

**HYDROGEOLOGIC INVESTIGATION REPORT
DESCHUTES COUNTY DEPARTMENT OF SOLID WASTE
NEGUS RECYCLING & TRANSFER FACILITY
REDMOND, OREGON**



OCTOBER 9, 2020

Project No. 11386 (2)

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A Report Prepared For:

Mr. Jeff Shepherd, P.E.
Civil & Environmental Consultants, Inc.
215 S. Fourth Street, Suite 203
Vancouver, WA 98660

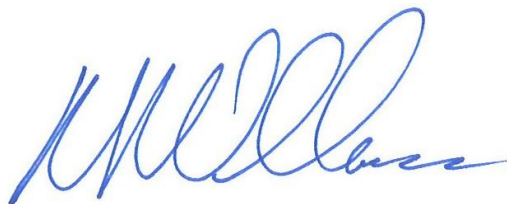
**HYDROGEOLOGIC INVESTIGATION REPORT
DESCHUTES COUNTY DEPARTMENT OF SOLID WASTE
NEGUS RECYCLING & TRANSFER FACILITY
REDMOND, OREGON**

Wallace Group Project Number 11386 (2)

Prepared By:



Stephen M. Woodward, R.G.
Staff Geologist



R. Scott Wallace, R.G.
Principal Hydrogeologist

The Wallace Group, Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

EXECUTIVE SUMMARY

The Wallace Group, Inc., (Wallace Group), was commissioned by Civil & Environmental Consultants, Inc. (CEC), on behalf of the Deschutes County Department of Solid Waste, to evaluate an existing on-site water well at the County's Negus Recycling & Transfer facility in Redmond, Oregon (**Figure 1**). The purpose of this work was to assess the capability of the well to provide water for the proposed future expansion of the Negus facility.

Groundwater underlying the Negus Recycling & Transfer facility occurs at a depth of 350.5 feet below ground surface (bgs) within volcanic bedrock and interbedded sedimentary/weathered zones of the Deschutes Formation. The existing Negus well was drilled in 1993 to a depth of 375 feet and was reportedly deepened to 420 feet in 2003. The well is constructed with outer 8-inch diameter steel casing to a depth of 25 feet bgs, and an internal 6-inch diameter steel liner extends from 5 to 385 feet bgs. The liner is perforated with 3/16-inch vertical slots from 315 to 385 feet bgs. The total well depth was measured at 400.4 feet on September 21, 2020, which indicates the uncased, bottom 20 feet of the well has been lost through sediment accumulation or sloughing over the past 17 years

The original 1993 drilling log reported the static water level at 325 feet bgs (**Appendix A**). Current static groundwater measurements indicate the water level has declined by approximately 25 feet over the past 27 years. This decrease is consistent with regional groundwater level declines throughout the Deschutes Basin and is attributed to prolonged drought, and to a lesser degree, irrigation water conservation (piping) projects.

The existing well is equipped with a submersible 5-hp pump that is set at approximately 364 feet bgs. The pumping capacity was measured at approximately 20 gpm on September 21, 2020. Based upon the current static groundwater level of 350.5 feet bgs, this pump depth provides approximately 13.5 feet of available drawdown. A significant amount of iron staining, scale, and encrustation was observed on the pump and pump column. Thompson Pump & Irrigation replaced the bottom 21-foot section of the pump column before re-setting the pump on September 23, 2020, due to concerns for the degraded condition of the column. It appears the well and associated pump hardware have not been serviced since the well was deepened in 2003.

During the step-drawdown test, the well was pumped at a rate of 15 gallons per minute (gpm) for the first 2-hour step and experienced approximately 1.3 feet of drawdown. The pumping rate was increased to 23 gpm for the second 2-hour step with corresponding drawdown increasing to approximately 2.3 feet. Due to electrical supply issues at the Negus facility, the pump repeatedly tripped the electrical breaker when the pumping rate was increased to 40 gpm. As such, the final pumping rate was set at 22 gpm and maintained at that rate for the final 2-hour pumping interval. Groundwater drawdown during the final pumping step decreased slightly from 2.0-to-1.8 feet at the end of pumping. This suggests well efficiency was improving over time due to pumping. Groundwater levels recovered to 90 percent of the initial static water level within 20 minutes of turning off the pump. A step-drawdown pumping test summary with pumping rates and groundwater drawdown over time is included for reference on **Figure 2**.

