Approved: 

MEMO

To: Kristopher Byrd, Well Construction and Compliance Section Manager

From: Travis Kelly, Well Construction Program Coordinator

Subject: Review of Water Right Application LL-1825

Date: June 25, 2020

The attached application was forwarded to the Well Construction and Compliance Section by the Groundwater Section. Aurora Bouchier reviewed the application. Please see Aurora's Groundwater Review and the Well Report.

Applicant's Well #Lamonta2 (CROO 54871): Based on a review of the Well Report, Applicant's Well #Lamonta2 seems to protect the groundwater resource.

The construction of Applicant's Well #Lamonta2 may not satisfy hydraulic connection issues.

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

CROO 54871

4/9/2020

WELL I.D. LABEL# L 136752
START CARD # 1046329
ORIGINAL LOG #

(1) LAND OWNER

Owner Well I.D. LAMONTA
First Name _____ Last Name _____
Company CITY OF PRINEVILLE
Address 387 NE 3RD ST
City PRINEVILLE State OR Zip 97754

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion ☐ Alteration (complete 2a & 10) ☐ Abandonment(complete 5a)

(2a) PRE-ALTERATION

	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD

☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger ☐ Cable Mud
☐ Reverse Rotary ☐ Other _____

(4) PROPOSED USE

☐ Domestic ☐ Irrigation ☐ Community ☐ Industrial/ Commericial ☐ Livestock ☐ Dewatering ☐ Thermal ☐ Injection ☒ Other MUNICIPAL

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)
Depth of Completed Well 298.00 ft.

BORE HOLE

Dia	From	To
16	0	298

SEAL

Material	From	To	Amt	sacks/lbs
Cement	0	200	140	S
		Calculated	92.72	
		Calculated		

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E
☐ Other _____
Backfill placed from _____ ft. to _____ ft. Material _____
Filter pack from 200 ft. to 298 ft. Material SAND Size 4/10
Explosives used: ☐ Yes Type _____ Amount _____

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	12	☒	1	226	.250	●	○	☒	☐
●	○	12	☐	291	298	.250	●	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____
Temp casing ☒ Yes Dia 16 From + ☒ 1 To 298

(7) PERFORATIONS/SCREENS

Perforations Method _____
Screens Type JOHNSON Material STAINLESS

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen	Casing	12	226	291	.25			

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

◉ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
400		200	1
600	165	200	72.8

Temperature 55 °F Lab analysis ☐ Yes By _____
Water quality concerns? ☐ Yes (describe below) TDS amount 325 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County CROOK Twp 14.00 S N/S Range 16.00 E E/W WM
Sec 31 NE 1/4 of the NW 1/4 Tax Lot 1200
Tax Map Number _____ Lot _____
Lat ____ ° ____ ' ____ " or 44.31746262 DMS or DD
Long ____ ° ____ ' ____ " or -120.86207477 DMS or DD
○ Street address of well ◉ Nearest address
NW LAMONTA

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration				
Completed Well	3/4/2020			8

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 222.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
2/14/2020	222	290	400			8

(11) WELL LOG

Ground Elevation _____

Material	From	To
CLAY GRAVELS BROWN	0	37
SILT SAND GRAY	37	65
SILT SAND GRAY/CLAY BROWN	65	167
CLAY STICKY GRAY	167	222
GRAVELS SAND	222	249
SILT SAND CLAY GRAY	249	251
GRAVELS SAND GRAY	251	290
CLAYSTONE GREEN	290	298

Date Started 2/12/2020 Completed 3/4/2020

(unbonded) Water Well Constructor Certification

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

License Number 1852 Date 3/28/2020
Signed JEB ABBAS (E-filed)

(bonded) Water Well Constructor Certification

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

License Number 1720 Date 4/9/2020
Signed JACK ABBAS (E-filed)
Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

CROO 54871

4/9/2020

Map of Hole

STATE OF OREGON
WELL LOCATION MAP

This map is supplemental to the WATER SUPPLY WELL REPORT

Oregon Water Resources Department
725 Summer St NE, Salem OR 97301
(503)986-0900

LOCATION OF WELL

Latitude: 44.31746262 Datum: WGS84
Longitude: -120.86207477
Township/Range/Section/Quarter-Quarter Section:
WM14.00S16.00E31NENW
Address of Well:
NW LAMONTA

Well Label: 136752

Printed: March 28, 2020

DISCLAIMER: This map is intended to represent the approximate location the well. It is not intended to be construed as survey accurate in any manner.

