

Hannah Elliott



From: jim newton <newtonjim@hotmail.com>
Sent: Wednesday, March 2, 2022 3:32 PM
To: Hannah Elliott; Plan
Subject: Re: CROOK COUNTY COURT HEARING RECORD NUMBER 217-21-000537-PLNG; CGE Submittal for Vanier File
Attachments: Vanier-KR 3-2-2022 CGE - Memorandum Crook Co File 217-21-000537-PLNG.pdf

CROOK COUNTY
MAR 02 2022
PLANNING DEPT

To Whom it may concern:

Enclosed is a memorandum prepared by Cascade Geoengineering, LLC in response to the proposed mine expansion of the Vanier/Knife River Site included in CROOK COUNTY PLANNING RECORD NUMBER 217-21-000537-PLNG.

Please admit this memorandum into the county record for review.

If you have any questions regarding this submittal, please contact me at your earliest convenience, my contact information is shown below.

Best,
~Jim

Jim Newton, PE, RG, CWRE
Principal - Engineer-Geologist
Cascade Geoengineering, LLC
21145 Scottsdale DR
Bend, Oregon 97701
360-907-4162
www.cascadegeoengineering.com

Memorandum

CROOK COUNTY
MAR 02 2022
PLANNING DEPT



CASCADE
GEOENGINEERING

21145 Scottsdale DR, Bend, Oregon 97701
360-907-4162 newtonjim@hotmail.com

March 2, 2022

TO:

Crook County
Community Development Department
Planning Division
300 NE 3rd Street, Room 12
Prineville, Oregon 97754

FROM:

Jim Newton, P.E., R.G., C.W.R.E.

RE: CROOK COUNTY COURT HEARING RECORD NUMBER 217-21-000573-PLNG; REVIEW OF KNIFE RIVER DOCUMENTS SUBMITTED FOR THE PROPOSED MINING REALTED TO HEARING NUMBER 217-21-000436-PLNG. SITE LOCATED NEAR PRINEVILLE, OREGON

Dear Crook County Community Planning Department:

This memorandum has been prepared by Cascade Geoengineering, LLC (CGE) on behalf of Richard Zimmerlee (resident and lease property farm tenant of the Vanier property located at 6487 NW Lamonta Road), and provides a review of a portion of the Knife River Corporation-Northwest (KR) Crook County Condition Use Application file number 217-21-000436-PLNG (Application), specifically, exhibits and testimony prepared by Stantec Consulting Services Inc. (Stantec) and Mr. Christopher Lidstone of Stantec, respectively. This memorandum has been prepared to supplement information into the County record for Conditional Use Application file number 217-21-000537-PLNG, as recently the County allowed information from the Application to be transferred to file number 217-21-000537-PLNG. The review contained within this memorandum was completed and prepared by Jim Newton of CGE, an Oregon registered professional geologist (RG), Oregon registered professional engineer (PE) and Oregon certified water right examiner (CWRE).

This memorandum has been prepared by CGE to directly address concerns related to the Vanier Site below:

- Proposed post-mining reclamation contours are proposed to essentially mimic the current groundwater levels recorded at the site, affecting future land use of the reclaimed mine site and potential impacts to groundwater quality;
- Mine strategies proposed by KR for the Vanier site are general mining approaches, however, site specific conditions may render these mining approaches ineffective, and KR has not conducted a detailed technical review of the existing site conditions in an attempt to prepare for, or anticipate the potential magnitude of groundwater impacts mining may pose to the Site;
- Testimony provided by Mr. Christopher Lidstone, as a paid consultant of KR, appeared to be ignorant, or possibly misleading, as to the extent of exploration that may have been conducted by KR in the past, as Mr. Lidstone testified to the Crook County Court on December 3, 2021 that no borings were conducted on the Vanier site, only test pits (noted as dug with an excavator, which is essentially a tracked backhoe with greater depth of digging capacity) were conducted on the site.
 - This may be true that Stantec did not install borings on the Vanier site as far as Mr. Lidstone testified to, however, KR installed borings at locations included in the, *“Aggregate Resource Investigation Vanier Site Prineville, Oregon 2019-2020”* prepared by Mr. Tim Marshall of KR, dated July 2020. And Further, Stantec noted in their *“Woodward/Vanier Aggregate Mine Hydrogeologic Characterization”* report prepared by Stantec Consulting Services Inc. (Stantec), dated March 2021, that, *“To assess the aggregate resources at Vanier, Knife River conducted a site investigation in June 2019. Seven soil borings were drilled to depths between 30 and 35 feet to assess the lateral continuity of the sand and gravel resources. The locations of these borings are noted on Figure 2.”*

INTRODUCTION

The review of Knife River and Stantec documents included in the public record for Crook County report was requested of CGE by Mr. Zimmerlee based on his concern over potential groundwater conditions that may change as a result of the proposed expansion of the existing Knife River Woodward. Mr. Zimmerlee is currently leasing the Vanier lands included in the KR and the Vanier Applications, and has leased the reclaimed portions of the existing Woodward portion of the active KR mine site. Mr. Zimmerlee is concerned that during active mining of the Vanier property, groundwater conditions may change in ways that affect the ability to continue to farm portions of the undisturbed Vanier lands, and, upon reclamation of the post-mined Vanier lands also. These concerns have been expressed to the County by Mr. Zimmerlee and included in documents contained with the KR Application and included in the Vanier Application.

Jim Newton of CGE has maintained contact with Mr. Zimmerlee since October 2021 regarding the KR Application, and more recently regarding the Vanier Application, and to provide additional details to the County regarding the proposed mining and reclamation of the proposed Vanier Site (the Vanier site is effectively the proposed expansion of the existing KR Woodward mine site, as Vanier borders the KR Woodward site to the immediate east and north, shown on an annotated KR County Exhibit 59 attached).

As part of the maintained contact with Mr. Zimmerlee, Mr. Newton conducted a site visit to the Vanier site on March 1, 2022 to measure the onsite domestic well of Mr. Zimmerlee's residence located at 6487 NW Lamonta Road, and observe test pits installed by Mr. Zimmerlee on February 28, 2022.

Mining Strategies Proposed by Stantec

Based on proposed mining strategies proposed by Stantec there are methods available to possibly mine the site with minimal impacts to groundwater or groundwater quality. This may be true, however, the greatest concern related to mining may lie more with the reclamation of the mine site and potential uses for the Vanier Site, as groundwater is encountered at depths at less than 10-feet and other areas less than 13-feet. With mine reclamation proposing to lower the current ground surface to less than 2-feet of encountered groundwater (or possibly closer), it would appear that KR is proposing to leave the site in a condition that may not allow for the area to return to farm use, and leave the shallow aquifer highly susceptible to contamination from ground surface applications associated with farming (e.g., application of fertilizers, pesticides or herbicides).

