



Application for a State Waste Discharge Permit to Discharge Industrial Wastewater to Ground Water by Land Treatment or Application

This application is for a state waste discharge permit as required by Chapter 90.48 RCW and Chapter 173-216 WAC. Permit applications provide Ecology with information on pollutants in the waste stream, materials that may enter the waste stream, the flow characteristics of the discharge, and the site characteristics at the point of discharge.

Ecology may request additional information to clarify the conditions of this discharge. The applicant should reference information previously submitted to Ecology that applies to this application in the appropriate section.

SECTION A. GENERAL INFORMATION

1. Applicant name: REC Solar Grade Silicon, Inc.

2. Facility name: same
(if different from applicant)

3. Applicant mail address: 3322 Road "N" NE
Street

Moses Lake, WA 98837
City/State Zip

4. Facility location address: same
(if different from above) Street

5. UBI No. 602-313-434 98837
City/State Zip

Sometimes called a registration, tax, "C," or resale number, the Unified Business Identifier (UBI) number is a nine-digit number used to identify persons engaging in business activities. The number is assigned when a person completes a [Master Business Application](#) to register with or obtain a license from state agencies. The Departments of Revenue, Licensing, Employment Security, Labor and Industries, and the Corporations Division of the Secretary of State are among the state agencies participating in the UBI program.

6. Latitude/longitude of the processing facility as decimal degrees (NAD83/WGS84):
47.135556 °N / 119.200000 °W

FOR ECOLOGY USE ONLY	Check One	New/Renewal <input type="checkbox"/>	Modification <input type="checkbox"/>	
Date application received		Application/Permit no.		
Date application accepted		Date fee paid		

7. Person to contact who is familiar with the information contained in this application:

<u>Paul Stenhouse</u> Name	<u>Environmental Engineer</u> Title
<u>(509) 793-9165</u> Telephone number	<u>(509) 766-9615</u> Fax number

8. Check One:

Permit renewal (including renewal of temporary permits authorized by RCW 90.48.200)

Does this application request a greater amount of wastewater discharge, a greater amount of pollutant discharge, or a discharge of different pollutants than specified in the last permit application for this facility? YES NO

For permit renewals, the current permit is an attachment, by reference, to this application.

Permit modification

Existing unpermitted discharge

Proposed discharge

Anticipated date of discharge: _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and/or imprisonment for knowing violations.

_____ Signature*	_____ Date	<u>Plant Manager</u> Title
---------------------	---------------	-------------------------------

Jeffrey S. Johnson
Printed name

*Applications must be signed as follows: Corporations, by a principal executive officer of at least the level of vice-president; partnership, by a general partner; sole proprietorship, by the proprietor. If these titles do not apply to your organization, the person who makes budget decisions for this facility must sign the application.

The application signatory may delegate signature authority for submittals required by the permit, such as monthly reports, to a suitable employee. You can delegate this authority to a qualified individual or to a position, which you expect to fill with a qualified individual. If you wish to delegate signature authority, please complete the following:

_____ Signature of delegated employee	_____ Date	_____ Title or function at the facility
_____ Printed name		

SECTION B. PRODUCT INFORMATION

- Briefly describe all manufacturing processes and products, and/or commercial activities at this facility. Provide the applicable Standard Industrial Category (SIC) and the North American Industry Classification System (NAICS) Code(s) for each activity (see *North American Industrial Classification System*, 2007 ed.). You can find the 1997 NAICS codes and the corresponding 1987 Standard Industry Category (SIC) codes at (<http://www.census.gov/epcd/naics/frames3.htm>).

Description: REC owns and operates a high purity polysilicon and silane plant in Moses Lake. REC sells polysilicon for use mainly in the photovoltaic industry while it uses silane gas as a raw material for polysilicon production. The facility discharges low chloride wastewater to the City of Moses Lake, Sand Dunes Treatment Plant; high chloride and high sodium, high silicate wastewaters to a series of lined evaporation ponds; and non-contact cooling water to a 60 million gallon lined storage pond and 125 acre land application site. Applicable Codes - 2012 NAICS Codes (Silane Gas: 325180 - Other Basic Inorganic Chemical Manufacturing; Solar Grade Polysilicon: 331410 - Nonferrous Metal (Except Aluminum) Smelting and Refining). 1987 SIC Codes - (Silane Gas: 2819; Solar Grade Polysilicon: 3339).

- List raw materials and products:

Type	RAW MATERIALS	Quantity
<i>Potatoes (Example)</i>		<i>20 million tons per year</i>
See Attachment 1 - Material Imports		
Type	PRODUCTS	Quantity
<i>French fries (Example)</i>		<i>10 million pounds per year</i>
Solar Grade Silicon		Quantities are business confidential
Silane Gas		Quantities are business confidential
Calcium Chloride		750,000 pounds per year

SECTION C. PLANT OPERATIONAL CHARACTERISTICS

1. For each process listed in B.1 that generates wastewater, list the process, assign the waste stream a name and ID #, and describe whether it is a batch or continuous flow.

Process	Waste Stream Name	Waste Stream ID#	Batch (B) or Continuous (C) Process
<i>Receiving raw potatoes (Example)</i>	<i>Mud Water</i>	<i>1</i>	<i>C</i>
Various	Low Chloride System	001	Batch
Various	High Chloride and High Sodium High Silicate Systems	004	Batch
Noncontact Cooling	Land Application	003	Batch

2. On a separate sheet, produce a schematic drawing showing production processes and water flow through the facility and wastewater treatment devices (*label as attachment C2*). The drawing should indicate the source of intake water and the operations contributing wastewater to the effluent and should label the treatment units. Construct the water balance by showing average flows between intakes, operations, treatment units, and points of discharge to land. If a water balance cannot be determined (*e.g., for certain mining activities*), provide a description of the nature and amount of any sources of water and any collection or treatment measures.

3. What is the highest daily discharge flow from the processing facility: 4/25/13: 824,691 gallons per day
 (Specify the time period for the value given)

What is the highest daily discharge flow to the sprayfields/infiltration basin: inches/acre/month OR
 (Specify the time period for the value given) 4/25/13: 824,691 gallons per day

What is the highest average monthly discharge flow (daily flows averaged over a month) from the processing facility: 6/2013: 499,454 gallons/day?
 (Specify the time period for the value given)

What is the highest average monthly discharge flow to the sprayfields: inches/acre/month OR
 (Specify the time period for the value given) 6/2013: 499,454 gallons per day

4. Describe any planned wastewater treatment or sprayfield/infiltration improvements and the schedule for the improvements or changes. (*Use additional sheets, if necessary and label as attachment C4.*)

5. If production processes are subject to seasonal variations, provide the following information. List discharge for each wastestream in gallons or million gallons per month. The combined value for each month should equal the estimated total monthly flow. Please indicate the proper unit by checking one of the following boxes:

gallons per day gallons per month million gallons per month

Waste Stream ID#	MONTHS											
	J	F	M	A	M	J	J	A	S	O	N	D
#1 (Example)	1000	1000	1000	1000	6000	2000	2000	2000	1000	1000	5000	4000
Irrigated Wastewater	0	0.89	2.06	6.04	5.00	14.98	14.10	7.98	0	3.52	0	0
Estimated total gallons												

6. If this is a discharge from the processing facility to a storage or evaporative lagoon, what is the size of the lagoon (give square footage for the bottom of the lagoon and the total volume of the lagoon at full operating depth). 10,000 square feet; 10 million gallons (Example)

7. Check the applicable box. Is this a discharge to a sprayfield or an infiltration bed ? Provide the average gallons per acre per day proposed for each month in the following table.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept.	Oct	Nov	Dec
Estimated gallons per acre per day	0	255	531	1612	1290	3996	3639	2060	0	909		

8. How many hours a day does this facility typically operate? 24
 How many days a week does this facility typically operate? 7
 How many weeks per year does this facility typically operate? 52
9. List all incidental materials such as oil, paint, grease, solvents, and cleaners that are used or stored on site (list only those with quantities greater than 10 gallons for liquids and 50 pound quantities for solids). For solvents and solvent-based cleaners, include a copy of the material safety data sheet for each material and estimate the quantity used. *Use additional sheets, if necessary and label as attachment C.7.)*

Materials/Quantity Stored: There will not be any new oils, paints, greases, solvents or cleaners introduced to the facility beyond what is currently stored onsite. Quantities for some of the chemicals may be increased in accordance with all applicable federal, state, and local laws and regulations. Material safety data sheets for all chemicals stored onsite were provided during the 2007 permit modification.

- | 10. | Some types of facilities are required to have spill or waste control plans. Does this facility have: | Yes | No |
|-----|---|-------------------------------------|-------------------------------------|
| a. | A spill prevention, control, and countermeasure plan (40 CFR 112)? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| b. | An Oil Spill Contingency Plan (chapter 173-182 WAC)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c. | An emergency response plan (per WAC 173-303-350)? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| d. | A runoff, spillage, or leak control plan (per WAC 173-216-110(f))? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| e. | Any spill or pollution prevention plan required by local, state or federal authorities? If yes specify: <u>SPCC Plan per 40CFR112</u> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| f. | A solid waste control plan? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

This page purposely left blank

SECTION E. WASTEWATER INFORMATION

1. How are the water intake and effluent flows measured?

Intake: not metered

Effluent meter

2. Describe the collection method for the samples analyzed below. (*i.e.*, grab, 24-hour composite). Applicants must collect grab samples (not composites) for analysis of pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform (including *E. coli*), and Enterococci (previously known as fecal streptococcus at § 122.26 (d)(2)(iii)(A)(3)), or volatile organics.

See Attachment 2 - Parameter Monitoring per State Waste Discharge Permit Number ST 8121 for a summary of collection methods by parameter. Results of parameters in addition to those specified in question E.4 below are reported in the monthly Discharge Monitoring Reports (DMRs). Results in E.4 are from August-December DMRs.

3. Has the effluent been analyzed for any other parameters than those identified in question E.4.? YES NO
If yes, attach results and label as attachment E.4. This data must clearly show the date, method and location of sampling. (*Note: Ecology may require additional testing.*)

4. Provide measurements or range of measurements for treated wastewater prior to discharge to the POTW for the parameters with an “X” in the left column. If you obtain the application from the internet, contact Ecology’s regional office to see if testing for a subset of these parameters is permissible. All analyses (except pH) must be conducted by a laboratory registered or accredited by Ecology (WAC 173-216-125). If this is an application for permit renewal, provide data for the last year for those parameters that are routinely measured. For parameters measured only for this application, place the values under “Maximum.” Report the values with units as specified in the parameter name or in the detection level.

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table unless Ecology approves an alternate method **or the method used produces measurable results in the sample and EPA has listed it as an EPA approved method in 40 CFR Part 136. If the Permittee uses an alternative method as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.**

X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19 th ,20 th edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
	BOD (5 day)					SM 5210 B	/2 mg/l
	COD					SM 5220 D	/10 mg/l
	Total suspended solids					SM 2540 D	/5 mg/l
	Fixed Dissolved Solids					SM 2540 E	
X	Total dissolved solids	338	542	433	18	SM 2540 C	
	Conductivity (micromhos/cm)					SM 2510 B	
X	Ammonia-N as N	0.1	1.4	0.15	18	SM 4500-NH ₃ C	/0.3 mg/L
X	pH	8.6	9.7	8.9	18	SM 4500-H	0.1 standard units
	Fecal coliform (organisms/100 mL)					SM 9221 E or 9222 D	
	Total coliform (organisms/100 mL)					SM 9221 B or 9222 B	
	Dissolved oxygen					SM 4500-O C/G	
X	Nitrate + nitrite-N as N	100	400	150	18	SM 4500-NO ₃ E	100 µg/L
	Total kjeldahl N as N					SM 4500-N _{org} C/E/FG	300 µg/l
	Ortho-phosphate-P as P					SM 4500-P E/F	10 µg/l
X	Total-phosphorous-P as P	1,000	1,500	1,100	18	SM 4500-P E/P/F	10 µg/l
	Total Oil & grease					EPA 1664A	1.4/5 mg/l
	NWTPH - Dx					Ecology NWTPH Dx	250/250 µg/l
	NWTPH - Gx					Ecology NWTPH Gx	250/250 µg/l
X	Calcium	8,100	11,400	9,600	18	EPA 200.7	10 µg/l
X	Chloride	28,100	35,100	30,600	18	SM 4500-Cl C	0.15 µg/l
X	Fluoride	3.1	3.8	3.5	18	SM 4500-F E	.025/0.1 mg/l

X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19 th , 20 th edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
X	Magnesium	3,300	4,300	3,900	18	EPA 200.7	10/50 µg/l
X	Potassium	10,400	13,000	11,700	18	EPA 200.7	700/ µg/l
X	Sodium	94,800	159,100	126,000	18	EPA 200.7	29/ µg/l
X	Sulfate	101,600	132,100	109,000	18	SM 4500-SO ₄ C/D	/200 µg/l
X	Alkalinity as CaCO ₃	121	188	163	18	SM 2320 B	/5 mg/L as CaCO ₃
	Arsenic(total)					EPA 200.8	0.1/0.5 µg/l
	Barium (total)					EPA 200.8	0.5/2 µg/l
	Cadmium (total)					EPA 200.8	.05/.25 µg/l
	Chromium (total)					EPA 200.8	0.2/1 µg/l
X	Copper (total)	19.2	100	43.1	18	EPA 200.8	0.4/2 µg/l
	Iron (total)					EPA 200.7	12.5/50 µg/l
	Lead (total)					EPA 200.8	0.1/.5 µg/l
X	Manganese (total)	3,800	25,100	10,600	18	EPA 200.8	0.1/0.5 µg/l
	Mercury (total) pg/L					EPA 1631E	0.2/0.5 pg/l
	Molybdenum(total)					EPA 200.8	0.1/0.5 µg/l
	Nickel(total)					EPA 200.8	0.1/0.5 µg/l
	Selenium (total)					EPA 200.8	1/1 µg/l
	Silver (total)					EPA 200.8	.04/.2 µg/l
	Zinc (total)					EPA 200.8	0.5/2.5 µg/l

Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.

Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10ⁿ, where n is an integer. (64 FR 30417).

ALSO GIVEN AS:

The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

This page purposely left blank

5. Does this facility use any of the following chemicals as raw materials in production, produce them as part of the manufacturing process, or are they present in the wastewater? (*The number following the chemical name is the Chemical Abstract Service (CAS) reference number to aid in identifying the compound.*) YES NO

If yes, specify how the chemical is used and the quantity used or produced (*Use additional sheets, if necessary and label as attachment E5.*):

Acrylamide/79-06-1	Nitrofurazone/59-87-0	Heptachlor/76-44-8
Acrylonitrile/107-13-1	N-nitrosodiethanolamine/ 1116-54-7	Heptachlor epoxide/1024-57-3
Aldrin/309-00-2	N-nitrosodiethylamine/55-18-5	Hexachlorobenzene/118-74-1
Aniline/62-53-3	N-nitrosodimethylamine/62-75-9	Hexachlorocyclohexane (alpha)/ 319-84-6
Aramite/140-57-8	N-nitrosodiphenylamine/86-30-6	Hexachlorocyclohexane (tech.)/ 608-73-1
Arsenic/7440-38-2	N-nitroso-di-n-propylamine/ 621-64-7	Hexachlorodibenzo-p-dioxin, mix/19408-74-3
Azobenzene/103-33-3	N-nitrosopyrrolidine/930-55-2	Hydrazine/hydrazine sulfate/ 302-01-2
Benzene/71-43-2	N-nitroso-di-n-butylamine/ 924-16-3	Lindane/58-89-9
Benzidine/92-87-5	N-nitroso-n-methylethylamine/ 10595-95-6	2 Methylaniline/100-61-8
Benzo(a)pyrene/50-32-8	PAH/NA	2 Methylaniline hydrochloride/ 636-21-5
Benzotrichloride/98-07-7	PBBs/NA	4,4' Methylene bis(N,N- dimethyl)aniline/101-61-1
Benzyl chloride/100-44-7	PCBs/1336-36-3	Methylene chloride (dichloromethane)/75-09-2
Bis(chloroethyl)ether/111-44-4	1,2 Dichloropropane/78-87-5	Mirex/2385-85-5
Bis(chloromethyl)ether/542-88-1	1,3 Dichloropropene/542-75-6	O-phenylenediamine/106-50-3
Bis(2-ethylhexyl) phthalate/ 117-81-7	Dichlorvos/62-73-7	Propylene oxide/75-56-9
Bromodichloromethane/75-27-4	Dieldrin/60-57-1	2,3,7,8-Tetrachlorodibenzo-p-dioxin/ 1746-01-6
Bromoform/75-25-2	3,3' Dimethoxybenzidine/119-90-4	Tetrachloroethylene/127-18-4
Carbazole/86-74-8	3,3 Dimethylbenzidine/119-93-7	2,4 Toluenediamine/95-80-7
Carbon tetrachloride/56-23-5	1,2 Dimethylhydrazine/540-73-8	o-Toluidine/95-53-4
Chlordane/57-74-9	2,4 Dinitrotoluene/121-14-2	Toxaphene/8001-35-2
Chlorodibromomethane/124-48-1	2,6 Dinitrotoluene/606-20-2	Trichloroethylene/79-01-6
Chloroform/67-66-3	1,4 Dioxane/123-91-1	2,4,6-Trichlorophenol/88-06-2
Chlorthalonil/1897-45-6	1,2 Diphenylhydrazine/122-66-7	Trimethyl phosphate/512-56-1
2,4-D/94-75-7	Endrin/72-20-8	Vinyl chloride/75-01-4
DDT/50-29-3	Epichlorohydrin/106-89-8	
Diallate/2303-16-4	Ethyl acrylate/140-88-5	
1,2 Dibromoethane/106-93-4	Ethylene dibromide/106-93-4	
1,4 Dichlorobenzene/106-46-7	Ethylene thioureae/96-45-7	
3,3' Dichlorobenzidine/91-94-1	Folpet/133-07-3	
1,1 Dichloroethane/75-34-3	Furmecyclo/60568-05-0	
1,2 Dichloroethane/107-06-2		

6. Are any other pesticides, herbicides, or fungicides used at this facility? YES NO
If yes, specify the material and quantity used.

Minimal quantities of zinc phosphide for rodent control, applications of Roundup, Banvel, 2,4-D Amine, and Surflan AS. Sodium hypochlorite to prevent microbial growth in cooling towers.

7. Are there other pollutants that you know of or believe to be present? YES NO

If yes, specify the pollutants and their concentration if known
(attach laboratory analyses if available).

DON'T KNOW

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # BAL 816

Well ID # MW-2

Latitude: 47.1347482

Longitude: -119.2057185

Well Elevation (to the nearest 0.01 feet) 1195.87 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L				
Total dissolved solids	mg/L				
Dissolved Fixed Solids	mg/L				
pH	Standard units	7.80 to 8.90	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	353 to 507	5	SM 2510 B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3				
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L				
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chloride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Potassium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sodium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sulfate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Bicarbonate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1168.90 to 1170.60	5	N/A	N/A

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # BAL 814

Well ID # MW-3

Latitude: 47.1357965

Longitude: -119.1942208

Well Elevation (to the nearest 0.01 feet) 1221.25 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L				
Total dissolved solids	mg/L				
Dissolved Fixed Solids	mg/L				
pH	Standard units	8.20 to 8.80	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	690 to 768	5	SM 2510B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3				
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L				
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chloride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Potassium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sodium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sulfate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Bicarbonate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1187.90 to 1189.00	5	N/A	N/A

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # BAL 813

Well ID # MW-4

Latitude: 47.1353666

Longitude: 119.1949195

Well Elevation (to the nearest 0.01 feet) 1217.6 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L				
Total dissolved solids	mg/L				
Dissolved Fixed Solids	mg/L				
pH	Standard units	7.90 to 8.10	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	471 to 904	5	SM 2510B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3				
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L				
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chloride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Potassium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sodium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sulfate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Bicarbonate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1196.50 to 1202.20	5	N/A	N/A

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # N/A

Well ID # MW-6

Latitude: 47.1373127

Longitude: -119.199701

Well Elevation (to the nearest 0.01 feet) 1206.68 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L				
Total dissolved solids	mg/L				
Dissolved Fixed Solids	mg/L				
pH	Standard units	8.40 to 9.20	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	308 to 322	5	SM 2510B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3				
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L				
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chloride	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Potassium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sodium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Sulfate	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Bicarbonate	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1185.00 to 1186.40	5	N/A	N/A

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # N/A

Well ID # MW-11

Latitude: 47.1381123

Longitude: -119.2044002

Well Elevation (to the nearest 0.01 feet) 1196.71 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L	1.0 to 1.3	5	SM 5310 B	1.0 mg/L
Total dissolved solids	mg/L	182 to 288	5	SM 2540 C	20.0 mg/L
Dissolved Fixed Solids	mg/L				
pH	Standard units	8.00 to 8.40	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	503 to 570	5	SM 2510 B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3	174 to 188	5	SM 2320 B	5 mg/L as CaCO3
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L	6.6 to 7.3	5	SM 4500-NO3 E	100 ug/L
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	48.7 to 57.0	5	EPA 200.7	0.2 mg/L
Chloride	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	18.3 to 34.6	5	SM 4500-Cl C	50 ug/L
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	20.1 to 26.3	5	EPA 200.8	50 ug/L
Potassium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	1.8 to 2.9	5	EPA 200.7	50 ug/L
Sodium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	23.6 to 28.3	5	EPA 200.7	50 ug/L
Sulfate	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	22.0 to 23.7	5	4500-SO4 C	2000 ug/L
Bicarbonate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	550 to 17200	5	EPA 200.7	50 ug/L
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	18 to 372	5	EPA 200.7	0.5 ug/L
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1163.30 to 1164.20	5	N/A	N/A

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # N/A

Well ID # MW-12

Latitude: 47.13510224

Longitude: 119.2069587

Well Elevation (to the nearest 0.01 feet) 1189.96 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L	1.0 to 1.2	5	SM 5310 B	1.0 mg/L
Total dissolved solids	mg/L	22 to 252	5	SM 2540 C	20.0 mg/L
Dissolved Fixed Solids	mg/L				
pH	Standard units	7.80 to 9.00	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	264 to 902	5	SM 2510 B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3	73 to 170	5	SM 2320 B	5 mg/L as CaCO3
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L	0.0 to 3.7	5	SM 4500-NO3 E	100 ug/L
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	5.4 to 43.0	5	EPA 200.7	0.2 mg/L
Chloride	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	18.7 to 23.2	5	SM 4500-Cl C	50 ug/L
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	2.7 to 16.6	5	EPA 200.8	50 ug/L
Potassium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	1.8 to 3.3	5	EPA 200.7	50 ug/L
Sodium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	28.8 to 45.7	5	EPA 200.7	50 ug/L
Sulfate	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	8.7 to 25.9	5	4500-SO4 C	2000 ug/L
Bicarbonate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	530 to 5600	5	EPA 200.7	50 ug/L
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	57 to 178	5	EPA 200.7	0.5 ug/L
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1166.30 to 1174.20	5	N/A	N/A

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # BEC 162

Well ID # MW-13

Latitude: 47.1381608

Longitude: -119.211172

Well Elevation (to the nearest 0.01 feet) 1204.12 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L	1.0 to 1.2	5	SM 5310 B	1.0 mg/L
Total dissolved solids	mg/L	728 to 1282	5	SM 2540 C	20.0 mg/L
Dissolved Fixed Solids	mg/L				
pH	Standard units	7.90 to 8.30	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	1324 to 1437	5	SM 2510 B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3	170 to 182	5	SM 2320 B	5 mg/L as CaCO3
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L	6.0 to 6.6	5	SM 4500-NO3 E	100 ug/L
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	105 to 119.0	5	EPA 200.7	0.2 mg/L
Chloride	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	250.6 to 299.5	5	SM 4500-Cl C	50 ug/L
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	66 to 73.5	5	EPA 200.8	50 ug/L
Potassium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	3.9 to 4.1	5	EPA 200.7	50 ug/L
Sodium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	33.1 to 38.3	5	EPA 200.7	50 ug/L
Sulfate	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	44.8 to 46.7	5	4500-SO4 C	2000 ug/L
Bicarbonate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	10 to 1300	5	EPA 200.7	50 ug/L
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	1 to 27	5	EPA 200.7	0.5 ug/L
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1164.30 to 1167.00	5	N/A	N/A

SECTION F. GROUNDWATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Well logs are included in Attachments G3 and G5. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # BEC 161

Well ID # MW-14

Latitude: 47.1452209

Longitude: -119.2067898

Well Elevation (to the nearest 0.01 feet) 1221.6 Check the appropriate box: The elevation measurement is relative to: the NAVD88 standard mean sea level

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L	1.3 to 1.6	5	SM 5310 B	1.0 mg/L
Total dissolved solids	mg/L	138 to 250	5	SM 2540 C	20.0 mg/L
Dissolved Fixed Solids	mg/L				
pH	Standard units	8.20 to 8.60	5	SM 4500-H+ B	N/A
Conductivity	(micromhos/cm)	420 to 494	5	SM 2510 B	1.0 µmhos/cm
Alkalinity	mg/L as CaCO3	188 to 212	5	SM 2320 B	5 mg/L as CaCO3
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrate-N, nitrate	mg/L	1.5 to 1.8	5	SM 4500-NO3 E	100 ug/L
Total kjeldahl N	mg/L				
Ortho-phosphate-P	mg/L				
Total-phosphate-P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Calcium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	33 to 39.0	5	EPA 200.7	0.2 mg/L
Chloride	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	3.1 to 6.4	5	SM 4500-Cl C	50 ug/L
Fluoride	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Magnesium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	23.4 to 27.3	5	EPA 200.8	50 ug/L
Potassium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	2.0 to 2.2	5	EPA 200.7	50 ug/L
Sodium	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	19.6 to 22.9	5	EPA 200.7	50 ug/L
Sulfate	<input checked="" type="checkbox"/> mg/L <input type="checkbox"/> µg/l	18.6 to 17.6	5	4500-SO4 C	2000 ug/L
Bicarbonate	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Barium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Cadmium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Chromium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Copper	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Iron	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	10 to 128	5	EPA 200.7	50 ug/L
Lead	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Manganese	<input type="checkbox"/> mg/L <input checked="" type="checkbox"/> µg/l	1 to 5	5	EPA 200.7	0.5 ug/L
Mercury	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Selenium	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Silver	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Zinc	<input type="checkbox"/> mg/L <input type="checkbox"/> µg/l				
Depth to Water level (to the nearest 0.01 feet)		1171.60 to 1175.80	5	N/A	N/A

SECTION G. SITE ASSESSMENT

The local library and local city or county planning offices may be helpful in providing the information required in this section. You may consult the Department of Ecology Water Resources Program to help identify wells within one mile of your site.

1. Land Application Sites: Provide the information below for each land application site. Provide the latitude/longitude (approximate center of the site; NAD83/WGS84 reference datum.) Attach a copy of the contract(s) authorizing use of any private land(s) used for each treatment site. Add table rows as necessary.

Legal Description (section/township/range) NW 1/4 of Section 17 T19N, R29E			
47° 08' 30" N	119° 12' 34" W	125 acres	REC Silicon
Latitude	Longitude	Acreage	Owner
Legal Description (section/township/range)			
Latitude	Longitude	Acreage	Owner
Legal Description (section/township/range)			
Latitude	Longitude	Acreage	Owner
Legal Description (section/township/range)			
Latitude	Longitude	Acreage	Owner

2. If this is a new discharge, list all environmental control permits or approvals needed for this project; for example, SEPA review, engineering reports, hydrogeologic reports, , , or air emissions permits.

3. Attach an original United States Geological Survey (USGS) 7.5 minute topographic map and aerial photograph(s) from an internet mapping site that shows the processing facility and sprayfield site(s). **USGS topographical maps are available from the Department of Natural Resources (360 902-1234), Metsker Maps (206 588-5222), some local bookstores, and internet sites.** Show the following on this map:
 - a. Location and name of internal and adjacent streets.
 - b. Surface water drainage systems within ¼ mile of the site.
 - c. All wells within 1 mile of the site.
 - d. Wastewater discharge points.
 - e. Land uses and zoning adjacent to the wastewater application site.
 - f. Groundwater gradient.
4. Describe the soils on the site using information from local soil survey reports. **Soils information is available from your local County Conservation District or from information contained in the sites hydrogeologic report.** *(Submit on separate sheet and label as attachment G.4.)*
5. Describe the local geology and hydrogeology within one mile of the site. Include any groundwater quality data. **The local library or local Soil Conservation Service may have this information.** *(Submit on separate sheet and label as attachment G.5.)*
6. List the names and addresses of contractors or consultants who provided information and cite sources of information by title and author.

Application prepared with assistance from:

Bernard Kronschnabel - Cascade Earth Sciences

12720 E Nora Ave, Ste A, Spokane, WA 99216

(509) 921-0290

SECTION H. STORMWATER

1. Do you have coverage under the Washington State Industrial Stormwater NPDES General permit? YES NO
If yes, please list the permit number here. _____
- If no, have you applied for coverage under the Washington State Industrial Stormwater NPDES general permit? YES NO

Note: If you answered "no" to both questions above, complete the following questions 2 through 8.

2. Describe the size of the stormwater collection area.
- a. Unpaved area 3,100,000 sq.ft.
 - b. Paved area 6,000,000 sq.ft.
 - c. Other collection areas (roofs) 75,000 sq.ft.
3. Does your facility's stormwater discharge to: *(Check all that apply)*
- Storm sewer system; name of storm sewer system *(operator)*:
 - Sanitary sewer
 - Directly to surface waters of Washington State *(e.g., river, lake, creek, estuary, ocean)*.
Specify waterbody name _____
 - Indirectly to surface waters of Washington State *(i.e., flows over adjacent properties first)*.
 - Directly to ground waters of Washington State via:
 - Dry well
 - Drainfield
 - Other
4. Areas with industrial activities at facility: *(check all that apply)*
- Manufacturing building
 - Material handling
 - Material storage
 - Hazardous waste treatment, storage, or disposal *(refers to RCRA, Subtitle C facilities only)*
 - Waste treatment, storage, or disposal
 - Application or disposal of wastewaters
 - Storage and maintenance of material handling equipment
 - Vehicle maintenance
 - Areas where significant materials remain

Access roads and rail lines for shipping and receiving

Other _____

5. Material handling/management practices

a. Types of materials handled and/or stored outdoors: *(check all that apply)*

Solvents

Hazardous wastes

Scrap metal

Acids or alkalies

Petroleum or petrochemical products

Paints/coatings

Plating products

Woodtreating products

Pesticides

Other *(please list)*: _____

b. Identify existing management practices employed to reduce pollutants in industrial storm water discharges: *(check all that apply)*

Oil/water separator

Detention facilities

Containment

Infiltration basins

Spill prevention

Operational BMPs

Surface leachate collection

Vegetation management

Overhead coverage

Other *(please list)*: _____

6. Attach a map showing stormwater drainage/collection areas, disposal areas and discharge points. This may be a hand drawn map if no other site map is available. Label this as attachment H.8.

SECTION I. OTHER INFORMATION

1. Describe liquid or solid wastes generated that are not disposed of in the waste stream(s) and describe the method of disposal. For each type of waste, provide type of waste, name, address, and phone number of hauler.

Calcium carbonate, calcium hydroxide, silicon powder, and grit are the major components from four wastewater treatment systems. All four wastewater treatment systems utilize neutralization, precipitation, and solids dewatering prior to disposal. Additionally, neutralized dryer solids (primarily consisting of silicon and sodium sesquicarbonate) are transferred for disposal. All solids are transported to the Grant County Landfill via Consolidated Disposal Service 2370 Basin St SW, Ephrata, WA 98823 (509-754-2468).

2. Describe any storage areas used for raw materials, products, and wastes.

Materials stored outside are typically in curbed, concrete containment areas consisting of at least 110% of the largest vessel volume. Containment areas are inspected monthly for integrity and precipitation capacity. Sampling and analysis of contents is conducted prior to removal of containment area liquids to determine correct treatment/disposal option. This facility has an up-to-date SPCC Plan on site that details storage locations and quantities of material regulated by 40CFR112.

Summary of attachments that may be required for this application:

(Please check those attachments that are included)

- C.2. Production schematic flow diagram and water balance
- C.4. Wastewater treatment improvements
- C.7. Additional incidental materials
- E.4. Additional results of effluent testing (CD-ROM)
- G.1. Copies of land use contracts
- G.3. USGS topographical map (CD-ROM)
- G.4. Soils description
- G.5. Local geology and hydrology (CD-ROM)
- H.8. Stormwater drainage map

If you need this document in a format for the visually impaired, call the Water Quality 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.

Attachment 1. Material Imports

Material	Annual Consumption	Units
Lime	5,017,553	pounds
Trona	2,628,000	pounds
Magnesium Oxide	66,300	pounds
Sodium Hydroxide (25%)	1,326,965	gallons
Sulfuric Acid (98%)	5,466	gallons
Flocculant	1,367	gallons
Coagulant	28,242	gallons
Hydrochloric Acid (38%)	34,164	gallons
Antiscalants	1,367	gallons
Boiler Chemicals	683	gallons
Oxygen Scavenger (Boiler)	683	gallons
Surfactant	142,122	gallons
Antifoam	570,539	gallons
Silicon Tetrachloride	3,440,800	pounds
Metallurgical Grade Silicon	44,300,021	pounds
Cuprous Chloride	106,088	pounds
Carbon Dioxide	215,671	pounds

Attachment 2 - Discharge Monitoring per Permit ST 8121

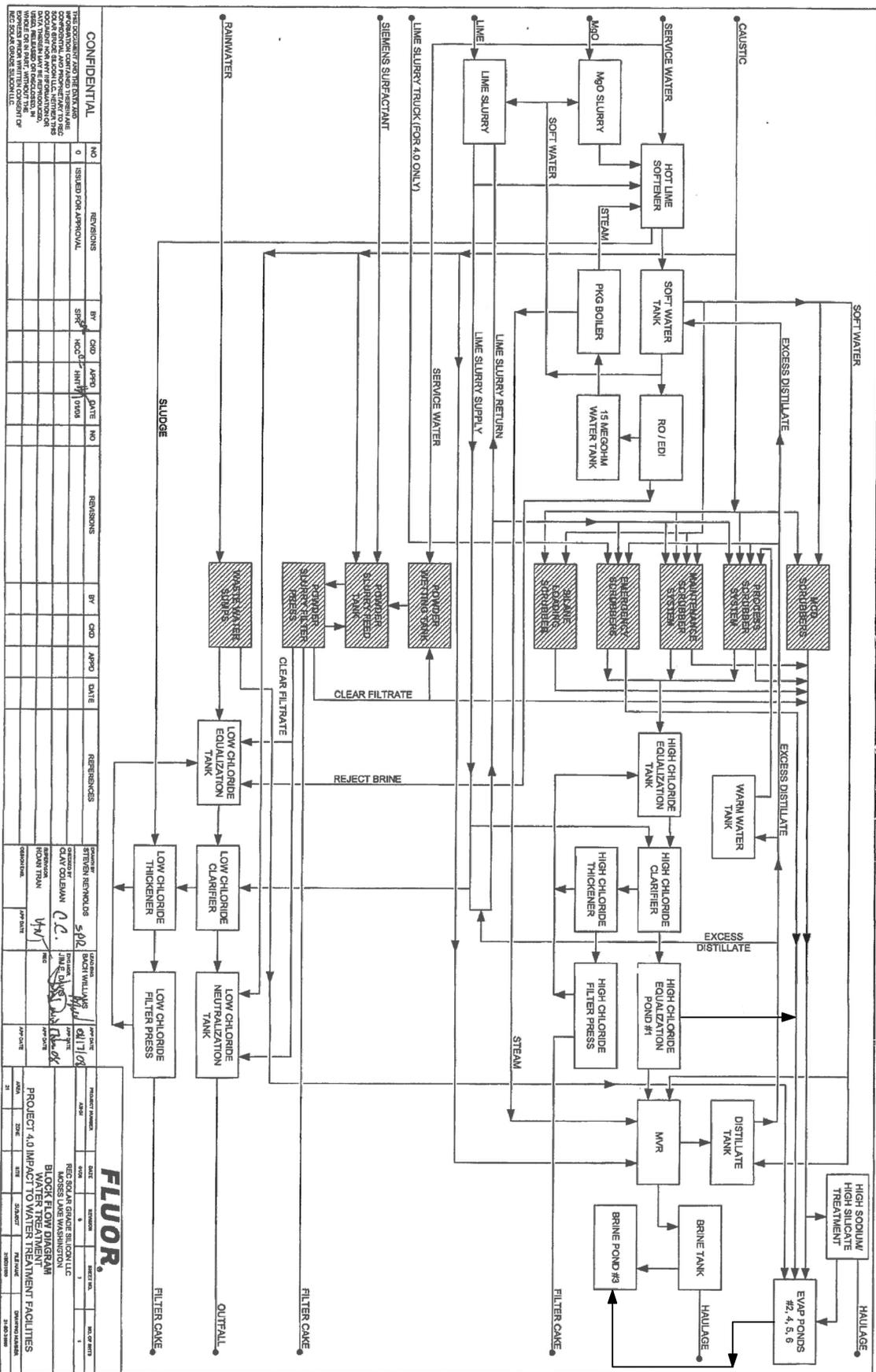
Parameter	Units	Sampling Frequency	Sample Type
TDS	mg/L	2/month	grab
pH	standard units	2/month	grab
Sodium	mg/L	2/month	grab
Chloride	mg/L	2/month	grab
Fluoride	mg/L	2/month	grab
Magnesium	mg/L	2/month	grab
Potassium	mg/L	2/month	grab
Manganese	mg/L	2/month	grab
Calcium	mg/L	2/month	grab
Alkalinity	mg/L	2/month	grab
NO ₃ -N	mg/L	2/month	grab
NH ₃ -N	mg/L	2/month	grab
Total P	mg/L	2/month	grab

Notes:

Abbreviations: TDS = total dissolved solids, mg/L = milligrams per liter,

NO₃-N = nitrate as nitrogen, NH₃-N = ammonia as nitrogen, P = phosphorus.

