Appaloosa Court

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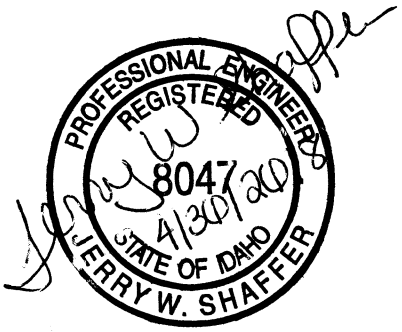

by

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EXECUTIVE SUMMARY

Appaloosa Court is a small mobile home park located in Latah County between the University of Idaho and the state of Washington. The mobile home park, formerly known at Stadium Drive Mobile Home Park, changed ownership in 2017. In 2013, the Idaho Department of Environmental Quality (IDEQ) conducted a site inspection and notified the owner(s) that their wastewater system was discharging to a wetlands without a wastewater discharge permit from the IDEQ or the United States Environmental Protection Agency (US EPA). The IDEQ ordered the owners to alter their wastewater system to removed the unauthorized discharge.

Appaloosa Court hired Shaffers Engineering and Consulting to evaluate their wastewater system and present options for removing the unauthorized discharge to the wetlands. Due to the limited land available in and around the mobile home park, Appaloosa Court's preferred solution is to construct a pressure sewer to tie the mobile home park's current collection/pumping system to the City of Moscow's wastewater treatment system for proper treatment and disposal. Both entities are agreeable to the solution but legal agreements between the entities still need to be drafted and approved.

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BACKGROUND

Appaloosa Court, previously known as Stadium Drive Mobile Home Park until it changed ownership in 2017, is located in Latah County at 2280 Old Pullman Road, Moscow, Idaho 83843. Appaloosa Court has 63 connections with 129 customers (Appendix H).

The mobile home park proper is located in T39N R06W S13 NESW while the wastewater treatment pond is located in T39N R06W S13 NWSE. Appaloosa Court borders the University of Idaho (UIdaho) and the City of Moscow on the north, the North Latah County Highway District, Northwest Pipeline Corp., and Douglas G. Cole on the south, and Wayne M. Sprouse and Karl W. Johnson to the west. Appaloosa Court lies on a north-facing slope with the high area being the Old Pullman Road to the south and the low area being the UIdaho property to the north. The north-south slope through the middle of the mobile home park proper is approximately 7.4% while the north-south slope at the wastewater pond is approximately 19.1%.

Figure 1. Land Ownership in and around Appaloosa Court.

There does not appear to be plans and records for the buried portions of the water distribution and wastewater collection systems. Most of the information presented in this report is based on conversations with the owner/previous owner(s), service providers (Roto Rooter), and the professional judgment of the engineer. While this is not desireable, the buried portions of the water and wastewater systems have had no reported problems, such as lack of water, dirty drinking water, or sewage backup/overflows. The owner has been encouraged to call in professionals to locate these lines and septic tanks and verify sizes, conditions, and material types.

The Appaloosa Court Public Water System (#2290036) is served by a single drinking water well (E0005436) located at the south end of the mobile home park (See Figure 2). The capacity of the well is unknown, but nearby wells have recorded production rates of 24 gpm

(34,560 gpd) and 100+ gpm (144,000 gpd), (based on limited drawdown tests). The discharge line from the well does not have a water meter to record production rates or volumes. Even though the well capacity is unknown, there has been no water shortages reported for this system.

Figure 2. Appaloosa Court site plan.

The wastewater collection system consists of four 4" gravity collection lines of unknown material and lengths. Each of these collection lines appear to be located beneath a row of mobile homes, a very common construction practice in the Moscow/Pullman area for mobile home parks. These four sewer lines empty into five septic tanks of unknown size, material, and condition. These septic tanks were apparently installed to remove solids from the wastewater stream prior to pumping the partially treated sewage up to the wastewater stabilization pond in order to minimize solids buildup in the wastewater stabilization pond (See Figure 2).

The gravity collection system empties into a wastewater lift station which, located at the north end of the mobile home park (See Figure 2). The lift station consists of a wet well pit that receives the wastewater from the five septic tanks, with a single submersible pump that lifts the wastewater up to the wastewater stabilization pond. The size and capacity of the pump is unknown.

The wastewater stabilization pond has a surface area of approximately 8,633 ft^2 (0.20 acres) at an unknown depth. In the December 13, 2011 Stadium Drive Wastewater Pond Seepage Test report by Terry M. Scanlan, PE, Mr. Scanlan estimated the size of the pond as 13,160 ft^2 in area with a depth of 5 to 6 feet at the center (Appendix E). It is clear that the

ends of the pond are shallow, with unknown slopes. For the sake of this evaluation, we will use the pond surface area of 8,633 ft^2 and an average depth of 5 feet. This equates to a pond volume of 43,165 ft^3, (322,874 gallons). It will be shown that though these numbers, or the number proposed by Mr. Scanlan may be lacking in accuracy, it will not affect the final pond evaluation.

The effluent from the pond is chlorinated by a tablet chlorinator located in a building just to the north of the wastewater treatment pond. The chlorinated effluent is then discharged to a wetlands located just north of the sewer lift station on UIdaho property. The discharge to the wetlands is year round. This configuration appears to be how the system was originally designed and constructed. There does not appear to be any problems with vectors or odors.

One other item of interest is that there is a right-of-way/easement in place that crosses the UIdaho property to the north, following the draw. It appears that the easment was provided for the eventual construction of a gravity sewer to the City of Moscow wastewater treatment plan (Appendix B).

METEOROLOGY

Weather data was taken from the Western Regional Climate Center, from the Pullman Airport website, and the the website for Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho. Raw weather data from these resources are listed in Appendix C.

Maximum temperatures in Moscow, Idaho usually occur in July (82.9°F) while the minimum temperature usually occurs in January (22.6°F). Highest precipitation usually occurs in January (3.00" rainfall/16.0" snowfall), while the lowest precipitation usually occurs in July (0.72" rainfall). Prevailing wind is generally from the west between March 3rd and October 30th, and from the south from October 30th to March 3rd. Wind speeds are higher from October 23rd to May 13th, with an average wind speed of 6.5 mph. Winds are calmer from May 13th to October 23rd, with average wind speeds of 5.8 mph.

Rainfall precipitation averages 23.59 inch/year while snowfall averages 49.0 inch/year. Assuming that snow is 10% moisture when it first falls, the total precipitation in Moscow, Idaho averages 28.49 inch/year.

Evapotranspiration for the wastewater pond is approximately 744 mm/year, or 29.29 inch/year. This is based on UIdaho figures for Open Water - Shallow Systems (ponds, streams.

SOILS AND GEOLOGY

Evaluation of the soils and geology at Appaloosa Court are based on the National Resources Conservation Service Web Soil Survey (Appendix D) and local well logs (Appendix F).

The soils beneath the mobile home park proper consists of:

- (10) Garfield silt loam, 3% to 30% slopes;
- (28) Latahco-Thatuna complex, 0% to 5% slopes;
- (33) Naff-Palouse complex, 7% to 25% slopes;
- (34) Naff-Thatuna complex, 7% to 25% slopes.

Note: the numbers in parenthesis refer to the soil groups reference numbers.

The soils underlying the wastewater pond consists of:

- (34) Naff-Thatuna complex, 7% to 25% slopes.

All of these soils consist of one to several layers of silt loam overlying a layer of silty clay loam. Depth to restrictive layers are generally over 80". Transmissivity is between 0.06 inch/hour to 0.6 inch/hour. The North Central District Health Department limits application rates for onsite systems to 0.2 gpd/ft^2.

There does appear to be a shallow limiting layer beneath the mobile home park that intersects with the surface just north of Appaloosa Court. There is a spring just north of the north border of Appaloosa Court with an accompanying wetlands.

Local well logs show that a clay layer overlies a basalt layer anywhere from a depth of 80 feet to 320 feet. Water was encountered between 106 feet to 362 feet.

CURRENT CONDITIONS

Because there are no well production records available, wastewater flow rates must be estimated using engineering references. The Idaho Department of Water Resources (IDWR) published Domestic, Commercial, Municipal and Industrial Water Demand Assessment and Forecast in Ada and Canyon Counties, Idaho in 2001. In this report, the IDWR stated that the average per capita water demand for single-family homes in Southwest Idaho was 194 gpcd, the average water demand for apartments was 82 gpcd, and the average demand for mobile homes was 150 gpcd. The demand for single family homes and for mobile homes include outside watering so we will use the average demand for apartment dwellers, which have no outside watering, to determine the average daily wastewater production for Appaloosa Court. Based on an Appaloosa Court population of 129 residents, average daily wastewater production should be 82 gpcd * 129 people = 10,578 gallons/day.

To ensure that these estimates are not restricted due to limited well production, we will look at demands for mobile homes, which include outside watering demands. The average daily demand for 129 people living in mobile homes should be 150 gpcd x 129 people = 19,350 gpd, which is less than the daily production rate of 34,560 for the 24 gpm neighboring well mentioned previously. This well has the lowest reported production rate for the wells identified in the area. Therefore the estimated wastewater production rate of 10,578 gallons/day should be acceptable.

The other item that contributes to wastewater flow is Inflow/Infiltration (I/I). We do not know the extent of I/I at Appaloosa Court since there has been no records kept on the wastewater pumped at the wastewater lift station. We will therefore have to estimate I/I. If we assume that I/I is not excessive for Appaloosa Court, we could use US EPA estimates of 120 gpcd for wastewater + I/I as a conservative figure. Based on this value, daily wet-weather wastewater flows would be 120 gpcd x 129 people = 15,480 gpd. For the sake of evaluation, we will use the 10,578 gpd value for the months of June through October. We will use the 15,480 gpd value for the months of November through May, which are the wettest months.

If we knew the capacity of the septic tanks, we could evaluate the septic tank design to see if there is a possibility of solids washout due to high flow rates during the winter/spring seasons. However we do not know the actual wet weather flows, nor the size of the septic tanks, so we don't really know about solids retention.

The pumping station appears to be working adequately. However, from conversations with the previous operator, the sewer lift pump is removed and replaced every two years.

Regarding the wastewater treatment pond, it appears that there is a discharge year round. Looking at an annual water balance equation, what enters the pond must also be removed from the pond in order to keep the amount of water in the pond constant:

Wastewater In + I/I_{In} + Precipitation = Seepage + Evapotranspiration + Discharge

Where Wastewater In = wastewater contributions from homes based on IDWR Report for apartments

= 10,578 gpd x 365.25 days = 3,863,600 gal/year

I/I_{In} = (120 - 82) gpcd x 129 people x days (November through May)
= 38 x 129 x 211.25 = 1,035,500 gal/year

Precipitation = 28.49 in/year x 5,380 gal/in pond = 153,300 gal/year

Seepage = 0.09 in/day x 365 day/year x 5,380 gal/in pond = 176,700 gal/year

Evapotranspiration = 29.29 in/year x 5,380 gal/in pond = 157,600 gal/year

Discharge = Wastewater In + I/I In + Precipitation - Seepage - Evapotranspiration
= 3,863,600 + 1,035,500 + 153,300 - 176,700 - 157,600
= 4,718,500 gal/year

This results in a daily outflow of 12,900 gpd (including I/I).

FUTURE CONDITIONS

Since Appaloosa Court is at capacity and there is no additional space in which to expand, future conditions should not differ other than possibly an increase in I/I and some regulatory changes. The owner should find a better way to measure wastewater flows and I/I contribution. This could be done by installing an hour meter on the pump and estimating the pumping rate (gallons per minute).

OPTIONS

Option A. **Do Nothing**

Because Appaloosa Court is presently discharging treated wastewater to UIdaho land just to the north of the mobile home park without a discharge permit from the US EPA or the IDEQ, doing nothing would not eliminate this discharge and Appaloosa Court would still be subject to legal action from either or both of these entities.

