Design Guidelines for

Gravity Systems in Soil Type 1

February 2017



Design Guideline for

Gravity Systems in Soil Type 1

February 2017



For information or additional copies of this report contact: Wastewater Management Program Physical address: 101 Israel Road SE, Tumwater, WA 98501 Mailing Address: PO Box 47824, Olympia, Washington 98504-7824

Phone:(360) 236-3330FAX:(360) 236-2257Webpage:www.doh.wa.gov/wastewaterEmail:wastewatermanagement@doh.wa.gov

Umair A. Shah, MD, MPH Secretary of Health

To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email <u>civil.rights@doh.wa.gov</u>.

Para solicitar este documento en otro formato, llame al 1-800-525-0127. Clientes sordos o con problemas de audición, favor de llamar al 711 (servicio de relé de Washington) o enviar un correo electrónico a <u>civil.rights@doh.wa.gov</u>.

DOH 337-003

Design Guideline for Gravity Systems in Soil Type 1 Effective Date: February 2017

Contents

Page

Purpose	4
Background	
Applicability	
How to Use this Guidance	
Regulatory Criteria	5
Hydrogeologic Conditions	6
Sources for Hydrogeologic Information	7
Definitions	11
Well Logs	13

Figures

Figure 1 – Table IV Chapter 246-272A	4
Figure 2 – Regulatory Criteria Flow Chart	6
Figure 3 – Vadose Zone Materials for Unconfined Aquifers	9
Figure 4 – Hydrogeology Flow Chart	10

Guideline for Using Conventional Gravity Distribution On-site Sewage Systems in Soil Type 1

Purpose

The purpose of this guideline is to provide assistance to local health jurisdictions (LHJ) when applying the five criteria listed in On-site Sewage Systems, WAC 246-272A-0234 (6), for permitting a gravity subsurface soil absorption system (SSAS) in Type 1 soils. The guidance should be used in conjunction with local knowledge of the site-specific conditions.

Background

Type 1 soils are defined in Table V in WAC 246-272A as "gravelly and very gravelly coarse sands, all extremely gravelly soils excluding soil types 5 and 6, and all soil types with greater than or equal to 90% rock fragments". A gravity SSAS is typically not permitted in Type 1 soils because soils with a high percentage of rock generally have a poor capability for treating pathogens that are present in septic tank effluent. Soils with a high percentage of rock often have higher infiltration rates and less soil. This can result in less than adequate treatment of pathogens.

Failure of an on-site system to properly treat the pathogens is difficult to detect because it does not result in immediate problems like those caused by hydraulic failure. Public health impacts from incomplete treatment of pathogens can be significant if it results in contamination of a current or potential source of drinking water. Washington State Department of Health recognizes that certain site conditions may mitigate a lack of treatment typically found with a gravity SSAS in a Type 1 soil. These include an arid climate, deep soil, and a protected aquifer.

Applicability

This guideline applies to Type 1 soils with a minimum vertical separation of at least 60 inches. These are sites where Treatment Level C with pressure distribution is required by rule. Figure 1 is highlighted to show where the guideline is applicable.

Vertical Separation	Soil Type		
in inches	1	2	3-6
12 < 18	A - pressure with timed dosing	B - pressure with timed dosing	B - pressure with timed dosing
≥ 18 < 24	B - pressure with timed dosing	B - pressure with timed dosing	B - pressure with timed dosing
≥ 24 < 36	B - pressure with timed dosing	C - pressure	E – pressure
≥ 36 < 60	B - pressure with timed dosing	E - pressure	E – gravity
≥ 60	C – pressure	E - gravity	E – gravity

Figure 1 Chapter 246-272A WAC Table VI Treatment Component Performance Levels and Method of Distribution

How to Use this Guidance

Step 1: Determine if your site has Type 1 soils and if it has at least 60 inches of vertical separation from the infiltrative surface to a restrictive layer. If the site does not have at least 60 inches of vertical separation, the regulations do not allow the use of a gravity SSAS. If there are 60 inches or more, go to Step 2.