Attachment C.2 Process Flow Diagram



CONFIDENTIAL		NO		REVISIONS		BY		DATE		NO		REVISIONS		BY		DATE		REFERENCES		DATE		APPROVED	
		0		ISSUED FOR APPROVAL		SPR		01/08															
<p>THIS DOCUMENT CONTAINS TRADE SECRETS AND PROPRIETARY INFORMATION OF FLUOR CORP. IT IS THE PROPERTY OF FLUOR CORP. AND IS TO BE USED ONLY FOR THE PROJECT AND NOT BE DISCLOSED TO ANY OTHER PARTY WITHOUT THE WRITTEN CONSENT OF FLUOR CORP.</p>																							
<p>PROJECT 4.0 IMPACT TO WATER TREATMENT FACILITIES</p>																							

FLUOR



Permit Number: ST0008121

Permittee: REC Solar Grade Silicon

Facility County: Grant

Receiving Waterbody:

Monitoring Period: 08/01/2013 - 08/31/2013

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE
POTW, DUNES TREATMENT PLANT

Version: 1

Week	Monitoring Point	Flow Gallons/Day (gpd) Continuous Metered/Recorded	pH Daily Min Standard Units Continuous Metered/Recorded	pH Daily Max Standard Units Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhm/cm Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhm/cm Continuous Metered/Recorded	Temperature Measured Degrees F Continuous Metered/Recorded	Total BOD5 Total Milligrams/L (mg/L) Weekly Composite Sample (24 HR Time Proportional comp)	Oil & Grease Total recoverable, FOG,HEM Milligrams/L (mg/L) Weekly Grab	Total Suspended Solids (TSS) Total suspended (TSS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Lbs/Day 5/Week Composite Sample (24 HR Time Proportional comp)
		001	001	001	001	001	001	001	001	001	001	001
1-Th	8/1/13	48365	7.2	8.1	1514.0	2215.0	88.0			12.5	1436.0	579.2
1-F	8/2/13	65759	6.7	8.9	1391.0	2209.0	83.0			42.5	902.0	494.7
1-Sa	8/3/13	58671	6.9	7.9	1680.0	2023.0	80.0					
2-Su	8/4/13	140	7.7	8.1	1715.0	2075.0	80.0					
2-M	8/5/13	27052	7.7	8.8	259.0	2056.0	82.0			2.3	240.0	54.1
2-T	8/6/13	10206	7.5	8.7	314.0	1241.0	82.0			29.9	692.0	58.9
2-W	8/7/13	76377	6.9	7.6	1201.0	1396.0	86.0	22.5	1.4	32.1	580.0	369.5
2-Th	8/8/13	27398	6.3	7.8	161.0	1317.0	86.0			31.9	760.0	173.7
2-F	8/9/13	37345	6.9	8.7	163.0	1452.0	84.0			26.4	642.0	200.0
2-Sa	8/10/13	28038	6.1	6.9	1166.0	2947.0	90.0					
3-Su	8/11/13	299	6.3	6.9	2655.0	2863.0	88.0					
3-M	8/12/13	30381	6.1	8.4	1463.0	2655.0	88.0			7.2	210.0	53.3
3-T	8/13/13	35854	7.5	8.7	1638.0	2080.0	90.0			27.0	434.0	129.8
3-W	8/14/13	71014	6.9	8.1	1653.0	1810.0	85.0	5.0	1.4	12.9	326.0	193.0
3-Th	8/15/13	30197	7.2	8.7	1478.0	1813.0	84.0			30.5	662.0	166.7
3-F	8/16/13	25931	7.3	8.1	1552.0	1686.0	86.0			74.5	1118.0	241.8
3-Sa	8/17/13	25958	8.1	8.9	1561.0	1788.0	88.0					
4-Su	8/18/13	24441	8.3	8.6	1396.0	1663.0	86.0					
4-M	8/19/13	52112	8.1	8.6	1393.0	1658.0	84.0			47.8	742.0	322.4
4-T	8/20/13	64099	8.0	8.2	1346.0	1420.0	86.0			36.7	794.0	424.4
4-W	8/21/13	28723	7.6	8.1	1241.0	1419.0	82.0	11.0	1.4	5.7	450.0	107.8
4-Th	8/22/13	12985	8.0	8.3	1402.0	1547.0	84.0			1.4	294.0	31.8
4-F	8/23/13	26217	7.4	8.2	1188.0	1523.0	88.0			96.4	734.0	160.5
4-Sa	8/24/13	25882	7.5	8.0	1275.0	1384.0	82.0					
5-Su	8/25/13	32633	7.9	8.0	1289.0	1387.0	85.0					
5-M	8/26/13	50069	7.7	8.2	1258.0	1463.0	84.0			29.7	864.0	360.8
5-T	8/27/13	53555	7.1	7.7	1261.0	1389.0	84.0			18.1	910.0	406.4
5-W	8/28/13	34438	7.0	8.1	1155.0	1666.0	84.0	25.2	1.4	52.8	850.0	244.1
5-Th	8/29/13	2006	7.0	8.0	1580.0	1762.0	85.0			41.2	984.0	16.4
5-F	8/30/13	28997	7.0	8.1	1449.0	1787.0	85.0			21.5	1218.0	294.6
5-Sa	8/31/13	258	7.5	8.2	1650.0	1787.0	80.0					
Minimum			6.1		161							
			>= 6.0		Report Only							
Average		33400					84.8065	15.925	1.4	30.9545	720.091	231.086
		<= 210000					Report Only	Report Only	Report Only	<= 350	Report Only	<= 3240
Maximum		76377		8.9	2655	2947	90	25.2	1.4	96.4	1436	579.2
		<= 300000		<= 11.0	Report Only	Report Only	Report Only	<= 300	<= 100	Report Only	Report Only	<= 4560



Week	Monitoring Point	Magnesium	Manganese	Ammonia	Phosphorus	Potassium	Total Dissolved Solids (TDS)	Flow Gallons/Day (gpd) Continuous Metered/Recorded	pH	Total Dissolved Solids (TDS)	Sodium	Chloride
		Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)			Total Milligrams/L (mg/L) 2/Month Grab	Standard Units 2/Month Grab	Total Milligrams/L (mg/L) 2/Month Grab
1-Th	8/1/13							C				
1-F	8/2/13							C				
1-Sa	8/3/13							C				
2-Su	8/4/13							C				
2-M	8/5/13							C				
2-T	8/6/13							C				
2-W	8/7/13	3.4	41.6	8.7	0.1	9.6	252.0	C	9.2	354.0	119.6	33.2
2-Th	8/8/13							C				
2-F	8/9/13							C				
2-Sa	8/10/13							C				
3-Su	8/11/13							C				
3-M	8/12/13							C				
3-T	8/13/13							C				
3-W	8/14/13							C				
3-Th	8/15/13							531982				
3-F	8/16/13							781779				
3-Sa	8/17/13							757478				
4-Su	8/18/13							762608				
4-M	8/19/13							750454				
4-T	8/20/13							777196				
4-W	8/21/13						322.0	765828	9.6	462.0	122.5	31.1
4-Th	8/22/13							770414				
4-F	8/23/13							763503				
4-Sa	8/24/13							748361				
5-Su	8/25/13							574895				
5-M	8/26/13							C				
5-T	8/27/13							C				
5-W	8/28/13							C				
5-Th	8/29/13							C				
5-F	8/30/13							C				
5-Sa	8/31/13							C				
Minimum									9.2			
									Report Only			
Average							287	725863		408	121.05	32.15
							Report Only	Report Only		Report Only	Report Only	Report Only
Maximum		3.4	41.6	8.7	0.1	9.6	322	781779	9.6	462	122.5	33.2
		Report Only	<= 2500	Report Only	Report Only	Report Only	Report Only	Report Only				



Reporting Codes Used: C - No Discharge

Overall DMR Notes/Comment

Total flow for process 001 = 1,035,400gallons.
Sanitary flow meter down from Aug, 13th - 20th. Flow was calculated by multiplying 45 gpm (Pump is rated for 40-45gpm) times number of minutes discharged.
Max flow for sanitary - 47gpm
003 Outfall August 7th total copper = 34.4 ug/L
003 Outfall August 21st total copper = 100.0 ug/L

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE POTW, DUNES TREATMENT PLANT

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
HSHS	All Parameters		C	
HCEP	All Parameters		C	

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Paul Stenhouse

9/12/2013 9:44:13 AM

Signature

Date



Permit Number: ST0008121

Permittee: REC Solar Grade Silicon

Facility County: Grant

Receiving Waterbody:

Monitoring Period: 09/01/2013 - 09/30/2013

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE
POTW, DUNES TREATMENT PLANT

Version: 1

Week	Monitoring Point	Flow Gallons/Day (gpd) Continuous Metered/Recorded	pH Daily Min Standard Units Continuous Metered/Recorded	pH Daily Max Standard Units Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhm/cm Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhm/cm Continuous Metered/Recorded	Temperature Measured Degrees F Continuous Metered/Recorded	Total BOD5 Total Milligrams/L (mg/L) Weekly Composite Sample (24 HR Time Proportional comp)	Oil & Grease Total recoverable, FOG,HEM Milligrams/L (mg/L) Weekly Grab	Total Suspended Solids (TSS) Total suspended (TSS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Lbs/Day 5/Week Composite Sample (24 HR Time Proportional comp)
		001	001	001	001	001	001	001	001	001	001	001
1-Su	9/1/13	32806	6.8	9.8	1732.0	2376.0	82.0					
1-M	9/2/13	54633	7.0	7.4	1877.0	2337.0	86.0			68.3	1872.0	853.0
1-T	9/3/13	38124	6.9	8.1	1681.0	1877.0	88.0			39.1	1410.0	448.3
1-W	9/4/13	25899	7.1	8.0	1542.0	1710.0	87.0	60.0	1.4	28.6	1318.0	284.7
1-Th	9/5/13	35668	7.2	7.6	1738.0	1838.0	88.0			115.4	1306.0	388.5
1-F	9/6/13	46880	6.4	9.6	193.0	3095.0	84.0			52.3	2604.0	1018.1
1-Sa	9/7/13	61969	6.3	8.0	1904.0	3121.0	86.0					
2-Su	9/8/13	57549	7.0	7.5	1753.0	2141.0	87.0					
2-M	9/9/13	19291	7.4	7.6	1792.0	1942.0	85.0			23.0	1552.0	249.7
2-T	9/10/13	24203	7.3	7.7	1336.0	1932.0	80.0			14.9	910.0	183.7
2-W	9/11/13	22728	7.3	7.7	1241.0	1442.0	83.0	18.6	3.2	4.4	502.0	95.2
2-Th	9/12/13	10753	7.3	8.3	1318.0	1603.0	88.0			26.5	452.0	40.5
2-F	9/13/13	54391	7.6	8.3	1526.0	1701.0	88.0			24.6	930.0	421.9
2-Sa	9/14/13	62928	7.4	8.3	1503.0	1709.0	86.0					
3-Su	9/15/13	23902	7.5	8.0	1450.0	1685.0	83.0					
3-M	9/16/13	3102	7.8	8.1	1452.0	1682.0	88.0			77.3	182.0	4.7
3-T	9/17/13	35712	7.8	8.3	1467.0	1623.0	80.0			212.7	614.0	182.8
3-W	9/18/13	17432	7.3	8.6	1103.0	1596.0	74.0	33.0	2.7	25.2	866.0	125.9
3-Th	9/19/13	2588	7.5	8.5	997.0	1597.0	78.0			0.3	224.0	4.8
3-F	9/20/13	58154	6.8	7.9	1180.0	1833.0	78.0			105.8	1116.0	541.3
3-Sa	9/21/13	63578	6.6	7.3	1600.0	1825.0	81.0					
4-Su	9/22/13	29316	6.8	7.4	1461.0	1642.0	75.0					
4-M	9/23/13	245	6.8	7.5	1442.0	1564.0	80.0			15.8	1092.0	2.2
4-T	9/24/13	53264	7.1	7.4	1256.0	1522.0	84.0			8.6	616.0	273.6
4-W	9/25/13	11699	7.2	7.7	1366.0	1490.0	80.0	8.0	1.8	99.7	476.0	46.4
4-Th	9/26/13	42017	6.9	7.7	1335.0	1489.0	67.0			25.5	924.0	323.8
4-F	9/27/13	72464	6.3	7.6	1105.0	1414.0	76.0			21.2	876.0	529.4
4-Sa	9/28/13	222	6.8	8.2	122.0	1104.0	74.0					
5-Su	9/29/13	27276	7.0	8.2	124.0	1308.0	78.0			1.3	274.0	62.3
5-M	9/30/13	237	7.1	7.7	1308.0	1370.0	78.0					
Minimum			6.3		122							
			>= 6.0		Report Only							
Average		32967.7					81.7333	29.9	2.275	47.1667	957.905	289.562
		<= 210000					Report Only	Report Only	Report Only	<= 350	Report Only	<= 3240
Maximum		72464		9.8		3121	88	60	3.2	212.7	2604	1018.1
		<= 300000		<= 11.0		Report Only	Report Only	<= 300	<= 100	Report Only	Report Only	<= 4560



Week	Monitoring Point	Sodium		Chloride		Fluoride		Sulfate		Nitrate		Alkalinity		Calcium	
		Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Weekly Composite Sample (24 HR Time Proportional comp)	Total Weekly Composite Sample (24 HR Time Proportional comp)	Total Monthly Composite Sample (24 HR Time Proportional comp)	Total Monthly Composite Sample (24 HR Time Proportional comp)	Total Monthly Composite Sample (24 HR Time Proportional comp)
		001	001	001	001	001	001	001	001	001	001	001	001	001	001
1-Su	9/1/13														
1-M	9/2/13	143.6	65.4	47.6	21.7	8.1	3.6	211.9	96.5						
1-T	9/3/13	126.7	40.3	46.5	14.8	7.2	2.3	282.5	89.8						
1-W	9/4/13	125.7	27.1	44.8	9.7	6.2	1.3	305.6	66.0	89.8	23.0	184.0			
1-Th	9/5/13	120.0	35.7	44.2	13.2	7.3	2.2	285.4	84.9						
1-F	9/6/13	183.5	71.7	42.0	16.4	7.1	2.8	722.1	282.3						
1-Sa	9/7/13														
2-Su	9/8/13														
2-M	9/9/13	173.8	27.9	42.8	6.9	7.0	1.1	373.8	60.2						
2-T	9/10/13	121.9	24.6	42.6	8.6	5.3	1.1	284.3	57.4						
2-W	9/11/13	92.8	17.6	28.4	5.4	3.6	0.7	116.8	22.2	21.0					
2-Th	9/12/13	82.9	7.5	22.4	2.0	3.1	0.3	84.1	7.5						
2-F	9/13/13	125.1	56.8	50.1	22.8	9.3	4.3	226.2	102.6						
2-Sa	9/14/13														
3-Su	9/15/13														
3-M	9/16/13	77.6	2.0	19.7	0.5	3.0	0.1	43.2	1.1						
3-T	9/17/13	104.2	31.1	31.8	9.4	5.5	1.6	144.1	43.0						
3-W	9/18/13	118.1	17.2	38.5	5.6	7.6	1.1	275.6	40.0	43.1					
3-Th	9/19/13	69.1	1.5	17.0	0.4	2.3	0.0	22.9	0.5						
3-F	9/20/13	111.2	54.0	41.7	20.3	8.3	4.0	248.0	120.3						
3-Sa	9/21/13														
4-Su	9/22/13														
4-M	9/23/13	106.1	0.2	41.5	0.1	7.4	0.0	290.0	0.6						
4-T	9/24/13	90.0	39.9	32.1	14.3	4.6	2.0	148.5	66.0						
4-W	9/25/13	80.9	7.9	27.3	2.7	4.1	0.4	112.3	10.9	16.0					
4-Th	9/26/13	115.7	40.6	49.9	17.5	5.6	1.9	197.3	69.2						
4-F	9/27/13	99.8	60.4	38.9	23.5	5.7	3.5	284.3	171.8						
4-Sa	9/28/13														
5-Su	9/29/13	69.2	15.8	18.9	4.3	2.8	0.6	44.5	10.2						
5-M	9/30/13														
Minimum															
Average		111.329	30.7238	36.6048	10.481	5.76667	1.6619	223.971	66.8095	42.475					
		Report Only	<= 558	Report Only	<= 63	Report Only	<= 28	Report Only	Report Only	Report Only					
Maximum		183.5	71.7	50.1	23.5	9.3	4.3	722.1	282.3	89.8	23	184			
		Report Only	<= 796	Report Only	<= 90	Report Only	<= 46	Report Only	Report Only	Report Only	Report Only	Report Only			



Week	Monitoring Point	Magnesium Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Manganese Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Ammonia Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Phosphorus Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Potassium Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 2/Month Grab		Flow Gallons/Day (gpd) Continuous Metered/Recorded		pH Standard Units 2/Month Grab		Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 2/Month Grab		Sodium Total Milligrams/L (mg/L) 2/Month Grab		Chloride Total Milligrams/L (mg/L) 2/Month Grab	
		001	001	001	001	001	001	001	001	002	003	003	003	003	003	003	003						
1-Su	9/1/13													C									
1-M	9/2/13													C									
1-T	9/3/13													C									
1-W	9/4/13	7.6	78.0	1.5	0.1	9.5	338.0						C	9.7	398.0	128.7	30.0						
1-Th	9/5/13													C									
1-F	9/6/13													C									
1-Sa	9/7/13													C									
2-Su	9/8/13													C									
2-M	9/9/13													C									
2-T	9/10/13													C									
2-W	9/11/13													C									
2-Th	9/12/13													C									
2-F	9/13/13													C									
2-Sa	9/14/13													C									
3-Su	9/15/13													C									
3-M	9/16/13													C									
3-T	9/17/13													C									
3-W	9/18/13						340.0						C	9.1	460.0	116.7	31.2						
3-Th	9/19/13													C									
3-F	9/20/13													C									
3-Sa	9/21/13													C									
4-Su	9/22/13													C									
4-M	9/23/13													C									
4-T	9/24/13													C									
4-W	9/25/13													C									
4-Th	9/26/13													C									
4-F	9/27/13													C									
4-Sa	9/28/13													C									
5-Su	9/29/13													C									
5-M	9/30/13													C									
Minimum														9.1									
														Report Only									
Average														339	C		429	122.7	30.6				
														Report Only	Report Only		Report Only	Report Only	Report Only				
Maximum		7.6	78	1.5	0.1	9.5	340							C	9.7	460	128.7	31.2					
		Report Only	Report Only	Report Only	Report Only	Report Only	<= 2500							Report Only	Report Only	Report Only	Report Only	Report Only	Report Only				



Reporting Codes Used: C - No Discharge

Overall DMR Notes/Comment

Wastewater DMR Summary – September 2013

General Notes

- pH & conductivity readings exclude extreme, off-scale data spikes caused from IE calibrations, flow cutoffs, keyed mikes, flow startups, etc

Process Effluent

- Total flow for September is 989,030 gallons.
 No Sample on Sept. 30th (no flow) so Sunday's sample (9-29-13) was used.
- No exceedences.

Sanitary Sewer

- No exceedences.
- Maximum flow 55 gpm

Monitor Wells

- No comments.

Outfall 004

- No Comments.

003 Outfall - Irrigation Outfall and Firewater Pond

- 003 Outfall September 4th total copper = 42.6 ug/L
- 003 Outfall September 18th total copper = 33.2 ug/L.

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE POTW, DUNES TREATMENT PLANT

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
HSHS	All Parameters		C	No discharge for the month.
HCEP	All Parameters		C	No water applied for dust control.

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Paul Stenhouse

Signature

10/14/2013 2:52:03 PM

Date



Permit Number: ST0008121

Permittee: REC Solar Grade Silicon

Facility County: Grant

Receiving Waterbody:

Monitoring Period: 10/01/2013 - 10/31/2013

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE
POTW, DUNES TREATMENT PLANT

Version: 1

Week	Monitoring Point	Flow Gallons/Day (gpd) Continuous Metered/Recorded	pH Daily Min Standard Units Continuous Metered/Recorded	pH Daily Max Standard Units Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhm/cm Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhm/cm Continuous Metered/Recorded	Temperature Measured Degrees F Continuous Metered/Recorded	Total BOD5 Total Milligrams/L (mg/L) Weekly Composite Sample (24 HR Time Proportional comp)	Oil & Grease Total recoverable, FOG,HEM Milligrams/L (mg/L) Weekly Grab	Total Suspended Solids (TSS) Total suspended (TSS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Lbs/Day 5/Week Composite Sample (24 HR Time Proportional comp)
		001	001	001	001	001	001	001	001	001	001	001
1-T	10/1/13	29672	6.9	7.8	1203.0	1338.0	78.0			19.4	718.0	177.7
1-W	10/2/13	26049	7.2	7.8	1382.0	1650.0	76.0	34.8	1.4	20.4	678.0	147.3
1-Th	10/3/13	36423	6.8	7.7	1334.0	1538.0	64.0			22.1	646.0	196.3
1-F	10/4/13	56824	6.6	7.1	1304.0	1511.0	76.0			17.6	402.0	190.5
1-Sa	10/5/13	56032	7.1	8.3	1511.0	1650.0	76.0					
2-Su	10/6/13	53468	7.2	8.1	1422.0	1568.0	74.0					
2-M	10/7/13	47358	7.4	8.4	1383.0	1621.0	76.0			12.2	544.0	214.8
2-T	10/8/13	69053	7.5	8.0	1073.0	1493.0	74.0			16.9	484.0	278.7
2-W	10/9/13	50690	7.1	7.8	991.0	1252.0	74.0	26.1	1.7	15.8	446.0	188.5
2-Th	10/10/13	14384	7.8	8.4	1252.0	1517.0	72.0			3.8	312.0	37.4
2-F	10/11/13	62614	6.9	8.5	1120.0	1524.0	72.0			45.7	520.0	271.5
2-Sa	10/12/13	52899	6.6	7.0	1183.0	1428.0	73.0					
3-Su	10/13/13	28889	6.7	7.5	1369.0	1447.0	70.0					
3-M	10/14/13	26142	6.8	7.7	1314.0	1513.0	69.0			35.0	662.0	144.3
3-T	10/15/13	5395	7.0	7.5	1396.0	1525.0	72.0			56.0	462.0	20.8
3-W	10/16/13	21670	7.1	7.5	1424.0	1491.0	70.0	13.2	2.6	3.0	426.0	77.0
3-Th	10/17/13	24554	6.8	7.5	1420.0	1593.0	72.0			6.0	356.0	72.9
3-F	10/18/13	49342	6.4	8.7	583.0	1882.0	72.0			30.0	880.0	362.1
3-Sa	10/19/13	49052	6.6	9.1	868.0	3644.0	72.0					
4-Su	10/20/13	23729	8.2	9.0	3333.0	3608.0	73.0					
4-M	10/21/13	8985	8.0	8.7	2941.0	3435.0	65.0			223.0	1330.0	99.7
4-T	10/22/13	24037	7.7	8.2	2808.0	3087.0	68.0			914.4	852.0	170.8
4-W	10/23/13	22591	7.4	8.4	2019.0	2787.0	72.0	62.0	3.3	94.8	1088.0	204.9
4-Th	10/24/13	69644	7.2	8.1	1802.0	2540.0	72.0			57.5	880.0	511.1
4-F	10/25/13	26533	7.0	8.4	1681.0	1831.0	70.0			32.9	620.0	137.2
4-Sa	10/26/13	43362	6.8	8.0	1682.0	1859.0	72.0					
5-Su	10/27/13	419	6.9	7.1	448.0	1725.0	70.0					
5-M	10/28/13	25010	6.9	8.4	792.0	2079.0	72.0			32.3	886.0	184.9
5-T	10/29/13	221	6.3	8.3	859.0	3326.0	69.0			189.8	896.0	1.7
5-W	10/30/13	21344	7.0	8.2	968.0	2074.0	60.0	7.1	1.4	17.4	370.0	65.9
5-Th	10/31/13	22047	7.6	8.9	842.0	2041.0	65.0					
Minimum			6.3		448							
			>= 6.0		Report Only							
Average		33820.4					71.2903	28.64	2.08	84.8182	657.182	170.727
		<= 210000					Report Only	Report Only	Report Only	<= 350	Report Only	<= 3240
Maximum		69644		9.1		3644	78	62	3.3	914.4	1330	511.1
		<= 300000		<= 11.0		Report Only	Report Only	<= 300	<= 100	Report Only	Report Only	<= 4560



Week	Monitoring Point	Sodium		Chloride		Fluoride		Sulfate		Nitrate		Alkalinity		Calcium	
		Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Weekly Composite Sample (24 HR Time Proportional comp)	Total Weekly Composite Sample (24 HR Time Proportional comp)	Total Monthly Composite Sample (24 HR Time Proportional comp)	Total Monthly Composite Sample (24 HR Time Proportional comp)	
		001	001	001	001	001	001	001	001	001	001	001	001		
1-T	10/1/13	99.2	24.5	40.6	10.1	6.2	1.5	243.4	60.2						
1-W	10/2/13	95.9	20.8	41.2	9.0	7.3	1.6	224.6	48.8	26.5	55.8	86.0			
1-Th	10/3/13	102.7	31.2	38.9	11.8	8.1	2.5	210.8	64.0						
1-F	10/4/13	104.0	49.3	38.1	18.1	8.3	4.0	202.0	95.8						
1-Sa	10/5/13														
2-Su	10/6/13														
2-M	10/7/13	105.9	41.8	44.3	17.5	5.8	2.3	237.6	93.8						
2-T	10/8/13	97.7	56.3	38.8	22.4	5.1	3.0	182.8	105.3						
2-W	10/9/13	79.9	33.8	37.0	15.7	4.2	1.8	134.7	57.0	4.5					
2-Th	10/10/13	66.6	8.0	17.9	2.1	2.6	0.3	35.3	4.2						
2-F	10/11/13	100.9	52.7	38.9	20.3	9.2	4.8	108.0	56.4						
2-Sa	10/12/13														
3-Su	10/13/13														
3-M	10/14/13	109.9	24.0	38.0	8.3	6.6	1.4	299.0	65.2						
3-T	10/15/13	91.9	4.1	25.2	1.1	5.1	0.2	135.0	6.1						
3-W	10/16/13	103.9	18.8	23.1	4.2	3.4	0.6	136.0	24.6	2.0					
3-Th	10/17/13	85.4	17.5	20.1	4.1	3.5	0.7	69.1	14.1						
3-F	10/18/13	139.9	57.6	42.6	17.5	15.3	6.3	230.0	94.6						
3-Sa	10/19/13														
4-Su	10/20/13														
4-M	10/21/13	295.0	22.1	39.3	2.9	11.3	0.8	530.0	39.7						
4-T	10/22/13	184.8	37.0	101.2	20.3	11.2	2.2	131.0	26.3						
4-W	10/23/13	204.3	38.5	44.5	8.4	11.7	2.2	348.4	65.6	29.0					
4-Th	10/24/13	165.4	96.0	39.0	22.7	10.4	6.0	310.9	180.6						
4-F	10/25/13	122.3	27.1	28.9	6.4	6.6	1.5	203.6	45.0						
4-Sa	10/26/13														
5-Su	10/27/13														
5-M	10/28/13	158.8	33.1	40.1	8.3	10.2	2.1	366.3	76.4						
5-T	10/29/13	171.6	0.3	86.1	0.2	6.6	0.0	124.8	0.2						
5-W	10/30/13	66.3	11.8	18.9	3.4	2.9	0.5	56.9	10.1	0.5					
5-Th	10/31/13														
Minimum															
Average		125.105	32.1045	40.1227	10.6727	7.34545	2.10455	205.464	56.0909	12.5					
		Report Only	<= 558	Report Only	<= 63	Report Only	<= 28	Report Only	Report Only	Report Only					
Maximum		295	96	101.2	22.7	15.3	6.3	530	180.6	29	55.8	86			
		Report Only	<= 796	Report Only	<= 90	Report Only	<= 46	Report Only	Report Only	Report Only	Report Only	Report Only			



Reporting Codes Used: C - No Discharge

Overall DMR Notes/Comment

001	Total flow 1,048,432 gallons. October 31st no sample.
002	Maximum flow = 56 gpm
003	October 2nd copper = 19.2ug/L October 9th copper = 35.8 ug/L

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE POTW, DUNES TREATMENT PLANT

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
HSHS	All Parameters		C	No discharge for the month.
HCEP	All Parameters		C	No discharge for the month.

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Paul Stenhouse

11/13/2013 1:43:46 PM

Signature

Date



Permit Number: ST0008121

Permittee: REC Solar Grade Silicon

Facility County: Grant

Receiving Waterbody:

Monitoring Period: 11/01/2013 - 11/30/2013

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE POTW, DUNES TREATMENT PLANT

Version: 1

Week	Monitoring Point	Flow Gallons/Day (gpd) Continuous Metered/Recorded	pH Daily Min Standard Units Continuous Metered/Recorded	pH Daily Max Standard Units Continuous Metered/Recorded	Conductivity (Specific Conductance) Micromhos/cm Continuous Metered/Recorded	Conductivity (Specific Conductance) Micromhos/cm Continuous Metered/Recorded	Temperature Measured Degrees F Continuous Metered/Recorded	Total BOD5 Total Milligrams/L (mg/L) Weekly Composite Sample (24 HR Time Proportional comp)	Oil & Grease Total recoverable, FOG,HEM Milligrams/L (mg/L) Weekly Grab	Total Suspended Solids (TSS) Total suspended (TSS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids (TDS) Lbs/Day 5/Week Composite Sample (24 HR Time Proportional comp)
		001	001	001	001	001	001	001	001	001	001	001
1-F	11/1/13	43165	7.8	8.6	903.0	1362.0	70.0			13.8	396.0	142.5
1-Sa	11/2/13	44937	7.1	7.8	1277.0	1369.0	72.0			16.9	608.0	227.9
2-Su	11/3/13	24086	6.7	7.7	1295.0	1539.0	70.0			28.9	596.0	119.7
2-M	11/4/13	470	7.2	8.7	428.0	1655.0	60.0					
2-T	11/5/13	25232	6.9	8.7	513.0	1506.0	68.0			16.3	502.0	105.6
2-W	11/6/13	21975	6.6	7.7	1504.0	1759.0	70.0	5.0	1.4	9.4	512.0	93.8
2-Th	11/7/13	23437	7.1	7.5	1479.0	2518.0	65.0			8.6	398.0	77.8
2-F	11/8/13	24466	6.8	7.3	2234.0	2604.0	71.0			167.8	1200.0	244.9
2-Sa	11/9/13	45675	7.3	7.6	2026.0	2353.0	70.0					
3-Su	11/10/13	59137	7.5	8.8	1763.0	2143.0	70.0					
3-M	11/11/13	18158	7.6	8.2	1658.0	1972.0	68.0			52.6	982.0	148.7
3-T	11/12/13	22607	7.4	7.6	1555.0	1755.0	66.0			30.7	732.0	138.0
3-W	11/13/13	22383	6.9	7.6	1130.0	1781.0	68.0	9.6	1.4	47.4	708.0	132.1
3-Th	11/14/13	33401	7.1	7.9	949.0	1158.0	64.0			29.6	618.0	172.2
3-F	11/15/13	21921	7.5	7.9	946.0	1003.0	60.0			20.2	456.0	83.4
3-Sa	11/16/13	10144	7.0	7.7	991.0	1086.0	60.0					
4-Su	11/17/13	18734	6.6	7.6	944.0	1158.0	66.0			7.1	354.0	55.3
4-M	11/18/13	45040	6.4	7.9	747.0	944.0	70.0			25.7	634.0	238.1
4-T	11/19/13	42847	6.9	7.9	738.0	840.0	69.0			32.8	640.0	228.7
4-W	11/20/13	3810	6.3	7.3	782.0	873.0	62.0	5.1	1.4	480.0	11.4	0.4
4-Th	11/21/13	42145	6.5	8.2	756.0	932.0	66.0			32.4	758.0	266.4
4-F	11/22/13	388	7.0	8.4	840.0	1027.0	62.0					
4-Sa	11/23/13	43808	7.2	9.3	816.0	949.0	68.0					
5-Su	11/24/13	570	6.5	9.5	865.0	1019.0	65.0					
5-M	11/25/13	42235	6.5	9.5	784.0	956.0	62.0	59.2	1.4	86.8	672.0	236.7
5-T	11/26/13	21790	8.8	9.5	809.0	1013.0	65.0			54.9	350.0	63.6
5-W	11/27/13	43724	8.0	9.4	811.0	1012.0	69.0			57.1	552.0	201.3
5-Th	11/28/13	45858	7.5	8.4	863.0	1253.0	68.0			45.0	728.0	278.4
5-F	11/29/13	42915	7.1	8.2	356.0	1449.0	68.0			14.0	912.0	326.4
5-Sa	11/30/13	23110	6.1	7.4	1126.0	1520.0	72.0					
Minimum			6.1		356							
			>= 6.0		Report Only							
Average		28605.6					66.8	19.725	1.4	58.0909	605.427	162.814
		<= 210000					Report Only	Report Only	Report Only	<= 350	Report Only	<= 3240
Maximum		59137		9.5		2604	72	59.2	1.4	480	1200	326.4
		<= 300000		<= 11.0		Report Only	Report Only	<= 300	<= 100	Report Only	Report Only	<= 4560



Week	Monitoring Point	Sodium		Chloride		Fluoride		Sulfate		Nitrate		Alkalinity		Calcium	
		Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Lbs./Day 5/Week Composite Sample (24 HR Time Proportional comp)	Total Weekly Composite Sample (24 HR Time Proportional comp)	Total Weekly Composite Sample (24 HR Time Proportional comp)	Total Monthly Composite Sample (24 HR Time Proportional comp)	Total Monthly Composite Sample (24 HR Time Proportional comp)	
1-F	11/1/13	81.1	29.2	23.3	8.4	3.3	1.2	94.1	33.9						
1-Sa	11/2/13	137.9	51.7	35.8	13.4	3.9	1.5	256.8	96.3						
2-Su	11/3/13	133.5	26.8	35.5	7.1	5.3	1.1	224.8	45.1						
2-M	11/4/13														
2-T	11/5/13	91.1	19.2	29.5	6.2	4.5	0.9	170.8	36.0						
2-W	11/6/13	74.4	13.7	22.8	4.2	3.4	0.6	107.4	19.7	10.5	130.0	35.2			
2-Th	11/7/13	77.2	15.1	21.5	4.2	3.2	0.6	88.0	17.2						
2-F	11/8/13	165.0	33.6	42.0	8.6	9.4	1.9	308.5	63.0						
2-Sa	11/9/13														
3-Su	11/10/13														
3-M	11/11/13	184.2	27.9	30.6	4.6	5.7	0.9	338.7	51.3						
3-T	11/12/13	124.3	23.5	29.0	5.5	5.4	1.0	185.5	35.0						
3-W	11/13/13	117.6	21.9	29.1	5.4	5.5	1.0	206.4	38.5	27.2					
3-Th	11/14/13	108.8	30.3	31.3	8.7	6.1	1.7	202.9	56.5						
3-F	11/15/13	86.2	15.8	22.1	4.0	3.8	0.7	101.4	18.6						
3-Sa	11/16/13														
4-Su	11/17/13	78.1	12.2	19.4	3.0	3.3	0.5	64.6	10.1						
4-M	11/18/13	109.8	41.3	30.9	11.6	6.3	2.4	191.1	71.8						
4-T	11/19/13	104.3	37.3	32.5	11.7	5.7	2.0	259.2	92.7						
4-W	11/20/13	84.1	2.6	22.5	0.7	3.9	0.1	110.4	3.5	4.4					
4-Th	11/21/13	123.4	43.4	35.1	12.3	4.3	1.5	333.3	117.1						
4-F	11/22/13														
4-Sa	11/23/13														
5-Su	11/24/13														
5-M	11/25/13	126.4	44.5	37.4	13.2	5.0	1.8	253.2	89.2	3.5					
5-T	11/26/13	82.6	15.0	21.7	4.0	2.7	0.5	85.2	15.5						
5-W	11/27/13	99.0	36.1	22.8	8.3	3.7	1.3	113.7	41.5						
5-Th	11/28/13	150.3	57.4	28.2	10.8	6.8	2.6	292.3	111.8						
5-F	11/29/13	145.0	51.9	29.6	10.6	7.2	2.6	335.5	120.1						
5-Sa	11/30/13														
Minimum															
Average		112.923	29.5636	28.7545	7.56818	4.92727	1.29091	196.536	53.8364	11.4					
		Report Only	<= 558	Report Only	<= 63	Report Only	<= 28	Report Only	Report Only	Report Only					
Maximum		184.2	57.4	42	13.4	9.4	2.6	338.7	120.1	27.2	130	35.2			
		Report Only	<= 796	Report Only	<= 90	Report Only	<= 46	Report Only	Report Only	Report Only	Report Only	Report Only			



Week	Monitoring Point	Magnesium Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Manganese Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Ammonia Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Phosphorus Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Potassium Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 2/Month Grab	Flow Gallons/Day (gpd) Continuous Metered/Recorded	pH Standard Units 2/Month Grab	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 2/Month Grab	Sodium Total Milligrams/L (mg/L) 2/Month Grab	Chloride Total Milligrams/L (mg/L) 2/Month Grab
		001	001	001	001	001	002	003	003	003	003	003
1-F	11/1/13											
1-Sa	11/2/13											
2-Su	11/3/13											
2-M	11/4/13											
2-T	11/5/13											
2-W	11/6/13	2.9	15.6	0.3	0.2	7.7	378.0					
2-Th	11/7/13											
2-F	11/8/13											
2-Sa	11/9/13											
3-Su	11/10/13											
3-M	11/11/13											
3-T	11/12/13											
3-W	11/13/13											
3-Th	11/14/13											
3-F	11/15/13											
3-Sa	11/16/13											
4-Su	11/17/13											
4-M	11/18/13											
4-T	11/19/13											
4-W	11/20/13						348.0					
4-Th	11/21/13											
4-F	11/22/13											
4-Sa	11/23/13											
5-Su	11/24/13											
5-M	11/25/13											
5-T	11/26/13											
5-W	11/27/13											
5-Th	11/28/13											
5-F	11/29/13											
5-Sa	11/30/13											
Minimum									Report Only			
Average							363					
							Report Only	Report Only		Report Only	Report Only	Report Only
Maximum		2.9	15.6	0.3	0.2	7.7	378					
		Report Only	Report Only	Report Only	Report Only	Report Only	<= 2500	Report Only	Report Only	Report Only	Report Only	Report Only



Reporting Codes Used: C - No Discharge

Overall DMR Notes/Comment

001 Outfall
 Total Flow 858,168 gallons
 No sample Nov. 4th so Sunday's sample used (11-3-13)
 No sample Nov. 22nd so Sunday's sample used (11-17-13)
 No exceedences.

