January 14, 2013

MEMORANDUM

TO: Erick Neher, PG, Regional Administrator, Idaho Falls Regional Office
Greg Eager, PE, Regional Engineering Manager, Idaho Falls Regional Office

FROM: Tom Rackow, PE, Staff Engineer, Idaho Falls Regional Office

RE: I-207-02 Eagle Farms, Staff Analysis

Introduction

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.04 for issuing Wastewater Reuse Permits. It briefly states the principal facts and significant questions considered in preparing the draft permit conditions and provides a summary of the basis for the draft permit. The analysis references applicable requirements and supporting materials as appropriate.

Eagle Farms, Inc. operates a fresh potato packaging facility situated on approximately 30 acres of land in a now-suburban area northeast of Idaho Falls, Idaho. Eagle Farms purchased the facility from the J.R. Simplot Company in 2002. The facility has been washing and packaging fresh produce under various ownership since 1976 (Equus, 2012).

Eagle Farms has separate municipal (sewage) and industrial (potato wash water) wastewater systems. Municipal wastewater is discharged to the Iona Bonneville Sewer District. The industrial wastewater from potato washing operations will be split with approximately 60% discharged to the Iona Bonneville Sewer District and 40% land applied to the 7.5-acre onsite wastewater reuse irrigation system under consideration for this wastewater reuse permit. Since 2010 Eagle Farms has taken numerous pro-active steps to reduce wastewater generation rates and eliminate nuisance odor conditions. All of the in-plant process changes they have made to reduce wastewater generation rates will allow the facility to achieve a sustainable, long-term wastewater treatment/disposal solution that is not expected to cause environmental impacts.

Background

While investigating odor complaints at the facility during the summer of 2004, DEQ discovered the operation of an unpermitted wastewater land application system, including unlined mud settling/percolation ponds followed by infrequent land application to a small fallow field behind the facility. The land application system has likely been in operation since the facility was constructed in 1976. Eagle Farms was eventually issued its first wastewater reuse permit LA-000207-01 on May 20, 2008 for continued operation of the potato wash water land application

system using wheel line irrigation systems during the summer growing season and flood irrigation during the non-growing season the remainder of the year.

Following a Notice of Violation in August 2009, Eagle Farms entered into a Consent Order with the Department on February 8, 2010 to resolve a number of violations of LA-000207-01 that had occurred related to monitoring and reporting, development of management plans, and closure of the old mud settling ponds. Through investigations conducted in association with fulfillment of the terms and the 2010 Consent Order, Eagle Farms disclosed to the Department additional ongoing violations occurring at the site, including the treatment and disposal of wastewater volumes generally in excess of permitted volumes, and construction of new wastewater facilities without engineering plan and specification review or approval. The discovery of the additional violations required the execution of a new Consent Order to supersede the 2010 Order.

The newest Consent Order was executed with Eagle Farms on August 8, 2011 to resolve the new violations and ultimately bring Eagle Farms into compliance and adequately permitted under Idaho law. Recognizing that additional time was needed for Eagle Farms to identify a long-term solution to address the excess flow issue, the August 2011 Consent Order required Eagle Farms to prepare and operate under an Interim Plan of Operation that, while not compliant with LA-000207-01, allowed the facility to continue operating in a manner that imposed minimal risk to human health and the environment. Operation under the Interim Plan provided Eagle Farms the time necessary to evaluate their industrial wastewater disposal options and present to DEQ a final solution for long-term operations that would effectively treat and dispose of all industrial wastewater in compliance with Idaho law. And finally, if continued land application/reuse was selected as the long term solution, Eagle Farms was to perform a Ground Water and Soil Investigation to fully characterize all hydro-geological conditions, perform a well acceptability analysis for all wells – public and private – located around the sites, and to provide ground water modeling results that anticipate the hydrogeological and water quality impacts on and off-site of future wastewater disposal/reuse practices.

The facility's final solution was presented to DEQ on October 14, 2011. It presented a long-term solution involving significant water reductions within the facility with a combined industrial wastewater discharge to the municipal sewer and land application. A portion of the potato wash water, 10,000 gallons/day, will discharge to the Iona Bonneville Sewer District (IBSD) and a portion will be land applied year-round to the onsite wastewater reuse fields in compliance with a new slow-rate wastewater reuse permit issued by DEQ. The in plant water-use reductions are meant to ensure that facility water use does not exceed the permissible discharge volumes permitted by IBSD and the DEQ. The Interim Plan of Operation was approved by DEQ on December 15, 2011 and Eagle Farms has been operating under the interim plan since that time.

As part of the August 8, 2011 consent order, a Ground Water and Soil Investigation was performed during the spring of 2012 by Clearwater Geosciences on behalf of Eagle Farms. The investigation included hydrogeological characterization of the reuse site, installation of three dedicated monitoring wells, evaluation of ground water quality from the monitoring and other onsite wells, modeling of potential impacts from future wastewater reuse activities, a Well Location Acceptability Analysis, and a limited soil characterization review of the property from

a geological perspective during well drilling operations. The final report was submitted to DEQ on April 11, 2012 (Clearwater, 2012).

A wastewater pre-application conference was held on March 23, 2012 during which DEQ outlined with Eagle Farms and Equus International the specific information that needed to be submitted in the facility's wastewater reuse permit application package. On April 26, 2012 DEQ received an initial reuse permit application package from Equus International(2012). DEQ reviewed the application and determined the application package to be incomplete and provided comments to Eagle Farms and Equus on June 18, 2012. Subsequently, on September 11, 2012 DEQ received a revised Plan of Operation (Forsgren Associates, 2012) and a Quality Assurance Project Plan (Eagle, 2012), and on September 20, 2012 a revised permit application (Equus, 2012). DEQ reviewed and determined the September 2012 revised permit application, Plan of Operation, and Quality Assurance Project Plan to be complete, allowing the permitting process to continue.

A Completeness Determination letter was sent to Eagle Farms on October 31, 2012. The October 31st letter also authorized Eagle Farms to continue operating under the Interim Plan of Operations in accordance with paragraph 5.a.2 of the August 14, 2011 consent order.

The revised Permit Application, Plan of Operations, Quality Assurance Project Plan submitted in September 2012, and the Ground Water and Soil Investigation Plan submitted in April 2012 largely serve as the basis for the following permitting evaluation.

I. Site Location and Ownership

The Eagle Farms, Inc. potato washing and packaging facility is located at 4050 E. Lincoln Road in Bonneville County, in between the cities of Idaho Falls and Iona. The 30-acre facility includes receiving and shipping docks, the produce packaging buildings, a truck/vehicle maintenance facility, one potato storage cellar, a large semi/truck parking and turnaround area, and the recycled water treatment and irrigation systems that are being considered for this wastewater reuse permit.

Once rural, the facility is now surrounded primarily by residential subdivisions and an elementary school (Equus, 2012). The reuse irrigation system and fields are located within a small area on the southern end of the property. Lincoln Road establishes the northern boundary of the facility. A residential subdivision is directly adjacent to the eastern edge of the reuse site with limited setback/buffer distances to the wastewater reuse irrigation systems. An elementary school is located along the southern boundary of the facility property and reuse site, and a few small rural 'ranchettes' remain on the west side of the facility, across the ditch and railroad tracks (Equus, 2012).

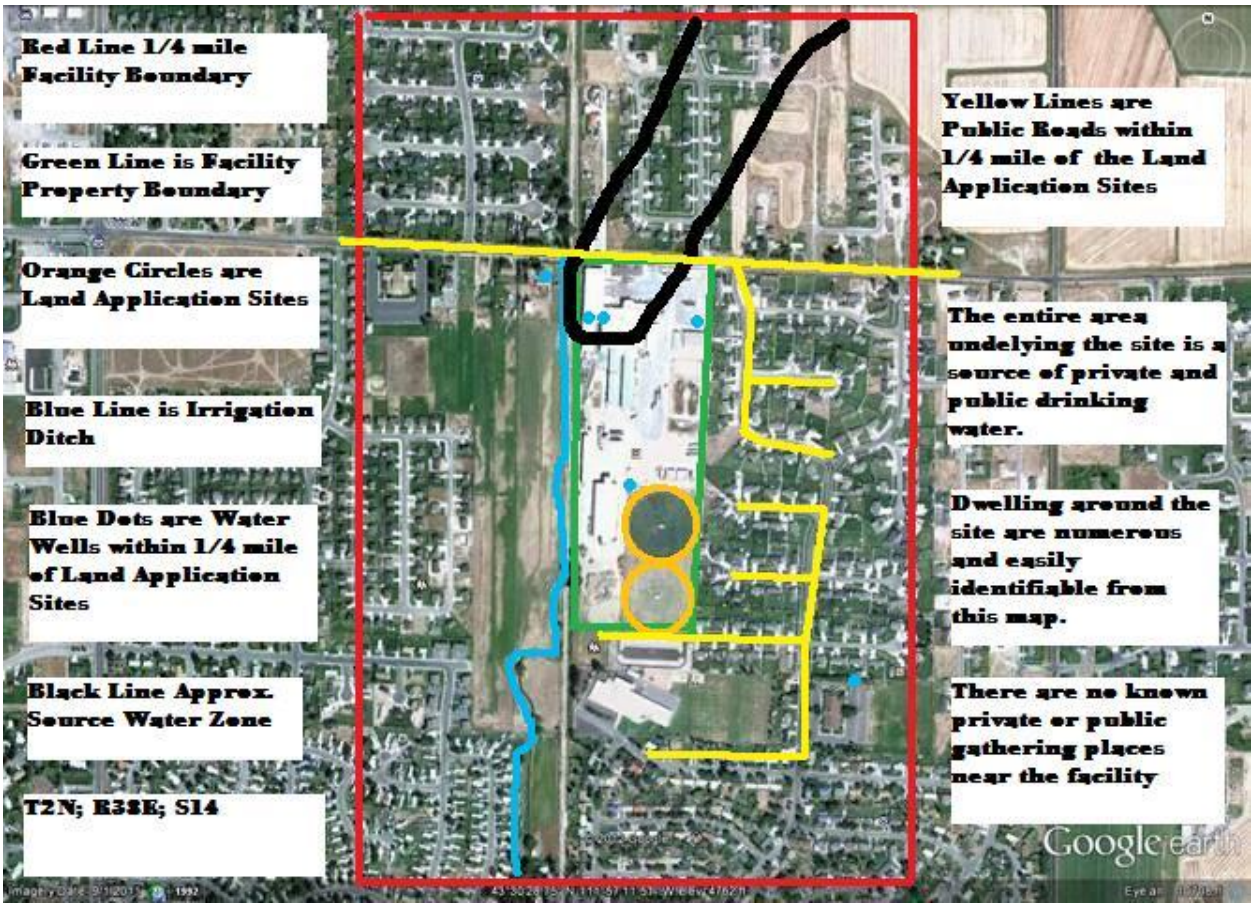

Figure 1. Eagle Farms Vicinity Map and items of concern. Eagle Farms is located at 4050 E. Lincoln Road, northeast of Idaho Falls, Idaho in Township 2 North, Range 38 East, Section 14. Map Source: Permit application (Equus, 2012). Note: Results of the Ground Water and Soil Investigation (Wood, 2012) indicate ground water flows north, contrary to the southwest direction depicted by the well capture zone on this map.

Eagle Farms, Inc. is an Idaho Corporation. The Articles of Incorporation of Eagle Farms, Inc. provided by the facility in the permit application package list Mr. Newman Giles as the company President and Incorporator. According to the permit application, the production facility and wastewater reuse site are fully owned by Eagle Farms, Inc. No lease or rental agreements exist for the subject site, and there are no other agreements affecting the ownership or operation of the reuse facility (e.g. easements, rights-of-way, etc.) (Equus, 2012).

The permit application package also provides documentation from Mr. Mark Fillmore of the Bonneville County Planning and Zoning confirming neither the production facility nor the wastewater reuse facilities at Eagle Farms require any type of planning and zoning approvals or conditional use permits (Equus, 2012).

Documentation within the permit application also indicate the facility has sufficient water rights for supplemental irrigation during the growing season to support crop production.

II. Process Description

Eagle Farms receives, washes, packages, and ships whole un-processed potatoes to the fresh market. Potatoes are delivered to the facility by semi-truck, unloaded, and sent through a washing operation fed by the facility's 2 public water supply wells located on the property (PWS #7100038). The historical operation involved washing the potatoes and sending the mud water to several percolation ponds where the mud was settled out and the wastewater primarily evaporated and percolated through the ponds into ground water. Through the consent order process with DEQ, the percolations ponds were disconnected from the wastewater system and physically demolished and removed from the facility. The vehicle parking area has now been expanded to include the area where the old ponds were removed. All industrial wastewater is now discharged to either the Iona Bonneville Sewer District or the on-site land application system as described next. The municipal wastewater generated within the facility is contained and controlled by a separate plumbing system that discharges the black waste to the Iona Bonneville Sewer District. The municipal system is not part of this permit evaluation

Eagle Farms recently implemented a number of in-plant water reduction and recycling strategies where the wash water will be used within the plant for extended periods of time prior to discharge. At the end of the cycle, the spent wash water is collected in a sump within the facility and discharged to a set of redundant concrete sedimentation basins. The sedimentation basins consist of two sets of 2 sedimentation basins allowing one set to be actively receiving and settling mud while the other set of basins are offline to allow draining and removal of the mud from the system. Each set of basins operate in series. The outer basin is approximately 40 ft wide x 45 ft long x 28 inches deep at maximum water level and contains a ramp at one end to allow mud removal using a loader. Water overflows the outer basin into a smaller inner basin approximately 40 ft wide x 25 ft long x 28 inches deep with 4 vertical side walls (no ramp). A small skid-steer type of loader must be lowered into the inner basin to remove settled mud. The dewatered mud is placed in dump trucks and transported to the offsite waste solids disposal site off Bone Road east of Idaho Falls, in accordance with the DEQ-approved Waste Solids Management Plan. The facility is considering modifications to the settling basins to improve performance. Any modifications will require engineering plan and specification review and approval by DEQ prior to construction.

Figure 2. Concrete settling basins and wastewater pump station. In this picture, the south set of basins are currently in operation while the north basins are being de-watered and prepared for dredging. The final wastewater pump station is within the small building along the western edge of the basins. Within this station are two separate pumps to transport wastewater to either the onsite land application system or the IBSD municipal sewer system. Source: Google Earth.

