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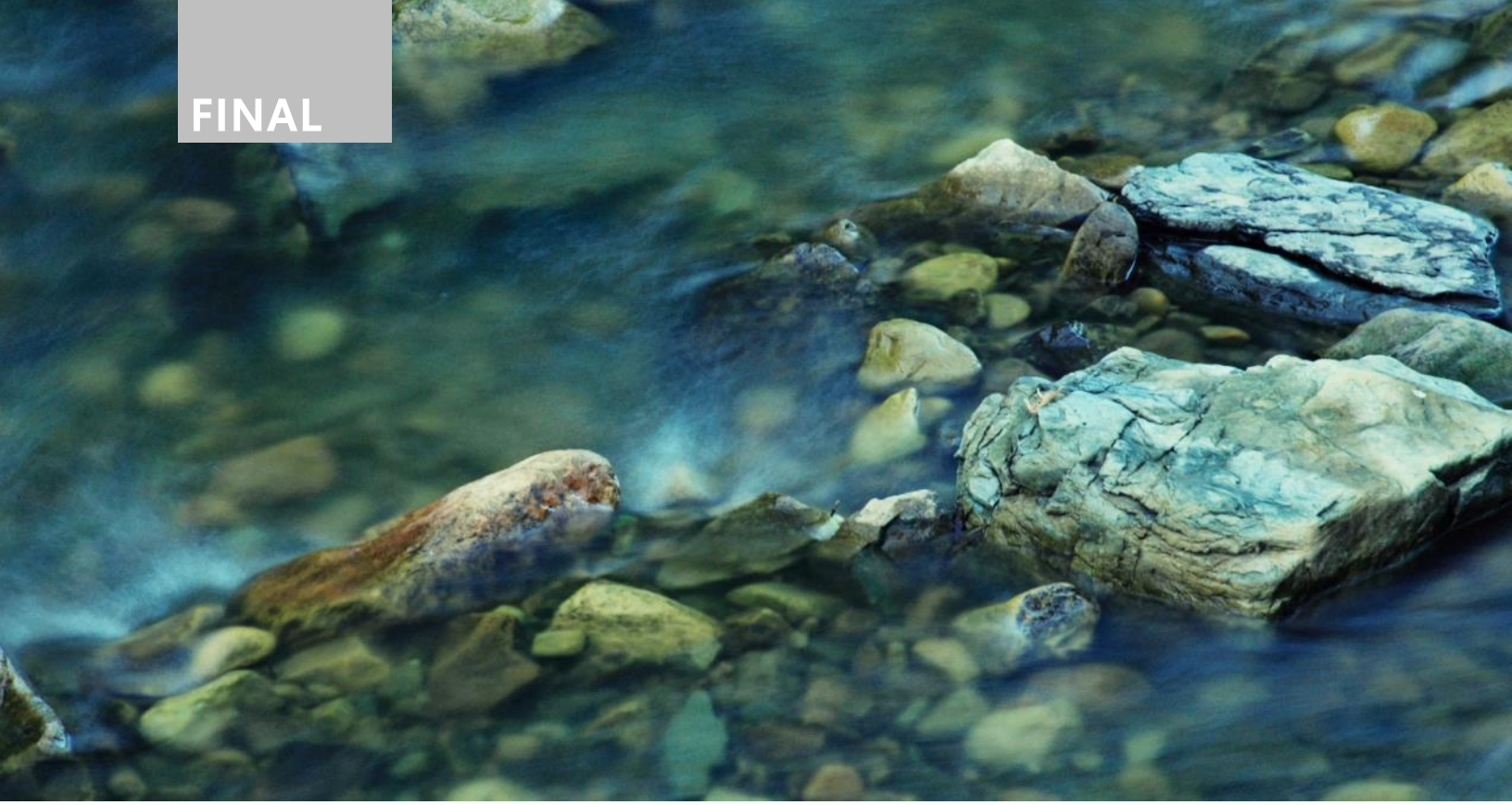