002 Outfall
 No exceedences.
 Maximum flow 64 gpm.

Monitor wells
 No comments

004 Outfall
 No comments

003 Irrigation Outfall
 No Discharge

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE POTW, DUNES TREATMENT PLANT

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
003	All Parameters		C	No discharge
HSHS	All Parameters		C	No discharge
HCEP	All Parameters		C	No discharge

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Paul Stenhouse

12/13/2013 9:27:59 AM

Signature

Date



Permit Number: ST0008121

Permittee: REC Solar Grade Silicon

Facility County: Grant

Receiving Waterbody:

Monitoring Period: 12/01/2013 - 12/31/2013

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE POTW, DUNES TREATMENT PLANT

Version: 1

Week	Monitoring Point	Flow Gallons/Day (gpd) Continuous Metered/Recorded	pH Daily Min Standard Units Continuous Metered/Recorded	pH Daily Max Standard Units Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhmhos/cm Continuous Metered/Recorded	Conductivity (Specific Conductance) Microhmhos/cm Continuous Metered/Recorded	Temperature Measured Degrees F Continuous Metered/Recorded	Total BOD5 Total Milligrams/L (mg/L) Weekly Composite Sample (24 HR Time Proportional comp)	Oil & Grease Total recoverable, FOG,HEM Milligrams/L (mg/L) Weekly Grab	Total Suspended Solids (TSS) Total suspended (TSS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 5/Week Composite Sample (24 HR Time Proportional comp)	Total Dissolved Solids Lbs/Day 5/Week Composite Sample (24 HR Time Proportional comp)
		001	001	001	001	001	001	001	001	001	001	001
1-Su	12/1/13	443	6.4	7.2	1270.0	1441.0	68.0					
1-M	12/2/13	26734	6.1	7.9	1083.0	1443.0	64.0			41.5	540.0	120.4
1-T	12/3/13	21778	7.1	8.3	418.0	1192.0	67.0			29.9	858.0	155.8
1-W	12/4/13	22392	6.7	9.2	173.0	1407.0	64.0	5.0	1.4	6.6	230.0	42.9
1-Th	12/5/13	4614	8.2	9.4	969.0	1328.0	65.0			33.9	756.0	29.1
1-F	12/6/13	43724	8.4	9.4	959.0	1198.0	67.0			42.9	868.0	316.6
1-Sa	12/7/13	52051	7.9	8.5	960.0	1020.0	64.0					
2-Su	12/8/13	39766	7.9	8.8	889.0	991.0	64.0					
2-M	12/9/13	26582	7.7	8.8	890.0	947.0	65.0			17.6	834.0	184.9
2-T	12/10/13	38635	8.1	8.7	892.0	936.0	63.0			13.9	798.0	257.1
2-W	12/11/13	26108	8.3	8.8	869.0	895.0	63.0	11.6	1.4	25.7	866.0	188.6
2-Th	12/12/13	34412	8.3	8.9	816.0	1020.0	66.0			10.0	690.0	198.0
2-F	12/13/13	7886	7.1	8.8	942.0	1099.0	66.0			24.8	720.0	47.4
2-Sa	12/14/13	20873	8.6	8.8	835.0	1012.0	65.0					
3-Su	12/15/13	21435	8.0	8.9	810.0	1050.0	65.0					
3-M	12/16/13	43324	8.0	8.9	878.0	952.0	64.0			21.4	738.0	266.7
3-T	12/17/13	46049	7.5	8.6	952.0	1134.0	68.0			17.0	754.0	289.6
3-W	12/18/13	23240	7.3	8.4	1011.0	1233.0	68.0	5.2	1.4	15.2	940.0	182.2
3-Th	12/19/13	46657	7.9	8.6	898.0	1104.0	68.0			16.5	956.0	372.0
3-F	12/20/13	55495	7.7	8.3	885.0	998.0	65.0			20.3	778.0	360.1
3-Sa	12/21/13	26648	6.9	9.0	815.0	968.0	70.0					
4-Su	12/22/13	20793	8.3	9.1	865.0	998.0	70.0					
4-M	12/23/13	22940	8.2	8.6	958.0	1052.0	70.0			9.2	496.0	94.9
4-T	12/24/13	21396	8.0	8.6	1000.0	1179.0	72.0			6.0	456.0	81.3
4-W	12/25/13	24282	8.0	8.6	1151.0	1599.0	71.0			7.5	684.0	138.5
4-Th	12/26/13	47753	7.6	8.1	1366.0	1683.0	70.0	8.2	2.2	20.6	1232.0	490.7
4-F	12/27/13	22805	7.4	8.0	1183.0	1420.0	72.0			11.6	722.0	137.3
4-Sa	12/28/13	4639	6.6	7.9	1345.0	1548.0	64.0					
5-Su	12/29/13	35216	7.7	8.1	1078.0	1367.0	70.0					
5-M	12/30/13	35926	7.9	8.1	1099.0	1263.0	70.0	27.7	2.8	18.4	866.0	259.5
5-T	12/31/13	40414	7.6	8.1	1077.0	1226.0	70.0			26.6	942.0	317.5
Minimum			6.1		173							
			>= 6.0		Report Only							
Average		29193.9					67.0323	11.54	1.84	19.8682	760.182	205.959
		<= 210000					Report Only	Report Only	Report Only	<= 350	Report Only	<= 3240
Maximum		55495		9.4		1683	72	27.7	2.8	42.9	1232	490.7
		<= 300000		<= 11.0		Report Only	Report Only	<= 300	<= 100	Report Only	Report Only	<= 4560



Week	Monitoring Point	Magnesium Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Manganese Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Ammonia Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Phosphorus Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Potassium Total Milligrams/L (mg/L) Monthly Composite Sample (24 HR Time Proportional comp)		Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 2/Month Grab		Flow Gallons/Day (gpd) Continuous Metered/Recorded		pH Standard Units 2/Month Grab		Total Dissolved Solids Total Dissolved Solids (TDS) Milligrams/L (mg/L) 2/Month Grab		Sodium Total Milligrams/L (mg/L) 2/Month Grab		Chloride Total Milligrams/L (mg/L) 2/Month Grab		
		001	001	001	001	001	001	001	001	002	003	003	003	003	003	003								
1-Su	12/1/13																							
1-M	12/2/13																							
1-T	12/3/13																							
1-W	12/4/13	2.9	4.4	0.2	0.2	7.7	274.0																	
1-Th	12/5/13																							
1-F	12/6/13																							
1-Sa	12/7/13																							
2-Su	12/8/13																							
2-M	12/9/13																							
2-T	12/10/13																							
2-W	12/11/13																							
2-Th	12/12/13																							
2-F	12/13/13																							
2-Sa	12/14/13																							
3-Su	12/15/13																							
3-M	12/16/13																							
3-T	12/17/13																							
3-W	12/18/13						166.0																	
3-Th	12/19/13																							
3-F	12/20/13																							
3-Sa	12/21/13																							
4-Su	12/22/13																							
4-M	12/23/13																							
4-T	12/24/13																							
4-W	12/25/13																							
4-Th	12/26/13																							
4-F	12/27/13																							
4-Sa	12/28/13																							
5-Su	12/29/13																							
5-M	12/30/13																							
5-T	12/31/13																							
Minimum																	Report Only							
Average							220																	
Maximum		2.9	4.4	0.2	0.2	7.7	274																	
		Report Only	Report Only	Report Only	Report Only	Report Only	<= 2500										Report Only							



Reporting Codes Used: C - No Discharge

Overall DMR Notes/Comment

Process 001
 Total flow 905,010
 No Exceedences.

Sanitary Sewer 002
 Maximum flow 60gpm
 No exceedences.

Groundwater Monitoring
 No comment.

Irrigated Effluent 003
 No water applied to field.

Outfall 004
 No comments.

Outfall: 001 - DISCHARGE TO CITY OF MOSES LAKE POTW, DUNES TREATMENT PLANT

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
003	All Parameters		C	No water applied to field.
HSHS	All Parameters		C	
HCEP	All Parameters		C	

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Paul Stenhouse

Signature

1/13/2014 7:14:34 AM

Date

**Hydrogeologic Study
REC Solar Grade Silicon, LLC
Moses Lake, Washington**

August 2009



A **valmont**  COMPANY
Conserving Resources. Improving Life.

Cascade Earth Sciences
107 Island Avenue
La Grande, Oregon 97850
(541) 963-7758
www.cascade-earth.com



**Hydrogeologic Study
REC Solar Grade Silicon, LLC
Moses Lake, Washington**

Prepared For: Mr. Brandon R. Green, Environmental Engineer
REC Solar Grade Silicon, LLC
3322 Road North NE
Moses Lake, Washington 98837

Prepared By: Cascade Earth Sciences
107 Island Avenue
La Grande, Oregon 97850
(541) 963-7758

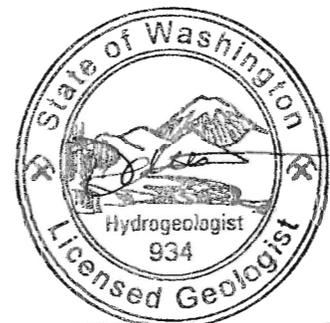
Author: Douglas R. Wanta, LG, Senior Geologist

Reviewed By: Dan J. Bruner, PG, Managing Geologist
Dustin G. Wasley, PE, Principal Engineer

Report Date: August 14, 2009

Project Number: 2922008

Submitted By:



Douglas R. Wanta

Douglas R. Wanta, LG, Senior Geologist

Disclaimer: The contents of this document are confidential to the intended recipient at the location to which it has been addressed. The contents may not be changed, edited, and/or deleted. The information contained in this document is only valid on the date indicated on the original project file report retained by CES. By accepting this document, you understand that neither CES nor its parent company, Valmont Industries, Inc. (Valmont) accepts any responsibility for liability resulting from unauthorized changes, edits, and/or deletions to the information in this document.

CONTENTS

EXECUTIVE SUMMARY	v
1.0 INTRODUCTION	1
2.0 BACKGROUND	1
2.1 Site Description	1
2.1.1 Process Description	1
2.1.2 Climate	3
2.1.3 Topography, Drainage and Surface Water	3
2.1.4 Soils	3
3.0 GEOLOGY	4
3.1 Regional Geology	4
3.2 Local Geology	5
4.0 HYDROGEOLOGY	6
4.1 Regional Hydrogeology	6
4.2 Local Hydrogeology	7
4.2.1 Depth to Groundwater	7
4.2.2 Saturated Thickness	7
4.2.3 Groundwater Flow	7
4.2.4 Seasonal Water Level Variations	8
4.2.5 Groundwater Recharge	8
4.2.6 Hydraulic Gradient	8
4.2.7 Hydraulic Conductivity	8
4.2.8 Specific Yield and Specific Retention	8
4.2.9 Storage Coefficient or Storativity	8
4.2.10 Estimated or Effective Porosity	9
4.2.11 Transmissivity	9
4.2.12 Calculated Groundwater Flow Velocity	9
4.2.13 Beneficial Use of Groundwater	9
5.0 GROUNDWATER QUALITY	10
6.0 PROPOSED MONITORING WELL NETWORK	10
7.0 CONCLUSIONS AND RECOMMENDATIONS	11

TABLE

Table 1.	Well Inventory Summary
----------	------------------------

FIGURES

Figure 1.	Site Location Map
Figure 2.	Site Detail
Figure 3.	Geologic Map
Figure 4.	Geologic Cross Section
Figure 5.	Registered Water Wells within 1 Mile of Site

APPENDIX

Appendix A.	Registered Water Well Reports Within One Mile of the Site
-------------	---

EXECUTIVE SUMMARY

Renewable Energy Corporation Solar Grade Silicon, LLC (REC) is constructing a lined 60 million gallon storage pond for non-contact cooling water generated from their existing plant. The pond will be used to store water collected during the winter months. The water will be transferred from the pond and irrigated onto 125 acres of agricultural land owned by REC that is located directly north of the pond. Water will be irrigated using one center pivot during the summer months to support crop water needs and crop production. The pond and the land application system occupy a contiguous area (Site).

The City of Moses Lake has determined that the pond will not have a probable significant adverse impact on the environment provided certain mitigation measures are complied within the Mitigated Determination of Non-Significance (MDNS). A requirement of the MDNS states that REC shall prepare an engineering report and hydrogeologic study for pond construction and land application of wastewater per Washington Administrative Codes (WAC) 173-240, Submission of Plans and Reports for Construction of Wastewater Facilities, and 173-200, Water Quality Standards for Ground Waters of the State of Washington. Specifically, per WAC 173-240-130. The Washington Department of Ecology must approve the engineering report and hydrogeologic study prior to placing the pond and land application system into service.

The following conclusions and recommendations are offered.

- There is an unconfined aquifer hosted by alluvium and fractured basalt at the Site.
- The depth to groundwater is expected to range from 21 to 32 feet below ground surface.
- Groundwater is estimated to flow west-southwest.
- Recharge to the unconfined aquifer is primarily from leakage from the canals and to a lesser extent from irrigation and precipitation.
- The unconfined aquifer is not known to be used in the area of the Site, presumably due to poor yields or inconsistent quantity of water.
- There are no wells completed in the alluvial aquifer within one mile downgradient of the Site boundary.
- Confined basalt aquifers occur below the unconfined aquifer. Confining aquitards consist of fine-grained sediments and/or firm, unfractured basalt.
- Groundwater in the confined basalt aquifers is likely to be isolated by aquitards from groundwater in the unconfined aquifer beneath the Site. There are six wells completed in the basalt aquifer within one mile downgradient of the Site boundary. All six wells are cased wells into firm basalt and are not likely to be hydraulically connected with the unconfined alluvial aquifer.

A groundwater monitoring well network with four wells should be installed in the unconfined aquifer at the Site. The monitoring well locations and rationale are listed below.

Well	Hydrogeologic Position	Purpose of Monitoring Point
MW-1	Upgradient of the pond	Monitors groundwater upgradient of the pond
MW-2	Downgradient of the pond	Monitors groundwater downgradient of the pond
MW-3	Downgradient of Site and pivot	Monitors groundwater downgradient of the pivot
MW-4	Upgradient of pivot	Monitors groundwater upgradient of the pivot

1.0 INTRODUCTION

Renewable Energy Corporation Solar Grade Silicon, LLC (REC) produces polysilicon and silane gas at its Moses Lake, Washington facility for solar panels and other uses. The REC facility is located on the east side of Moses Lake (Figure 1). The water REC receives from the City of Moses Lake is used directly in processing the polysilicon and indirectly in cooling the transformers used in the production process (non-contact cooling water).

REC is constructing a lined 60 million gallon (MG) storage pond for non-contact cooling water generated from their existing plant. The pond will be used to store water collected during the winter months. The water will be transferred from the pond and irrigated onto agricultural land owned by REC that is located northwest of the pond (Figure 2). Water will be irrigated using a center pivot during the summer months to support crop water needs and crop production. The pond and the land application system occupy a contiguous area (Site).

The City of Moses Lake has determined that the pond construction as designed does not have a probable significant adverse impact on the environment provided certain mitigation measures are complied with in the Mitigated Determination of Non-Significance (MDNS). A requirement of the MDNS states that REC shall prepare an engineering report and hydrogeologic study for pond construction and land application of wastewater per Washington Administrative Codes (WAC) 173-240, Submission of Plans and Reports for Construction of Wastewater Facilities, and 173-200, Water Quality Standards for Ground Waters of the State of Washington. Specifically, per WAC 173-240-130, “(2) The engineering report shall include the following information together with any other relevant data as requested by the department:...(p) “Where discharge is through land application, including seepage lagoons, irrigation, and subsurface disposal, a geohydrologic evaluation of factors such as:

- (i) Depth to ground water and ground water movement during different times of the year;
- (ii) Water balance analysis of the proposed discharge area;
- (iii) Overall effects of the proposed facility upon the ground water in conjunction with any other land application facilities that may be present...”

2.0 BACKGROUND

2.1 Site Description

The Site is located in Grant County, Washington at an average elevation of about 1,210 feet above mean sea level based on ground elevations shown on the United States Geological Survey (USGS) topographic map for the area around the Site (USGS, 1956). Specifically, the Site is located in Section 17 of Township 19 North, Range 29 East of the Willamette Meridian (USGS, 1956). The physical address is 3322 Road “N” N.E. Moses Lake, Washington.

2.1.1 Process Description

Non-contact cooling water is generated during the manufacture of polysilicon. The cooling water will be conveyed to a 60 MG lined storage pond located west of the facility (Figure 2). During the crop growing season, cooling water from the facility and the storage pond will be irrigated on the Site with a

125-acre center pivot located northwest of the pond to meet crop needs. The pond will typically be drained by the end of June, and then remain empty until refilling begins in the fall.

Design Flow

The pond is designed to accommodate an average daily flow rate of 300,000 gallons per day (gpd). The average flow rate was determined from the average daily flow rate of 254,293 gpd in 2007, plus a 20 percent safety margin (~ 50,000 gpd). The typical duration period for land application watering (irrigating the field) is mid-October to mid-March or 151 days. The capacity of this storage pond is approximately 58,000,000 gallons. The capacity required for 151 days of storage is 45,300,000 gallons. Therefore, an additional of 28% of storage capacity is available based on this watering cycle and the average daily flow rate of 300,000 gpd.

Cooling Water Quality

The cooling water quality was analyzed from five years of data (2003 to 2007) from discharge monitoring reports (DMRs). When constituents were not reported on DMRs, source water data was used. The source water was represented by a water sample collected from the City of Moses Lake well #17 in 2006. When using source water data, constituent concentrations were adjusted to account for 2.5 cycles in the cooling towers and therefore concentrations were increased by 2.5 times.

Water quality parameters with potential to be the most limiting to land application were determined as electrical conductivity (EC), pH, nitrate-nitrogen (NO₃-N), and the sodium adsorption ratio (SAR). The five-year averages were calculated for EC and pH using the DMR data and source water data was used to determine NO₃-N concentrations and calculate SAR. Representative cooling water quality parameters for planning purposes include the following.

- EC - 882 micromhos per centimeter (µmhos/cm)
- pH - 8.6 standard units (s.u.)
- NO₃-N - 3.8 milligrams per liter (mg/L)
- SAR - 8.2 (unitless)

The EC is a suitable concentration for land application under the right management practices, which means that irrigation water with an EC of 822 µmhos/cm (0.822 dS/m) requires leaching or dilution with supplemental irrigation water (Ayers and Westcot, 1985). The pH is slightly high but acceptable, as 6.5 to 8.5 s.u. is the default range for suitable pH. The NO₃-N concentration is acceptable because it will be removed by crop harvest, under conditions of good crop and irrigation management. An irrigation water SAR below 10 is considered to have a low sodium hazard¹ (Fipps, 2003). An SAR of 8.2 is below the threshold of 10, but it is close enough that monitoring the cooling water SAR and soils will be necessary to manage potential water infiltration problems. Overall, based on the information above, the cooling water is suitable for land application.

¹ Sodium hazard represents the potential for decreased water infiltration due to high SAR. $SAR = (Na \text{ meq/L}) / (\text{SQRT} ((Ca \text{ meq/L} + Mg \text{ meq/L})/2))$. Where Ca = calcium, meq/L = millequivalents per liter, Mg = magnesium, Na = sodium, SQRT = square root.

2.1.2 Climate

Climate at the Site is classified as semi-arid, and is characterized by cool, moist winters and hot, dry summers (USDA/SCS, 1984). Air temperature and precipitation data representative of the Site were reviewed from the Washington State University AgWeatherNet (www.agWeatherNet.com) station for Moses Lake, Washington, which is located approximately seven miles southeast of Moses Lake, Washington. The average annual air temperature is about 50 degrees Fahrenheit (° F) with an average maximum temperature of 86° F in August and an average minimum temperature of 24° F in January and February. The growing season for most crops will typically occur during March through October.

2.1.3 Topography, Drainage and Surface Water

The Site gently slopes to the west-southwest (Figure 1). East of the Site, the topography becomes steeper and drainages more incised.

The East Low Canal, an irrigation canal operated by the East Columbia Basin Irrigation District, is located approximately one mile east-northeast of the Site at a higher elevation. The canal conveys water stored at the Grand Coulee Dam from March through October each year. Seepage from the canal recharges the unconfined shallow aquifer, some of which discharges into creeks.

An irrigation canal that emanates at a point about 1.5 miles northeast of the Site from the East Low Canal flows south along the east side of the pivot, turns southwest and flows along the west side of the pond. Like the East Low Canal, this tributary canal only contains irrigation water during the summer months and likely recharges groundwater. Water land applied at the Site is not likely to drain into the canals.

A perennial drainage flows southwest along the east side of the pond. The perennial drainage emanates from an ephemeral drainage at a point just north of Road 4 NE. The perennial drainage does not contact the land application Site. Surface water flow from this drainage was diverted into buried drainage pipes on REC property and are identified as DE 226 and DE 227 under the direction of the Bureau of Reclamation. The pipes convey water to the southeast corner of Section 17 where it leaves the Site. Several agricultural drains south of the east pivot convey shallow groundwater to these pipes.

2.1.4 Soils

Soil information was reviewed from a United States Department of Agriculture – National Resource Conservation Service (USDA-NRCS) Web Soil Survey². The proposed land application site consists of a 125-acre center pivot irrigated field within a 160-acre parcel of land with shallow silt loam soils. Approximately 73 percent of the parcel consists of Scoon silt loam occurring on 0-5 percent slopes. The typical profile of Scoon series has a restrictive cemented layer (duripan) from 16-26 inches depth that overlies extremely gravelly sand. Approximately 22 percent of the Site consists of soils mapped as Starbuck fine sandy loam occurring on 0-15 percent slopes. The typical profile of Starbuck soil has a restrictive basalt layer at approximately 16 inches. Due to the shallow depths of these soils, the plant available water holding capacities ([amount of water retained by the soil that plants can use](#)) of these soils are very low at 2.5 and 2.6 inches for Scoon and Starbuck, respectively. The remaining 5 percent of the Site consists of Malaga cobbly sandy loam with 0-15 percent slopes. The Malaga

² Soils and topography data are from the Web Soil Survey: <http://websoilsurvey.nrcs.usda.gov/app/>

cobbly sandy loam has a plant available water holding capacity of about 2.0 inches. Moreover, the shallow and/or coarse soils at the Site will require light and frequent irrigation applications to produce viable crops.

3.0 GEOLOGY

The Site lies within the Quincy basin of the Columbia Plateau physiographic province. The Columbia Plateau is comprised of a series of flood basalts that cover most of eastern Washington, northeastern Oregon, and western Idaho occupying approximately 70,000 square miles. An intermountain area, the Columbia Plateau is bounded to the west by the Cascade Range, while the Okanogan Highlands form the northern boundary. The Rocky Mountains form the eastern boundary, with the Blue Mountains serving as the southern boundary (Lane and Whiteman, 1989). The basalt flows of the Columbia Basalt Group are Miocene in age, forming an extensive volcanic plateau (Alt and Hyndman, 1978). The Columbia basalts in area of the Site are overlain by sand and loess derived from sedimentary deposits from the ancestral floods that blanketed the Columbia Basin near the end of the most recent ice age (Alt and Hyndman, 1978). The dominant geologic feature is a thick sequence of basalt flows overlain by, and interbedded with, sedimentary rock. A geologic map of the area surrounding the Site is shown on Figure 3 and a geologic cross section is shown on Figure 4.

3.1 Regional Geology

A sequence of Miocene age basalt flows of the Columbia River Basalt Group covers the region. The basalt flows are generally dark gray, fine-grained, and dense. The numerous basalt flows are subdivided into four formations, starting with oldest to youngest, called the Imnaha Basalt, Grande Ronde Basalt, Wanapum Basalt, and Saddle Mountains Basalt. Of the formations, only the Grande Ronde Basalt and Wanapum Basalt are believed to be present near the Site. The Priest Rapids Member of the Wanapum Basalt Formation is composed of one or two basalt flows and is the bedrock immediately beneath the Site. The basalts at the site dip (slope) gently to the southwest (Grolier and Bingham, 1978).

Sedimentary rocks of the Ellensburg Formation deposited between the Grande Ronde Basalt and Wanapum Basalt inter-finger with the basalts of the plateau. The rocks of this formation consist of fluvial (stream) and lacustrine (lake) sediments and layers of volcanoclastic sediments (volcanic ash). The members of this formation interbed with the basalts along the western fringe of the plateau. The Vantage Member of the Ellensburg Formation crops out near Ephrata. Thickness of the Vantage Member can range from a few feet to a hundred feet and on average 25 feet throughout the plateau (USGS, 1986). Based on water well records, these outcrops do not occur near the Site (Appendix A).

The unconsolidated Pliocene, Pleistocene, and Holocene fluvial, glaciofluvial, and volcanoclastic sediments make up the other major geologic unit of the plateau. The Ringold Formation is the oldest geologic layer overlying the basalt sequence. The Ringold Formation is composed of weakly to moderately cemented silt and sand, with occasional conglomerate layers. This formation is present at depth in the north central portion of the Site based on the geologic map of the Moses Lake Quadrangle (WDNR, 1990) and registered water well reports (Appendix A).

Unconsolidated sediments overlying the basalts and Ringold Formation in the Quincy basin include: extensive deposits of gravels and sands deposited by glacial melt-water, unsorted colluvium deposited north of the Site, and alluvial sand and silt. These deposits presently occupy most of the land surface near the Site. Windblown silt (loess), which occurs throughout much of the Columbia Plateau, is present over the area southwest of the Site near the Potholes Reservoir. This unit generally does not yield water.

3.2 Local Geology

The local geology was evaluated using published literature and well logs obtained for wells constructed within one mile of the Site. Well log details are summarized in Table 1 and copies of the well logs are provided in Appendix A. Well locations are shown on Figure 5.

Five geologic units were identified at the Site including, from youngest to oldest, eolian (Qe), alluvium (Qa), fluvial gravel (Qfg), cemented sand and silt (Qfs), and the Priest Member (MVwpr) of the Columbia River Basalts. Descriptions of these units are provided below.

Alluvium (Qa)

Alluvium (Holocene to Pleistocene – present to 2 million years ago [mya]) – Silt, sand, and gravel in stream beds, floodplains, and terraces; includes stratified sand and gravel in alluvial fans and lacustrine silt and silty peat (WDNR, 1990). This unit is present in Section 17, near the natural drainage between the two pivots and extending southeast of the Site (Figure 3).

Sand and Silt (Qfs)

Sand and silt (Pleistocene – 0.01 to 2 mya) consists of horizontally bedded silt and fine to coarse basaltic sand; includes rhythmically bedded or laminated friable lacustrine fine sand and silt, which contain lenses of basaltic sand and gravel and ice-rafted erratic boulders (Grolier and Bingham, 1978). These sediments were deposited in low-energy slackwater environments created by temporary ponding of glacial outburst floodwaters (WDNR, 1990). Most of the water well reports for the area and geologic logs for borings conducted for a geotechnical investigation at the Site indicated the presence of this unit and a caliche zone within it (Hart Crowser, 2007). The distribution of this unit is shown on Figure 3.

Gravel (Qfg)

Gravel (Pleistocene – 0.01 to 2 mya) consist of fluvial gravel, ranging from boulders to fine sand, chiefly of rounded basalt fragments but locally containing clasts of granitic and metamorphic rocks, Ringold Formation sediments, and caliche (Grolier and Bingham, 1978). Deposited by glacial outburst floodwaters surging into the Quincy basin from the Grand Coulee and upper Crab Creek channels. Include components of glacial outwash derived from the Okanogan lobe of the Cordilleran ice sheet (WDNR, 1990). According to some of the water wells reports and geologic mapping of the area, this unit is present near the center of Section 17 (Figure 3).

Columbia River Basalt – Priest Rapids Member of the Wanapum Basalt (MVwpr)

Wanapum Basalt (Priest Rapids Member [Middle Miocene 14.5 to 15.5 mya]) consists of four flows of grayish black (fresh) to red-brown (weathered), medium to coarse-grained, slightly open-textured thin

flows and minor flow breccia with reversed magnetic polarity. Large columns as much as ten feet in diameter are common, as are platy parting in the basal flow.

The Priest Rapids Member is the uppermost member of the Wanapum Basalt (WDNR, 1990). In the western part of the Quincy basin, the Priest Rapids Member overlies the Quincy diatomite, which attains a maximum thickness of 20 feet. Where the underlying diatomite is absent, a pillow-palagonite bed, as much as ten feet thick, characterizes the base of the Priest Rapids Member. Based upon a review of well logs from the Ecology Water Resources Division (WDOE, 2009), the depth to basalt near the Site ranges from 15 feet to 43 feet, with a median depth of 28 feet. Based on water well records (WDOE, 2009), soil borings conducted at the Site (Hart Crowser, 2007), and geologic mapping (WDOE, 1990), basalt of the Priest Rapids Member is present at all locations below the unconsolidated sediments of the Site. The basalt near the Site dips to the southwest (Drost and Whiteman, 1986).

4.0 HYDROGEOLOGY

Two groundwater systems are present near the Site: deep, basalt aquifers and a shallow, unconfined system that exists in the unconsolidated formations overlying the basalt bedrock. Because the deep basalt aquifers are not expected to be impacted by land application activities, discussion of hydrogeologic properties is primarily limited to the uppermost unconfined aquifer situated primarily in the unconsolidated sediments over the basalt bedrock. The following sections present a conceptual hydrogeologic model for the Site.

4.1 Regional Hydrogeology

Prior to the implementation of irrigated agriculture in the area, groundwater primarily existed only in the basalt formations with relatively scarce resources present in the shallower sedimentary formations. Over the past 50 years, the Columbia Basin Irrigation Project (Williamson and others, 1998) has dramatically changed the hydrogeology of the area. Water level records indicate that the depth to groundwater has risen tens to hundreds of feet within the basin since the project was completed. Canal leakage and irrigation drainage from agricultural fields has recharged the aquifer, often to the point of creating base flow in streams and irrigation wasteways. In many drainages, shallow groundwater created by canal leakage flows down local topographic gradients and discharges into stream drainages. Canals flow with some losses to seepage generally from March 1 through October 31, which causes groundwater to rise and stream flows to increase. Groundwater elevations and stream flows decline after the canals are emptied. Nearly all groundwater for beneficial uses is pumped from deep wells drilled into the confined basalt aquifers.

Rises in groundwater levels have saturated lower portions of sedimentary deposits that were formerly dry. Since these sedimentary deposits fill eroded depressions in the basalt surface, the saturated portions of the deposits may form long and narrow localized aquifers separated by uplifts in the basalt. Where the glaciofluvial sand and gravels are saturated, they form highly conductive zones that can transmit water to, or drain water from, areas of depression along the basalt's surface. In cases where basalt fracturing is present at the top of the basalt, water that drains into or from the depressions can be considered hydraulically connected with shallow basalt aquifer systems.

Due to the rising shallow groundwater levels, base flows have increased or been created in many of the streams and drainageways of the basin. The result is an overall annual increase in stream flow, which appears responsive to surrounding irrigation activities, as well as the occurrence of spring activity along cut banks and upward flow from channel bottoms. Saturated areas and wetlands in the valley bottomlands (common near Moses Lake area) are the result of these phenomena and the Bureau of Reclamation and private landowners have installed subsurface drains to lower the water table and recapture the affected agricultural acreage (refer to Section 2.4.6). Wasteways were constructed by the Bureau of Reclamation to remove return water and excess drainage from the surrounding agricultural developments and to channel this water to the Potholes Reservoir five miles southwest of the Site.

4.2 Local Hydrogeology

Based on the water well reports within Section 17 (Table 1, Appendix A), the uppermost groundwater-bearing geologic materials of the Site consist of 15 to 43 feet of unconsolidated sediments which overly basalt bedrock. The sediments consist predominantly of sand from ground surface to 14 feet below ground surface (bgs) followed by caliche, which is alluvium cemented with calcium carbonate deposits, from 2 to 31 feet bgs, and basalt from 15 to 43 bgs. Groundwater occurs in the unconsolidated sediment varying from 21 to 32 feet bgs. The basalt near the contact with the alluvial unconsolidated sediments is described as soft, rotten, broken, and fractured. Groundwater in the upper basalt of this area is likely in contact with the upper alluvial aquifer. Areas with significant caliche and massive basalt may be effective aquitards that prevent significant downward leakage to deeper groundwater bearing zones within the basalt sequence. Additional details on hydrogeologic properties of the upper alluvial aquifer are described below.

4.2.1 Depth to Groundwater

The depth to groundwater at the Site was estimated by reviewing the water well reports for wells within Section 17 (Table 1, Appendix A). The depth to groundwater for the upper alluvial aquifer is estimated to range from 21 to 32 feet bgs. A geotechnical investigation conducted at the Site indicated groundwater between 25 and 30 feet bgs (Hart Crowser, 2007).

4.2.2 Saturated Thickness

Saturated thickness in an unconfined aquifer is the distance between the water table and the base of the aquifer. An estimate of average saturated thickness of ten feet was obtained from calculating the difference between the water table depth and depth of the firm basalt recorded on geologic logs for the soil borings conducted at the Site (Hart Crowser, 2007).

4.2.3 Groundwater Flow

Groundwater flow is the movement of groundwater in the zone of saturation. Since the East Low Canal is located to the east-northeast at a higher elevation to the Site (Figure 1), groundwater is expected to flow generally to the west-southwest (perpendicular to orientation of canal). When the canals are dry, groundwater beneath most of the Site is expected to continue to flow down the topographic gradient of the basalt surface (Figure 4). The estimated groundwater flow direction is shown on Figure 2.

4.2.4 Seasonal Water Level Variations

Groundwater is expected to rise during the irrigation season (March through October) when the canals are flowing and then decline when the canals are not used from November through February. Because the major source of recharge is canal water, it is probable that areas within the alluvium may dry out when the canals are not being used.

4.2.5 Groundwater Recharge

Groundwater recharge is the process involved in the addition of water to the zone of saturation. Due to the proliferation of seepage from irrigation canals and the dry climate in the area, the primary source of groundwater recharge is canal seepage with minor contributions from deep soil water drainage from sprinkler irrigated fields and precipitation.

4.2.6 Hydraulic Gradient

The hydraulic gradient is the slope of a water table or potentiometric surface. The hydraulic gradient influences the direction and rate of groundwater flow and is generally expressed at feet per foot (ft/ft). It is expected that during the irrigation season, the hydraulic gradients are greatest near the East Low Canal or other areas leaking water to the ground. Hydraulic gradients at the Site can be calculated after monitoring wells are constructed and groundwater elevations can be determined. In the interim, a rough estimate would be generally similar to the slope of the topography and the top of the basalt towards the southwest (Figure 4), from the East Low Canal across the Site, which is approximately 0.004 to 0.006 ft/ft.

4.2.7 Hydraulic Conductivity

Hydraulic conductivity is a measure of a rock or sediment's ability to transmit water in a specified direction. Assuming that the hydraulic conductivity is uniform in all directions, the hydraulic conductivity was estimated for saturated lithologies described on the geologic logs of water wells constructed in Section 17 (Appendix A). Of the wells that are completed in the uppermost portion of the alluvial aquifer, the aquifer formation is generally described as fine sand and silt overlying basalt. The alluvial aquifer formation should have a hydraulic conductivity ranging from 0.003 to 0.28 feet per day (Fetter, 1994).

4.2.8 Specific Yield and Specific Retention

The specific yield is the fractional amount of water that would drain freely from rocks or sediments due to gravity. The volume of the groundwater that is retained either as a film on grains or in small pore spaces after drainage is called specific retention. Specific retention increases with decreasing grain sizes. Based on the geologic logs for monitoring wells, the grain sizes of sediments in the unconfined aquifer are fine sand and silt. Specific yield for the fine sand and silt is expected to range from 0.18 to 0.21 and specific retention for the fine sand and silt is expected to range from 0.14 to 0.32 (Fetter, 1994).

4.2.9 Storage Coefficient or Storativity

The storage coefficient or storativity is the volume of water that a permeable unit will absorb or expel from storage per unit surface area per unit change in head, that quantity is dimensionless. As mentioned above, the aquifer at the Site is unconfined; for an unconfined aquifer, the storativity is

usually taken to be equal to the specific yield (Fetter, 1994). As mentioned previously, the specific yield (and storage coefficient) for the upper unconfined aquifer is estimated to range from 0.18 to 0.21 depending on the aquifer formation material.

4.2.10 Estimated or Effective Porosity

Estimated porosity is the ratio of voids in a rock or sediment to the total volume of material. It is a measure of the amount of groundwater that may be stored in the material. Estimated or effective porosity equals the sum of specific yield and specific retention of the aquifer material. For fine sand and silt, porosity is estimated to range from 0.35 to 0.50 (Fetter, 1994).

4.2.11 Transmissivity

Transmissivity is a measure of the amount of water that can be transmitted horizontally through a unit width by the full saturated thickness of the aquifer under a hydraulic gradient of one (Fetter, 1994). The transmissivity for groundwater at the Site is a product of the hydraulic conductivity and the saturated thickness of the aquifer and is expressed as gallons per day per foot (gal/day/ft). Based on the estimated saturated aquifer thickness of approximately ten feet and an average hydraulic conductivity ranging from 0.003 to 0.28 feet per day, transmissivity is estimated to be 0.03 to 2.8 gal/day/ft.

4.2.12 Calculated Groundwater Flow Velocity

The velocity of groundwater is a measurement of the rate of a volume of water through a cross sectional area of a porous medium. It provides a rough estimate of travel time for dissolved constituents to be transported through groundwater given no other variables (i.e., degradation, dispersion, etc.). For this study, groundwater velocity was calculated using Darcy's velocity equation: $v = (K \cdot i) / n$, where "K" is hydraulic conductivity; "i" is the horizontal hydraulic gradient; and "n" is the effective porosity. It is expressed as feet per day. Using the values above for each of the parameters resulted in an average velocity for the Site ranging from 10^{-5} to 10^{-3} feet per day or 0.015 to 1.5 feet per year.

4.2.13 Beneficial Use of Groundwater

A survey of local water wells was conducted by CES to determine the use of groundwater and evaluate its beneficial use in the vicinity. Records of all registered water wells within a one mile radius of the Site were obtained from the Ecology (Ecology, 2009). For this survey, CES researched Sections 7, 8, 9, 16, 17, 18, 19, 20, and 21 of Township 9 North, Range 29 East of the Willamette Meridian. Table 1 summarizes the water well construction, location, selected hydrogeologic data, and ownership information used for this report.