After passing through the inner sedimentation basins, decanted wastewater flows to an adjacent pump house where it can be independently pumped to either the land application system or the municipal sewer. One system discharges up to 10,000 gallons per day from the pump pit to the Iona Bonneville Sewer District using a small sump pump controlled by the system's Programmable Logic Controller (PLC). The PLC is set to automatically turn off the IBSD sump pump when it reaches 10,000 gpd. The other system, that is the primary purpose of this permit evaluation, discharges wastewater from the sump to the onsite wastewater land application system where it will be land applied year-round onto three separates fields. The reuse pump. An irrigation pump is also installed to pump supplemental irrigation water

from the canal into the reuse pump pit to provide makeup water when necessary during the growing season. The canal pump is manually energized by facility operators and will only be engaged to provide makeup water when the land application pump is running. This is to avoid pumping canal water into the sump at the same time the sump is discharging to the IBSD sewer system.

Although the reuse site was originally permitted by DEQ in 2008 as a 12-acre field using wheel lines in summer and flood irrigation in winter, Eagle Farms removed those irrigation systems and replaced them with two small pivots of 2.6-acres each. A portion of the reuse site was also sold to a neighboring property owner, and another portion was removed from service to provide additional setback to the elementary school. The changes reduced the active size of the land application site from 12 acres to its current size of 5.2 acres.

The permit application package for this new permit proposes to return a portion of the site to land application as a third reuse field. Irrigation options and methods for the third field are still being evaluated by Eagle Farms and will have to be reviewed and approved by DEQ prior to use, but the facility is considering either a flood or solid-set irrigation system conducive to winter operations. Therefore, this permit evaluation will consider permitting a total of 7.5 acres including two 2.6-acre pivots and one 2.3 acre solid-set. The field arrangements are shown on the following figure.

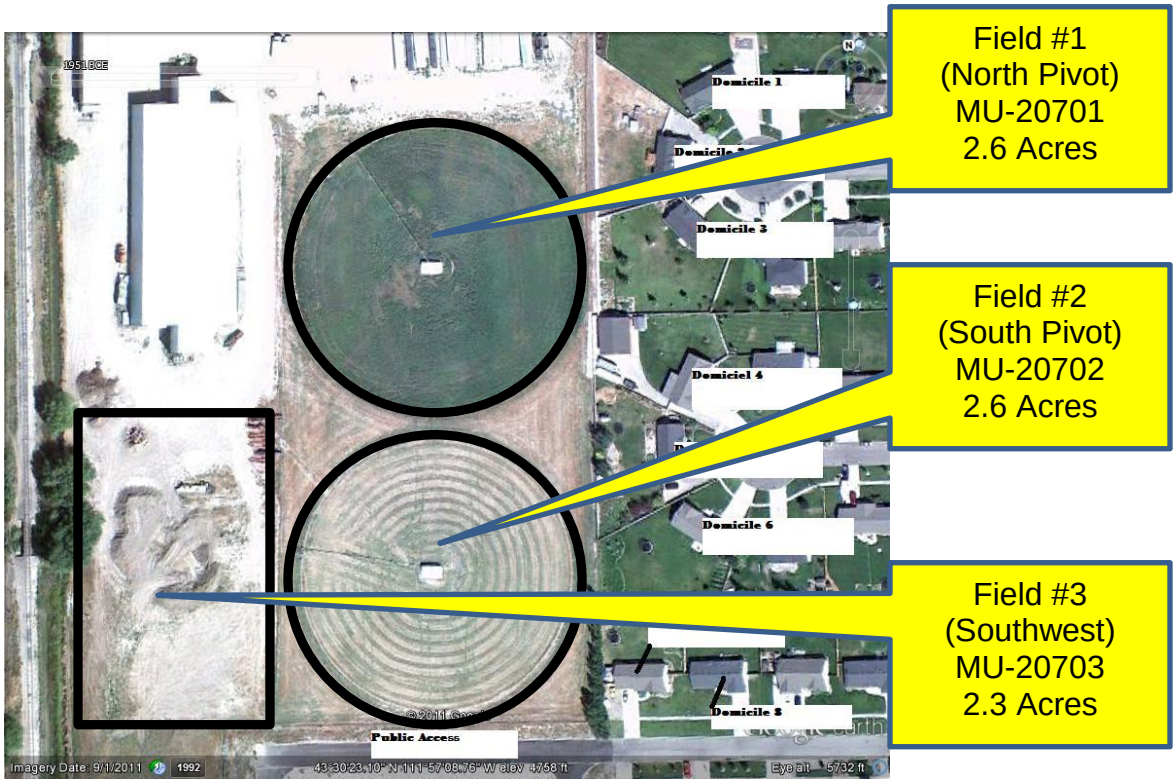

Figure 3. Proposed Management Units. Source: Permit Application, Figure 1 (base map only) (Equus, 2012).

Continuing discussions with the facility indicate they are also evaluating the option of removing the two pivots and replacing with other irrigation methods to convert the fields back to the original 'square' shape that will maximize acreage. Changes to the irrigation systems and acreage will require a permit modification and will be addressed at that time.

III. Site Characteristics

A. Site Management History

As stated earlier, this potato washing and packaging facility has been in operation under various ownership since 1976. The facility has only served as a fresh produce packaging facility where raw, whole produce is washed, boxed, and shipped. Cutting, peeling, cooking, dehydrating or other food processing methods are not used at this facility. Eagle Farms, Inc. has operated the facility since 2002, and during the last two years have made significant strides in modernizing the facility to reduce potable water consumption and greatly reduce the volume of wash water generation and disposal.

Historically, all potato wash water was discharged to onsite percolation ponds. Eagle Farms has since removed those ponds and now discharges approximately 60% of the wash water to the Iona Bonneville Sewer District and land applies the remaining 40%. The land applied wastewater is industrial wash water from washing dirt off of whole potatoes. It does not contain any municipal black waste or sewage.

The facility, including the land application site, is wholly owned and operated by Eagle Farms, Inc. There are no sub-contracted operators. Bonneville County does not require any type of special or conditional use permit for operation of the wastewater land application system at this facility.

B. Climatic Characteristics

Climatic characteristics at Eagle Farms are consistent with the greater Idaho Falls area. According to the permit application, the facility is at an elevation of approximately 4,760 ft near the margins of the high desert Snake River Plain. Average annual precipitation is approximately 10-inches per year. Average total snowfall is approximately 35-inches. Average maximum yearly temperatures are approximately 57-degrees F with average minimum yearly temperatures of approximately 31-degrees F. The highest recorded temperature in the Idaho Falls Area was 104-degrees F in 2002, and the lowest was -34 degrees F below zero in 1985 (Equus, 2012).

Data obtained by DEQ from the Western Regional Climate Center for the Idaho Falls FAA ARPT weather station #104457 for the period of record from 1948-2005 indicate the following (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?idifap):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temp. (F)	27.0	33.7	44.0	56.8	67.0	76.2	85.8	84.4	73.6	60.3	42.4	30.0	56.8
Avg. Min. Temp. (F)	10.0	15.3	23.5	31.2	39.0	45.5	50.8	49.1	40.6	31.1	22.1	12.6	30.9
Avg. Total Precip. (in)	0.76	0.74	0.75	0.89	1.38	1.19	0.54	0.70	0.72	0.75	0.82	0.80	10.03
Avg. Total Snowfall (in)	8.7	6.4	3.8	2.2	0.5	0.0	0.0	0.0	0.0	0.7	4.5	8.6	35.3
Avg. Snow Depth (in)	5	4	2	0	0	0	0	0	0	0	0	3	1

Below-freezing temperatures are the norm for the non-growing season and limited precipitation is received during the growing season. The year-round irrigation systems are designed to continue operating during extended freezing periods during winter.

C. Soils

The permit application (Equus, 2012) references the Ground Water and Soil Investigation report (Wood, 2012) and states "this report indicates that the top five to six feet of material at this site consists of 'silt loam soil' rather than 'silty clay loam' as indicated in NRCS soil maps." The application then estimates the soil available water holding capacity (AWC) to be 2.44 inches/ft based on the generic silt loam AWC values from DEQ's reuse guidance manual (DEQ, 2007). This equates to a water holding capacity of 12.2 inches of water within the top 60 inches of soil, and is roughly double the 6.2 inch water holding capacity indicated by NRCS soil maps

The permit application does not provide any further documentation or other onsite test results or measurements to support the claim of 5-6 ft of silt loam soil. Furthermore, review of Wood's (2012) ground water and soil investigation (GWSI) report indicate that soil pits, soil cores, or other methods were not used to fully characterize the top 60 inches of soil across the land application site. Rather, the data within the GWSI describes the soils at Eagle Farms from a geological well drilling perspective. The monitoring well logs provided within the GWSI report indicate the Eagle Farms facility, including the land application site, contains approximately 1 ½ to 2 ½ feet of "silty" soil over gravel and sands that extend down 20-30 feet as follows:

Monitoring Well MW-1 (North end of facility, in parking lot, down-gradient)

0.5 ft of Gravel (parking lot):
2 ft of "brown silt"
36.5 ft of "sand and gravel"

Monitoring Well MW-2 (Southwest of reuse site, up-gradient, installed on top of an artificially elevated runoff containment berm):

4 ft of "silt embankment" (the fill created by the elevated runoff berm)
2.5 ft of "silty soil layer"
23.5 ft of "sand and gravel"

Monitoring Well MW-3 (south of reuse site, up-gradient, installed on top of an artificially elevated runoff containment berm):

5 ft of "silt embankment" (the fill created by the elevated runoff berm)
1.5 ft of "silty soil layer"
29.5 ft of "gravel with medium sand"

The soil characterization provided in Wood's (2012) well construction logs are consistent with the Natural Resources Conservation Service (NRCS) soil maps. The permit application did not provide any test pit data or other site specific evidence that suggests the soil texture under each field differs from what Wood (2012) and the NRCS soil map data show. Therefore, DEQ recommends the NRCS soil map data be used to characterize the site and establish the reuse permit loading limits.

The NRCS Soil data obtained by DEQ from the USDA NRCS Web Soil Survey website (http://websoilsurvey.nrcs.usda.gov/app/) indicate Eagle Farm's wastewater reuse site consist entirely of Soil #21, Paesl silty clay loam, 0-2% slope, well drained, > 80 inches to groundwater, non-saline to very slightly saline, and low available water holding capacity (AWC). The AWC of the Paesl silty clay loam down to 60 inches is as follows:

Layer	Description	Avg. AWC (in/in)	Total AWC (in)
0-5"	Silty clay loam	0.18	0.9
5-10"	Silty clay loam	0.18	0.9
10-17"	Silty clay loam	0.20	1.4
17-25"	Silty clay loam	0.20	1.6
25-60"	Very gravelly loamy coarse sand	0.04	1.4
		Total AWC =	6.2 inches

Results from the May 2010 soil sampling event are included in the permit application and appear to be representative of current conditions at the site:

Soil Parameter	1st foot	2nd foot	3rd foot
Conductivity (uS)	0.42 (L)	0.25 (L)	0.22 (L)
Nitrate Nitrogen (ppm)	28 (H)	9 (L)	6 (L)
Ammonium Nitrogen (ppm)	8	12	1
Available Phosphorus (ppm)	16 (M)	7 (L)	6 (L)
pH	7.9 (H)	8.4 (VH)	8.4 (VH)
Organic Matter (%)	1.84 (H)	1.08 (H)	0.93 (L)
Potassium (ppm)	350 (VH)	138 (M)	135 (M)
SAR	0.16 (L)	0.15 (L)	0.16 (L)
DTPA Iron (ppm)	12 (VH)	9 (H)	10 (H)
DTPA Manganese (ppm)	7 (H)	3 (H)	2 (M)
Calcium (ppm)	4623 (H)	4761 (H)	4439 (H)
Sodium (ppm)	43 (L)	39 (L)	41 (L)
Magnesium (ppm)	278 (L)	246 (L)	292 (L)

1. Ratings estimated by DEQ from soil quality information published by Stukenholtz Laboratory, Inc. and Western Laboratories, Inc. L=low, M=medium, H=high, VH=very high.

D. Surface Water

The only surface water near the site is a small irrigation ditch along the western boundary of the Eagle Farms property. The center pivot fields are approximately 280 feet east of the ditch. The new 2.3-acre expansion field is adjacent to the ditch along the western edge of the field. Adequate buffer zone setbacks and appropriate irrigation system design that prevents spray drift will need to be provided.

A review of FEMA's April 2, 2002 Flood Insurance Rate Map 1600270070 D shows that Eagle Farms does not reside within a flood plain.

E. Ground Water / Hydrogeology

The ground water and hydrogeological characteristics of the site and region are fully described within the Ground Water and Soils Investigation (Woods, 2012). A summary of the report is as follows.

Regional Hydrogeology

The Eastern Snake River Plain is a northeast trending basin located in southeastern Idaho. Ten thousand square miles of the basin are primarily filled with highly fractured layered Quaternary basalt flows of the Snake River Group. Individual basalt flows range from 10-50 feet thick and average 25 feet. Basalt is thickest in the central part of the eastern plain and thins toward the margins. Estimates of the total thickness of the flows are as great as 5,000 feet. A thin layer (0-100 feet) of windblown and fluvial sediments overlies the basalt.

The layered basalts host one of the most productive aquifers in the United States. The Snake River Plan Aquifer is generally considered unconfined and well yields of 2,000 to 3,000 gallons per minute are common for wells open to less than 100 feet of the

aquifer. Estimated aquifer thickness ranges from several hundred feet near the plain's margin to thousands of feet near the center. The majority of aquifer recharge results from surface water irrigation activities and natural recharge through stream losses, direct precipitation, and tributary basin underflow.

The regional ground water flow direction of the Snake River Plain aquifer is to the southwest paralleling the basin; however, flow direction(s) at the local scale can be highly variable due to preferential flow paths through the fractured and layered basalts.

Local Hydrogeology

A well log analysis was performed by Wood (2012) covering an approximate one mile radius around the facility. Fractured basalt is the predominate water bearing lithology in the area. Wood states that the lithologies of the wells are consistent with the regional and local understanding of the geology, but heterogeneous conditions prevail and localized properties can vary. Local water transmitting capabilities are very high in this area. The regional direction of flow in this area is generally toward the southwest with a gradient of 0.002.

Three new monitoring wells were constructed in February 2012 as part of the GWSI study. The wells were constructed under the direct onsite supervision of a licensed professional geologist from Rocky Mountain Environmental Associates (RMEA). Assuming a southwest direction of flow consistent with the regional aquifer, one well (MW-1) was installed along the northern boundary of the facility and two wells (MW-2 and MW-3) were installed along the southern boundary of the land application site as shown in the figure below.