Option B. **Optimize Present Treatment System**

This option would consider optimizing the current drinking water system, wastewater collection system and wastewater pumping system to reduce the wastewater and I/I discharge to the pond to eliminate the discharge from the pond. Looking at an annual water balance equation, what enters the pond must also be removed from the pond in order to keep the amount of water in the pond constant:

Wastewater In + I/I In + Precipitation = Seepage + Evapotranspiration + Discharge

Where Wastewater In = wastewater contributions from homes based on IDWR Report for apartments
= 10,578 gpd x 365.25 days = 3,863,600 gal/year
I/I In = (120 - 82) gpcd x 129 people x days (November through May)
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Discharge = Wastewater In + I/I In + Precipitation - Seepage - Evapotranspiration
= 3,863,600 + 1,035,500 + 153,300 - 176,700 - 157,600
= 4,718,500 gal/year

Of the five identified water inflows/outflows, the only one that Appaloosa Court has the ability to affect significantly is I/I. This would be done after running tests on I/I and then reconstructing the collection system. If we were to eliminate I/I completely, that would still result in a discharge of 3,683,000 gal/year (10,085 gpd). Should there be a question on the ability to reduce water usage at the site, Appaloosa Court would have to reduce drinking water flow to 3.84 gpcd, or a little more than one toilet flush per day per person.

Based on these figures, optimization of the water and/or wastewater systems would not eliminate the unauthorized discharge at Appaloosa Court.

Option C. **Modify Present Treatment System and Permit Discharge**

Modifications that could be made at Appaloosa Court include enlarging the size and thus

the storage capacity of the pond, and/or increasing the evapotranspiration amount at the pond. Other improvements such as applying the effluent to a land application site or discharging to a water body are not feasible due to the lack of land at Appaloosa Court and the level of treatment and the distance to a water body (Paradise Creek).

Increasing the capacity of the wastewater pond to try to increase water loss due to evapotranspiration and/or seepage is not really a viable option. The net loss of water due to evapotranspiration/precipitation is 4,300 gal/year. In order to remove of the 4,718,500 gal/year of treated wastewater discharge, the pond would have to be enlarged by a factor of 1,100. If we completely eliminate I/I, we would still have to enlarge the wastewater pond by a factor of 857.

One thought is that we could increase summertime evapotranspiration through sprinklers. This would increase storage going into the late fall/winter months. The problem is that during the winter there is virtually no evapotranspiration as well as an increase of precipitation. The pond itself would completely fill from empty to full in 30 days from the wastewater component alone if we take away the evapotranspiration completely.

Based on these observations, modification of the existing wastewater system would not eliminate the unpermitted discharge.

Option D. <u>Onsite Treatment and Disposal System</u>

An onsite system consists of three components:

1. The septic tank;
2. The sewer lift station if the drainfield invert elevation is higher than the outlet of the septic tank or if the drainfield is pressurized; and
3. The drainfield.

Appaloosa Court already contains the first two components, the septic tank(s) and the sewer lift station, so the third component would be the limiting component for an onsite system. The drainfield consists of a series of distribution structures and pipes delivering wastewater to a a matrix of perforated pipes laid in buried trenches. These trenches are separated by undisturbed soils and buffers that separate the drainfield from features such as wells, property boundaries, buildings, etc. In addition, the site must contain enough land to create an identical replacement drainfield should the original drainfield fail.

Treatment in a drainfield comes from passing wastewater through a thin biological mat that builds up over time and that occupies the surface of the trenches bottom, extending a short distance into the undisturbed soil of the trench bottom. The treatment area consists of the the total bottom area of the trench(s), excluding the trenches housing the transfer structures and pipes. Remember, undisturbed ground, buffer areas, and transfers structures and pipe do not count towards the treatment area.

When considering an onsite system at Appaloosa Court, we must consider the two parameters that will determine the size of a drainfield, the amount of water that must be disposed of and the ability of the ground to accept the water. If we consider the worse-case scenario of 120 gpcd for wastewater and I/I, this would result in a total of 15,480 gpd for at

least part of the year. The soils at Appaloosa Court are a C-2, clay loam, which limits the treatment area application rate to 0.2 gpd/ft^2. Based on the daily wastewater flowrate and wastewater application rate, Appaloosa Court would need to have an treatment application area of at least 77,400 ft^2. This figure does not include buffers, undisturbed soil, and transfer structures/pipes, and the replacement drainfield, so the entire drainfield site would have to be even larger. For the sake of simplicity, we will look initially to see if there is enough treatment area available to meet the required 77,400 ft^2.

Open space at Appaloosa Court is very limited. There is a small open field to the southwest of the wastewater treatment pond where an on-site treatment/disposal system could possibly be located. A general outline of this area is shown in Figure 2.

Figure 3. Proposed On-site System Area.

This area is bordered on the west and southeast by roads, on the north by the wastewater treatment pond, and on the south by the Avista Corporation pumping station. The site borders a fill on the southeast and a cut on the west so portions of the site may or may not have native compaction.

Order	Label	Waypoint	Latitude	Longitude	Elevation	Distance from Start	Distance to Next	Bearing	Grade
1	Point 1	Point 1	N46.72186	W117.03331	2668.00 ft	0.00 ft	105.32 ft	S81.92°E Custom	-7.6%
7	Point 1	Point 1	N46.72186	W117.03331	2668.00 ft	568.04 ft	0.00 ft	N8.02°E Custom	10.0%
2	Point 2	Point 2	N46.72182	W117.03289	2682.00 ft	105.32 ft	94.38 ft	S30.40°E Custom	-11.5%
3	Point 3	Point 3	N46.72159	W117.03270	2701.00 ft	199.70 ft	112.97 ft	S41.38°W Custom	-3.0%
4	Point 4	Point 4	N46.72136	W117.03300	2707.00 ft	312.67 ft	53.08 ft	N59.53°W Custom	0.0%
5	Point 5	Point 5	N46.72144	W117.03318	2707.00 ft	365.75 ft	52.82 ft	N83.42°W Custom	14.1%
6	Point 6	Point 6	N46.72145	W117.03339	2694.00 ft	418.57 ft	149.47 ft	N8.02°E Custom	10.0%

Table 1. Coordinates for Property Corners for Proposed On-site System Area

Table 1 lists the coordinates used to outline the area of the field identified above in order to calculate the area of the field. The area for the outlined site is approximately 21,000 ft^2. The area of the field, 21,000 ft^2, is far less than the 77,400 ft^2 that is required to treat and dispose of Appaloosa Court's daily wastewater loading. Again, this area does not include buffers, undisturbed soils, transfer structures, and a replacement drainfield.

Based on these observations, design and construction of an onsite system that would fit the identified field would not eliminated the unpermitted discharge at Appaloosa Court

Option E. Sewer Lift Station with Pressure/Gravity Sewers to the City of Moscow Wastewater Collection System and Wastewater Treatment System

Option E involves moving wastewater offsite to the City of Moscow wastewater collection and treatment systems. This option consists of two components, the sewer lift station/sewer pumping system, and the pressure/gravity sewer to City of Moscow systems.

The sewer pumping station consists of four components:

1. Screening component to remove larger solids (diapers, cans, mattresses, bodies, etc.);
2. Wet well;
3. Duplex pumps with appropriate appurtenances; and
4. Electrical and controls (Figure 4).

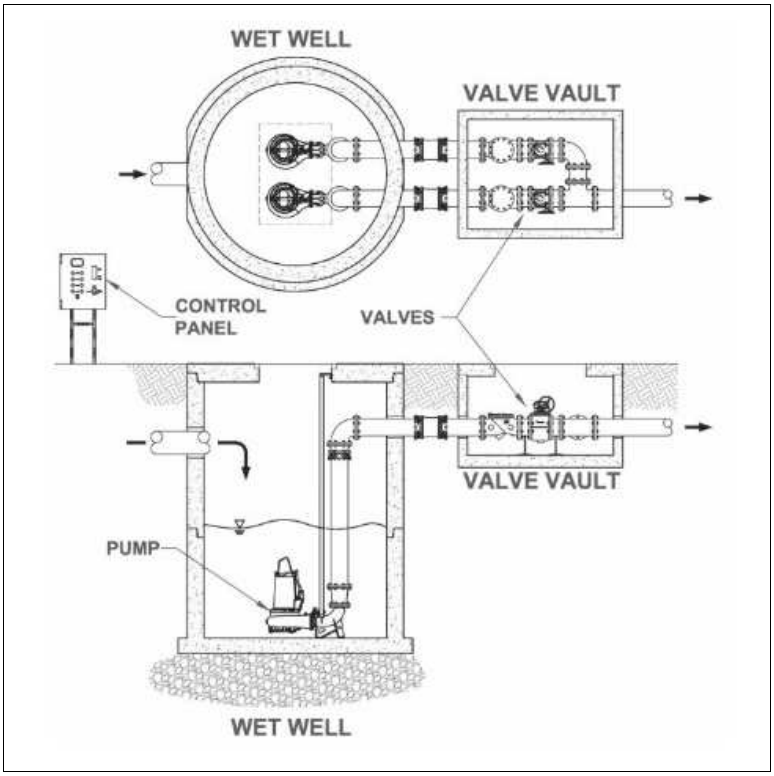

Figure 4. Standard drawings for sewer lift station.

The existing wastewater system contains a sewer lift station that consists of five septic tanks, a wet well, submersible pumps, and an electrical and control system. The septic tanks will be removed in order to reduce the potential for the formation of filamentous bacteria, which can harm treatment at the Moscow WWTP. This existing lift station must be revised and/or removed for new construction.

In order to ensure that the submersible pumps are protected from larger solids (balls, rags, etc.), a screen must be installed prior to the wetwell.

The function of the wet well is to store wastewater to allow the sewer lift pump(s) to operate on a regular cycle to prevent excessive start-up. Factors to consider when sizing wet well size are:

- The volume required for pump cycling based on the pump manufacturer's duty cycle recommendations.
- Appropriate dimensions to minimize turbulence.
- Vertical separation between pump control points.
- Sewer inlet elevation.
- Capacity required between alarm levels, septic tank backup and overflow elevations.
- The number, spacing and size of pumps. The wet well floor shall have adequate slope to the intake hopper and the horizontal area of the hopper shall be kept to a minimum.
- Minimize pump starts and stops (reducing energy use), while avoiding too long of a retention time because the sewage in the wet well will become septic.

Sewer velocities need to be kept between 2 fps and 7 fps in order to keep solids in suspension and to not create too high of headloss in the pipeline. Some sources say that velocities should be a minimum of 3 fps to scour the pressure pipe. Since the Moscow WWTP is concerned about having a lift station so close to their headworks and the potential to disrupt flows and treatment, Appaloosa Court will maintain a minimum 2 fps velocity in the pipes.

Based on this flowrate, and looking at a pump cycling time of a minimum of 6 starts/hour, the maximum wet well volume would be 675 gallons. Note: 30 minutes in the longest we want the the wastewater to stay in the wet well before it becomes septic and creates an odor. Again, the final design will look at a pump cycle time of 6 starts/hour. Limiting the pump cycle times might help the sewage lift pump last longer than two years. Based on this criteria, the wet well volume will be set at a total of 675 gallons, or a 5-foot diameter wet well that is 5.5 feet of operating depth.

The sewer lift station will have a duplex pump system with all the appropriate appurtenances and electrical. The sizing of the pumps will have to wait until we determine the final route selected.

There are three pressure/gravity sewer route options identified for the construction of a pressure/gravity sewer line. Pressure/gravity sewer route E1 follows the original easement down the draw lying to the north of Appaloosa Court. This option removes the septic tanks and lift station at Appaloosa Court and combines the four gravity collection lines into a single gravity 8" sewer that travels to down to Sixth Street, where it is pumped over to a new manhole above the City of Moscow's sewer interceptor and then into the City of Moscow's

system. Pressure/gravity sewer route option E2 involves the installation of a pressure sewer eastward along the northern edge of Appaloosa Court property boundary, up to the Old Pullman Road and then along the Old Pullman Road to Perimeter Drive and to an existing UIdaho manhole. The sewer would be a pressure sewer to a high point on the Old Pullman Road, and then become an 8" gravity sewer for the rest of the route. Pressure sewer route option E3 travels from the existing sewer lift station, up the hill to the west of the draw north of Appaloosa Court, and then becomes an 8" gravity sewer down to the City of Moscow system. Much of this route lies within a few hundred feet from the gravity sewer portion of option E1.