Post-Mining Reclamation Contours Proposed by Knife River

The proposed post-mining reclamation land contours of the Vanier Site were presented in Exhibit 59 of the KR Application, title "*Final Reclamation Contours Vanier/Woodward NWR—COR*" with a receipt stamped date of November 15, 2021 by Crook County Planning Dept. CGE conducted a comparison of the proposed reclamation contours in relation to the measured depth to groundwater and comparison of existing ground surface elevations, these findings are below:

- The attached KR Exhibit 59 has been annotated by CGE to note the location of a test pit ZT-2 dug with a backhoe by Mr. Zimmerlee on February 28, 2022 and observed by Mr. Newton of CGE on March 1, 2022.
 - The noted depth to groundwater in the test pit was measured 118-inches below ground surface (bgs), or approximately 9.83-feet bgs. The existing surface elevation of ZT-2 is 2,922-feet, as noted by Google Earth Pro. This would yield an elevation of groundwater at the Site as 2912.17-feet bgs, by comparison, the KR noted 'final reclamation contours' at this location would be slightly less than approximately 2,914 feet (based on a general scale of the KR Exhibit 59, this would yield an estimated ground surface elevation of 2,913.86 feet), a difference between the groundwater elevation and proposed post-mining ground surface of 1.69-feet in elevation.
- The measured depth to groundwater of the domestic well located at the Zimmerlee residence at 6487 NW Lamonta Road was measured on March 1, 2021 at 12.65-feet bgs. During a site visit to this same well on November 10, 2021 CGE measured a water level in the well of approximately 10.08 feet bgs. Based on Google Earth Pro, the surface elevation of the Zimmerlee domestic well is 2,928-feet, this would yield a groundwater elevation in March 1, 2021 as 2,915.25.

Review of Stantec Installed Test Pits and KR Installed Well Borings

Based on a review of the Stantec Report and comparison of Mr. Lidstone's testimony during the December 3, 2021 Crook County Court hearing appear to differ significantly. Mr. Lidstone, a stated employee of Stantec and paid consultant for KR, testified in response to Mr. Newton's testimony during the December 3, 2021 hearing that some of the test borings could have been completed as monitoring wells, that no borings were installed on the Vanier Site. If Mr. Lidstone was involved in the preparation of the Stantec report for the Vanier Site, as he also testified being involved with the preparation of the Stantec report, Mr. Lidstone should have noted that on page 3.1, paragraph 2 of the Stantec report there is a specific reference to KR borings installed on the Vanier site, quoted from the Stantec report as, *"To assess the aggregate resources at Vanier, Knife River conducted a site investigation in June 2019. Seven soil borings were drilled to depths between 30 and 35 feet to assess the lateral continuity of the sand and gravel resources. The locations of these borings are noted on Figure 2."* A copy of the Stantec Figure 2 is included to this memorandum for reference.

Additionally, Oregon has required the filing of borings, whether they were installed for water wells, geotechnical borings, exploration or other means since 1955 and currently regulated under Oregon Administrative Rules 690-240. During the installation of test borings installed during the Site investigation by KR for the Vanier Site, geotechnical well logs were filed for these borings and are publicly available on the Oregon Water Resources Department (OWRD) webpage www.oregon.gov/owrd. The well boring logs are attached to this memorandum, with each well log containing a simple site location map also showing the location of each of the well borings.

CONCLUSIONS

Based a review of the KR submittals associated with Crook County File 217-21-000573-PLNG and testimony provided by Mr. Christopher Lidstone, as a consultant for KR, and the above concerns, it is the opinion of CGE that KR has not prepared a thorough review of the Vanier Site with adequate understanding of the site conditions to prepare a mining approach, or reclamation plan that may allow the Vanier Site to be mined responsibly by reducing impacts to the existing and future use of the Vanier Site and immediate lands. With there being potential long-term risk to the shallow groundwater aquifer on the Vanier Site and surrounding area and KR's limited understanding of the Site conditions, not allowing mining of Vanier Site as proposed at this time without a full understanding or consideration for long-term affects is likely prudent.

As noted in the CGE Memorandum dated November 15, 2021, the following recommendations are still warranted:

"RECOMMENDATIONS

Considering the likelihood that KR will continue to pursue permitting of the expansion/Vanier area, CGE would like to offer recommendations that may provide additional basis for geologic and hydrogeologic

investigations that may assist the applicant to address concerns by Mr. Zimmerlee and potentially other nearby landowners:

- *If KR or Stantec is to conduct additional analysis on potential groundwater impacts to the proposed KR mining expansion/Vanier area, it would be recommended the investigative and evaluation work be conducted under the direction of an Oregon registered professional geologist that will certify such work and follow Oregon guidelines as presented by the Oregon State Board of Geologist Examiners.*
- *Install exploratory borings and wells within the actual proposed expansion/Vanier mining area, this will allow the evaluation of actual materials to be mined, and the aquifer to be impacted by mining to be evaluated.*
- *Engage with concerned neighboring residents/landowners in a manner that is proactive to address concerns directly and provide an avenue for neighbors to both voice concerns and develop mining and reclamation strategies that addresses these concerns.”*

