

LAKE 52472

**STATE OF OREGON
WATER SUPPLY WELL REPORT**

(as required by ORS 537.765 & OAR 690-205-0210)

WELL LABEL # L _____

START CARD # 209507

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

(1) LAND OWNER Owner Well I.D. _____
 First Name _____ Last Name _____
 Company Oregon - Dogam
 Address 1225s Ferry St U140
 City Salem State OR Zip 97321-4285

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

(3) DRILL METHOD
 Rotary Air Rotary Mud Cable Auger Cable Mud
 Reverse Rotary Other _____

(4) PROPOSED USE Domestic Irrigation Community
 Industrial/Commercial Livestock Dewatering Injection
 Thermal Other _____

(5) BORE HOLE CONSTRUCTION Special Standard: Yes (attach copy)
 Depth of Completed Well 1000 ft.

BORE HOLE			SEAL				
Dia	From	To	Material	From	To	Amount	Scks/lbs
<u>10 3/4</u>	<u>0</u>	<u>40</u>		<u>0</u>	<u>40</u>	<u>1yd</u>	<u>26</u>
<u>6 1/8</u>	<u>40</u>	<u>1000</u>		<u>0</u>	<u>1000</u>	<u>26yd</u>	<u>150</u>

How was seal placed: Method A B C D E
 Other _____
 Backfill placed from 0 ft. to _____ ft. Material _____
 Filter pack from 0 ft. to _____ ft. Material _____ Size _____
 Explosives used: Yes Type _____ Amount _____

(6) CASING/LINER

Csng	Lnr	Dia	+	From	To	Gauge	Steel	Plastic	Welded	Thrd
<u>3 7/8</u>				<u>1</u>	<u>1000</u>		<u>X</u>			<u>X</u>

Shoe Inside Outside Other Location of shoe(s) _____
 Temporary casing Yes Diameter _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method NONE
 Screens Type _____ Material _____

Perf	Scrn	Csng	Lnr	Screen Dia	From	To	Screen/slot width	Slot length	# of slots	Tele/pipe size
<u>0</u>										

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

Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
<u>NONE</u>			

Temperature _____ °F Lab analysis Yes By _____
 Water quality concerns? Yes (describe below)

From	To	Description	Amount	Units
<u>NONE</u>				

(9) LOCATION OF WELL (legal description)
 County lake Twp 26 N or S 0 Range 20 E or W W.M.
 Sec 31 SW 1/4 of the SW 1/4 Tax Lot _____
 Tax Map Number _____ Lot _____
 Lat _____ " or _____ DMS or DD
 Long _____ " or _____ DMS or DD

Street Address of Well (or nearest address) Oregon military Radar - Section 6 Christmas valley

(10) STATIC WATER LEVEL

	Date	SWL (psi)	+	SWL (ft)
Existing Well/Predcepening	<u>4-29</u>	<u>0</u>		
Completed Well				

Flowing Artesian? Yes Dry Hole? Yes
 WATER BEARING ZONES Depth water was first found _____

SWL Date	From	To	Est Flow	SWL (psi)	+	SWL (ft)

(11) WELL LOG Ground Elevation _____

Material	From	To
<u>Brown Sands</u>	<u>0</u>	<u>20</u>
<u>Brown clay</u>	<u>20</u>	<u>40</u>
<u>Green clay - Sands</u>	<u>40</u>	<u>125</u>
<u>clay stone</u>	<u>125</u>	<u>185</u>
<u>Green clay</u>	<u>185</u>	<u>190</u>
<u>clay stone</u>	<u>190</u>	<u>270</u>
<u>Green clay</u>	<u>270</u>	<u>425</u>
<u>Sands - gravels</u>	<u>425</u>	<u>513</u>
<u>Green clay</u>	<u>513</u>	<u>550</u>
<u>Gravel strings - whitechips</u>	<u>550</u>	<u>663</u>
<u>white - Black silt - clay stone</u>	<u>663</u>	<u>1000</u>

Date Started 4-26-13 Completed 4-29-13

(unbonded) Water Well Constructor Certification
 I certify that the work I performed on the construction, deepening, 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 the best of my knowledge and belief.