Figure 5 is a vicinity topographic map showing locations of nearby water wells. The water wells were numbered on Figure 5, Table 1, and on the well logs placed in Appendix A. Wells that could be located to the quarter/quarter section are identified with a circle, wells located only to a quarter section are indicated with a triangle, and wells only located to the section are shown with a square.

The survey identified 80 water wells in the search query. The majority of the wells are listed as domestic. A breakdown of the distribution of wells by type is as follows:

Type of Well	Number of Wells	Percentage of Total
Domestic	37	46%
Not Reported	14	18%
Test	12	15%
Irrigation	5	6%
Industrial	5	6%
Domestic/Irrigation	4	5%
Municipal	3	4%
Total	80	100%

A majority of wells are listed as domestic or “not reported”, meaning that the well report did not contain sufficient information to discern the use. There are 68 wells completed in the basalt aquifer, 6 wells (5 are test wells) completed in the alluvial aquifer, and 6 wells that did not have enough information recorded (not reported) to determine in which aquifer the well was completed. Based on the water well search, it appears that the alluvial aquifer does not serve beneficial uses due to low yields or inconsistent quantity of water.

There are no wells completed in the alluvial aquifer in the estimated downgradient direction (west-southwest) within one mile of the Site boundary. There are six wells completed in the basalt aquifer in the estimated downgradient direction within one mile of the Site boundary. All six wells are cased well into firm basalt and are not likely connected with the alluvial aquifer through soft, rotten, or fractured basalt.

5.0 GROUNDWATER QUALITY

Groundwater quality has not been monitored near the pivot or pond areas of the Site. A monitoring well network is proposed to adequately assess the quality of groundwater in the unconfined aquifer below the Site; details are provided in the section below.

6.0 PROPOSED MONITORING WELL NETWORK

Based on the analysis above, it is apparent that an unconfined aquifer exists at the Site. Groundwater monitoring is recommended to establish background conditions before land application commences. The following network of four groundwater monitoring wells to be installed in the shallow, alluvial aquifer is proposed.

Well	Hydrogeologic Position	Purpose of Monitoring Point
MW-1	Upgradient of the Pond	Monitors groundwater upgradient of the Pond
MW-2	Downgradient of the Pond	Monitors groundwater downgradient of the Pond
MW-3	Downgradient of Site and Pivot	Monitors groundwater downgradient of the Pivot
MW-4	Upgradient of Pivot	Monitors groundwater upgradient of the Pivot

Well locations are shown in Figure 2 are approximate and may vary laterally by 100 feet, depending on Site conditions (surface obstructions, etc.). In addition, based on a groundwater elevation survey, the actual hydrogeologic position and purpose may differ slightly from those proposed in this study. The suggested locations are based on estimated groundwater flow directions that may prove to be inconsistent.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are offered.

- There is an unconfined aquifer hosted by alluvium and fractured basalt at the Site.
- The depth to groundwater is expected to range from 21 to 32 feet bgs.
- Groundwater is estimated to flow west-southwest.
- Recharge to the unconfined aquifer is primarily from leakage from the canals and to a lesser extent from irrigation and precipitation.
- The unconfined aquifer is not known to be used in the area of the Site, presumably due to poor yields or inconsistent quantity of water.
- There are no wells completed in the alluvial aquifer within one mile downgradient of the Site boundary.
- Confined basalt aquifers occur below the unconfined aquifer. Confining aquitards consist of fine-grained sediments and/or firm, unfractured basalt.
- Groundwater in the confined basalt aquifers is likely to be isolated by aquitards from groundwater in the unconfined aquifer beneath the Site.
- There are six wells completed in the basalt aquifer within one mile downgradient of the Site boundary; all six wells are cased well into firm basalt and are not likely to be hydraulically connected with the alluvial aquifer.

A groundwater monitoring well network with four wells should be installed in the unconfined aquifer at the Site. The monitoring well locations and rationale are listed below.

Well	Hydrogeologic Position	Purpose of Monitoring Point
MW-1	Upgradient of the Pond	Monitors groundwater upgradient of the Pond
MW-2	Downgradient of the Pond	Monitors groundwater downgradient of the Pond
MW-3	Downgradient of Site and Pivot	Monitors groundwater downgradient of the Pivot
MW-4	Upgradient of Pivot	Monitors groundwater upgradient of the Pivot

REFERENCES

- Alt, D.D., and D.W. Hyndman, 1978. *Roadside Geology of Oregon*. 11th Printing: October 1993. Roadside Geology Series. Missoula, Montana: Mountain Press Publishing Co.
- Ayers and Westcot, 1985. *Water Quality for Agriculture*. Fao Irrigation and Drainage Paper 29 (Rev. 1), Food and Agriculture Organization (FAO) of the United Nations. Rome, Italy. 1985.
- Drost and Whiteman, 1986. Surficial Geology, Structure, and Thickness of Selected Geohydrologic units in the Columbia Plateau, Washington. By B.W. Drost and K.J.. Whiteman. U.S. Geologicla Survey Water Resources Investigations Report 84-4326. U.S. Department of Interior. Tacoma, Washington 1986.
- Ecology, 2009. Registered Water Well Reports for Wells in Township 19N, Range 29E, and Sections 7, 8, 9, 16, 17, 18, 20, and 21. Washington Department of Ecology. Olympia, Washington.
- Fetter, 1994. *Applied Hydrogeology – Third Edition*. Prentice-Hall, Inc. Fetter, C.W. Upper Saddle River, New Jersey,
- Fipps, Guy, 2003. *Irrigation Water Quality Standards and Salinity Management*. Texas Cooperative Extension. Texas A & M University System, Publication B-1667 4-03.
- Grolier and Bingham, 1978. *Bulletin No. 71*. Grolier, M.J. and J.W. Bingham. Department of Natural Resources, Division of Geology and Earth Resources.
- Hart Crowser, 2007. *Geotechnical Engineering Design Study, REC Silicon Facility Expansion 4.0 Moses Lake, Washington*. Prepared for REC Silicon LLC and Fluor Corporation. Prepared by Hart Crowser, Inc. September 5, 2007.
- Lane, R.C. and K.J. Whiteman, 1989. *Ground-Water Level Springs 1985, and Ground-Water Level Changes Spring 1983 to 1985, in Three Basalt Units Underlying the Columbia Plateau, Washington and Oregon*. U.S. Geological Survey, Water Resources Investigations Report 88-4018.
- USDA/SCS, 1984. Soil Survey of Grant County, WA. USDA Soil Conservation Service and Washington State University, Agricultural Research Center.
- USGS, 1956. *7.5 Minute Series Topographic Map: Wheeler, Washington – Grant County*. U.S. Department of Interior, U.S. Geological Survey, Washington, D.C.
- USGS, 1984. *Groundwater Pumpage from the Columbia Plateau Regional Aquifer System*, Water Resources Investigations Report 87-4135. D.R. Cline and M.E. Knadle. United States Geological Survey, Tacoma, Washington.
- USGS, 1986. *Surficial Geology, Structure, and Thickness of Selected Geohydrolic Units in the Columbia Plateau, Washington*. By B.W. Drost and K.J. Whiteman. Investigation Report 84-4326, Tacoma, Washington.

WDNR, 1990. *Geologic Map of Moses Lake 1:100,000 Quadrangle Washington*. Washington Division of Geology and Earth Resources Open File Report 90-1. January 1990. Washington State Department of Natural Resources

Williamson, Alex K., Mark D. Munn, Sarah J. Ryker, Richard J. Wagner, James C. Ebbert, and Ann M. Vanderpool, 1998. *Water Quality in the Central Columbia Plateau, Washington and Idaho, 1992–95*. U.S. Geological Survey Circular 1144, 35 p.

TABLE

Table 1. Well Inventory Summary

**Table 1. Well Inventory Summary
REC Silicon, Inc., Moses Lake, Washington**

Well Inventory Number ¹	Township, Range, Section Well I.D. Number	Owner	Well Completion Date	Well Location	Use ²	Yield ³	Total Well Depth feet	Casing feet, bgs ⁴	Screened Interval feet, bgs ⁴	Screened Aquifer	Static Water Level feet bgs
T19N R29E Section 7 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956											
1	19N/29E-7 App #4901	Eldon W. Burden Moses Lake, WA	6/29/1958	SE of NE of NE	NR	420 NR Pump	170	0 to 19 (10)	None	Basalt	36
2	19N/29E-7 App #4378	John R. Tregellas Moses Lake, WA	9/22/1956	N of SE of NE	NR	105 NR Pump	176	0 to 176 (8)	None	Basalt	46
3	19N/29E-7	Rocky Terry Grant County, WA	4/22/1992	NE of NW	D	40 NR Air	122	+1 to 23 (6)	None	Basalt	7
4	19N/29E-7	Roy Lewellen Grant County, WA	4/19/1992	NE of NW	D	126 NR Air	302	+1 to 19 (6)	None	Basalt	36
5	19N/29E-7 AGG 289	Paule Timozees PO Box 2321 Moses Lake, WA	9/21/2001	NE of NW	D	31 4 hr Pump	121	+1 to 24 (6)	None	Basalt	27.1
6	19N/29E-7 ACW 286	Scott Wiberg 4200 W Cove Crest Dr Moses Lake, WA	9/4/1998	NE of NW	D	50 2 hr Air	192	+1 to 21 (6)	None	Basalt	105
7	19N/29E-7 App #7513	Marvin L. Bertram 1034 W Oregon St Moses Lake, WA	3/2/1965	NE of SE	D/I	330 7 hr Pump	160	0 to 6 (8)	None	Basalt	44
8	19N/29E-7 App #QB-077 Permit #93-26003	Walter Wilson Rt 2 Box 71-K Moses Lake, WA	3/25/1987	NE of SE	I/R	70 NR Air	125	None	None	Basalt	35-40
9	19N/29E-7	Dave Hussey 522 Crestview Moses Lake, WA	9/28/1992	SE of SE	D	100 NR Air	62	+1 to 29 (6)	None	Basalt	23
10	19N/29E-7 App #7524 Permit #7080	David Craig Hussey Box 419 Star Route Moses Lake, WA	6/15/1965	SE of SE	I	NR	70	0 to 47 (10)	None	Basalt	NR
11	19N/29E-7 Permit #10253A	H.B. Gates 207 Sonny Lane Moses Lake, WA	3/28/1975	SE of SE	D/I	NR	55	NR	NR	NR	NR
12	19N/29E-7	Alton Chapel 4499 Rd L NE Moses Lake, WA	3/26/1990	NW of SW	D	40 NR Air	102	+1 to 83 (6)	None	Basalt	56
13	19N/29E-7 ACK 777	Al Chapel 4499 Rd L NE Moses Lake, WA	5/6/1997	NW of SW	D	40-50 2 hr Air	97	+1 to NR (6)	None	Basalt	NR
T19N R29E Section 8 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956											
14	19N/29E-8 ACK 800	AC Brower 4625 Rd M NE Moses Lake, WA	7/22/1997	E of W	D	50 2 hr Air	175	+1 to 19 (6) +1 to 83 (5 9/16)	70 to 83 Perforations 1/4" x 3"	Basalt	58
15	19N/29E-8 ACK 799	AC Brower 4625 Rd M NE Moses Lake, WA	7/21/1997	E of W	D	50 NR Air	58	+1 to 19 (6) +1 to 83 (5)	70 to 80 Perforations 1/4" x 3"	Basalt	55
16	19N/29E-8	Larry Campbell 4480 Rd N NE Moses Lake, WA	6/1/1993	NE of NE	D	18 0.5 hr Air	85	+1 to 35 (6)	None	Basalt	34
17	19N/29E-8	Rick Klinger 1212 Doolittle Moses Lake, WA	7/9/1983	SE of NE	D	NR	160	+1 to 39 (6)	None	Basalt	50
18	19N/29E-8	Lloyd Peterson	2/1/1988	NE of SE of NW	NR	NR	450	0 to 8 (8)	NR	Basalt	84
19	19N/29E-8 APB 418	Santos Villarreal FU 33 Othello, WA	5/21/2007	SW of NW	D	30-35 4 hr Air	340	+1 to 100 (6)	None	Basalt	95

**Table 1. Well Inventory Summary
REC Silicon, Inc., Moses Lake, Washington**

Well Inventory Number ¹	Township, Range, Section Well I.D. Number	Owner	Well Completion Date	Well Location	Use ²	Yield ³	Total Well Depth feet	Casing feet, bgs ⁴	Screened Interval feet, bgs ⁴	Screened Aquifer	Static Water Level feet bgs
20	19N/29E-8	Edward H. Buchman Rt 2 Box 73 Grant County, WA	9/7/1979	SE	D	80 1.5 hr Bailer	70	0 to 38 (6)	None	Basalt	50
21	19N/29E-8	Alan D. Predochl 639 Pioneer Way Moses Lake, WA	2/13/1992	SE of SE	D	50 NR Air	162	+1.5 to 38.5 (6) 10 to 162 (4)	122 to 162 Perforations 1/8" x 12"	Basalt	20
22	19N/29E-8	Lloyd Goehri Moses Lake, WA	3/31/1986	E of SW of SE	D	NR	170	+1 to 19 (6)	None	Basalt	43
23	19N/29E-8 App #8120 Permit #7876	Lloyd Goehri Rte 2 Box 71C Moses Lake, WA	4/19/1967	E of SW	D/I	525 4 hr NR	273	0 to 37 (12)	NR	Basalt	57
24	19N/29E-8 App #10220 Permit #9757	Robert L. Oliver 710 E. Broadway Moses Lake, WA	9/16/1969	W of SW	I	600 4 hr NR	400	0 to 33 (12) 0 to 76 (15)	NR	Basalt	29
25	19N/29E-8 AKO 571	Bruce W. Bailey Moses Lake, WA	12/24/2004	SE of SW	D	80-90 2 hr Air	182	+1 to 19 (6)	None	Basalt	72
26	19N/29E-8	Len Landrie 12723 N Mayfair Spokane, WA	4/19/1984	SW of SW	D	15 NR Air	150	+1 to 19 (6) 5 to 150 (6)	90 to 150 Perforations 1/8" x 7"	Basalt	70
TI9N R29E Section 9 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956											
27	19N/29E-9 GWC 1780-A	Albert Peters Rt 1 Moses Lake, WA	6/28/1950	NR	NR	1200 NR NR	392	0 to 28 (18)	None	Basalt	NR
28	19N/29E-9 ATL 035	4S Land Co LP PO Box 1483 Moses Lake, WA	5/2/2000	SE of NE	I	NR	472	+1 to 35 (16) +1 to 240 (12)	None	Basalt	274
29	19N/29E-9 Permit #10587	Frank P. Shinn Jr.	1/5/1973	SE of NE	D/I	2550 4 hr NR	592	8 to 58 (18)	None	Basalt	167
30	19N/29E-9 GWC 851A	Frank Shinn	6/10/1950	NE of NW	NR	675 NR NR	637	0 to 53 (10)	NR	Basalt	250
31	19N/29E-9 Cert #1485-A	Greenview Water Association Inc. Rt 1 Moses Lake, WA	9/1952	NW of NW of NW	NR	26.5 NR Pump	302	0 to 17 (6)	NR	Basalt	160
32	19N/29E-9	National Food Corp	5/1/1991	SE of SW	R	NR/R	719	+1 to 346.5	None	NR	214
TI9N R29E Section 16 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956											
33	19N/29E-16 Permit #10709	Carnation Company Rt 2 Box 60C Moses Lake, WA	5/1/1969	NR	In	1600 NR Pump	659	0 to 112 (20)	None	Basalt	130
34	19N/29E-16 AIR 294	Joel Delarosa 9126 Rd H NW Ephrata, WA	10/24/2005	NE of NE	D	40 2 hr Air	55	+1 to 40 (6)	None	Alluvial	14
35	19N/29E-16	Dan Korkinen 4075 Rd E NW	8/24/1997	NW of NW	D	50 4 hr Air	190	+1 to 40 (6)	None	Basalt	18
36	19N/29E-16 Cert #2052-A	Wheeler Water Association, Inc. Moses Lake, WA	7/10/1953	SW of NW	NR	113 NR Pump	290	NR (6)	NR	Basalt	55
37	19N/29E-16 AFQ 497	William Walker 14928 4th St NE Moses Lake, WA	4/21/2001	S of SE	D	30 2 hr Air	102	+1 to 43 (6)	None	Basalt	35
38	19N/29E-16 ABM 493	Jose Grajeda 14929 4th Ave Wheeler, WA	6/27/1995	NE of SE	D	70 2 hr Air	66	+2 to 25	None	Basalt	26

Table 1. Well Inventory Summary
REC Silicon, Inc., Moses Lake, Washington

Well Inventory Number ¹	Township, Range, Section Well I.D. Number	Owner	Well Completion Date	Well Location	Use ²	Yield ³	Total Well Depth feet	Casing feet, bgs ⁴	Screened Interval feet, bgs ⁴	Screened Aquifer	Static Water Level feet bgs
39	19N/29E-16	Nestle USA 14124 Wheeler Rd NE Moses Lake, WA	NR	NW of SE	In	NR	NR	NR	NR	NR	NR
40	19N/29E-16 Cert #569-D	Northern Pacific Railway Smith Tower Seattle, WA	1910	SE of SE	NR	50 NR Pump	NR	0 to 58 (10)	NR	NR	130
41	19N/29E-16 AHJ 863	Domingo Rocha 14873 3rd St Moses Lake, WA	5/7/2004	SE of SE	D	45 2 Air	82	+1 to 52 (6) 47 to 80 (5 5/8)	50 to 80 Perforations 1/4" x 2"	Basalt	38
42	19N/29E-16 ALR 370	Mania Farias Moses Lake, WA	7/13/2005	SE of SE	D	30-40 2 hr Air	80	+ 1 to 33 (6)	None	Basalt	30
43	19N/29E-16 AIL 371	Melecio Cerna Moses Lake, WA	7/14/2005	SW of SE	D	30 2 hr Air	90	+1 to 39 (6) 30 to 90 (5 5/8)	NR	Basalt	26
44	19N/29E-16	Jessie Shannon Rt 2 Box 81 Moses Lake, WA	12/18/1985	SW of SE	D	25 NR Air	75	+ 1 to 27 (6)	None	Basalt	50
45	19N/29E-16	National Frozen Foods Corp 14406 Rd 3 NE Moses Lake, WA	NR	SE of SW	NR	NR	719	346.5 (12)	NR	NR	NR
46	19N/29E-16 Permit #7021	Pronto Foods, Inc. Moses Lake, WA	9/25/1965	SW of SW	In	1400 5 hr NR	670	0 to 75.5 (16)	NR	Basalt	55
47	19N/29E-16 Permit #7827	Western Farms Association Moses Lake, WA	5/26/1967	SW of SW	Mu	1500 2 hr Pump	720	+2 to 79 (16) 502 to 573 (12)	521 to 571 Perforations 1/4" x 4"	Basalt	124.6
48	19N/29E-16 Permit #7829	Terminal Ice & Cold Storage Co. 514 Pittock Block Portland, OR	5/25/1967	SW of SW	In	421 3.5 hr Air Pump	495	0 to 30 (15) 0 to 73.5 (12)	NR	Basalt	116
49	19N/29E-16	Amerigold PO Box 399 Moses Lake, WA	NR	SW of SW	In	NR	NR	NR	NR	NR	NR
<i>T19N R29E Section 17 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956</i>											
50	19N/29E-17	Union Carbide PO Box 1667 Moses Lake, WA	6/18/1990	NR	T	6 1/3 hr Air	40	+2 to 2 (6) +2 to 39 (4)	NR	Basalt	20
51	19N/29E-17	Union Carbide PO Box 1667 Moses Lake, WA	6/18/1990	NR	T	3 1/3 hr Air	41	+2 to 2 (6) +2 to 39 (4)	20 to 39 Perforations 1/8" x 3"	Basalt	30
52	19N/29E-17	Union Carbide PO Box 1667 Moses Lake, WA	6/18/1990	NR	T	10 1/3 hr Air	41	+2.5 to 2 (6) +2 to 41 (4)	NR	Basalt	21
53	19N/29E-17	Union Carbide PO Box 1667 Moses Lake, WA	6/18/1990	NR	T	2 1/3 hr Air	50	+2.5 to 2 (6) +2 to 50 (4)	NR	Basalt	50
54	19N/29E-17 App #4890	Anthony Mandery 6551 50th NE Seattle, WA	10/10/1958	NW	NR	1350 4 hr Pump	417	0 to 7 (12)	NR	Basalt	55
55	19N/29E-17	Gary & Linda Kindopp 4308 Joann Dr Moses Lake, WA	8/20/1992	NE of NE	D	200 NR NR	170	+1 to 35 (8)	None	Basalt	8

**Table 1. Well Inventory Summary
REC Silicon, Inc., Moses Lake, Washington**

Well Inventory Number ¹	Township, Range, Section Well I.D. Number	Owner	Well Completion Date	Well Location	Use ²	Yield ³	Total Well Depth feet	Casing feet, bgs ⁴	Screened Interval feet, bgs ⁴	Screened Aquifer	Static Water Level feet bgs
56	19N/29E-17	Megan Fielding 13952 Rd 4 NE Moses Lake, WA	2/14/1992	NE of NE	D	75 NR Air	82	+2.5 to 37.5 (6) 15 to 82 (4)	42 to 82 Perforations 1/8" x 12"	Basalt	16
57	19N/29E-17 ACX 192	ASIMI 3322 Rd N NE Moses Lake, WA	10/30/1997	SE of NE	T	60 1 hr Air	181	+2 to 41 (6)	None	Alluvial	32
58	19N/29E-17 ACX 192	ASIMI 3322 Rd N NE Moses Lake, WA	10/30/1997	SE of NE	T	60 1 hr Air	187	+2 to 43 (6)	None	Basalt	32
59	19N/29E-17	Union Carbide Moses Lake, WA	11/5/1984	SE	T	25 2.5 hr Pump	40	+2 to 20 (4)	NR	Basalt	18
60	19N/29E-17	Union Carbide Moses Lake, WA	11/6/1984	SE	T	5 1 hr Pump	40	+2 to 20 (4)	NR	Basalt	18
61	19N/29E-17 ALT 467	Grant Co #5 Moses Lake, WA	8/18/2007	NE of SE	D	50-60 NR Air	156	+3 to 55 (6)	None	Basalt	31
62	19N/29E-17 APF 060	Moses Lake Silicon Facility 3322 Road N NE Moses Lake, WA	7/23/2007	NE of SE	T	NR	42.5	0 to 31.5 (2)	31.5 to 42.5 2"	Alluvial	NR
63	19N/29E-17 APF 059	Moses Lake Silicon Facility 3322 Road N NE Moses Lake, WA	7/27/2007	NE of SE	T	NR	40	0 to 29 (2)	29 to 40 2"	Alluvial	NR
64	19N/29E-17 BAT 506	Moses Lake Silicon Facility 3322 Road N NE Moses Lake, WA	10/2/2007	NE of SE	T	NR	44	0 to 33 (2)	33 to 44 2"	Alluvial	NR
65	19N/29E-17 BAT 505	Moses Lake Silicon Facility 3322 Road N NE Moses Lake, WA	10/1/2007	NE of SE	T	NR	39	0 to 28 (2)	38 to 39 2"	Alluvial	NR
<i>T19N R29E Section 18 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956</i>											
66	19N/29E-18	Spencer Jones Rt 2 Box 153 Moses Lake, WA	5/13/1978	NE of NW	D	60 1.5 hr Bailer	65	0 to 53 (6)	None	Basalt	30
67	19N/29E-18 SC #6209	Tren Jones Astro Enterprises Rt 2 Box 159A Moses Lake, WA	11/7/1988	NE of NW	D	40 NR Air	95	+1 to 64 (6)	None	Basalt	39
<i>T19N R29E Section 20 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956 and Sieler, Washington 1956 (Photorevised 1978)</i>											
68	19N/29E-20 Permit #2570 Well #1	Utah-Idaho Sugar Co. Salt Lake City, UT	3/19/1953	W of E	NR	1416 NR Pump	1030	0 to 19.42 (26) 0 to 79.33 (20)	NR	Basalt	125
69	19N/29E-20 Permit #2570 Well #3	Utah-Idaho Sugar Co. Salt Lake City, UT	4/12/1954	W of E	NR	900 NR Pump	720	0 to 90 (18)	NR	Basalt	110
70	19N/29E-20 Permit #2570 Well #3	Utah-Idaho Sugar Co. Salt Lake City, UT	9/15/1955	W of E	NR	895 NR Pump	910	0 to 67.33 (24) 0 to 98.75 (18) 591 to 694 (10)	NR	Basalt	107
71	19N/29E-20 ABP 647	Pacifex 13583 Wheeler Rd NE Grant County	11/16/1994	NW of NE	D	25 4 hr Air	220	+1 to 40 (6)	None	Basalt	40
72	19N/29E-20 AAN 874	City of Moses Lake PO Box 579 Moses Lake, WA	12/23/2003	NW of NW	Mu	2200 8 hr Air	525	+1 to 44 (24) +1 to 280 (16)	None	Basalt	51
73	19N/29E-20 AHP 781	Central Leasing of Washington PO Box 850 Moses Lake, WA	11/14/2004	NW of SE	I	300 1 hr Air	584	+1 to 79 (20)	None	Basalt	40

**Table 1. Well Inventory Summary
REC Silicon, Inc., Moses Lake, Washington**

Well Inventory Number ¹	Township, Range, Section Well I.D. Number	Owner	Well Completion Date	Well Location	Use ²	Yield ³	Total Well Depth feet	Casing feet, bgs ⁴	Screened Interval feet, bgs ⁴	Screened Aquifer	Static Water Level feet bgs
<i>T19N R29E Section 21 - USGS 7.5 Minute Quadrangle - Wheeler, Washington, 1956 and Sieler, Washington 1956 (Photorevised 1978)</i>											
74	19N/29E-21	Eka Nobel, Ron Stevenson 2701 Rd N NE Moses Lake, WA	12/11/1992	NW	D	75 NR Air	43	+1 to 42 (6)	None	Basalt	20
75	19N/29E-21	Merle Hardy Rt 2 280 RD NE Wheeler, WA	7/5/1988	NW of NW	D	40 1 hr Air	100	+1 to 19 (6)	None	Basalt	35
76	19N/29E-21 ALT 402	Glen & Janet McCloud 90 Hendricks Ln Othello, WA	11/17/2005	SW of NW	D	20 2 hr Air	162	+1 to 34 (6)	None	Basalt	6
77	19N/29E-21	Sun Harvest Inc 15250 NE 95th Redmond, WA	6/12/1990	SE of SE	D	70 NR Air	177	+1 to 19 (6)	None	Basalt	17
78	19N/29E-21	George Pollak Rd 2 NE Moses Lake, WA	8/18/1993	SE of SE	D	90 NR Artesian	202	+2 to 38 (6)	None	Basalt	0
79	19N/29E-21 ACU 268	Larry Campbell 4480 Rd N NE Moses Lake, WA	8/27/1998	SW of SE	D	40 2 hr Air	300	+1 to 39 (6)	None	Basalt	239
80	19N/29E-21 726	Moses Lake Moses Lake, WA	2/26/1994	NW of SW	Mu	3000 24 Pump	1240	0 to 44 (20) 0 to 686 (16)	None	Basalt	185

NOTES:

All information based on original Washington Department of Ecology well log data (Ecology, 2009). Field verification of location and current use status were not made.

Abbreviations: App # = application number, ID # = unique well identification number, bgs = below ground surface, NA = not applicable, NR = not reported,

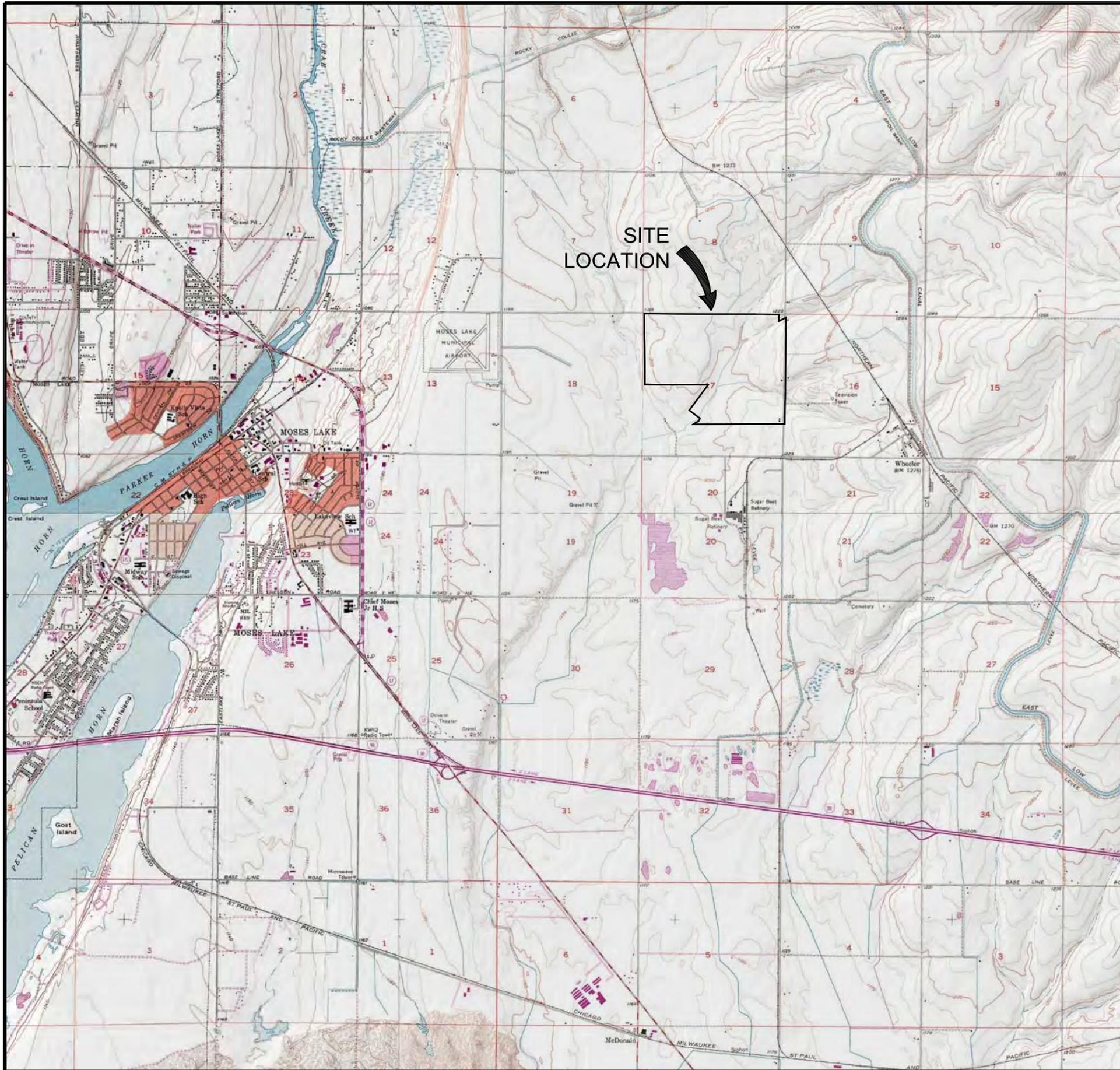
TBD = to be determined.

1 Well inventory numbers assigned for the purpose of this report and correspond to text and or figure references within this report.

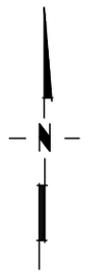
2 A = abandoned, D = domestic, I = irrigation, In = industrial, MU = municipal, O = other (stock), R = recondition (e.g., deepening), T = test well.

3 Yield information is presented in sequence as follows: gallons per minute, test duration, and test method (e.g., "Air").

4 Casing length (e.g., "0 to 107") with diameter (e.g., "(2)") reported in inches.



0 4000 FEET
 SCALE
 (LOCATIONS ARE APPROXIMATE)



(SOURCE: USGS 7.5 Minute Topographic Maps of Oregon on CD-ROM, TOPO! Software ©2006 NGHT, Inc.)

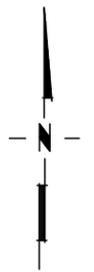


Figure 1. Site Location Map

PROJECT NUMBER: 2922008	REC Solar Grade Silicon, LLC
DATE: 7/28/09	
DWG BY: 3kac	Grant County Moses Lake, Washington T4N, R29E, Section 17
DWG NO: 2922008F1.F2.F5.dwg	
PROJECT MANAGER: 3DRW	 CASCADE EARTH SCIENCES A Valmont Industries Company
REVISED:	



0 600 FEET
 SCALE
 (LOCATIONS ARE APPROXIMATE)



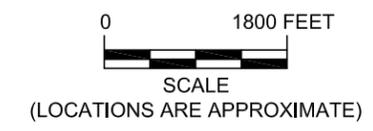
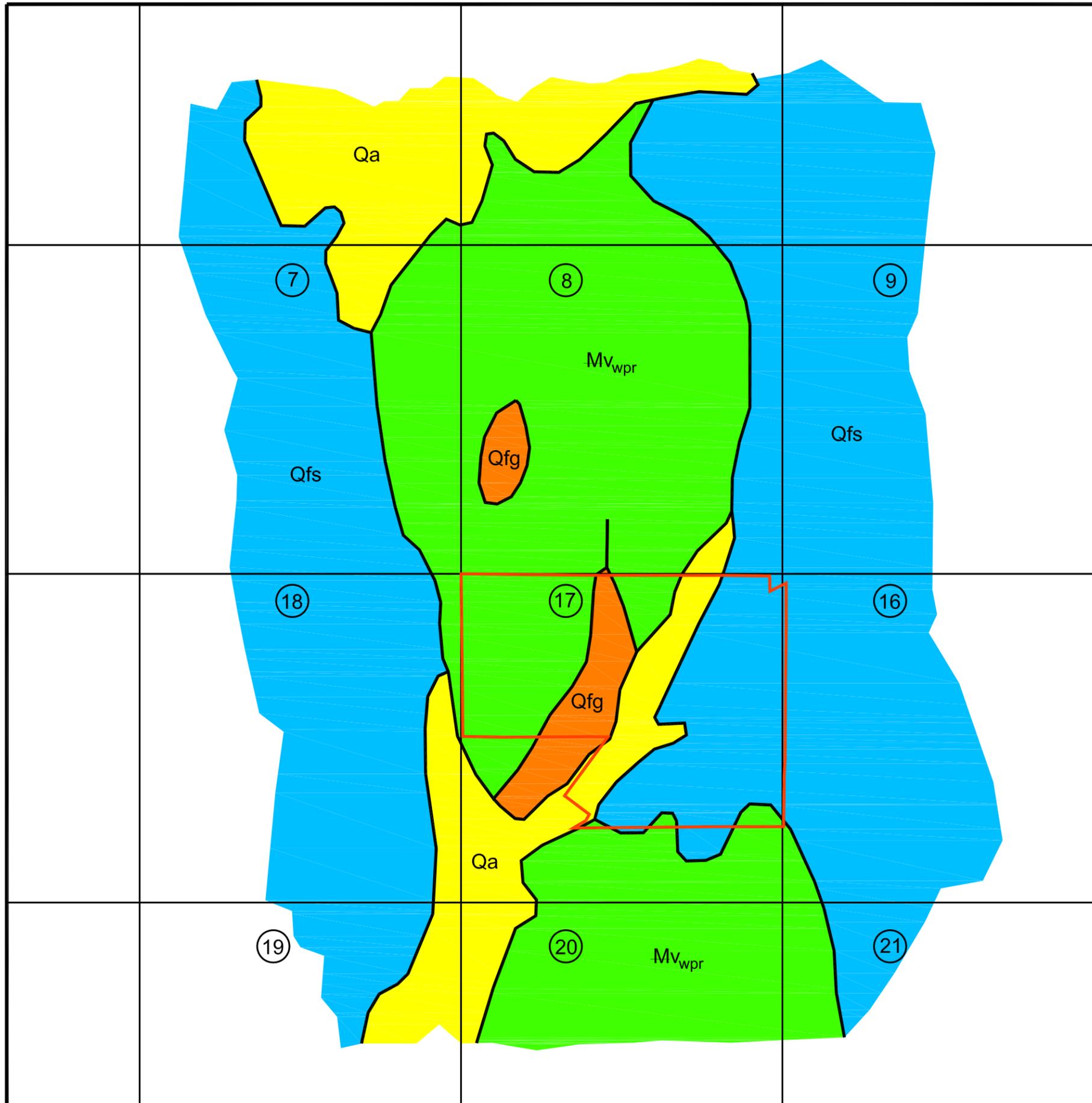
(SOURCE: Google Earth Pro, Image July 18, 2006
 ©2008 Google™)

EXPLANATION

- ⊕^{MW-5} Proposed Monitoring Well Location
- ← Estimated Groundwater Flow Direction
- - - - - Site Boundary

Figure 2. Site Detail

PROJECT NUMBER: 2922008	REC Solar Grade Silicon, LLC
DATE: 7/28/09	
DWG BY: 3kac	Grant County Moses Lake, Washington T4N, R29E, Section 17
DWG NO: 2922008F1.F2.F5.dwg	
PROJECT MANAGER: 3DRW	CES CASCADE EARTH SCIENCES A Valmont Industries Company
REVISED:	