The first pressure/gravity sewer, option E1, would follow the route identified in the easement between Appaloosa Court and the UIdaho down to just north of Sixth Street (Appendix B). This route, as shown in Figure 4, is a generally northern route that crosses Sixth Street and enters a new manhole and from there into the City of Moscow wastewater system. An 8" gravity sewer with manholes will be installed from Appaloosa Court down to Sixth Street, terminating in a sewer lift station near N46.72914° W117.02992°. The sewer lift station would then pump the sewage to a new manhole at a site located uphill from the City of Moscow wastewater collection line. The sewer lift station must be capable of pumping a minimum of 45 gallons of sewage per mint through a 3" pressure sewer line at a total dynamic head of 21 feet. The 8" gravity sewer shall be designed with a minimum slope of 0.4 feet/100 feet, at a minimum soils cover of 3-1/2 feet, and manhole spacing no greater than 400 feet. This design would involve removing the existing septic tanks, the combining of all collection sewers at the site into a common manhole, the construction of approximately 3,072 feet of 8" gravity sewer, 812 feet of 3" pressure sewer, ten manholes, and a sewer lift station.

The pros for this route include:

1. There is already an easement across UIdaho property that UIdaho; and
2. The sewage will empty directly into City of Moscow infrastructure and not involve UIdaho wastewater infrastructure, Appaloosa Court will only have to develop an agreement with the City of Moscow.
3.

The cons for this route include:

1. While there is power located near the site of the proposed sewer lift station, the power belongs to the UIdaho and they cannot sell it to Appaloosa Court and power must be brought in from from Highway 8 near the entrance to the Moscow WWTP; and
2. UIdaho has stated that they have three buildings coming in shortly to the site and they will be located at or near the proposed gravity sewer, meaning the sewer would have to be relocated.

Order	Label	W...	Latitude	Longitude	Elevation	Distance from St...	Distance to N...	Bearing	Grade
1	Appaloosa Court MH 01	Ap...	N46.72209	W117.03432	2643.00 ft	0.00 ft	214.75 ft	N59.09°E Custom	1.9%
2	Appaloosa Court MH 02	Ap...	N46.72239	W117.03359	2636.00 ft	214.75 ft	311.52 ft	N28.31°E Custom	1.7%
3	Appaloosa Court MH 03	Ap...	N46.72314	W117.03300	2627.00 ft	526.27 ft	401.37 ft	N29.38°E Custom	2.3%
4	Appaloosa Court MH 04	Ap...	N46.72410	W117.03222	2611.00 ft	927.64 ft	402.32 ft	N28.00°E Custom	0.3%
5	Appaloosa Court MH 05	Ap...	N46.72508	W117.03146	2609.00 ft	1329.96 ft	396.18 ft	N29.01°E Custom	2.6%
6	Appaloosa Court MH 06	Ap...	N46.72603	W117.03070	2591.00 ft	1726.14 ft	302.89 ft	N27.89°E Custom	0.4%
7	Appaloosa Court MH 07	Ap...	N46.72676	W117.03013	2589.00 ft	2029.03 ft	396.84 ft	N3.55°E Custom	1.9%
8	Appaloosa Court MH 08	Ap...	N46.72785	W117.03003	2576.00 ft	2425.87 ft	273.61 ft	N3.26°E Custom	0.4%
9	Appaloosa Court MH 09	Ap...	N46.72860	W117.02997	2574.00 ft	2699.48 ft	197.86 ft	N3.94°E Custom	0.6%
10	Appaloosa Court Sewer Lift Stati...	Ap...	N46.72914	W117.02992	2572.00 ft	2897.34 ft	722.41 ft	N0.26°E Custom	0.0%
11			N46.73112	W117.02990		3619.75 ft	88.84 ft	N32.01°E Custom	0.0%
12	Appaloosa Court MH 10	Ap...	N46.73132	W117.02972		3708.59 ft	174.95 ft	N1.54°E Custom	0.0%
13	Last City of Moscow MH	La...	N46.73180	W117.02970		3883.54 ft	0.00 ft	N1.54°E Custom	0.0%

Table 2. Appaloosa Court Pressure/Gravity Sewer Route Option E1

Figure 5. Appaloosa Court Pressure/Gravity Sewer Route Option E1

The second pressure/gravity sewer option E-2 would follow the south border of the Appaloosa Court up to the Old Pullman Road and follow the Old Pullman Road down to Perimeter Drive. At Perimeter Drive, the sewer would head north and tie into an existing manhole at the entrance to the southern part of the UIdaho Facilities section of the campus. The sewer would be pressurized up until the highest point on the Old Pullman Road and from there would become a gravity sewer for the rest of the route. The 3" pressure sewer would be approximately 110 feet long, terminating into Manhole 1, located approximately 70 feet above the sewer lift station. The selected pump must be able to produce 45 gpm at a total head of 110 feet of head (this allows a minimum pipe pressure of 10 psi and does not consider minor fitting. The 8" gravity sewer shall be designed with a minimum slope of 0.4 feet/100 feet, at a minimum soils cover of 3-1/2 feet, and manhole spacing no greater than 400 feet. This design would involve removing the existing septic tanks, the combining of all collection sewers at the site into the sewer lift station, the construction of approximately 3,640 feet of 8" gravity sewer, 110 feet of 3" pressure sewer, ten manholes, and a sewer lift station).

The pros to this route are:

1. The route is located along a road bed so the sewer alignment should not have to be changed in the future;
2. The Old Pullman Road provides great access to all portions of the sewer;
3. The sewer will terminate at an existing UIdaho sewer manhole;
4. The UIdaho says that their existing downstream sewer does have capacity for the Appaloosa Court wastewater load;
5. While the existing UIdaho sewer is at/near capacity, it is very unlikely that any new services will be added unless the UIdaho gets rid of the golf course; and
6. The sewer lift station will not have to be moved, only upgraded.

The cons to this route are:

1. This route will have Appaloosa Court entering into contracts with Latah County, the North Latah County Highway District, the UIdaho, and the City of Moscow, which make for a very complicated process to get final approval;
2. The existing existing downstream sewer from the UIdaho manhole is near capacity and the UIdaho may have to improve the sewer, requiring Appaloosa Court to help fund the infrastructure improvement;
3. The route is along the Old Pullman Road, thus requiring traffic control, pavement cutting, removal, and replacement;
4. The route includes a short portion along perimeter drive and the UIdaho my not allow construction during the fall once the students return; and
5. There are multiple utility crossings on Perimeter Drive and some utilities may have to be moved in order to allow the new sewer to cross.

Figure 6. Appaloosa Court Pressure/Gravity Sewer Route Option E2

Order	Label	W...	Latitude	Longitude	Elevation	Distance from St...	Distance to N...	Bearing	Grade
1	Lift Station	Ap...	N46.72206	W117.03429	2645.00 ft	0.00 ft	108.88 ft	N71.65°E Custom	-0.5%
2	Route 2 Station 1	Ro...	N46.72216	W117.03388	2646.00 ft	108.88 ft	500.42 ft	S87.33°E Custom	-6.9%
3	Route 2 Station 2	Ro...	N46.72209	W117.03189	2706.00 ft	609.30 ft	716.18 ft	N53.83°E Custom	-0.7%
4	Route 2 Manhole 1	Ro...	N46.72325	W117.02958	2715.00 ft	1325.48 ft	216.95 ft	N63.55°E Custom	1.8%
5	Route 2 Manhole 2	Ro...	N46.72351	W117.02881	2708.00 ft	1542.43 ft	188.14 ft	N63.89°E Custom	-0.6%
6	Route 2 Manhole 3	Ro...	N46.72374	W117.02813	2710.00 ft	1730.57 ft	291.64 ft	N70.19°E Custom	-0.2%
7	Route 2 Manhole 4	Ro...	N46.72401	W117.02704	2711.00 ft	2022.21 ft	176.76 ft	N44.28°E Custom	2.3%
8	Route 2 Manhole 5	Ro...	N46.72436	W117.02655	2704.00 ft	2198.97 ft	352.19 ft	N21.73°E Custom	2.4%
9	Route 2 Manhole 6	Ro...	N46.72526	W117.02603	2689.00 ft	2551.16 ft	162.91 ft	N53.93°E Custom	6.3%
10	Route 2 Manhole 7	Ro...	N46.72552	W117.02550	2671.00 ft	2714.06 ft	272.45 ft	N81.41°E Custom	4.8%
11	Route 2 Manhole 8	Ro...	N46.72563	W117.02443	2648.00 ft	2986.51 ft	267.21 ft	N79.58°E Custom	4.3%
12	Route 2 Manhole 9	Ro...	N46.72576	W117.02338	2628.00 ft	3253.72 ft	169.74 ft	N57.49°E Custom	0.0%
13	Route 2 Manhole 10	Ro...	N46.72601	W117.02281		3423.46 ft	327.44 ft	N33.27°W Custom	0.0%
14	Existing Uldaho Manhole		N46.72676	W117.02352		3750.91 ft	0.00 ft	N33.27°W Custom	0.0%

Table 3. Appaloosa Court Pressure/Gravity Sewer Route Option E2

The third pressure/gravity sewer route is option E3. This route follows the ridgeline just to the west of the the current easement. Wastewater is lifted up to the top of the ridge and then gravity flows down to an existing manhole in the City of Moscow system. The septic tanks would be removed and the four collection lines would be combined at the sewer lift station. The sewer lift station would be located at the site of the current lift station and would deliver wastewater through 1,285' pressure sewer to Manhole 1. The lift station must be capable of pumping 45 gallons of wastewater per minute at a total dynamic head of 24 feet. From Manhole 1, an 2,700' long 8" gravity sewer will take the wastewater to an existing manhole in

the City of Moscow System. The 8" gravity sewer shall be designed with a minimum slope of 0.4 feet/100 feet, at a minimum soils cover of 3-1/2 feet, and manhole spacing no greater than 400 feet. This design would involve removing the existing septic tanks, the combining of all collection sewers at the site into the sewer lift station, the construction of approximately 2,700 feet of 8" gravity sewer, 1,285 feet of 3" pressure sewer, eight manholes, and a sewer lift station).

The pros to this route are:

1. The route is cross-country with little to no roads so construction costs should be kept low and construction should move along quickly; and
2. This route does not include any UIdaho wastewater infrastructure and thus Appaloosa Court will only have to work on a service agreement with the City of Moscow.
3. We would keep the sewer lift station at the present site and not have to run new power to the station; and
4. We could construct in the fall season even after the students return.

The cons to this route are:

1. A new sewer easement must be developed by the UIdaho;
2. There will be some utility crossings north of Sixth Street;
3. The UIdaho is expanding facilities into this area, and though the UIdaho has stated that they should not occupy this space for at least 15 years, it may occur sooner; and
4. Appaloosa Court will have to work with the City of Moscow WWTP to not disrupt treatment due to the new sewer connection.

Figure 7. Appaloosa Court Pressure/Gravity Sewer Route Option E3

Order	Label	W...	Latitude	Longitude	Elevation	Distance from St...	Distance to N...	Bearing	Grade
1	Appaloosa Court Lift Station	Ap...	N46.72209	W117.03432	2643.00 ft	0.00 ft	1281.43 ft	N3.75°W Custom	-0.7%
2	Appaloosa Court Route E3 MH 01	Ap...	N46.72560	W117.03465	2659.00 ft	1281.43 ft	398.94 ft	N48.97°E Custom	0.3%
3	Appaloosa Court Route E3 MH 02	Ap...	N46.72632	W117.03345	2657.00 ft	1680.36 ft	397.89 ft	N9.18°E Custom	0.7%
4	Appaloosa Court Route E3 MH 03	Ap...	N46.72740	W117.03320	2652.00 ft	2078.25 ft	399.95 ft	N30.69°E Custom	4.0%
5	Appaloosa Court Route E3 MH 04	Ap...	N46.72834	W117.03238	2624.00 ft	2478.20 ft	300.52 ft	N3.97°E Custom	6.3%
6	Appaloosa Court Route E3 MH 05	Ap...	N46.72916	W117.03230	2591.00 ft	2778.72 ft	282.93 ft	N21.86°E Custom	2.2%
7	Appaloosa Court Route E3 MH 06	Ap...	N46.72988	W117.03188	2580.00 ft	3061.65 ft	413.30 ft	N55.00°E Custom	0.6%
8	Appaloosa Court Route E3 MH 07	Ap...	N46.73053	W117.03053	2576.00 ft	3474.96 ft	255.61 ft	N2.81°E Custom	-1.1%
9	Appaloosa Court Route E3 MH 08	Ap...	N46.73123	W117.03048	2581.00 ft	3730.56 ft	255.59 ft	N32.66°E Custom	5.2%
10	City of Moscow Manhole	Cit...	N46.73182	W117.02993	2558.00 ft	3986.16 ft	0.00 ft	N32.66°E Custom	5.2%

Table 4. Appaloosa Court Pressure/Gravity Sewer Route Option E3

RECOMMENDATIONS

The recommendation is to go with either Option E2 or Option E3. We have discussed the pro's and con's of each in the body of the report. Option E1 was the preferred option until the UIdaho informed Mr. Olps that they could not supply power to the lift station but that we would have to bring it in from about 1,000 feet away. This, coupled with the threat that Mr. Olps would have to move the system in a few years as they start to develop the draw.