License Number _____ Date SALEM, OR

Signed _____

(bonded) Water Well Constructor Certification
 I accept responsibility for the construction, deepening, 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.

License Number 1946 Date MAY 10-13

Signed [Signature]
 Contact Info. (optional) _____

BOREHOLE SUMMARY LOG

BOREHOLE NO. ARRA QMD-1	FINAL DEPTH (FT) 1000'	COMMENTS
PROJECT NAME: Geothermal Oregon Military Dept.	CONTRACTOR: Welsco	START DATE: Apr 26, 2013
PROJECT DESCRIPTION: Thermal Gradient Well	DRILLER(S): D. Anderson / Troy Hood	COMPLETION DATE: Apr 29, 2013
DOGAMI REP(S): Clark Newendorp	HELPER(S): Chuck/Hector	
ELEVATION(FT):	SITE DESCRIPTION: Sector 6	
PROPERTY OWNER(S)/CONTACT(S): Oregon Military Dept. Lt. Ken Safe	UNDERGROUND LOCATER(S):	

HOLE DIAMETER(S): 10 3/4 / 6 1/8	DRILL METHOD(S): mud rotary	CASING TYPE/DIA.: 8 5/8 / 2 3/8	BIT TYPE(S): Tri-cone
BOTTOM OF HOLE (FT) 1000	BOTTOM OF CASING (FT) 46 / 1000'	NO. OF APPROVED SAMPLES	DRILL FLUID Bentonite

DATE	DRILL METHOD	DRILL FROM:	DRILL TO:	START TIME	END TIME	WEATHER	OTHER
4-26	Rotary mud	0	125'	0730	1930	Sunny Breezy	
4-27	Rotary mud	125	423	0700	1900	11	
4-28	Rotary mud	423	1023	0700	1800	11	TD
4-28	chanced way bit to tri-cone	590'	-	0700	1600	11	
				0700	1600	"	TD

PVC CASING INSTALLATION				
TOTAL PIPE (FEET):	PIPE I.D.: 2 3/8	PIPE SCH.: steel	THREAD OR GLUED:	GROUT TECHNIQUE: Tremie
AMOUNT/TYPE OF GROUT USED:	FILL BOREHOLE WITH WATER:		WELL CAP: locked	

MATERIAL ITEMS
NUMBER OF CORE BOXES
SPLIT PVC (BOTH HALVES)(FT)
COMPLETED CASING DEPTH (FT)
AUGER FOOTAGE/DEPTHS (FT)
CORE FOOTAGE/DEPTHS (FT)
NUEMAX FOOTAGE/DEPTHS (FT)
MISC. 88 bags of cuttings

ADDITIONAL COMMENTS (DELAYS, EQUIP. FAILURES, ETC.):
No equipment failure, 8 trips to fill water truck

APPROVED BY: _____ DRILLER: _____ DOGAMI REP: _____

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color, Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
							///	Gravel fill - 3/4 minus blk basalt		Artificial fill for parking lot
10	0-10						↑ brown	Qal - brown, clayey sand to sand/clay mixture medium to high plasticity	↑ Surficial	surface material throughout 0-40'
20	10-20					same		hit surficial water @ ~5' bgl		
30	20-30					same		"hole belching"		
40	30-40					same		Driller set casing @ 40' bgl		
50	40-50				#	Driller says transition between 40-45' bgl				
60	50-60					↑ Grey	Ltgy, tuffaceous siltstone, with blk basalt chips * & occasional red scoria; shell fragments present - basalt probably residual from upper 40'	↑ all chips are rounded	fair cuttings return	
70	60-70						Ltgy tuffaceous siltstone with brown mudstone		Driller's Log 0-40 brown sand & clay 40-125 green clay w/ grey mud.	
80	70-80				#		Ltgy, tuffaceous siltstone, plant material - reed stem?			
						↓ no fossil				