CLOSURE

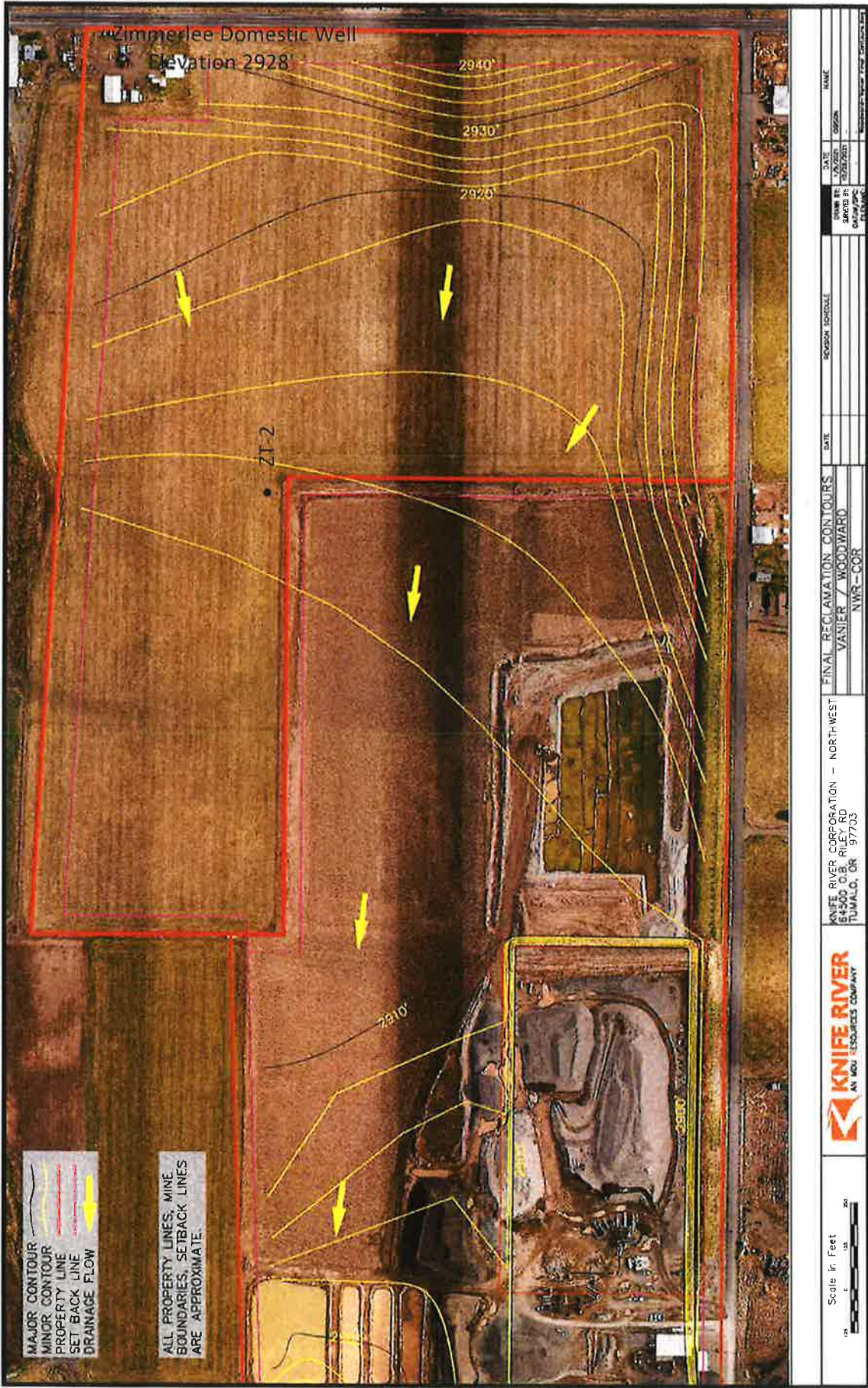
If you have questions regarding this memorandum, please feel free to contact me at your convenience. I can be reached by email at newtonjim@hotmail.com, or by telephone at 360-907-4162.

Sincerely,



Expires 5/1/2022

Jim Newton, PE, RG, CWRE
Principal – Engineer-Geologist
Cascade Geoengineering, LLC



Notes Added by CGE 3-2-2022

- ZT-2 Notes location of Test Pits installed by Mr. Zimmerlee 2-28-0022
- ❖ Location of Zimmerlee Domestic Well

CROOK COUNTY
NOV 15 2021
PLANNING DEPT

EXHIBIT

59

labbles



MAR 2021
 Figure 2



KNIFE RIVER
 As-drilled Test Wells and Test Pits

STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

8/20/2019

(1) OWNER/PROJECT Hole Number B-1

PROJECT NAME/NBR: 110-19-1059

First Name ROBERT J (JR.) Last Name VANIER

Company _____

Address PO BOX 326

City DAYVILLE State OR Zip 97825

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

(3) CONSTRUCTION

Rotary Air Hand Auger Hollow stem auger
 Rotary Mud Cable Push Probe
 Other SONIC

(4) TYPE OF HOLE:

Uncased Temporary Cased Permanent
 Uncased Permanent Slope Stability
 Other _____
 Other: _____

(5) USE OF HOLE

SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard (Attach copy)

Depth of Completed Hole 35.00 ft.

BORE HOLE			SEAL				sacks/	
Dia	From	To	Material	From	To	Amt	lbs	
6	0	35	Other	0	2	2	S	
			Bentonite Chips	2	35	9	S	

Backfill placed from 0 ft. to 2 ft. Material SOIL / GRAVEL
 Filter pack from _____ ft. to _____ ft. Material _____ Size _____

(7) CASING/SCREEN

Casing	Screen	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS

Pump Bailor Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration(hr)

Temperature 52 °F Lab analysis Yes By _____

Supervising Geologist/Engineer _____

Water quality concerns? Yes (describe below) TDS amount 110 ppm

From	To	Description	Amount	Units

(9) LOCATION OF HOLE (legal description)

County CROOK Twp 14.00 S N/S Range 15.00 E E/W WM
 Sec 14 SE 1/4 of the SE 1/4 Tax Lot 00103
 Tax Map Number _____ Lot _____
 Lat _____ " or _____ DMS or DD
 Long _____ " or _____ DMS or DD
 Street address of hole Nearest address

6487 NW LAMONTA ROAD, PRINEVILLE, OR 97754

(10) STATIC WATER LEVEL

Existing Well / Predeepening	Date	SWL(psi)	+	SWL(ft)
Completed Well	6/12/2019			18

Flowing Artesian?

WATER BEARING ZONES

Depth water was first found 18.00

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)
6/12/2019	18	35			18

(11) SUBSURFACE LOG Ground Elevation _____

Material	From	To
Sandy Silt	0	9
Silty sand w/ gravel	9	19
Sand and Gravel	19	29
Silt	29	35

Date Started 6/12/2019 Completed 6/12/2019

(12) ABANDONMENT LOG:

Material	From	To	Amt	sacks/ lbs
Other	0	2	2	S
Bentonite Chips	2	35	9	S

Date Started 6/12/2019 Completed 6/12/2019

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).

