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Department of Environmental Quality

Richard W. Spron Executive Director

DIVISION OF DRINKING WATER Kenneth H. Boustield, P.E. Director

October 29, 2008

Sean Brown
Deepwater Distribution Company
P.O. Box 2443
Park City, Utah 84060

Dear Mr. Brown:

Subject: PER Concurrence and Additional Comments on Converting the Existing Deepwater Well to Public Water Supply Source, System #26099, File #07578

We have had a continuing dialogue with John Files of Cascade Water Resources regarding the conversion of Deepwater's existing well (presently serving two or three residences) to a public drinking water supply well. In our letter to you dated May 7, 2008, we expressed our concern that this well may not be adequately sealed to the surrounding soil formations. We also listed the additional information needed for our review of the well as a public drinking water source.

We have also reviewed the Preliminary Evaluation Report (PER) submitted for Deepwater Well #1. The Division of Drinking Water concurs with this report. This PER must be refined and a complete Drinking Water Source Protection Plan submitted within one year of the date of this letter. Refer to R309-600-13(6) and R309-600-7(1).

John Files indicated that Deepwater may be willing to accept a classification of Under the Direct Influence of Surface Water (UDI) for the well given the cost of performing remedial procedures on the well's grout seal. Classification as UDI will require the immediate installation of a disinfection process designed to provide a 3-log removal for Giardia as outlined in Utah's Drinking Water Rules followed by the installation of a complete treatment process or its equivalent within 18 months.

As an example, assuming the well water has a pH of 7.5 and its temperature is about 5° Celsius, the water would need at least 179 minutes detention time to meet the 3-log removal requirement using chlorine as the disinfecting agent. If the connected residences had a peak water use of 100 gpm and a 100% baffled tank (providing an estimated detention efficiency of 50%), the tank would need to have a capacity of at least 36,000 gallons to provide the needed detention time. The pH and temperature of water from the Deepwater Well will need to be tested on site to determine a more exact requirement.

Sean Brown Page 2 October 29, 2008

facilities, submitted together with all the items listed in our May 7. 2008 letter before we would If we were to allow this process it would be necessary to have plans for the complete treatment approve the plans to proceed with using the well as a source of drinking water. We trust the above evaluation will meet your need. Should you have further questions, please contact Mark Jensen or Michael Georgeson at (801) 536-4200.

Sincerely,

Kenneth H. Bousfield, P.E.

Director

mej

John Files, Cascade Water Resources. 472 East Wasatch Way, Park City, UT 84098 Ying-Ying Macauley, Division of Drinking Water Phil Wright, Wasatch County: Health Department Mark Jensen, Division of Drinking Water ij

PilwplPlan review Deepwater 26099-07578 Deepwaler Response 2. doc

August 4, 2008

Department of Environmental Quality Drinking Water Source Protection P.O. Box 144830 Salt Lake City, Utah 84114-4830

To Whom It May Concern:

On behalf of Deepwater Distribution, we acknowledge the Preliminary Evaluation Report for our Well I culinary well, located in the Southeast ¼ of Section 32, Township 2 South, Range 1 East is hereby acknowledged. We hereby agree not to locate or allow the location of any uncontrolled potential contamination sources as defined in R309-113—6(1)(u) of the Umh Administrative Code, within zone 1 (100 ft. radius from well head). We also agree not to locate or allow the location of any pollution sources as defined in R309-113-6(1)(t) of the Utah Administrative Code, within zone 2 (see attached map for location of zones) unless design standards are implemented to prevent contaminated discharges.

Blythewood Partnership (Zone 1 &2)

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Its:	

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Sean Brown Inc

August 4, 2008

Department of Environmental Quality Drinking Water Source Protection P.O. Box 144530 Salt Lake City, Utah 84114-4830

To Whom It May Concern:

On behalf of Deepwater Distribution, we acknowledge the Preliminary Evaluation Report for our Well I culinary well, located in the Southeast % of Section 32, Township 2 South, Range I First is hereby acknowledged. We hereby agree not to locate or allow the location of any uncontrolled potential commination sources as defined in R309-113-6(1)(u) of the Utah Administrative Code, within zone 1 (100 ft. radius from well head). We also agree not to locate or allow the location of any pollution sources as defined in R309-113-6(1)(t) of the Utah Administrative Code, within zone 2 (see attached map for location of zones) unless design standards are implemented to prevent contaminated discharges.