Provided by well constructor

Groundwater Application Review Summary Form

Application # LL- _1825_

GW Reviewer _Aurora C Bouchier_ Date Review Completed: _6/15/2020_

Summary of GW Availability and Injury Review:

☒ Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

☐ There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

☐ The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

WATER RESOURCES DEPARTMENT

MEMO **June , 2020**

TO: Application LL-**1825**

FROM: GW: Aurora C Bouchier
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference & General/Local Surface Water Evaluation for Deschutes Ground Water Study Area

The source of appropriation is within or above the **Deschutes** Scenic Waterway

Use the Scenic Waterway condition (Condition 7J).

PREPONDERANCE OF EVIDENCE FINDING UNDER ORS 390.835:

Department has found that there is a preponderance of evidence that the proposed use of groundwater will measurably reduce the surface water flows necessary to maintain the free-flowing character of the **Deschutes** Scenic Waterway in quantities necessary for recreation, fish and wildlife.

LOCALIZED IMPACT FINDING

☒ The proposed use of groundwater will have a localized impact to surface water in the **Crooked** River/Creek Subbasin.

If the localized impact box above is checked, then the water use under any right issued pursuant to this application is presumed to have a localized impact on surface water within the identified subbasin. Mitigation of the impact, originating from within the Local Zone of Impact identified by the Department, will be required before a permit may be issued for the proposed use.

If the localized impact box above is not checked, then the water use under any right issued pursuant to this application is presumed to have a general (regional) impact on surface water. Mitigation of the impact, originating anywhere within the Deschutes Basin above the Madras gage, will be required before a permit may be issued for the proposed use.

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 6/15/2020
FROM: Groundwater Section Aurora C Bouchier
Reviewer's Name
SUBJECT: Application LL- 1825 Supersedes review of na
Date of Review(s)

PUBLIC INTEREST PRESUMPTION; GROUNDWATER

OAR 690-310-130 (1) *The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525.* Department staff review groundwater applications under OAR 690-310-140 to determine whether the presumption is established. OAR 690-310-140 allows the proposed use be modified or conditioned to meet the presumption criteria. **This review is based upon available information and agency policies in place at the time of evaluation**.

A. GENERAL INFORMATION: Applicant's Name: **City of Prineville** County: **Crook**

A1. Applicant(s) seek(s) 2.68 cfs from 1 well(s) in the Deschutes Basin, Lower Crooked (Crooked River ZOI) subbasin

A2. Proposed use Municipal Seasonality: year round

A3. Well and aquifer data **(attach and number logs for existing wells; mark proposed wells as such under logid)**:

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	CROO 54871	Lamonta 2	Fluviolacustrine**	2.68	14S/16E-31 NE-NW	765' S, 1240' E fr NW cor S 31
2						
3						
4						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	2856	222	8	3/4/2020	298	0-200	-1-226, 291-298	-	226-291	400	-	P
										**600	165	P

Use data from application for proposed wells.

A4. **Comments:** **The well log lists 2 pump tests.

The limited license application is to produce up to 1200 gpm (or 756 acre feet) out of the City's new Lamonta Well 2 (CROO 54871). The letter attached to the application states that *the City will limit the combined annual volume of water appropriated under the City's Permits G-17577, G-18155 AND this proposed limited license, to no more than the maximum annual volume authorized under Permits G-17577 and G-18155, which is currently 1,509.75 acre-feet.*

It should be noted that the wells authorized under Permits G-17577 and G-18155 (CROO 1894, CROO 53453, CROO 53956 and CROO 54191) are all located on the bluff near the Pineville airport and produce from the Deschutes Fm whereas the proposed POA is located in the Crooked River valley and produces from the fluviolacustrine sand and gravels (Robinson and Price, 1963).

A5. ☒ **Provisions of the** Deschutes Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water ☒ **are**, *or* ☐ **are not**, activated by this application. (Not all basin rules contain such provisions.)
Comments: Within the USGS Groundwater Study Area Boundary, therefore the pertinent rules apply (OAR 690-505-0500 – 0620).

A6. ☐ **Well(s) #** _____ , _____ , _____ , _____ , _____ , tap(s) an aquifer limited by an administrative restriction.
Name of administrative area:
Comments:

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. **Based upon available data**, I have determined that groundwater* for the proposed use:

a. ☐ **is** over appropriated, ☒ **is not** over appropriated, *or* ☐ **cannot be determined to be** over appropriated during any period of the proposed use. * This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;

b. ☒ **will not** *or* ☐ **will** likely be available in the amounts requested without injury to prior water rights. * This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;

c. ☐ **will not** *or* ☐ **will** likely to be available within the capacity of the groundwater resource; or

d. ☐ **will, if properly conditioned**, avoid injury to existing groundwater rights or to the groundwater resource:

i. ☒ The permit should contain condition #(s) **7N, 7T**;

ii. ☐ The permit should be conditioned as indicated in item 2 below.

iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

B2. a. ☐ **Condition** to allow groundwater production from no deeper than _____ ft. below land surface;

b. ☐ **Condition** to allow groundwater production from no shallower than _____ ft. below land surface;

c. ☐ **Condition** to allow groundwater production only from the _____ groundwater reservoir between approximately _____ ft. and _____ ft. below land surface;

d. ☐ **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

Describe injury –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): _____

B3. **Groundwater availability remarks:**

A nearby well (CROO 1540, located approximately 50 feet from the proposed POA) is currently authorized for production of 0.51 cfs under Certificate 94818 (a recent transfer, T-13176, moved 0.26 cfs from CROO 1540 but maintained 0.51 cfs at CROO 1540). Well-to-well interference at CROO 1540 due to pumping at CROO 54871 was modeled using reported transmissivity values for the fluviolacustrine gravels (5,500 to 11,000 gpd/ft, from Robinson and Price) and a 40 foot thick productive zone. At the full requested maximum rate (1200 gpm) the drawdown at CROO 1540 will likely be on the order of 140 to 315 feet (assuming continuous pumping for 365 days). At half the requested maximum rate (600 gpm) the drawdown at CROO 1540 will likely be on the order of 70 to 160 feet (again assuming continuous pumping for 365 days).

Pumping measurements at CROO 1540 list water levels as deep as 217.9 feet below land surface. As CROO 1540 is 256 feet deep, it appears likely that the combined cone of depression if both wells were pumping would be problematic, likely for both wells.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

C1. **690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: _____

C2. **690-09-040 (2) (3):** Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: _____

Water Availability Basin the well(s) are located within: _____

C3a. **690-09-040 (4):** Evaluation of stream impacts for each well that has been determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water (SW) source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that SW source, not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% *natural* flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked ☒ box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

C3b. **690-09-040 (4):** Evaluation of stream impacts <u>by total appropriation</u> for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells**. Otherwise same evaluation and limitations apply as in C3a above.

	SW #		Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐

Comments: ____

____

____

____

____

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.													
(B) = 80 % Nat. Q													
(C) = 1 % Nat. Q													
(D) = (A) > (C)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(E) = (A / B) x 100		%	%	%	%	%	%	%	%	%	%	%	%

(A) = total interference as CFS; (B) = WAB calculated natural flow at 80% exceed. as CFS; (C) = 1% of calculated natural flow at 80% exceed. as CFS; (D) = highlight the checkmark for each month where (A) is greater than (C); (E) = total interference divided by 80% flow as percentage.

Basis for impact evaluation:

C4b. **690-09-040 (5) (b) The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.**

C5. ☐ **If properly conditioned**, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:

i. ☐ The permit should contain condition #(s)_____;

ii. ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:**

During the 1940's, wells producing from the lower sands and gravels of the fluviolacustrine unit experienced a water level decline which prompted a study by the USGS, resulting in Water-Supply Paper 1619-P which was published in 1963. Since the 1950's-1960's it appears that the water level in wells producing from the lower sands and gravels have remained more or less stable, with spring time water levels essentially coincident with the elevation of the nearby reaches of both Ochoco Creek and the Crooked River (see hydrograph below). This implies a hydraulic connection.

Due to studies like the one mentioned above and the USGS WRI Report 00-4162 report which concluded that groundwater within the Deschutes Ground Water Study Area (DGWSA) is hydraulically connected to surface water, groundwater reviews for applications within the DGWSA do not evaluate groundwater/surface water considerations (Section C of this review). However, in this instance transient stream depletion was modeled using Hunt 2003. As in the well-to-well interference modeling described above, published transmissivity vales from Robinson and Price were used. Although the stream depletion values are low (0.02% of production, or 0.001 cfs, at 30 days of pumping at 1200 gpm), the stream depletion increases over time.

References Used:

Application file LL-1825, and file for nearby transfer T-13176.

Gannett, Marshall W., Lite, Kenneth E. Jr., Morgan, David S., and Collins, Charles A., 2001, Ground-Water Hydrology of the upper Deschutes Basin, Oregon: U.S. Geological Survey Water-Resources Investigations Report 00-4162.

Lite, Kenneth E., and Gannett, Marshall W., 2002, Geologic Framework of the Regional Ground-Water Flow System in the Upper Deschutes Basin, Oregon: U.S. Geological Survey Water-Resources Investigations Report 02-4015.