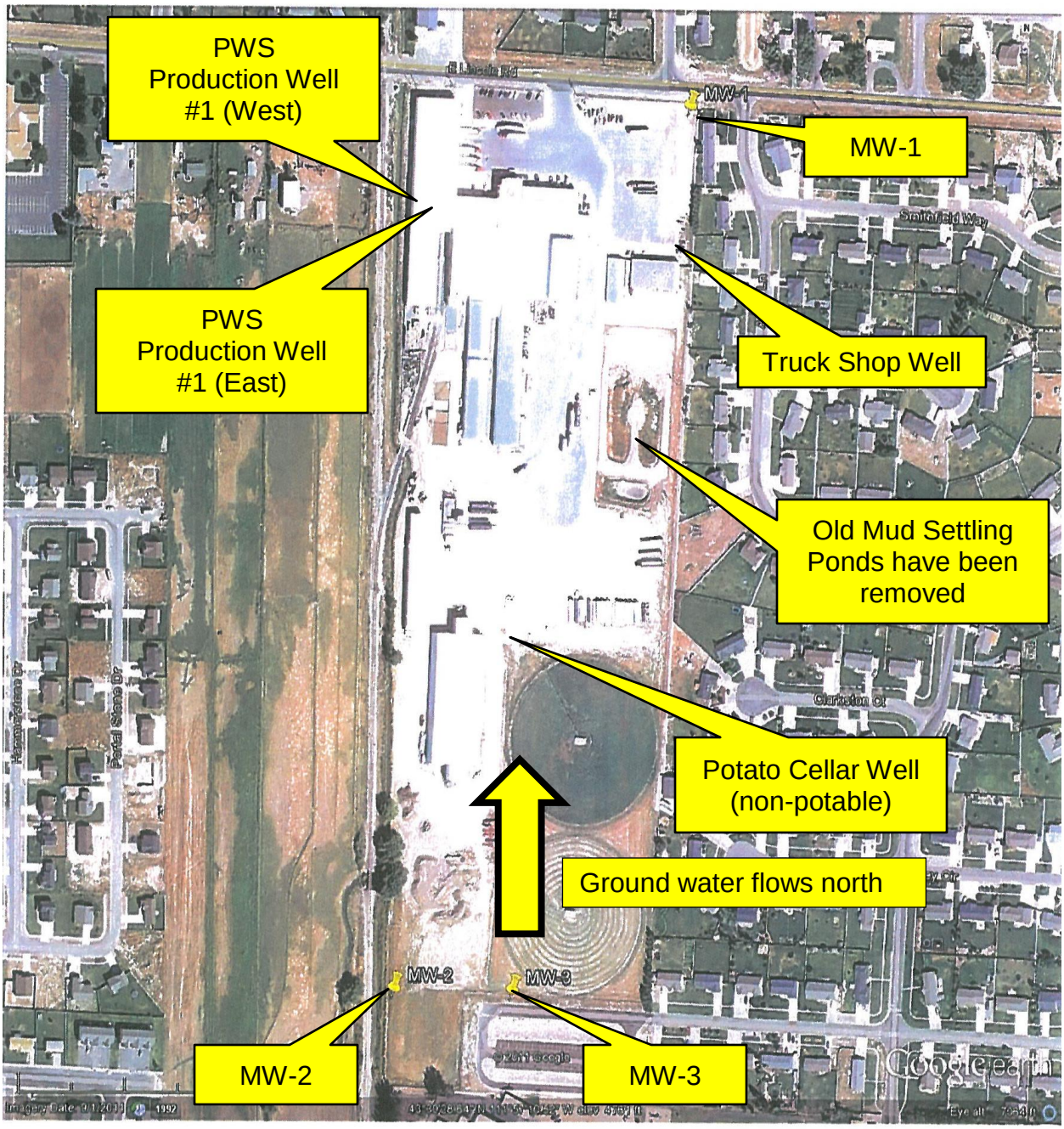

Figure 3. Location of on-site wells (public, domestic, and monitoring). Map Source: Figure 5 in Ground Water and Soil Investigation Report (Wood, 2012).

The GWSI states RMEA's geologist recorded the depth and lithology encountered in each well and collected lithological samples from the drill cuttings at 5-foot intervals. The geologist was also authorized to stop drilling and look for evidence of perched water. No perched water was observed during drilling of any of the wells. As stated by Wood (2012), the lack of perched water is not surprising given the very coarse nature of the sedimentary layer on top of the basalt.

The lithology of the 3 monitoring wells was similar with a thin layer of silt loam soil over a thick sequence of coarse gravels (up to cobble size) and sand. The sedimentary sequence extends to the top of the basalt layer 39 to 50 feet below land surface. The basalt layer extends to about 80 feet and is underlain by a layer of clay. All 3 wells terminated at the top of the clay layer. Although the GWSI includes a statement that the site contains 5-6 feet of silt loam soil, it doesn't appear that test pits were dug for confirmation, and the well logs indicate only 1.5 to 2.5 feet of soil over the sands and gravels consistent with the NRCS soils maps as explained earlier. Well logs for the 3 new monitoring wells are attached to this analysis.

The uppermost water was encountered during drilling within the basalt layers, with static water levels at 66-67 feet below ground surface. Although the permit application (Equus, 2012) states the aquifer is locally confined under Eagle Farms, the GWSI (Wood, 2012) does not support that assertion. Further personal communication with Mr. Wood in December 2012 confirmed that ground water beneath Eagle Farms is unconfined.

Top of casing (TOC) well elevations were surveyed by an Idaho licensed professional land surveyor after well completion to establish the datum needed to measure and evaluate ground water depths and direction of flow. The monitoring well TOC elevations presented by the surveyor in Wood's (2012) GWSI are as follows:

Well	Latitude NAD 83	Longitude NAD 83	City of Idaho Falls 2004 Coordinate System - Northing	City of Idaho Falls 2004 Coordinate System – Easting	Elevation NAVD 88	Measuring Point Description
MW-1	N43°30'38.48665"	W111°57'05.86670"	672256.796	713441.859	4758.11	North Side Casing Mark MP
MW-2	N43°30'19.88646"	W111°57'15.06168"	670372.723	712764.997	4756.15	North Side Casing Mark MP
MW-3	N43°30'19.70643"	W111°57'11.89061"	670354.603	712998.765	4755.80	North Side Casing Mark MP
PW-1 (west)			672026	712808	4759.83	Steel Floor North Side

Ground water levels were measured 3 times in the spring of 2012 after completion of the monitoring wells and, contrary to the southwestern flow of the regional aquifer, the localized water table under Eagle Farms appears to flow north-northeast. Wood (2012) indicates each water level measurement was investigated and repeated to confirm its accuracy. Similarly, the surveyor also doubled-checked the wellhead elevation results and determined them to be accurate. Therefore, until future water

level measurements provide evidence to the contrary, the localized ground water gradient is believed to flow north-northeast toward MW-1 along Lincoln Road.

Ground water quality data obtained in March 2012 during the ground water and soil investigation are as follows:

Constituent	GWQR Standard	Up-gradient		Down-gradient	
		MW-2	MW-3	PW-1	MW-1
Arsenic (ug/L)	50	<2.2	<2.2	<2.2	<2.2
Barium (ug/L)	2,000	85.7	86.8	89.6	87.8
Calcium (mg/L)	n/a	51.9	56.3	58.2	59.1
Iron, Total (ug/L)	300	<7.4	<7.4	68.6	433
Magnesium (mg/L)	n/a	16.3	17.6	18.4	18.7
Manganese, Total (ug/L)	50	<0.27	<0.27	<0.27	<0.27
Potassium (mg/L)	n/a	3.29	3.52	3.62	3.87
Sodium (mg/L)	n/a	21	22.3	20.1	23.1
Chloride (mg/L)	250	18.4	8.7	16.9	19.5
Fluoride (mg/L)	4	0.34	0.17	0.36	0.36
Sulfate (mg/L)	250	36.1	18.3	36.1	36.9
Nitrate+Nitrite (mg/L)	10	1.8	1.8	2	1.9
VDS (mg/L)	n/a	44	41	53	61
TDS (mg/L)	500	329	329	341	330
Alk. as CaCO3 (mg/L)	n/a	220	216	227	226
Benzene (ug/L)	5	<0.36	<0.36	<0.36	<0.36
Toluene (ug/L)	1,000	<0.39	<0.39	<0.39	<0.39
Ethylbenzene (ug/L)	700	<0.38	<0.38	<0.38	<0.38
Total Xylene (ug/L)	10,000	<1.1	<1.1	<1.1	<1.1

Wood's (2012) ground water and soil investigation indicates the aquifer is not confined under Eagle Farms. The single sampling event data may indicate the historically high industrial discharges to the old earthen percolation ponds may not have significantly impacted the regional aquifer, with the possible exception of iron. Continued ground water monitoring will be necessary to confirm these preliminary results and validate 1) ground water depth, 2) direction of flow, 3) up-gradient/background concentrations, 4) down-gradient concentrations/impacts, and 5) seasonal variances.

The permit application (Equus, 2012) states petroleum-based (BTEX) volatile organic contaminants (VOC's) have been sporadically and infrequently detected in Eagle Farms public water system and in the industrial wastewater effluent. However, consistent sampling of both inflows and effluent, at consistent sampling locations, to try and isolate the location and source of the sporadic hits did not occur as discussed next.

In December 2007 total xylene was detected in Eagle Farms' public water system well at a concentration of 1.46 micrograms/liter. The maximum contaminant level for total xylene is 10,000 micrograms/liter.

In December 2010, subsequent VOC samples were collected from both the public water supply well and the wastewater sedimentation basins. This time, BTEX was not detected in the public water system, but it *was* present in the wastewater system. Toluene was present in the wastewater at 0.97 micrograms/liter and Xylenes were present at 0.82 micrograms/liter. Benzene and Ethylbenzene were not detected (Equus, 2012).

In May 2011 another round of BTEX sampling was performed on the wastewater sedimentation basins (i.e. effluent), but not the public water supply (i.e. influent) coming into the facility. The wastewater sample contained ethylbenzene at 1.02 micrograms/liter and Xylenes at 5.38 micrograms/liter. Because the inflow was not sampled at the same time, it is unclear if the BTEX contamination was generated on-site or brought into the facility through the PWS wells from some unknown, up-gradient source of contamination.

In February 2012 wastewater BTEX samples were collected from a different location in the wastewater treatment process. The wastewater samples were collected from the wastewater pump house sump downstream of the sedimentation basins. This time, Toluene was detected at 0.95 micrograms/liter and Xylenes detected at 1.52 micrograms/liter. Because this sample was collected from a different sump that contained pumps that might have been lubricated with petroleum-based products, the sample results should not be directly compared to previous wastewater analyses. And since the fresh water influent was again not analyzed, one cannot determine if the BTEX detections are a result of on-site activities or off-site contamination brought into the facility through Eagle Farm's water wells.

The last and most recent BTEX samples were collected in March 2012 from the onsite public water system and new monitoring wells. The wastewater effluent was not sampled. As shown in the March 2012 ground water monitoring results table above, BTEX was not detected in any of the ground water samples.

Because of the inconsistent sampling of both influent and effluent, and the different sampling locations of the effluent, DEQ concurs with Equus (2012) that the source of the BTEX detections cannot be determined at this time. Continued sampling is needed to confirm the sources and concentrations of the BTEX.

During the consent order process, DEQ's Water Quality Program informed the DEQ regional office and Eagle Farms that the facility would not be allowed to land apply wastewater with detectable levels of BTEX. Continued BTEX sampling of both the effluent and ground water will help determine the source, frequency, and concentrations of any BTEX in the system.

In response to the consent order process, Eagle Farms has been implementing new methods and in-plant processes to reduce water use and wastewater generation rates. One of the newly constructed in-plant processes greatly reduces the facility's water used for processing and packaging their products. This process includes an oxidation step to meet the facility's USDA requirements and maintain quality of their products. Although DEQ does not have authority to review or approve industrial in-plant processes (IDAPA 58.01.16.401.01), Eagle Farms has provided access to DEQ staff to review and inspect the new systems within their plant. The BTEX detections discussed above are generally 700 to 10,000 times less than the primary constituent standards specified in the Ground Water Quality Rule IDAPA 58.01.11 (listed in the previous table). Although not specifically designed to treat or remove BTEX, staff believe that the new in-plant oxidation process will likely treat and reduce the very low concentrations of BTEX to undetectable levels. Staff recommend sampling the effluent directly downstream of the in-plant oxidation process to confirm removal of the BTEX prior to discharge to the sedimentation basins.

IV. Wastewater Characterization, Cropping Plan, Loading Rates

A. Wastewater Characterization

Wastewater sources transported to the industrial wastewater reuse system include only the wash water used to wash the whole, unprocessed potatoes. Municipal black waste from bathrooms, sinks, drinking fountains and break rooms are isolated and separate from the industrial food washing system. The municipal waste system discharges to IBSD through a separate plumbing and drain pipe system. The black waste system will not backup into the industrial wastewater collection or discharge systems. The in-plant potato washing system retains the wash water for extended periods of time. It's also oxidized for in-plant processing purposes as discussed earlier. When the wash water has completed its life cycle within the facility it is discharged to a sump within the plant and then pumped to one set of concrete sedimentation basins outside the facility. The clarified effluent from the flow-through sedimentation basins reports to the wastewater sump pump building where up to 10,000 gpd is discharged to the IBSD sewer system and the remainder, up to permit limits, is discharged to the onsite wastewater land application/reuse system.

The industrial wash water is fairly typical compared to other potato fresh packing sheds. Wastewater generation rates and effluent concentrations can vary greatly depending on several factors including wastewater residence time within the facility and the type of soil washed off the potatoes. Washing loose sandy soils off potatoes requires less water than thick 'sticky' soils, for example. The permit application lists the typical wastewater quality from the 2011 reporting year as follows. These concentrations are expected to remain representative of future operations.

Wastewater Constituent	Average	Std. Deviation
COD (mg/L)	582	350
TKN (mg/L)	25	13.2
Ammonia (mg/L)	4.7	3.4
Nitrate+Nitrite (mg/L)	0.65	0.82
Total P (mg/L)	8.6	5
Chloride (mg/L)	45.2	32.1
Conductivity (uS)	799	181
K (mg/L)	86.4	36.3
pH	7.15	0.1
TDS (mg/L)	789	432
VDS (mg/L)	256	108
NVDS (mg/L)	531	379
TSS (mg/L)	2574	2453
BOD (mg/L)	245	193

Staff recommend the new permit discontinue monitoring of BOD, TSS, ammonia and nitrite nitrogen in the industrial wash water. COD is a more representative and complete measure of the organics than BOD in this industrial system. Nitrate+Nitrite concentrations are already quite low, and with the addition of the in-plant oxidation process the presence of nitrite in the effluent is not expected. Ammonia nitrogen concentrations are captured within the total Kjeldahl nitrogen (TKN) analysis. And because this industrial system does not require disinfection of the effluent prior to land application or discharge to the sewer, it is not necessary to evaluate total suspended solids (TSS).