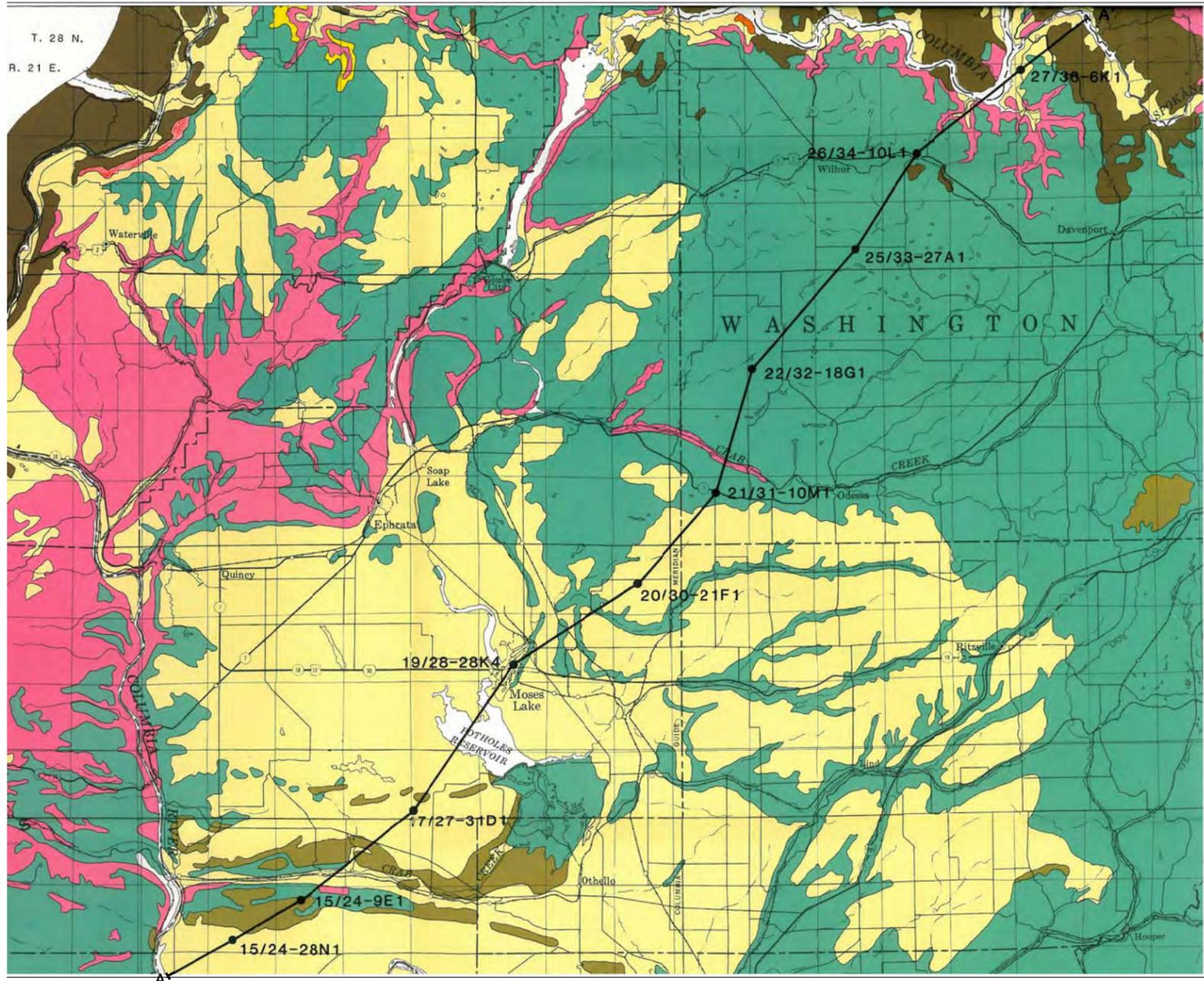
(SOURCE: Geologic Map of the Moses Lake 1:100,000 Quadrangle, Washington, Washington Division of Geology and Earth Resources, Open File Report 90-1, January 1990, Washington State Department of Natural Resources)

EXPLANATION

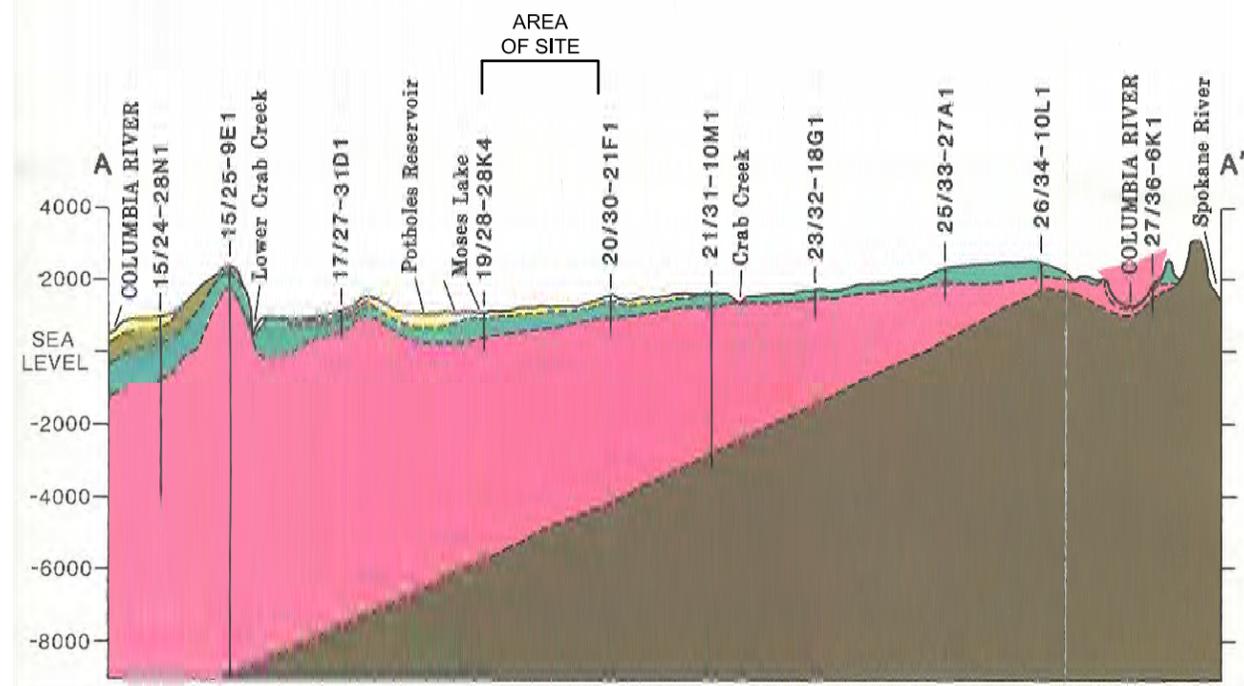
- (17) Section Number
- Site Boundary
- Qa Alluvium (Holocene to Pleistocene) -- Silt, sand and gravel in stream beds, floodplains, and terraces; includes stratified sand and gravel in alluvial fans and lacustrine silt and silty peat.
- Qfg Gravel (Pleistocene) -- Fluvial gravel, ranging from boulders to fine sand, chiefly of rounded basalt fragments but locally containing clasts of granitic and metamorphic rocks, Ringold Formation sediments, and caliche (Grolier and Bingham, 1971). Deposited by glacial outburst floodwaters surging into the Quincy basin from the Grand Coulee and upper Crab Creek channels. Include components of glacial outwash derived from the Okanogan lobe of the Cordilleran ice sheet.
- Qfs Sand and Silt (Pleistocene) -- Horizontally bedded silt and fine to coarse basaltic sand; includes rhythmically bedded or laminated friable lacustrine fine sand and silt which contain lenses of basaltic sand and gravel and ice-rafted erratic boulders (Grolier and Bingham, 1971). These sediments were deposited in low-energy slackwater environments created by temporary ponding of glacial outburst floodwater (Hanson and others, 1979).
- MVwpr Wanapum Basalt, Priest Rapids Member (middle Miocene) -- Four flows of grayish-black (fresh) to red-brown (weathered), medium- to coarse-grained, slightly diktytaxitic basalt with reversed magnetic polarity. Large columns as much as 3 m (10 ft) in diameter are common, as are platy partings in the basalt flow. In the western part of the Quincy basin, the Priest Rapids Member overlies the Quincy diatomite, which attains a maximum thickness of 6 m (2 ft). Where the underlying diatomite is absent, a pillow-palagonite bed, as much as 3 m (10 ft) thick, characterizes the base of the Priest Rapids (Mackin, 1961; Grolier and Bingham, 1971, 1978). The Priest Rapids is the uppermost member of the Wanapum Basalt, which erupted between 15.5 and 14.5 million years ago (Long and Duncan, 1983).

Figure 3. Geologic Map

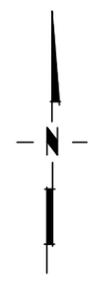
PROJECT NUMBER: 2922008	REC Solar Grade Silicon, LLC
DATE: 8/6/09/09	
DWG BY: 3kac	Grant County Moses Lake, Washington T4N, R29E, Section 17
DWG NO: 2922008F3.dwg	
PROJECT MANAGER: 3DRW	 CASCADE EARTH SCIENCES A Valmont Industries Company
REVISED:	



- Quaternary Sediments
- Quaternary Basalt
- Ellensburg Formation (sediments)
- Saddle Mountains Basalt
- Wanapum Basalt
- Grande Ronde Basalt
- Rocks older than Grande Ronde (primarily sedimentary and granitic rocks)



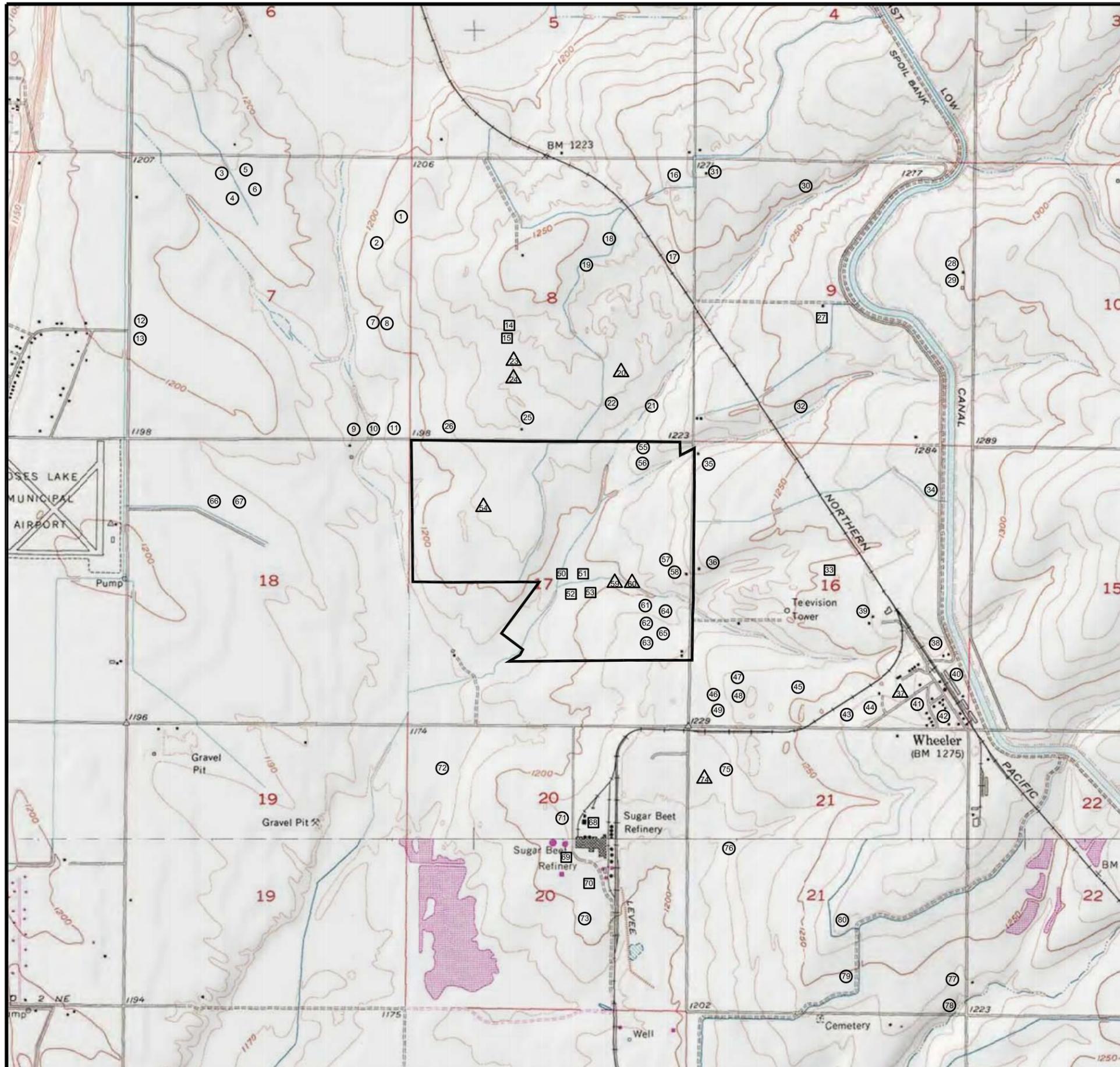
0 25 MILES
SCALE
(LOCATIONS ARE APPROXIMATE)



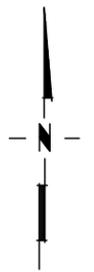
(SOURCE: *Surficial Geology, Structure, and Thickness of Selected Geohydrologic Units in the Columbia Plateau, Washington*; Drost and Whiteman, 1986, State of Washington Department of Ecology, Department of the Interior, United States Geological Survey)

Figure 4. Geologic Cross-Section

PROJECT NUMBER: 2922008	REC Solar Grade Silicon, LLC
DATE: 7/28/09	
DWG BY: 3kac	Grant County Moses Lake, Washington T4N, R29E, Section 17
PROJECT MANAGER: 3DRW	
REVISED:	CES CASCADE EARTH SCIENCES A Valmont Industries Company



0 2000 FEET
 SCALE
 (LOCATIONS ARE APPROXIMATE)



(SOURCE: USGS 7.5 Minute Topographic Maps of Oregon on CD-ROM, TOPO! Software ©2006 NGHT, Inc.)

EXPLANATION

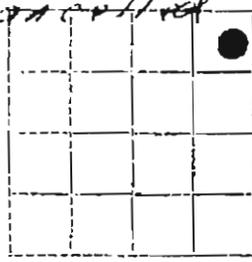
- ⊙ Well Location to 1/4 - 1/4 of Section
- △ Well Location to 1/4 Section
- ⊠ Well Location to Section
- Site Boundary

Figure 5. Registered Water Wells within 1 Mile of Site

PROJECT NUMBER: 2922008	REC Solar Grade Silicon, LLC
DATE: 7/28/09	
DWG BY: 3kac	Grant County Moses Lake, Washington T4N, R29E, Section 17
DWG NO: 2922008F1.F2,F5.dwg	
PROJECT MANAGER: 3DRW	 CASCADE EARTH SCIENCES A Valmont Industries Company
REVISED:	

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG No. **Appli. #4901**
Date **9-28**, 1959 *Completed*
Record by **well driller**
Source **driller's record**



Location: State of WASHINGTON
County **Grant**
Area
Map

SE 1/4 NE 1/4 sec 7 T19 N, R29 E

Diagram of Section

Drilling Co. **Freer Drilling Co.**
Address **Noses Lake, Wash.**

Method of Drilling Date **6-29**, 1958

Owner **Eldon W. Burden**
Address **Noses Lake, Wash.**

Land surface, datum *2* ft. above
below

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Top soil	2	2
	Basalt weathered	17	19
	" black	16	35
	" black porous w/b	6	41
	" black	11	52
	" gray - hard	50	102
	" black	12	114
	" brown-porous with clay seamd w/b	39	153
	" black	17	170
	PUMP TEST:		
	Dim. 170"x10"		
	SWL: 36 ft.		
	Yield: 420 g.p.m.		
	Type & size of pump: Turbine		
	" " " " engine: gas		
	CASING:		
	10" diam. from 0 to 19 ft.		

Turn up _____ Sheet _____ of _____ sheets

2

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

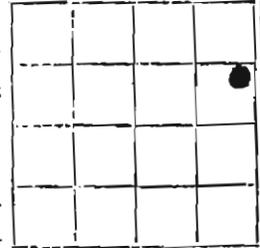
WELL LOG

No. Appli. 4378

Date Sep. 22, 1956

Record by well driller

Source driller's record



Location: State of WASHINGTON

County Grant

Area

Map

N 1/2 SE 1/4 NE 1/4 sec. 7 T. 19N. R. 29 E.

Diagram of Section

Drilling Co. W. B. Frear

Address Moses Lake, Wash.

Method of Drilling Date Sept. 1956

Owner John R. Tregellas

Address Moses Lake, Wash.

Land surface, datum 12.3 ft. above
below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
-------------	----------	------------------	--------------

(Transcribe driller's terminology literally but paraphrase as necessary. In parentheses, if material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Soil	2	2
	Lava	75	77
	Hard gray basalt	99	176

PUMP TEST:

Diam. 176'x8"

SWL: 46 ft.

DD: 104 ft.

Yield: 105 g.p.m.

CASING: 8" diam. from 0 to 176

77 ft. of 8" casing, 8" shoe

Turn up

Sheet _____ of _____ sheets

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with
Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

Start Case No. 4

STATE OF WASHINGTON

Water Right Permit No. _____

(1) OWNER: Name Roy Lowellen Address _____

(2) LOCATION OF WELL: County Grant NE 1/4 NW 7 T. 19 N. R. 29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
 Abandoned New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

MATERIAL	FROM	TO
<u>Dirt & Boulders</u>	<u>0</u>	<u>6</u>
<u>Gravel</u>	<u>6</u>	<u>8</u>
<u>Basalt soft brown.</u>	<u>8</u>	<u>17</u>
<u>Basalt black.</u>	<u>17</u>	<u>32</u>
<u>Basalt soft black.</u>	<u>32</u>	<u>39</u>
<u>Basalt Grey</u>	<u>34</u>	<u>90</u>
<u>Basalt Brown.</u>	<u>90</u>	<u>101</u>
<u>Basalt black.</u>	<u>101</u>	<u>128</u>
<u>Basalt Black & Brown.</u>	<u>128</u>	<u>135</u>
<u>Basalt Black</u>	<u>135</u>	<u>145</u>
<u>Basalt Brown</u>	<u>145</u>	<u>149</u>
<u>Basalt Grey Hard</u>	<u>149</u>	<u>188</u>
<u>Basalt Brown.</u>	<u>188</u>	<u>189</u>
<u>Basalt Grey soft</u>	<u>189</u>	<u>238</u>
<u>Basalt Grey Hard.</u>	<u>238</u>	<u>285</u>
<u>Basalt Black H2O</u>	<u>285</u>	<u>288</u>
<u>Basalt Grey</u>	<u>288</u>	<u>302</u>

(5) DIMENSIONS: Diameter of well _____ inches.
 Drilled _____ feet. Depth of completed well _____ ft.

(6) CONSTRUCTION DETAILS: Shoe.
 Casing installed: 6" Diam. from 11 ft. to 19 ft.
 Welded * Diam. from _____ ft. to _____ ft.
 Liner installed * Diam. from _____ ft. to _____ ft.
 Threaded * Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perforations _____ in. by _____ in.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.

Screens: Yes No
 Manufacturer's Name _____
 Type _____ Model No _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
 Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 19 ft.
 Material used in seal Portacote.
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

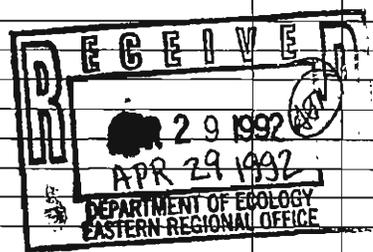
(7) PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 36 ft. below top of well Date 4-21-92.
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (Cap, valve, etc.)

(9) 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.
 " 126 gpm " " " "
 " " " " " " "
 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. with _____ ft. drawdown after _____ hrs.
 Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water 61 Was a chemical analysis made? Yes No



Work started 4-19-92 19. Completed 4-20-92 19.

WELL CONSTRUCTOR CERTIFICATION:
 I 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.
 NAME Joy Drilling Co (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
 Address Moses Lake wa.
 (Signed) Tim Shaw License No. 469
 Contractor's Registration No. Jay DRC 13704 Date 4-21-92 19.
 (USE ADDITIONAL SHEETS IF NECESSARY)

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original with
Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent

W130741 (5)

UNIQUE WELL ID # A66289

Water Right Permit No

100430

(1) OWNER Name Paul Timozes Address Box 2321 Moses Lake WA 98848

(2) LOCATION OF WELL County Grant NE 1/4 NW 1/4 Sec 7 T. 19 N R 24 E WM

(2a) STREET ADDRESS OF WELL (or nearest address)

TAX PARCEL NO

(3) PROPOSED USE Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(4) TYPE OF WORK Owner's number of well (if more than one) 1
 New Well Method Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted
 Decommission

(5) DIMENSIONS Diameter of well 6 inches
Drilled 121 feet Depth of completed well 121 ft

(6) CONSTRUCTION DETAILS

Casing Installed 6 ft
 Welded Liner installed Threaded
Diam from 11 ft to 24 ft
Diam from _____ ft to _____ ft
Diam from _____ ft to _____ ft

Perforations Yes No
Type of perforator used _____
SIZE of perforations _____ in by _____ in
perforations from _____ ft to _____ ft

Screens Yes No K-Pac Location _____
Manufacturer's Name _____ Model No _____
Type _____
Diam _____ Slot Size _____ from _____ ft to _____ ft
Diam _____ Slot Size _____ from _____ ft to _____ ft

Gravel/Filter packed Yes No Size of gravel/sand _____
Material placed from _____ ft to _____ ft

Surface seal Yes No To what depth? 18 ft. ft
Material used in seal Bestcrete
Did any strata contain unusable water? Yes No
Type of water? Surface Depth of strata 17-24
Method of sealing strata off Casing & Cement

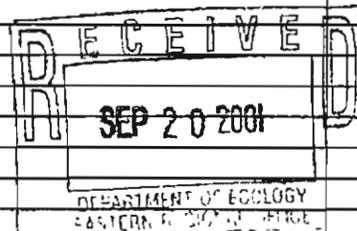
(7) PUMP Manufacturer's Name Permaton
Type S-10 HP 1 1/2

(8) WATER LEVELS Land-surface elevation above mean sea level _____ ft
Static level 27.1 ft below top of well Date _____
Artesian pressure _____ lbs per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc)

(9) WELL TESTS Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? Joy Drilling
Yield 31 gal/min with 12.2 ft drawdown after 4 hrs
Yield _____ gal/min with _____ ft drawdown after _____ hrs
Yield _____ gal/min with _____ ft 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
29.5 11:30 _____ _____ _____ _____
27.6 11:40 _____ _____ _____ _____
Date of test 8-28-01
Bailer test _____ gal/min with _____ ft drawdown after _____ hrs
Artesian 7.5 gal/min with _____ ft drawdown after 2 hrs
Artesian flow _____ gpm Date _____
Temperature of water 60 Was a chemical analysis made? Yes No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION
Formation Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered

MATERIAL	FROM	TO
<u>Point</u>	<u>0</u>	<u>2</u>
<u>Gravel in Green shale</u>	<u>2</u>	<u>12</u>
<u>Gravel in Sand</u>	<u>12</u>	<u>17</u>
<u>Basalt Brown</u>	<u>17</u>	<u>24</u>
<u>Basalt Gray</u>	<u>24</u>	<u>104</u>
<u>Basalt Brown H2O</u>	<u>104</u>	<u>121</u>



Work Started 9-20-01 Completed 9-21-01

WELL CONSTRUCTION CERTIFICATION

I 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

Type or Print Name Tim Stice License No 0469
(Licensed Driller/Engineer)
Tramee Name _____ License No _____
Drilling Company Joy Drilling Co
(Signed) Tim Stice License No 0469
(Licensed Driller/Engineer)
Address Moses Lake WA
Contractor's Registration No Joy DR013704 Date 8-28-01

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006.

The Dep. The Department of Ecology does NOT Warrant the Data and/or the Information on this Well Report.

7

STATE OF WASHINGTON,
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT Appl. #7513

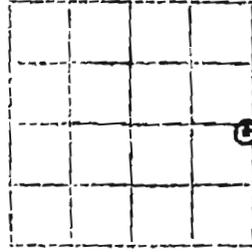
WELL LOG No. _____

Date March 2, 19 65

Record by Driller

Source Driller's Record

Location: State of WASHINGTON
County Grant
Area 40' W & 40'S of E $\frac{1}{2}$ cor.
Map NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7 T. 19 N., R. 29 E. E. W.
Drilling Co. Othello Drilling Company
Address 134 E. Larch, Othello, Washington
Method of Drilling Driven Date _____, 19____
Owner Marvin L. Bertram
Address 1034 W. Oregon St. Moses Lake, Wash.
Land surface, datum _____ ft. above
below



CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
-------------	----------	------------------	--------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Domestic and irrigation well		
	Black lava	0	140
	Brown lava	140	160
	Casing: 8" from 0 to 6'		
	SWL: 44' on November 14, 1964		
	Yields 330 gpm with 3' DD after 7 hours		
	Immediate recovery		
	November 14, 1964		
	Temp: 55°		
	Pump: 15 HP turbine 6"		

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. OB-077

Permit No. 93-26003

8

(1) OWNER: Name Walter Wilson Address Route 2, Box 71-K, Moses Lake, WA 98837

LOCATION OF WELL: County GRANT - NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec 7 T. 19 N. R. 29E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic Industrial Municipal
Irrigation Test Well Other

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 55 ft. Depth of completed well 125 ft.

(6) CONSTRUCTION DETAILS: NONE

Casing installed: " Diam. from ft. to ft.
Threaded " Diam. from ft. to ft.
Welded " Diam. from ft. to ft.

Perforations: Yes No
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes No
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes No Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes No To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 35-40 ft. below top of well Date 3/25/87
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom?
Yield: 70 gal./min. with ft. drawdown after hrs.
" ESTIMATED AIRLIFT " " "
" " " " " "

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. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes No

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Basalt, black & brown, broken w/tan caliche	70	110

Basalt, black, broken w/water	110	125
-------------------------------	-----	-----

NO PVC Liner Installed
NO Drive shoe utilized

NOTE: REVISED WELL LOG WITH PERMIT NUMBER

RECEIVED

MAY 18 1987

Work started 3/24, 19 87 Completed 3/25, 19 87

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME PONDEROSA DRILLING & DEVELOPMENT INC.
(Person, firm, or corporation) (Type or print)

Address E. 6010 Broadway, Spokane, WA 99212

[Signed] Douglas E. Lane
Douglas E. Lane (Well Driller)

License No. 1030 Date 3/25, 19 87

5/18/87

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 9

Water Right Permit No. _____

(1) OWNER: Name Dave Hussey Address 522 Crestview ml.

(2) LOCATION OF WELL: County Grant SE & SE Sec. 7 T. 19 N., R. 29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

(4) TYPE OF WORK: Owner's number of well (if more than one) 1
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

MATERIAL	FROM	TO
Dirt & gravel	0	14
Basalt Brown. Red blk.	14	18
Clay yellow.	18	20
Clay Grey	20	24
Basalt Black Brown Red yellow	24	60
Basalt Grey	60	62

(5) DIMENSIONS: Diameter of well _____ inches.
Drilled _____ feet. Depth of completed well _____ ft.

(6) CONSTRUCTION DETAILS: Shoc
Casing installed: 6 * Diam. from 41 ft. to 29 ft.
Welded * Diam. from _____ ft. to _____ ft.
Liner installed * Diam. from _____ ft. to _____ ft.
Threaded * Diam. from _____ ft. to _____ ft.

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 18 ft.
Material used in seal Ben-ton-it
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 23.5 ft. below top of well Date 9-29-92
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) 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.
" " " 100 GPM. " "
" " " " " "
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

Work started 9-29-92, 19. Completed 9-29-92, 19.

WELL CONSTRUCTOR CERTIFICATION:
I 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.

NAME Jay Drilling Co (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address MOSES Lake Wa.
(Signed) Tim Slaw License No. 469
(WELL DRILLER)
Contractor's Registration No. JOPORC13701A Date 9-29, 1992

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with
Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 1

12

Water Right Permit No. _____

(1) OWNER: Name Alton Chapel Address 4499 Rd L NE Moses Lake, Wa.

(2) LOCATION OF WELL: County Grant NW ^{SW} x NW x Sec 7 T19 N. R29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 4499 Rd L NE Moses Lake, Wa.

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Soil	0	2
Soil boulders	2	12
Gravel	12	44
Sand black	44	83
Clay brown	63	79
Basalt broken brown	79	83
Basalt black	83	89
Basalt brown (water)	89	99
Basalt black	99	102

(4) TYPE OF WORK: Owner's number of well 1
 (If more than one)

Abandoned New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 6 inches.
 Drilled 102 feet. Depth of completed well 102 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 Diam. from +1 ft. to 83 ft.
 Welded * Diam. from _____ ft. to _____ ft.
 Liner installed
 Threaded * Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perforations _____ in. by _____ in.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.

Screens: Yes No
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
 Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 18 ft.
 Material used in seal Bentonite
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 56 ft. below top of well Date 3-26-90
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (Cap, valve, etc.)

(9) 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.
 " Air Lift " 40 GPM " " "
 " " " " " " "

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 _____

Ballor test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water 59 Was a chemical analysis made? Yes No

Work started 3-23-90, 19. Completed 3-26-90, 19.

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME Joy Drilling Co.
 (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Moses Lake, Wa.

(Signed) Jim Stans License No. 469
 (WELL DRILLER)

Contractor's Registration No. JOYDRC1370H Date 3-27-90, 19.

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

59902

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 40291486

UNIQUE WELL I.D. # ACK 777

13

Water Right Permit No. _____

(1) OWNER: Name Al Chapel Address 4499 Rd L NE Moses Lake,

(2) LOCATION OF WELL: County Grant NW 1/4 SW 1/4 Sec 7 T. 19 N. R. 29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 4499 Rd L NE Moses Lake wa.

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled _____ feet. Depth of completed well _____ ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 Diam. from 4 ft. to _____ ft.
Welded _____ Diam. from _____ ft. to _____ ft.
Liner installed _____ Diam. from _____ ft. to _____ ft.
Threaded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? _____ ft.
Material used in seal _____
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level _____ ft. below top of well Date _____
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? _____
Yield: 40-50 gal./min. with air lift ft. drawdown after 2 hrs.
" " " " "
" " " " "

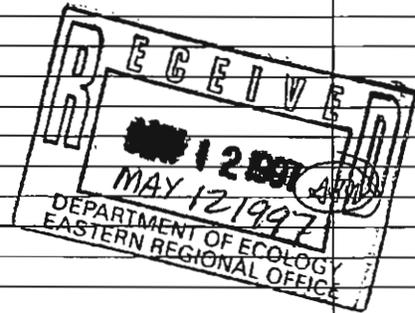
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Time Water Level Time Water Level

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 60 Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Dirt	0	2
Dirt + Boulders.	2	12
Sand. some Rock. Gravel	12.	18
Gravel + Sand.	18	44
Sand.	44	63
Clay Brown	63.	79
Basalt Brown.	79	83
Basalt Black	83	85
Basalt Brown	85	97



Work Started 5-5-97 19. Completed 5-6-97 19

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME Joy Drilling Co
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Moses Lake wa.

(Signed) Tom Shum License No. 0969
(WELL DRILLER)

Contractor's Registration No. Joy DRC 1370H Date 5-6-97 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

The Department of Ecology does NOT Warrant the Data and/or the Information on this Well Report.

15

60033

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W09 1659

UNIQUE WELL I.D. # ACK 799

Water Right Permit No. _____

OWNER: Name AC Brower Address 4625 Rd M NE ML

(2) LOCATION OF WELL: County Graft E 1/4 W 1/4 Sec 8 T. 19 N., R. 296 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 92 feet. Depth of completed well 92 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 Diam. from 11 ft. to 19 ft.
Welded Liner installed Diam. from 11 ft. to 83 ft.
Threaded Diam. from _____ ft. to _____ ft.

Perforations: Yes No
Type of perforator used touch
SIZE of perforations 4 x 3 in. by _____ in.
_____ perforations from 70 ft. to 80 ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 19 ft. ft.
Material used in seal Benlate
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____ H.P. _____
Type: _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 55 ft. below top of well Date 7-21-97
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? _____
Yield: 50 gal./min. with 4.1 ft. ft. 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

Date of test _____

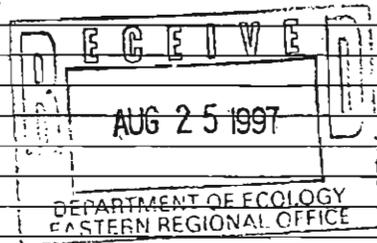
Baller test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Aintest _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____
Temperature of water 59 Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Dirt	0	2
Caliche	2	7
Basalt - Black	7	11
Basalt Brown	11	14
Basalt Black	14	42
Basalt Brown	42	66
Basalt Brown Red yellow		
clay with H2O	66	82
Basalt Gray	82	92
Wet Basalt	92	156
Basalt Brown	156	158
Basalt Gray	158	181
Basalt Brown H2O	181	198
Basalt Gray	198	202



Work Started 7-19-97 Completed 7-21-97 19

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME Jay Drilling Co (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address MOSES Lake wa.

(Signed) Tom Stevens License No. 0469 (WELL DRILLER)

Contractor's Registration No. 507DRC1370 Date 7-23-97 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

NE4SE4NW4
Sec. 8
T19N
R29E

19/29-8
①
⑱

129/B

LLOYD PETERSON ^{VIDEO} SCAN REVIEW

JML
JML

3-8

Casing - No leaks

-21

hard rock, no moisture, smooth walls

-

condensation or seepage begins

0-67

blur - too bright - no picture

7

SWC

4-100

rough walls, cavernous, huge breakouts

20-165

hard competent rock, fractured, big vert crack
crooked hole
161 big cracks

65-172

rough broken zone - interflow?

72-186

hard rock - smooth walls

186-197

very rough, big cavern, pillars?, blocky
195 - big cavern

97-230

224 - big crack - good competent rock, smooth
" " " " " " " " " " " "

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

97-230

224 - big rock - good competent rock, smooth walls - (OK for plug)

(18)

-233

intuflow?, pillows?, soft matrix, well rounded

233-299

good competent rock, smooth walls
268- 272 big lilled ...

(2)

299-³⁴²~~330~~

slightly rough walls - some soft opening zones
altered flow?

305-345

break out - blocky core zone, highly fractured

345-358

good rock

358-386

big break out, highly fractured, soft, clayey
material knocked off walls with camera
381 huge cavern (check for ventage?)
384 crooked ledge No - with + 600'

386-450

competent rock, 441-443 soft zone

.0

Total Depth - big chunks at bottom

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.



WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

274510

19

Construction/Decommission ("x" in circle)
 Construction
 Decommission ORIGINAL INSTALLATION Notice of Intent Number _____

CURRENT
 Notice of Intent No. WE06576

Unique Ecology Well ID Tag No. APB 418

Water Right Permit No. _____

Property Owner Name Santos Villarreal

Well Street Address FU 33

City Othello County Adams

Location SW 1/4-1/4NW 1/4 Sec 8 Twn 19 R 29 ^{BWM or WWM} circle one

Lat/Long (s, t, r) Lat Deg _____ Lat Min/Sec _____

Still REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No. 2100490330100

PROPOSED USE: Domestic Industrial Municipal
 DeWater Irrigation Test Well Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____
 New well Reconditioned Method: Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 340 ft.
 Depth of completed well 340 ft.

CONSTRUCTION DETAILS
 Casing Welded 6" Diam. from +1 ft. to 100 ft.
 Installed: Liner installed _____ Diam. from _____ ft. to _____ ft.
 Threaded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam _____ Slot size _____ from _____ ft. to _____ ft.
 Diam _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
 Materials placed from _____ ft. to _____ ft.

Surface Seal Yes No To what depth? 100 ft.
 Material used in seal Bentonite
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 95 ft. below top of well Date 5/21/07
 Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well inp in water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
 Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Artes 30-35 gal./min. with stem set at _____ ft. for 4 hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

CONSTRUCTION OR DECOMMISSION PROCEDURE
 Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Gravel/Boulders	0	24
Tan Clay	24	56
grey Clay	56	84
Tan Sandstone	84	91
Med. Brown/Blk Basalt	91	114
Hard Grey Basalt	114	155
Red/ Brown Soft Clay	155	168
Hard Grey	168	185
Brown Soft	185	194
Hard Grey	194	204
Med Black	204	212
Hard Grey	212	290
Med. Blk Honeycomb	290	316
Hard Grey	316	322
Med. Blk H2O	322	340

RECEIVED
 OCT 24 2007

DEPARTMENT OF ECOLOGY
 EASTERN REGIONAL OFFICE

Start Date 5/14/07 Completed Date 5/21/07

WELL CONSTRUCTION CERTIFICATION: I 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 Trainee Name (Print) Leonard Martel
 Driller/Engineer/Trainee Signature _____
 Driller or trainee License No. 1907

Drilling Company LEMCO DRILLING INC
 Address PO BOX 23
 City, State, Zip LIND WA 99341

IF TRAINEE,
 Driller's Licensed No. _____
 Driller's Signature _____

Contractor's
 Registration No. LEMCODI101JT Date 5/25/07

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. 20
Permit No. _____

(1) OWNER: Name EDWARD H BUCHMAN Address RT 2 Box 73
LOCATION OF WELL: County GRANT - 1/4 S, E 1/4 Sec 8 T. 19 N. R. 29 W.M.
Bearing and distance from section or subdivision corner _____

(3) PROPOSED USE: Domestic Industrial Municipal
Irrigation Test Well Other

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 70' ft. Depth of completed well 70' ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from 0 ft. to 38' ft.
Threaded " Diam. from _____ ft. to _____ ft.
Welded 6" Diam. from 0 ft. to 38' ft.

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 20'
Material used in seal Bentonite + Clay Cuttings
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off. _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation 1230 ft.
Static level 50' ft. below top of well Date 9-7-79
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) 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.

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 _____
Ballor test 80 gal./min. with ? ft. drawdown after 1 1/2 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes No

(10) WELL LOG:
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
<u>Dist</u>	<u>0</u>	<u>10'</u>
<u>Clay</u>	<u>10'</u>	<u>35'</u>
<u>Broken Basalt & Strips of Cleatichy</u>	<u>35'</u>	<u>60'</u>
<u>Hard Basalt</u>	<u>60'</u>	<u>70'</u>

RECEIVED

OCT 22 1979

DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 9-7, 1979. Completed 9-7, 1979

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Honey Drilling
(Person, firm, or corporation) (Type or print)

Address 708 180 E Maple

[Signed] Jim Doherrera
(Well Driller)

License No. 0799 Date 9-7, 1979

The Department of Ecology does NOT Warrant the Data and/or the Information on this Well Report.

21

File Original and First Copy with
Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

Start Card No. _____

STATE OF WASHINGTON

Water Right Permit No. _____

(1) OWNER: Name Alan D. Predochl Address 639 S. Pioneer Way Moses Lake, WA

(2) LOCATION OF WELL: County Grant SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec 8 T. 19 N. R. 29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
 Abandoned New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 6" inches.
 Drilled 162 feet. Depth of completed well 162 ft.