Robinson, J. W., and Price, D., 1963, Ground Water in the Prineville Area Crook County, Oregon: U.S. Geological Survey Water-Supply Paper 1619-P.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 1 **Logid:** CROO 54871

D2. **THE WELL does not appear to meet current well construction standards based upon:**

a. ☐ review of the well log;

b. ☐ field inspection by _____;

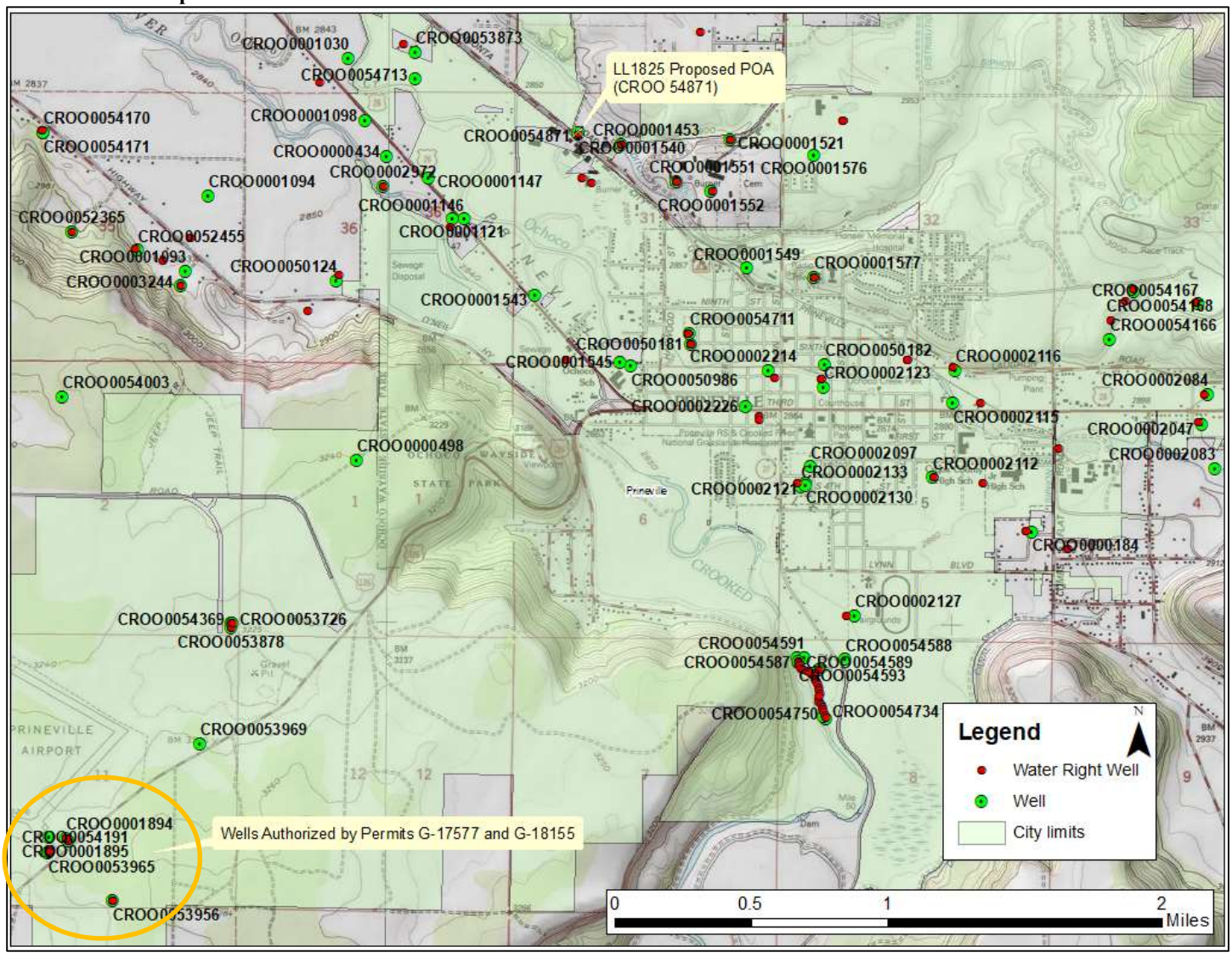
c. ☐ report of CWRE _____;