We are still working with the UIdaho to get the final information to develop both options to the point where Mr. Olps can compare them financially. We are also working with the City of Moscow, and the North Latah County Highway District and Latah County. I am hoping to get the needed information regarding utility crossings and what the real capacity and limits are on the existing sewer manhole and downstream system.

Appendix A

Calculations

The volume of the wetwell is based on the formula:

$V_{MIN} = T_{MIN} * Q_{OUT}/4$

Where V_{MIN} = Minimum storage volume of wet well to hold/gather fluid during pump off (gallons)
T_{MIN} = Minimum cycle time between pump starts (minutes)
Q_{OUT} = Discharge flow rate out of wet well (gpm)

Will look at two conditions, (6) pump starts/hour and (2) pump starts/hour

The discharge piping will be DR 9 HPDE pipe with an ID of 2.676". We want to keep pipe velocity between 2 fps and 7 fps.

Q_{IN} = 10.8 gpm (based on 120 gpcd for wastewater + I/I
Q_{OUT} = 45 gpm (one pump on) to maintain a 2.57 fps flow
90 gpm (both pumps on) to maintain a 5.17 fps flow
Note: pipe velocities are between 2 fps and 7 fps.

V_{MIN} ranges from 113 gallons minimum (45 gpm every 10 minutes) to 675 gallons maximum (90 gpm every 30 minutes). Bases on a 5-foot diameter wet well, this would equate to a total fluid depth of between 0.769 feet to 4.60 feet.

Appendix B

Appaloosa Court/Stadium Drive Mobile Home Park Easement

ALTA OWNER'S POLICY (6/17/06)

SCHEDULE B

File No.: 18199 **Policy No.: O-9301-003482470**

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) that arise by reason of:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records. Proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by Public Records.
2. Any facts, rights, interests, or claims which are not shown by the Public Records, but which could be ascertained by an inspection of the Land or by making inquiry of persons in possession thereof.
3. Easements, liens, or encumbrances, or claims thereof, which are not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims, or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor, or material heretofore or hereafter furnished, imposed by law and not shown by the Public Records.
7. General taxes for the year 2016, which are a lien, payable on or before December 20 of said year and not delinquent until after said date.
8. All rights of way for public utilities and public roads as the same now exists over and across the herein described property.
9. Right of Way Easement granted to the Washington Water Power Company, recorded July 16, 1947 in Book 6 of Leases and Agreements at Page 377, records of Latah County, Idaho.
10. Right of Way Contract between Hubert and Elizabeth Dahmen and Pacific Northwest Pipeline Corporation, recorded August 27, 1956 in Book 9 of Leases and Agreements at Page 491 and Amendment recorded April 9, 1986 as Instrument No. 350942, records of Latah County, Idaho.
11. Right of Way Easement granted to the Washington Water Power Company, recorded June 12, 1959 in Book 11 of Deeds at Page 637, records of Latah County, Idaho.
12. Right of Way Easement granted to the Washington Water Power Company, recorded April 15, 1968 in Book 12 of Leases and Agreements at Page 539, records of Latah County, Idaho.
13. Right of Way Easement granted to the Washington Water Power Company, recorded December 12, 1977 as Instrument No. 290720, records of Latah County, Idaho.
14. Easement Agreement between The Regents of the University of Idaho granting to Marie Lew, recorded September 10, 1985 as Instrument No. 346536, records of Latah County, Idaho.

File No. 18199
ID STG ALTA Owner's Policy Sch B SE

 STEWART TITLE GUARANTY COMPANY

ALTA OWNER'S POLICY (6/17/06)

SCHEDULE B

15. Sewage Service Agreement between the City of Moscow and Lennard Chin, recorded October 21, 1985 as Instrument No. 347499, records of Latah County, Idaho.

16. Right of Way Easement granted to the Washington Water Power Company, recorded December 17, 1996 as Instrument No. 424569, records of Latah County, Idaho.

17. A Deed of Trust to secure an indebtedness of $1,100,000.00, and any other amounts as therein provided:

Date:	July 29, 2016
Recorded:	August 1, 2016, as Instrument No. 580280
Grantor:	Appaloosa, LLC, an Idaho limited liability company
Trustee:	Moscow Title, Inc.
Beneficiary:	Lennard Chin Family LLC, an Idaho limited liability company

File No. 18199
ID STG ALTA Owner's Policy Sch B SE

Page 2 of 2 STEWART TITLE GUARANTY COMPANY

346536

EASEMENT AGREEMENT

THE REGENTS OF THE UNIVERSITY OF IDAHO (the Grantors) hereby grant to MARIE LEW (the Grantee), a widow dealing with her sole and separate property, residing at 5045 Old Pullman Road, Moscow, Idaho, and her successors and assigns in perpetuity, an easement over real property of the Grantor described in the attached "EASEMENT DESCRIPTION," for the purpose of installing, maintaining, and repairing a sanitary sewer for the benefit of real property of the Grantee described in the attached "EASEMENT DESCRIPTION," for the purpose of installing, maintaining, and repairing a sanitary sewer for the benefit of real property of the Grantee described in the attached "DOMINANT ESTATE DESCRIPTION," subject to the following terms and conditions:

1. The sewer line is to be a minimum of three (3) inches inside diameter and is to be used only to transport effluent water.

2. Grantee shall be responsible for maintenance and repair of said sewer and shall have the right of reasonable access across Grantor's property to effect such maintenance and repair.

3. Grantee shall maintain the sewer line to meet all federal and state regulations and shall make repairs immediately to prevent leakage of effluent.

4. Grantors shall not be liable or responsible for any infractions of city, county, state, or federal laws, rules, or approvals.

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346536

5. The sewer will be installed and maintained in such manner as to minimize disruption of surface terrain. The land area and fences, roadways, and other improvements shall be restored to original condition as nearly as reasonably possible.

6. Within thirty (30) days after completion of the sewer line, Grantee will provide to grantors a set of as-built drawings, stamped by a licensed professional engineer, indicating the precise location of the sewer and all invert readings of line depths and manhole locations and depths.

7. In the event Grantors elect to construct a building or other improvement and perform land leveling on any property traversed by said sewer, Grantee shall, upon ninety (90) days' notice from Grantors, remove said sewer to other property to be designated by Grantors, and Grantee shall receive an easement over such designated property on terms substantially equivalent to this easement. In such event, Grantee shall refill and level all excavated areas and restore the property to its original condition as nearly as reasonably possible.

8. In the event that Grantee's property described in the attached "DOMINANT ESTATE DESCRIPTION" ceases to be used as a mobile home park, Grantor may, at its option, terminate and revoke this easement after one hundred eighty (180) days' notice to Grantee.

9. Any notice provided for herein shall consist of written notice mailed by registered or certified mail to the owner of Grantee's property (as described in the attached "DOMINANT ESTATE DESCRIPTION") as shown by the land title records of the Latah County Clerk, at said owner's then-current address as shown by the property tax records of the Latah County Treasurer.

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346536

MARIE LEW (the Grantee) hereby accepts the foregoing grant of easement and agrees on behalf of herself and her successors and assigns in perpetuity to abide by its terms and faithfully perform the Grantee's duties set forth herein.

Dated July 31, 1985.

THE REGENTS OF THE UNIVERSITY OF IDAHO, Grantor

By _____

(Name) David L. Mc Kinney

(Title) Financial Vice President

_____
MARIE LEW, Grantee

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346536

STATE OF IDAHO)
) ss.
COUNTY OF LATAH)

On this 31st day of July, 1985, David L. Mc Kinney, known to me to be the person whose name is subscribed to the foregoing instrument on behalf of THE REGENTS OF THE UNIVERSITY OF IDAHO, personally appeared before me and acknowledged that he/she executed the same on behalf of said Regents and University.

[signature] 3-18-86
Notary Public

STATE OF IDAHO)
) ss.
COUNTY OF Latah)

On this 8th day of August, 1985, MARIE LEW, known to me to be the person whose name is subscribed to the foregoing instrument as Grantee, personally appeared before me and acknowledged that she executed the same.

[signature]
Notary Public

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346536

EASEMENT DESCRIPTION

In Section 12, T39N, R6W BM, an easement for sanitary sewer ten (10) feet in width, centered over the following described line:

Beginning at the Southeast corner of said Section 12, thence West, along the Section line, 1800.00 feet to the True Point of Beginning;

Thence N12°25'W, 275.00 feet;
Thence N64°20'W, 227.00 feet, to the end of this easement.

AND, in Section 13, T39N, R6W BM, an easement for sanitary sewer, ten (10) feet in width, centered over the following described line:

Beginning at the Northeast corner of said Section 13, thence West, along the Section line, 1800.00 feet to the True Point of Beginning;

Thence S03°21'W, 995.00 feet;
Thence S28°31'W, 1900.00 feet, to the end of this easement.

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DOMINANT ESTATE DESCRIPTION

That part of the Northeast Quarter of the Southwest Quarter of Section 13, Township 39 North, Range 6 West, Boise Meridian, described as follows:

Beginning at the Northeast corner of the Southwest Quarter of Section 13, Township 39 North, Range 6 West, Boise Meridian; thence North 88°45' West along the North boundary of said Southwest Quarter a distance of 634.0 feet; thence South 3°47' East 466.6 feet; thence South 3°04' West 711.1 feet; thence Northeasterly along the center of the existing County Road 976.6 feet more or less to the East boundary of said Southwest Quarter; thence North along the East boundary of said Southwest Quarter 448.8 feet more or less to the point of beginning;

EXCEPTING THEREFROM the following described property:

Beginning at the Northeast corner of the Southwest Quarter of Section 13, Township 39 North, Range 6 West, Boise Meridian; thence North 88°45' West along the North boundary of said Southwest Quarter a distance of 634.0 feet; thence South 3°47' East 466.6 feet; thence South 3°04' West 711.1 feet to the True Point of Beginning; thence North 3°04' East 311.3 feet; thence South 67°46' East 103.2 feet; thence South 30°31' West 50.0 feet; thence South 59°29' East 119.0 feet; thence North 30°31' East 50.0 feet; thence South 59°29' East 52.5 feet to the centerline of existing County Road; thence South 35°21 West along said centerline 7.9 feet; thence South 44°09' West along said centerline 88.8 feet; thence South 52°38' West along said centerline 106.2 feet; thence South 65°43' West along said centerline 84.6 feet; thence South 64°27' West along said centerline 35.5 feet to the True Point of Beginning.