B. Cropping Plan

Eagle Farms land application site consists of a newly planted grass mixture consisting primarily of alfalfa with smaller portions of fescue, creeping foxtail, and brome grasses mixed in (Equus, 2012). Because the crop is new and the historically overloaded site is undergoing changes including irrigation reductions, accurate historical site-specific crop yield data is not available at this time. However, the seed mixture is somewhat similar to the mixtures used at other year-round wastewater reuse facilities. The permit application specifies an expected yield of 6.6 *dry* tons/acre, which is about 50% greater than the historical county average hay yield and is not usually achieved at other industrial reuse sites with similar grass mixtures and year-round land application. Data obtained from the USDA Agricultural Statistics Service website show that crop yields for hay in Bonneville County are generally around 4 tons/acre from year to year. Staff does not expect Eagle Farms will be able to achieve the 6.6 dry ton/acre yield estimated in the permit application.

The permit application states that formal crop rotations are not currently anticipated or planned. If necessary, future rotations may include 3-4 years of alfalfa followed by 2 years of potatoes or sugar beets and 1-2 years of grain.

C. Hydraulic Loading Rate

As part of the consent order process, Eagle Farms studied their wastewater treatment and disposal options and elected to reduce wastewater generation rates to the point that a portion could be land applied to the onsite slow-rate land application system and a portion discharged to the local sewer. Eagle Farms has proactively made extensive changes to its operation in an effort to reduce wastewater generation rates to meet the capacities available in the land application and sewer systems. Historical wastewater rates from 2001-2010, which were entirely land applied, varied between 624,000 and 1,887,000 gallons/month. Through their water conservation efforts and in-plant process changes, Eagle Farms has made significant strides in reducing wastewater generation to about 350,000 gallons/month where approximately 200,000 gallons/months is discharged to the IBSD sewer system and approximately 150,000 gallons/month is proposed to be land applied.

Staff recommends the land application system be permitted as a slow-rate system, as designed, to be managed as an agronomic treatment unit where the water and nutrients applied to the site are beneficially reused while maintaining soil productivity, minimizing nuisances, and protecting beneficial uses of ground and surface water as recommended in DEQ's reuse guidance manual (DEQ, 2007).

<u>Non-Growing Season</u>

Non-Growing Season (NGS) loading rates should be set based on the soil water holding capacity and climatic conditions as follows:

NGS HLR = AWC + (PPT – ET) = AWC + (Pdef)

Where: HLR = Non-Growing Season Hydraulic Loading Rate (in.)
AWC = Available Water Capacity of the soil (in.)
PPT = NGS Precipitation, November 1st – March 30th (in.)
ET = Evapotranspiration, November 1st – March 30th (in.)
Pdef = Precipitation Deficit (PPT – ET), November 1st – March 30th (in.)

Precipitation deficit values were obtained from the University of Idaho's ET Idaho website for the National Weather Service Station #104457, Idaho Falls FAA Arpt (http://data.kimberly.uidaho.edu/ETIdaho/). Pdef values for a frequent cutting alfalfa crop are used because Eagle Farms land application site will contain an alfalfa-mix crop year-round. Based on the following table, the Non-Growing Season precipitation deficit is (-1.1) inches (meaning precipitation is greater than evapotranspiration). The precipitation deficit values that apply to Eagle Farms site are as follows:

	Non-Growing Season (NGS)					Growing Season (GS)							Totals	
Pdef	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	NGS	GS
mm/day	-0.37	-0.37	-0.30	-0.04	0.19	0.68	3.88	5.11	5.28	4.52	3.05	1.13		
in/mo.	-0.44	-0.45	-0.37	-0.04	0.23	0.80	4.74	6.04	6.44	5.52	3.60	1.38	-1.1	28.5

The soil AWC is 6.2 inches as specified earlier in Section III.C, and the NGS Pdef is (-1.1) inches as specified in the table above, therefore, the NGS Hydraulic Loading rate limit for the Eagle Farms wastewater reuse system is:

NGS HLR = (AWC + Pdef) = (6.2 – 1.1) = 5.1 in/ac per NGS

Eagle Farms' permit application proposes to utilize the two existing 2.6-acre center pivots and return to service another 2.3-acre portion of the previously permitted area. The total acreage available for land application at permit issuance will be 7.5-acres; therefore, the total NGS hydraulic volume Eagle Farms can land apply will be:

NGS HLR = (5.1 inches)x(7.5 acres)x(1 MG/36.827 ac-in) = 1,039,000 gallons

If irrigated uniformly throughout the NGS, Eagle Farms will be able to land apply approximately 207,000 gallons/month to the land application site after the new 2.3-acre field is brought online. **Until then only 5.2-acres is available under the center pivots, so the facility will only be able to apply approximately 144,000 gallons/month during the NGS – equivalent to approximately 1 inch/acre using 5.2 acres.**

<u>Growing Season</u>
Growing Season (GS) hydraulic loading rates to a slow-rate land application system like Eagle Farms are based upon the irrigation requirements of the crops grown on the site. The crops 'treat' the wastewater by consuming the liquid and nutrients within it. The final treatment step to remove the nutrients from the system occurs when the facility harvests and removes the crop tissue from the treatment site. Growing Season wastewater and supplemental irrigation application rates should generally follow the irrigation water requirement of the crop to promote healthy crops with good yields that adequately treat the wastewater applied. Therefore, the growing season hydraulic loading rate specified in the draft permit is

GS HLR = IWR = IR/Ei = Pdef/Ei

Where: IWR = crop Irrigation Water Requirement
IR = crop Irrigation Requirement
Ei = irrigation system application efficiency
Pdef = precipitation deficit, equivalent to the IR.

The total precipitation deficit (Pdef) for the April 1st – October 31st Growing season is 28.5 inches as shown in the Pdef table, above.

Eagle Farms currently uses two full-circle center pivots that are required to use drag tubes year-round as part of their buffer zone mitigation plans. And Eagle Farms has indicated to DEQ their intention to install a solid-set sprinkler system on the 2.3-acre southwest field that they intend to return to service. Based on the recommendations provided in DEQ's reuse guidance manual (DEQ, 2007), staff recommend an irrigation application efficiency (Ei) of 80% be specified for all three fields.

Based on a precipitation deficit of 28.5 inches and an application efficiency of 80%, the permit specifies the total Growing Season (GS) hydraulic loading total of:

GS HLR = (28.5 in/ac.) / (0.80) = 35.6 inches/acre

The total acreage available for land application at permit issuance will be 7.5-acres; therefore, the total GS hydraulic volume Eagle Farms can land apply will be:

GS HLR = (35.6 inches)x(7.5 acres)x(1 MG/36.827 ac-in) = 7,250,000 gallons

At the current wastewater generation rate of approximately 350,000 gallons/month, Eagle Farms will generate approximately 2.45 million gallons during the growing season. Supplemental irrigation water will need to be provided to supply the roughly 7 million gallon irrigation needs of the crop. The permit application indicates Eagle Farms has adequate irrigation water rights available to support the needs of the land application site.

<u>Monthly Wastewater Discharge</u>
Eagle Farms permit application estimates reducing monthly wastewater generation rates to 350,000 gallons/month that will be split and discharged to 2 separate systems, the onsite reuse system and the IBSD sewer. The facility states they will first discharge the automated 10,000 gallons/day to IBSD then manually discharge any remaining wastewater to the reuse system. The permit presents a scenario of 20 working days/month so 200,000 gallons/month will discharge to IBSD and the remaining 150,000 gallons/month to the reuse system. However, the IBSD permit appears to allow Eagle Farms to discharge 10,000 gpd to IBSD every day of the year, so theoretically they could discharge a maximum of approximately 300,000 gallons/month to the sewer assuming a 30-day month (3,650,000 gallons/year).

The maximum volume of effluent that can be discharged to the wastewater reuse system is based upon the per-acre NGS and GS hydraulic loading limitations presented above and is dependent on the acreage utilized. Currently, Eagle Farms only uses 5.2 acres under the 2 center pivots. A 2.3 acre portion of the old site is proposed to be returned to service under this new permit which will bring the total acreage up to 7.5 acres. The maximum permittable monthly hydraulic loading rates

to the reuse system under both scenarios (5.2 vs. 7.5 acres) and the remaining volume that will need to be discharged to IBSD is shown on the following table.

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Estimated Wastewater Generation Rate (gal/month)	350k[1]	350k	350k	350k	350k	350k	350k	350k	350k	350k	350k	350k
Reuse Permit Limit (in/acre)[2]	1.02	1.02	1.02	1.02	1.02	1.00	5.90	7.60	8.10	6.90	4.50	1.70
Reuse Permit Limit @ 5.2 acres (gal/month)	144k	144k	144k	144k	144k	141k	833k	1.073k	1.144k	974k	635k	240k
Remainder to IBSD[3] (gal/month)	206k	206k	206k	206k	206k	209k	0	0	0	0	0	110k
Reuse Permit Limit @ 7.5 acres (gal/month)	208k	208k	208k	208k	208k	204k	1.202k	1.548k	1.650k	1.405k	916k	346k
Remainder to IBSD[3] (gal/month)	142k	142k	142k	142k	142k	146k	0	0	0	0	0	4k

1. The "k" represents thousands. i.e., 350k = 350,000.
2. Reuse permit limits are distributed monthly for interpretation purposes. The NGS permit limit is 5.1 in/ac divided evenly over 5 months (1.02 in/mo.). Monthly GS hydraulic limits vary according to the monthly irrigation water requirement (IWR = Pdef/Ei).
3. IBSD discharge permit limit is 10,000 gallons/day, 365 days/year.

The table above shows that the combined wastewater reuse and IBSD sewer discharge permit limits have the capacity to treat the estimated 350,000 gallons/month if managed properly. During the growing season, the reuse site will be able to treat the entire 350,000 gal/month, and will also require the addition of canal makeup water to meet the irrigation water requirements of the crop. When additional makeup water is needed to meet the irrigation water requirements of the crop, Eagle Farms will provide makeup water by manually activating their canal irrigation pump. The canal pump will add canal water directly into the final wastewater pump station sump. To prevent unnecessarily using up available treatment capacity Eagle Farms must ensure the canal pump will not be activated while the IBSD pump is discharging to the sewer, which would pump canal water directly into the sewer. Perhaps the best prevention is to ensure that the reuse and IBSD discharge pumps won't be operated at the same time under normal conditions.

There are dual wastewater disposal systems at Eagle Farms. To ensure that all wastewater discharge volumes are accurately documented and representative of actual operations, staff recommend that the reuse permit require water balance monitoring at the facility including inflow to the plant, discharge to IBSD, and discharge to the reuse system (in = out). Tracking all inflows (canal and water system) and outflows (reuse and IBSD) will help validate and verify the wastewater volumes generated and the amount discharged to each system. Eagle Farms currently has flow meters and

associated equipment run-time meters installed to allow independent measurement of all inflows and outflows.

D. Constituent Loading Rates

The maximum permittable hydraulic loading limits presented in the previous section, combined with the historical constituent concentrations from Section IV.A of this analysis, are presented in the following table to show what the average and maximum estimated loading rates will be to the reuse system under consideration for this permit. The recommended permit limits are also presented in the table. If Eagle Farms chooses to maximize discharge to IBSD, it would reduce the hydraulic and constituent loading to the reuse site. Thus, the following table represents the maximum or worst-case scenario for loading to the reuse site. Note that the table presents all loading on a per-acre bases. The total volumes and total pounds will vary depending on the number fields and acres used by the facility, but the per-acre rates remain constant.

Constituent Loading Rates.

Parameter	Average Loading Rate[1]	Range[2]	Recommended Permit Limits
WW Application Depth (in/ac-yr)[3]	40.7	n/a	5.1in/ac for NGS IWR for GS
WW Application Volume (MG/ac-yr)[4]	1.105	n/a	n/a
Total Nitrogen Loading (lb/ac-yr)[5]	237	107-367	150% of Crop Uptake
Total Phosphorus Loading (lb/ac-yr)[5]	79	33-126	No Limit
Total Dissolved Solids Loading (lb/ac-yr)[5]	7,300	3,300-11,200	No Limit
NVDS Loading (lb/ac-yr)[5]	4,900	1,400-8,400	No Limit
COD Loading (lb/ac-day, annual avg.)[6]	15	6-24	50 lb/ac-day, each season

1. Average Loading Rates calculated using the average constituent concentrations shown in Section IV.A.
2. Loading Rate Range calculated using the standard deviation of the constituent concentrations shown in Section IV.A.
3. Annual WW Application Depth = NGS + GS permit limits = (5.1 in/ac + 35.6 in/ac) = 40.7 inches/year.
4. (in/ac) = (MG) x (36.827 ac-in / MG) / (acres). MG = million gallons.
5. (lb/ac) = (MG) x (mg/L) x (8.34) / (acres)
6. (lb/ac-day) = (lb/ac) /365 days.

The nitrogen load should be adequately treated and removed if a high quality crop with good yields is grown and harvested. Staff recommends the permit specify a nitrogen loading limit of 150% of crop uptake. Phosphorus loading is higher than required by the crop, but not at levels that cause concern at this time. Because this site does not have any surface water phosphorus concerns or impacts, and because there is no ground water quality standard for phosphorus, a phosphorus loading limit is not recommended at this time. COD loading is low and does not raise concerns about ground water impacts or nuisance conditions. Staff recommends the standard seasonal average COD loading rate of 50 lbs/acre-day be specified for both seasons. Salt loading (TDS, NVDS) is high and raises concern. However, the Ground Water and Soil Investigation (Wood, 2012) included some basic ground water mixing models indicating wastewater discharge volumes up to the maximum permit limits

will not impact ground water concentrations of salts due to the properties of the Snake River Plain Aquifer under the site, including high hydraulic conductivity. The monitoring well installation and limited sampling that occurred during the GWSI seem to support the modeling conclusions as the historical overloading does not appear to have impacted salt concentrations in the local aquifer. Dissipation of high wastewater loading rates into the fast moving aquifer without impacting ground water concentrations has occurred at other facilities in the area, so it's not unheard of. Since hydraulic loading rates under this permit will be significantly less than what has occurred in the past, and the limited ground water data indicate past activities may not have impacted the aquifer, staff does not recommend any salt loading limits in the new permit at this time. However, there isn't enough ground water monitoring data at this location to say without a doubt that the high salt loading will not be a concern. If ongoing ground water monitoring efforts show that ground water impacts have, or begin to occur, DEQ may issue a permit modification at that time implementing a reduced NVDS loading limit to address the issue.