* freshwater snail shells
reed stem
shell frags

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
90	80-90						Grey	lt gy, tuffaceous siltstone, w/ lt brown siltstone, no shell fragments, frag of basalt		fair chip return
100	90-100						grey - no fossil/frag	50-50% brown siltstone & lt gy siltstone, no shell frags, includes fragments of basalt		good chip return
110	100-110						grey	Same		poor cuttings return
120	110-120					*#	grey	lt gy tuffaceous siltstone, w/ glassy chips → palagonite or vitrophyric and blk basalt chips; shell fragments, biotite flakes (?), spine, freshwater snail shells (3 mm)		fair chip return driller noted cherty @ 125' claystone
130	120-130					#	grey	brn tuffaceous siltstone mixed w/ lt gy tuffaceous siltstone, 45% reddish palagonite/vitrophyric chips could be volcanic glass, occasional shell fragments	90-160	poor cuttings return
140	130-140					#	grey	lt gy, tuffaceous siltstone, some reddish palagonite/vitrophyric chips could be vol. glass, occasional shell frags & plant material - reed stem, biotite flakes (?)	all chips are rounded	poor cuttings return
150	140-150					#	grey	lt gy, tuffaceous siltstone, >5% blk basalt chips, occasional shell frags, some brown tuffaceous siltstone chips present		Good cuttings return
160	150-160					#	grey	brn, tuffaceous siltstone, w/ >5% blk basalt chips, some white to bluish gy - tuff (pumice) islands, some shell frags		Good cuttings return

* freshwater snail shells
reed stem
shell fragments

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
170	170-180					≠	w/ sandstone?	Same as 180		Fair to good cuttings return
180	180-190					≠		brn tuffaceous siltstone, occasional blk basalt chips, no shell frag.		good cuttings return
190	190-200					*≠		Lt gy tuffaceous siltstone to tuff(?) - pumice(?) (1-2%); blk basalt chips; occasional shell frag & freshwater snail shells		Good cuttings return
200	200-210					≠		same as 190 but increase in shell frag and blk basalt chips present		poor cuttings return
210	210-220					*≠		50-50 mix of Lt gy tuffaceous siltstone & whitish tuff/pumice c., also brn mudstone present, Biotite flakes(?), freshwater snail shells & shell frags, some blk basalt chips	tuff/sandstone chip angular/blocky - mostly rounded chips - mudstone chips angular	good cuttings return
220	220-230							Lt gy tuffaceous siltstone w/ ~10% whitish tuff/sandstone, also brn mudstone present, amber flakes that could be biotite		Good cuttings return Lost circulation below 220'
230	230-240							Lt brn tuffaceous siltstone w/ gy siltstone (~5-10%) & whitish tuff/pumice (~1%), no shell frag & lack of blk basalt grains		good cuttings return
240	240-250					*		gy tuffaceous siltstone & lessor whitish tuff/pumice c., some blk basalt chips, maybe pyrite coating, bluish siltstone, freshwater snail shells & amber colored biotite flakes(?)		good cutting return

* freshwater snail shells
≠ shell fragments

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
250	250-260									Driller increased mud weight, slowed drilling rate - no effect
260	260-270									
270	270-280									
280	280-290									
290	290-300									borehole tends to bridge ~ 300' when tripping the bit
303								collected sample @ 303'		poor cuttings return
300	300-310							lt gy siltstone abundant shell frags & fresh water snail(s) shells; amber fish scales maybe present		organic debris - red stem?
310	310-320							lt gy, tuffaceous(?) siltstone w/ whitish silt/tuff/pumice (10-20%) w/ shell frags & amber biotite flakes(?) blk & red chips (basalt). Mudstone chips are present.		fair cuttings return
320	320-330							same but w/ >5% mudstone chips		fair cuttings return
330	330-340							same, w/ amber biotite flakes(?) - less shell frags, if any		good cuttings return

* freshwater snail shells

† shell fragments

no cuttings return 250-300'