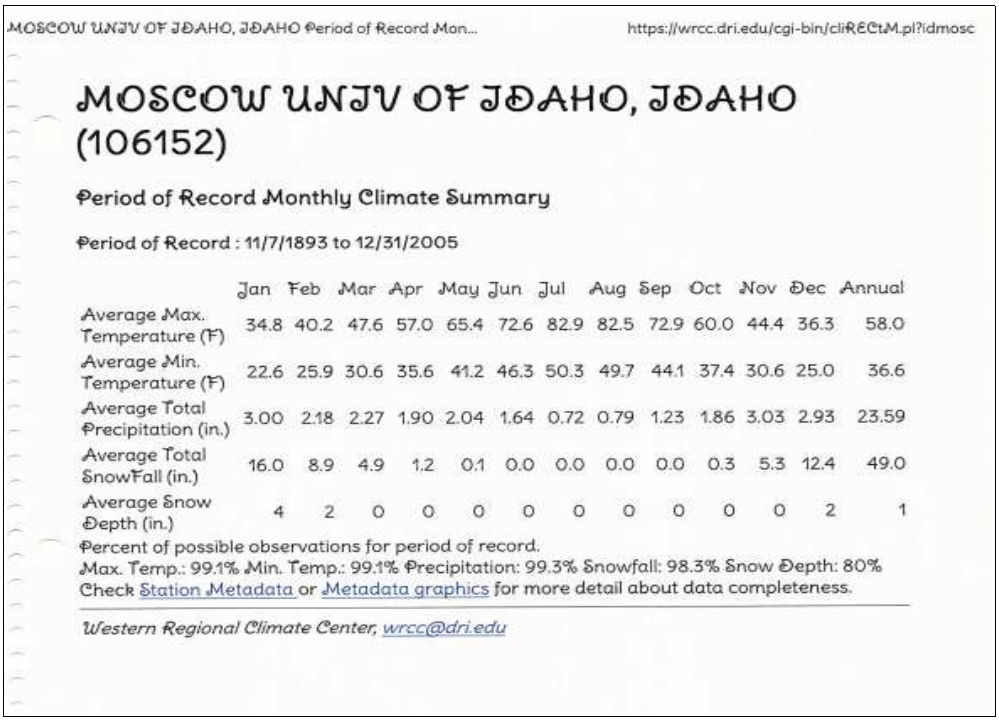
NO. [illegible]
AT THE REQUEST OF:
Leonard Chin
DATE & HOUR:
9-10-85 10:58 A M.
ELLEN JOHNSTON
LATAH COUNTY RECORDER
FEE $ 12 Alaire D. Hanson, Deputy

- 6 -

m/ Leonard Chin
717 E B st
Moscow, Id 83843

Appendix C

Appaloosa Court Meteorology Data



MOSCOW UNIV OF IDAHO, IDAHO Period of Record Mon... https://wrcc.dri.edu/cgi-bin/cliRECtM.pl?idmosc

MOSCOW UNIV OF IDAHO, IDAHO (106152)

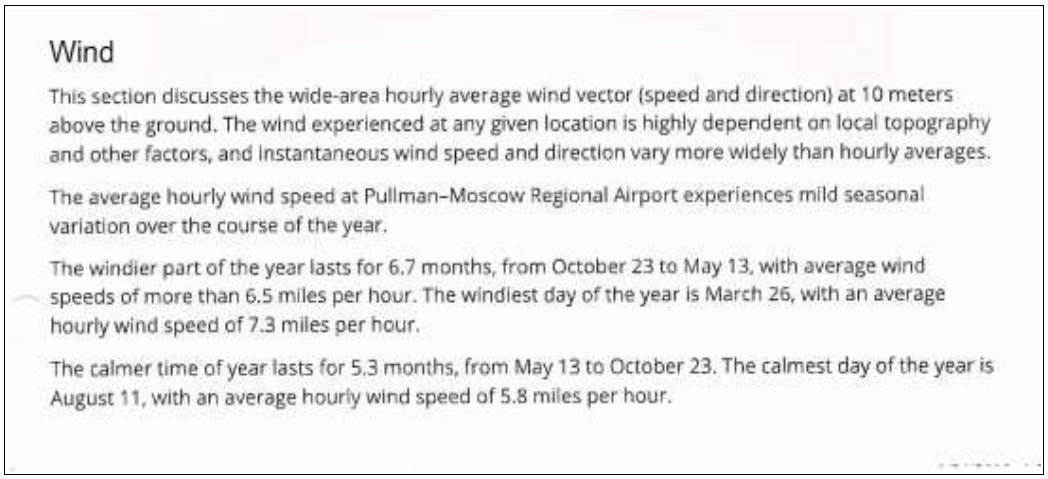
Period of Record Monthly Climate Summary

Period of Record : 11/7/1893 to 12/31/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	34.8	40.2	47.6	57.0	65.4	72.6	82.9	82.5	72.9	60.0	44.4	36.3	58.0
Average Min. Temperature (F)	22.6	25.9	30.6	35.6	41.2	46.3	50.3	49.7	44.1	37.4	30.6	25.0	36.6
Average Total Precipitation (in.)	3.00	2.18	2.27	1.90	2.04	1.64	0.72	0.79	1.23	1.86	3.03	2.93	23.59
Average Total SnowFall (in.)	16.0	8.9	4.9	1.2	0.1	0.0	0.0	0.0	0.0	0.3	5.3	12.4	49.0
Average Snow Depth (in.)	4	2	0	0	0	0	0	0	0	0	0	2	1

Percent of possible observations for period of record.
Max. Temp.: 99.1% Min. Temp.: 99.1% Precipitation: 99.3% Snowfall: 98.3% Snow Depth: 80%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu



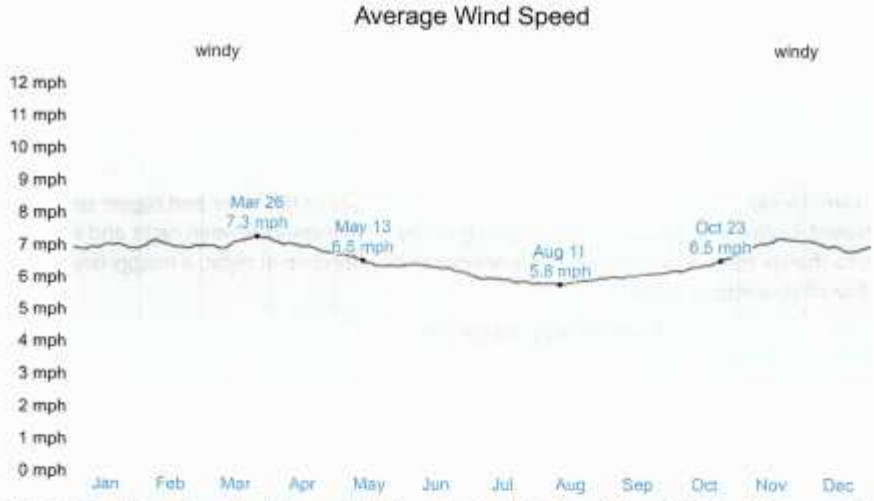
Wind

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed at Pullman–Moscow Regional Airport experiences mild seasonal variation over the course of the year.

The windier part of the year lasts for 6.7 months, from October 23 to May 13, with average wind speeds of more than 6.5 miles per hour. The windiest day of the year is March 26, with an average hourly wind speed of 7.3 miles per hour.

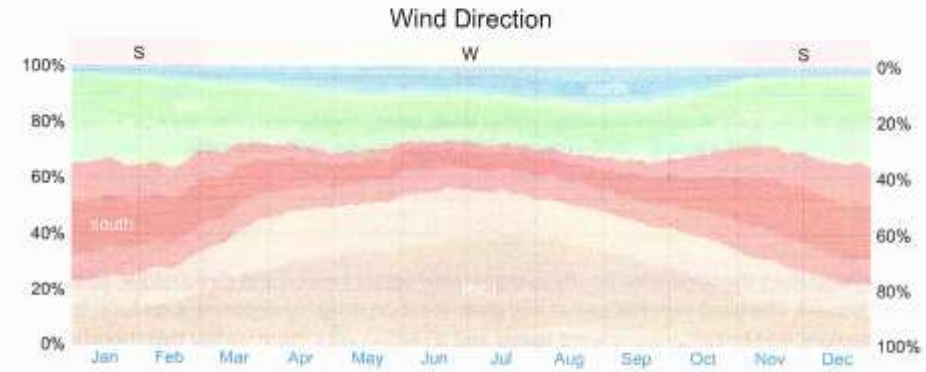
The calmer time of year lasts for 5.3 months, from May 13 to October 23. The calmest day of the year is August 11, with an average hourly wind speed of 5.8 miles per hour.



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

The predominant average hourly wind direction at Pullman-Moscow Regional Airport varies throughout the year.

The wind is most often from the west for 7.9 months, from March 3 to October 30, with a peak percentage of 57% on June 21. The wind is most often from the south for 4.1 months, from October 30 to March 3, with a peak percentage of 42% on January 1.



The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions (north, east, south, and west), excluding hours in which the mean wind speed is less than 1 mph. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).

Best Time of Year to Visit

ET*Idaho* 2012 -- Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho

Please send suggestions for improving this site to robison at kimberly dot uidaho dot edu *Copyright 2012, University of Idaho.*

Moscow - Univ of Idaho (NWS -- 106152)

Statistics based on thirty year normal spans 1978 to 2010 years

For a different land cover or crop click on the above link.
You can highlight this table and copy via the clipboard to a Mircosoft Excel or OpenOffice spreadsheet to plot or otherwise work with this data.

Open water - shallow systems (ponds, streams)
Actual Evapotranspiration (Click here for a graph)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season[a]	Non Growing Season[b]	Annual
Mean[j]	mm/day												mm		
Monthly[c]	0.23	0.57	1.33	2.26	3.00	3.66	4.44	4.05	2.70	1.46	0.46	0.19	744	0	744
15-Day Moving Average[d]	0.23	0.55	1.34	2.26	3.03	3.65	4.47	4.04	2.65	1.45	0.44	0.19			
7-Day Moving Average[e]	0.23	0.56	1.33	2.26	3.02	3.66	4.47	4.05	2.68	1.46	0.44	0.19			
3-Day Moving Average[f]	0.23	0.57	1.33	2.26	3.00	3.66	4.45	4.05	2.70	1.46	0.45	0.19			
Standard Deviation[k]	mm/day												mm		
Monthly[c]	0.05	0.13	0.32	0.24	0.43	0.32	0.60	0.40	0.34	0.26	0.09	0.06	39	0	39
15-Day Moving Average[d]	0.07	0.14	0.29	0.33	0.42	0.41	0.51	0.44	0.44	0.29	0.13	0.06			
7-Day Moving Average[e]	0.09	0.21	0.37	0.48	0.59	0.61	0.61	0.58	0.55	0.42	0.18	0.09			
3-Day Moving Average[f]	0.13	0.26	0.46	0.64	0.77	0.79	0.76	0.73	0.69	0.51	0.22	0.13			
20% Exceedance[l]	mm/day												mm		
Monthly[c]	0.26	0.68	1.55	2.44	3.24	3.97	4.77	4.31	2.95	1.58	0.55	0.22	783	0	783
15-Day Moving Average[d]	0.33	0.81	1.80	2.84	3.84	4.38	5.27	4.67	3.38	1.97	0.72	0.28			
7-Day Moving Average[e]	0.42	1.03	2.18	3.27	4.30	4.73	5.47	5.05	3.75	2.33	0.91	0.37			

3-Day Moving Average[f]	0.59	1.14	2.54	3.68	4.72	5.24	5.77	5.40	4.06	2.65	1.09	0.56			
80% Exceedance[m]	mm/day												mm		
Monthly[c]	0.20	0.46	1.16	2.05	2.67	3.32	4.05	3.74	2.32	1.28	0.35	0.15	707	0	707
15-Day Moving Average[d]	0.13	0.36	0.93	1.74	2.31	2.94	3.64	3.25	1.99	0.91	0.26	0.09			
7-Day Moving Average[e]	0.06	0.26	0.75	1.47	2.02	2.48	3.20	2.92	1.61	0.77	0.20	0.01			
3-Day Moving Average[f]	-0.01	0.15	0.59	1.17	1.58	1.88	2.63	2.17	1.35	0.65	0.12	-0.08			
Ave Highest ET_{act}	mm/day												--		
15-Day Moving Average[g]	0.29	0.69	1.60	2.60	3.42	4.04	4.81	4.43	3.01	1.78	0.59	0.24			
7-Day Moving Average[h]	0.37	0.84	1.84	2.99	3.85	4.45	5.11	4.80	3.39	2.08	0.71	0.32			
3-Day Moving Average[i]	0.50	0.98	2.21	3.44	4.29	4.88	5.46	5.18	3.79	2.32	0.88	0.46			
Ave Lowest ET_{act}	mm/day												--		
15-Day Moving Average[g]	0.17	0.45	1.11	1.92	2.65	3.26	4.10	3.64	2.33	1.15	0.32	0.14			
7-Day Moving Average[h]	0.10	0.34	0.90	1.64	2.24	2.80	3.75	3.28	2.03	0.94	0.26	0.07			
3-Day Moving Average[i]	0.02	0.25	0.72	1.34	1.77	2.28	3.19	2.75	1.64	0.76	0.18	-0.02			
Special normal distribution parameters for monthly, seasonal, and annual intervals															
Skew[m]	0.02	1.31	0.18	0.35	0.08	0.12	-0.11	-0.16	-0.32	0.13	0.06	-0.12	-0.40	0.00	-0.40
Kurtosis[o]	0.73	4.80	0.80	3.36	0.69	2.23	0.78	0.68	2.45	0.71	2.45	0.82	2.60	0.00	2.60

[a] Growing Season: This is usually the time from green up or planting in the spring to a killing frost or harvest in the fall. It is not applicable for entries without a growing season and will be blank.