September 17, 2020
Yakima Valley Dairies | SDWA-10-2013-0080

ANCHOR QEA

Yakima Valley Dairies 2019 Annual Report

Prepared for Cow Palace, LLC
George DeRuyter & Son Dairy, LLC; D&A Dairy, LLC; George & Margaret, LLC
Liberty Dairy, LLC; H&S Bosma Dairy

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Prepared for
Cow Palace, LLC
George DeRuyter & Son Dairy, LLC; D&A Dairy, LLC;
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Liberty Dairy, LLC; H&S Bosma Dairy

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ABBREVIATIONS

AFMP	application field management plan
bgs	below ground surface
CDMA	code division multiple access
Consent Order	Administrative Order on Consent
DAF	dissolved-air flotation
Dairies	Yakima Valley Dairies
DSO	Washington State Department of Ecology Dam Safety Office
EPA	U.S. Environmental Protection Agency
GCL	geosynthetic clay liner
HASP	health and safety plan
HDPE	high-density polyethylene
IWMP	irrigation water management plan
K	potassium
MCL	maximum contaminant level
MDL	method detection level
MG	millions of gallons
mg/L	milligrams per liter
N	nitrogen
NH4	ammonium
NDN	nitrification/denitrification
NE Catch Basin	Cow Palace Dairy Northeast Catch Basin
NRCS	Washington Natural Resources Conservation Service
NW Catch Basin	Cow Palace Dairy Northwest Catch Basin
O&M	operations and maintenance
P	phosphorus
ppm	parts per million
QAPP	quality assurance project plan
RO	reverse osmosis
SOW	Statement of Work
TKN	total Kjeldahl nitrogen
VWC	volumetric water content
Yakima Valley Dairies	1) Cow Palace, LLC; 2) D&A Dairy, LLC (also known as D and A Dairy, L.L.C.), George DeRuyter & Son Dairy, LLC, and George & Margaret, LLC; and 3) Liberty Dairy, LLC, and its associated dairy facility H&S Bosma Dairy

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Executive Summary

This Annual Report summarizes activities that were undertaken in 2019 by several dairies ("Dairies") that signed an Administrative Order on Consent ("Consent Order") Docket No. SDWA-10- 2013-0080 with the U.S. Environmental Protection Agency (EPA) in March 2013 to address nitrate contamination of a drinking water aquifer beneath and downgradient of their Dairy facilities. In 2019, 1) Cow Palace, LLC; 2) George DeRuyter & Son Dairy, LLC, D&A Dairy, LLC (also known as D and A Dairy, L.L.C.), and George & Margaret, LLC; and 3) Liberty Dairy, LLC, and its associated dairy facility H&S Bosma Dairy (collectively referred to as the Yakima Valley Dairies or Dairies) continued performing activities consistent with the requirements of the Consent Order. The goal of the work conducted in accordance with the Consent Order is to achieve drinking water quality that meets the EPA maximum contaminant level (MCL) for nitrate of 10 milligrams per liter (mg/L) in the drinking water aquifer beneath and downgradient of the Dairies. Four Consent Order objectives support this goal, including providing safe drinking water to residents whose well water exceeds the nitrate federal drinking water standard, taking actions to control potential sources of nitrogen at the Dairies, monitoring groundwater to ensure the effectiveness of source control actions, and ensuring effective nutrient management at the Dairies to reduce the introduction of nitrate to the drinking water aquifer.

The relationship of the Dairy facilities with nitrate migration and groundwater contamination is depicted in the conceptual site model contained in this Annual Report (Figures 4 and 5). Data summarized in this Annual Report were collected and analyzed by the Dairies in accordance with EPA-approved quality assurance project plans (QAPP) to ensure that all data are of known and documented quality, of sufficient quantity, legally defensible, and suitable for their intended use.

In accordance with the Consent Order, in 2013 the Dairies identified 224 private residences within the boundary of, or within 1 mile downgradient of their facilities. Forty-eight residences already had reverse osmosis (RO) treatment units in place, and 63 additional residences exceeded the nitrate MCL as determined by laboratory analysis conducted by the Dairies. Forty-one residences were vacant, could not be reached after multiple attempts, or refused to participate in the sampling. In 2013, the Dairies offered to install and maintain RO units at residences that exceeded the MCL and offered to maintain RO units at residences that already had one.