V. Site Management

Eagle Farms permit application package included a revised Plan of Operations (Forsgren, 2012) and a Quality Assurance Project Plan (Eagle Farms, 2012). Both plans are dated August 2012 and were submitted to DEQ in September 2012. The plans describe the operation, maintenance, monitoring, and management of the revised wastewater reuse operations that are being considered for this permit. Site management plans are included in the Plan of Operations and are briefly discussed below. Staff recommend both plans be revised to incorporate the requirements of the new permit and re-submitted after permit issuance. The purpose of the re-submittal is to incorporate the requirements of the new permit and to make corrections where needed. One of the most pressing needs is for Eagle Farms to coordinate the monitoring, calculations, and reporting requirements presented in both plans. Currently, these 2 plans present inconsistent proposals and procedures for monitoring constituents and frequencies, as well as the calculation and reporting methodologies. A brief discussion of the site management and quality assurance plans follows.

A. Buffer Zones

Eagle Farms' land application site is located on the southern portion of their property. Actual buffer distances, fencing, and posting are compared against distances recommended in the Reuse Guidance Manual (DEQ, 2007) because the Recycled Water Rules IDAPA 58.01.17 do not specify or require buffer distances for industrial reuse facilities.

Information presented in the permit application (Equus, 2012), Plan of Operations (Forsgren, 2012) and the Ground Water and Soil Investigation (Wood, 2012) indicate the following buffer zones:

Eagle Farms Buffer Zones.

	Guidance Buffer Recomendations	Actual Reuse Area Buffer
Public Water Systems	1,000 ft	1,935 ft (downgradient)
Private Water Supply Wells	500 ft	78 ft[1] (non-consumptive) 950 ft[1] (consumptive)
Inhabited Dwellings	300 ft	80 ft
Permanent or intermittent surface water, other than irrigation ditches and canals	100 ft	4 ½ miles (Snake River)
Nearest Irrigation Ditches/Canals	50 ft	50 ft
Areas Accessible to the Public	50 ft	30 ft
Fencing	Recommended	6' pvc privacy along homes (east), Chain link along school (south), Barb wire along canal (west), Open to facility (north)
Posting	Recommended	Every 500 ft around application area perimeter.

1. The potato storage cellar well is located 78 ft down-gradient of the north pivot, but it is NOT used for human consumption. The well serves the storage cellar's climate control system only. The nearest domestic well used for human consumption is Eagle Farm's on-site domestic well at the truck shop, approximately 950 ft down gradient of the reuse site.

Mitigation measures employed at Eagle Farms include: 6-ft tall solid pvc privacy fences between the neighbor's backyards and the land application system, a new row of closely-spaced poplar trees on Eagle Farm's side of the fence, drag tubes on all center pivot sprinkler heads to prevent spray drift, and control structures (berms) around the perimeter of the entire land application site to prevent runoff. Staff recommend the permit require drag tubes be used year-round on the pivots due to the proximity to the homes. The new irrigation system for the new 2.3 acre southwest field will also require spray drift mitigation due to this field's proximity to the elementary school to the south and the irrigation ditches to the west. Because the southwest field will be brought back online, staff recommend a compliance activity requiring additional runoff control structures around the perimeter of each field to contain all wastewater on each individual field and prevent its migration toward the containment berms in southwest corner as it does now. The mitigation measures appear to be acceptable for operation of this reuse system, given the low strength of the potato washing water at this facility.

The permit application states the nearest public water system are the Falls Water wells 1,935 feet south of the land application site; however Eagle Farms has two public water system wells on site, and these two PWS wells are approximately 1,100 feet north of the reuse site. The unexpected northerly ground water flow presented in the GWSI (Wood 2012) places the Eagle Farms PWS wells directly down gradient of the reuse site. The Falls Water wells are apparently up-gradient and thus not affected by Eagle Farms operations. Data presented in the GWSI, which included a Well Location Acceptability Analysis, concluded Eagle Farms PWS and other wells do not show any significant impacts from wastewater reuse system, and that all wells are currently 'acceptable.'

The nearest area accessible is the school access road and parking lot along the southern boundary of Eagle Farms reuse site. A 4-ft high chain link fence is located approximately 20 feet north of the road. The row of new poplar trees is on the north side of the fence, followed by the runoff berm that is approximately 4-ft high and 10- to 15-ft wide. So the realistic separation distance between the public road and the actual application area is approximately 40-45 feet. Recall that the application area in question is a center pivot with drag tubes, so there is no spray drift concerns for this field.

B. Runoff

The Runoff Management Plan presented in the most recent Plan of Operations is an outdated and un-approved version from Equus International that needs to be replaced with the more recent, September 2011 version created by Forsgren Associates and approved by DEQ. Forsgren's September 2011 Runoff Management Plan, approved by DEQ, was submitted as part of Eagle Farm's Interim Plan of Operations. The plan included the construction of runoff containment berm around the perimeter of the entire 9.7-acre field previously used for land application (Eagle Farms is currently using only 5.2-acres of the field with the two center pivots. The acreage will be expanded to a total of 7.5 acres under this new permit). The natural contour of the site, although relatively flat, allows runoff to migrate toward the southwest corner, where the 2.3-acre 'expansion' site will be returned to service under this new reuse permit. Without changes to the runoff control system, the southwest field will receive both the wastewater applied directly to it, as well as all runoff from the two center pivot fields, which will likely cause hydraulic overloading on this field. As described earlier, Eagle Farms has made significant changes to its in-plant process and greatly reduced the volume of wastewater generated at this facility. The large volumes of runoff generated during past operations are no longer expected. Nevertheless, year-round land application practices can still result in ice buildup that has the potential to run off and migrate to other locations during quick-thaw events. Therefore, staff recommend a compliance activity in the permit requiring additional runoff containment berms around each individual management unit to contain and control runoff on each field to prevent migration and overloading at other locations.

C. Waste Solids

A revised (Revision #3) waste solids management plan was submitted by Equus International in August 2011 and is included in the most recent (August 2012) Plan of Operations submitted by Forsgren Associates. The revised plan was approved by DEQ on September 9, 2011. The plan requires the sedimentation basins be cleaned out at least once every 20 days. Mud is not allowed to remain in the basins longer than 20 days to assist with nuisance odor controls at the facility. All mud dredged from the sedimentation basins is combined with 'dry' tare dirt, cull potatoes, and other dirt and sand washed off the potatoes during the in-plant processes, placed in a dump truck, and transported to the approved offsite disposal facility in the foothills east of Idaho Falls. The waste solids disposal property is owned by Eagle Farms and

located off of Bone Road, approximately six miles east of the facility at T2N R39E Section 22 NE ¼ NW ¼ SE ¼ as shown in the figure below. It is located in a rural agricultural area off Bone Road, east of Idaho Falls.

The waste solids plan indicates the facility generates a combined 13 yd^3/day of waste solids consisting of 8 yd^3/day tare dirt, 3 yd^3/day in-plant waste 'sludge' (sand and dirt washed off potatoes), and 2 yd^3/day sedimentation basin 'sludge' (sand and dirt). Cull potatoes are negligible. Tare dirt and in-plant separated dirt and sand will be shipped to the approved disposal site every day of operations (typically Monday through Saturday). Dredging and transport of mud from the sedimentation basins to the disposal site will take place at least once every 20 days. Waste solids will be stockpiled and dumped and lifts as thinly as possible to facilitate further drying. The plan anticipates that the material can be dumped thinly enough that subsequent spreading or leveling by grading equipment will not be necessary. Given the distance from the nearest home (more than a mile) Eagle Farms does not anticipate the need for any nuisance odor treatment chemicals. During winter operations, Bone Road will be maintained by the county. The private 'driveway' distance from the county road to the disposal site is approximately 0.4 miles and will be maintained by Eagle Farms personnel as necessary to enable continuous winter operations.

Source: Figure 1 from Eagle Farms Waste Solids Management Plan, Report # EF-WSMP-08-2011 Rev. 3, August 2011, Equus International Environmental.

D. Nuisance Odors

Eagle Farms most recent nuisance odor management plan was prepared by Equus International Environmental, is dated April 2012, and is included in the most recent (August 2012) Plan of Operations submitted by Forsgren Associates. In general, historical odor complaints were caused by the old earthen settling ponds that contained all the settled mud for an extended period of time. The earthen lagoons were only dredged once per year to make room for the next harvest and processing/packaging season. The long residence time caused both the wastewater and sediments to turn anaerobic which created significant odors at the facility. Odors were greatest when the lagoons were drained and the 'sour' anaerobic mud was dredged and removed.

Through the enforcement and consent order process of the past couple years, Eagle Farms demolished and removed the old earthen lagoons and installed smaller concrete sedimentation basins at a different location farther away from the homes. The changes seem to have eliminated the nuisance odors at the facility. By operating in accordance with the approved waste solids management plan (hauling tare dirt every day and not allowing mud to remain in the new sedimentation basins for more than 20 days), Eagle Farms is able to maintain an aerobic wastewater system that does not generate the nuisance odors of the past.

Eagle Farms odor management plan includes a list of practices the facility has incorporated to prevent, identify, track, and respond to nuisance odors. The plan appears to be adequate at this time.

E. Grazing

Grazing of domestic livestock on the wastewater reuse site has not been proposed by Eagle Farms. The draft permit does not allow livestock grazing on the reuse site.

F. Salts

As discussed in Section IV.D, salt loading (TDS, NVDS) is high and raises concern. However, the Ground Water and Soil Investigation (Wood, 2012) included some basic ground water mixing models indicating wastewater discharge volumes up to the maximum permit limits should not significantly impact ground water TDS concentrations. The monitoring well installation and limited sampling that occurred during the GWSI seem to support the modeling conclusions as the historical overloading does not appear to have impacted salt concentrations in the local aquifer. Soil salt levels have also not risen to a level of concern. Therefore, staff does not recommend any salt loading limits or salt loading management plans at this time. If ongoing ground water monitoring efforts show that ground water impacts have or begin to occur, or if soil salt levels rise to levels of concern, DEQ may issue a permit modification at that time requiring a salt loading correction plan.

G. Lagoon Seepage

The concrete sedimentation basins were seepage tested during the summer and early fall of 2010. Recall the sedimentation system is a redundant set of dual basins (two sets of 2 basins). Each set of concrete basins were tested as single units. The allowable limit specified in the previous permit for the newly constructed concrete basins is 0.125 inches/day. The test results were:

North Basins = 0.008 inches/day
South Basins = 0.068 inches/day

DEQ typically recommends that industrial wastewater lagoons be tested at the same 10-year frequency as municipal wastewater lagoons. The next seepage test should take place in 2020, assuming no changes are made to the basins that would affect their integrity or seepage rate. Because the new permit will expire in 2018, seepage test will not be needed until the next permit cycle. However, Section 3.5 of the draft permit does specify that additional seepage testing during this permit cycle may be required if there is a change of condition to any of the basins that may affect their permeability including, but not limited to, cracking, basin modification or repair below the high water line, or basin replacement.

H. Quality Assurance / Quality Control

A revised Quality Assurance Project Plan (QAPP) was submitted by Eagle Farms as part of the permit application package. The most recent QAPP submitted by Eagle Farms to DEQ is dated August 27, 2012. A review of the QAPP indicates that changes and corrections will be necessary to adjust the sampling and monitoring requirements to meet the new permit. Coordination between the sampling, monitoring and reporting requirements presented in both the QAPP and the Plan of Operations is also necessary as the two documents currently present contradictory and inconsistent information. Staff recommend the monitoring and reporting sections of both documents be revised to incorporate the terms and conditions of the new permit, and to make corrections where necessary. Staff recommend the QAPP be revised within 60 days of permit issuance to ensure that all monitoring required by the new permit is obtained and evaluated in accordance with an accurate QAPP.

VI. Monitoring

The August 2012 Plan of Operations (PO) and the August 27, 2012 Quality Assurance Project Plan (QAPP) present inconsistent proposals for monitoring and calculating hydraulic and constituent loading to the land application site. Both documents will need to be revised to make corrections and incorporate the requirements of this new permit. The follow sections briefly describe the proposals in the PO and QAPP and present DEQ's monitoring, calculation, and reporting recommendations for the new permit.

A. Hydraulic Loading

Both the Plan of Operation and the QAPP propose to only measure the total daily combined hydraulic volume (wastewater + supplemental irrigation water) pumped to the wastewater reuse site, then compiled monthly and seasonally. Totalized volumes for the NGS and GS are then proposed to be divided by the total acreage under land application to determine compliance with the permit's hydraulic loading limits. Neither plan proposes to monitor or track the volumes discharged to IBSD to verify the facility's water balance or compliance with IBSD's 10,000 gpd permit limit.

The proposal does not account for Eagle Farms manual, independent management and operation of each of the 3 separate fields being permitted (2 pivots and the 2.3-acre field that will be returned to service with a still-undetermined irrigation system). Calculating a total combined hydraulic application rate to the total permitted reuse site does not provide a valid representation of the true, real-world operation and application rates to each field. The facility's wastewater generation rate can vary greatly throughout the year. Irrigation water requirements also vary significantly throughout the growing season. Calculating a seasonal per-acre application rate using the entire acreage would not show if all 3 irrigation systems are being used equally, and would not show if each field is being irrigated substantially following the irrigation water requirements of the crop during the growing season.

There is a flow meter on the canal pump that pumps into the wastewater pump house vault to measure supplemental irrigation water brought into the pump station. A flow meter is installed on the wastewater discharge line to the reuse site. A meter is installed on the discharge line to IBSD. Hours meters are also installed on both center pivots so Eagle Farms can calculate flows to each pivot. And the future irrigation system for the 2.3 acre expansion field will require a flow meter to track all flows to that field.

Independent tracking of wastewater and supplemental irrigation water to each management unit is necessary to accurately calculate the wastewater constituent loading to each field. Therefore, DEQ recommends daily independent tracking and monthly calculation of both wastewater and supplemental irrigation water to each management unit, as was required in the previous permit. The draft permit specifies independent daily monitoring of wastewater and supplemental irrigation water volumes to each management unit. Daily flows to each field should be recorded, and monthly and seasonal application rate (in/ac) totals to each field should be calculated and presented in the annual report for review.

