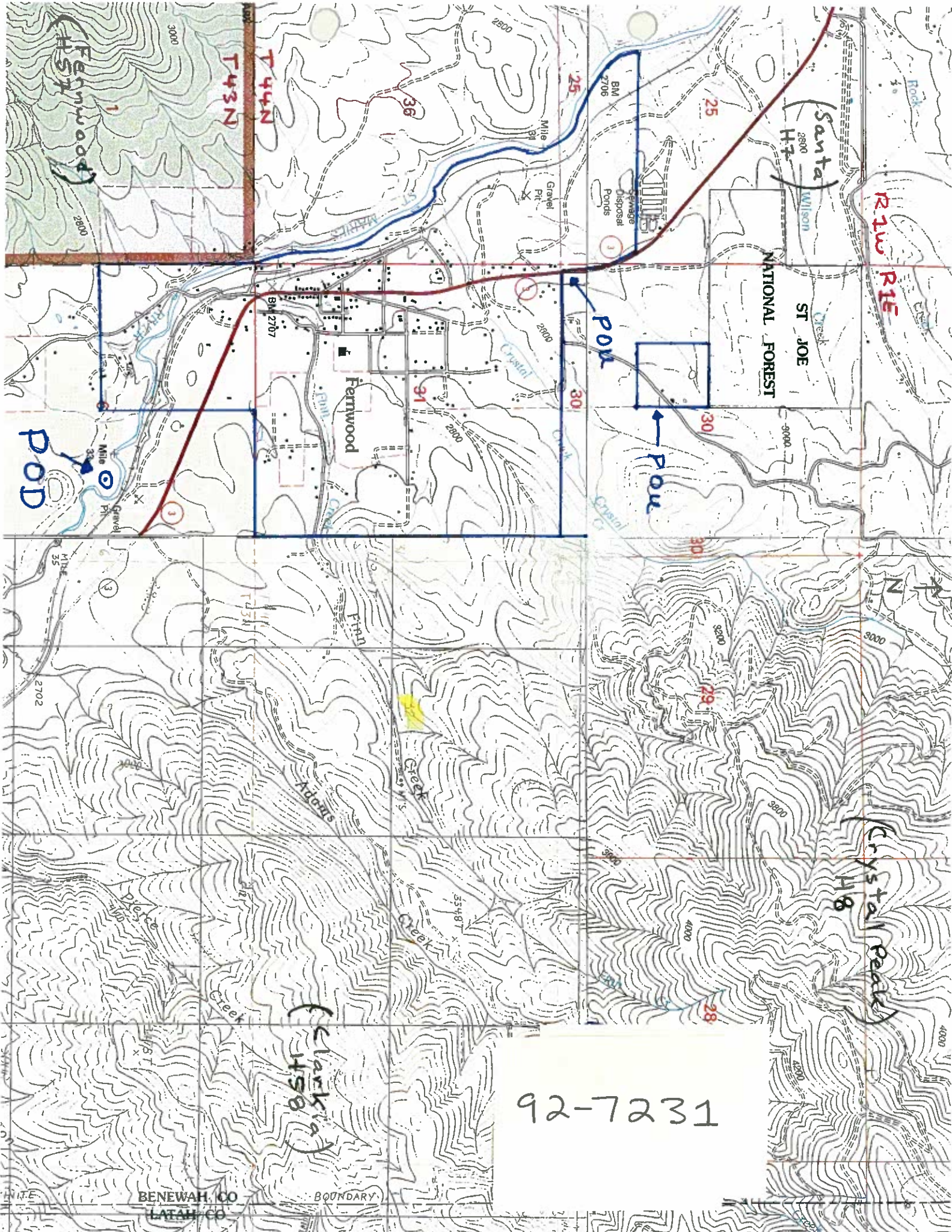
7/7/8

92-7231

Fernwood Water & Sewer District Delivery System Diagram

NOT TO SCALE

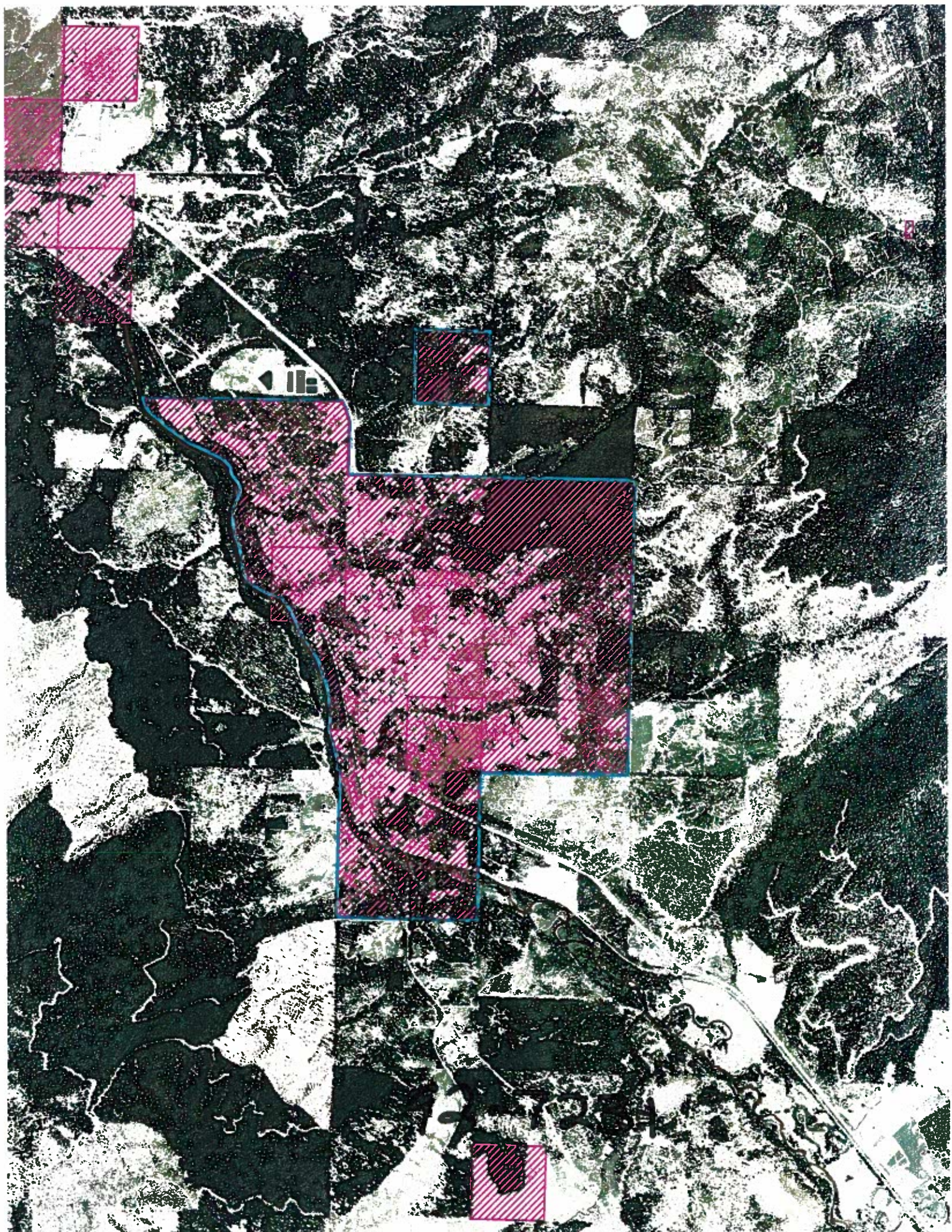




92-7231

BENEWAH, CO
LATAH, CO

BOUNDARY





92-7231 Well Point of
Diversion.jpg



92-7231 Crystal CR
Reservoir.jpg



92-7231 Chart Recorder.jpg



92-7231 Sensus W-350
Flowmeter.JPG



92-7231 Well Treatment
BLDG.JPG



92-7231 Part of POU
Fernwood Fire & RV Dum...