Step 2: Use the section on Regulatory Criteria and Figure 2 to determine if your site meets criteria 1 through 4. If not, a gravity SSAS is not allowed. If yes, go to Step 3.

Step 3: Use the section on Hydrogeologic Conditions (Criteria 5) and Figure 4 to determine if your site meets these conditions for a gravity SSAS. If yes, a gravity SSAS is allowed.

Three well logs included in this guidance show examples of various hydrogeologic conditions.

Regulatory Criteria

The five regulatory criteria in Section 0234(6) are listed below. All five of the criteria must be **met to install a gravity SSAS in a Type 1 soil.** Figure 2 is a flow chart for applying Criteria 1 through 4. Figure 4 is a flow chart for applying criteria 5.

Criteria 1. Single-family residence

The on-site system must be designed and used for a single-family residence. Design flows and wastewater strength must be no more than would be allowed for a single family residence. This criterion eliminates the added risk to groundwater associated with higher strength and volume of non-residential wastewaters.

Criteria 2. Lot size

The lot size must be greater than 2.5 acres. A minimum lot size provides more dilution for pathogens (and nitrate) in the groundwater. The location of other pathogen sources both within the 2.5 acres and on adjacent properties should be considered.

Criteria 3. Annual Precipitation

Annual regional precipitation must be less than 25 inches. State precipitation data can be found at <u>www.wrcc.dri.edu/summary/climsmwa.html</u>. Lower precipitation generally means slower travel of pathogens to groundwater allowing for better treatment.

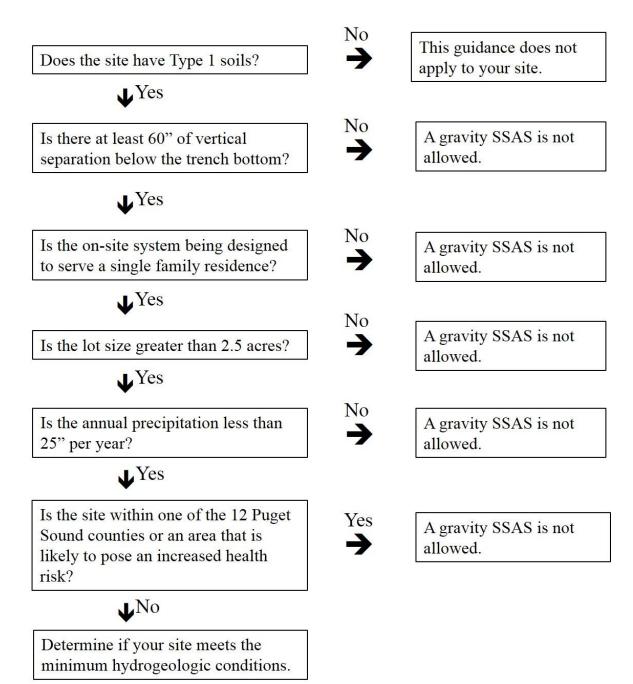
Criteria 4. Puget Sound Counties and Areas of Increased Public Health Risk

A Gravity SSAS on Type 1 soils is not allowed in the twelve counties bordering Puget Sound which are Whatcom, Kitsap, Clallam, Island, Jefferson, Mason, San Juan, King, Skagit, Snohomish, Tacoma, and Pierce. WAC 246-272A-0015 (1) (b) lists other areas that may pose an increased public health risk. These areas may also not be suitable for a Gravity SSAS on Type 1 soils.

Criteria 5. Hydrogeologic Conditions

The hydrogeologic conditions beneath the drainfield must meet minimum requirements for the uppermost aquifer. The uppermost aquifer is the most susceptible to contamination from a gravity SSAS. Protection of this aquifer will minimize the risk to public health and also to the environment.

Figure 2. Regulatory Criteria 1-4 Flow Chart



Hydrogeologic Conditions

The purpose of the hydrogeology review is to determine whether or not the upper most aquifer is susceptible to contamination from a gravity SSAS. The health officer must be satisfied that the information used to determine the hydrogeologic conditions is accurate, complete and representative of the site. This is true whether the conditions are determined from a detailed hydrogeology report or from local knowledge.