d. ☐ other: (specify) _____

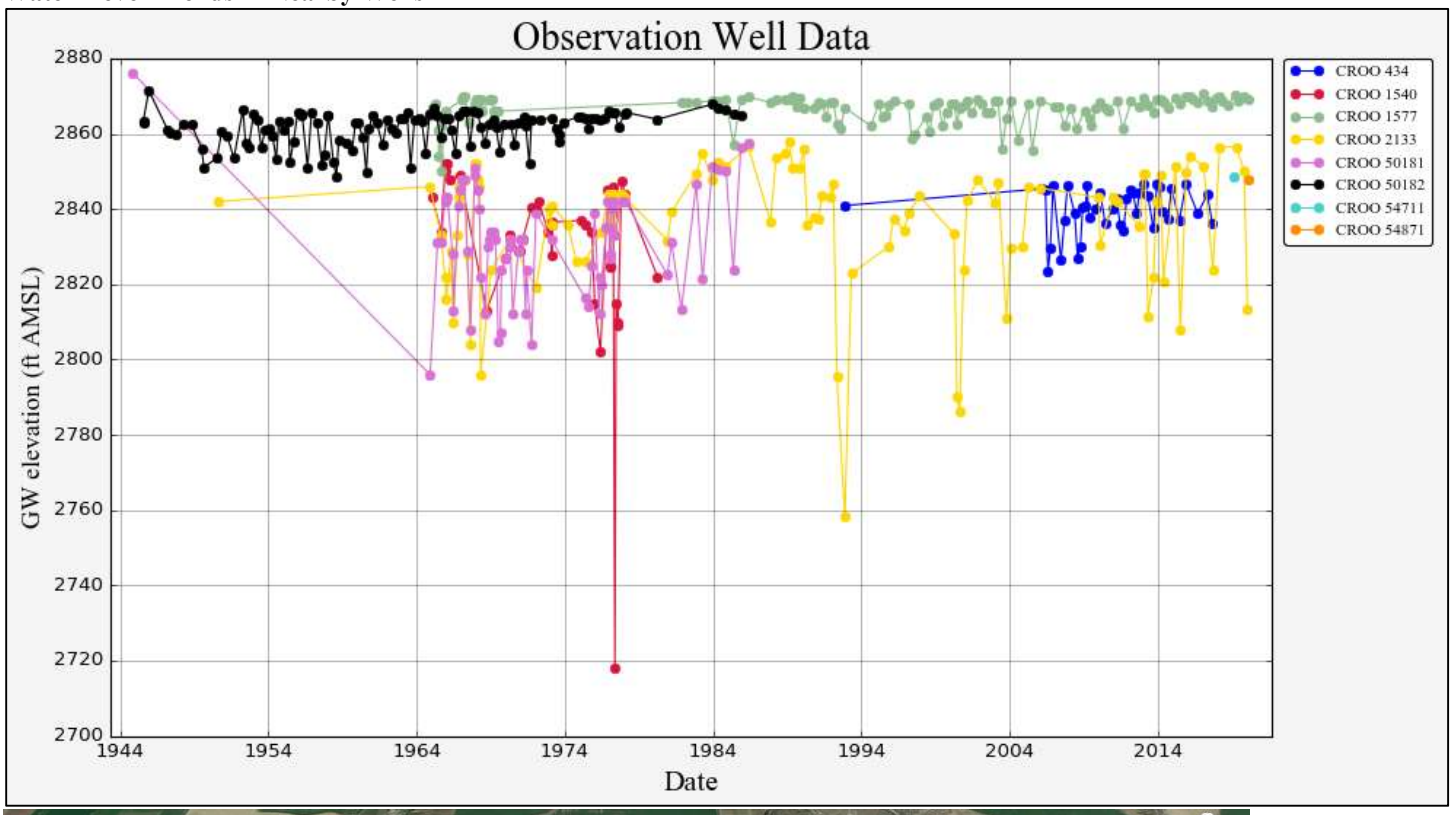
D3. **THE WELL construction deficiency or other comment is described as follows:** _____