92-7231 Flowmeter
Closeup.jpg



92-7231 Finn CR
Reservoir.jpg



92-7231 Reservoir
Telemetry Box.JPG



92-7231 DEQ Tag.jpg



92-7231 Reservoir Fill
telemetry box.JPG

92-7231



92-7231 Well Point of Diversion.jpg



92-7231 DEQ Tag.jpg

92-7231

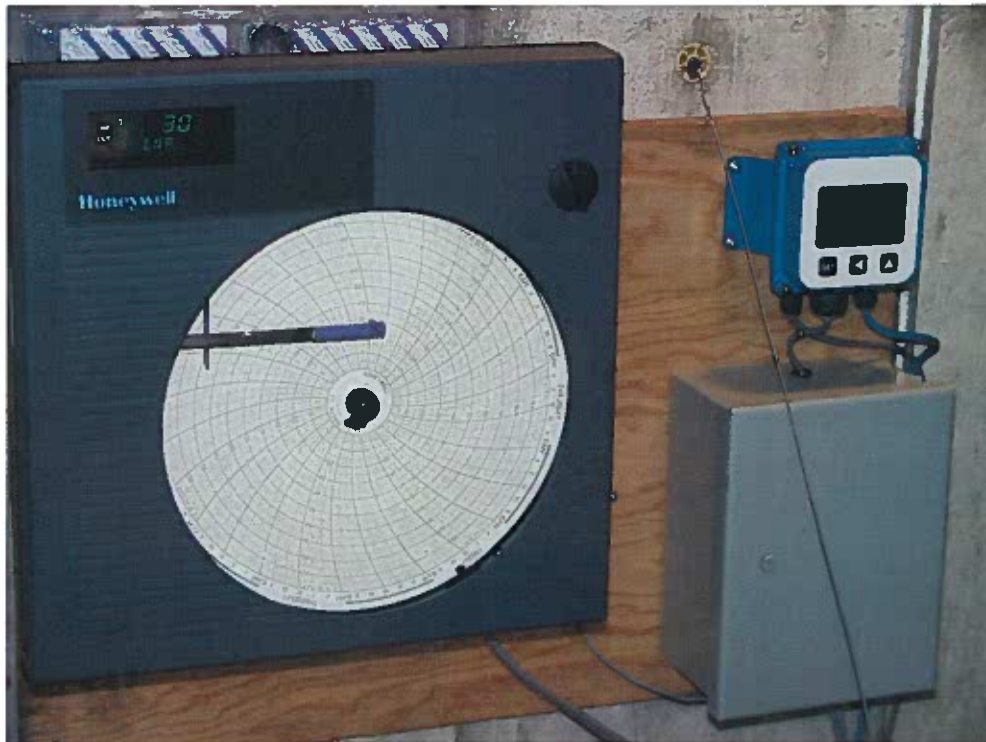


92-7231 Well Treatment BLDG.jpg



92-7231 Reservoir Telemetry Box.jpg

92-7231

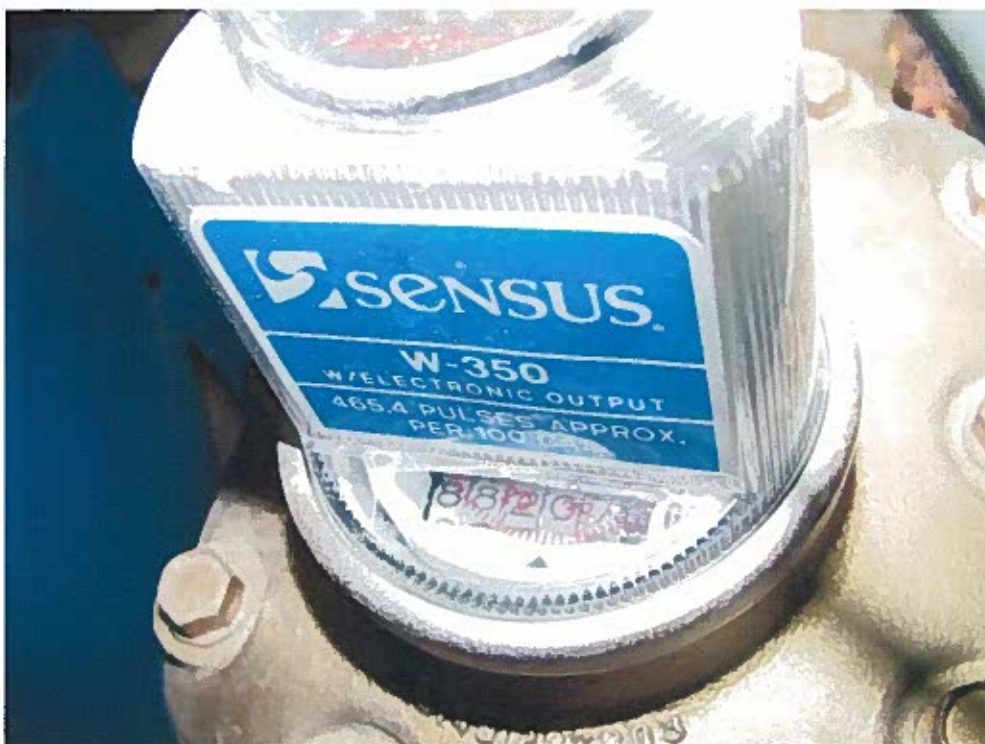


92-7231 Chart Recorder.jpg



92-7231 Sensus W-350 Flowmeter.jpg

92-7231



92-7231 Flowmeter Closeup.jpg



92-7231 Finn CR Reservoir. jpg

92-7231



92-7231 Crystal CR reservoir. jpg



92-7231 Part of POU Fernwood Fire & RV Dump Station.jpg

92-7231



92-7231 Reservoir Fill Telemetry Box.jpg

92-7231

Area of Interest

Anx 445
1/17/08

5

RECEIVED
APR 24 2008