Sources for Hydrogeologic Information

1. Well Logs

Well logs are the most direct and often the most valuable source of information for determining the hydrogeology of a site. The Washington Department of Ecology maintains a water well database for all well logs. The data can be accessed at http://apps.ecy.wa.gov/wellog/. A representative well log is essential for understanding the hydrogeology of an area. Well logs vary in their usefulness and the information they contain has varying degrees of accuracy. Therefore, interpretation of well logs should be conservative.

It is preferable to have at least one representative well log within 500 feet of the drainfield. If a well log is not available within 500 feet, all well logs within ¹/₄ mile surrounding the proposed drainfield should be reviewed. At a minimum, one well log within the ¹/₄ mile radius is needed. The Health Officer must be confident that the well log is representative of the site. Each well log should contain location, depth of completed well, static water level, detailed material description with starting and ending depths, well ID number if available, and driller's signature and date.

2. Washington State Department of Health Drinking Water Data

The Department of Health maintains a drinking water data base for public water systems. The data can be accessed at <u>www.doh.wa.gov/DataandStatisticalReports/EnvironmentalHealth/</u><u>DrinkingWaterSystemData/SentryInternet.aspx</u>. Data for public water systems within ¹/₄ mile should be reviewed for nitrates or other contaminants. Nitrate in groundwater is often used as an indicator that an aquifer is at risk of contamination. Nitrates in groundwater can originate from sources other than on-site systems. However, whenever there are increased nitrate levels, the area should be reviewed carefully before approving a gravity SSAS in a Type 1 soil. The drinking water and groundwater standard for nitrates is 10 mg/L. In general, a gravity SSAS in Type 1 soils should not be installed when nitrate levels in groundwater are at or above 5 mg/L.

3. Hydrogeology Reports

The local health officer should consult local hydrogeology reports if they are available. These reports will often contain vadose zone (the area between the surface and the aquifer) information and, in some cases, groundwater data. Hydrogeology reports or geological borings are often completed for the installation of a large on-site system, community well, construction of a commercial building, or a highway construction project. State and federal regional hydrogeology reports may also provide information and are usually available online.

Determine the Upper-Most Aquifer

The first step in the hydrogeologic review is to determine the location of the upper most aquifer. The upper most aquifer is defined as the shallowest saturated zone that can yield sufficient water to support a beneficial use. A beneficial use can be drinking water, irrigation, recharge to surface water or recharge to a deeper aquifer. The upper most aquifer can be shallow, deep, perched, confined, or unconfined. Some saturated zones have an insufficient quantity of water to support a beneficial use and do not meet the definition of an aquifer. These zones are isolated from an aquifer and can be seasonal or due to irrigation. Before deciding if a saturated zone meets the definition of an aquifer, the health officer should have knowledge as to whether the saturated zone can or cannot support a beneficial use. The health officer should also know whether contamination of these zones will pose a risk to public health. If the health officer is unsure, they should consider the saturated zone the uppermost aquifer.

A representative well log is often the best source of information for locating the upper most aquifer. Locate the upper most aquifer by finding the first mention of "water" or "wet" in the "description of material" section (the term "moist" usually does not indicate a saturated zone). Generally, this will be the uppermost aquifer unless it meets the requirements for perched or seasonal zone as described above. On Well Log #1 (page 13), the upper most aquifer is from 8 to 129 feet. On Well Log #2 (page 14), the upper most aquifer extends from 250 to 275 feet. On Well Log #3 (page 15), the upper most aquifer begins at 170 feet.

Confined and Unconfined Aquifers

The second step in the hydrogeology review is to determine if the uppermost aquifer is a confined or unconfined aquifer. For the purpose of this guidance, the terms "confined" and "unconfined" aquifer will be used. In actual settings, many "confined" aquifers are only semi-confined.

Confined Aquifer Sites

A confined aquifer has an overlying impervious layer which separates the aquifer from the surface. A confined aquifer will provide physical protection to the aquifer from surface sources of contamination. When a well is drilled into the confined aquifer, water rises in the well to some level above the lowermost level of the confining layer. This is called the static water level and is shown on the well log.