In 2019, the Dairies continued to provide safe drinking water to 45 residences within the 1-mile downgradient boundary of the Dairies. The residences have been provided with reverse osmosis treatment units or bottled water.

The Dairies are in the process of lining 40 earthen animal waste storage lagoons to reduce or eliminate nitrogen leakage from the lagoons to subsurface soils and groundwater. In 2019, the average concentrations of total nitrogen in liquid manure samples was 1,940 parts per million (ppm) in Cow Palace lagoons, 2,187 ppm in Bosma lagoons, and 1,523 ppm in the DeRuyter lagoons (see

Tables 8a, 9a, and 10a). On a volume basis, by 2019, and using the initial capacities of the original lagoons, Cow Palace Dairy has lined 89% of its 31.7-million-gallon lagoon storage capacity, H&S Bosma Dairy has lined 18% of its 55.5-million-gallon lagoon storage capacity, and George DeRuyter & Son Dairy has lined 8% of its 38.9 million-gallon lagoon storage capacity.[1] Lining of all the Dairies' lagoons is scheduled to be completed by 2022.

Lagoon lining and construction activities in 2019 resulted in the completion of two large lagoon lining projects each at Liberty/H&S Bosma Dairies and Cow Palace Dairy.

In lieu of lining lagoons in 2019, the George DeRuyter & Son Dairy, after seeking and obtaining EPA approval, installed a nitrogen treatment system, called a nitrification/denitrification (NDN) system, in one of its lagoons to reduce the amount of nitrogen in its liquid manure (Appendix B). Pilot testing of the NDN system began in 2019, extended into early 2020, and demonstrated an average total nitrogen removal of 40%. Major repairs and upgrades to the Dairy's manure digester and to the dissolved-air flotation unit (DAF) were completed. The manure digester and DAF operate in line with the NDN system. The repaired digester produced approximately 300 to 400 cubic feet of low carbon biogas per minute, which is enough to supply about 1,500 homes. The lagoon that contains the NDN system will be lined.

Throughout 2019, the Dairies continued to monitor the groundwater. Nitrate concentrations in all upgradient wells except YVD-02 had nitrate concentrations below the MCL of 10 mg/L. Nitrate concentrations in all northern wells, including all upgradient monitoring wells except for YVD-02,[2] and downgradient wells DC-07 and YVD-17 remained below the nitrate MCL of 10 mg/L. Of the 17 downgradient monitoring wells, only DC-07 and YVD-17 have nitrate concentrations below the MCL. DC-07 is likely receiving relatively clean surface water discharges from an adjacent creek, and YVD-17 is likely receiving relatively clean surface water discharges from a nearby irrigation canal. Nitrate concentrations in 15 monitoring wells that are downgradient of Dairy nitrate sources exceeded the MCL in 2019, ranging from 0.49 mg/L in YVD-17 to 186 mg/L in monitoring well DC-03. Historical groundwater concentration plots for nitrate are included in Figures 12 through 16.

In support of the objective of effective nutrient management, the Dairies continued pre-plant and post-harvest soil and manure sampling to help ensure that the application of nitrogen to their crop fields does not exceed agronomic rates. Overall, nitrogen levels in fields to which manure is applied

[1] Calculations of total initial lagoon volumes were based on the pie chart information in Figure 3, which is provided in millions of gallons (MG): for Cow Palace Dairy, 28.2 MG (lined capacity) + 3.5 MG (unlined capacity) = 31.7 MG (total capacity); for H&S Bosma Dairy, 9.9 MG + 45.6 MG = 55.5 MG; and for George DeRuyter & Son Dairy, 3.1 MG +35.8 MG = 38.9 MG. Calculations for percentage of total volume lined were as follows: for Cow Palace Dairy, 28.2 MG (lined) / 31.7 MG (total) * 100 = 89% lined at the end of 2019; for H&S Bosma Dairy, 9.9 MG/55.5 MG = 18%; for George DeRuyter & Son Dairy, 3.1 MG / 38.9 MG = 8%. Percentages are rounded.