(6) CONSTRUCTION DETAILS:
 Casing installed: 6" Diam. from +1 1/2 ft. to 38 1/2 ft.
 Welded 4" Diam. from 10 ft. to 162 ft.
 Liner installed Threaded Diam. from _____ ft. to _____ ft.
 Perforations: Yes No
 Type of perforator used Skill saw
 SIZE of perforations 1/8 in. by 12 in.
80 perforations from 122 ft. to 162 ft.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.

Screens: Yes No
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
 Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 18' ft.
 Material used in seal Bentonite
 Did any strata contain unusable water? Yes No
 Type of water? Surface Depth of strata 14'
 Method of sealing strata off 6" casing - bentonite

(7) PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 20' ft. below top of well Date 2-12-92
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
 Was a pump test made? Yes No If yes, by whom? _____
 Yield: 50+ gal./min. with _____ ft. drawdown after _____ hrs.
"Estimated air lift 50+ gal per min."

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

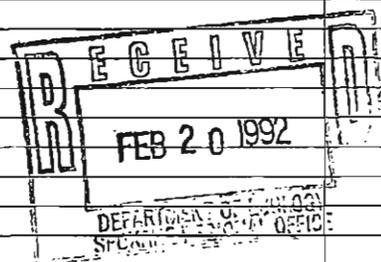
Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
 Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Top soil	0	3
Clay brown	3	14
Clay brown w/sand 1 GPM	14	16
Clay tan w/basalt gravel	16	35
Basalt gray	35	38
Basalt gray w/water 2GPM	38	42
Basalt gray	42	150
Basalt gray w/water 50+ GPM	150	155
Basalt gray	155	162



6" Drive shoe utilized

Work started 2-12-92, 19. Completed 2-13, 1992

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME Ponderosa Drilling & Development, Inc.
 (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address E. 5010 Broadway Spokane, WA 99212

(Signed) Alvin Carris License No. 1869
 (WELL DRILLER) (Alvin Carris)

Contractor's Registration No. PO-ND EI*248JE Date 2-17, 1992

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warrant the Data and/or the Information on this Well Report.

File Original and First Copy with
Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. 22

Permit No. _____

(1) OWNER: Name Lloyd Goehri Address MOSES LAKE WA
(2) LOCATION OF WELL: County GRANT E 1/2 - SW 1/4 SE 1/4 Sec. 8 T. 19 N. R. 19 W.M.
bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic Industrial Municipal
Irrigation Test Well Other

(4) TYPE OF WORK: Owner's number of well _____
(If more than one) _____
New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 170 ft. Depth of completed well 170 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 11 ft. to 19 ft.
Threaded " Diam. from _____ ft. to _____ ft.
Welded " Diam. from _____ ft. to _____ ft.

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 19 ft.
Material used in seal CEMENT
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation _____
above mean sea level _____
Static level 13 ft. below top of well Date 3-31-86
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____
(Cap, valve, etc.)

(9) 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.
" " " " " "
" " " " " "

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. with _____ ft. drawdown after _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes No

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Soil	0	2
COLECHC	2	9
BLACK Basalt	9	61
VERY HARD Grey	61	159
BR Broken Water	159	167
med Grey Basalt	167	170

APR 29 1986

DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started MARCH 27 1986 Completed MARCH 31 1986

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME L & L DRILLING INC
(Person, firm, or corporation) (Type or print)
Address P.O. Box 167 Wilson Creek
[Signed] Jerry Welley
(Well Driller)
License No. 0518 Date 4-17 1986

4/26/86

(USE ADDITIONAL SHEETS IF NECESSARY)

23

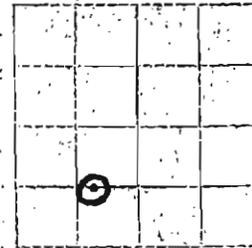
STATE OF WASHINGTON
 DEPARTMENT OF CONSERVATION
 DIVISION OF WATER RESOURCES

Appli. 8120

Per. 7876

WELL LOG

Record by Driller
 Source Driller's Record



Location: State of WASHINGTON

County Grant

Area

Map

E 1/4 SW 1/4 sec. 8 T. 19 N. R. 29 E

Diagram of Section

Drilling Co. Haney Drilling Co.

Address 1720 West Crouse St. Moses Lake, Wash.

Method of Drilling Cable Date April 19, 1967

Owner Loyd Goehri

Address Route 2, Box 71C, Moses Lake, Wash.

Land surface, datum 1220 ft above

SWL: 57' Date April 22, 1967 Dims. 12"x273'

CORRELATION	MATERIAL	From (feet)	To (feet)
-------------	----------	-------------	-----------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Domestic supply and irrigation			
	Top soil	0	7
	Caliche	7	12
	Clay	12	17
	Rock, broken, brown & clay	17	37
	Rock, porous, brown	37	58
	Basalt, hard, gray	58	104
	Basalt, broken w/clay	104	210
	Basalt, hard, gray	210	227
	Basalt, soft, gray	227	270
	Basalt, firm, gray	270	273
	Casing: 12" from 0' to 37'		
	Yield: 525 gpm with 190' DD after 4 hrs.		
	Recovery: time: water level:		
	0	57'	
	10 min.	57'	
	20 min.	57'	

Turn up _____ Sheet _____ of _____ sheets

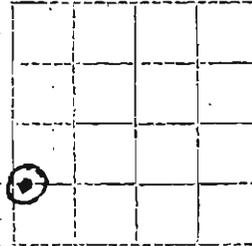
24

Appli: 10220
 Permit: 9757

STATE OF WASHINGTON
 DEPARTMENT OF CONSERVATION
 DIVISION OF WATER RESOURCES

WELL LOG

Record by..... Driller
 Source Driller's Record



Location: State of WASHINGTON
 County..... Grant
 Area.....
 Map.....

W₂ 1/4 SW₄ sec. 8 T. 19 N., R. 29 W.

Drilling Co. Frear Drilling
 Address Moses Lake, Washington
 Method of Drilling cable Date Sept. 16, 1969
 Owner Robert L. Oliver
 Address 710 E. Broadway, Moses Lake, Wn.

Land surface, datum 1200 ft. above
 below
 SWL: 29 Date Sept. 20, 1969 Dims.: 0' to 400

CORRELATION	MATERIAL	From (feet)	To (feet)
-------------	----------	-------------	-----------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	IRRIGATION		
	Top soil	0	1
	Coliche	1	12
	Basalt, clay & broken	12	15
	Basalt, black, broken	15	32
	Basalt, black	32	42
	Basalt, black, broken, water	42	48
	Basalt, black, firm	48	53
	Basalt, grey	53	76
	15" well drilled to 76' & 76' of 12" casing cemented in with 20 sacks cement sealing off the water hit at 48'		
	Basalt, grey	76	108
	Basalt, with/ black, broken	108	115
	Chek seams & water Static 45'		
	Basalt, black	115	142

Turn up of sheets

WELL LOG--Continued No. /

CON- LATION	MATERIAL	From (feet)	To (feet)
	Depth forward	142	
	Basalt, grey	142	154
	Basalt, black, water	154	167
	Static table 32'6"		
	Basalt, grey	167	174
	Basalt, black, water, rock	174	190
	Static table 32'8"		
	Basalt, hard, grey	190	221
	Basalt, black, streak of black shale, signs of water	Static 31'	221
	Basalt, grey	272	308
	Basalt, black	308	324
	Basalt w/ black & brown	324	339
	Clay seams signs of water		
	static 30'8"		
	Basalt, grey	339	400
	Casing from 0' to 33' & 0' to 76'		
	Seal: cement to 76' 48' strata		
	Yield: Shinn Irrigation with		
	600 gpm with 49' DD after 4 hrs.		
	Rec. data: Time	Water Level	
	0	78	
	1	25'	
	2	25'	
	5	25'	
	Date of test: 9-20-69		
	<i>Mater 73-6-394</i>		
	<i>11/24/75</i>	<i>000</i>	<i>00</i>
	<i>11/26/76</i>	<i>178</i>	<i>17</i>

Please print, sign and return to the Department of Ecology

161678 (25)



Water Well Report

Original - Ecology, 1st copy - owner, 2nd copy - driller

Construction/Decommission

Construction
 Decommission ORIGINAL INSTALLATION Notice of Intent Number _____

PROPOSED USE: Domestic Industrial Municipal
 DeWater Irrigation Test Well Other

TYPE OF WORK: Owner's number of well (if more than one) one
 New well Reconditioned Method: Dig Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 182
 Depth of completed well 182 ft.

CONSTRUCTION DETAILS
 Casing Welded 6 Diam. from 11 ft. to 19 ft.
 Installed: Liner installed Diam. from _____ ft. to _____ ft.
 Threaded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 19 ft.
 Material used in seal Bentone
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level 1090 ft.
 Static level 72 ft. below top of well Date 12-24-04
 Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal/min. with _____ ft. 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
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

 Date of test _____
 Bailor test _____ gal/min. with _____ ft. drawdown after _____ hrs.
 Airtest 90-90 gal/min. with stem set at 160 ft. for 2 hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water 62 Was a chemical analysis made? Yes No

Current Notice of Intent No. 179650

Unique Ecology Well ID Tag No. AKO 571

Water Right Permit No. _____

Property Owner Name Bruce W. Bailey

Well Street Address NO ADDRESS

City MOSES LAKE County Grant

Location SE 1/4-1/4 SW 1/4 Sec 8 Twn 19R 29E circle one

Lat/Long (s, t, r) Lat Deg _____ Lat Min/Sec _____

still REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No. 12-0903-520

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dirt	0	2
Gravel	2	16
Basalt Brown	16	19
Basalt Black	19	42
Basalt Brown	42	75
Basalt Grey	75	154
Basalt Red	154	177
Basalt Grey	177	182

RECEIVED

DEC 27 2004

DEPARTMENT OF ECOLOGY
 EASTERN WASHINGTON

Start Date 12-23-04 Completed Date 12-24-04

WELL CONSTRUCTION CERTIFICATION: I 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/Trainee Name (Print) Jim Stiens
 Driller/Engineer/Trainee Signature Jim Stiens
 Driller or trainee License No. 0469

Drilling Company Joy Drilling Co
 Address 5369 Jay el Ct.
 City, State, Zip Moses Lake WA 98837

If TRAINEE, Driller's Licensed No. _____
 Driller's Signature _____

Contractor's Registration No. Joy DRC 1370H Date 12-24-04
 Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

27

GWC 1780-A
SEC 9-19/29

U.S. No. 1254-2-30-254 24118

RETURN TO
OF HYDRAULICS
RECORD BY WELL DRILLER OR OTHER CONSTRUCTOR OF WORKS
FOR WITHDRAWAL OF GROUND WATER

RECEIVED
MAY 11 1951

Under Permit No. G. W. 759

DEPARTMENT OF
CONSERVATION & DEVELOPMENT

(The well driller or other constructor of works for the withdrawal of public ground waters shall be obligated to furnish the permittee a recorded record of the factual information necessary to show compliance with the provisions of this section. See Sec. 8, Chap. 260, Laws of 1945.)

1. Albert Peters, Dealer Rt. 1 - Moses Lake, Washington
(Name and address of owner of well or other works for withdrawal of water)
2. Type: name or number of works where water is taken Well
(Well, bore or hydroelectric works)
3. Date on which work on well or other structure was started October 10, 1948
4. Date on which work was completed June 28, 1950
5. If work on well or other structure was abandoned, give date November 1948 and March 19, 1950
and reason for abandonment Owner did not wish to go deeper
6. DESCRIPTION OF WORKS:

(a) Well: Depth 392 ft. Diameter 18 in. or ft. Dug or drilled drilled
Flowing or pump well Pump Well

If PUMP WELL: Type and size of pump is Four less Oil Lubricated Turbine # 86833

Type and size of motor or engine is 125 HorsePower - 1760 RPM

Depth from ground surface to water level before pumping 327 feet

After continuous operation four hours, the measured discharge of the pump is

1200 g.p.m., and the drawdown of water level is 305 feet
(At least four)

Recovery data (taken after pump has been shut off) (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level
Recovery of water <u>immediately</u>			

Date of test July 21, 1950

If FLOWING WELL: Measured discharge g.p.m. on (Date)

Shut-in pressure at ground surface lbs per sq. in. on (Date)

Water is controlled by (Cap. Valve, etc.)

CASING: (Give diameter, commercial specifications and depth below ground surface of each casing size.)

18 in. diameter Standard Pipe from 0 to 28 ft

 in. diameter from to ft.

 in. diameter from to ft.

 in. diameter from to ft.

Describe and show depth of shoe, plug, adapter, liner or other details:

Long-patterned drive shoe on bottom joint of pipe.

20
22
23

[]

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

27

GWC 1780-A

Perforated casing or screens:

None	from	to	ft.
(Number per foot and size of perforations, or describe screen)	from	to	ft.
	from	to	ft.
	from	to	ft.
	from	to	ft.

LOG OF WELL OR TUNNEL: (Describe each stratum or formation clearly, indicate if water bearing, and give thickness and depth as indicated.)

MATERIAL	Thickness (Feet)	Depth (Feet)
Top Soil	4	4
Sandy Loam	18	22
Gray Shale	20	42
Broken Basalt (Small amount of water)	73	115
Dark Basalt	51	166
Black Basalt (Intermediate Clay Seams)	49	215
Black Basalt - Hard	95	310
Porous Gray Basalt - Small Amount of Water	19	329
Hard Gray Basalt	42	371
Porous Black Basalt - Water Bearing	21	392
(47 feet - 18" hole - balance of well - 12")		

(b) INFILTRATION TRENCH OR TUNNEL: Type...

Dimensions: (Trench—length, course and cross-sectional size) (Trench—minimum and maximum depths)

Bottom width ft. Discharge g.p.m. Date of test

Position of water bearing stratum with reference to portal of tunnel

Frank J. [Signature]
(Signature of driller or other constructor)

Box 165 - Wood Lake, Washington
(Address)

STATE OF WASHINGTON.

County of *Franklin*

I, *Frank J. [Signature]*, being first duly sworn, do hereby certify that I am the driller or constructor of the aforesaid well or tunnel or trench who furnished the foregoing statement of facts; that I have read said statement and each and all of the items therein contained are true to the best of my knowledge and belief.

Frank J. [Signature]
(Signature)

Subscribed and sworn to before me this *24* day of *May* 1951

R. S. [Signature]
Notary Public

11229



Well Report Change Form

Instructions: Record any change made to the well report record on this form. You must append this form to the well report image. File this form with the original well report. **USE INK PEN ONLY WHEN FILLING OUT THIS FORM.**

(REQUIRED) This Well Report has been changed on (Date) 6 / 10 / 05

(REQUIRED) Not in NITS NITS Log ID# _____

Regional Office: CRO ERO NWRO SWRO

Well Type: Water Well Resource Protection Well

Notice of Intent #: _____ Unique Ecy Well ID Tag No: _____

(Required) Original Owner Name: Albert Peters

Well Street Address: _____

City: _____ County: Grant Zip Code: _____

Geographic Location:

(Required) _____ 1/4 of the _____ 1/4 Section 9 Township 19 Range 29 EWM or (circle one) WWM

(Optional) Lat Degrees _____ Lat Time _____ Horizontal collection method code _____

Long Degrees _____ Long Time _____

Tax Parcel No (include all zeros and dashes): _____

Type of Work: New Well Reconditioned Deepened

Well Report Recvd Date: ____/____/____ Well Completed Date: ____/____/____

Well Diameter (in): 14 Well Depth (ft): 392 Other: _____

Driller License No: _____ Trainee License No: _____

Other (Specify): _____

(Required) Person Requesting Change Jaimie Tower

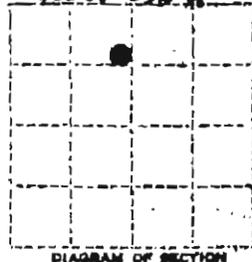
(Required) Reason for Change County data was missing. Current county data was derived from township, section, range, and quarter quarter data

(Required) Tracker Signature: Jaimie Tower

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG No. Appl. 1590
Date July 10, 19 50 Cert. 851-A
Record by Earl C. Morrison
Source Driller's Record



Location: State of WASHINGTON
County Grant
Area _____
Map _____
NE 1/4 NW 1/4 sec. 9 T. 19 N., R. 29 E. W.

Drilling Co. Morrison & Morrison
Address Box 260; Harrington
Method of Drilling FOAM SKIN Date July 11 1950
Owner W. P. McGuire 1700 Broadway
Address P.O. Box 1099; Moses Lake 97457
Land surface, datum 1250 ft. above
below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
-------------	----------	------------------	--------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Yellow clay	17	17
	Black basalt	12	59
	Grey basalt	14	73
	Grey basalt	26	99
	Blue basalt	14	113
	Blue & grey streaked basalt	10	123
	Grey basalt	17	140
	Hard grey basalt	5	145
	Mixture of blue & grey basalt	19	164
	Blue basalt	17	181
	Grey & blue basalt	4	185
	Water bearing rock (water level)	5	190
	Porous rock	14	207
	Blue basalt	17	224
	Blue shale	8	232
	Black basalt	26	258

Turn up (over) Sheet _____ of _____ sheets

WELL LOG.—Continued

No. _____ / _____

CONDI- TION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Depth forward	—	
	Grey basalt	21	279
	Hard grey basalt	5	284
	Grey basalt	40	324
	Very hard grey basalt	6	330
	Grey basalt	7	337
	Gravel	5	342
	Black basalt	13	355
	Grey basalt	22	377
	Very hard grey basalt	16	393
	Grey basalt	8	401
	Layers black basalt, & porous rock (more water)	23	424
	Layers of black & grey basalt	12	436
	Black basalt	19	455
	Black basalt & blue clay	17	472
	Black & blue basalt	9	481
	Blue & grey basalt	10	491
	Hard blue basalt	4	495
	Hard grey basalt	3	498
	Grey basalt	17	515
	Blue basalt	15	530
	Grey basalt	13	543
	Black basalt	17	560
	Increase in water at 552 to 557'		
	Black sand & black basalt	8	568
	Black basalt	10	578
	Black & grey basalt some sand	9	587
	Black basalt, blue clay & shale	18	605
	Black basalt	20	625
	Black basalt	12	637
	Pump test:		
	Dia: 637 x 10" Drilled		
	SWL: 250'		
	DD: 14'		
	Yield: 675 g.p.m.		
	Casing: 10" dia. I.D. from 0 to 53'		
	Perforations: no information		

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

30

Sheet No 1

WELL DRILLING LOGS FOR
W.P. MC CLURE
LOSOS BARR, WASH.

RECEIVED
JAN 22 1951
DEPARTMENT OF
CONSERVATION & DEVELOPMENT

Started drilling 4/4/1950

GWC-851A
SCE 9-19/29

From 0 to 47 feet-- yellow clay
 From 47 to 59 feet-- black basalt
 From 59 to 72 feet-- grey basalt
 From 72 to 99 feet-- grey basalt
 From 99 to 113 feet-- blue basalt
 From 113 to 123 feet-- blue and grey streaked basalt
 From 123 to 140 feet-- grey basalt
 From 140 to 145 feet-- hard grey basalt
 From 145 to 164 feet-- mixture of blue and grey basalt
 From 164 to 181 feet-- blue basalt
 From 181 to 188 feet-- grey and blue basalt
 From 188 to 190 feet-- water bearing rock and gravel

Hit water approximately 190 feet

From 190 to 207 feet-- porous rock
 From 207 to 224 feet-- blue basalt
 From 224 to 232 feet-- blue shale
 From 232 to 246 feet-- black basalt
 From 246 to 279 feet-- grey basalt
 From 279 to 294 feet-- hard grey basalt
 From 294 to 324 feet-- grey basalt
 From 324 to 330 feet-- very hard grey basalt
 From 330 to 337 feet-- grey basalt
 From 337 to 342 feet-- gravel
 From 342 to 353 feet-- black basalt
 From 353 to 377 feet-- grey basalt
 From 377 to 393 feet-- very hard grey basalt
 From 393 to 401 feet-- grey basalt
 From 401 to 424 feet-- layers black basalt and porous rock
 increase in water at approximately 424 feet.
 From 424 to 436 feet-- black and grey basalt in layers
 From 436 to 458 feet-- black basalt
 From 458 to 472 feet-- black basalt and blue clay
 From 472 to 481 feet-- black and blue basalt
 From 481 to 481 feet-- blue and grey basalt
 From 481 to 485 feet-- hard blue basalt
 From 485 to 493 feet-- hard grey basalt
 From 493 to 514 feet-- grey basalt
 From 514 to 527 feet-- blue basalt
 From 527 to 540 feet-- grey basalt
 From 540 to 550 feet-- black basalt

Increase in water at approximately 514 feet to 517 feet.

From 517 to 530 feet-- black sand and black basalt
 From 530 to 573 feet-- black basalt
 From 573 to 587 feet-- black and grey basalt with
 some sand.
 From 587 to 605 feet-- black basalt blue clay and shale.
 From 605 to 625 feet-- black basalt
 Increase in water at approximately 605 feet
 From 625 to 627 feet-- black basalt

Completed July 10, 1953

MORRISON & MORRISON (DRILLERS)
BOX 260
WASHINGTON, D.C.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. _____

Permit No. **10709**

33

(1) OWNER: Name Carnation Company Address Route 2, Box 60C, Moses Lake, WA. 98801

LOCATION OF WELL: County Grant County 1/4 Sec. 16, T19 N, R29E, W12E

and distance from section or subdivision corner 1090 Ft East & 300 Ft N. from S. W. Corner, Sec 16

(3) PROPOSED USE: Domestic Industrial Municipal
Irrigation Test Well Other

(4) TYPE OF WORK: Owner's number of well (if more than one) No II
New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 12" to 15" inches
Drilled 700-627 ft. Depth of completed well 700-627 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 12" Diam. from 0 ft. to 112 ft.
Threaded " Diam. from 0 ft. to 100 ft.
Welded " Diam. from 0 ft. to 100 ft.

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 112 ft.
Material used in seal _____
Did any strata contain unusable water? Yes No
Type of water Surface Depth of strata 32'
Method of sealing strata off CEMENT BOTTOM

(7) PUMP: Manufacturer's Name Byron Jackson
Type: Deep Well 16 Stage HP 200

(8) WATER LEVELS: Land-surface elevation 1242 ft.
Static level 130 ft. below top of well Date 9/72
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level SHINN
Was a pump test made? Yes No If yes, by whom SHINN Irrig.
Yield: gal./min. with _____ ft. drawdown after _____ hrs.
" 1600 " 180 " " "

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 _____
Baller test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ 67 Was a chemical analysis made? Yes No

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
<u>Over Burden</u>	<u>0</u>	<u>5</u>
<u>Caliche</u>	<u>5</u>	<u>18</u>
<u>Broken Basalt & Clay S</u>	<u>18</u>	<u>29</u>
<u>Black Broken Basalt</u>	<u>27</u>	<u>42</u>
<u>Broken Black & Brown B</u>	<u>42</u>	<u>82</u>
<u>Basalt Water Bearing</u>		
<u>Black Basalt</u>	<u>82</u>	<u>114</u>
<u>Black & Brown Basalt</u>	<u>114</u>	<u>131</u>
<u>Black Basalt</u>	<u>131</u>	<u>141</u>
<u>Black & Brown Basalt</u>	<u>141</u>	<u>160</u>
<u>Some Water</u>		
<u>Grey Basalt</u>	<u>160</u>	<u>172</u>
<u>Black & Brown Basalt</u>	<u>172</u>	<u>177</u>
<u>Grey Basalt</u>	<u>177</u>	<u>183</u>
<u>Black Basalt</u>	<u>183</u>	<u>216</u>
<u>Black & Brown Basalt</u>	<u>216</u>	<u>237</u>
<u>with Clay seams</u>		
<u>Grey Basalt</u>	<u>237</u>	<u>258</u>
<u>Black & Brown Basalt</u>		
<u>with Clay seams</u>	<u>258</u>	<u>281</u>
<u>Grey Basalt</u>	<u>281</u>	<u>577</u>
<u>Black & Brown Basalt</u>	<u>577</u>	<u>590</u>
<u>Water bearing</u>		
<u>Grey Basalt</u>	<u>590</u>	<u>627</u>
<u>15" to 12" at 592</u>		
<u>Black Basalt Water Bearing</u>	<u>627</u>	<u>629</u>
<u>W. Bearing Clay</u>		
<u>Blue Clay</u>	<u>629</u>	<u>635</u>
<u>Black Broken Basalt</u>	<u>635</u>	<u>642</u>
<u>Clay seams (Water)</u>		
<u>Grey Basalt</u>	<u>642</u>	<u>659</u>

Work started 9-8 1968 Completed 5-1 1969

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Fresh Drilling
(Person, firm, or corporation) (Type or print)

Address Moses Lake Wash

[Signed] [Signature]
(Well Driller)

License No. _____ Date May 29, 1973

OK
720
64-73

34

Please print, sign and return to the Department of Ecology



Water Well Report

Original - Ecology, 1st copy - owner, 2nd copy - driller

187033

Construction/Decommission

Construction
 Decommission ORIGINAL INSTALLATION Notice of Intent Number _____

PROPOSED USE: Domestic Industrial Municipal
 DeWater Irrigation Test Well Other _____

TYPE OF WORK: Owner's number of well (if more than one) 1
 New well Reconditioned Method: Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 45 ft.
 Depth of completed well 45 ft.

CONSTRUCTION DETAILS
 Casing Welded 6 Diam. from +1 ft. to 40 ft.
 Installed: Liner installed Diam. from _____ ft. to _____ ft.
 Threaded Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location 40-45
 Manufacturer's Name Johnson
 Type SS Model No. _____
 Diam. 5" Slot size 20 from 40 ft. to 45 ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 18 ft.
 Material used in seal Butter
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 14 ft. below top of well Date 10-24-05
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (cup, 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal./min. with _____ ft. 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
_____	_____	_____	_____	_____	_____

 Date of test _____
 Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airstest 40 gal./min. with stem set at 35 ft. for 2 hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water 59.8 Was a chemical analysis made? Yes No

Current Notice of Intent No. W178980

Unique Ecology Well ID Tag No. AIR 294

Water Right Permit No. _____

Property Owner Name Joel Delarosa

Well Street Address 9126 Ad H New

City Clatsop County County Grant 98838 ²³

Location NE 1/4 NE 1/4 Sec 16 Twn 19 R 29 EWM or WWM circle one

Lat/Long (s, t, r) Lat Deg _____ Lat Min/Sec _____

still REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No. 151 9090-04

CONSTRUCTION OR DECOMMISSION PROCEDURE
 Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Boulders & Gravel	0	16
Sand Block	16	45
Sandy Blue Sand	45	55

RECEIVED

JAN 3 2006

DEPARTMENT OF ECOLOGY
 EASTERN REGIONAL OFFICE

Start Date 10-24-05 Completed Date 10-24-05

WELL CONSTRUCTION CERTIFICATION: I 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/Trainee Name (Print) Tim Stien S.
 Driller/Engineer/Trainee Signature [Signature]
 Driller or trainee License No. 0469

Drilling Company Joy Drilling Co
 Address 5369 Javel Ct.
 City, State, Zip MOSES WA 98837

IF TRAINEE,
 Driller's Licensed No. _____
 Driller's Signature _____

Contractor's
 Registration No. Joy DRC 13704 Date 11-1-05
 Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Appl. #3283

Date July 10, 1953

Cart. #2052-A

Record by Sam Palmerton

Source Well Driller's record

Location: State of WASHINGTON

County Grant

Area _____

Map _____

SW 1/4 NW 1/4 sec. 16 T. 19 N. R. 29 E.

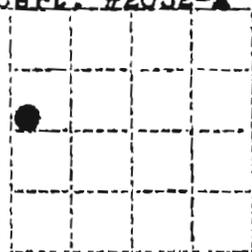


DIAGRAM OF SECTION

Drilling Co. Wheeler Water Association, Inc.

Address Moses Lake, Wash.

Method of Drilling drilled Date 19

Owner Wheeler Water Association, Inc.

Address Moses Lake, Wash.

Land surface, datum 1221 ft. above
below

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses, if material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials. List all casings, perforations, screens, etc.)

	Top soil	20	20
	Gravel	11	31
	Brown basalt	35	66
	Water, 58' to 60'		
	Black basalt	49	115
	Gray basalt	23	138
	Brown porous basalt	20	158
	Black basalt	21	179
	Brown basalt	58	237
	Black basalt	31	268
	Black porous basalt	20	288
	Water 268' to 288'		
	Black basalt	2	290
Pump Test:			
	Dim: 290' x 6"		
	SWL: 55'		

Turn up (Over)

Sheet _____ of _____ sheets

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Well Tagging Form

m 39

Unique Well Tag No: AEH 393 -

111743 02

RECORD VERIFICATION (check one)

- Well Report available (please attach this form to the well report and submit it to the Ecology Regional Office near you)
- Verification inconclusive
- Well Report not available

WELL OWNERSHIP, IF DIFFERENT FROM WELL REPORT

First Name: Nestle USA Last Name: _____

Street Address: 14124 Wheeler Rd NE

City: Moses Lake State: WA

LOCATION OF WELL, IF DIFFERENT FROM WELL REPORT

Well Address: _____

City: _____ County: _____

T. 14 N. R. 29 E W.M. Sec. 16 NW 1/4 of the SE

FOR AGENCY USE ONLY

Latitude 47 07 53 . ~~54383~~ ⁶⁴⁶⁸⁵ "

Longitude 119 11 19 . ~~03063~~ ^{39568 W} "

Elevation at land surface ~~395~~ 402 feet/meters (circle one)

- GPS
- Topographic Map
- Survey
- Computer generated
- Digital Altimeter
- Topographic Map
- Other GPS

Additional information, if available:

- Location marked on topographic map (please attach)
- Location marked on air photo (please attach)

FOR AGENCY USE ONLY

WELL CHARACTERISTICS

Physical Description of well (size of casing, type of well, housing, etc.)

Location of Well identification Tag:

on outlet pipe behind pump in well house

Was supplemental tag needed for ease of identifying well?

Yes

No

If yes, where was tag placed?

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Scale 1:24,000 (1"=2,000')

Indicate the location of the well within the Section by drawing a dot at that point.

SECTION 16

COMMENTS:

FOR ECOLOGY WATER RESOURCES PROGRAM ONLY

Water Right # _____

Date Issued _____

Circle One:

Application

Permit

Certificate

Claim

Exempt

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Decla. #649

Date 1910 19__

Cert. #569-D

Record by J. T. Moore

Source G. W. Decla. Claim

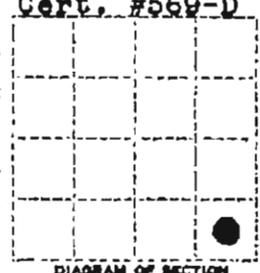
Location: State of WASHINGTON

County Grant

Area _____

Map _____

SE 1/4 SE 1/4 sec. 16 T. 19 N., R. 29 E.



Drilling Co. _____

Address _____

Method of Drilling drilled Date 19__

Owner Northern Pacific Railway

Address Smith Tower, Seattle

Land surface, datum _____ ft. above
below _____

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	no record		
	1st water vein	300	300
	2nd " "	57	357
Pump Test:			
	Dim: 372' x 10"		
	SW: 130'		
	Dd: not given		
	Yield: 50 g.p.m. (Claim)		
	Casing: 10" dia. W.S. pipe from 0'		
	to 58'		
	Pump: Geared pump head, 5 3/4" x 36		
	cylinder		
	Motor: 15 hp		

Turn up _____

Sheet _____ of _____ sheets

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

41

WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission ("x" in circle)
 Construction
 Decommission ORIGINAL CONSTRUCTION Notice
of Intent Number 150399

CURRENT Notice of Intent No. W173629
Unique Ecology Well ID Tag No. AHTJ 863
Water Right Permit No. _____

Property Owner Name Romano Rodriguez
Well Street Address 14873 3rd St Moses Lake
City MOSES LAKE County: Grant
Location SE 1/4 1/4 SE 1/4 Sec 16 Twn 19 R 29 EWM Circle or one WWM
Lat/Long: Lat Deg _____ Lat Min/Sec _____
(s, l, r still) Long Deg _____ Long Min/Sec _____
REQUIRED
Tax Parcel No. 12 1689 000

PROPOSED USE: Domestic Industrial Municipal
 DeWater Irrigation Test Well Other
TYPE OF WORK: Owner's number of well (if more than one) 1
 New Well Reconditioned Method: Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 82 ft.
Depth of completed well 82 ft.
CONSTRUCTION DETAILS
Casing Welded 6" Diam. from 41 ft. to 52 ft.
Installed: Liner installed 52" Diam. from 47 ft. to 80 ft.
 Threaded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
Type of perforator used touch
SIZE of perms 7/8 in. by 2 in. and no. of perms 40 from 30 ft. to 80 ft.
Screens: Yes No K-Pac Location _____
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot Size _____ from _____ ft. to _____ ft.
Diam. _____ Slot Size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
Materials placed from _____ ft. to _____ ft.
Surface Seal: Yes No To what depth? 30 ft. ft.
Materials used in seal Best Seal
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

PUMP: Manufacturer's Name ac motor
Type: Sub H.P. 3/4 120pm
WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 38 ft. below top of well Date _____
Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
Yield: _____ gal./min. with _____ ft. 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

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airstest 45 gal./min. with stem set at 60 ft. for 2 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 59 Was a chemical analysis made? Yes No

CONSTRUCTION OR DECOMMISSION PROCEDURE
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.
(USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dirt	0	16
caliche	16	22
Dirt	22	39
Basalt Casting Bone	39	52
Basalt Block	52	55
Basalt Black Red		
Basalt yellow shale	55	82

RECEIVED
JUN - 8 2004
EASTERN REGIONAL OFFICE
Start Date 5-7-04 Completed Date 5-7-04

WELL CONSTRUCTION CERTIFICATION: I 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 Trainee Name (Print) Tim Stevens Drilling Company Joy Drilling Co
Driller/Engineer/Trainee Signature Tim Stevens Address 5369 Janel Ct.
Driller or Trainee License No. 0469 City, State, Zip MOSES LAKE WA.
Contractor's Registration No. Joy DR13704 Date _____
If trainee, licensed driller's Signature and License no. _____
Ecology is an Equal Opportunity Employer. ECV 050-1-20 (Rev 4/01)

Please print, sign and return to the Department of Ecology



Water Well Report

Original - Ecology, 1st copy - owner, 2nd copy - driller

175887

Construction/Decommission

Construction
 Decommission ORIGINAL INSTALLATION Notice of Intent Number _____

PROPOSED USE: Domestic Industrial Municipal
 DeWater Irrigation Test Well Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____
 New well Reconditioned Method: Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 80 ft.
 Depth of completed well 80 ft.

CONSTRUCTION DETAILS
 Casing Welded 6" Diam from +1 ft. to 33 ft.
 Installed: Liner installed _____ Diam. from _____ ft. to _____ ft.
 Threaded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 33 ft.
 Material used in seal grout
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 30 ft. below top of well Date 7-13-05
 Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal./min. with _____ ft. 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

Date of test _____
 Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airiest 30-40 gal./min. with stem set at 75 ft. for 2 hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water 51.6 Was a chemical analysis made? Yes No

Current Notice of Intent No. W 185334

Unique Ecology Well ID Tag No. ARR 370

Water Right Permit No. _____

Property Owner Name Mania Parias

Well Street Address NA

City Moses Lake County Grant

Location SE 1/4 SE 1/4 Sec 16 Twn 12 R 27 EWM or WWM circle one

Lat/Long (s, t, r) Lat Deg _____ Lat Min/Sec _____

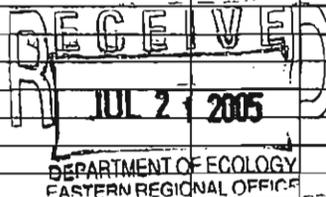
still REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No. 12-116300

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dirt	0	14
caliche	14	19
Dirt	19	22
Basalt brown red	22	33
Basalt grey	33	52
Basalt black red	52	80
Brown	420	



Start Date 7-13-05 Completed Date 7-13-05

WELL CONSTRUCTION CERTIFICATION: I 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/Trainee Name (Print) Jim Steens
 Driller/Engineer/Trainee Signature Jim Steens
 Driller or trainee License No. 0469

Drilling Company Joy Drilling Co
 Address 5369 Jewel Ct
 City, State, Zip Moses Lake WA 98837
 Contractor's Registration No. Joy DR13704 Date 7-15-05
 Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)

IF TRAINEE.
 Driller's Licensed No. _____
 Driller's Signature _____

Please print, sign and return to the Department of Ecology



Water Well Report

Original - Ecology, 1st copy - owner, 2nd copy - driller.

176395

Construction/Decommission

Construction
 Decommission ORIGINAL INSTALLATION Notice of Intent Number _____

Current

Notice of Intent No. W 185335

Unique Ecology Well ID Tag No. A/L 371

Water Right Permit No. _____

Property Owner Name Melecio Cerna

Well Street Address A91

City Moses Lake County Grant

Location SW 1/4-11SE 1/4 Sec 16 Twn 17 R 79 EWM or WWM circle one

Lat/Long (s, l, r) Lat Deg _____ Lat Min/Sec _____

still REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No. 12-16-68-000

PROPOSED USE: Domestic Industrial Municipal
 Dr Water Irrigation Test Well Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____
 New well Reconditioned Method: Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 20 ft.
 Depth of completed well 90 ft.

CONSTRUCTION DETAILS
 Casing Welded 6" Diam. from 71 ft. to 39 ft.
 Installed: Liner installed 5 3/8" Diam. from 30 ft. to 90 ft.
 Threaded 6" Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 40 ft.
 Material used in seal Portland
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

PUMP: Manufacturer's Name _____ H.P. _____
 Type _____

WATER LEVELS: Land surface elevation above mean sea level _____ ft.
 Static level 26 ft. below top of well Date 7-14-05
 Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

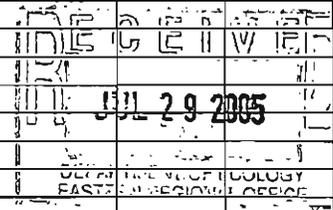
Time	Water Level	Time	Water Level	Time	Water Level
_____	_____	_____	_____	_____	_____

 Date of test _____
 Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Arrest 30 gal./min. with stem set at 80 ft. for 2 hrs
 Artesian flow _____ g.p.m. Date _____
 Temperature of water 59.6 Was a chemical analysis made? Yes No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dirt	0	15
Caliche	15	21
Dirt	21	25
Basalt Brown red		
Yellow	25	39
Basalt Grey	39	47
Basalt Red Yellow		
Brown white shale H2O	47	90
Basalt Grey	90	



Start Date 7-14-05 Completed Date 7-14-05

WELL CONSTRUCTION CERTIFICATION: I 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/Trainee Name (Print) Tim Stevens
 Driller/Engineer/Trainee Signature Tim Stevens
 Driller or trainee License No. 0469

Drilling Company Joy Drilling Co
 Address 5369 Janet Ct
 City, State, Zip Moses Lake WA

If TRAINEE:
 Driller's Licensed No. _____
 Driller's Signature _____

Contractor's
 Registration No. Joy PAC13704 Date 7-15-05
 Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with
Department of Ecology
Second Copy -- Owner's Copy
Third Copy -- Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.
Permit No.