At the maximum pumping rate of 23 gpm the Negus well exhibited 2.3 feet of drawdown. This represents approximately 7 percent of the 33.6 feet of available drawdown for the well, assuming the pump intake is set near the bottom of the well casing (385 feet bgs). The specific capacity (gpm/ft. of drawdown) for the Negus well is 10.0 gpm/ft. and the well appears capable of sustaining a pumping rate in the 20-to-25 gpm range without exceeding the well's available drawdown. Groundwater temperature during the pumping test remained stable and ranged from 15.5 to 16.0 degrees C.

Based on our findings and analysis, we recommend the following:

- Equip the well with new hardware, electrical infrastructure, and a submersible pump capable of producing 25 gpm.
- Install an air-line or pressure transducer in the well to monitor dynamic (i.e. pumping) groundwater levels and to facilitate groundwater data collection and analysis of well performance over time.
- Install an in-line meter to facilitate real-time measurement and recording of flow rates.
- Install the submersible pump intake as close as practical to the bottom of the well's cased interval (385 feet bgs) to maximize available drawdown.
- Consult with a local pump contractor and develop an annual operation and maintenance program for the well.
- The well should be pumped continuously for 2-to-3 hours each month to reduce the potential for chemical and/or biological fouling.

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1. Vicinity Map
2. Step-Drawdown Pumping Test Summary

APPENDICES

- A. Negus Transfer Facility Water Well Logs
- B. Site Photos and Water Well Video Images

1.0 INTRODUCTION

1.1 GENERAL

The Wallace Group, Inc., (Wallace Group), was commissioned by CEC, on behalf of the Deschutes County Department of Solid Waste, to perform a hydrogeologic evaluation of an existing on-site water well at the County's Negus Recycling & Transfer facility in northeast Redmond, Oregon (**Figure 1**). The purpose of the work was to assess the well's capability to provide potable and/or industrial water for future expansion of the Negus Recycling & Transfer facility. This evaluation was performed in general accordance with Wallace Group Proposal TWG20P082, dated August 18, 2020, and was authorized by CEC on August 21, 2020.

1.2 SCOPE OF WORK

Wallace Group's hydrogeologic scope of work was performed between September 21-23, 2020, and included the following tasks:

- Purge the on-site water well and assess existing submersible pump capacity
- Water well video logging
- Install temporary pump and perform an 8-hour pumping test
- Reinstall existing pump
- Pumping test data analysis and reporting

1.3 HYDROGEOLOGIC SETTING

Based upon the Negus facility well logs (**Appendix A**) and our knowledge of regional hydrogeologic conditions in the upper Deschutes Basin, groundwater in the Redmond area typically occurs in relatively deep basalt flows and interbedded weathered/sedimentary zones of the Deschutes Formation. Depth to groundwater in Redmond is generally in-excess of 300 feet below ground surface (bgs). The regional aquifer system primarily receives recharge from precipitation and snowmelt in the High Cascade Range and groundwater flow in northern Deschutes County is generally to the northwest (Gannett, et al., 2001). The static groundwater level recorded when the on-site well was drilled in 1993 was 325 feet bgs. The static groundwater level was measured at 331 feet bgs in 2003 when the well was reportedly deepened. The pre-pumping test groundwater level on September 21, 2020, was measured at 350.5 feet bgs. This data indicates the Negus well has experienced a water level decline of approximately 25 feet since the well was installed 27 years ago.

2.0 FIELD ACTIVITIES

2.1 EXISTING PUMP CAPACITY AND VIDEO LOGGING

On September 21, 2020, Wallace Group staff measured the static groundwater level at 350.5 feet bgs in the on-site well prior activating the existing 5-hp submersible pump. The well was pumped for one hour at a maximum discharge rate of approximately 20 gallons per minute (gpm). The discharge water was routed via temporary PVC piping to undeveloped, adjacent Deschutes County property. The discharge water was very turbid with iron scaling at the start of pumping, however the water appeared relatively clear after 1-to-2 minutes of pumping. The submersible pump was pulled (i.e. removed) by a crew from Thompson Pump & Irrigation of Bend, Oregon, in preparation for down hole video logging (**Appendix B-1**). The existing pump was set with the intake at approximately 364 feet bgs. A significant amount of iron staining, scale, and encrustation was observed on the pump and pump column, as shown in **Appendix B-4**.