Confining layers are identified by their density, thickness, soil texture, level of saturation, and gravel content. Several confining layers can exist above an aquifer. When reviewing a well log for a confining layer, look for terms such as such as clay, hardpan, compacted, cemented, till and bedrock that is solid, hard, or massive. Fractured or weathered bedrock is not a confining layer. The presence of gravel in any layer, except compacted till, means the layer is too permeable to be considered a confining layer. A wet layer is not considered a confining layer regardless of the materials. The confining layer (as defined above) must be 20 feet thick or greater and the uppermost aquifer must be encountered at least 50 feet deep (as recorded under materials - not the static water level).

Well Log #1 (page 13) is an example of a fine textured layer beginning at 15 feet that is not confined because it is wet.

Well Log #2 (page 14) is an example of a confined aquifer that meets the requirements for a gravity SSAS in Type 1 soil.

Well Log #3 (page 15) is not a confined aquifer because it does not have a confining layer as defined above.

Unconfined Aquifers

For purposes of this guidance, an unconfined aquifer is one that does not meet the above requirements for a confined aquifer. Unconfined aquifers are not protected from the surface by an impermeable layer and therefore are more susceptible to contamination. The top of the unconfined aquifer is often referred to as the water table because it represents the top of the saturated zone.

Since there is no confining layer above an unconfined aquifer, protection of the groundwater from surface contamination is dependent on the materials in the vadose zone. The materials in the vadose zone must filtrate or attenuate the pathogens and slow down their time of travel so that die-off occurs before they reach the groundwater.

For unconfined aquifers, a gravity SSAS can be used in Type 1 soils with less risk if the minimum cumulative depth of material is fine enough and/or thick enough. Figure 3 shows cumulative thicknesses required for the various materials. If the size of the sand is not described on the well log, medium sand should be assumed. If the well log lists multiple layers of materials above the unconfined aquifer, the cumulative thickness must satisfy the most conservative thickness requirement. For example, if a well log shows 30 feet of dry coarse sand and 20 feet of dry silty sand, this would satisfy the 50 foot thickness requirement in Table 3.

Well Logs # 1 and #3 are examples of an unconfined aquifer.

Well Log #1 does not meet the requirements for a gravity SSAS in Type 1 soil.

Well Log #3 does meet the requirements for a gravity SSAS in Type 1 soil.

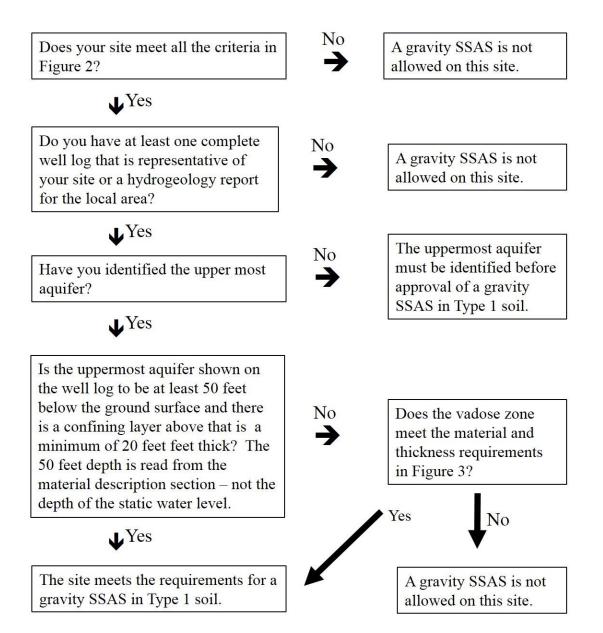
Vadose Zone Materials for Unconfined Aquifers		
Descriptive Well Log Entry*	Cumulative Thickness from Ground Surface to Top of Water	
Unsaturated coarse sand, medium sand and finer textures that do not contain gravel, cobbles or boulders.	50 feet or greater	
Unsaturated medium sand and finer textures which may include gravel. Does not include cobbles or boulders.	100 feet or greater	
Fractured or broken bedrock, coarse sand with gravel or any materials with cobbles or boulders.	Not suitable for a gravity SSAS	

Figure 3 Vadose Zone Materials for Unconfined Aquifers

* Materials cannot be described as wet or having water

* If sand size is not listed on the well log, the LHJ and designer should assume medium sand.