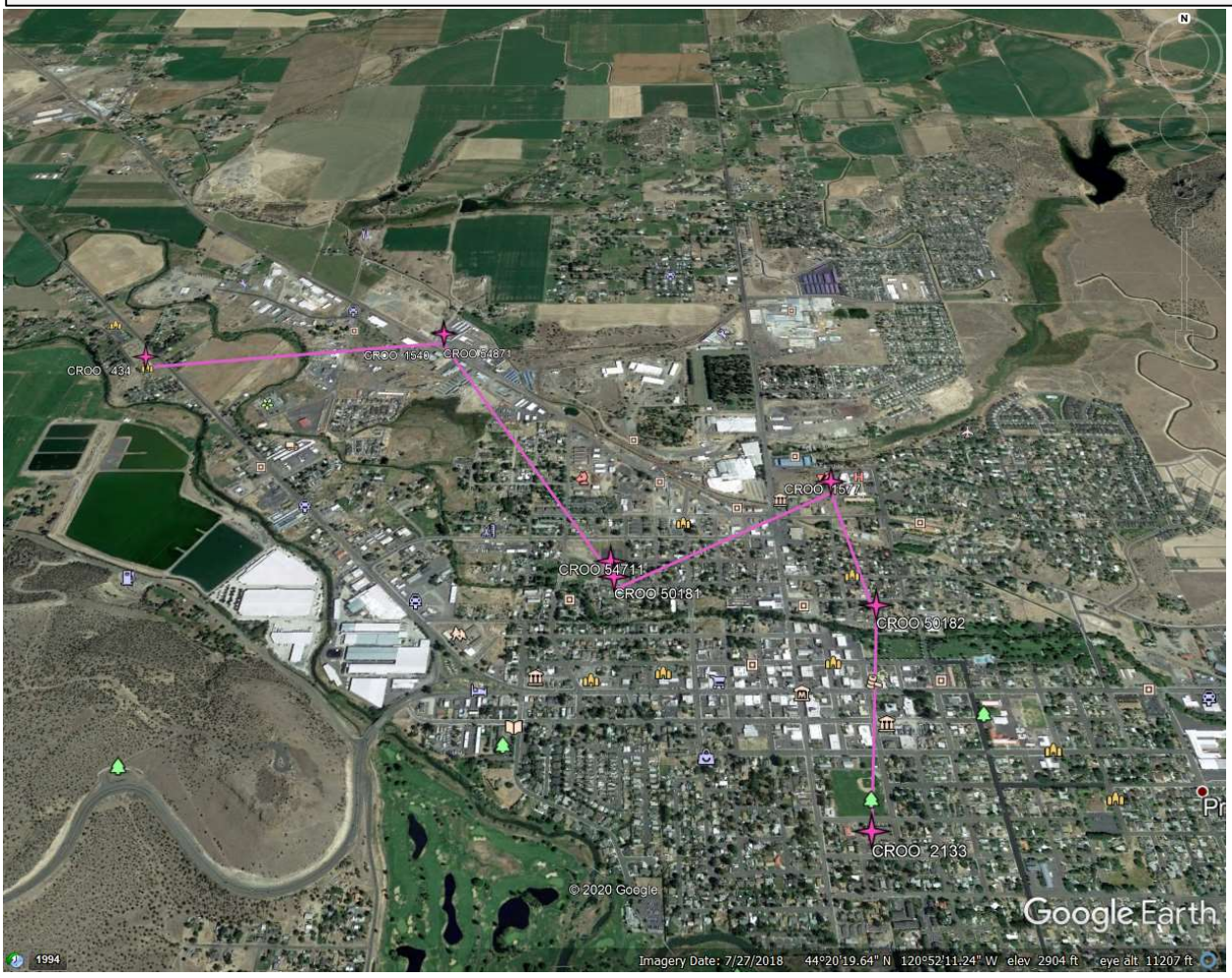
D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Well Location Map



Water-Level Trends in Nearby Wells





Well-to-well Interference Modeling

Full Maximum Rate Requested (1200 gpm)

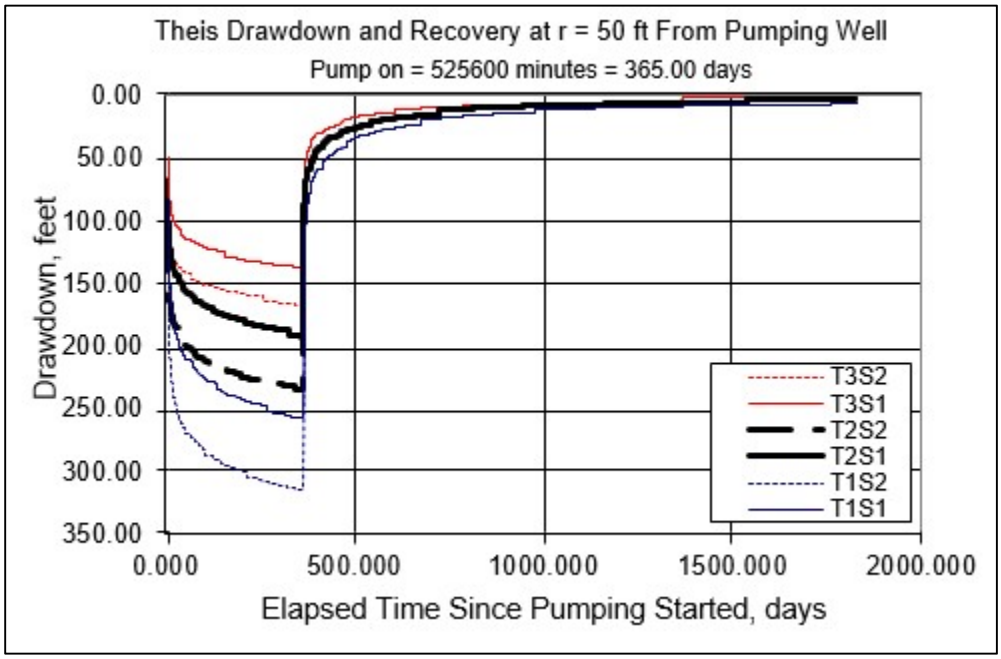
Theis Time-Drawdown Worksheet v.3.00

Calculates Theis nonequilibrium drawdown and recovery at any arbitrary radial distance, r, from a pumping well for 3 different T values and radial distance, r, from a pumping well for 3 different T values and 2 different S values.