After purging the well and removing the existing pump, a submersible video camera provided by Thompson Pump & Irrigation was lowered into the well casing (**Appendix B-2**). The video camera confirmed that the well is constructed of 6-inch diameter steel casing to a depth of 385 feet bgs (**Appendix B-3**). The well is perforated with vertical 3/16-inch slots from 315 to 385 feet bgs. Based upon an Oregon Water Resource Department well log prepared by Western Water Development, the well was deepened in 2003 to a depth of 420 feet bgs (**Appendix A**). Based upon the video data, it appears the current total well depth is 400.4 feet bgs (**Appendix B-3**).

2.2 STEP-DRAWDOWN PUMPING TEST

On September 22, 2020, crews from Thompson Pump & Irrigation installed a temporary, 5-hp submersible pump to facilitate an 8-hour step-drawdown pumping test of the existing Negus well. The pump intake was set just above the bottom of the well casing at a depth of 384.1 feet bgs which provided up to 34 feet of available groundwater drawdown for the test. The field crew also installed a temporary pressure transducer with data-logging features to the pump column. This instrumentation monitored and recorded pre-test “static” groundwater levels, dynamic groundwater levels, temperature during pumping, and groundwater level recovery after pump shut-off.

The well was pumped at a rate of 15 gallons per minute (gpm) for the first 2-hour interval (step). The pumping rate was increased to approximately 23 gpm for the second 2-hour step.

When the pumping rate was increased to 40 gpm for the third step, the electrical breakers at the Negus facility tripped repeatedly every 1-to-2 minutes. The field crew attempted to adjust the pumping rate and maintain power to the pump; however, they were not able to sustain a pumping rate above 22-to-23 gpm. As such, the pumping rate for the final step of the test was maintained at approximately 22 gpm for final 2-hours of pumping. Groundwater levels recovered rapidly when the pumping phase ended. A step-drawdown pumping test summary with pumping rates and groundwater drawdown over time is included for reference on **Figure 2**.



3.0 FINDINGS

3.1 EXISTING WELL CONDITIONS

Groundwater underlying the Negus Recycling & Transfer facility occurs at a depth of 350.5 feet bgs within volcanic bedrock and interbedded sedimentary/weathered zones of the Deschutes Formation. The existing Negus well was drilled in 1993 to a depth of 375 feet and was reportedly deepened to 420 feet in 2003. The well is constructed with outer 8-inch diameter steel casing to a depth of 25 feet bgs, and an internal 6-inch diameter steel liner extends from 5 feet to 385 feet bgs. The liner is perforated with 3/16-inch vertical slots from 315 to 385 feet bgs. The total well depth was measured at 400.4 feet on September 21, 2020, which indicates the uncased, bottom 20 feet of the well has been lost through sediment accumulation or sloughing over the past 17 years

The well reportedly provides a relatively small amount of domestic water for the current Negus facility. The pump capacity was measured at approximately 20 gpm when pumped for a period of one-hour on September 21, 2020. The original 1993 drilling log reported the static water level at 325 feet bgs (**Appendix A**). Current static groundwater measurements indicate the water level has declined by approximately 25 feet over the past 27 years. This decrease is consistent with regional groundwater level declines throughout the Deschutes Basin, and is attributed to prolonged drought, and to a lesser degree, irrigation water conservation (piping) projects.

The existing well is equipped with a submersible 5-hp pump that is set at approximately 364 feet bgs. Based upon the current static groundwater level of 350.5 feet bgs, this pump depth provides approximately 13.5 feet of available drawdown. A significant amount of iron staining, scale, and encrustation was observed on the pump and pump column, as shown in **Appendix B-4**. Thompson Pump & Irrigation replaced the bottom 21-foot section of the pump column before re-setting the pump due to concerns for the degraded condition of the column. It appears the well and associated pump hardware has not been serviced since the well was deepened in 2003.

3.2 STEP-DRAWDOWN PUMPING TEST

The static water level in the Negus well was measured at 350.5 feet bgs prior to pumping. The temporary 5-hp submersible pump intake was set near the bottom of the well casing at 384.1 feet bgs, which provided 33.6 feet of available groundwater drawdown for the pumping test.

The well was pumped at a rate of 15 gallons per minute (gpm) for the first 2-hour step and experienced approximately 1.3 feet of drawdown as shown on **Figure 2**. The pumping rate was increased to 23 gpm for the second 2-hour step with corresponding drawdown increasing to approximately 2.3 feet. Due to previously discussed electrical supply issues at the Negus facility, the final pumping rate was maximized at 22 gpm, and maintained at that rate for the final 2-hour pumping phase of the test. Groundwater drawdown during the final phase of pumping decreased slightly to 1.8 feet at the end of pumping. This suggests well efficiency was improving over time due to pumping. Groundwater levels recovered to 90 percent of the initial static water level within 20 minutes of turning off the pump. A step-drawdown pumping test summary with pumping rates and groundwater drawdown over time is included for reference on **Figure 2**.