Blythewood Partnership (Zone 1 &2) Its:

Charles Salteman and Ingrid Nygaard (Zone 1 & 2)

By. Its:

Robert and Tanya Powel (Zonc 1 & 2)

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights

State of Utah
Division of Water Rights

State of Utah
Divisional Page "Additional Well Data Form" and attach

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ADDITIONAL WELL DATA FORM

Water Right #_

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Drinking Water Source Protection Plan

Deepwater Distribution Co., Inc. Well 1,

PWS # UTAH26099

Wasatch County, Utah

November 2008

Prepared for: Deepwater Distribution Co. Inc.

Prepared By:

Cascade Water Resources 472 East Wasatch Way Park City, UT 84098

TABLE OF CONTENTS

	UTIVE SUMMARY	jii
EXEC		
1.0		
1.1		
1.2	Source Information Designated Person	3
1.3	Designated Person DELINEATION REPORT	3
2.0		
2.1	Geologic Data Aquifer Data	5
2.3	Aquifer Data	8
2.4		
2.5	Boundaries of DWSP Zones	8
2.6	Status of the AquiferINVENTORY OF POTENTIAL CONTAMINATION SOURCES	11
3.0	INVENTORY OF POTENTIAL CONTAINMENT TO USO STATE TO STATE THE STATE OF	11
Su		
3.1	Hazard Identification Priority and Location of PCSs	12
3.2	Priority and Location of PCSs	INATION
4.0	Priority and Location of PCSS IDENTIFICATION AND ASSESSMENT OF POTENTIAL CONTAM RCE HAZARD CONTROLS	12
SOU		
4.		
4.	2 Residential Septic Systems	12
5.0	2 Residential Septic Systems Management for existing pcs's Residential Chemical Use	12
5.	1 Residential Chemical Use	12
5.	Residential Chemical Use	ownership
6.0	.2 Septic Tank	13
Ma		
7.0	p and list, and land use agreements	13
8.0		
9.0	7.77	
10.	0 Contingency Plan	1.4
•		
11	777.076.0	17
12	10 KEFERENCES	

LIST OF FIGURES

Figure 1: Location Map	2
Figure 1: Location Map	
Figure 2: Regional Geology	4
Figure 3 Well Construction DiagramFigure 4: Potentiometric Map	6
Figure 4: Detentiomatric Mon	9
riguie 4. Folditionicitie tytap	10
Figure 5 & 5a: Source Protection Areas, Land and PCS Location Map	ΤU

LIST OF APPENDICES

APPENDIX A: Drillers Log, Permanent Pump AQTESOLV plots, Pump Test Data.

APPENDIX B: Land Use Letter, Wasatch County DWSP Ordinance, Chemistry

EXECUTIVE SUMMARY

This document will serve as the Drinking Water Source Protection Plan (DWSP) for Deepwater Distribution Co., Inc. Well 1. The well was drilled in 2001 by Deepwater Distribution.

Well Location and Design

The well is located in north 1,000 feet, west 600 feet from the southeast corner of Section 32, Township 2 South, Range 4 East, Salt Lake Base and Meridian (SLB&M), and was drilled by Zimmeramn Well Service. The targeted production rate for this well is 60 to 75 gallons per minute.

Source Protection Zone Delineation

The Preferred Delineation Procedure using a WHPA groundwater model was used to establish the groundwater time-of-travel zones. The 15-year groundwater time-of-travel zone (Protection Zone 4) for the Well #1 is approximately 800 feet long by 500 feet wide. The well will be screened in an aquifer that is considered a "Protected Aquifer".

Potential Contamination Source (PCS) Inventory and Assessment

Two PCS was identified within protection Zone 3. The PCSs are a residence and a private septic system; both pose a low, but uncontrolled threat of groundwater contamination.

Land Protection

The land protection method of Zoning Ordinances is in place via Wasatch County Code 16.28.06.