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

License/Registration Number 10637 Date 8/20/2019

First Name ZANE Last Name SHADRICK

Affiliation ZANESHADRICK

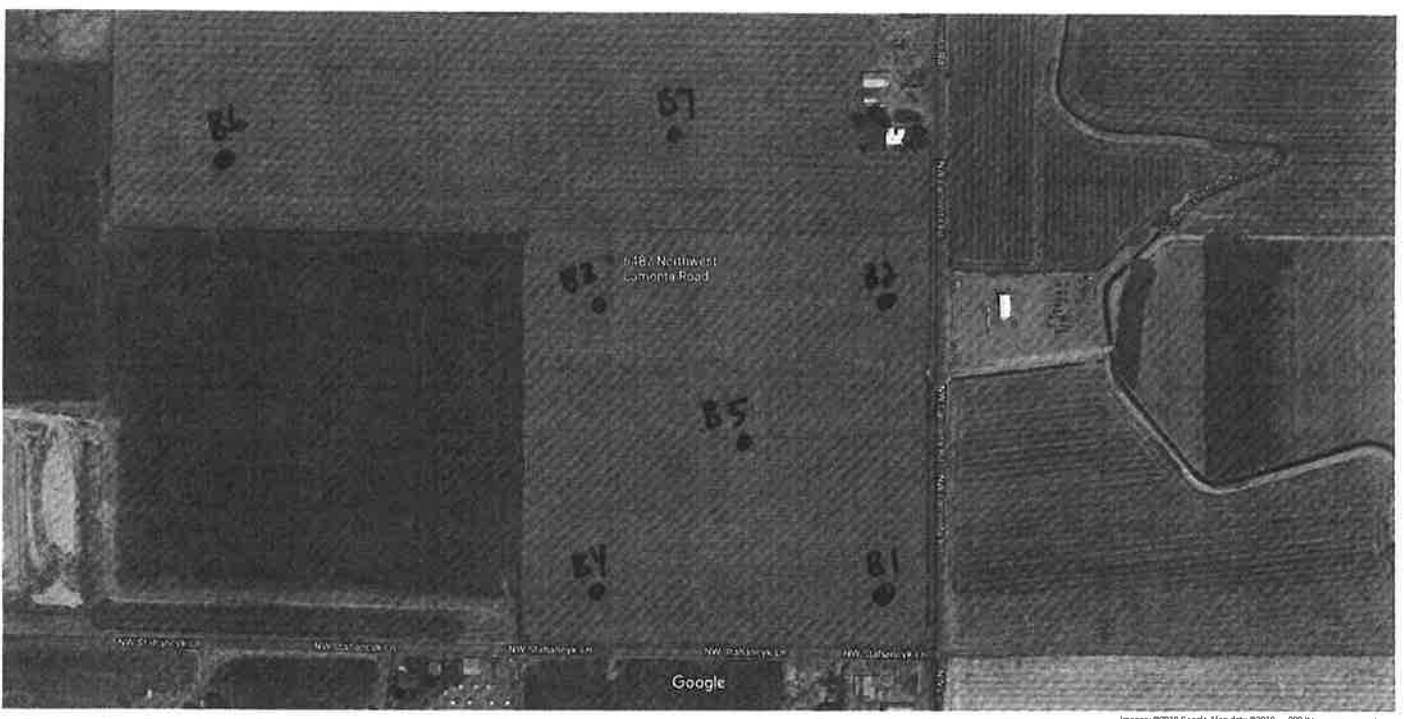
GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

CROO 54795

8/20/2019

Map of Hole

Google Maps 6487 NW Lamonta Rd
Prineville OR 110-19-1059



STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

8/20/2019

(1) OWNER/PROJECT Hole Number B-2

PROJECT NAME/NBR: 110-19-1059

First Name ROBERT J (JR.) Last Name VANIER
Company
Address PO BOX 326
City DAYVILLE State OR Zip 97825

(2) TYPE OF WORK [X] New [] Deepening [X] Abandonment
[] Alteration (repair/recondition)

(3) CONSTRUCTION
[] Rotary Air [] Hand Auger [] Hollow stem auger
[] Rotary Mud [] Cable [] Push Probe
[X] Other SONIC

(4) TYPE OF HOLE:
[] Uncased Temporary [] Cased Permanent
[] Uncased Permanent [] Slope Stability
[] Other

(5) USE OF HOLE
SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard [] (Attach copy)
Depth of Completed Hole 35.00 ft.

Table with columns: Dia, From, To, Material, SEAL, Amt, sacks/lbs. Includes rows for Other, Bentonite Chips.

Backfill placed from 0 ft. to 2 ft. Material SOIL / GRAVEL
Filter pack from ft. to ft. Material Size

(7) CASING/SCREEN table with columns: Casing, Screen, Dia, From, To, Gauge, Stl, Plstc, Wld, Thrd.

(8) WELL TESTS
[] Pump [] Bailer [] Air [] Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration(hr)

Temperature 52 °F Lab analysis [] Yes By

Supervising Geologist/Engineer

Water quality concerns? [] Yes (describe below) TDS amount 110 ppm

Table with columns: From, To, Description, Amount, Units.

(9) LOCATION OF HOLE (legal description)

County CROOK Twp 14.00 S N/S Range 15.00 E E/W WM
Sec 14 NE 1/4 of the SE 1/4 Tax Lot 00103
Tax Map Number Lot
Lat " or DMS or DD
Long " or DMS or DD
[] Street address of hole [] Nearest address
6487 NW LAMONTA ROAD, PRINEVILLE, OR 97754

(10) STATIC WATER LEVEL

Table with columns: Date, SWL(psi), +, SWL(ft). Includes rows for Existing Well / Predeepening, Completed Well.

WATER BEARING ZONES
Flowing Artesian? []
Depth water was first found 18.00

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), +, SWL(ft). Includes row for 6/12/2019.

(11) SUBSURFACE LOG Ground Elevation

Table with columns: Material, From, To. Includes rows for Silt, Sandy silt, Sand and Gravel, Sandy Silt.

Date Started 6/12/2019 Completed 6/12/2019

(12) ABANDONMENT LOG:

Table with columns: Material, From, To, Amt, sacks/lbs. Includes rows for Other, Bentonite Chips.

Date Started 6/12/2019 Completed 6/12/2019

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).