At the maximum pumping rate of 23 gpm the Negus well exhibited 2.3 feet of drawdown. This represents approximately 7 percent of the 33.6 feet of available drawdown for the well, assuming the pump intake is set near the bottom of the well casing (385 feet bgs). The specific capacity (gpm/ft. of drawdown) for the Negus well is 10.0 gpm/ft. and the well appears capable of sustaining a pumping rate in the 20-to-25 gpm range without exceeding the well's available drawdown. Higher pumping rates may be possible for the Negus well, however, additional pumping analysis would be required to determine a maximum sustainable pumping rate.

Groundwater temperature was monitored during the pumping tests via a transducer attached to the pump column. The transducer depth was 381.3 feet bgs during the test. Groundwater temperatures were steady and ranged from 15.5 to 16.0 degrees C.

4.0 RECOMMENDATIONS

Based on our findings and analysis, we recommend the following:

- Equip the well with new hardware, electrical infrastructure, and a submersible pump capable of producing 25 gpm.
- Install an air-line or pressure transducer in the well to monitor dynamic (i.e. pumping) groundwater levels and to facilitate groundwater data collection and analysis of well performance over time.
- Install an in-line meter to facilitate real-time measurement and recording of flow rates.
- Install the submersible pump intake as close as practical to the bottom of the well's cased interval (385 feet bgs) to maximize available drawdown.
- Consult with a local pump contractor and develop an annual operation and maintenance program for the well.
- The well should be pumped continuously for 2-to-3 hours each month to reduce the potential for chemical and/or biological fouling.

5.0 LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of our profession practicing in the same locality, under similar conditions and at the date the services are provided. Our findings and recommendations are based on information provided by CEC and the Deschutes County Department of Solid Waste, and a limited number of field observations and related data. It is possible that conditions could vary between or beyond the points explored or data evaluated. The professional judgments expressed in this report meet the standard of care of our profession; however, no warranty is expressed or implied.

This report may be used only by CEC, the Deschutes County Department of Solid Waste, their designated representatives, and applicable regulatory agencies, only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report. Use of this report beyond a two-year period will require a review by Wallace Group to evaluate the report's applicability to the current project and any changed site conditions.

5.0 REFERENCES

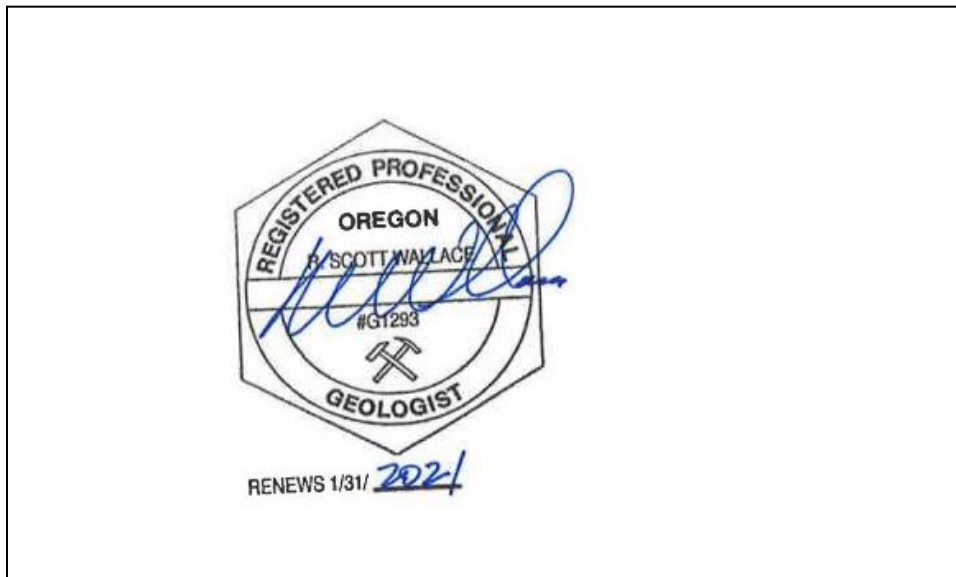
Gannett, M.W., Lite, K.E., Jr., Morgan, D.S., and Collins, C.A., 2001, *Ground-water hydrology of the upper Deschutes Basin, Oregon: U.S. Geological Survey Water Resources Investigations Report 00-4162*, 77p.