1.0 INTRODUCTION

In the fall of 2001, Mike Zimmerman drilled, constructed, developed and pump tested Deepwater Distribution Co. Inc. Well #1 (DDW #1) for Deepwater Distribution. Since completion the well has served as a source for three homes in the area. Due to current and projected growth in the area, and excess depth to water; is more feasible to form a Public Water System and use existing sources than drill individual wells. The planned short term connections DDW #1 is demand based, with a possible long term projection of up to 100 connections.

A PER and Engineering Plans and Specifications for DDW #1 have been turned into the Division of Drinking Water and been concurred with. The well does not currently have a sanitary seal installed, but does have an 80' bentonite seal.

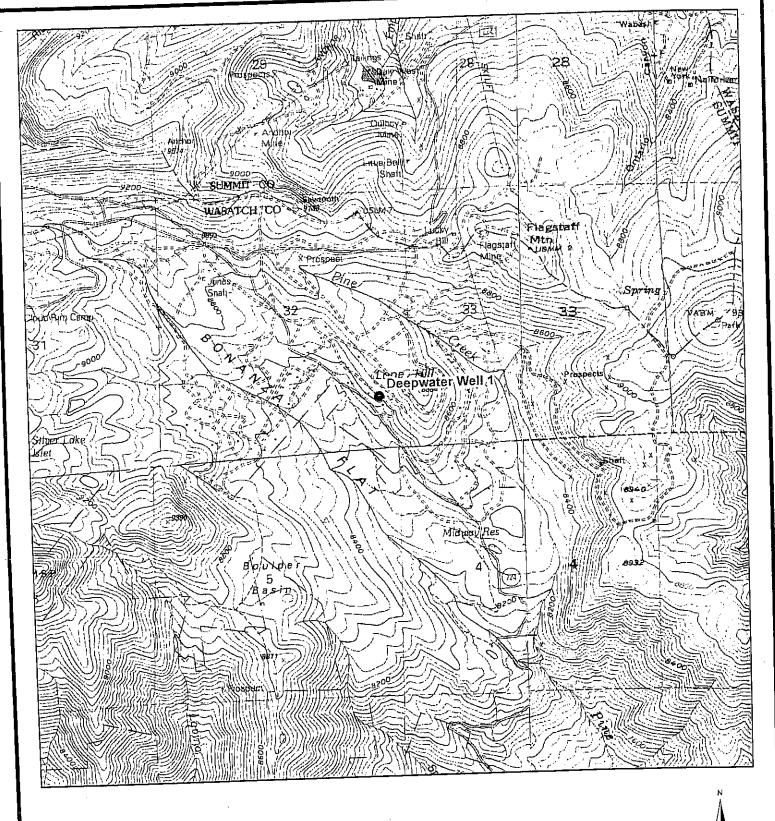
This document is presented to the State of Utah Department of Environmental Quality, Division of Drinking Water (DDW) as a Drinking Water Source Protection Plan (DWSP) for Deepwater Distribution Well #1. This document is intended to meet the requirements of a DWSP as set forth in Utah Administrative Code R309-600 (UDEQ-DDW, 2000).

1.1 System Information

The PWS number is UTAH 26099, the source is listed as WS001 Deepwater Well #1.

1.2 Source Information

The existing drinking water source will be a single groundwater well identified as the Deepwater Distribution Well #1(DDW Well #1). The well was drilled in the fall of 2001 by Mike Zimmerman Well Service, license # 747. The well is located approximately, north 1,000 feet, west 600 feet from the southeast comer of Section 32, Township 2 South, Range 4 East, Salt Lake Base and Meridian. Figure 1 shows the location of DDW Well #1.



DEEPWATER WELL 1





DEEPWATER DISTRIBUTION WELL 1 DWSP			
Drawn By: JI	Date: 10/24/2008		
Project Mgr: JF	Scale: 1"=2000'		

FIGURE 1
LOCATION MAP

1.3 Designated Person

The designated person responsible for this DWSP is:

Sean Brown, President Deepwater Distribution Company PO Box 2443 Park City, UT 84060 Phone Number: (435) 640-7111

2.0 DELINEATION REPORT

The delineation report contains the following information: geologic data, aquifer data, proposed well construction data, summary of the data and methods used to establish the groundwater protection zones, and appropriate maps of the protection zones.