[b] Nongrowing Season: This is usually the time from a killing frost or harvest in the fall to the of green up in the spring. It is not applicable for entries without a growing season.

[c] Mean of the average daily value for month

[d] Mean of the fourteen 15-day period averages contained in the month

[e] Mean of the twenty three 7-day period averages contained in the month

[f] Mean of the twenty seven 3-day period averages contained in the month

[g] Mean of the highest/lowest 15-day period average in month

[h] Mean of the highest/lowest 7-day period average in month

[i] Mean of the highest/lowest 3-day period average in month

[j] This value represents the *mean value* for the parameter for the month over the 'normal' period of record. Generally, the 'normal' period is the last thirty years with data.

[k] This value represents the *standard deviation* for the parameter for the month over the 'normal' period.

[l] This value represents the *value* for the parameter that has a 20% chance of being exceeded that month durning any particular year. Conversely, there is an 80% chance that the parameter value will be less than the *value* shown.

[m] This value represents the *value* for the parameter that has a 80% chance of being exceeded that month durning any particular year. Conversely, there is an 20% chance that the parameter value will be less than the *value* shown.

[n] This value represents the *skewness (asymmetry) of the distribution of the parameter values* for the month (year) over the 'normal' period. A value near zero indicates that the distribution approximates a normal (Gaussian) and symmetrical distribution. A negative skew indicates that the parameter distribution has relatively few low values compared to high values. A positive skew indicates that the distribution has relatively few high values compared to the number of low values. A skew value near 1 indicates that the underlying distribution approximates a lognormal distribution.

[o] This value represents the *kurtosis* of the parameter value distribution for the month (year) over the 'normal' period. Kurtosis is a measurement of the height to width ratio of the probability distribution, or the *peakedness (slenderness)*. A normal (Gaussian) distribution has a kurtosis of 3. A high kurtosis distribution has a sharper peak and longer tails, while a low kurtosis distribution has a more rounded peak and shorter tails.

This work and report were prepared by the University of Idaho Research and Extension Center at Kimberly, Idaho under contract with the Idaho Department of Water Resources. Work was supported by funding from IDWR and the Idaho Agricultural Experiment Station and Idaho Engineering Experiment Station. The authors gratefully acknowledge the long-term evapotranspiration data collection and long-standing advice provided by Dr. James L. Wright, USDA-ARS Kimberly (ret.), the more than two decades of high quality agricultural weather data collection by the U.S. Bureau of Reclamation AgriMet system, and the very long-standing, routine data collection by the hundreds of cooperative weather station volunteers across the state who, for more than one-hundred years, have faithfully observed daily air temperature and precipitation.

The citation for the evapotranspiration data used from this site should be: *Allen, Richard G. and Clarence W. Robison, 2012.* ***Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho: Supplement updating the Time Series through December 2008****, Research Technical Completion Report, Kimberly Research and Extension Center, University of Idaho, Moscow, ID.*

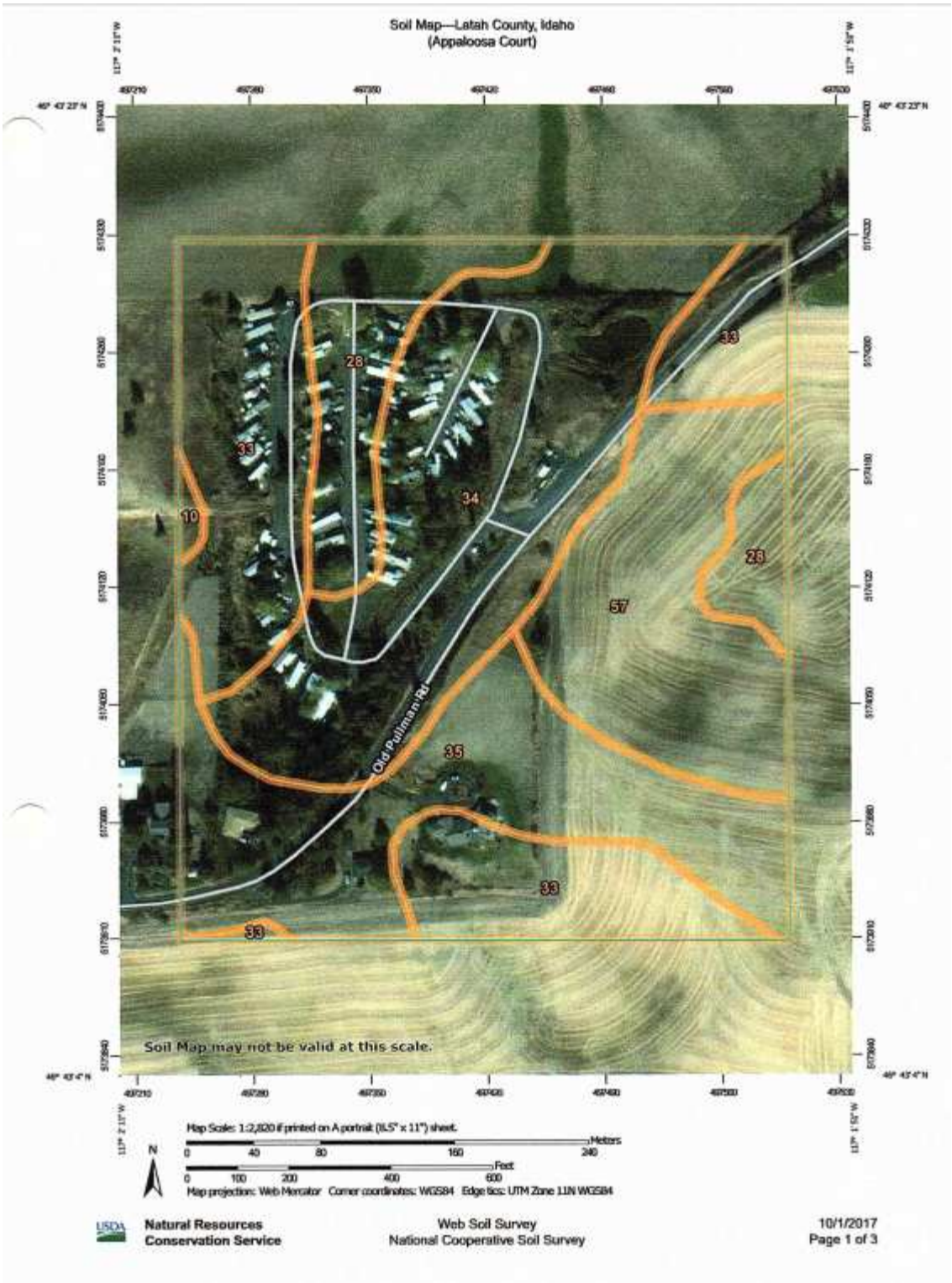
Questions regarding the data should be addressed to Clarence W. Robison or Richard G. Allen, University of Idaho, Kimberly Research and Extension Center, 3793 North 3600 East, Kimberly, ID 83341. Telephone (208)-423-6610

University of Idaho
A LEGACY OF LEADING

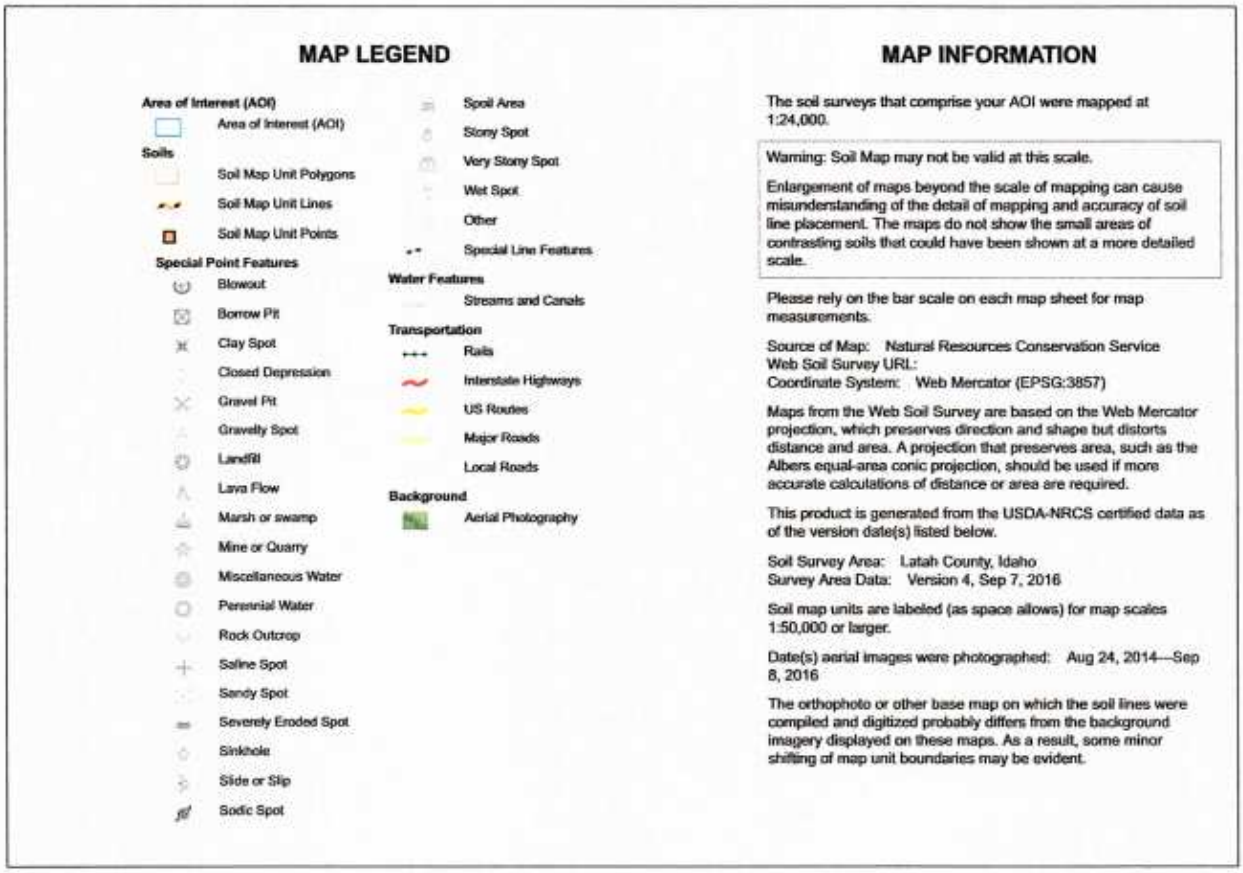
ETIdaho web site powered by Debian, Apache, Firebird DBMS, Python, with matplotlib, and kinterbasdb.

Appendix D

Appaloosa Court Soils and Geology


Soil Map—Latah County, Idaho
(Appaloosa Court)
28
33
34
10
57
35
38
53
Old Pullman Rd
Soil Map may not be valid at this scale.
Map Scale: 1:2,820 if printed on A portrait (8.5" x 11") sheet.
Meters
0 40 80 160 240
N
Feet
0 100 200 400 600
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84
Natural Resources
Conservation Service
Web Soil Survey
National Cooperative Soil Survey
10/1/2017
Page 1 of 3

Soil Map—Latah County, Idaho
(Appaloosa Court)



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:
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: Latah County, Idaho
Survey Area Data: Version 4, Sep 7, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 24, 2014—Sep 8, 2016

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.