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

License/Registration Number 10637 Date 8/20/2019

First Name ZANE Last Name SHADRICK

Affiliation ZANESHADRICK

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

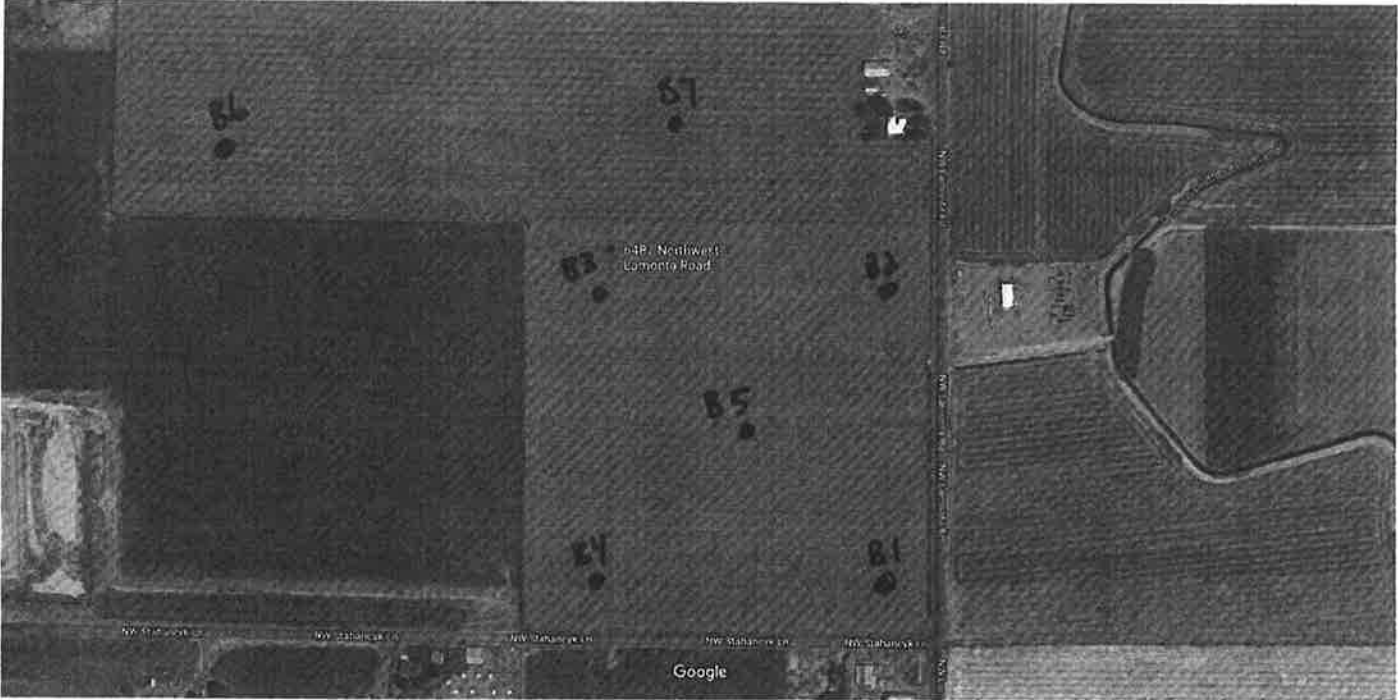
CROO 54796

8/20/2019

Map of Hole

Google Maps 6487 NW Lamonta Rd
Prineville OR

110-19-1059



STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

8/20/2019

(1) OWNER/PROJECT Hole Number B-3
PROJECT NAME/NBR: 110-19-1059
First Name ROBERT J. (JR.) Last Name VANIER
Company
Address PO BOX 326
City DAYVILLE State OR Zip 97825

(2) TYPE OF WORK [X] New [] Deepening [X] Abandonment
[] Alteration (repair/recondition)

(3) CONSTRUCTION
[] Rotary Air [] Hand Auger [] Hollow stem auger
[] Rotary Mud [] Cable [] Push Probe
[X] Other SONIC

(4) TYPE OF HOLE:
[] Uncased Temporary [] Cased Permanent
[] Uncased Permanent [] Slope Stability
[] Other

(5) USE OF HOLE
SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard [] (Attach copy)
Depth of Completed Hole 30.00 ft.
BORE HOLE SEAL sacks/
Dia From To Material From To Amt lbs

Backfill placed from 0 ft. to 2 ft. Material SOIL / GRAVEL
Filter pack from ft. to ft. Material Size

(7) CASING/SCREEN
Casing Screen Dia + From To Gauge Stl Plstc Wld Thrd

(8) WELL TESTS
[] Pump [] Bailer [] Air [] Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration(hr)

Temperature 52 °F Lab analysis [] Yes By
Supervising Geologist/Engineer
Water quality concerns? [] Yes (describe below) TDS amount 110 ppm
From To Description Amount Units

(9) LOCATION OF HOLE (legal description)
County CROOK Twp 14.00 S N/S Range 15.00 E E/W WM
Sec 14 NE 1/4 of the SE 1/4 Tax Lot 00103
Tax Map Number Lot
Lat " or DMS or DD
Long " or DMS or DD
[] Street address of hole [] Nearest address
6487 NW LAMONTA ROAD, PRINEVILLE, OR 97754

(10) STATIC WATER LEVEL
Date SWL(psi) + SWL(ft)
Existing Well / Predeepening
Completed Well 6/12/2019 18
Flowing Artesian? []
WATER BEARING ZONES
Depth water was first found 18.00
SWL Date From To Est Flow SWL(psi) + SWL(ft)
6/12/2019 18 30 18

(11) SUBSURFACE LOG
Ground Elevation
Material From To
Sandy Silt 0 9
Silty sand 9 19
Sand and Gravel 19 29
Silt 29 30

Date Started 6/12/2019 Completed 6/12/2019

(12) ABANDONMENT LOG:
Material From To Amt lbs
Other 0 2 2 S
Bentonite Chips 2 30 8 S

Date Started 6/12/2019 Completed 6/12/2019

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).
I accept responsibility for the construction, deepening, alteration, or abandonment work performed during the construction dates reported above. All work performed during this time is in compliance with Oregon geotechnical hole construction standards. This report is true to the best of my knowledge and belief.
License/Registration Number 10637 Date 8/20/2019
First Name ZANE Last Name SHADRICK
Affiliation ZANESHADRICK