The Preferred Delineation Procedure was used to define protection zones for Well #1.

2.1 Geologic Data

2.1.1 Regional Geology

The well is screened in the fractured quartzite's of the Weber Formation. The formation is locally highly fractured in the Park City Mining District due to faulting and folding. Locally there are several previously unmapped faults that intersect and crosscut the area of Well 1. Due both to the regional highly fractured nature of this formation and also to the performance of the well during the 48 hour pump test in which the well responded like a homogeneous unconfined aquifer, the well will be modeled for now as a homogeneous aquifer.

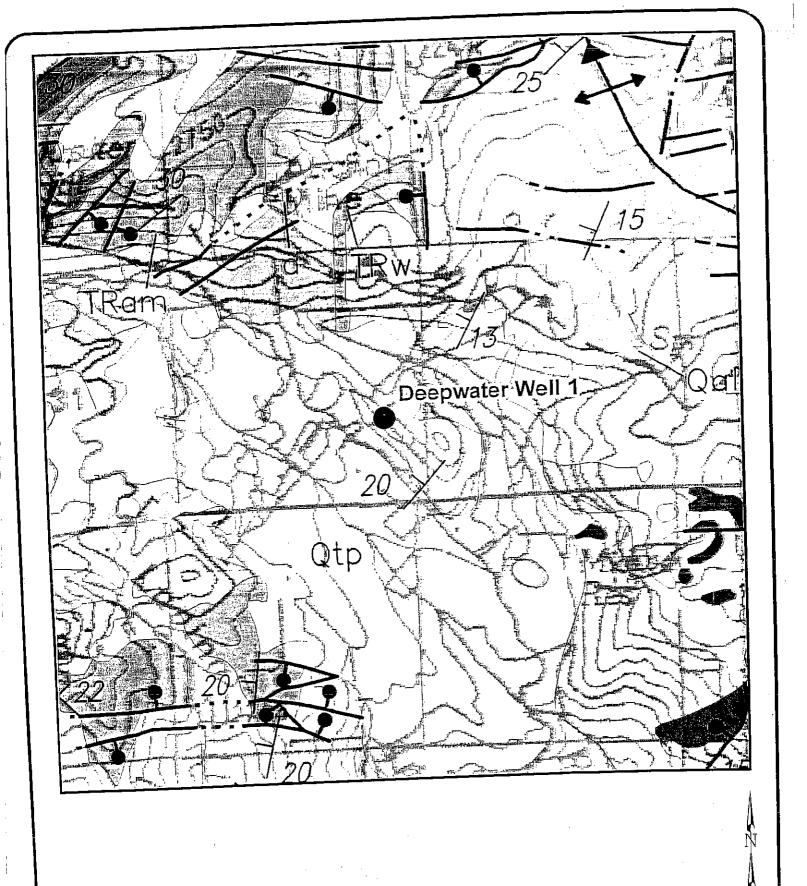
The Legend for the geologic map is attached in Appendix B

2.1.2 Local Geology

Figure 2 depicts the local geology of the Well #1 area: Below is a summary of the geology encountered in Well #1 from the drillers log which is included in Appendix A.

0-38'	Sandy, Silty, Cobbles, Boulders
38'-45'	Boulder
45'-47'	Clay
47'-67'	Clay, Cobbles
67'-70'	Weathered Quartzite
70'-548'	Various colors of Quartzite
548'-555'	Void
555'-890'	Locally fractured Quartzite

The clay layer that was encountered in the well appears to be a locally continuous as it was also encountered in Brighton Estates Well No. 3, located approximately 4000 feet to the southeast of Deepwater Well #1. This clay layer was characterized by Weston Engineering (1999).





DEEPWATER DISTRIBUTION WELL 1 DWSP			
Drawn By: Ji	Date: 10/24/2008		

Drawn By: Ji Date: 10/24/2008

Project Mgr: JF Scale: 1"=2000'

FIGURE 2 LOCAL GEOLOGY The primary target of the well is the fractured quartzite of the Weber Formation. It is thought the well is completed in this formation.