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

10/1/2017
Page 2 of 3

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10	Garfield silt loam, 3 to 30 percent slopes	0.2	0.4%
28	Latahco-Thatuna complex, 0 to 5 percent slopes	4.0	10.5%
33	Naff-Palouse complex, 7 to 25 percent slopes	9.3	24.6%
34	Naff-Thatuna complex, 7 to 25 percent slopes	10.7	28.4%
35	Palouse silt loam, 3 to 7 percent slopes	7.6	20.2%
57	Tilma-Thatuna complex, 7 to 25 percent slopes	6.0	15.9%
Totals for Area of Interest		**37.8**	**100.0%**

Latah County, Idaho

28—Latahco-Thatuna complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2ph6m
Elevation: 2,210 to 3,170 feet
Mean annual precipitation: 23 to 29 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Latahco and similar soils: 55 percent
Thatuna and similar soils: 30 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Latahco

Setting

Landform: Drainageways, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess

Typical profile

A1 - 0 to 14 inches: silt loam
A2 - 14 to 20 inches: silt loam
Ec - 20 to 28 inches: silt loam
Btc - 28 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 10 to 16 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: DRY MEADOW (R009XY019ID)
Hydric soil rating: No

Description of Thatuna

Setting

Landform: Loess hills
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loess

Typical profile

A - 0 to 20 inches: silt loam
B/Ec - 20 to 39 inches: silt loam
Btcb - 39 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: COOL LOAMY 16-24 PZ (R009XY103WA)
Hydric soil rating: No

Minor Components

Aquolls

Percent of map unit: 5 percent
Landform: Flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: MEADOW (R009XY018ID)
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Latah County, Idaho
Survey Area Data: Version 4, Sep 7, 2016

Latah County, Idaho

33—Naff-Palouse complex, 7 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2ph6s
Elevation: 2,070 to 3,250 feet
Mean annual precipitation: 23 to 29 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 145 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Naff and similar soils: 50 percent
Palouse and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Naff

Setting

Landform: Loess hills
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 60 inches: silty clay loam

Properties and qualities

Slope: 7 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: LOAMY 16-24 PZ (R009XY102WA)
Hydric soil rating: No

Description of Palouse

Setting

Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess

Typical profile

A - 0 to 25 inches: silt loam
Bt - 25 to 60 inches: silt loam

Properties and qualities

Slope: 7 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: LOAMY 16-24 PZ (R009XY102WA)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Latah County, Idaho
Survey Area Data: Version 4, Sep 7, 2016

Latah County, Idaho

34—Naff-Thatuna complex, 7 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2ph6t
Elevation: 2,100 to 3,390 feet
Mean annual precipitation: 23 to 29 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 145 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Naff and similar soils: 40 percent
Thatuna and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Naff

Setting

Landform: Loess hills
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 60 inches: silty clay loam

Properties and qualities

Slope: 7 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: LOAMY 16-24 PZ (R009XY102WA)
Hydric soil rating: No

Description of Thatuna

Setting

Landform: Loess hills
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess

Typical profile

A - 0 to 20 inches: silt loam
B/Ec - 20 to 39 inches: silt loam
Btcb - 39 to 60 inches: silty clay loam

Properties and qualities

Slope: 7 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: COOL LOAMY 16-24 PZ (R009XY103WA)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Latah County, Idaho
Survey Area Data: Version 4, Sep 7, 2016

Appendix E

Stadium Drive Mobile Home Park Seepage Test Results Report

Test Submittal:
Wastewater Lagoon Seepage Test
At Stadium Drive Mobile Home Park
Moscow, Idaho

Prepared for

John E. Burns
Stadium Drive Mobile Home Park
2280 Old Pullman Road
Moscow, Idaho 83843

Prepared by

SPF Water Engineering, LLC
300 East Mallard, Suite 350
Boise, Idaho 83706
(208) 383-4140

December 13, 2011

SPF WATER ENGINEERING

PROFESSIONAL ENGINEER LICENSED 6266 12/13/11 STATE OF IDAHO TERRY M. SCANLAN

Appendix F

Local Well Logs

Form 238-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Office Use Only
Well ID No.
Inspected by
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: Long:

1. WELL TAG NO. D 00 46124
LING PERMIT NO 842757
er Right or Injection Well No.

2. OWNER:
Name David Leach
Address 2421 Old Pullman Rd
City Moscow State ID Zip 83843

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 39 North X or South
Rge 6 East or West X
Sec. 13 1/4 NE 1/4 SW 1/4
Gov't Lot County LATAH
Lat: Long:
Address of Well Site 2421 Old Pullman Hwy.
City Moscow
Lt. Blk. Sub. Name

4. USE:
X Domestic Municipal Monitor Irrigation
Thermal Injection Other

5. TYPE OF WORK check all that apply (Replacement etc.)
New Well Modify Abandonment Other

6. DRILL METHOD:
X Air Rotary Cable Mud Rotary Other

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
Bentonite	0	26	400 #	Top Pour

Was drive shoe used? X Y N Shoe Depth(s) 182'
Was drive shoe seal tested? X Y N How? AIR Pressure

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+2	-184	280	Steel	X		X	
4.5	-22	-366	160	PVC		X		X

Length of Headpipe Length of Tailpipe
Packer Y X N Type

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method SAW
Screen Type & Method of Installation

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
-326	-366	1/64	48	4.5	PVC		X

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
) ft. below ground Artesian pressure ___ lb.
Depth flow encountered ___ ft. Describe access port or control devices:
Top of casing
39N 6W 13

12. WELL TESTS:
Pump Bailer X Air Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
24			1.5

Water Temp. 56° Bottom hole temp.
Water Quality test or comments: Good
Depth first Water Encountered 320'

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10	0	20	Clay		X
8	20	186	"		X
6	186	320	Blk Bslt		X
C	320	359	Soft Blk Bslt	24	
6	359	366	Blue Shale		X

RECEIVED
JAN 30 2007
IDWR/North

RECEIVED
OCT 31 2006
IDWR/North

Completed Depth 366' (Measurable)
Date: Started 10-10-06 Completed 10-11-06

14. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Company Name WILKERSON DRILLING Firm No. 125
Principal Driller Date 10-17-06
and
Driller or Operator II Date
Operator I Date
Principal Driller and Rig Operator Required.
Operator I must have signature of Driller/Operator II.

Form 238-7
1/78

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

1. WELL OWNER

Name Otto Hill

Address Moscow

Owner's Permit No. 87-79-N-10

2. NATURE OF WORK

☑ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning) _____

3. PROPOSED USE

☑ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☑ Rotary ☑ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☑ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	8 inches +	1 feet	174 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☐ Yes ☑ No
Was a packer or seal used? ☐ Yes ☑ No
Perforated? ☐ Yes ☑ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☑ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☑ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 174 Material used in seal: ☐ Cement grout ☑ Puddling clay ☐ Well cuttings
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☑ Overbore to seal depth
Method of joining casing: ☐ Threaded ☐ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port _____

7. WATER LEVEL

Static water level 28C feet below land surface.
Flowing? ☐ Yes ☐ No G.P.M. flow approx
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____

8. WELL TEST DATA

☐ Pump ☐ Bailer ☑ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	174	overburden, clay		✓
8	174	177	basalt		✓
8	177	327	lava		✓
8	327	362	basalt		✓
8	362	366	blue shale		✓
8	366		clay		✓

RECEIVED
Department of Water Resources
Northern District Office
FEB 13 1980

10. Work started 9/10/79 Finished 9/14/79

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Dr. Callahan

Address Moscow

Owner's Permit No. 87-86-N-5

2. NATURE OF WORK

☑ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☑ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☑ Rotary ☑ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☑ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.264 inches	8 inches +	1 feet	80 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☑ Yes ☐ No
Was a packer or seal used? ☐ Yes ☑ No
Perforated? ☐ Yes ☑ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☑ Yes ☐ No
Manufacturer's name _____
Type PVC Liner Model No. _____
Diameter 6" Slot size 1/8 Set from 316' feet to 329' feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☑ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 80' Material used in seal: ☐ Cement grout ☑ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☑ Overbore to seal depth
Method of joining casing: ☐ Threaded ☑ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port _____

7. WATER LEVEL

Static water level 192' feet below land surface.
Flowing? ☐ Yes ☑ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____
Describe artesian or temperature zones below

8. WELL TEST DATA

☐ Pump ☐ Bailer ☑ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
100+		

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	69	overburden		✓
10	69	78	conglomerate		✓
10	78	80	basalt firm		✓
8	80	106	basalt firm		✓
8	106	118	hard gray basalt 102' 1.2GPM	✓	
8	118	122	basalt, firm		✓
8	122	123	basalt, fract. 123' 1.3GPM	✓	
8	123	138	basalt firm		✓
8	138	224	hard gray basalt		✓
8	224	249	fractured basalt		✓
8	249	251	black shale 6.0GPM	✓	
8	251	316	clay		✓
8	316	329	coarse gray sand 100+	✓	

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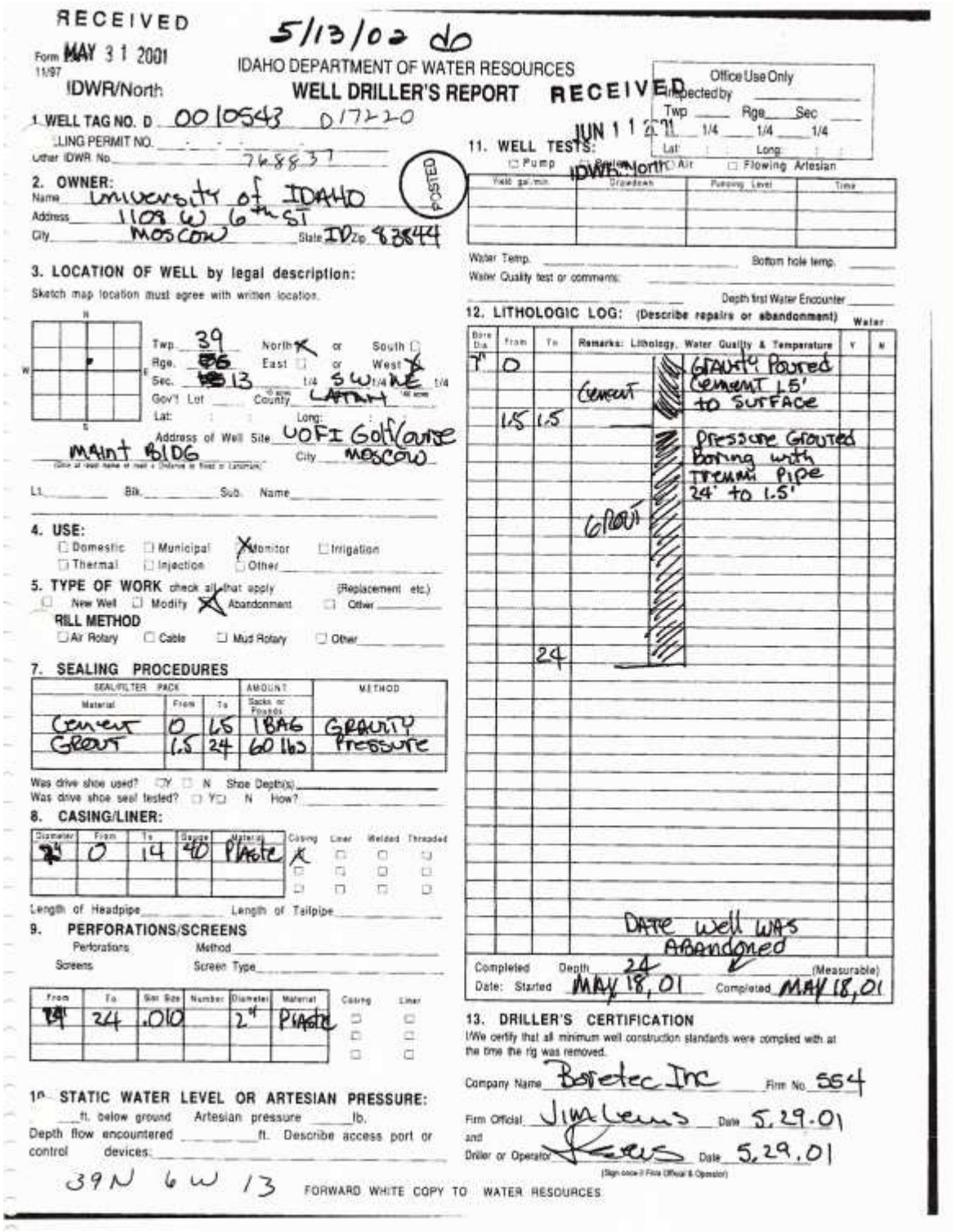
10.