6.0 PROFESSIONAL AUTHENTICITY

This report has been authored and reviewed by the undersigned, respectively. This report is void if the original seal(s) and signature(s) are not included.



Stephen M. Woodward, R.G.
Staff Geologist



R. Scott Wallace, R.G.
Principal Hydrogeologist

FIGURES



**PROJECT
LOCATION**



Approximate
Scale: 1" = 1500'

THE INFORMATION INCLUDED ON THIS GRAPHIC REPRESENTATION HAS BEEN COMPILED FROM A VARIETY OF SOURCES AND IS SUBJECT TO CHANGE WITHOUT NOTICE. WALLACE GROUP MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, AS TO ACCURACY, COMPLETENESS, TIMELINESS, OR RIGHTS TO THE USE OF SUCH INFORMATION. THIS DOCUMENT IS NOT INTENDED FOR USE AS A LAND SURVEY PRODUCT NOR IS IT DESIGNED OR INTENDED AS A CONSTRUCTION DESIGN DOCUMENT. THE USE OR MISUSE OF THE INFORMATION CONTAINED ON THIS GRAPHIC REPRESENTATION IS AT THE SOLE RISK OF THE PARTY USING OR MISUSING THE INFORMATION.



**VICINITY MAP
NEGUS RECYCLING & TRANSFER FACILITY
2400 NE MAPLE WAY
REDMOND, OREGON**

PROJECT No:	11386 (2)
DRAWN:	October 7, 2020
DRAWN BY:	AML
CHECKED BY:	RSW
FILE NAME:	11386 (2) Figure 1

FIGURE
1

Step-Drawdown Pumping Test Summary - September 22, 2020 Negus Recycling & Transfer Facility Well

Elapsed Time (min)