Written by Karl C. Wozniak September 1992. Last modified December 17, 2019

Input Data:	Var Name	Scenario 1	Scenario 2	Scenario 3	Units	
Total pumping time	t		365		d	
Radial distance from pumped well:	r		50		ft	Q conversions
Pumping rate	Q		1200		gpm	1,200.00 gpm
Hydraulic conductivity	K	18	25	36	ft/day	2.67 cfs
Aquifer thickness	b		40		ft	160.43 cfm
Storativity	S_1		0.01			231,016.04 cfd
	S_2		0.001			5.30 af/d
Transmissivity Conversions	T_f2pd	720	1000	1440	ft2/day	
	T_ft2pm	0.5	0.694444	1	ft2/min	Recalculate
	T_gpdpft	5385.6	7480	10771.2	gpd/ft	

Use the Recalculate button if recalculation is set to manual



Well-to-well Interference Modeling

Half Maximum Rate Requested (600 gpm)

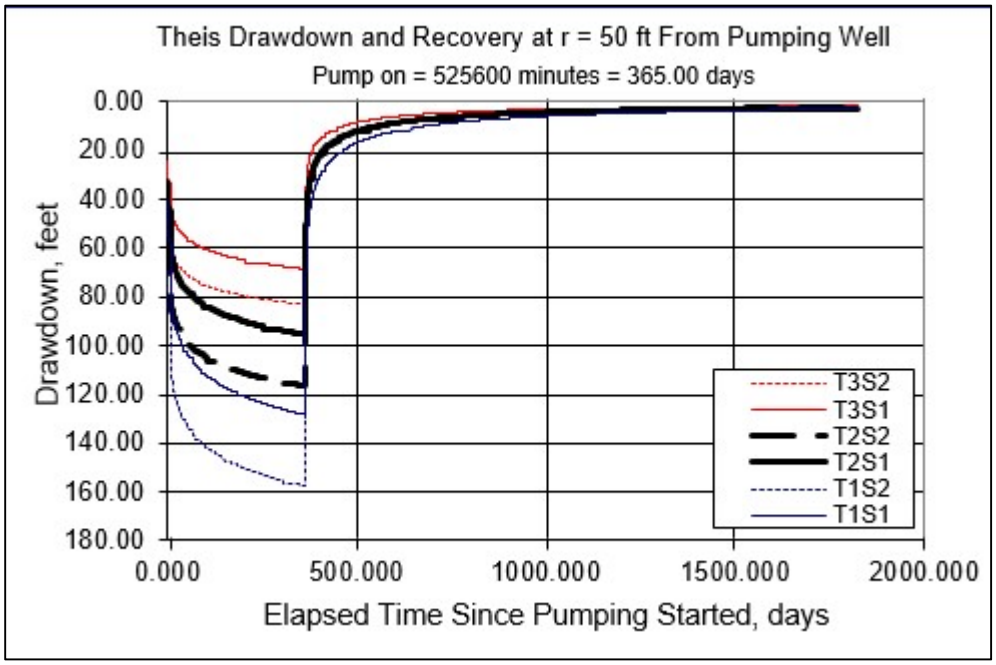
Theis Time-Drawdown Worksheet v.3.00

Calculates Theis nonequilibrium drawdown and recovery at any arbitrary radial distance, r, from a pumping well for 3 different T values and radial distance, r, from a pumping well for 3 different T values and 2 different S values.