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IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

RECEIVED
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IDWR/North

Office Use Only
Inspected by
Twp ___ Rge ___ Sec ___
___ 1/4 ___ 1/4 ___ 1/4
Lat: Long:

1. WELL TAG NO. D 0010543 D17220
LING PERMIT NO.
Other IDWR No. 76883

2. OWNER:
Name University of IDAHO
Address 1109 W 6th ST
City Moscow State ID Zip 83844

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.
Twp 39 North X or South
Rge R6 East or West X
Sec S13 1/4 SW 1/4 NE 1/4
Gov't Lot County LATAH
Lat: Long:
Address of Well Site UOFI Golf Course Maint Bldg City Moscow
Lt Blk Sub Name

4. USE:
Domestic Municipal X Monitor Irrigation
Thermal Injection Other

5. TYPE OF WORK check all that apply (Replacement etc.)
New Well Modify X Abandonment Other
RILL METHOD
Air Rotary Cable Mud Rotary Other

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Cement	0	1.5	1 BAG	GRAVITY
Grout	1.5	24	60 lbs	PRESSURE

Was drive shoe used? Y N Shoe Depth(s)
Was drive shoe seal tested? Y N How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
2"	0	14	40	Plastic	X			

Length of Headpipe Length of Tailpipe

9. PERFORATIONS/SCREENS
Perforations Method
Screens Screen Type

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
14	24	.010		2"	Plastic		

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
ft. below ground Artesian pressure lb.
Depth flow encountered ft. Describe access port or control devices:

39N 6W 13

11. WELL TESTS:
Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Pumping Level	Time

Water Temp. Bottom hole temp.
Water Quality test or comments:
Depth first Water Encounter

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
7"	0		GRAVITY Poured Cement 1.5' to SURFACE		
			Cement		
	1.5	1.5			
			PRESSURE GROUTED Boring with Tremmi Pipe 24' to 1.5'		
			GROUT		
		24			
			DATE well WAS ABANDONED		

Completed Depth 24 (Measurable)
Date: Started MAY 18, 01 Completed MAY 18, 01

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Company Name Boretec Inc Firm No. 554
Firm Official Jim Lewis Date 5.29.01
and
Driller or Operator Lewis Date 5.29.01
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Appendix G

Appaloosa Court Pressure Sewer Survey Estimate

Rim Rock Consulting, Inc.
129 West 3rd Street, #102
Moscow, ID 83843

(208) 883-5339
rimrock@rimrockconsulting.net

PROPOSAL TO PROVIDE SURVEYING SERVICES January 30, 2018

Shaffers Engineering
205 SW State St
Pullman, WA 99163

509-432-7070
shaffersengineering@gmail.com

PROJECT DESCRIPTION: Proposed Sewer line from Appaloosa Mobil Home Court to the City of Moscow Sewer system. Located in Section 13, T39N, R6W, and Section 18, T39N, R5W, BM, City of Moscow Idaho.

SCOPE OF WORK: "RIM ROCK" will:

1) Establish primary & secondary control along proposed Sewer route
2) Provide 50 foot wide cross sections at 50 foot stations along route for design purposes
3) Provide Plan & Profile drawings in CAD format with 1.0 foot contours
4) Layout the route based on design criteria
5) Stakeout manhole and Air Vac/Air Relief stations according to design locations and specs
6) Set easement corners and file a Record of Survey per Idaho code
7) Provide easement descriptions along route as necessary

COMPENSATION:
The estimated cost to provide the above Scope of Work is **$12,500**.

If you have any questions give me a call at 208-883-5339.

Duane Priest, PLS
129 W 3rd St, #102
Moscow, ID 83843
duane@rimrockconsulting.net

Appendix H

Stadium Drive Water System Inventory

State of Idaho Public Water System Enhanced Sanitary Survey

WATER SYSTEM INVENTORY INFORMATION

SURVEY DATE (mm/dd/yyyy)	PWS #
	ID2290036

Name of Public Water System:	# of Groundwater Sources: 1	# of Storage Facilities: 1
STADIUM DRIVE MOBILE HOME PARK	# of Surface Water: 0	Total Storage (gal): **16000**

Date of Last Survey: **04/10/2008**	Health District/DEQ Region: **LRO**	Primary Source Type: **GW**	County: **LATAH**
Number of Service Connections: **63**	Residential Population: **129**	Status: **APPROVED**	Water Purchased From: / Water Sold To:

Owner Type: **Private**	Legal Entity: **Individual**	Water System Classification: **Community**	Combined Sources: Sources Combined: *	System Classification: **VSWS,**	Seasonal Operation Dates: Date Open: **1/1** Date Closed: **12/31**

* Use the Facility Information to answer items highlighted:

Water System Facility Information

Facility Name	Facility Type	TAG	Const. Date	Status	Status Date	Availability	Water Type	ANNL_OP_PRD
DISTRIBUTION SYSTEM	DS	T2290036DS1	01/01/1974	A	01/01/1974			/ - /
STORAGE RESERVOIR	ST	000000012653		A	01/01/1969	P		/ - /
WELL NEW	WL	E0005436	08/20/1993	A	01/01/1974	P	GW	/ - /
WELL OLD	WL	T2290036S1	01/01/1969	I	01/01/1994	P	GW	/ - /

Water System Sample Points

Facility Name	Facility Type	TAG	SP-ID	TYPE	DESCRIPTION	ACTIVITY	ACTIVITY DATE
DISTRIBUTION SYSTEM	DS	T2290036DS1	DS-01		GENERIC SAMPLING POI	A	01/01/1974
DISTRIBUTION SYSTEM	DS	T2290036DS1	DS-03	DS	TRAILER #6	A	07/23/2001
DISTRIBUTION SYSTEM	DS	T2290036DS1	DS-04	DS	TRAILER #18	A	08/27/2001
DISTRIBUTION SYSTEM	DS	T2290036DS1	DS-05	DS	WATER SUPPLY	A	12/12/2001
DISTRIBUTION SYSTEM	DS	T2290036DS1	DS-06	DS	TRAILER #63	A	12/14/2001
DISTRIBUTION SYSTEM	DS	T2290036DS1	DS-07	DS	TRAILER #20	A	01/10/2002
WELL NEW	WL	E0005436	NEWWL	EP	ENTRY POINT	A	01/01/1974
WELL OLD	WL	T2290036S1	1	EP	ENTRY POINT	I	01/01/1994

Water System Contact Information

*** All systems must have an AC & FC (one of each only)**
*** All C & NTNC must have a DO & OP**

REL	Name	Addr1	City	State	Zip	BUS_PH	Ext	Mobile	Emergency	Fax	Email

AC	CHIN, LENNARD	218 E 2nd Street, Apt B	MOSCOW	ID	83840	509-334-3229	208-596-5591	glendimer@hotmail.com
DO	BURNS, JOHN E	NW 125 LARRY ST	PULLMAN	WA	99163	509-332-7704	509-332-7246	alisab@turbonet.com
EC	BURNS, JOHN E	NW 125 LARRY ST	PULLMAN	WA	99163	509-332-7704	509-332-7246	alisab@turbonet.com
FC	CHIN, LENNARD	218 E 2nd Street, Apt B	MOSCOW	ID	83840	509-334-3229	208-596-5591	glendimer@hotmail.com
OP	BURNS, JOHN E	NW 125 LARRY ST	PULLMAN	WA	99163	509-332-7704	509-332-7246	alisab@turbonet.com
OP	CHIN, LENNARD	218 E 2nd Street, Apt B	MOSCOW	ID	83840	509-334-3229	208-596-5591	glendimer@hotmail.com
OW	CHIN, LENNARD	218 E 2nd Street, Apt B	MOSCOW	ID	83840	509-334-3229	208-596-5591	glendimer@hotmail.com
SA	BURNS, JOHN E	NW 125 LARRY ST	PULLMAN	WA	99163	509-332-7704	509-332-7246	alisab@turbonet.com

Ground Water Module - Source Information

Source Name	TAG	Type	STS	Pump Cap	Casing Size	Date Drilled	Casing Depth	Static Water Depth	Scrn Depth (From)	Scrn Depth (To)	Lat	Long	Well Depth	Grout Depth
WELL NEW	E0005436	WL	A			08/20/1993					46.720078	-117.034806		

Storage Module - Information

Facility Name	Type	Status	TAG	Date in Service	Volume	UOM	Lat	Long
STORAGE RESERVOIR	ST	A	000000012653		12000	GAL		

Treatment Objective and Process

There are no Treatment Objectives and Processes

TCR Sample Schedules

Analyte Name	Analyte Code	-	--	---	Begin Date	End Date
COLIFORM (TCR)	3100	1	RT	MN	10/01/2011	
COLIFORM (TCR)	3100	5	TR	MN	09/01/2011	09/30/2011

Non-TCR Sample Schedules

Facility Name	Tag	Analyte/ Analyte Group Code	-	--	---	IMP Begin Date	End Date	Season Begin Date	Season End Date
WELL NEW	E0005436	1052	1	RT	3Y	01/01/2008			
DISTRIBUTION SYSTEM	T2290036DS1	PBCU	5	RT	3Y	01/01/1996		6/1	9/30
WELL NEW	E0005436	ALFA	1	RT	9Y	01/01/2008			
WELL NEW	E0005436	R226	1	RT	6Y	01/01/2008			

WELL NEW	E0005436	R228	1	RT	6Y	01/01/2008
WELL NEW	E0005436	R6&8	1	RT	6Y	01/01/2008
WELL NEW	E0005436	URAN	1	RT	6Y	01/01/2008
WELL NEW	E0005436	VOCS	1	RT	6Y	01/01/2002
WELL NEW	E0005436	ZARS	1	RT	3Y	01/01/1996
WELL NEW	E0005436	ZFLU	1	RT	9Y	01/01/1993
WELL NEW	E0005436	ZIOC	1	RT	9Y	01/01/2002
WELL NEW	E0005436	ZNO2	1	RT	9Y	01/01/2008
WELL NEW	E0005436	ZNO3	1	RT	YR	01/01/2000

Violation History - 3 Years

From: September 7, 2008 to September 7, 2011

Chemical Violation History

There are no Violations

Coliform Violation History

There are no Violations

DBP Violation History

There are no Violations

Lead and Copper Violation History

There are no Violations

SWTR LT1 and MRDL Violation History

There are no Violations

Sample History - 3 Years

From: September 7, 2008 to September 7, 2011

Chemical and Radiological Sampling History (Detections Only)

Contaminant	Date Collected	Facility	Non Detect?	Detected level	Units
BARIUM	09/08/2010	WELL NEW	N	0.134000000	MG/L
FLUORIDE	09/08/2010	WELL NEW	N	0.395000000	MG/L
NITRATE	09/08/2010	WELL NEW	N	0.227000000	MG/L
NITRATE	06/02/2009	WELL NEW	N	0.337000000	MG/L

Coliform Sampling History

There is no Sample History

DBP Sampling History

There is no Sample History

Lead and Copper Sample History

Contaminant	# Samples Collected	Result	Units	Period Begin Date	Period End Date
LEAD SUMMARY	5	0.000	MG/L	01/01/2008	12/31/2010
COPPER SUMMARY	5	0.012	MG/L	01/01/2008	12/31/2010

Chlorine Maximum Residual Disinfectant Level Sampling History

There is no Sample History