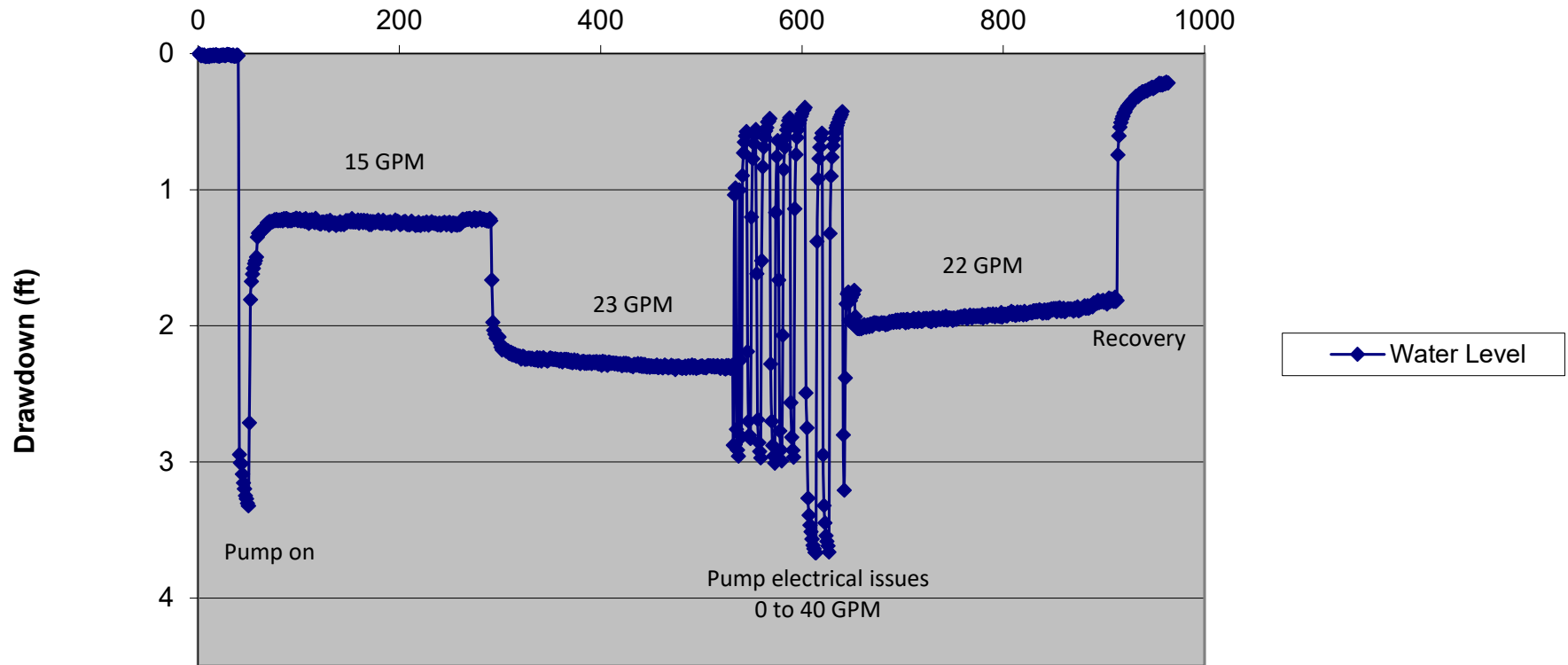


Figure 2

APPENDIX A

STATE OF OREGON
WATER WELL REPORT
 (as required by ORS 537.765)

DESC
1768

RECEIVED

JUN 21 1993

(START CARD) # 52646

15S/13E/11aa

(1) OWNER: Well Number #1.
 Name Deschutes Cty Public Works
 Address 61150 SE 27th St
 City Bend, State Or Zip 97702

(2) TYPE OF WORK:
 New Well Deepen Recondition Abandon

(3) DRILL METHOD:
 Rotary Air Rotary Mud Cable
 Other

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Other

(5) BORE HOLE CONSTRUCTION:
 Special Construction approval Yes No Depth of Completed Well 375 ft.
 Explosives used Yes No Type _____ Amount _____

HOLE		SEAL		Amount		
Diameter	From	To	Material	From	To	sacks or pounds
12"	0	25	Bentonite	0	25	19
8"	25	375				

How was seal placed: Method A B C D E
 Other Poured Down Dry

Backfill placed from _____ ft. to _____ ft. Material _____
 Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing: 8"	+1	25	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner: 6"	-5	375	188	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s) _____

(7) PERFORATIONS/SCREENS:
 Perforations Method Electric Saw
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
315	375	3/16	720			<input type="checkbox"/>	<input checked="" type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour

Pump Bailor Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
30	18	363	4

Temperature of Water 58.0 Depth Artesian Flow Found _____
 Was a water analysis done? Yes By whom _____
 Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
 Depth of strata: _____

WATER RESOURCES DEPT.
(9) LOCATION OF WELL by legal description:
 County Desch. Latitude _____ Longitude _____
 Township 15S N or S, Range 13E E or W, WM. _____
 Section 11 NE $\frac{1}{4}$ NE $\frac{1}{4}$
 Tax Lot 103 Lot _____ Block _____ Subdivision _____
 Street Address of Well (or nearest address) _____
2400 NE Maple Ave Redmond, OR 97756

(10) STATIC WATER LEVEL:
325 ft. below land surface Date 5/17/93
 Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:
 Depth at which water was first found 326

From	To	Estimated Flow Rate	SWL
326	375	90	325

(12) WELL LOG: Ground elevation _____

Material	From	To	SWL
Brown Rock	0	4	
Hard Grey Basalt	4	57	
Broken Basalt	57	59	
Hard Grey Basalt	59	73	
Brown Basalt	73	91	
Broken Basalt	91	94	
Brown Basalt	94	103	
Red Cinder Conglomerate	103	107	
Brown Sandstone	107	112	
Broken Grey Basalt	112	114	
Hard Grey Basalt	114	121	
Brown Sandstone	121	137	
Grey Basalt	137	139	
Brown Sandstone	139	181	
Grey Basalt	181	214	
Brown Sandstone Conglom.	214	221	
Grey Sandstone	221	293	
Black Sandstone	293	307	
Brown Sandstone Conglom.	307	326	
Brown/Tan Sandstone W.B.	326	375	325

Date started 5/1/93 Completed 5/3/93

(unbonded) Water Well Constructor Certification:
 I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
 Signed Robert Becker WWC Number 1385
 Date 6/12/93

(bonded) Water Well Constructor Certification:
 I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
 Signed Robert Becker WWC Number 1385
 Date 6/12/93

STATE OF OREGON
WATER SUPPLY WELL REPORT

(as required by ORS 537.765)

Instructions for completing this report are on the last page of this form

DESC 55403

WELL ID # 61623

(START CARD) # 157662

(1) OWNER: Well Number: **Negus #1**
 Name **Deschutes County Public Works Dept.**
 Address **1000 SE 27th**
 City **Bend** State **OR** Zip **9701**

(2) TYPE OF WORK:
 New Well Deepening Alteration (repair/recondition) Abandonment

(3) DRILL METHOD:
 Rotary Air Rotary Mud Cable Auger
 Other

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Livestock Other

(5) BORE HOLE CONSTRUCTION:
 Special Construction approval Yes No Depth of Completed Well **420** ft.
 Explosives used Yes No Type _____ Amount _____

HOLE			SEAL			Amount
Diameter	From	To	Material	From	To	sacks or pounds
6in	375	420	Not disturbed			

How was seal placed: Method A B C D E
 Other **Not Disturbed**
 Backfill placed from _____ ft. to _____ ft. Material _____
 Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liner:				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s) _____

(7) PERFORATIONS/SCREENS:

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						<input type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour
 Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
25+	5ft	415	1 hr.