DWR/North

15

44N01W25

44N01E30

16

16

5

44N01W36

44N01E31

1:12,000

2,000

1,000

0

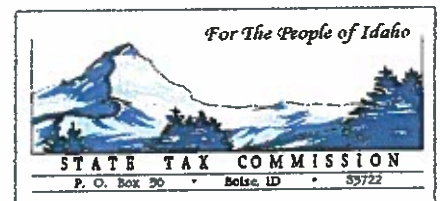
2,000 Feet

Idaho Stateplane
Zone: 3751
Datum: NAD 83
Units: Survey feet
Spheroid: GRS 1980

GIS Staff
Technical Support Bureau
(208) 334-7750

This map is only a representation of the tax code area
boundaries and should not be used for legal or
surveying applications

92-7231



Ordinance 2007-1

15

RECEIVED
APR 24 2008
IDWR/North

*From: 15
To: 16*

5

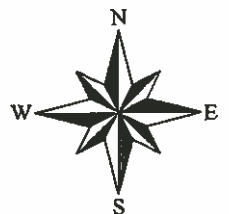
16

1:4800

**Benewah County
Fernwood Water District
Ordinance 2007-1, 10/9/07
Sec 25 T44N R1W BM**

Legend

-  2007-1
-  Tax Code Area



92-7231

**Engineering
Report**

for

**The
Fernwood
Water
District**

DRAFT
4/17/97

Ryden-Yeager & Associates, Inc.