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

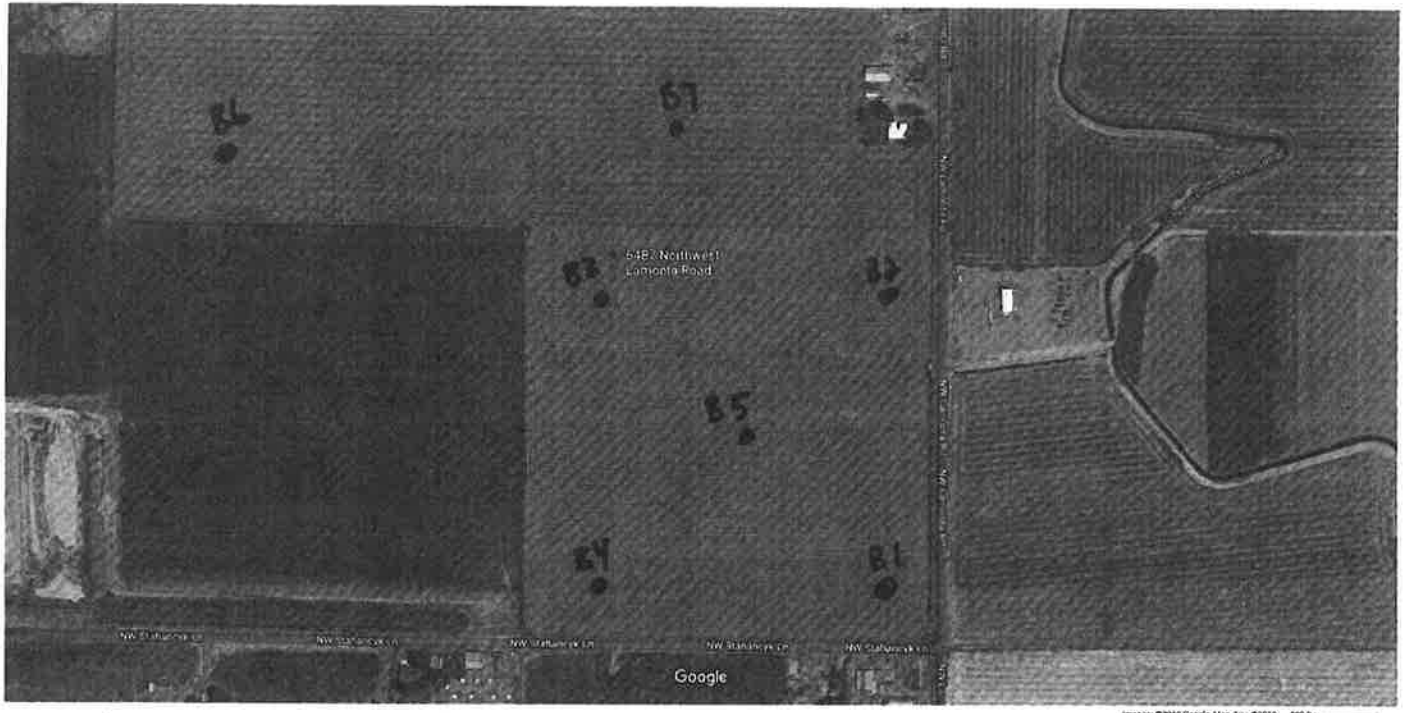
CROO 54797

8/20/2019

Map of Hole

Google Maps 6487 NW Lamotta Rd
Prineville OR

110-19-1059



STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

8/20/2019

(1) OWNER/PROJECT Hole Number B-4

PROJECT NAME/NBR: 110-19-1059

First Name ROBERT J (JR.) Last Name VANIER
Company
Address PO BOX 326
City DAYVILLE State OR Zip 97825

(2) TYPE OF WORK [X] New [] Deepening [X] Abandonment
[] Alteration (repair/recondition)

(3) CONSTRUCTION
[] Rotary Air [] Hand Auger [] Hollow stem auger
[] Rotary Mud [] Cable [] Push Probe
[X] Other SONIC

(4) TYPE OF HOLE:
[] Uncased Temporary [] Cased Permanent
[] Uncased Permanent [] Slope Stability
[] Other
Other:

(5) USE OF HOLE
SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard [] (Attach copy)
Depth of Completed Hole 30.00 ft.

Table with columns: Dia, From, To, Material, SEAL, Amt, sacks/lbs. Includes rows for Bentonite Chips.

Backfill placed from 0 ft. to 2 ft. Material SOIL / GRAVEL
Filter pack from ft. to ft. Material Size

(7) CASING/SCREEN

Table with columns: Casing, Screen, Dia, From, To, Gauge, Stl, Plstc, Wld, Thrd

(8) WELL TESTS

Table with columns: Pump, Bailer, Air, Flowing Artesian, Yield gal/min, Drawdown, Drill stem/Pump depth, Duration(hr)

Temperature 52 °F Lab analysis [] Yes By

Supervising Geologist/Engineer

Table with columns: Water quality concerns?, From, To, Description, Amount, Units

(9) LOCATION OF HOLE (legal description)

County CROOK Twp 14.00 S N/S Range 15.00 E E/W WM
Sec 14 SE 1/4 of the SE 1/4 Tax Lot 00103
Tax Map Number Lot
Lat or DMS or DD
Long or DMS or DD
[] Street address of hole [] Nearest address
6487 NW LAMONTA ROAD, PRINEVILLE, OR 97754

(10) STATIC WATER LEVEL

Table with columns: Date, SWL(psi), SWL(ft). Includes rows for Existing Well / Predeepening and Completed Well.

WATER BEARING ZONES

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), SWL(ft). Includes row for 6/12/2019.

(11) SUBSURFACE LOG Ground Elevation

Table with columns: Material, From, To. Includes rows for Silt, Silty sand, Sand and Gravel, Silt.

Date Started 6/12/2019 Completed 6/12/2019

(12) ABANDONMENT LOG:

Table with columns: Material, From, To, Amt, sacks/lbs. Includes rows for Other and Bentonite Chips.

Date Started 6/12/2019 Completed 6/12/2019

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).