Temperature of Water **56** Depth Artesian Flow found _____
 Was a water analysis done? Yes By whom _____
 Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
 Depth of strata: _____

(9) LOCATION OF WELL by legal description:
 County **Deschutes** Latitude _____ Longitude _____
 Township **15S** N or S. Range **13E** E or W. of WM.
 Section **11** **NE** 1/4 **NE** 1/4
 Tax lot **103** Lot _____ Block _____ Subdivision _____
 Street Address of Well (or nearest address) **2400 NE Maple, Negus Transfer Station, Redmond, OR**

(10) STATIC WATER LEVEL:
331 ft. below land surface. Date **6/15/03**
 Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:
 Depth at which water was first found **375**

From	To	Estimated Flow Rate	SWL
375	420	50+	331

(12) WELL LOG: Ground elevation _____

Material	From	To	SWL
Brown Sandstone WB	375	405	331
Broken Gray Basalt & Brown Sandstone WB	405		
Brown Sandstone Conglomerate WB	408	420	331

Well was found to contain a significant amount of sand and discolored water. We tripped in hole and began cleaning with air & water. A large amount of Iron Bacteria material was evacuated from the well. We deepened it to 420 ft. and disinfected it with chlorine solution to kill iron bacteria. Advised owner representative to use the well more heavily from time to time to flush out well.

WESTERN WATER DEVELOPMENT
 P.O. Box 1670
 Redmond, OR 97756

RECEIVED
 JUN 19 2003
 WATER RESOURCES DEPT.
 SALEM, OREGON

Date started **6/13/03** Completed **6/15/03**

(unbonded) Water Well Constructor Certification:
 I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number _____
 Signed _____ Date _____

(bonded) Water Well Constructor Certification:
 I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

WWC Number **1385**
 Signed **Robert Buckner** Date **6/16/03**

APPENDIX B



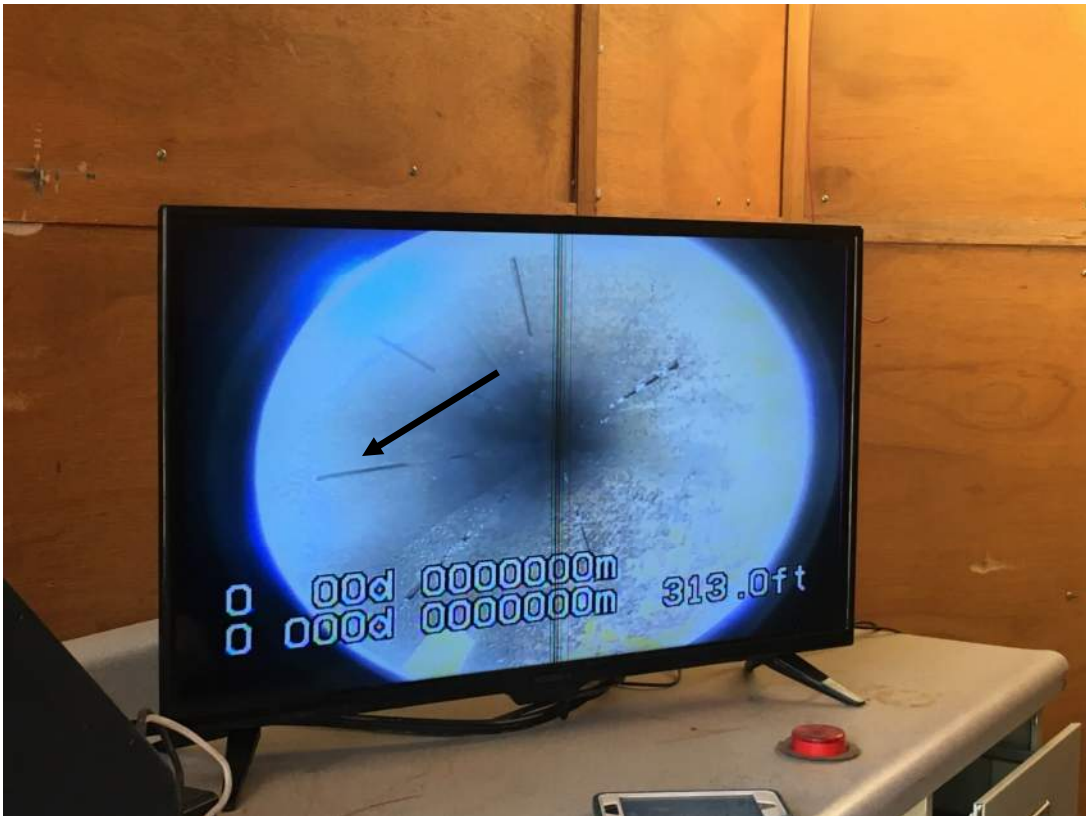
Thompson Pump and Irrigation staff removing the existing pump.