B. Wastewater Monitoring

The Plan of Operation and the QAPP propose inconsistent wastewater sampling locations and constituents. The PO proposes to collect wastewater samples from a sump inside the plant, upstream of the sedimentation basins. The QAPP proposes to collect wastewater samples from a sampling port "near" the wastewater pump house. It is not clear where, exactly, this proposed sampling port is located. DEQ recommends all wastewater compliance samples, with the exception of BTEX (monitor BTEX immediately downstream of in-plant wastewater oxidation system), be collected as grab samples from within the wastewater effluent sump in the pump house downstream of the sedimentation basins. Samples from this location will accurately represent the water quality of the effluent discharged to both the reuse system and IBSD as the pumps for both systems draw from this sump. The wastewater retention time in the concrete sedimentation basins is expected to be on the order of days instead of hours, so a 24-hour composite sampler is not necessary. Grab samples collected from the sump should adequately represent the wastewater quality of the system. Because supplemental irrigation water from the canal can also be discharged into this sump, the permit specifies that wastewater samples collected from the sump must be 100% wastewater and not diluted with canal water. The updated QAPP and Plan of Operations will need to reflect this important requirement.

Wastewater monitoring proposed in the Plan of Operations includes weekly TDS (stored then composited into one monthly compliance sample); monthly TDS, VDS, NVDS, TKN and NNN (nitrate + nitrite nitrogen); and semi-annual (January & July) COD, NH_3, P, Cl, K, pH, Fe, Mn, Al, and Conductivity. Regarding BTEX, the PO states that continuing efforts will be made to collect and analyze wastewater samples for BTEX, but the PO doesn't identify the monitoring frequencies or locations.

The QAPP proposes monthly BTEX, TDS, VDS, NVDS, TKN, NNN and semi-annual (January & July) COD, P, Cl, K, pH and Conductivity. The QAPP recommends monthly monitoring of Fe, Mn, and Al instead of semi-annually as recommended in the PO.

The permit application (and Section IV.A of this staff analysis) presents historical monitoring data results showing the highly variable nature of the wastewater quality. The data show some constituents vary by more than 60% over time. The volume and wash water constituent concentrations in this industry vary based on the type of soils (sand vs. clay) and fertilizer residuals (sand vs. clay) stuck to the potatoes delivered to the facility. Note that currently, all wastewater data is representative of the 'old' high-volume wash system at Eagle Farms. The water quality effects of the water reductions and the new in-plant systems that reduce wastewater volume are yet to be determined. Staff recommend monthly wastewater monitoring continue for: pH, electrical conductivity, TKN, nitrate nitrogen, total phosphorus, potassium, COD, TDS, VDS, NVDS, and BTEX.

C. Supplemental Irrigation Water Monitoring

Both the Plan of Operations and the QAPP propose monitoring supplemental irrigation water from the irrigation canal once per year in July. Both plans propose sampling for: COD, TDS, VDS, NVDS, total Kjeldahl nitrogen (TKN), nitrate+nitrite nitrogen, ammonia nitrogen, total phosphorus, potassium, chloride, iron, manganese, aluminum, conductivity, and pH. A comparison of the average wastewater and supplemental irrigation water quality is as follows:

Constituent	WW Average[1]	SIW (2009)[2]	SIW (2010)[2]
COD (mg/L)	582	<20	<20
TKN (mg/L)	25	9.35	0.3
Ammonia (mg/L)	4.7	<0.05	0.07
Nitrate + Nitrite (mg/L)	0.65	<0.3	<0.3
Total Phosphorus (mg/L)	8.6	<0.05	0.06
Potassium (mg/L)	86.4	2.05	1.7
Chloride (mg/L)	45.2	14.4	7.15
TDS (mg/L)	789	380	210
VDS (mg/L)	256	350	90
NVDS (mg/L)	531	30	20
Conductivity (uS)	799	366	313
pH	7.15	8.61	8.42

1. The average wastewater concentrations presented in the permit application (Equus 2012) and Section IV.A. of this analysis.
2. Two supplemental irrigation water samples were collected on 10/21/2009 and 6/28/2010 and presented in Eagle Farms 2010 Annual Report (Equus, 2010).

The data in the table above show that COD, ammonia, nitrate+nitrite, and phosphorus are either at or below detection limits and their contribution to the constituent loading to the wastewater reuse site, in comparison to the wastewater effluent, is negligible. Staff does not recommend continued sampling of these parameters in the supplemental irrigation water. Additionally, the DEQ concurs with the once per year supplemental irrigation water sampling in July and recommends the following parameters be sampled and reported: total Kjeldahl nitrogen (TKN), potassium, chloride, total dissolved solids (TDS), volatile dissolved solids (VDS), non-volatile dissolved solids (NVDS), conductivity, and pH.

D. Soil Monitoring

Both the Plan of Operations and the QAPP recommend soil sampling once per year, in April, for the following constituents: pH, organic matter, nitrate nitrogen, ammonium nitrogen, plant available phosphorus, potassium sodium adsorption ratio (SAR), electrical conductivity, DTPA iron, DTPA manganese, and DTPA aluminum. The only difference is the PO proposes monthly monitoring of iron, manganese and aluminum while the QAPP proposes monitoring these 3 parameters only during the first and last year.

Staff mostly concur with the suggested monitoring parameters. However, now that a long-term crop is being established on the reuse site that consists primarily of a nitrogen fixing legume (alfalfa), it is recommended that organic nitrogen be added to the annual monitoring because the mineralization rate of the organic N will be necessary to both evaluate nitrogen buildup in the soils, and any supplemental fertilizer recommendations.

Eagle Farms only recently began monitoring soils in 2010, under the high-load, no-crop conditions during interim operations. A baseline of soil quality has not yet been established. Now that hydraulic and nutrient loading rates are expected to be at a lower, sustainable level, and a long-term crop is becoming established, additional changes and trends in soil quality may occur prior to reaching a 'steady state." Therefore staff recommend iron and manganese also be monitored yearly.

Staff recommend monitoring the following soil parameters once per year in April, prior to any supplemental fertilizer applications: pH, % organic matter, organic nitrogen, nitrate nitrogen, ammonium nitrogen, plant available phosphorus, potassium, DTPA iron, DTPA manganese, electrical conductivity, and Sodium Adsorption Ratio (SAR). Phosphorus should be analyzed using the Olsen Method due to the high pH.

E. Ground Water Monitoring

The Plan of Operation proposes sampling only the three (3) new monitoring wells. The PO proposes quarterly monitoring of depth, elevation, total dissolved solids (TDS), volatile dissolved solids (VDS), non-volatile dissolved solids (NVDS), total Kjeldahl nitrogen, nitrate nitrogen and nitrite nitrogen. The PO also proposes semi-annual monitoring of aluminum, iron, and manganese each January and July.

The QAPP proposes quarterly sampling from seven (7) wells including the three monitoring wells, Public Water Supply Well #1 East, Public Water Supply Well #1 West, the Truck Shop Well, and the Potato Cellar Mister Well (not used for human consumption). The quarterly constituents include the same parameters as the Plan of Operations plus pH, conductivity, potassium, and BTEX. The QAPP does not include ground water depth measurements, elevations, or contour mapping.

Ground water monitoring is a new activity at Eagle Farms and an accurate understanding of ground water quality impacts at the site has not been fully determined. The presence of BTEX has not been clearly established yet, and any variability in depths, directions, and concentrations are currently unknown. Elevated iron concentrations were found in one of the down-gradient wells during the GWSI.

Three new, dedicated monitoring wells were constructed as part of the Ground Water and Soil Investigation and are properly constructed and screened to allow sampling at the uppermost water layer where wastewater percolation and mixing is most likely to occur. It is desirable to have a minimum of one up-gradient well to determine

background concentrations entering the site, and at least 2 down-gradient wells to capture possible variability of any potentially impacted ground water 'plumes' leaving the site. The 3 new monitoring well locations were selected based on the known southerly direction of the regional aquifer. However, as discussed earlier, after the wells were installed and measurements were taken, it was determined that the localized ground water may actually flow in a northerly direction. So monitoring well MW-1, positioned along the northernmost property boundary, is the only dedicated 'down-gradient' well at this time and it is unclear if it is properly positioned to accurately evaluate ground water impacts from the wastewater reuse system. Since little is currently known about the localized aquifer depth, direction of flow, and water quality under Eagle Farms, DEQ recommends that the four on site domestic and public water system pumping wells also be sampled at the same frequency as the three monitoring wells for the next permit cycle. Data from the 7 wells will be used to establish the baseline of ground water quality and direction of flow at the site.

Although the PO and QAPP propose quarterly sampling, January well sampling tends to be very difficult in this area due to snow and historically very cold temperatures at that time of year. For consistency with other permitted facilities in the region, staff recommend ground water monitoring be performed 3 times per year in April, July, and October.

Staff recommend ground water monitoring three times per year for depth, elevation, conductivity, pH, nitrate nitrogen, total phosphorus, total dissolved solids, iron (total and filtered), manganese (total and filtered), and BTEX (Benzene, Toluene, Ethyl benzene, and Xylene).

The draft permit states that all 7 wells are "Compliance Wells." The meaning of this statement is that data from all 7 wells will be used collectively to evaluate ground water quality under the site, and determine compliance with the Ground Water Quality Rule.

F. Crop Uptake

The Plan of Operations recommends measuring crop yield using on-site scales, and using "well established table values" to estimate crop tissue nutrient content. The PO doesn't indicate if crop yields from individual harvests on individual management units will be measured separately or combined into one total annual yield for the entire site. The PO also doesn't identify the table values proposed for use, nor does it explain or justify how a table value for a single species crop would be representative of the mixed-species crop recently planted at Eagle Farms.

The QAPP proposes to record the harvest methods (bales, green-chop, etc.) and yield from each harvest using either the total measured weight or the average bale weight method using the on-site truck scale. It is not clear if the intent is to determine total yield for the entire site or individual yields from each management unit. Unlike the PO, the QAPP proposes to analyze crop tissue samples rather than use table values,

and recommends analysis for total Kjeldahl nitrogen, nitrate nitrogen, total phosphorus

The mixed-seed crop is new and not fully established at Eagle Farms. Through 2009 there were no crops planted on the wastewater reuse fields. The crop was planted in 2010, but the crop remained sparse and could not be harvested according to the 2010 annual report (Equus, 2011). In 2011, the crop was still not well established and the limited yield was not large enough to sample according to the facility's 2011 annual report (Equus, 2012). Nitrogen loading to the site is quite variable and has been high (> 350 lb/acre) as presented in Section IV.D. of this staff analysis. The wastewater generation rates, management of the wastewater reuse site, and the future loading rates to each field under this new reuse permit, are significantly different than the historical operations that occurred through early 2012, and it is unknown how the changes to the operation of the reuse system will alter future crop yields.

The new crop has not matured and site specific yields and nutrient uptakes have not yet been established. The expected crop yields of 7 dry tons/acre presented in the permit application appear to be unrealistically high and are almost double the historical alfalfa yields of 4-5 tons/acre for Bonneville County according to data from the USDA National Agricultural Statistics Service. And DEQ is not aware of a specific established table that would be appropriate or representative of the mixed-seed crop with yet undocumented yield and nutrient uptake potential. The 2.3-acre 'expansion field' being returned to service will also have a different type of irrigation system which will require different management techniques and irrigation rates, and will likely result in crop yields and nutrient uptake rates different from the center pivot fields.

Due to all of the changes to this facility's wastewater generation rates and management of the reuse system that occurred under the consent order process the past couple years, the wastewater reuse system being evaluated for this permit can still be considered 'new' and in a state of change. Therefore, DEQ recommends individual crop yield measurements and tissue analysis for each harvest from each management unit. Individual yields, tissue analyses, and nutrient uptake calculations for each management unit should be determined, and subsequently added to determine the cumulative annual yield and uptake rates for each independent field. Both wet and dry yields should be independently measured for each harvest on each field. Tissue samples should be collected and analyzed for total Kjeldahl nitrogen, nitrate nitrogen, total phosphorus, and ash. Individual crop yields and nutrient uptake rates from each harvest should be presented and also combined to show the total annual yield and nutrient uptake and removal rates for each management unit.

G. Meteorological Monitoring

Meteorological monitoring is not recommended for this facility. Long term historical climate conditions from the National Weather Service's "Idaho Falls FAA Arpt" weather station #104457 (available at www.wrcc.dri.edu/summary/climsmid.html) are suitable for evaluations at Eagle Farms. Evapotranspiration and consumptive irrigation water requirements for the site can also be reasonably determined using the 30-year statistical summary data from the same weather station presented through the University of Idaho's ETIdaho website (http://data.kimberly.uidaho.edu/ETIdaho). The draft permit specifies that growing season hydraulic loading rates to each management unit shall substantially follow the irrigation water requirements of the crop using data from the ETIdaho website for the "Idaho Falls FAA Arpt" station.

H. Calculation Methodologies

DEQ will use the following methods to determine permit compliance. DEQ recommends the revised plan of operations and QAPP present the specific meters, methods, and equations that will be used.

Hydraulic loading:
Hydraulic volumes of wastewater and supplemental irrigation water to each individual management unit should be recorded daily using the flow meters and hour meters current installed. Daily volumes should be compiled and reported in monthly, seasonal, and annual volumes.

Per-acre hydraulic application depths should also be documented daily and compiled monthly, seasonally, and annually for each individual management unit based on the actual acreage irrigated in a particular season or year. Hydraulic volumes on each management unit should be converted to application depths as follows:

Application Depth (inches) = (gallons applied) / (acres used x 27,154 gal/ac-in)

Constituent loading:
Wastewater constituent loading to each individual management unit should be calculated and compiled into monthly, seasonal, and annual totals. Monthly loads should be the product of the monthly volume applied to the individual management unit and the monthly compliance sample result from the analytical laboratory, divided by the actual acreage irrigated on the particular management unit as shown below. The monthly loads for each constituent can then be added together to determine seasonal and annual loads:

Monthly Constituent Loading (lb/acre/month) = [(volume applied in Million Gallons/month) x (monthly constituent concentration in mg/L) x (8.34)] / (Management Unit acres utilized).