Figure 4: Hydrogeology Flow Chart



Definitions

Aquifer. A geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs.

Contamination. Degradation of natural groundwater quality by biological, chemical, or physical materials which lower the water quality to a degree which creates a potential hazard to the environment, public health, or interferes with a beneficial use.

Confined Aquifer. An <u>aquifer in which ground water is confined under pressure which is</u> significantly greater than atmospheric pressure. A confined layer of impermeable or very low permeable materials is above the confined aquifer.

Extremely Gravelly. Soil with sixty percent or more, but less than ninety percent rock fragments by volume.

Impermeable. Earth materials with a texture or structure that does not permit fluids to perceptibly move into or through its pores or interstices.

Gravelly. Soils with fifteen percent or more, but less than thirty-five percent rock fragments by volume.

Gravity Subsurface Soil Adsorption System. A soil dispersal component (drainfield) of trenches or beds containing either a distribution pipe within a layer of drainrock covered with a geotextile, or an approved gravelless distribution technology, designed and installed in original, undisturbed, unsaturated soil providing at least minimal vertical separation as established in WAC 246-272A with gravity distribution of septic tank effluent.

Perched Aquifer. A <u>zone of saturation of groundwater</u> above an <u>impermeable</u> or low permeable layer of soil or rock.

Recharge. The amount of water that reaches groundwater via infiltration and percolation after application to the land surface. The net amount of recharge to groundwater is a function of precipitation and irrigation after subtracting losses due to effects of evaporation, transpiration and run-off. Transpiration losses during subsurface flow tend to be seasonal and range between 10 to 20 percent of the total water budget.

Rock Fragment. A rock or mineral fragments having a diameter of two millimeters or more; for example, gravel, cobbles, stones, and boulders.

Static water level means the vertical distance from the surface of the ground to the water level in the well when the water level is not affected by pumping or free flow. A confined aquifer has a static water level some distance above the aquifer.

Type 1 Soil. Gravelly and very gravelly coarse sands, all extremely gravelly soils excluding soil types 5 and 6, all soil types with greater than or equal to 90% rock fragments. Refer to WAC 246-272A-0220 for a complete list of soil type definitions.

Unconfined Aquifer. An aquifer with no confining geologic structure on the aquifer (aquifer pressure about the same as atmospheric pressure).

Upper-most Aquifer. The shallowest confined or unconfined aquifer.

Vadose Zone. The zone between the land surface and the water table within which the moisture content is less than saturation (except in the capillary fringe) and pressure is less than atmospheric.

Very Gravelly. Soil containing thirty-five percent or more, but less than sixty percent rock fragments by volume.

Water Table. The upper surface of the saturated zone whether permanent or seasonal.

Well. A excavation that is constructed when the intended use of the well is for the location, diversion, artificial recharge, observation, monitoring, dewatering or withdrawal of ground water for agricultural, municipal, industrial, domestic, or commercial use.

Well Log. A report completed during well construction that describes and identifies the well. It normally provides a description of the depth, thickness, and character of each layer, stratum or formation penetrated by the well. Also called a Water Well Report.

Design Guideline for Gravity Systems in Soil Type 1 Effective Date: February 2017