92-7231

Table 2: Current Maximum Fire Flows

Location	Model Junction Node No.	Recorded Field Flow (gpm)	Maximum Predicted Fire Flow (gpm)
School Parking Lot	J500	645	457
4th & Spring St.	J350	560	460
North of Fern & 6th St. Intersection	J370	390	181
4th St. & State Hwy. 3	J490	390	455

Field tests show that the maximum fire flow from the hydrant located on State Highway 3 across from 4th street only produced 390 gpm. If the 20 psi minimum is ignored, the model predicts that the flow would be in excess of 500 gpm. This indicates that the flow is restricted, which could be caused by an obstruction in the water main, a partially closed valve, or a malfunctioning hydrant barrel valve. The restriction would have to occur between the intersection of Spring and 3rd Streets and the hydrant discharge.

The District is required to provide certain fire flows as per State law. Conversations with the Deputy State Fire Marshall have resulted in the preliminary determination by his office that the District needs enough storage to provide 2750 gpm for two hours. He also determined that the distribution system must provide 1000 gpm flows for residential fires, and 2750 gpm flows for fires at the school. His office is willing to work with the District in determining actual fire flows. An on site survey may result in a requirement for lower flows. The District should ask the local fire district to contact the Fire Marshall's Office (Jim Macklin, 208-799-5024) and arrange for completion of this survey prior to proceeding with a construction project.

C. Well Design and Analysis

1. Well Location Analysis

According to the well log completed by H₂O Well Service, the well was drilled on September 9, 1996 using an air rotary drill. A 14" diameter bore was completed to 20 feet below the ground surface, and a 10" bore and welded steel casing was drilled/driven to a depth of 183 feet through silt and clay. The well was completed to a depth of 207 feet in black basalt. The 14" annular space around the 10" casing was filled with bentonite pellets to form a surface seal. Figure 4 shows a schematic of the completed well.

The well is located near the St. Maries river, and the wellhead is in the flood plain. The elevation of the top of the well casing is approximately 2886 feet above Mean Sea Level (MSL).

Review of the flood insurance rating map (Community Panel No. 160014 0600 B) shows that the well is located within the flood boundaries set by the Federal Insurance Administration (FIA). The pertinent area within the boundaries is classified as Zone A, which means that the probable flood water elevation has not been determined by the FIA. This means that the best available data must be used to determine the probable water elevation. Field survey suggests that the

probable water surface elevation is approximately six feet above the existing ground surface at the wellhead.

2. Analysis of Existing Well Construction

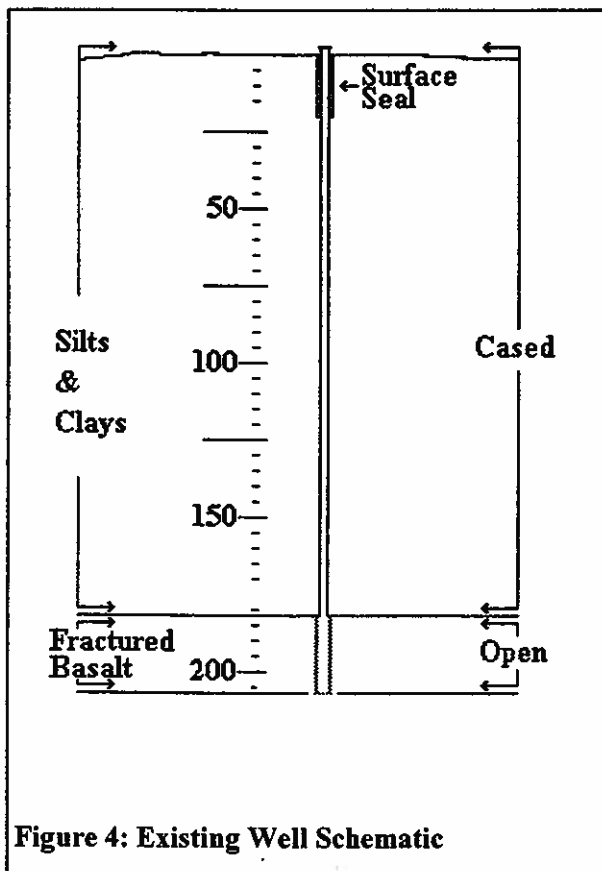
The existing well must comply with the Idaho Water Resource Board rules. These rules are set forth in IDAPA 37, Title 03, Chapter 09. The following items are pertinent:

The casing, surface seal, and completion described in the well log meets the requirements of the standards. The well is artesian, but the static pressure at the surface is less than 20 psi. Nonetheless, this will require that the pump and discharge assembly placed in the well provide a seal to prevent leakage.