2.2 Well Materials, Design, and Construction Data

2.2.1 Casing and Seal

Well 1 was drilled using rotary reverse method to 890 feet below ground surface (bgs). Figure 3 is the well construction diagram for the well.

2.2.2 Pumps

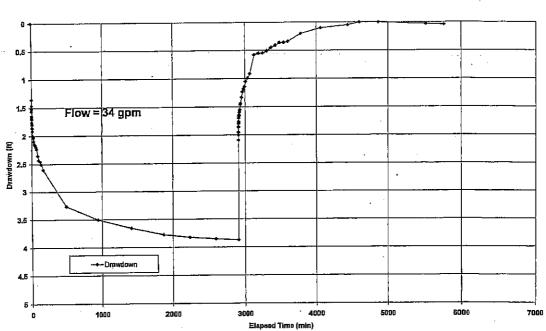
The current pump in is a STA-RITE 7.5 HP 4" submersible pump. The pump curve for this pump is included in Appendix A.

2.3 Aquifer Data

2.3.1 Constant Rate Pump Test

After a new pump and sounding tube was installed in the well in September 2008, a 48-hour constant rate test aquifer test was performed on the well at a flow rate that averaged 34 gallons per minute.

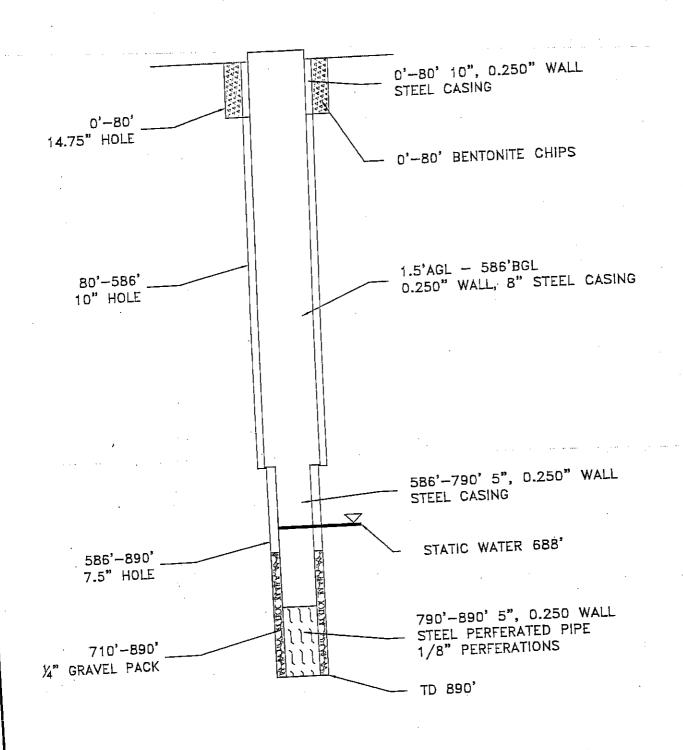
Over the period of 48 hours the well had 3.87 feet of drawdown. Below are the drawdown and recovery plots for the aquifer test.



Drawdown and Recovery in Deepwater Well 1 Constant Rate Test

DeepWaterDWSP.doc

DEEPWATER DISTRIBUTION WELL 1



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DEEPWATER DISTRIBUTION WELL 1 DWSP.				
Drawn By: Л	Date: September 2008			
Project Manager: JF	Scale: No Scale			

WELL CONSTRUCTION DIAGRAM

2.3.2 Hydraulic Conductivity

AQTESOLV Version 2.5 aquifer test analysis software was used to analyze the drawdown and recovery data from the test well. The AQTESOLV plots are included in the well report in Appendix A. Due to the small drawdown in Well 1, AQTESOLV produced a wide range of transmissive results. Both drawdown and recovery data from Well 1 were analyzed using both fractured and homogeneous aquifer methods.

The aquifer is a fractured bedrock aquifer. The quartzite and fractures were encountered throughout the depth of the producing zone in Well 1.. For this reason, an unconfined homogeneous analytical solution was applied to the time-drawdown data.

Type curve matching produced an aquifer transmissivity estimate produced a range of results from 1,358 ft²/day to 3,510 ft²/day, the plots are included in Appendix A.