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

License/Registration Number 10637 Date 8/20/2019

First Name ZANE Last Name SHADRICK

Affiliation ZANESHADRICK

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

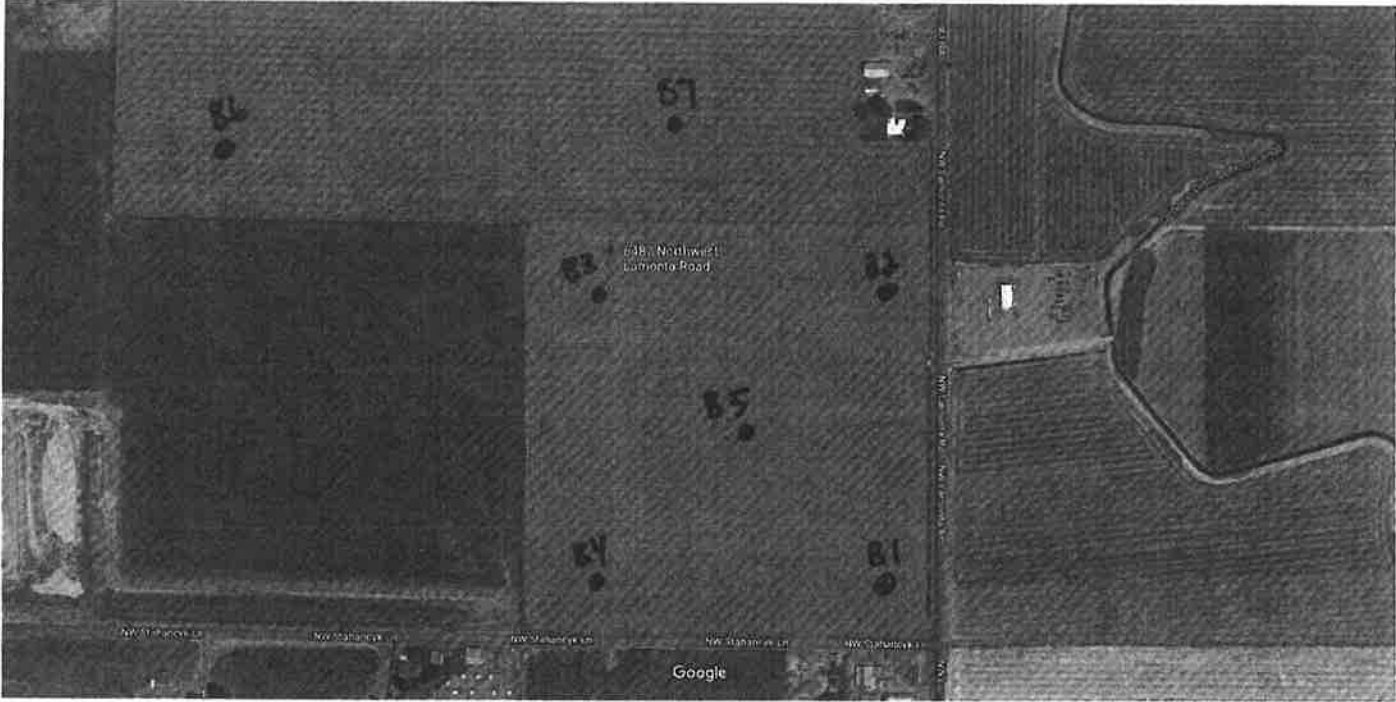
CROO 54798

8/20/2019

Map of Hole

Google Maps 6487 NW Lamonta Rd
Prineville OR

110-19-1059



STATE OF OREGON
GEOTECHNICAL HOLE REPORT
 (as required by OAR 690-240-0035)

8/20/2019

(1) OWNER/PROJECT Hole Number B-5

PROJECT NAME/NBR: 110-19-1059

First Name ROBERT J. (JR.) Last Name VANIER
 Company _____
 Address PO BOX 326
 City DAYVILLE State OR Zip 97825

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

(3) CONSTRUCTION
 Rotary Air Hand Auger Hollow stem auger
 Rotary Mud Cable Push Probe
 Other SONIC

(4) TYPE OF HOLE:
 Uncased Temporary Cased Permanent
 Uncased Permanent Slope Stability
 Other _____
 Other: _____

(5) USE OF HOLE
 SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard (Attach copy)
 Depth of Completed Hole 35.00 ft.

BORE HOLE			SEAL			sacks/	
Dia	From	To	Material	From	To	Amt	lbs
6	0	35	Other	0	2	2	S
			Bentonite Chips	2	35	9	S

Backfill placed from 0 ft. to 2 ft. Material SOIL / GRAVEL
 Filter pack from _____ ft. to _____ ft. Material _____ Size _____

(7) CASING/SCREEN

Casing	Screen	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS
 Pump Bailer Air Flowing Artesian
 Yield gal/min _____ Drawdown _____ Drill stem/Pump depth _____ Duration(hr) _____

Temperature 52 °F Lab analysis Yes By _____

Supervising Geologist/Engineer _____

Water quality concerns? Yes (describe below) TDS amount 110 ppm

From	To	Description	Amount	Units

(9) LOCATION OF HOLE (legal description)
 County CROOK Twp 14.00 S N/S Range 15.00 E E/W WM
 Sec 14 SE 1/4 of the SE 1/4 Tax Lot 00103
 Tax Map Number _____ Lot _____
 Lat _____ " or _____ DMS or DD
 Long _____ " or _____ DMS or DD
 Street address of hole Nearest address
6487 NW LAMONTA ROAD, PRINEVILLE, OR 97754

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	6/13/2019			18

WATER BEARING ZONES
 Flowing Artesian?
 Depth water was first found 18.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
6/13/2019	18	35				18

(11) SUBSURFACE LOG Ground Elevation _____

Material	From	To
Sandy Silt	0	18
Sand and Gravel	18	32
Silt	32	35

Date Started 6/13/2019 Completed 6/13/2019

(12) ABANDONMENT LOG:

Material	From	To	Amt	sacks/
Other	0	2	2	S
Bentonite Chips	2	35	9	S

Date Started 6/13/2019 Completed 6/13/2019

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).

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

License/Registration Number 10637 Date 8/20/2019

First Name ZANE Last Name SHADRICK
 Affiliation ZANESHADRICK

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

CROO 54799

8/20/2019

Map of Hole

Google Maps 6487 NW Lamonta Rd
Prineville OR

110-19-1059



STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

8/20/2019

(1) OWNER/PROJECT Hole Number B-6
PROJECT NAME/NBR: 110-19-1059
First Name ROBERT J (JR.) Last Name VANIER
Company
Address PO BOX 326
City DAYVILLE State OR Zip 97825

(2) TYPE OF WORK [X] New [] Deepening [X] Abandonment
[] Alteration (repair/recondition)

(3) CONSTRUCTION
[] Rotary Air [] Hand Auger [] Hollow stem auger
[] Rotary Mud [] Cable [] Push Probe
[X] Other SONIC

(4) TYPE OF HOLE:
[] Uncased Temporary [] Cased Permanent
[] Uncased Permanent [] Slope Stability
[] Other

(5) USE OF HOLE
SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard [] (Attach copy)
Depth of Completed Hole 30.00 ft.
BORE HOLE SEAL sacks/
Dia From To Material From To Amt lbs

Backfill placed from 0 ft. to 2 ft. Material SOIL / GRAVEL
Filter pack from ft. to ft. Material Size

(7) CASING/SCREEN
Casing Screen Dia + From To Gauge Stl Plstc Wld Thr

(8) WELL TESTS
[] Pump [] Bailer [] Air [] Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration(hr)
Temperature 52 °F Lab analysis [] Yes By
Supervising Geologist/Engineer
Water quality concerns? [] Yes (describe below) TDS amount 110 ppm
From To Description Amount Units

(9) LOCATION OF HOLE (legal description)
County CROOK Twp 14.00 S N/S Range 15.00 E E/W WM
Sec 14 NW 1/4 of the SE 1/4 Tax Lot 00103
Tax Map Number Lot
Lat " or " DMS or DD
Long " or " DMS or DD
[] Street address of hole [] Nearest address
6487 NW LAMONTA ROAD, PRINEVILLE, OR 97754

(10) STATIC WATER LEVEL
Date SWL(psi) + SWL(ft)
Existing Well / Predeepening
Completed Well 6/13/2019 18
Flowing Artesian? []
WATER BEARING ZONES
Depth water was first found 18.00
SWL Date From To Est Flow SWL(psi) + SWL(ft)
6/13/2019 18 30 18

(11) SUBSURFACE LOG Ground Elevation
Material From To
Silt 0 5
Silty sand and gravel 5 17
Silt 17 30
Date Started 6/13/2019 Completed 6/13/2019