(44)

(1) **OWNER:** Name Jessie M. Shannon Address Route 2, Box 81, Moses Lake, WA 98837
LOCATION OF WELL: County GRANT - SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec 16 T 29 N. R 19E W.M.
 Bearing and distance from section or subdivision corner 19 29

(3) **PROPOSED USE:** Domestic Industrial Municipal
 Irrigation Test Well Other

(4) **TYPE OF WORK:** Owner's number of well (if more than one)
 New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

(5) **DIMENSIONS:** Diameter of well 6.7 inches.
 Drilled 7.5 ft. Depth of completed well 73 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 6" Diam. from +1 ft. to 27 ft.
 Threaded " Diam. from ft. to ft.
 Welded " Diam. from ft. to ft.

Perforations: Yes No
 Type of perforator used
 SIZE of perforations in. by in.
 perforations from ft. to ft.
 perforations from ft. to ft.
 perforations from ft. to ft.

Screens: Yes No
 Manufacturer's Name
 Type Model No
 Diam. Slot size from ft. to ft.
 Diam. Slot size from ft. to ft.

Gravel packed: Yes No Size of gravel:
 Gravel placed from ft. to ft.

Surface seal: Yes No To what depth? 27 ft.
 Material used in seal: bentonite
 Did any strata contain unusable water? Yes No
 Type of water? Depth of strata
 Method of sealing strata off

(7) **PUMP:** Manufacturer's Name
 Type: H.P.

(8) **WATER LEVELS:** Land-surface elevation above mean sea level ft.
 Static level 50 ft. below top of well Date 12/18/75
 Artesian pressure lbs. per square inch Date
 Artesian water is controlled by (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
 Was a pump test made? Yes No If yes, by whom?
 Yield: 25 gal./min. with ft. drawdown after hrs.
 " ESTIMATED AIRLIFT " " " " " " "

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. with ft. drawdown after hrs.
 Artesian flow g.p.m. Date
 Temperature of water Was a chemical analysis made? Yes No

(10) **WELL LOG:**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Silt	0	15
Caliche	15	23
Basalt, soft	23	27
Basalt, medium	27	65
Basalt, fractured w/water	65	75
60' of 4" PVC Liner Installed		
6" Drive shoe installed		
RECEIVED		
JAN 8 1986		
DEPARTMENT OF ECOLOGY SPOKANE REGIONAL OFFICE		
Work started <u>12/17</u> , 19 <u>85</u> . Completed <u>12/18</u> , 19 <u>85</u> .		

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME PONDEROSA DRILLING & DEVELOPMENT INC.
 (Person, firm, or corporation) (Type or print)

Address E. 6010 Broadway, Spokane, WA 99212

[Signed] James M. Doyle
 James M. Doyle (Well Driller)
 License No. 1287 Date 12/18, 1985

1/8/86

45



UNIQUE WELL I.D. NUMBER	A	B	Z	5	0	1
	X	Y	Z	1	2	3

WELL TAGGING FORM

Date of Field Visit _____ By _____

RECORD VERIFICATION

- Well Report available (please attach)
- Well Report not available
- Verification inconclusive

WELL OWNERSHIP

Name NATIONAL FROZEN FOODS CORPORATION

Street address 14406 ROAD 3 N.E.

City MOSES LAKE State WASHINGTON

LOCATION OF WELL

Well Address 14406 ROAD 3 N.E.

City MOSES LAKE County GRANT

T. 19 N. R. 29 W.M. Sec. 16 1/4 SE 1/4 SW

GPS Location: Latitude _____ ° _____ ' _____ "

Longitude _____ ° _____ ' _____ "

- Elevation at land surface _____ feet/meters (circle one)
- Digital Altimeter
 - Topographic Map
 - Other _____

If unable to verify location with GPS equipment:

- Location marked on topographic map (please attach if available)
- Location marked on air photo (please attach if available)

WELL CHARACTERISTICS

Physical Description of Well (size of casing, type of well, housing, etc.): _____

Depth of well is 719'. set a bridge at 352', set 346½' of 12" casing cemented in with one yard of neat cement

Location of Well Identification Tag: _____

Was Supplemental Tag needed for ease of identifying well?

- NO YES

If yes, where was tag placed? _____

Scale 1:24,000 (1"=2,000')

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Indicate the location of the well within the Section by drawing a dot at that point.

SECTION _____

COMMENTS: _____

FOR ECOLOGY WATER RESOURCES PROGRAM USE ONLY

Water Right # _____ Date Issued _____

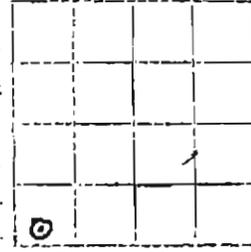
Circle one: Application Permit Certificate Claim Exempt

40

STATE OF WASHINGTON.
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT Appli. #7474

WELL LOG No. Permit-#7021

Date..... Sept. 25, 1965.
Record by..... Driller
Source..... Driller's Record



Location: State of WASHINGTON
County..... Grant
Area..... 590' E and 300' N of
Map..... SW section corner.
SW 1/4 SW 1/4 sec. 16 T. 19 N., R. 29 E.

Drilling Co..... Frear Drilling
Address..... Moses Lake, Washington
Method of Drilling..... Date July 16, 1965

Owner..... Pronto Foods, Inc.
Address..... Moses Lake, Washington
Land surface, datum..... ft above
below

CORRE- LATION	MATERIAL	DEPTH (feet) FROM	DEPTH (feet) TO
------------------	----------	-------------------------	-----------------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Industrial use		
	DIMS: 16" x 670'		
	Dirt	0	8
	Calichy	8	16
	Rock, broken	16	75
	Basalt, black	75	106
	Gray basalt	106	134
	Basalt, black	130	241
	Clay, broken	241	260
	Basalt, black (wtr 275 to 289)	260	320
	Basalt, gray	320	360
	Basalt, black	360	378
	Basalt, gray	378	421
	Basalt, black	421	466

Turn up Sheet of sheets

46

WELL LOG—Continued

No. /

COMB-LAYER	MATERIAL	DEPTH (feet) FROM	DEPTH (feet) TO
	Depth forward	-----	
	Basalt, black, broken	466	503
	Basalt, gray (water at 572')	503	574
	Basalt, black (wtr at 620-632)	574	664
	Basalt, gray	664	670
	Casing: 16" from 0-75'		
	Surface sealed with cement to depth of 76'		
	SWL: 55' on 7/16/65		
	Yield: 1400 gpm with 106' DD after 5 hrs.		
	RECOVERY DATA:	Time	Water Level
		0	135'
		10	135'
		15	135'
		20	135'
	NOTE: Pump gravel around bowls had to lower pump to free in well.		
	DATE: 8/21/65		
	Temp: 55°		
	Meter	15	483 1800 gals
		12/75	509 823
		12/76	399 170

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

47

**WATER WELL REPORT
STATE OF WASHINGTON**

Original and First Copy with
Division of Water Resources
1 Copy - Owner's Copy
1 Copy - Driller's Copy

Application No. 8463
Permit No. 7827

1) OWNER:

Name WESTERN FARMERS ASSOCIATION
Address MOSES LAKE WASH.

2) LOCATION OF WELL:

County St. W. Owner's number, if any -
Section 16 T. 14 R. 29 E W.M.
Bearing and distance from section or subdivision corner
The easterly 1439 feet of the N $\frac{1}{2}$ of Farm Unit 81, Irrigation Block 41 within SW $\frac{1}{4}$ of Sec. 16, T. 19 N., R. 29 E.W.M.

3) TYPE OF WORK (check):

Install Well Deepening Reconditioning Abandon
If abandonment, describe material and procedure in Item 11.

4) PROPOSED USE (check):

Domestic Industrial Municipal
Irrigation Test Well Other

(5) TYPE OF WELL:

Rotary Driven
Cable Jetted
Dug Bored

6) CASING INSTALLED:

Threaded Welded

" Diam. from 4.2 ft. to 7.9 ft. Gage 375
" Diam. from 50.2 ft. to 57.3 ft. Gage 312
" Diam. from _____ ft. to _____ ft. Gage _____

7) PERFORATIONS:

Perforated? Yes No

Type of perforator used TORCH CUT
SIZE of perforations $\frac{1}{4}$ in. by 4 in. 12 holes PER FT
perforations from _____ ft. to _____ ft.
600 perforations from 521 ft. to 571 ft.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.

8) SCREENS:

Well screen installed Yes No

Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.

9) CONSTRUCTION:

Was well gravel packed? Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.
Was a surface seal provided? Yes No To what depth? 79 ft.
Material used in seal - NEAT CEMENT GROUT
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Depth of sealing strata off _____

10) WATER LEVELS:

Static level 124.6 ft. below land surface Date May 24, 67
Artesian pressure _____ lbs. per square inch Date _____
Water is controlled by _____ (Cap. valve, etc.)

OK/rr

(11) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? Yes No. If yes, by whom? HOLMAN DRILLING
Yield: 1000 gal./min. with 5.7 ft. drawdown after 2 hrs.
" 1200 " 6.8 " 2 "
" 1500 " 8.3 " 2 "

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
0	132.9	40	126.2
10 SEC	127	50	126
20	126.5	60 SEC	125.9
30	126.3		

Date of test MAY 24 67

Ballor test _____ gal./min with _____ ft. drawdown after _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water 51° Was a chemical analysis made? Yes No

(12) WELL LOG:

Diameter of well 16 inches.

Depth drilled 720 ft. Depth of completed well 720 ft.

Formation: Describe by color, character, size of material and structure, and show thickness of layers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
SANDY CLAY	0	26
BASALT (BRN SOFT) * ^{CHASD OFF}	26	64
BASALT (HARD GRAY)	64	128
BASALT (MED GRAY) *	128	140
BASALT (HARD GRAY)	140	167
BASALT (MED BRN FRACTURED) *	167	184
BASALT (MED GRAY)	184	342
BASALT (SOFT BRN + CLAY)	342	346
BASALT (HARD GRAY)	346	517
BASALT (SOFT DARK GRAY) * *	517	569
BASALT (HARD DARK GRAY)	569	583
BASALT (MED BLACK FRACTURED) *	583	607
BASALT (HARD GRAY)	607	664
BASALT (SOFT RED FRACTURED) *	664	695
BASALT (SOFT PURPLE) *	695	714
BASALT (HARD BLACK)	714	720

WATER BEARING * CASING INSTALLED
Work started MARCH 9 1967 Completed MAY 26 1967

(13) PUMP:

Manufacturer's Name WORTHINGTON
Type VERTICAL TURBINE HP. 200

Well Driller's Statement:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME HOLMAN DRILLING CORP
(Person, firm, or corporation) (Type or print)

Address E 3710 9th SPOKANE WASH

[Signed] Arnold E Holman
(Well Driller)

License No. 223.02.4726 Date May 29, 1967

STATE OF WASHINGTON.

DEPARTMENT OF CONSERVATION AND DEVELOPMENT

Appl: 8463
Permit: 7827

WELL LOG

No. /

Date: October 2, 1967

Record by: Driller

Source: Driller's record

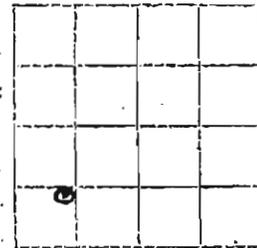


Diagram of Section

Location: State of WASHINGTON

County: Grant

Area:

Map:

SW 1/4 SW 1/4 sec 16 T. 19 N., R. 29E E. W.

Drilling Co.: Holman Drilling Corp.

Address: East 3410 --9th, Spokane, Wash.

Method of Drilling: Cable Date: May 26, 1967

Owner: Western Farmers Association

Address: Moses Lake, Washington

Land surface, datum: 12.30 ft. above

SWL: 124.6 5-24-67 below Dims: 16" x 720'

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
-------------	----------	------------------	--------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Municipal		
	Clay, sandy	0	26
	Basalt, brown, soft	26	64
	Basalt, grey, hard	64	128
	Basalt, grey, med.	128	140
	Basalt, grey, hard	140	167
	Basalt, brown, med., fractured	167	184
	Basalt, grey, med.	184	342
	Basalt, clay, brown, soft	342	346
	Basalt, grey, hard	346	517
	Basalt, dark grey, soft	517	569
	Basalt, dark grey, hard	569	583
	Basalt, med. black, fractured	583	607
	Basalt, grey, hard	607	664
	Basalt, red, soft, fractured	664	695
	Basalt, purple, soft	695	714

Turn up

Sheet of sheets

STATE OF WASHINGTON
 DEPARTMENT OF CONSERVATION
 DIVISION OF WATER RESOURCES Appl. #8483

WELL LOG Permit # 7829

Record by.....Driller.....

Source.....Driller's record.....

Location: State of WASHINGTON

County.....Grant.....

Area.....

Map.....

SW 1/4 SW 1/4 sec. 16 T. 19 N. R. 29 E. WX

Drilling Co. Frear Drilling

Address.....Moses Lake, Washington.....

Method of Drilling.....Cable..... Date May 25, 1967

Owner.....Terminal Ice & Cold Storage Co.,

Address.....514 Pittock Block Portland, Oregon 97205.....

Land surface, datum.....1240 ft. above..... 12" x 425

SWL: 116' Date May 17, 1967 Dims.: 8" x 495

CORRELATION	MATERIAL	From (feet)	To (feet)
	Industrial		
	Topsoil	0	8
	Coliche	8	16
	Basalt, black and brown, broken with clay seams	16	60
	Basalt, black	60	73 1/2
	Basalt, black	73 1/2	116
	Basalt, gray	116	149
	Basalt, black	149	166
	Basalt, gray	166	194
	Basalt, black	194	215
	Basalt, gray	215	234
	Basalt, black	234	287
	Basalt, gray	287	347
	Basalt, black, water-bearing	347	357
	Basalt, gray	357	424

Turn up Sheet of sheets

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with the Department of Ecology Resources
 Second Copy - Owner's Copy
 Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. 111
 Permit No. 7227

48

(1) OWNER: Name Terminal Ice and Cold Storage Address 517 E. M. OREGON
 (2) LOCATION OF WELL: County Grant - Sec. 5 T. 19 N. R. 29 W. M.
 Bearing and distance from section or subdivision corner N 44° E 1650 ft from SW corner of Sec. 16

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
 New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 12" to 4.25 inches.
 Drilled _____ ft. Depth of completed well 149.5 ft.

(6) CONSTRUCTION DETAILS:
 Casing installed: 15" Diam. from 0 ft. to 30 ft.
 Threaded 12" Diam. from 0 ft. to 73 1/2 ft.
 Welded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perforations _____ in. by _____ in.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.

Screens: Yes No
 Manufacturer's Name _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel: _____
 Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? _____ ft.
 Material used in seal Cement
 Did any strata contain unusable water? Yes No
 Type of water? Surface Depth of strata 100 ft.
 Method of sealing strata 50 lbs. cement

(7) PUMP: Manufacturer's Name LLOYNE PUMPS INC.
 Type: VERT. TURBINE HP 40

(8) WATER LEVELS: Land-surface elevation 1240 ft. above mean sea level.
 Static level 116 ft. below top of well Date 5-17-67
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
 Was a pump test made? Yes No If yes, by whom? Loyne Pumps
 Yield: 458 gal./min. with 104 ft. drawdown after 1 1/2 hrs.
 " 421 " 86 " 3 1/2 "

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
<u>1 1/2 min.</u>	<u>140</u>				

Date of test 5-17-67
 Water test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
<u>Top soil</u>	<u>0</u>	<u>8</u>
<u>Caliche</u>	<u>8</u>	<u>16</u>
<u>Black Brown Basalt</u>		
<u>Broken with clay veins</u>	<u>16</u>	<u>60</u>
<u>Water at No. 70 well 57 ft</u>		
<u>Water table 28 ft</u>		
<u>Black Basalt</u>	<u>60</u>	<u>73 1/2</u>
<u>Set 73 1/2 ft in casing</u>		
<u>Black Basalt</u>	<u>73 1/2</u>	<u>116</u>
<u>Gray Basalt</u>	<u>116</u>	<u>149</u>
<u>Black Basalt</u>	<u>149</u>	<u>166</u>
<u>Gray Basalt</u>	<u>166</u>	<u>194</u>
<u>Black Basalt</u>	<u>194</u>	<u>215</u>
<u>Gray Basalt</u>	<u>215</u>	<u>234</u>
<u>Black Basalt</u>	<u>234</u>	<u>287</u>
<u>13 gal. water per min.</u>		
<u>12" casing cemented to rock formation No. surface water.</u>		
<u>Gray Basalt</u>	<u>287</u>	<u>347</u>
<u>Black Basalt</u>	<u>347</u>	<u>357</u>
<u>Water bearing</u>		
<u>Gray Basalt</u>	<u>357</u>	<u>424</u>
<u>Black shale</u>	<u>424</u>	<u>427</u>
<u>Black Basalt</u>	<u>427</u>	<u>488</u>
<u>Water bearing</u>		
<u>Gray Basalt</u>	<u>488</u>	<u>495</u>

Work started Feb 28, 1967. Completed May 25, 1967

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Freen Drilling
 (Person, firm, or corporation) (Type or print)

Address Moses Lake Wash.

[Signed] Red Corp.
 (Well Driller)

License No. 223-024467 Date May 31, 1967

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

49 m



WASHINGTON STATE DEPARTMENT OF ECOLOGY

Well Tagging Form

Unique Well Tag No: 87510L 01 ABR 083

RECORD VERIFICATION (check one)

- Well Report available (please attach this form to the well report and submit it to the Ecology Regional Office near you)
- Verification inconclusive
- Well Report not available

WELL OWNERSHIP, IF DIFFERENT FROM WELL REPORT

First Name: Americold Last Name: _____
 Street Address: Po Box 399
 City: Moses Lake State: WA

LOCATION OF WELL, IF DIFFERENT FROM WELL REPORT

Well Address: _____
 City: _____ County: _____
 T. 19 N. R. 29 E W.M. Sec. 16 SW 1/4 of the SW

FOR AGENCY USE ONLY

Latitude 47 08 01 . 11556 N "
 Longitude 119 11 18 . 15378 W "

Elevation at land surface 401 feet/meters (circle one)

Additional information, if available:

- GPS
- Topographic Map
- Survey
- Computer generated
- Digital Altimeter
- Topographic Map
- Other GPS

- Location marked on topographic map (please attach)
- Location marked on air photo (please attach)

FOR AGENCY USE ONLY

WELL CHARACTERISTICS

Physical Description of well (size of casing, type of well, housing, etc.)

Location of Well identification Tag:

on outlet pipe in well house

Was supplemental tag needed for ease of identifying well?

Yes

No

If yes, where was tag placed?

D	C	B	A
E	F	G	H
M	L	K	J
<i>N</i>	P	Q	R

Scale 1:24,000 (1"=2,000')

Indicate the location of the well within the Section by drawing a dot at that point.

SECTION 16

COMMENTS:

FOR ECOLOGY WATER RESOURCES PROGRAM ONLY

Water Right # _____

Date Issued _____

Circle One:

Application

Permit

Certificate

Claim

Exempt

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

50

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

Star Card No. 9565

STATE OF WASHINGTON

Water Right Permit No. _____

(1) OWNER: Name Union Carbide Address PO Box 1667 Moses Lake WA

(2) LOCATION OF WELL: County Graha Sec. 17 T. 19 R. 29 W. 8

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Irrigation Industrial Municipal
 DeWater Test Well Other ground water monitor

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information

MATERIAL	FROM	TO
8" SAND (Tan)	0	11
8" Hard Caliche clay	11	16
8" Brown Sandy clay	16	31
8" Soft Brealt Same Clay	31	40

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Deepened Reconditioned
Method: Dug Bored Cable Driven Rotary Jetted

(5) DIMENSIONS: Diameter of well 8" inches.
Drilled 40 feet. Depth of completed well 39 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam from +2 ft to -2 ft
Welded 4" Diam from +2 ft to -39 ft
Liner installed
Threaded Diam from _____ ft to _____ ft

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ m by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name cardwork
Type PVC Model No. 050
Diam. 4 Slot size 10 from -19 ft. to -39 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel SAND 10-20
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? -16' ft
Material used in seal Bentonite 3/8 pellets
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation _____ ft.
Static level 20' ft below top of well Date 6-17-90
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? _____
Yield 6 gal/min. with 39 ft. drawdown after 1/3 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

Date of test 6-17-90
Bailer test _____ gal/min. with _____ ft. drawdown after _____ hrs.
Artesian 6 gal/min. with stem set at 39 ft. for 1/3 hrs.
Artesian flow _____ g.p.m. Date 6-17-90
Temperature of water _____ Was a chemical analysis made? Yes No

Work started 6-16 19. Completed 6-18 1990

WELL CONSTRUCTOR CERTIFICATION:
I 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.

NAME 1420 Well Service Inc (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 582 W/ Hayden Ave Hayden Lake Id
(Signed) John Whelan License No. 1516 (WELL DRILLER)
Contractor's Registration No. 1420 WES 158 KB Date 6-19-90 19

(USE ADDITIONAL SHEETS IF NECESSARY)

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

51

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Thrd Copy - Driller's Copy

WATER WELL REPORT

Start Card No. 9565

STATE OF WASHINGTON

Water Right Permit No. _____

1) OWNER: Name Union Carbide Address P.O. Box 1667 Moses Lake Wa

(2) LOCATION OF WELL: County Grant Sec. 17 T. 19 R. 29 W. 4

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

MATERIAL	FROM	TO
Sand	0	14
Caliche	14	27
Gravel & Loose Sand	27	35
Pattern Basalt	35	41

(5) DIMENSIONS: Diameter of well 8" inches.
Drilled 41 feet. Depth of completed well 39 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 40x6" Diam from +2 ft to -39 ft
Welded 4" Diam from +2 ft to -39 ft
Linear installed
Threaded

MONITORING WELL

MAY 25 1990

Perforations: Yes No
Type of perforator used Torch
SIZE of perforations 1/8" in. by 3" in.
24 perforations from -20 ft to -39 ft.

Screens: Yes No
Manufacturer's Name Aardvark
Type PVC Model No. 050
Diam 4" Slot size 10 from -19 ft to -39 ft.

Gravel packed: Yes No Size of gravel 10-20 Sand
Gravel placed from _____ ft to _____ ft.

Surface seal: Yes No To what depth? 19 ft.
Material used in seal 3/8 pellets Bentonite
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P.

(8) WATER LEVELS: Land surface elevation above mean sea level _____ ft
Static level 30' ft below top of well Date 6-17-90
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap. valve, etc.)

Work started 6-16 1990 Completed 6-18 1990

(9) 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.

WELL CONSTRUCTOR CERTIFICATION:

I 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.

Time	Water Level	Time	Water Level	Time	Water Level

NAME H2O well Service Inc
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 582 W/ Haystack Ave. Hayden Id.

(Signed) John Wheeler License No. 1516
(WELL DRILLER)

Contractor's Registration No. H20wes158KRB Date 6-19-90 1990

(USE ADDITIONAL SHEETS IF NECESSARY)

Date of test _____
Railer test _____ gal / min with _____ ft. drawdown after _____ hrs.
Artest 3 gal / min. with stem seal at 41 ft. for 1/2 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes No

3

53

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

Start Card No. 9565

STATE OF WASHINGTON

Water Right Permit No. _____

(1) OWNER: Name Union Castle Address 150. Box 1667 Moses Lake wa

(2) LOCATION OF WELL: County Grant Sec 17 T. 19 R. 29 WM

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater Rotary Other

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

MATERIAL	FROM	TO
Sand	0	3
Caliche	3	6
Broken Sandy Clay	6	26
Roller Clay & Gravel	26	50

(5) DIMENSIONS: Diameter of well _____ inches.
Drilled _____ feet. Depth of completed well _____ ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam from +26' ft to -2 ft.
Welded 4" Diam from +2 ft. to -50 ft.
Liner installed
Threaded Diam. from _____ ft. to _____ ft.

MONITORING WELL

JUN 25 1990

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ in by _____ in.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer Name Cardwell
Type Pvc Model No. _____
Diam 4" Slot size 0.10 from -30 ft to -50 ft.
Diam _____ Slot size _____ from _____ ft to _____ ft.

Gravel packed: Yes No Size of gravel 10-20 Sand
Gravel placed from -26 ft. to 50 ft.

Surface seal: Yes No To what depth? 26' ft
Material used in seal 3/8" Durotouch pellets
Did any strata contain undesirable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land surface elevation _____ ft.
Static level -31 ft. below top of well Date 6-17-90
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap. valve, etc.)

Work started 6-16, 19. Completed 6-18, 1990

(9) 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.
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

WELL CONSTRUCTOR CERTIFICATION:

I 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

NAME H2O Well Service Inc.
(PERSON FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 582 W. Hayden Ave Hayden Lake ID

(Signed) John Whelan License No 1516
(WELL DRILLER)

Contractor's Registration No H20 WES158KB Date 6-19-90 19

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

54

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. **Appli. 4890**

Date **12-18-58**, 19.....

Record by **Well driller**

Source **driller's record**

Location: State of WASHINGTON

County **Grant**

Area.....

Map.....

$\frac{1}{4}$ NW $\frac{1}{4}$ sec. **17**, T. **19** N., R. **29** E.

Diagram of Section

Drilling Co. **Frear Drilling Co.**

Address **Moses Lake, Wash.**

Method of Drilling..... Date **10-10**, 19**58**

Owner **Anthony Mandery**

Address **Seattle, Wash.**

Land surface, datum **1218** ft. above
below

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Dirt	2	2
	Broken rock (water)	57	59
	Hard grey basalt	107	166
	Broken rock (water)	18	184
	Reduced to 8' black basalt (water)	116	300
	Black basalt & broken (water)	25	325
	Black basalt & broken (water)	22	347
	Hard black basalt (water)	11	358
	Grey & hard basalt "	59	417
	PUMP TEST:		
	Dim. 12 to 184' x 417'		
	SWL: 55 ft.		
	DD: 98 ft.		
	Yield: 1350 g.p.m.		
	Water Temp. 58°		

Turn up (over)

Sheet..... of..... sheets

19/29-17
54

RETURN TO:
DIVISION OF WATER RESOURCES
335 GENERAL ADMINISTRATION BLDG
OLYMPIA, WASHINGTON

S. P. No. 724-4-57-424 6812

RECEIVED
WATER CONSERVATION

RECORD BY WELL DRILLER OR OTHER CONSTRUCTOR OF WORKS
FOR WITHDRAWAL OF GROUND WATER

DEC 1 1958

Under Permit No. G. W. 4890

(The well driller or other constructor of works for the withdrawal of public ground waters shall be obligated to furnish the permittee a certified record of the factual information necessary to show compliance with the provisions of this section." Sec. 8, Chap. 363, Laws of 1948.)

1. Anthony Mandley, 6551-50th N.E. Seattle 15
(Name and address of owner of well or other works for withdrawal of water)
2. Type; name or number of works where water is taken _____
(Well, tunnel or infiltration trench)
3. Date on which work on well or other structure was started July 15-1958
4. Date on which work was completed Oct 1-1958
5. If work on well or other structure was abandoned, give date _____
and reason for abandonment _____

6. DESCRIPTION OF WORKS:

(a) WELL: Depth 417 ft. Diameter 12 in. or ft. Dug or drilled Drilled
 Flowing or pump well Pump Water Temp. 48
 8" from 18 1/2' to 27'

If PUMP WELL: Type and size of pump is 10" Bunker - (Bunker)
 Type and size of motor or engine is 250 Hp. Continental R-10
 Depth from ground surface to water level before pumping 55 feet

After continuous operation for 4 hours, the measured discharge of the pump is
1350 g.p.m., and the drawdown of water level is 98 feet
 (At least four) (Pumping level above static water level)

Recovery data (taken after pump has been shut off) (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level
<u>4:00 P.M.</u>	<u>153'</u>		
<u>4:03</u>	<u>98'</u>		
<u>4:07</u>	<u>55'</u>		

Date of test 10-10-58

If FLOWING WELL: Measured discharge _____ g.p.m. on _____ (Date)

Shut-in pressure at ground surface _____ lbs. per sq. in. on _____ (Date)

Water is controlled by _____ (Cap, valve, etc.)

CASING: (Give diameter, commercial specifications and depth below ground surface of each casing size.)

- 2 in. diameter _____ from 0 to 7 ft.
- _____ in. diameter _____ from _____ to _____ ft.
- _____ in. diameter _____ from _____ to _____ ft.
- _____ in. diameter _____ from _____ to _____ ft.

Describe and show depth of shoe, plug, adapter, liner or other details:

OK
DM

54

Perforated casing or screens:

_____	from _____	to _____	ft.
(Number per foot and size of perforations, or describe screen)			
_____	from _____	to _____	ft.
_____	from _____	to _____	ft.
_____	from _____	to _____	ft.
_____	from _____	to _____	ft.

LOG OF WELL OR TUNNEL: (Describe each stratum or formation clearly, indicate if water bearing, and give thickness and depth as indicated.)

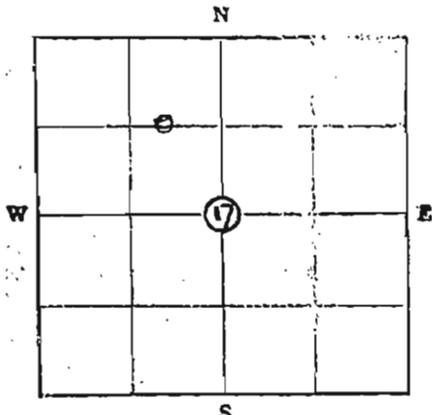
MATERIAL	Thickness (Feet)	Depth to bottom (Feet)
Gravel	2	2
Broken Banks (water)	57	59
Hard Grey Basalt	107	166
Broken Rock (water)	18 18	184
Reduced to 8' Black Basalt (water)	116	300
Black Basalt & Broken (water)	25	325
Black & Broken (water)	22	347
Hard Black Basalt (water)	11	358
Grey & Hard water	59	417

(b) INFILTRATION TRENCH OR TUNNEL: Type _____

Dimensions: _____
(Tunnel—length, course, and cross-sectional size) (Trench—entrance and maximum depth)

Bottom width _____ ft. Discharge _____ g.p.m. Date of test _____

Position of water bearing stratum with reference to portal of tunnel _____



Sec. 17 Twp. 19 N Rge. 29 E

Show approximate location of well or other works with (X) on section plat at left.

Freed Drilling Co
Fred Jones
 Signature of well driller or other constructor

Misses Lake Washington
 Address

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

56

File Original and First Copy with
Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

Start Card No. _____

STATE OF WASHINGTON

Water Right Permit No. _____

(1) **OWNER:** Name Megan Fielding Address 13952 Rd. 4 NE Moses Lake, WA

(2) **LOCATION OF WELL:** County Grant NE 1/4 NE 1/4 Sec. 17 T. 19 N. R. 29 W.M.

(2a) **STREET ADDRESS OF WELL** (or nearest address) _____

(3) **PROPOSED USE:** Domestic Irrigation Industrial Municipal
 DeWater Test Well Other

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Top soil	0	3
Clay tan	3	18
Basalt gravel	18	37
Basalt gray	37	50
Basalt w/ caliche w/water 75 GPM	50	62
Basalt gray	62	82

(4) **TYPE OF WORK:** Owner's number of well (if more than one) _____
 Abandoned New well Deepened Reconditioned
 Method: Dug Cable Rotary Bored Driven Jetted

(5) **DIMENSIONS:** Diameter of well 6" inches.
 Drilled 82 feet. Depth of completed well 82 feet.

(6) **CONSTRUCTION DETAILS:**
 Casing installed: 6" • Diam. from +2 1/2 ft. to 37 1/2 ft.
 Welded Liner installed Threaded
4" • Diam. from 15 ft. to 82 ft.
 _____ • Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used Skill saw
 SIZE of perforations 1/8 in. by 12" in.
80 perforations from 42 ft. to 82 ft.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.

Screens: Yes No
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
 Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 18' ft.
 Material used in seal Bentonite
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

(7) **PUMP:** Manufacturer's Name _____
 Type: _____ H.P. _____

(8) **WATER LEVELS:** Land-surface elevation above mean sea level _____ ft.
 Static level 16' ft. below top of well Date 2-14-92
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
 Was a pump test made? Yes No If yes, by whom? _____
 Yield: 75+ gal./min. with _____ ft. drawdown after _____ hrs.
 " Estimated air lift 75+ GPM " " " " " " " "

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 _____
 Better test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

6" Drive shoe utilized

Work started 2-13-92, 19. Completed 2-14, 1992

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME Ponderosa Drilling & Development, Inc.
 (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address E. 6010 Broadway Spokane, WA 99212

(Signed) Alvin Carris License No. 1869
 Contractor's (WELL DRILLER) (Alvin Carris)
 Registration No. PO-ND-EI*248JE Date 2-17, 1992

(USE ADDITIONAL SHEETS IF NECESSARY)

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

57

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W088525

UNIQUE WELL I.D. # ACK 192

Water Right Permit No. 98837

(1) OWNER: Name ASIMT Address 3322 Rd N NE, Moses Lake Wa

(2) LOCATION OF WELL: County Grant SE 1/4 NE 1/4 Sec 17 T. 19 N. R. 29E

(2a) STREET ADDRESS OF WELL (or nearest address) Rd N NE Well #1 Grounding

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

Grounding

(4) TYPE OF WORK: Owner's number of well (if more than one) 2
 Abandoned New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well _____ inches.
 Drilled _____ feet. Depth of completed well _____ ft.

(5) CONSTRUCTION DETAILS:
 Casing installed: 2 1/2" Diam. from 72 ft. to 41 ft.
 Welded Liner installed Threaded

Perforations: Yes No
 Type of perforator used _____
 SIZE of perforations _____ in. by _____ in.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.

Screens: Yes No
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
 Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 10 ft.
 Material used in seal: Bentonite
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
 Type: _____ H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 32 ft. below top of well Date _____
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (Cap, valve, etc.)

(9) 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.

Time	Water Level	Time	Water Level	Time	Water Level

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
 _____ _____ _____ _____ _____ _____
 DEPARTMENT OF ECOLOGY
 EASTERN REGIONAL OFFICE

Date of test _____
 Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airtest 60+ gal./min. with stern set at 170 ft. for 1 hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
TOP SOIL	0	13
Caliche	13	26
Brown Clay	26	29
Sand & Water	29	36
Brown Clay	36	43
Fractured Basalt	43	47
Black Basalt	47	104
Fractured Brown Basalt 26GPM	104	109
Black Basalt	109	154
Fractured Brown Basalt & Water	154	161
Black Basalt	161	169
Fractured Brown Basalt & Water	169	174
Black Basalt	174	176
Brown Basalt & Water	176	178
Black Basalt	178	181

Work Started _____ 19 _____ Completed 10-30 19 97

WELL CONSTRUCTOR CERTIFICATION:
 I 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.

NAME Mathews Drilling
 Address 9455 Stonecrest Rd. M.L. Wa
 (Signed) Mitch Mathews License No. 1267

Contractor's Registration No. Mathed C11786 Date 10-30 19 97

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-8600. The TDD number is (206) 407-8006.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

59

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No.

(1) OWNER: Name Union Carbide Address Moses Lake, Washington

LOCATION OF WELL: County Grant - SE 1/4 Sec. 17 T. 19 N. R. 29 W.M.

Bearing and distance from section or subdivision corner Monitoring well

(3) PROPOSED USE: Domestic Industrial Municipal
Irrigation Test Well Other

(4) TYPE OF WORK: Owner's number of well (if more than one) 1
New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 12 inches.
Drilled.....ft. Depth of completed well 40.....ft.

(6) CONSTRUCTION DETAILS: 316 Stainless Steel

Casing installed: 4" Diam. from +2 ft. to 20 ft.
Threaded " Diam. fromft. toft.
Welded " Diam. fromft. toft.

Perforations: Yes No
Type of perforator used.....
SIZE of perforations in. by in.
..... perforations from ft. to ft.
..... perforations from ft. to ft.
..... perforations from ft. to ft.

Screens: Yes No
Manufacturer's Name Johnson 316
Type Stainless steel Model No.....
Diam. 4" Slot size 0.025 from 20 ft. to 40 ft.
Diam. Slot size fromft. toft.

Gravel packed: Yes No Size of gravel:
Gravel placed from 19 ft. to 40 ft.

Surface seal: Yes No To what depth? 18 ft.
Material used in seal cement
Did any strata contain unusable water? Yes No
Type of water? surface Depth of strata.....
Method of sealing strata off.....

(7) PUMP: Manufacturer's Name.....
Type:..... H.P.....

(8) WATER LEVELS: Land-surface elevation above mean sea level 1200 ft.
Static level 18 ft. below top of well Date.....
Artesian pressure lbs. per square inch Date.....
Artesian water is controlled by..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom?.....
Yield: 25 gal./min. with 2 1/2 ft. drawdown after 2 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

Date of test 11/5/84
Bailer test..... gal./min. with..... ft. drawdown after..... hrs.
Artesian flow..... g.p.m. Date.....
Temperature of water..... Was a chemical analysis made? Yes No

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Over burden	0	2
Caliche	2	15
Red and Black Basalt with clay seams water	15	31
Grey Basalt	31	40

Installed

20 ft. stainless X 4" steel Johnson 316 well screen, slot size 0.025 from 20 to 40 feet.

22 ft. stainless steel casing 4" X 22 ft. 2 ft. above grade.

Screen gravel packed from 19 ft. to 40 ft. Pea gravel and F9 filter sand.

1 ft. of Bentonite pellets from 18 to 19 ft.

Cement seal from 18 to 19 ft.

4" stainless steel locking cap.

RECEIVED
NOV 15 1984
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 10/29 1984 Completed 11/5 1984

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME JOY DRILLING COMPANY, INC.
(Person, firm, or corporation) (Type or print)

Address P. O. Box 971, Moses Lake, Washington

[Signed] Ted Joy
Ted Joy (Well Driller)

License No. 0228 Date 11/8, 1984

11/15/84

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT warrant the Data and/or the Information on this Well Report.