· · · · · · · · · · · · · · · · · · ·		4 1	
	Well Log	H [
WATER WELL REPORT	CURRENT		
Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller			
ECOLOGY State of Washington Construction/Decommission ("x" in circle)		276	-
Construction	Unique Ecology Well ID Tag NoBAT	32	>
Decommission ORIGINAL INSTALLATION	Water Right Permit No.		
Notice of Intent Number PROPOSED USE: Domestic Industrial Municipal	Property Owner Name Joe Mac	au	
DeWater Irrigation Test Well Other	Well Street Address 234 To	nor	5+
TYPE OF WORK: Owner's number of well (if more than one)	City Soap Lake County Add	land	
New well Reconditioned Method : Dug Bored Driven	Location 361/4-1/4 NE 1/4 Sec 4 Twn 32 R	40	EWM []
Dimensions: Diameter of well inches, drilled 300 ft. Depth of completed well 375 ft.	(s, t, r Still REQUIRED)		
CONSTRUCTION DETAILS			
Casing D'Welded <u>6</u> " Diam. from <u>2</u> ft to $\frac{175}{284}$ ft. Installed: <u>1</u> "Liner installed <u>4</u> " Diam. from <u>24</u> ft to <u>284</u> ft.	Lat/Long Lat Deg Lat Min/S Long Deg Long Min		
□ Threaded" Diam. From fl. to fl. Perforations: □ * Yes □ No	Tax Parcel No. (Required)		
Type of perforator usedSaw	CONSTRUCTION OR DECOMMISSION	PROCEDUR	E
SIZE of perfsin. byin. and no. of perfsfromft. toft.	Formation: Describe by color, character, size of material and nature of the material in each stratum penetrated, with at lea	structure, and	the kind and
Screens: Yes No K-Pac Location	of information. (USE ADDITIONAL SHEETS IF NECESS	ARY.)	
Manufacturer's Name	MATERIAL	FROM	TO
Type Model No. Diam. Slot size from ft. to ft.	lop soil	0	8
DiamSlot size from ft. to ft.	Sand ? Grovel, Wet	a	15
Gravel/Filter packed: Yes Pro Size of gravel/sand Materials placed from fl. to ft.	Clay : Silt, gray wet	15	124
Surface Seal: Yes No To what depth? ft.	Clad : SIII , gray wer	15	167
Material used in seal Bentonite	Quartz broken w/ C/24	129	176
Did any strata contain unusable water?			97/
Type of water? Depth of strata	Quartz, hard, tractured	176	275
Method of sealing strata off	Quartz proken water	275	284
PUMP: Manufacturer's Name	avariz proper ware	an	301
Туре: Н.Р	Quartz	284	300
WATER LEVELS: Land-surface elevation above mean sea level ft.			
Static level 8 ft. below top of well Date 5/14/08 Artesian pressure 1bs. per square inch Date //	1		+
Artesian pressure IDS. per square incl. Date		· ·	1
WELL TESTS: Drawdown is amount water level is lowered below static level Was a pump test made? Yes Yes You If yes, by whom?			
Yield:ft. drawdown afterhrs.			
Yield:gal/min. withft. drawdown afterhrs.			
Yield:gal/min. withft. drawdown afterhrs.		<u> </u>	
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)			-
Time Water Level Time Water Level Time Water Level			-
Date of test			
Bailer test gal/min. withft. drawdown after hrs.			-
Airtest 15 gal/min, with stem set a 275 ft. for 2 hrs.			
Artesian flow g.p.m. Date	Start Date Completed Da	te	

WELL CONSTRUCTION CERTIFICATION: 1 constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller DEngineer Traince Name (Print)	Drilling Company Drill Right
Driller/Engineer/Trainee Signature Don Johnson	Address
Driller or trainee License No.	City, State, Zip Soap Lake, WA.
IF TRAINEE: Driller's License No: Driller's Signature: Driller's Dignature:	Contractor's Registration No. DR #654 Date 5/21/08
and the second sec	W . D D