(12) ABANDONMENT LOG:
Material From To Amt lbs
Other 0 2 2 S
Bentonite Chips 2 30 8 S
Date Started 6/13/2019 Completed 6/13/2019

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).
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License/Registration Number 10637 Date 8/20/2019
First Name ZANE Last Name SHADRICK
Affiliation ZANESHADRICK

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

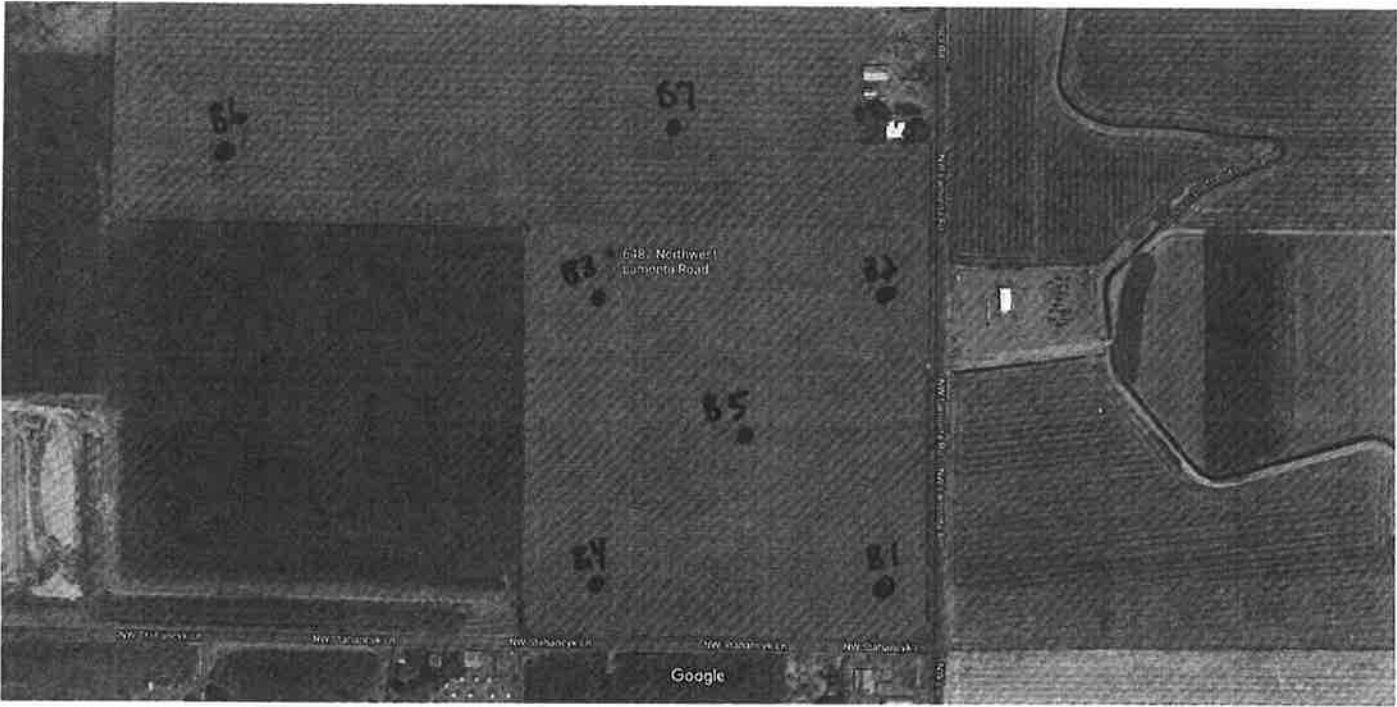
CROO 54800

8/20/2019

Map of Hole

Google Maps 6487 NW Lamonta Rd
Prineville OR

110-19-1059



STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

8/20/2019

(1) OWNER/PROJECT Hole Number B-7
PROJECT NAME/NBR: 110-19-1059
First Name ROBERT J.(JR.) Last Name VANIER
Company
Address PO BOX 326
City DAYVILLE State OR Zip 97825

(2) TYPE OF WORK [X] New [] Deepening [X] Abandonment
[] Alteration (repair/recondition)

(3) CONSTRUCTION
[] Rotary Air [] Hand Auger [] Hollow stem auger
[] Rotary Mud [] Cable [] Push Probe
[X] Other SONIC

(4) TYPE OF HOLE:
[] Uncased Temporary [] Cased Permanent
[] Uncased Permanent [] Slope Stability
[] Other

(5) USE OF HOLE
SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard [] (Attach copy)
Depth of Completed Hole 30.00 ft.
BORE HOLE SEAL sacks/
Dia From To Material From To Amt lbs
6 0 30 Other 0 2 2 S
Bentonite Chips 2 30 8 S

Backfill placed from 0 ft. to 2 ft. Material SOIL / GRAVEL
Filter pack from ft. to ft. Material Size

(7) CASING/SCREEN
Casing Screen Dia + From To Gauge Stl Plstc Wld Thr

(8) WELL TESTS
[] Pump [] Bailer [] Air [] Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration(hr)

Temperature 52 °F Lab analysis [] Yes By
Supervising Geologist/Engineer
Water quality concerns? [] Yes (describe below) TDS amount 110 ppm
From To Description Amount Units

(9) LOCATION OF HOLE (legal description)
County CROOK Twp 14.00 S N/S Range 15.00 E E/W WM
Sec 14 NE 1/4 of the SE 1/4 Tax Lot 00103
Tax Map Number Lot
Lat " ' " or DMS or DD
Long " ' " or DMS or DD
[] Street address of hole [] Nearest address
6487 NW LAMONTA ROAD, PRINEVILLE, OR 97754

(10) STATIC WATER LEVEL
Date SWL(psi) + SWL(ft)
Existing Well / Predeepening
Completed Well 6/13/2019 18
Flowing Artesian? []
Depth water was first found 18.00

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), + SWL(ft). Row 1: 6/13/2019, 18, 30, , , 18.

(11) SUBSURFACE LOG
Ground Elevation
Material From To
Sandy Silt 0 10
Sand and gravel 10 23
Silt 23 30

Date Started 6/13/2019 Completed 6/13/2019

(12) ABANDONMENT LOG:
Material From To Amt lbs
Other 0 2 2 S
Bentonite Chips 2 30 8 S

Date Started 6/13/2019 Completed 6/13/2019

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License/Registration Number 10637 Date 8/20/2019
First Name ZANE Last Name SHADRICK
Affiliation ZANESHADRICK

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

CROO 54801

8/20/2019

Map of Hole

Google Maps 6487 NW Lamonta Rd
Prineville OR

110-19-1059