(6)



WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

271416

Construction/Decommission ("x" in circle)

Construction

Decommission ORIGINAL INSTALLATION Notice of Intent Number _____

PROPOSED USE: Domestic Industrial Municipal
 DeWater Irrigation Test Well Other

TYPE OF WORK: Owner's number of well (if more than one) _____
 New well Reconditioned Method: Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 156 ft.
 Depth of completed well 156 ft.

CONSTRUCTION DETAILS
 Casing Welded 6" Diam. from 73 ft. to 55' ft.
 Installed: Liner installed _____" Diam. from _____ ft. to _____ ft.
 Threaded _____" Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 40 ft.
 Material used in seal Butylite
 Did any strata contain unusable water? Yes No
 Type of water? Surface Depth of strata 40
 Method of sealing strata off Casing Cement

PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 31 ft. below top of well Date 8-18-07
 Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal./min. with _____ ft. 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

Date of test _____
 Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airstest 50-60 gal./min. with stem set at _____ ft. for _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

CURRENT Notice of Intent No. W179306

Unique Ecology Well ID Tag No. A1467

Water Right Permit No. _____

Property Owner Name Grant Co #5

Well Street Address 3408 Rd NE

City MOSES LAKE County Grant

Location NE 1/4-1/4 SE 1/4 Sec 17 Twn 19 R29 WWM circle one

Lat/Long (s, t, r) Lat Deg _____ Lat Min/Sec _____

Still REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No. 190462002

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dirt	0	12
Clay	12	13
Dirt	13	35
Dark Black	35	41
Basalt black brown	41	50
Clay seams, coning	50	55
Basalt black	50	57
Basalt grey	57	81
Basalt soft black	81	83
Basalt grey	83	135
Basalt brown	135	151
Basalt grey	151	156

RECEIVED

SEP 19 2007

DEPARTMENT OF ECOLOGY
 EASTERN REGIONAL OFFICE

Start Date 8-17-07 Completed Date 8-18-07

WELL CONSTRUCTION CERTIFICATION: I 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 Trainee Name (Print) Jim Stien S
 Driller/Engineer/Trainee Signature Jim Stien
 Driller or trainee License No. 0469

Drilling Company Joy Drilling Co
 Address 5369 Janel et ave
 City, State, Zip MOSES LAKE WA 98837
 Contractor's Registration No. JYDR137064 Date 8-18-07

If TRAINEE, Driller's Licensed No. _____
 Driller's Signature _____

Ecology is an Equal Opportunity Employer.

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

67
 Application No. SC #6209
 Permit No.

(1) **OWNER:** Name Tren Jones Astro Enterprises Address Route 2 Box 159A M.L. WA.

(2) **LOCATION OF WELL:** County Grant — NE 1/4 NW 1/4 Sec 18 T. 19 N. R. 29 W.M.
 Bearing and distance from section or subdivision corner

(3) **PROPOSED USE:** Domestic Industrial Municipal
 Irrigation Test Well Other

(4) **TYPE OF WORK:** Owner's number of well (if more than one)
 New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

(5) **DIMENSIONS:** Diameter of well 6 inches.
 Drilled 95 ft. Depth of completed well 95 ft.

(6) **CONSTRUCTION DETAILS:**

Casing installed: 6" Diam. from 71 ft. to 64 ft.
 Threaded " Diam. from ft. to ft.
 Welded " Diam. from ft. to ft.

Perforations: Yes No
 Type of perforator used
 SIZE of perforations in. by in.
 perforations from ft. to ft.
 perforations from ft. to ft.
 perforations from ft. to ft.

Screens: Yes No
 Manufacturer's Name
 Type Model No.
 Diam. Slot size from ft. to ft.
 Diam. Slot size from ft. to ft.

Gravel packed: Yes No Size of gravel:
 Gravel placed from ft. to ft.

Surface seal: Yes No To what depth? 18 ft.
 Material used in seal Benlac, etc.
 Did any strata contain unusable water? Yes No
 Type of water? Depth of strata
 Method of sealing strata off

(7) **PUMP:** Manufacturer's Name
 Type: H.P.

(8) **WATER LEVELS:** Land-surface elevation 1060 ft. above mean sea level.
 Static level 39 ft. below top of well Date 11-7-88
 Artesian pressure lbs. per square inch Date
 Artesian water is controlled by (Cap, valve, etc.)

(9) **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.
 " " " " " " " "
 " " " " " " " "

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
<u>air lift</u>	<u>40 gpm</u>				

Date of test
 Bailor test gal./min. with ft. drawdown after hrs.
 Artesian flow g.p.m. Date
 Temperature of water 54 Was a chemical analysis made? Yes No

(10) **WELL LOG:**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
<u>Dirt & gravel mix.</u>	<u>0</u>	<u>22</u>
<u>sand black.</u>	<u>28</u>	<u>44</u>
<u>Clay brown.</u>	<u>44</u>	<u>55</u>
<u>Basalt brown w/ clay seams.</u>	<u>55</u>	<u>59</u>
<u>Soap stone yellow.</u>	<u>59</u>	<u>61</u>
<u>Basalt brown & black.</u>	<u>61</u>	<u>79</u>
<u>Basalt black.</u>	<u>79</u>	<u>82</u>
<u>Basalt Red N²O.</u>	<u>82</u>	<u>94</u>
<u>Basalt grey</u>	<u>94</u>	<u>95</u>

NOV 14 1988

DEPARTMENT OF ECOLOGY
 SPOKANE REGIONAL OFFICE

Work started 10-4-88 19 Completed 11-7-88 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME JOY Drilling Co.
 (Person, firm, or corporation) (Type or print)

Address MOSES lake wa.

[Signed] Tren Jones
 (Well Driller)

License No. 0469 Date 11-8 88, 19

68

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

Well #1

WELL LOG

No. Appl. #2727

Date March 19, 1953

Permit #2570

Record by

Source well driller's record

Location: State of WASHINGTON

County Grant

Area

Map

W. 1/4 Sec 20 T. 19 N. R. 29 E. 20

Diagram of Section

Drilling Co.

Address

Method of Drilling drilled Date 3-16-53

Owner Utah-Idaho Sugar Co.

Address Salt Lake City, Utah

Land surface, datum 20 ft above below

Sec 20
68-73

CONC- LAYER	MATERIAL	THICKNESS (feet)	DEPTH (feet)
----------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

See attached sheets Well No. 2			
Pump Test:			
Dim: 1030' x 24" x 20" x 16"			
SWL: 125' (3/16/53)			
Dd: 230'			
Casing: 28" OD Casing from 0-19.42'			
20" OD Casing from 0-79.33'			
20" Open rock hole from 79.33 to 820'			
16" Open rock hole from 820'-1080'			
Pump: 345' setting, 11 stage 12" bowl, Gear Head, Airline 365"			
Motor: dual gas engine drive			
Yield: 1416 (max. g.p.m.)			
Note: drawdown info. in folder			

Turn up

Sheet of sheets

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WELL LOG.—Continued

No. /

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Depth forward	—	
	Top soil and caliche	0	19
	Porous and fractured basalt	19	70
	Hard gray to black	74	515
	Brown med. hard basalt (W)	515	529
	Hard gray basalt	529	600
	Green and white clay	600	617
	Porous brown basalt	617	620
	Gray and black basalt	620	675
	Brown basalt with clay	675	879
	Hard gray basalt	719	763
	Brown basalt (W)	763	765
	Dense gray basalt	765	903
	Porous dark basalt	903	905
	Dense gray basalt	905	1030
	<i>Meter 74-10-440</i>	<i>541</i>	
	<i>12/10/70</i>	<i>994-470</i>	

The Dep. The Department of Ecology does NOT Warrant the Data and/or the Information on this Well Report.

Well #2

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Appl. #2727
Permit #2570

Date April, 1954

C 2700

Record by

Source well driller's record

Location: State of WASHINGTON

County Grant

Area

Map

W. 1/4 E. 1/4 sec 20 T. 19. N., R. 29 E.

Diagram of Section

Drilling Co.

Address

Method of Drilling drilled Date Apr. 12, 1954

Owner Utah-Idaho Sugar Co.

Address Salt Lake City, Utah

Land surface, datum ft. above below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
-------------	----------	------------------	--------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	See Driller's Report Well No. 2		
	Soil & gravel	90	90
	Basalt	630	720
	Pump Test:		
	Dim: 720' x 16"		
	SWL: 110'		
	Dd: 350'		
	Yield: 900 g.p.m.		
	Casing: 18" from 0' to 90'		
	Pump: LS-1248 Jacuzzi		
	Motor: 150 HP Electric Motor		
	MEXI 74-12-542		

Turn up

Sheet of sheets

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

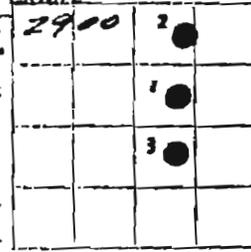
WELL LOG

No. Appl. 2727
2573

Date Sept. 16, 1955

Record by Utah-Idaho Sugar Co.

Source Driller's Record



Location: State of WASHINGTON

County Grant

Area

Map

W 1/2 E 1/2 sec. 20 T. 19 N., R. 29 E.

Diagram of Section

Drilling Co. A.A. Durand

Address

Method of Drilling Drilled Date 9-14, 1955

Owner Utah-Idaho Sugar Co.

Address Salt Lake City, Utah

Land surface, datum ft above
below

CONDI- TION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
----------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

See Attached Well No. 3

Pump Test:

Dia: 9 1/2" X 18" X 12" X 10"

SWL: 107'

DD: 228'

Yield: 895 g.p.m.

Casing:

24" O.D. Well Casing from 0 to 6733'

18" O.D. Well Casing from 0 to 9875'

10" O.D. Well casing liner
from 5 91' 3" to
694'

Perforations: None

Turn up

Sheet 1 of 1 sheets

The Dep. The Department of Ecology does NOT Warrant the Data and/or the Information on this Well Report.

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

72

WATER WELL REPORT

Original & 1st copy Ecology 2nd copy owner 3rd copy driller

Construction/Decommission (x in circle) 126436

Construction
 Decommission **ORIGINAL CONSTRUCTION Notice of Intent Number**

CURRENT Notice of Intent No W150719
 Unique Ecology Well ID Tag No AAN 874
 Water Right Permit No _____

Property Owner Name City of Moses Lake

Well Street Address P O Box 1579

City Moses Lake County GRANT

Location NW 1/4 1/4 NW 1/4 Sec 20 Twn 19N R 29 EWM circle or one

Lat/Long (s, r still) Lat Deg _____ Lat Min/Sec _____

REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No _____

PROPOSED USE Domestic Industrial Municipal
 DeWater Irrigation Test Well Other

TYPE OF WORK Owner's number of well (if more than one) _____
 New Well Reconditioned Method Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS Diameter of well 16" inches drilled 585' ft
 Depth of completed well 525' ft

CONSTRUCTION DETAILS
 Casing Welded 24 Diam from +1 ft to 44 ft
 Installed Liner installed 16 Diam from +1 ft to 280 ft
 Threaded Diam from _____ ft to _____ ft

Perforations - Yes No

Type of perforator used _____
 SIZE of perfs _____ in by _____ in and no. of perfs _____ from _____ ft to _____ ft

Screens Yes No K Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No _____
 Diam _____ Slot Size _____ ft
 Diam _____ Slot Size _____ from _____ ft to _____ ft

Gravel/Filter packed Yes No Sieve gravel/sand _____
 Materials placed from _____ ft to _____ ft

Surface Seal Yes No To what depth? 280' ft

Materials used in seal _____
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

PUMP Manufacturer's Name _____
 Type _____ HP _____

WATER LEVELS Land surface elevation above mean sea level _____ ft
 Static level 51' ft below top of well Date _____
 Artesian pressure _____ lbs 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? Irrigators
 Yield 2200 gal/min with 150' ft drawdown after 8 hrs
 Yield _____ gal/min with _____ ft drawdown after _____ hrs
 Yield _____ gal/min with _____ ft 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

 Date of test _____
 Bailor test _____ gal/min with _____ ft drawdown after _____ hrs
 Airtest 2500 gal/min with stem set at 525 ft for 2 hrs
 Artesian flow _____ g p m Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

CONSTRUCTION OR DECOMMISSION PROCEDURE
 Formation Describe by color character size of material and structure and the kind and nature of the material in each stratum penetrated with at least one entry for each change of information Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY)

MATERIAL	FROM	TO
Brown Silt	0	2
Black Sand & gravel	2	25
Broken Brown Basalt		
some Tan Clay Silt	25	34
Hard Gray Basalt	34	117
Med soft Brown & Black	117	128
Hard Dark gray	128	162
Soft Brown Visicular		
& Gray water	162	168
Hard gray basalt	168	196
Soft Dark gray	196	203
Hard light gray	203	221
Soft Broken gray & brown basalt some		
gray & brown clay	221	243
Med hard dark gray	243	270
Very hard gray basalt	270	305
Soft Brown Visicular		
Basalt, broken gray		
Brown silt water		
1000 GPM Aprox	305	322
Hard gray basalt	322	375
Soft broken brown		
Basalt	375	379
Med hard dark gray		
Basalt 240psi 2Airpks	379	390
Hard dark gray Basalt	390	432

Start Date 11-01-02 Completed Date 12/23/03

WELL CONSTRUCTION CERTIFICATION I 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 Trainee Name (Print) Larry McLanahan Drilling Company BJExploration Co Inc
 Driller/Engineer/Trainee Signature [Signature] Address 404 N Conway St
 Driller or Trainee License No 0337 City State Zip Kennewick, WA 99336

If trainee, licensed driller s _____
 Signature and License no _____

Contractor s _____
 Registration No BJEXPCI1320K Date 12/23/03
 Ecology is an Equal Opportunity Employer ECY 050 1 20 (Rev 4/01)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Please print, sign and return to the Department of Ecology

73



Water Well Report

Original - Ecology, 1st copy - owner, 2nd copy - driller

180228

Current

Notice of Intent No. W150751

Construction/Decommission

Construction
 Decommission *ORIGINAL INSTALLATION Notice of Intent Number*

Unique Ecology Well ID Tag No. AHP781

Water Right Permit No. _____

Property Owner Name Central Leasing of Washington

Well Street Address P.O. Box 850

City Moos Lake County GRANT

Location NW 1/4-1/4 SE 1/4 Sec 20 Twn 19N R 29 EWM or WWM circle one

Lat/Long (s, t, r) Lat Deg _____ Lat Min/Sec _____

still REQUIRED) Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

PROPOSED USE: DeWater Domestic Irrigation Industrial Test Well Municipal Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____
 New well Reconditioned Method: Dug Bored Driven Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 16" inches, drilled 584 ft. Depth of completed well 584 ft.

CONSTRUCTION DETAILS
 Casing Welded 20" Diam from +1 ft to 79' ft. Installed: Limer installed _____ Diam from _____ ft to _____ ft. Threaded _____ Diam from _____ ft to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____ ft. to _____ ft.
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 79' ft.
 Material used in seal CEMENT
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

PUMP: Manufacturer's Name _____ H.P. _____
 Type _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 40' ft. below top of well Date _____
 Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal./min. with _____ ft. 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 _____
 Date of test _____
 Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airtest 300 _____ gal./min. with stem set at 570 _____ ft. for _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Caliche	0	9
Med. hard brown	9	33
Med soft brown & gray basalt	33	58
Hard gray basalt	58	60
Broken soft water	60	76
Hard gray basalt	76	84
Red brown black broken basalt water 190psi	84	89.
Hard gray basalt	89	149
Brown & black basalt	149	153
Med gray basalt	153	162
Hard gray basalt	162	198
Brown black basalt clay seams	198	206
Hard gray basalt	206	236
Soft black basalt	236	245
Med black basalt	245	263
Hard gray	263	341
Red brown black broken Basalt Water 195psi	341	352
Med. basalt	352	371
Hard gray basalt	371	408
Void or crevis	416	419
Brown broken black basalt siltstone Water 200psi	408	429
Med. hard Basalt	429	440
Black red basalt clay seams	440	444
Med gray	444	463
Black brown siltstone	463	471
Med gray Basalt	471	482
Soft black brown basalt	482	485
Med hard basalt	485	509
Soft gray porous basalt H2O 210psi	509	518
Med. hard gray basalt	518	534
Hard gray basalt	534	542

Start Date 11-4-04 Completed Date 11-14-04

WELL CONSTRUCTION CERTIFICATION: I 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/Trainee Name (Print) Larry McLanahan
 Driller/Engineer/Trainee Signature [Signature]
 Driller or trainee License No. 0337

Drilling Company BJ Exploration Co. Inc
 Address 404 North Conway Street
 City, State, Zip Kennecook WA 99336
 Contractor's Registration No. BJEXPCT1320K
 Ecology is an Equal Opportunity Employer.

TRAINEE,
 Driller's Licensed No. _____
 Driller's Signature _____

DEC 13 2004
 Date 12-9-04
 ECY 050-1-20 (Rev 2003)
 DEPARTMENT OF ECOLOGY
 EASTERN REGIONAL OFFICE

76

Please print, sign and return to the Department of Ecology



Water Well Report

Original - Ecology, 1st copy - owner, 2nd copy - driller

187034

Construction/Decommission

Construction
 Decommission ORIGINAL INSTALLATION Notice of Intent Number _____

PROPOSED USE: Domestic Industrial Municipal
 DeWater Irrigation Test Well Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____
 New well Reconditioned Dug Bored Driven
 Deepened Cable Rotary Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 162 ft.
 Depth of completed well 162 ft.

CONSTRUCTION DETAILS
 Casing Welded 6 " Diam. from 71 ft. to 34 ft.
 Installed: Liner installed _____ Diam. from _____ ft. to _____ ft.
 Threaded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: Yes No K-Pac Location _____
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: Yes No Size of gravel/sand _____
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 34 ft.
 Material used in seal concrete
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata: _____
 Method of sealing strata off _____

PUMP: Manufacturer's Name _____ H.P. _____
 Type: _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level 6 ft ft. below top of well Date _____
 Artesian pressure _____ lbs. 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 _____ ft. drawdown after _____ hrs.
 Yield: _____ gal./min. with _____ ft. 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

Date of test _____
 Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Airstest 20 gal./min. with stem set at 14 ft for 2 hrs
 Artesian flow _____ g.p.m. Date _____
 Temperature of water 58.8 Was a chemical analysis made? Yes No

Current Notice of Intent No. W 216 356
 Unique Ecology Well ID Tag No. A11 402
 Water Right Permit No. _____
 Property Owner Name Glen & Janet McCloud
 Well Street Address 90 Hendricks Ln. 99344
 City Othello County Franklin
 Location SW 1/4-1/4 NW 1/4 Sec 21 Twp 19 R 29 EWM or WWM circle one
 Lat/Long (s, t, r) Lat Deg _____ Lat Min/Sec _____
 still REQUIRED) Long Deg _____ Long Min/Sec _____
 Tax Parcel No. 120-210-020

CONSTRUCTION OR DECOMMISSION PROCEDURE
 Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dirt	0	16
Sandstone	16	24
Basalt w/ clay from	24	34
Basalt block	34	37
Basalt brown	37	49
Basalt red	49	64
Basalt gray	64	99
Basalt brown H ₂ O	99	130
Basalt grey	130	147
Drum H ₂ O	147	160
Basalt layer	160	162

RECEIVED

JAN - 3 2006

DEPARTMENT OF ECOLOGY
 EASTERN REGIONAL OFFICE

Start Date 11-16-05 Completed Date 11-17-05

WELL CONSTRUCTION CERTIFICATION: I 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/Trainee Name (Print) Jim Stens
 Driller/Engineer/Trainee Signature Jim Stens
 Driller or trainee License No. 0469

IF TRAINEE,
 Driller's Licensed No. _____
 Driller's Signature _____

Drilling Company Joy Drilling Co
 Address 5369 Jewel St.
 City, State, Zip MOSES LAKE WA 98837
 Contractor's Registration No. Joy DRCL370H Date 11-18-05
 Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 77

Water Right Permit No. _____

(1) OWNER: Name Sun Harvest INC Address 15250 N.E. 95th Redmond, Wa.

(2) LOCATION OF WELL: County Grant SE 1/4 SE 1/4 Sec. 21 T. 19 N., R. 29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 1420 Rd 2 NE Moses Lake, Wa. 98837

(3) PROPOSED USE: Domestic Irrigation Industrial Municipal
 DeWater Test Well Other

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 177 feet. Depth of completed well 177 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 * Diam. from +1 ft. to 19 ft.
Welded * Diam. from _____ ft. to _____ ft.
Liner installed
Threaded * Diam. from _____ ft. to _____ ft.

Perforations: Yes No

Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No

Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 19 ft.
Material used in seal Cement Bentonite
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land surface elevation above mean sea level _____ ft.
Static level 17 ft. below top of well Date 6-12-90
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) 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.
" Air lift " 70 GPM " " "

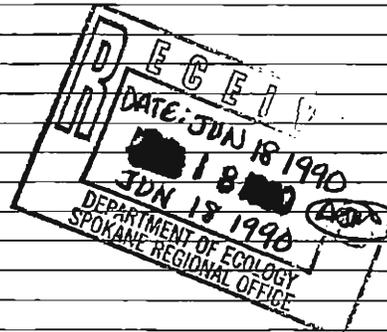
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Time Water Level Time Water Level Time Water Level

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airstest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 59 Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Caliche	0	3
Dirt	3	6
Basalt brown	6	15
Basalt black	15	62
Basalt brown (water)	62	75
Basalt hard gray	75	157
Basalt brown (water)	157	174
Basalt black	174	177



Work started 6-11-90, 19. Completed 6-12-90, 19.

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME Joy Drilling Co.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Moses Lake, Wa.

(Signed) Ted J. Shivers License No. 469
(WELL DRILLER)

Contractor's Registration No. J0YDRC1370H Date 6-14-90, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Well Log Data and Image are 'As Is' with NO Warranty. Well Log ID: 107708 (page 1 of 1)

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

Start Card No. W27558
Water Right Permit No. _____

~~31720~~
31720

OWNER: Name George Pollak Address Rd 2 N.E Moses Lake

(2) LOCATION OF WELL: County Grant SE 1/4 SE 1/4 Sec 21, T. 19N, R. 29W.M.

(2a) STREET ADDRESS OF WELL (or nearest address): _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

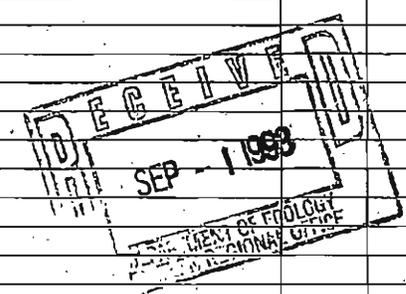
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

MATERIAL	FROM	TO
dirt	0	8
caliche	8	13
dirt	13	22
clay	22	29
basalt brown soft	29	36
basalt grey hard	36	145
basalt brown	145	152
basalt grey	152	192
basalt brown H2O	192	198
basalt black	198	202

(5) DIMENSIONS: Diameter of well 6" inches.
Drilled 200 feet. Depth of completed well 200 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 Diam. from +2 ft. to 38 ft.
Welded Liner installed Threaded
Perforations: Yes No



Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 38 ft.
Material used in seal benoite + cement
Did any strata contain unusable water? Yes No
Type of water? surface Depth of strata 6'-30'
Method of sealing strata off casing + cement

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level surface ft. below top of well Date _____
Artesian pressure 10 lbs. per square inch Date 8-18-93
Artesian water is controlled by packer + liner valves (Cap, valve, etc.)

Work started 8-16-93 Completed 8-18 1993

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? _____
Yield: 90 gal./min. with _____ ft. drawdown after _____ hrs.
" 90 gals. per minute " " " " " " " " " " " "

WELL CONSTRUCTOR CERTIFICATION:

I 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.

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

NAME Joy Drilling Co (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 913 Garden Moses Lake

(Signed) Jim Strain License No. 0469
(WELL DRILLER)

Contractor's Registration No. 509 DEC 1370-H Date 8-24 1993

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warrant the Data and/or the Information on this Well Report.

61828

79

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Water Right Permit No. _____

Start Card No. 40094429

UNIQUE WELL I.D. # Acce. 268

OWNER: Name Larry Campbell Address 4480 Rd N. NE Moses Lake wa.

(2) LOCATION OF WELL: County Grant T. 19 N. R 29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned New well Method: Dug Bored
Deepened Cable Driven
Reconditioned Rotary Jetted

MATERIAL	FROM	TO
Dirt	0	12
coliche	12	18
Clay	18	28
Basalt soft brown	28	39
Basalt Grey	39	162
Basalt brown	162	167
Basalt black	167	201
Basalt Grey	201	239
Basalt black soft	239	246
Basalt Hard black	246	259
Basalt soft black	259	265
Basalt Grey	265	281
Basalt black brown red	281	294
Basalt Grey	294	300

(5) DIMENSIONS: Diameter of well 6 inches.
Driiled 300 feet. Depth of completed well 300 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 ft. Diam. from 1 ft. to 39 ft.
Welded Liner installed Threaded
Type of liner _____

Perforations: Yes No
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? 30 ft. ft.
Material used in seal Portland
Did any strata contain unusable water? Yes No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 239 ft. below top of well Date 6-27-98
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? _____
Yield: 40 gal./min. with 0.1 ft. ft. drawdown after 2 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

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 61 Was a chemical analysis made? Yes No

Work Started 8-26-98 19. Completed 8-27-98 19

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME Joy Drilling Co (PERSON, FIRM OR CORPORATION) (TYPE OR PRINT)
Address Moses Lake wa.
(Signed) Tim Steen License No. 0969 (WELL DRILLER)

Contractor's Registration No. JWP00137064 Date 6-27 19 98

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

80 2 of 2

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Water Right Permit No. _____

Start Card No. W-36455

UNIQUE WELL I.D. # 726

1) OWNER: Name Moses Lake Address Moses Lake

2) LOCATION OF WELL: County Grant NW 1/4 SW 1/4 Sec 21 T 19 N. R. 29 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address): _____

(3) PROPOSED USE: Domestic Industrial Municipal
 Irrigation Test Well Other
 DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
 Abandoned New well Method: Dug Bored
 Deepened Cable Driven
 Reconditioned Rotary Jetted

(5) DIMENSIONS: Diameter of well _____ inches.
 Drilled _____ feet. Depth of completed well _____ ft.

(6) CONSTRUCTION DETAILS:
 Casing installed: _____ Diam. from _____ ft. to _____ ft.
 Welded _____ Diam. from _____ ft. to _____ ft.
 Liner installed _____ Diam. from _____ ft. to _____ ft.
 Threaded _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes No
 Type of perforator used _____
 SIZE of perforations _____ in. by _____ in.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.
 _____ perforations from _____ ft. to _____ ft.

Screens: Yes No
 Manufacturer's Name _____
 Type _____ Model No. _____
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.
 Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes No Size of gravel: _____
 Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes No To what depth? _____ ft.
 Material used in seal _____
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
 Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
 Static level _____ ft. below top of well Data _____
 Artesian pressure _____ lbs. per square inch Data _____
 Artesian water is controlled by _____ (Cap. valve, etc.)

(9) 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.

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 _____
 Boiler test _____ gal./min. with _____ ft. drawdown after _____ hrs.
 Artest _____ gal./min. with stem set at _____ ft. for _____ hrs.
 Artesian flow _____ g.p.m. Date _____
 Temperature of water _____ Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information

MATERIAL	FROM	TO
Top of Vantage-clay & blk	612	625
blk basalt	625	666
red & tan basalt blk	666	699
hard grey basalt	699	703
blk w/red med hard	703	760
med blk basalt	760	802
soft med blk basalt	801	814
med grey basalt	814	835
hard grey basalt	835	924
soft porous b/basalt w/blueclay	924	925
soft b/basalt hard tan clay	925	945*
porous blk & brown basalt		
basalt med	945	970
hard grey basalt	970	980
grey basalt med	980	1054
blk basalt	1054	1144
blk brown water rock	1144	1207*
med grey basalt	1207	1250
		T.D.

** Note: All measurments above are made from the drill rig Kelly base which was ten feet above the ground surface

Work Started _____ 19 _____ Completed _____ 19 _____

WELL CONSTRUCTOR CERTIFICATION:

I 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.

NAME _____ (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address _____

(Signed) _____ License No. _____ (WELL DRILLER)

Contractor's Registration No. _____ Date _____ 19 _____

(USE ADDITIONAL SHEETS IF NECESSARY)



Custom Soil Resource Report for **Grant County, Washington**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	7
Soil Map.....	8
Legend.....	9
Map Unit Legend.....	10
Map Unit Descriptions.....	10
Grant County, Washington.....	12
75—Malaga cobbly sandy loam, 0 to 15 percent slopes.....	12
115—Royal very fine sandy loam, 0 to 2 percent slopes.....	12
132—Scoon silt loam, 0 to 5 percent slopes.....	13
141—Starbuck very fine sandy loam, 0 to 15 percent slopes.....	14
152—Taunton fine sandy loam, 0 to 2 percent slopes.....	15
References	17

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

Custom Soil Resource Report

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

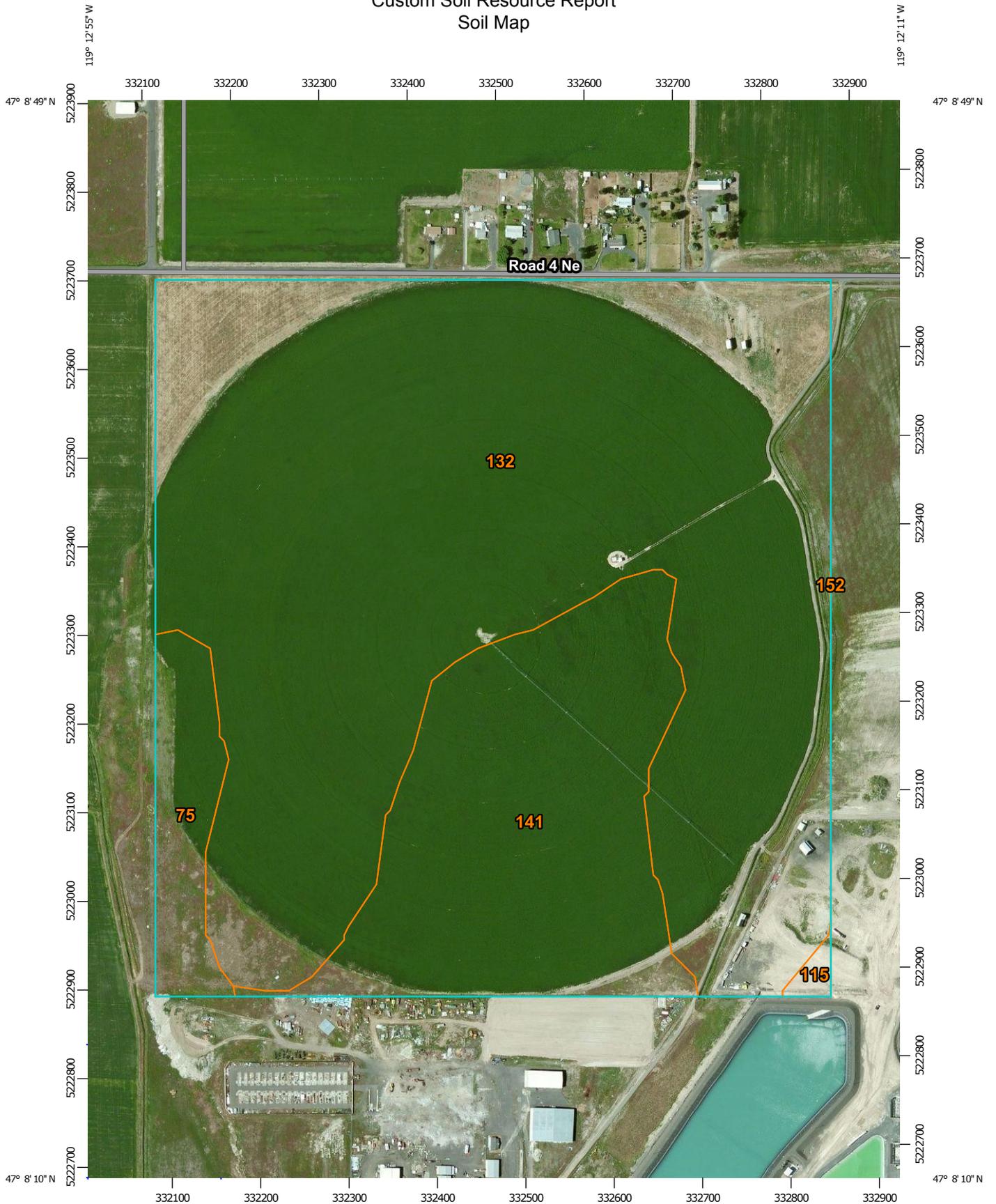
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:5,920 if printed on A portrait (8.5" x 11") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grant County, Washington
 Survey Area Data: Version 7, Dec 7, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Grant County, Washington (WA025)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
75	Malaga cobbly sandy loam, 0 to 15 percent slopes	6.8	4.4%
115	Royal very fine sandy loam, 0 to 2 percent slopes	0.5	0.4%
132	Scoon silt loam, 0 to 5 percent slopes	112.4	73.3%
141	Starbuck very fine sandy loam, 0 to 15 percent slopes	33.5	21.9%
152	Taunton fine sandy loam, 0 to 2 percent slopes	0.0	0.0%
Totals for Area of Interest		153.3	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

Custom Soil Resource Report

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Grant County, Washington

75—Malaga cobbly sandy loam, 0 to 15 percent slopes

Map Unit Setting

Elevation: 500 to 1,300 feet

Mean annual precipitation: 6 to 10 inches

Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 180 to 195 days

Map Unit Composition

Malaga and similar soils: 100 percent

Description of Malaga

Setting

Landform: Escarpments, terraces

Parent material: Glacial outwash

Typical profile

H1 - 0 to 6 inches: neutral, cobbly sandy loam

H2 - 6 to 11 inches: neutral, gravelly sandy loam

H3 - 11 to 18 inches: neutral, very gravelly sandy loam

H4 - 18 to 60 inches: neutral, extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 15 percent

Depth to restrictive feature: 15 to 28 inches to strongly contrasting textural stratification

Natural drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 15 percent

Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Farmland classification: Farmland of unique importance

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: B

Ecological site: LOAMY 6-10 PZ (R007XY102WA)

115—Royal very fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 400 to 1,000 feet

Mean annual precipitation: 6 to 9 inches

Mean annual air temperature: 48 to 54 degrees F

Custom Soil Resource Report

Frost-free period: 150 to 210 days

Map Unit Composition

Royal and similar soils: 100 percent

Description of Royal

Setting

Landform: Terraces, hills

Landform position (two-dimensional): Footslope

Parent material: Sandy alluvium

Typical profile

H1 - 0 to 10 inches: neutral, very fine sandy loam

H2 - 10 to 16 inches: neutral, very fine sandy loam

H3 - 16 to 60 inches: strongly alkaline, stratified fine sand to very fine sandy loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 30 percent

Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: SANDY 6-10 PZ (R007XY501WA)

132—Scoon silt loam, 0 to 5 percent slopes

Map Unit Setting

Elevation: 1,000 to 4,900 feet

Mean annual precipitation: 6 to 12 inches

Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 100 to 210 days

Map Unit Composition

Scoon and similar soils: 100 percent

Description of Scoon

Setting

Landform: Terraces, alluvial fans

Parent material: Loess

Custom Soil Resource Report

Typical profile

- H1 - 0 to 6 inches:* moderately alkaline, silt loam
- H2 - 6 to 16 inches:* moderately alkaline, gravelly silt loam
- H3 - 16 to 26 inches:* , cemented material
- H4 - 26 to 60 inches:* , stratified indurated to extremely gravelly sand

Properties and qualities

- Slope:* 0 to 5 percent
- Depth to restrictive feature:* 10 to 20 inches to duripan
- Natural drainage class:* Well drained
- Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- Depth to water table:* More than 80 inches
- Frequency of flooding:* None
- Frequency of ponding:* None
- Calcium carbonate, maximum in profile:* 5 percent
- Available water storage in profile:* Very low (about 2.5 inches)

Interpretive groups

- Farmland classification:* Not prime farmland
- Land capability classification (irrigated):* 6s
- Land capability classification (nonirrigated):* 6s
- Hydrologic Soil Group:* D
- Ecological site:* STONY 6-10 PZ (R007XY202WA)

141—Starbuck very fine sandy loam, 0 to 15 percent slopes

Map Unit Setting

- Elevation:* 400 to 2,700 feet
- Mean annual precipitation:* 6 to 12 inches
- Mean annual air temperature:* 48 to 50 degrees F
- Frost-free period:* 115 to 210 days

Map Unit Composition

- Starbuck and similar soils:* 100 percent

Description of Starbuck

Setting

- Landform:* Structural benches, hillslopes
- Landform position (two-dimensional):* Summit
- Parent material:* Loess and residuum weathered from basalt

Typical profile

- H1 - 0 to 8 inches:* neutral, very fine sandy loam
- H2 - 8 to 15 inches:* neutral, silt loam
- H3 - 15 to 19 inches:* , unweathered bedrock

Properties and qualities

- Slope:* 0 to 15 percent
- Depth to restrictive feature:* 12 to 20 inches to lithic bedrock
- Natural drainage class:* Well drained

Custom Soil Resource Report

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Farmland classification: Not prime farmland

Land capability classification (irrigated): 6s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D

Ecological site: STONY 6-10 PZ (R007XY202WA)

152—Taunton fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 200 to 2,200 feet

Mean annual precipitation: 6 to 12 inches

Mean annual air temperature: 48 to 54 degrees F

Frost-free period: 140 to 210 days

Map Unit Composition

Taunton and similar soils: 100 percent

Description of Taunton

Setting

Landform: Terraces

Parent material: Alluvium and loess

Typical profile

H1 - 0 to 8 inches: moderately alkaline, fine sandy loam

H2 - 8 to 19 inches: moderately alkaline, very fine sandy loam

H3 - 19 to 27 inches: moderately alkaline, gravelly fine sandy loam

H4 - 27 to 37 inches: , cemented material

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: 20 to 40 inches to duripan

Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 30 percent

Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance

Land capability classification (irrigated): 4e

Custom Soil Resource Report

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C

Ecological site: SANDY 6-10 PZ (R007XY501WA)

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