Helpful unit conversions include the following:

- 1 mg/L = 8.34 lb/MG (pounds per million gallons)
- 1 MG (million gallons) = 36.827 acre-inches = 3.069 acre-feet

Crop Yield:
Crop yields should be individually measured for each cutting on each management unit using the on-site truck scale. Either total weights (for grains or green-chop) or average bale counts (for baled grass, hay or straw) as described in the QAPP are acceptable. Both wet-basis and dry-basis yields should be reported for each individual yield. The individual dry-basis yields from each harvest or cutting on each management unit (MU) should be added together to report the total seasonal yield for each MU. The per-acre yields for each management unit will be determined as follows. Both wet basis and dry basis yields can be calculated in the same manner:

Management Unit yield/acre = (MU yield in lbs) / (MU acreage utilized)

Nutrient uptake and removal:
Total and per-acre nutrient uptake from each individual yield for each individual management unit should be calculated on a dry-bases by converting the as-harvested wet yield to a dry yield based upon the moisture content of the crop at the time of harvest. The total dry-basis constituent uptake (in pounds) can then be converted to a per-acre uptake when divided by the actual acreage utilized on the individual management unit.

Crop nitrogen uptake permit compliance:
For this permit cycle, DEQ recommends compliance with the nitrogen loading requirement of 150% of crop uptake by comparing current year nitrogen loading and crop nitrogen removal rate on each individual management unit. Multi-year median values are not appropriate since the crop is new and has no historical yield values that can be used. Similarly, there are no table values that DEQ is aware of that present specific data for the custom-blend seed mixture used at this facility. So the nitrogen loading limit for each individual management unit should be calculated on a dry-basis as follows:

Nitrogen Loading Limit, lb/ac = (season total crop nitrogen uptake, lb/ac x 1.5) / (season total wastewater nitrogen loading, lb/ac).

VII. Operator Licensure

Eagle Farms is an industrial wastewater facility. Operator licensure is not required.

VIII. Compliance Activities

A brief summary of the Compliance Activities discussed in this analysis and recommended in the new permit include the following:

1. Within 60-days of permit issuance, Eagle Farms must prepare and implement a revised Quality Assurance Project Plan (QAPP) that incorporates all monitoring and reporting required in the new permit. A copy of the revised QAPP along with written notice from Eagle Farms that the facility has implemented the revised QAPP must be submitted to DEQ within sixty (60) days of permit issuance. The QAPP needs to be submitted within 60 days to ensure the facility will be collecting valid, accurate data that supports compliance with the new permit.
2. The current runoff management system allows runoff from the 2 existing center pivots to accumulate behind the berms in the southwest corner of the site. Since the southwest corner will be returned to service under this permit, the additional runoff from the pivots is not desired. A compliance activity has been added requiring additional berms around each individual management unit to contain and control all wastewater and runoff on its own field.
3. The Truck Shop and Potato Cellar Mister Wells were not surveyed or utilized to determine ground water depths and direction of flow during the Ground Water and Soil Investigation. Eagle Farms proposes using these additional wells for monitoring purposes in the new permit. A compliance activity has been added requiring an elevation survey of the well head and establishment of the permanent measurement point on the well head that will be used to determine all future ground water depths in each well. The survey results for these 2 wells should be added to the well survey table originally presented by Wood in the 2012 GWSI, and incorporated into the future Plan of Operation and Quality Assurance Project Plan. The revised wellhead survey table must also be submitted to DEQ.
4. Submit an updated Plan of Operations that incorporates the requirements of the new permit and accurately reflects the current (not historical) wastewater generation, treatment, and disposal operations and management at Eagle Farms. The plan should include the most recent version of all site management plans. And all quality assurance and data processing information presented in the plan must also be consistent with the QAPP. Since a Plan of Operation is a working document for the operator and not a permit application, it should also be edited to correct errors and remove all permit application ‘proposals’ currently listed throughout the plan. The plan should also be constructed in the form of a manual that is designed for quick reference and day-to-day use by the operators. In consideration of all the very recent pro-active changes Eagle Farms has made to the wastewater generation, treatment and disposal systems at this facility, DEQ recommends allowing time for Eagle Farms to finish optimizing and learning how to efficiently operate the new wastewater generation, treatment, and discharge

systems (including IBSD sewer discharges and the wastewater reuse system). Allowing the remainder of the current non-growing season and much of the 2013 summer growing season is recommended. So DEQ recommends the revised Plan of Operation by submitted to DEQ by October 31, 2013, which is the end of the both the growing season and the 2013 reporting year. Eagle Farms can then begin the 2014 operating year using the newly revised Plan of Operation.

5. One of DEQ's recent changes in the wastewater reuse permitting program to improve permit renewal efficiencies is to require a pre-application workshop with the permittee 12-months in advance of permit expiration. The purpose of the pre-application workshop is to discuss the compliance status of the facility, any expected changes by the facility or by DEQ that might be forthcoming during the next permit cycle, and to specifically identify all of the information that the permittee will be required to submit as part of their permit renewal application package 6-months prior to permit expiration. The draft permit specifies a compliance activity requiring Eagle Farms to schedule this workshop with DEQ by October 31, 2016 if they intend to continue land applying wastewater beyond the expiration date of this permit, which will be October 31, 2017.
6. To ensure that Eagle Farms submits the next permit renewal application package to DEQ at least 180-day prior to permit expiration, as required by IDAPA 58.01.17.400.01, a compliance activity has been added requiring Eagle Farms to submit their permit renewal application package – that meets the requirements specified at the pre-application workshop – no later than April 30, 2017. This requirement is predicated by Eagle Farms decision to continue operating the wastewater reuse system. If Eagle Farms chooses to discontinue reuse and instead discharge all their industrial wastewater to the IBDS sewer system, then permit renewal won't be necessary and the reuse system will need to be closed in accordance with the closure requirement specified in IDAPA 58.01.17.801.

Recommendation

Staff recommend that the draft wastewater reuse permit be issued. The permit specifies hydraulic loading limits and establishes monitoring and reporting requirements to evaluate system performance and determine permit compliance.

References

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Equus, 2012, Eagle Farms Wastewater Reuse Permit Application Technical Report, Report # EF-WRATR-08-2012 Rev. 3, Equus International Environmental, August 2012.

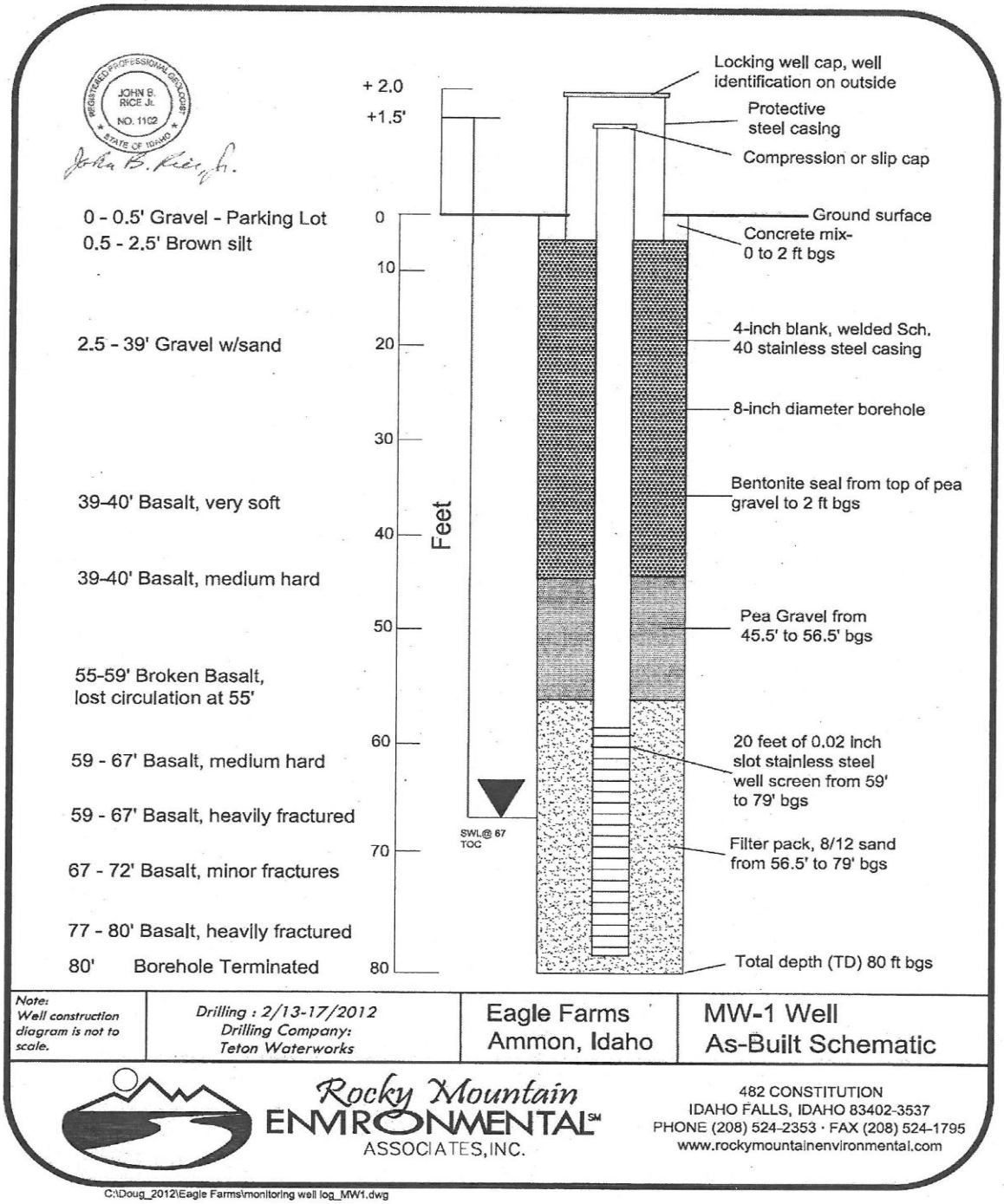
Equus, 2012, Eagle Farms 2010/2011 Annual Wastewater Reuse Site Performance Report, Report # EF-AWRSPR-02-2012 Rev. 2, February 2012.

Equus, 2011, Eagle Farms Interim Plan of Operations, Report # EF-IPO-08-2011 Rev. 3, December 2011.

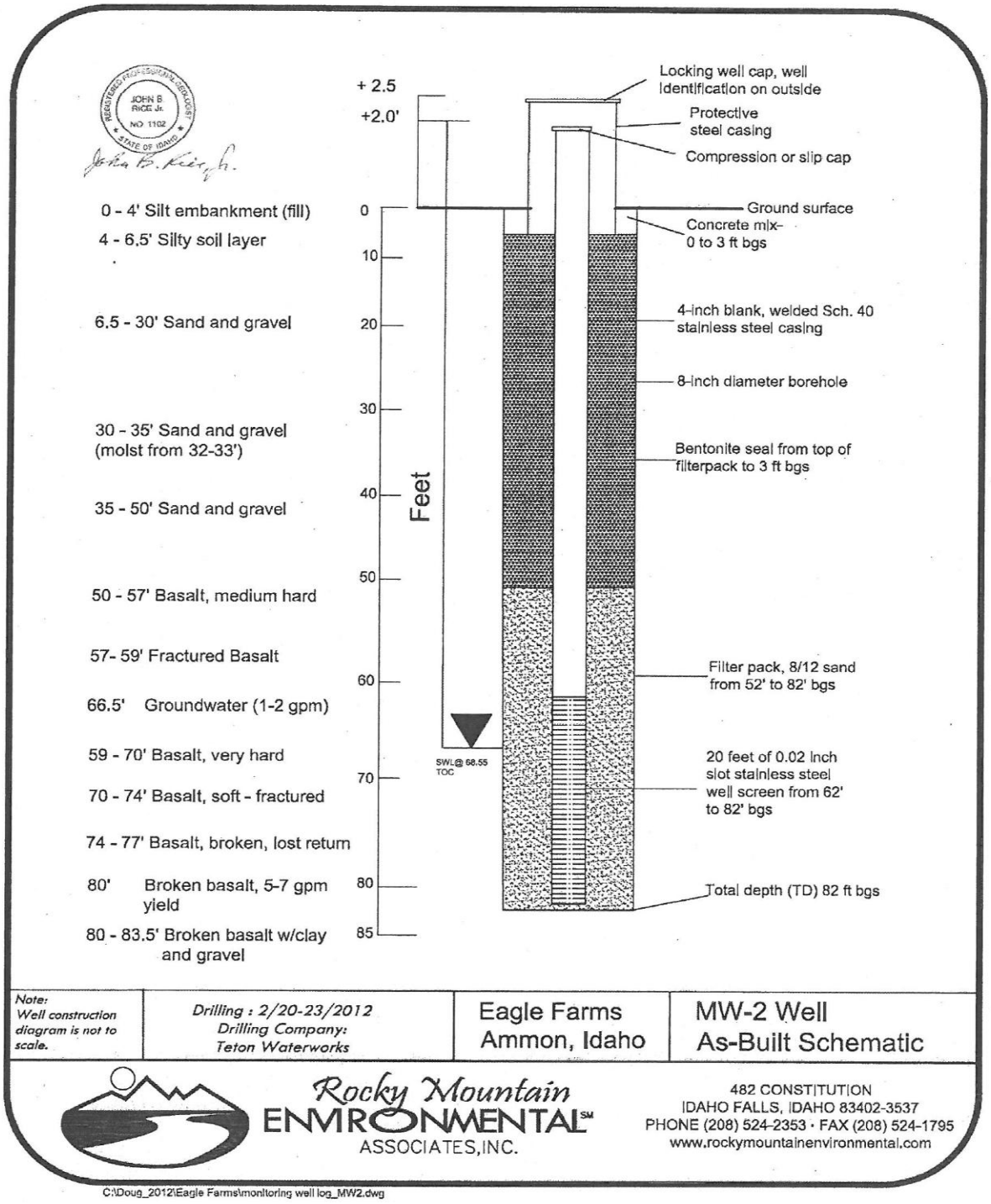
Equus, 2011, Eagle Farms 2009/2010 Annual Wastewater Reuse Site Performance Report, Report # EF-AWRSPR-01-2011 Rev. 1, January 2011.

Forsgren, 2012, Plan of Operation Potato Washing Facilities Wastewater, Eagle Farms, Idaho Falls, ID, Forsgren Project No. 01-10-0051, Forsgren Associates, Inc., August 2012.