As previously mentioned, the well is located in a floodplain. The best available data (debris placed on the bank during the 1996 flood) indicate that the wellhead cap and vent must be at least six feet above the existing ground level.

3. Pump Test Analysis

The well was test pumped by H2O Well Service on August 29, 1996. Note that this date is conflict with the drilling date of September 9, 1996. It is assumed that a clerical error was made on the well log and the actual drilling date was August 9, 1996. A model 8MB20 Red Jacket pump was set at 195 feet below the top of the surface casing. The well was test pumped for six hours at 168 gpm. The resulting water surface drawdown stabilized at 162 feet below the top of the surface casing. Recovery was rapid, and a 120 gpm flowrate was reported 12 minutes after the pump was shut down.



IDAPA 16.01.08.500 requires that the pump test produce 125% of the design discharge, or flow, rate. Based on the above test, the design flow rate is $168 \text{ gpm} / 1.25 = 134.4 \text{ gpm}$. Therefore, the recommended design flow rate, which is the rate used in this report, must be between 130 and 135 gpm.

Examination of the operating pressures caused by existing tank elevations and the friction losses associated with the new transmission line suggest that the total dynamic head of the pump will be about 500 feet.

Tentative analysis of available pumps indicate that, at approximately 500 total dynamic head with 135 gpm, a 20 hp pump must be

used. This means that 3 phase 480 volt service must be provided at the well site to insure maximum efficiency and reduced operating costs.

4. Proposed Alternative Well Completion Methods

A pump and transmission line must be installed in order to utilize the existing well. The transmission line is discussed in the Water Distribution System Section, and the major well production components are discussed in this section. No costs are supplied for bringing power to the location.

Three alternatives for well completion exist, which are combinations of two different concepts: 1) line shaft turbine versus submersible pumps; and 2) constructing the treatment and control building either at the wellhead, or at a location adjacent to but above the predicted floodplain.

a) Onsite Line Shaft Turbine

The first proposed alternative consists of an onsite structure enclosing the wellhead and utilizing a line shaft turbine pump. This alternative requires that the discharge piping and electrical controls be located above the floodplain, yet remain accessible for service and pump maintenance. The most economical approach would be to elevate the structure by using concrete retaining walls and earth fill. A service pad and ramp would also need to be constructed to allow a pump service unit to access the structure's access hatch and turbine assembly. The retaining walls would also serve as the foundation of the structure.

Another possible approach would be to provide for the turbine motor to be elevated and use an offsite structure to house the process electric controls and piping. However, this leaves the motor exposed to weather and possible vandalism. Also, adjusting and maintaining the discharge head packing would be difficult at best, and could require partially pulling the pump assembly on a routine basis.

Table 3: Onsite Line Shaft Turbine Pump and Structure Costs

10' x 12' x 6' retaining walls and fill:	\$1,925
Approach ramp and pad:	\$1,300
Line shaft turbine pump & appurtenances:	\$28,600
Well house:	\$14,500
Pump controls and process piping:	<u>\$27,000</u>
Total:	\$73,325

Benefits:

- Line shaft turbine pumps are historically more reliable.
- Location has already been acquired for the District's use.

Liabilities:

- Pump repair/replacement is difficult.
- Flood may isolate well and controls from access.

Fernwood Water & Sewer District
P.O. Box 215 – Fernwood, ID 83830
Phone (208) 245-3554
santafernwood@smgazette.com

Board of Directors

June 3, 2008

Henry Lewis – Chairman	208-245-4502
Judi Schaum	208-245-1146
Wayne Hatton	208-245-4516

92-7231