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
340	340-350					#		same w/ shell fragments woody or reed stem		fair to good cuttings return
350	350-360							ltgy tuffaceous(?) siltstone, w/ occasional shell frag, biotite flakes(?)		fair to good cuttings recovery
360	360-370					*		same w/ some whitish tuff/pumice chips, abundant shell frags and fresh water snail shells	tuff/pumice chips are angular/blocky	fair to good cuttings recovery
370	370-380							same, w/ reddish-blk basalt chips		poor cuttings recovery
380	380-390							same, w/ mudstone chips		poor cuttings return
390	390-400							No cuttings		Drilled w/o water to 440'
400										
410								No cuttings return 390-440' Lost to formation		

* freshwater snail shells
reed stem

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
420	410-420									driller's remark: green clay from 270-425'
430	420-430									
440	440-450					*#f		gy. tuffaceous (?) siltstone & whitish tuff/pumice (50-50 ratio) w/ Some gy siltstone & mudstone chips, abundant shell frags & fresh water snail shells, some blk basalt fragments	angular/blocky	fair to good
450	450-460							gy - same but less shell frags no snail shells, and no tuff/ pumice chips; nice reed stem specimen	angular/blocky	fair cuttings return
460	460-470							same as 450-460	angular/blocky	fair cuttings return
470	470-480							same but w/ ~10% white tuff/ sandstone/siltstone	angular/blocky	good cuttings return
480	480-490					*#f		same, now w/ abundant shell frags & fresh water snail shells	angular/blocky	good cuttings return
490	490-500							Same as 480-490	angular/blocky	good cuttings return

* freshwater snail shells
reed stem
f shell fragments

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
560-570						###	510-540' - all cuttings sand-sized	gy to brn, tuffaceous (?) siltstone abundant freshwater snail shells reed stem, shell frags, chips of tuff or pumice present (angular chips)	whitish tuff/sandstone; chips are angular/blocky	good chip recovery
570-580						gy to brn, t. faceous (?) siltstone of tuff/pumice, much less shell frag no snail shells, noticeably more reddish glass palagonite (?) / vitrophure & blk basalt material; clear "gy" (tuff) chips		fair cuttings recovery cuttings are fair		
580-590						gy, same chip material, occasional shell frag, 5-10% blk basalt material		poor/fair cuttings recovery		
590-600						gy, same, 10-20% blk & reddish (glassy) palagonite (?) / vitro- phric material, unidentified "whitish" layered chip(s)		fair cuttings return		
600-610					#	gy-brn, tuffaceous siltstone w/ tuff/pumice, abundant shell frags, ~5% blk to reddish (glassy) palagonite/vitrophuric material, gr/gy mudstone chips present		fair/good cuttings return		
610-620					*	same - w/ freshwater snail shells, bristite flakes (?)		Doller noted "change" at ~545'		
620-630						color change		good cuttings return		
630-640						gy-brn same as 570-580, whitish tuff/pumice material ~50% of chips, patches of brn to gy chips are about equal.		fair to good cuttings return		

* freshwater snail shells
reed stem
‡ shell fragments

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
580	590							— some chip material — also may have some blk to smoke volcanic glass		good cuttings return
590	600					†		gy, tuffaceous siltstone, starting to see "platy", iron stained laminated tuff or pumice, occasional shell frag.		good cuttings return changed wing bit to tri-cone.
600	610							gy - same chip material - interesting shell frag - or is this a crustacean leg(?)		poor cuttings return
610	620					†		gy, tuffaceous siltstone, w/shell frags, ~ 1/2 blk to reddish (glassy) palagonite/vitrophanic material, some calcitic tuff/pumice, occasional "brn" angular mudstone chip		fair cuttings. return
620	630					†		gy, same cutting material, whole fresh water "clam" shell ~ 3mm		
630	640							gy, same cuttings material		fair cuttings return
640	650							washed cuttings are still "sticky" to the touch		poor cuttings return
650	660									poor cuttings return
660	670									poor cuttings return