ECY 050-1-20 (Rev 06/08) If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

	Well Log #	\$2	
WATER WELL REPORT	CURRENT		
Original & 1" copy - Ecology, 2" copy - owner, 3" copy - driller			
ECOLOGY fatter of Weshington Construction/Decommission ("x" in circle)	Notice of Intent No.	0.00	
Construction	Unique Ecology Well ID Tag No. WOG	009	
Decommission ORIGINAL INSTALLATION	Water Right Permit No.		
Notice of Intent Number PROPOSED USE: -Domestic Industrial Municipal	Property Owner Name Ted Hahi	n	
DeWater Irrigation Test Well Other	Well Street Address 79 Shelto	mRa	6
TYPE OF WORK: Owner's number of well (if more than one)	City Spokane County Spo		
Cable Cable Jetted			
DIMENSIONS: Diameter of well or inches, drilled ft.	Location NW1/4-1/42 1/4 See Twn 21N R	456	EWM 🗆
Depth of completed well 275 ft.	(s, t, r Still REQUIRED)	5	Or WWM
CONSTRUCTION DETAILS	1		
Casing ∑Welded <u>L</u> "Diam. from <u>3</u> " ft. to <u>345</u> ft. Installed: ☐ Liner installed <u>"</u> Diam. from <u>ft</u> . to <u>ft</u> .	Lat/Long Lat Deg Lat Min/S	10.00	-
Installed: Liner installed" Diam. fromft. toft.	Long Deg Long Min	/Sec	-
Perforations: P Yes No	Tax Parcel No. (Required)		
Type of perforator used	CONSTRUCTION OR DECOMMISSION		
SIZE of perfs in. by in. and no. of perfs from ft. to ft.	Formation: Describe by color, character, size of material and nature of the material in each stratum penetrated, with at leas		
Screens: Yes No K-Pac Location	of information. (USE ADDITIONAL SHEETS IF NECESS		
Manufacturer's Name	MATERIAL	FROM	TO
Type Model No. Diam. Slot size 6 from 245 ft. to 275 ft.	Sand Loam w/gravel	0	24
Diam. Slot size from ft. to ft.	Clay Dark Brown	210	241
Gravel/Filter packed: Ves J-No Size of gravel/sand Materials placed from ft. to ft.	Clark Blue (arata	241	250
Surface Seal: Yes No To what depth? 30 ft.	Clay Dire gray	GUTI	0.50
Material used in seal Bentonike	Sand fine w/ water	250	260
Did any strata contain unusable water?			07/
Type of water? Depth of strata	Sand Coarse w/water	260	275
Method of sealing strata off	k		
PUMP: Manufacturer's Name			
Type: H.P			
WATER LEVELS: Land-surface elevation above mean sea level ft.			
Static level <u>20</u> ft. below top of well Date			
Artesian pressure Ibs. per square inch Date Artesian water is controlled by (cap, valve, etc.)		2.1	+
WELL TESTS: Drawdown is amount water level is lowered below static level			
Was a pump test made? Yes Yes You If yes, by whom? Yield: 100 gal/min. withft. drawdown afterhrs.			
Yield: <u>100</u> gal./min. with <u>1</u> t. drawdown after <u>hrs.</u> Yield: <u>gal./min. with <u>ft. drawdown after</u> hrs.</u>	· · · ·	<u> </u>	
Yield:gal./min. withft. drawdown afterbrs.			
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)			
Time Water Level Time Water Level Time Water Level			1
		<u>'</u> .	
Date of test			8
Bailer test gal/min. withft, drawdown afterhrs.	3		
Airtestgal /min. with stem set atft. forhrs.			
Artesian flow g.p.m. Date	Start Date 5/15/99 Completed Da	51:	2012000
Temperature of water Was a chemical analysis made? D Yes D No	Start Date Completed Da	<u> </u>	

WELL CONSTRUCTION CERTIFICATION: 1 constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller Engineer Traince Name (Print)	Drilling Company HSD Well JAC
Driller/Engineer/Trainee Signature	Address
Driller or trainee License No.	City, State, Zip Spokane,
IF TRAINEE: Driller's License No: Driller's Signature:	Contractor's Registration No Date 5/21/2000