This is very similar to the results that were submitted in the PER of 1,504 ft²/day with a hydraulic conductivity of 9.4 ft/day. The original transmissivity will be used for the calculation of protection zones as it appears to be a very conservative estimate of the aquifer.

2.3.3 Hydraulic Gradient and Flow Direction

A potentiometric map (Figure 4) was constructed using water-level data obtained from the Utah Division of Water Right well-information database, and water levels measured in accessible wells. The groundwater flow direction determined from this map is generally south-southeast with a horizontal gradient of 0.11.

2.3.4 Effective Porosity

There is no site-specific porosity information available. Kenecott Utah Copper Corporation (KUCC, 2002) estimated the porosity of fractured quartzite bedrock in the Bingham Mine Formation in the Oquirrh Group at 20 percent, this is thought to be similar to that of the quartzite encountered in Deepwater Well #1.

2.3.5 Saturated Thickness

Saturated thickness used is the water table to the bottom of the well. With a water table of 690 feet and a well depth of 890 feet the saturated thickness used was 200 feet.

2.3.6 Discharge Rate

Though the well was pump tested at 34 gallons per minute (gpm) a more conservative flow of 60 gpm was used in delineation of source protection zones. This aquifer could likely produce over 800 gpm; however this well is limited by the casing diameter.

DeepWaterDWSP.doc

Hydrogeologic Methods and Calculations 2.4

Drinking Water Source Protection Zones were delineated using the Preferred Delineation Procedure, which uses measured or estimated aquifer parameters, groundwater flow direction, and hydraulic gradient information to determine the size and shape of protection zones. WHPA the EPA's digital computer groundwater flow model was selected over other commonly used groundwater models to provide flexibility in simulating the complex hydrology found near Well #1.

Boundaries of DWSP Zones 2.5

The 250-day (Zone 2), 3-year (Zone 3), and the 15-year (Zone 4) groundwater travel time protection zones for the Well #1 are shown on Figure 5. The protection zones of the well are located in the southeast quadrant of Section 32, Township 2 South, Range 4 East, SLB&M. The generalized dimensions of the protection zones are summarized in Table 1.

Table 1: Well #1 Protection Zone Dimensions

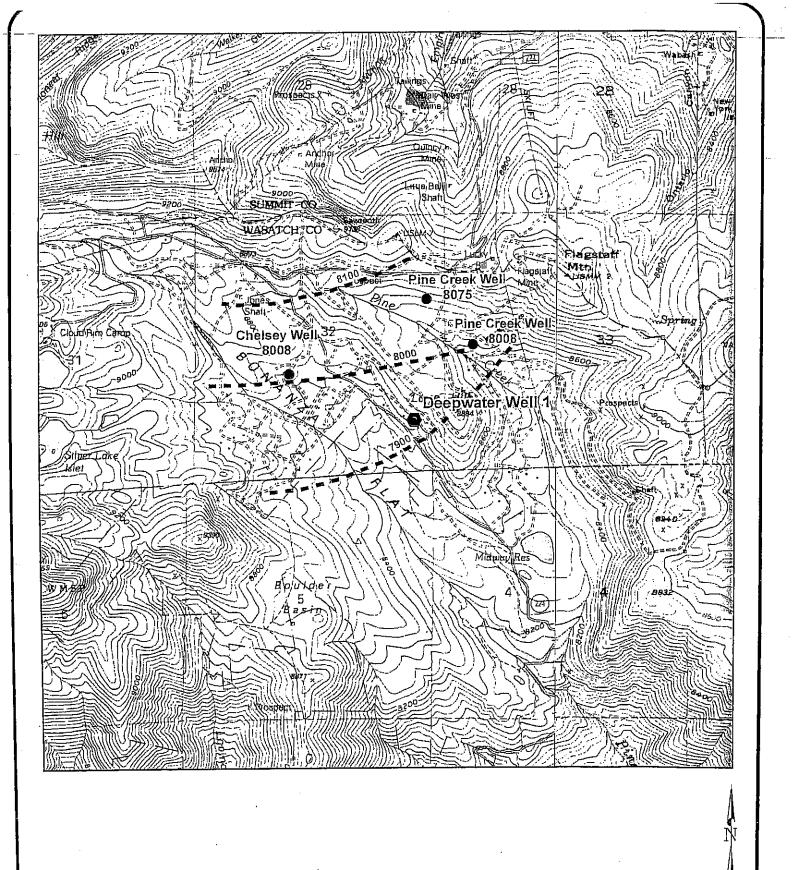
Table 1: Well #1 P	Length of	Width of	Distance Upgradient of Well	Distance Downgradient of Well
Protection Zone	Protection Zone ^a	200 ft.	360 ft.	30 ft.
Zone 2	390 ft.	200 ft.	460 ft.	40 ft.
Zone 3	500 ft.	500 ft.	700 ft.	100 ft.
Zone 4	800 ft.	July 11.		