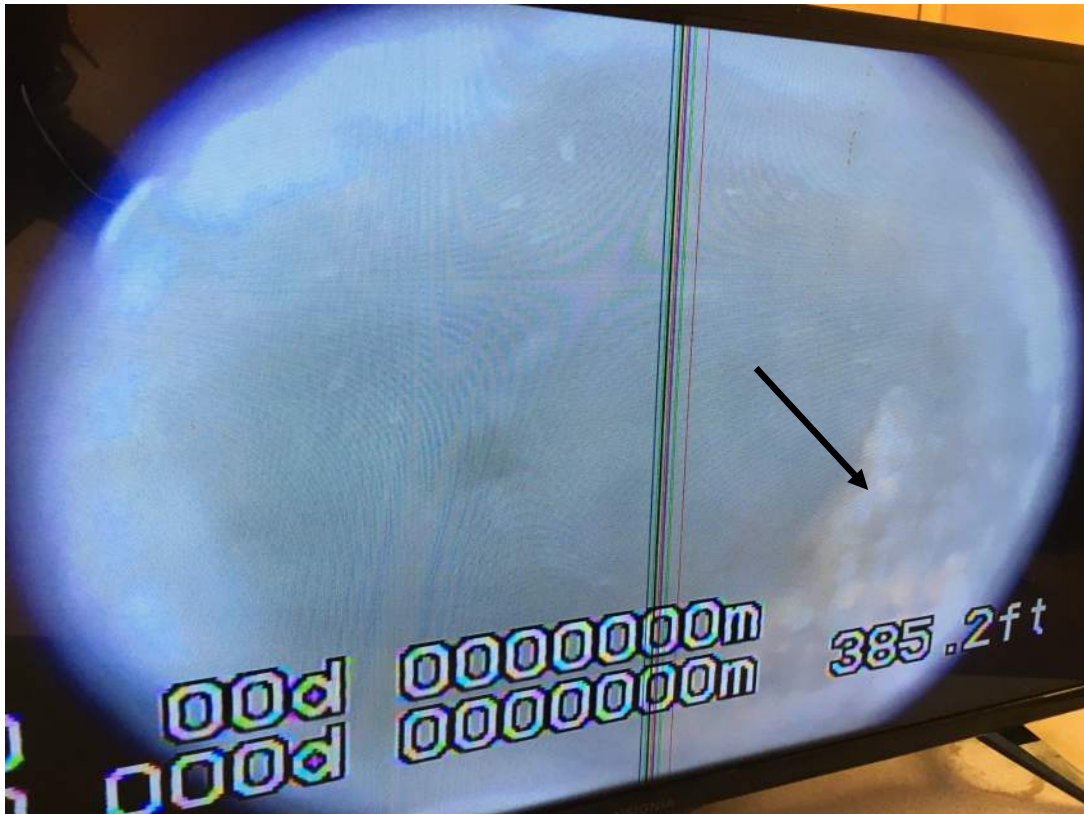
Plumbing of the discharge pipe and flow meter for the pumping tests.



Well logging camera and depth recorder being lowered into the well casing.



Slotted section of the well with vertical slots cut into the 6-inch steel casing at 315 ft bgs. The well is slotted from 315 to 385 ft bgs. Groundwater is present at 350.5 ft bgs.



The bottom rim of the 6-inch steel well casing is visible at 385 ft bgs.



The total well depth was recorded at 400.4 ft bgs.



**Existing 5 hp submersible pump removed from the well.
Note the iron staining and scale on pump.**



Iron encrustation and staining on the pump column below the water table.