ECY 050-1-20 (Rev 06/08) If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Construction/Decommission ("x" in circle)	CURRENT	Log	
Construction/Decommission ("x" in circle)	CUPPENT		
Construction/Decommission ("x" in circle)	CURRENT		
Construction	Notice of Intent No		
	Unique Ecology Well ID Tag No. ABZ	034	•
Decommission ORIGINAL INSTALLATION	Water Right Permit No.		
Notice of Intent Number	Property Owner Name Mr WICK		
PROPOSED USE: Domestic Industrial Municipal DeWater Irrigation Test Well Other	Well Street Address 6505 18	sth A	je.
TYPE OF WORK: Owner's number of well (if more than one)			
Reconditioned Method: Dug Bored Driven Deepened Deepened Jetted	City County Location 2W 1/4-1/4 56 1/4 Sec 18 Twn 3	1 R 24E	EWM Check
DIMENSIONS: Diameter of well inches, drilled ft.	(s, t, r Still REQUIRED)		WWM Done
CONSTRUCTION DETAILS	Lat/Long Lat Deg Lat M	lin/Sec	
Casing Welded 6 " Diam. from 2 ft. to 19.3 ft. Installed: Elliner installed 5 " Diam. from 190 ft. to 19.3 ft.			
Diam. from 1999 ft. to 1992 ft.	Tax Parcel No. (Required)		
Perforations: Yes No	CONSTRUCTION OR DECOMMISSION PROCED		
Type of perforator used SIZE of perfs in. by in. and no. of perfs from ft. to ft.	Formation: Describe by color, character, size of material and nature of the material in each stratum penetrated, with at lea	st one entry fo	d the kind and or each change
Screens: Y'es No K-Pac Location	of information. (USE ADDITIONAL SHEETS IF NECESS/ MATERIAL	ARY.)	ТО
Manufacturer's Name Type Slotted Model No.	TOPGOLI	O	11
Diam. 5 Slot size 10 from 193 ft. to 198 ft.			
Diam. Slot size from ft. to fi.	Sand & Gravel	1	35
Gravel/Filter packed: Yes No Size of gravel/sand Materials placed from ft. to ft.	Gravel	35	95
Surface Seal: Yes No To what depth?		0-	122
Material used in seal Bentoninu	Sand Grave	95	120
Did any strata contain unusable water? Yes No Type of water? Depih of strata	silt & sand medium	120	170
Method of sealing strata off	Sand w/ water	071	200
PUMP: Manufacturer's Name	Sana of water	110	
Турс: Н.Р	-		
WATER LEVELS: Land-surface elevation above mean sea level fl. Static level fl. below top of well Date		,	
Artesian pressurelbs. per square inch Date			
Artesian water is controlled by (cap, valve, etc.)] + ,		
WELL TESTS: Drawdown is amount water level is lowered below static level Was a pump test made? Yes No If yes, by whom?			
Yield: gal/min, with ft. drawdown after hrs.			
Yield: gal/min. with fi. drawdown after hrs. Yield: gal/min. with fi. drawdown after hrs.		+	
Recovery data (time taken as zero when pump turned off) (water level measured from well			
top to water level> Time Water Level Time Water Level Time Water Level		3	
			_
Date of test			
Bailer Test gal /min. with ft. drawdown after hrs.			
Airtestgal/min. with stem set atft. forhrs.			
Artesian flow g.p.m. Date	Start Date 10/10/95 Completed Da	te 01	13195
Temperature of water Was a chemical analysis made? Yes No	lity for construction of this well, and its compliance with a	all Washingto	on well
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibil construction standards. Materials used and the information reported above are tr		llina	
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibil construction standards. Materials used and the information reported above are true	ue to my best knowledge and belief. Drilling Company <u>ABL Pri</u>	llina	}
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibil construction standards. Materials used and the information reported above are tro Driller Engineer Trainee Name (Print)	ue to my best knowledge and belief. Drilling Company ABL Address	lling)
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibil construction standards. Materials used and the information reported above are true Driller Engineer Trainee Name (Print) Time Ad Smo Driller/Engineer/Trainee Signature Time Add	ue to my best knowledge and belief. Drilling Company <u>ABL Pri</u>	lling	<u></u>
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibil construction standards. Materials used and the information reported above are tra Driller Engineer Trainee Name (Print) Time Ad Smo Driller/Engineer/Trainee Signature Time Address Driller or trainee License No. 1295	ue to my best knowledge and belief. Drilling Company ABL; Address; City, State, Zip;	Ilina Date 10	<u>113/95</u>