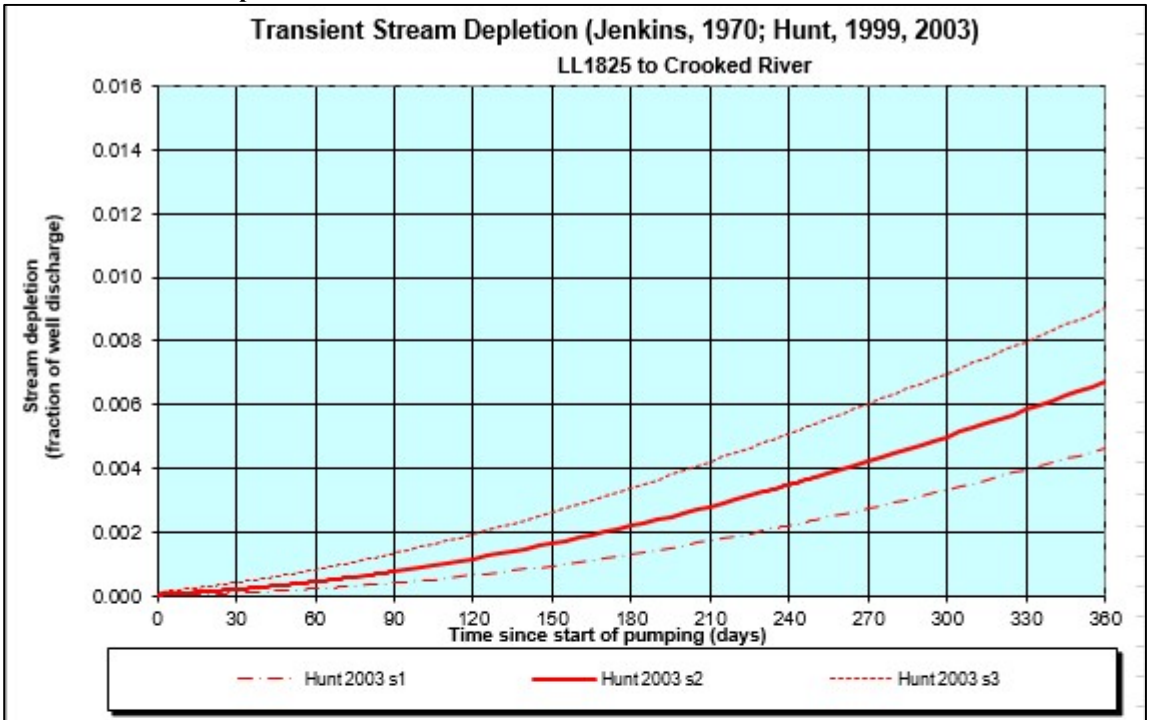
Written by Karl C. Wozniak September 1992. Last modified December 17, 2019

Input Data:	Var Name	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**	
Total pumping time	t		365		d	
Radial distance from pumped well:	r		50		ft	**Q conversions**
Pumping rate	Q		600		gpm	600.00 gpm
Hydraulic conductivity	K	18	25	36	ft/day	1.34 cfs
Aquifer thickness	b		40		ft	80.21 cfm
Storativity	S_1		0.01			115,508.02 cfd
	S_2		0.001			2.65 af/d
Transmissivity Conversions	T_f2pd	720	1000	1440	ft2/day	
	T_ft2pm	0.5	0.69444444	1	ft2/min	Recalculate
	T_gpdpft	5385.6	7480	10771.2	gpd/ft	

Use the Recalculate button if recalculation is set to manual



Transient Stream Depletion Model Results



Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 365 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	69.4%	78.1%	82.0%	84.4%	86.0%	87.2%	88.2%	88.9%	89.6%	90.1%	90.5%	91.0%
H SD 1999	15.5%	23.8%	29.3%	33.5%	36.9%	39.8%	42.2%	44.3%	46.1%	47.8%	49.3%	50.7%
H SD 2003	0.02%	0.05%	0.08%	0.12%	0.17%	0.22%	0.28%	0.35%	0.42%	0.50%	0.58%	0.67%
Qw, cfs	2.680	2.680	2.680	2.680	2.680	2.680	2.680	2.680	2.680	2.680	2.680	2.680
H SD 99, cfs	0.415	0.637	0.786	0.899	0.990	1.066	1.130	1.187	1.237	1.281	1.322	1.358
H SD 03, cfs	0.001	0.001	0.002	0.003	0.004	0.006	0.008	0.009	0.011	0.013	0.016	0.018

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	2.68	2.68	2.68	cfs
Time pump on (pumping duration)	tpon	365	365	365	days
Perpendicular from well to stream	a	3050	3050	3050	ft
Well depth	d	298	298	298	ft
Aquifer hydraulic conductivity	K	18	25	36	ft/day
Aquifer saturated thickness	b	40	40	40	ft
Aquifer transmissivity	T	720	1000	1440	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	1	1	1	ft/day
Aquitard saturated thickness	ba	250	250	250	ft
Aquitard thickness below stream	babs	236	236	236	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	25	25	25	ft
Streambed conductance (lambda)	sbc	0.105932	0.105932	0.105932	ft/day
Stream depletion factor	sdf	12.920139	9.302500	6.460069	days
Streambed factor	sbf	0.448741	0.323093	0.224370	
input #1 for Hunt's Q_4 function	t'	0.077399	0.107498	0.154797	
input #2 for Hunt's Q_4 function	K'	51.680556	37.210000	25.840278	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.448741	0.323093	0.224370	