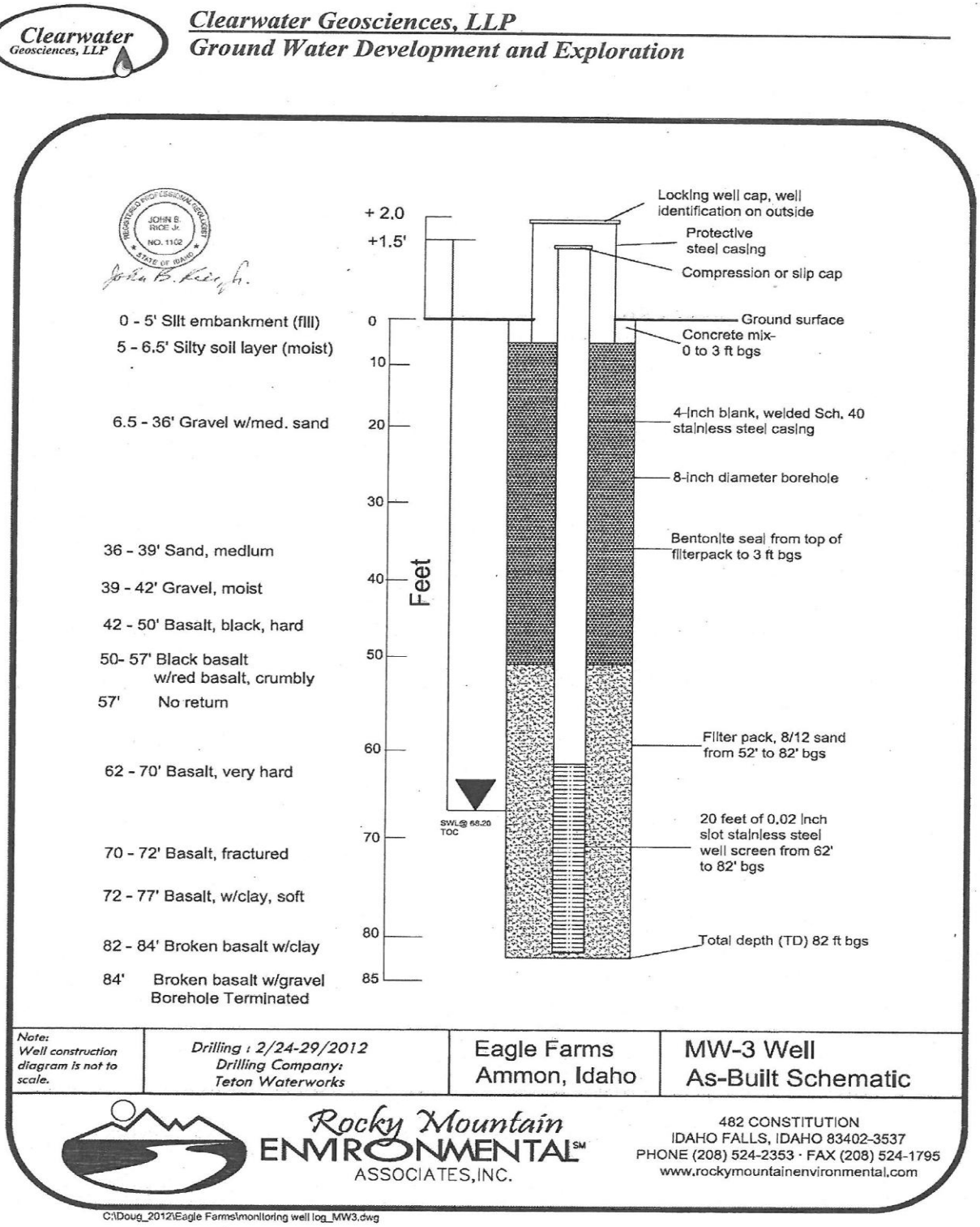
Appendix



Monitoring Well MW-1 As-Built Schematic (Wood, 2012).



Monitoring Well MW-2 As-Built Schematic (Wood, 2012)



Monitoring Well MW-3 As-Built Schematic (Wood, 2012)

Clearwater Geosciences, LLP
Ground Water Development and Exploration

USE TYPEWRITER OR BALL POINT PEN

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.

RECEIVED MAR 8 1977 Department of Water Resources Eastern District Office

1. WELL OWNER

Name: Idaho Falls Bonded Produce

Address: Lincoln Road Idaho Falls, Idaho

Owner's Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)

☐ Municipal ☒ Industrial ☐ Stock ☐ Waste Disposal or Injection

4. METHOD DRILLED

☐ Cable ☒ Rotary ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 8 inches Total depth 105 feet

Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	8 inches	+ 1 feet	105 feet
.250 inches	6 inches	1 feet	48 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 50 Material used in seal ☐ Cement grout

Bentonite ☒ Puddling clay ☐ Well cuttings

Sealing procedure used ☐ Slurry pit ☐ Temporary surface casing ☒ Overbore to seal depth

6. LOCATION OF WELL

Sketch map location must agree with written location.

Subdivision Name

Lot No. Block No.

County Bonneville

NW ¼ NE ¼ Sec. 14, T. 2 N/S, R. 38 E/W

7. WATER LEVEL

Static water level 63 feet below land

Flowing? ☐ Yes ☒ No G.P.M. flow

Temperature ° F. Quality good

Artesian closed-in pressure p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
8	0	49	Sand and Gravel		
6	49	72	Firm Gray Basalt		
	72	77	Cinders	x	
	77	83	Firm Gray Basalt		
6	83	105	Gravel	x	

000531

10. Work started Sept. 20, 1976 finished Sept. 21, 1976

11. DRILLERS CERTIFICATION

Firm Name Andrew Well Drilling Contr. Firm No. 5

Address 1268 East 17th Street Date 11-24-76
Idaho Falls, Idaho 83401

Signed by (Firm Official) Dale J. Andrew

and

(Operator) Dale Fuller

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

Eagle Farms PWS Production Well #1-East (Wood, 2012). A well log for Production Well #1-West has not been located.

Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 238-7
11/91

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

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AUG 27 1992
Department of Water Resources
Eastern District Office

1. WELL OWNER
Name: Idaho Bonded
Address: 4050 East Lincoln, Idaho Falls, ID
Drilling Permit No.: 25-92-E-108
Water Right Permit No.:

2. NATURE OF WORK
☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE
☒ Domestic ☐ Irrigation ☐ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED
☒ Rotary ☐ Air ☐ Auger ☐ Reverse rotary
☐ Cable ☐ Mud ☐ Other _____ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION
Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	8 inches	+ 1 feet	55 feet
.250 inches	6 inches	1 feet	96 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 ☐ Gun
Size of perforation? _____ inches by _____ inches

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

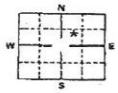
Well screen installed? ☐ Yes ☒ No
Manufacturer _____ Type _____
Top Packer or Headpipe _____
Bottom of Tailpipe _____

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 19 ft. 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: Well Lid

6. LOCATION OF WELL
Sketch map location must agree with written location.



Subdivision Name _____
Lot No. _____ Block No. _____
County: Bonneville
SW ¼ NE¼ Sec. 14, T. 2N N ☐ S ☐ R. 38 E ☐ W ☐

7. WATER LEVEL
Static water level 60 ft feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 62 est Quality Good
Describe artesian or temperature zones below.

8. WELL TEST DATA
☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
85 est		

9. LITHOLOGIC LOG 082557

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	3	Soil		x
	3	19	Gravel & Sand		x
8	19	50	Gravel and Sand		x
	50	53	Clay		x
	53	55	Clay and Basalt		x
	55	60	Basalt firm gray		x
	60	78	Basalt firm		x
	78	95	Gravel and sand	x	
	95	118	Basalt Firm		x
	118	122	Basalt broken	x	
	122	138	Basalt firm		x
	128	140	Basalt broken	x	
	140	143	Basalt Firm		x

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Department of Water Resources

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DEC 03 1992

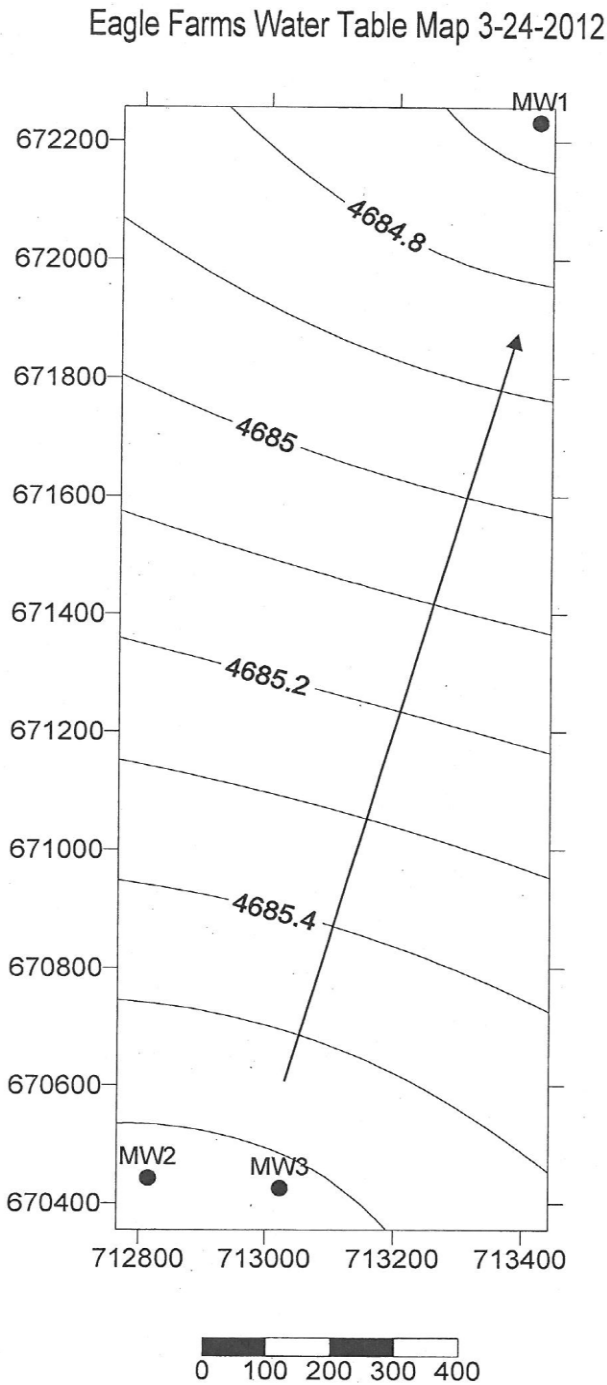
10.
Work started 8/5/92 finished 8/7/92

11. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Firm Name: Andrew Well Drilling Services Firm No. 5
Address: 1268 E. 17th St., Idaho Falls Date 8/13/92
Signed by Drilling Supervisor _____
and
(Operator) _____ (if different than the Drilling Supervisor)

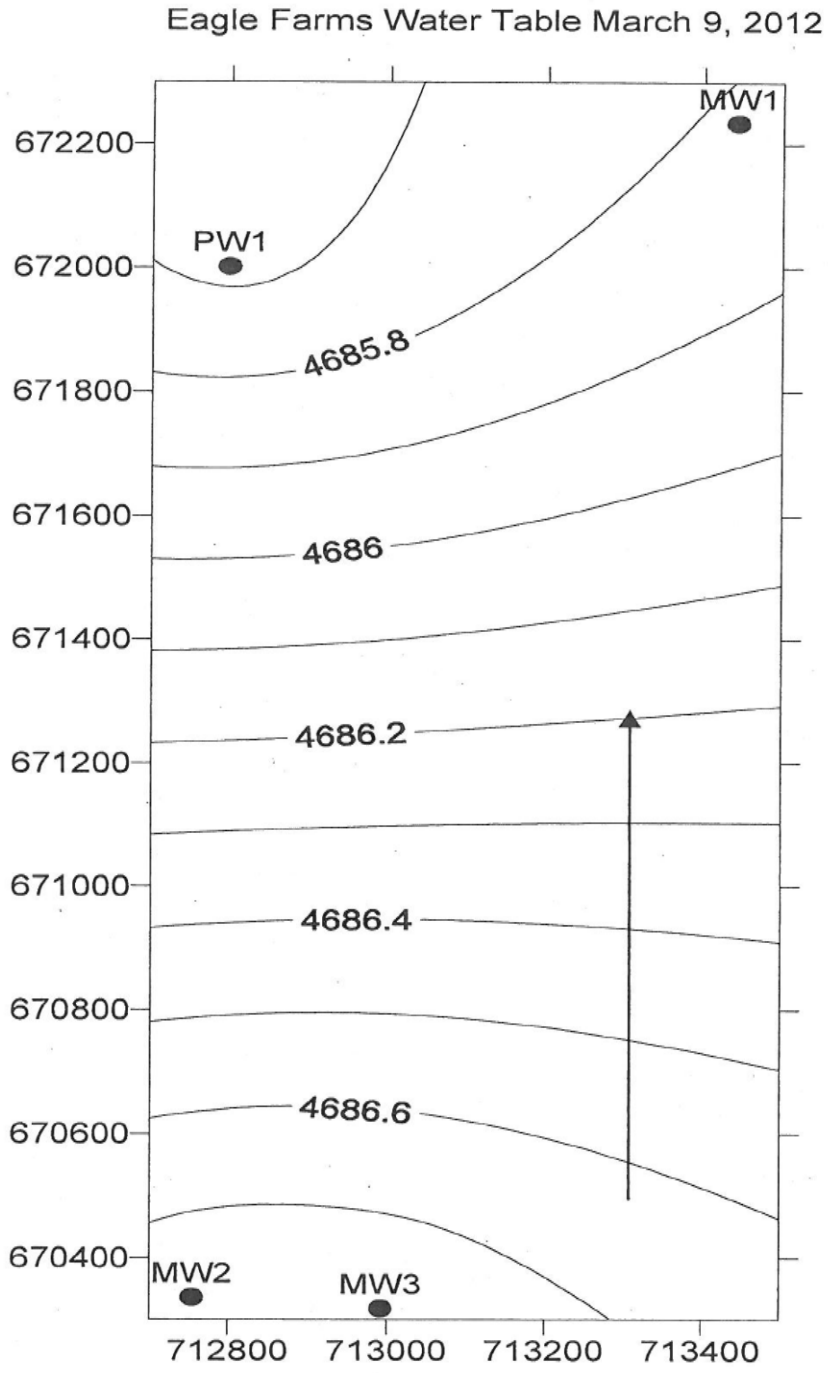
USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Eagle Farms Potato Cellar Mister Well (industrial, non-consumptive) (Wood, 2012). Note: Well logs do not exist for Production Well #1 West, or the Truck Shop Well.

Clearwater Geosciences, LLP
Ground Water Development and Exploration



Water Table Map, March 24, 2012 (Wood, 2012).



Water Table Map, March 9, 2012 (Wood, 2012).