²⁻Total length measured parallel to the direction of groundwater flow

Status of the Aquifer 2.6

The aquifer in the area of Well #1 does meet the requirements of a Protected Aquifer as defined in UAC R309-600-6(1)(v); therefore the aquifer is considered not "protected" and potential contamination sources must be adequately controlled. This Protected aquifer status has been determined by the DDW in the concurrence of the PER for Brighton Estates Well No. 3 and the well drillers log for Deepwater Well #1.

b-Total width measured perpendicular to the direction of groundwater flow



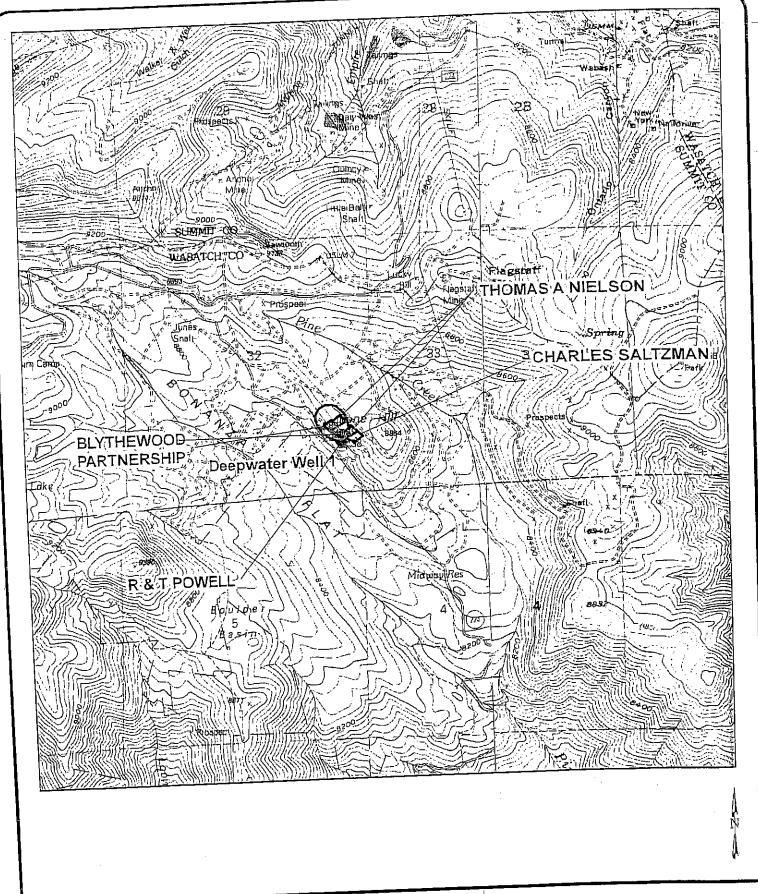


DEEPWATER DISTRIBUTION WELL 1 DWSP			
Drawn By: JI	Date: 10/26/2008		

Drawn By: JI Date: 10/26/2008

Project Mgr: JF Scale 1"=2000'

FIGURE 4
POTENTIOMETRIC MAP





DEEPWATER DISTRIBUTION WELL 1 DWSP	
Drough By: II	Date: 10/26/2008

Drawn By: JI Date: 10/26/2008

Project Mgr: JI Scale:1"=2000'

FIGURE 5 LAND, PCS AND PROTECTION ZONES