† shell fragments

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
680-690						±	brown	same chip material as 670' washed cuttings are still sticky to the touch, shell frags		poor cuttings return
690-700						lt brn-brn, tuffaceous siltstone w/ basalt chips			poor cuttings return	
700-710						same			poor cuttings return	
710-720						same			poor cuttings return	
720-730						±		lt gy, tuff/sandstone ~80% of chips, mixed w/ gy tuffaceous siltstone, ~20% blk basalt, occasional shell frags		fair cuttings return
730-740						±		lt gy, same chip materials, w/ more shell material		fair cuttings return
740-750						±		lt gy, same chip material some blk to smoky volcanic glass frags, chip material very much like 720-730'		fair cuttings return
750-760								lt gy & gy tuffaceous siltstone, occasional shell frag - some blk basalt material, appears to be more blk to smoky "glassy" volcanic glass(?)		very poor cuttings return

± shell fragments

BOREHOLE LOG

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
760-770							#	Ltgy to slightly brownish, same cuttings material as 750-760' more shell frags, - blk woody(?) material, more blk to smoky volcanic glass (?) up to 20-30% of cuttings	cuttings have consistency of a beach sand	very poor cuttings recovery
770-780							Ltgy to slightly brownish - same cuttings material	very poor cuttings recovery		
780-790							* #	gy, tuffaceous siltstone that has a speckled appearance (salt & pepper look), w/ shell frags, occasional blk to smoky volcanic glass (?), small shells, biotite (?), reddish palagonite/vitre	chips are hard - subangular	good cuttings recovery salt & pepper look due to grayish-white Qtz grains mixed w/ blk basalt grains
790-800							gy, same cuttings material but w/ less shell frags, appearance of mudstone chips	Good cuttings recovery		
800-810							#	gy, tuffaceous siltstone - speckled, w/ shell frags, 1 to 2% white tuff/ pumice, occasional blk to smoky volcanic glass		good cuttings recovery
810-820							#	gy, same material as 800-810', with, reed stem		good cuttings recovery
820-830								gy, same material as 800-810'		good cuttings recovery
830-840								gy, same material as 800-810'		good cuttings recovery
840-850								gy, same material as 800-810'		good cuttings recovery

* fresh water snail shell
shell fragments

BOREHOLE LOG

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
850-860								gy, same material as 800-810'		good cuttings recovery
860-870			-					darker gy, same material as 800-810'		good cuttings recovery
870-880								I can't see a change in cutting material but now the cuttings are particularly all sand size & recovery is poor to fair		poor-fair cuttings recovery
880-890								dk gy - same material as 800-810'		fair cuttings recovery
890-900								dk gy - same material as 800-810'		fair cuttings recovery
900-910								greenish brn to Lt brown - same material as 800-810' but w/ more mudstone(?) & color change		poor cuttings recovery
910-920								greenish brn to Lt brown - same material as 910-920'		very poor cuttings recovery
920-930								greenish brn to Lt brown - same material as 910-920'	910-930 cuttings have consistency of fine sand	very poor cuttings recovery

BOREHOLE LOG

Depth, ft.	Sample Number	Box Number	Blows/6 inches	Recovery	% Recovery	USCS	Graphic Log	Material Description: Color; Strength; Density; Plasticity; Organics; Weathering; Jointing; Other.	Geologic Unit	Comments
930-940								gy, tuffaceous siltstone - speckled w/ occasional shell frag.		fair cuttings return
940-950								slight color change to more greenish brn. - same cutting material as 930-940'		very poor cuttings return
950-960								No sample		
960-970								gy, tuffaceous siltstone - speckled w/ occasional shell frag.		very poor cutting return
970-980								dk gy, cutting material same as 960-970' but slightly darker gray due to increase in basalt content		Fair cuttings return
980-990								dk gy, cutting material same as 970-980'		poor cuttings return
990-1000							TD	dk gy, tuffaceous siltstone w/ whitish tuff/dumice chips, same as large as 2mm and 10-15% by volume; blk basalt grains (subrounded) - mostly fine sand size, some shell frags.		