[2] The Dairies have hypothesized that monitoring well YVD-02 was contaminated by an adjacent George DeRuyter & Son Dairy manured application field. To reduce the nitrate loading from the field to the groundwater, George DeRuyter & Son Dairy has adjusted its manure application practices avoiding manure application within 30 feet of the monitoring well (see Section 4.4).

have declined significantly from excessive levels that were measured by the Dairies in 2013 (Figures 23, 27, and 30). Historical nitrate concentration charts for each field are provided in Figures 21a through 21g, 25a through 25m, and 28a through 28n.

Fall nitrate concentrations in all application fields at Cow Palace Dairy and Liberty/H&S Bosma Dairies remained below the 45 ppm target at the 2-foot depth interval (12 to 24 inches).

Nitrate concentrations in four DeRuyter application fields exceeded the 45-ppm target in 2019 (Figure 17). Fields GDS-SU06 and GDS-SU08 exceeded the target in the spring pre-plant sampling, and fields GDS-SU04, GDS-SU05, and GDS-SU08 exceeded the target in the fall post-harvest sampling (Figure 17). Field GDS-SU08 has not met the 45-ppm target since the Consent Order was signed in 2013, though nitrate concentrations at the 2-foot depth in this field have declined significantly from 160.5 ppm in 2013 to 47.5 ppm in 2019.

In 2019, George DeRuyter & Son Dairy experienced an emergency during which the amount of liquid manure generated by the Dairy overwhelmed its lagoon storage capacity. To prevent liquid manure from overtopping the lagoons, the Dairy made emergency manure applications that exceeded the recommended agronomic rates, which contributed to George DeRuyter & Son fields exceeding the 45-ppm target in fall 2019. See Section 5.5.1.

The Dairies collected "post-harvest" representative soil samples from the 1-foot depth, the 2-foot depth, and the 3-foot depth intervals below ground surface from each application crop field. EPA has estimated, based on the Dairies' data, the number of tons of nitrate present at each soil depth in the Dairy's application fields in fall 2019. Collectively in all the Dairies' crop fields, there were about 127 tons of nitrate-N at the 1-foot soil depth, about 94 tons at the 2-foot depth, and about 104 tons at the 3-foot depth. The purpose of the 3-foot soil depth samples is to provide information regarding the soil nitrate concentrations below the crop root zone (see Consent Order Statement of Work Section III.F.1.e). These estimates were developed by multiplying the area-weighted nitrate-N estimates developed by the Dairies for each crop field at each soil depth, multiplying by the number of acres of crop fields for each Dairy to estimate the pounds of nitrate in the fields for each Dairy at each depth, adding the pounds at each soil depth at each Dairy to estimate the total pounds of nitrate at all the Dairies at each soil depth, and dividing by 2,000 to convert to tons. These estimates do not include additional nitrogen in the form of ammonium, mineralization from past manure, or mineralization from organic matter, which are likely to break down and form additional nitrate. Nitrate is highly mobile in water, and the nitrate in the soil column is vulnerable to leaching and migration into the groundwater. The Dairies have converted many of their fields to alfalfa production. Established multiyear stands of alfalfa can pull nitrate out of the soil deeper than 2 feet if the roots are allowed sufficient time to grow deeper into the soil profile.

To minimize the discharge of nitrate-laden irrigation water out of the root zone, the Dairies continued to monitor soil moisture levels in their application fields (see the charts in Appendix D). The Consent Order requires at least two soil moisture monitoring locations in each of the Dairies' 39 application fields. Each monitoring location, or "station," includes three sensors at different soil depths. Most fields have two sensor stations, and some have three. The number of stations identified for placement in each field was based on consideration of the location and type of susceptible areas (those areas within each field that may be the most susceptible to the migration of irrigation water below the crop root zone, such as low-lying areas within soils with the greatest permeability) as well as the irrigation method being used in that field. The Dairies installed 82 moisture sensor stations in 2,303 acres of application fields, which on average is one station for every 28 acres. Table 11 summarizes the network of irrigation sensor stations.

Movement of nitrate-laden water out of the root zone can also mobilize nitrate deeper in the soil column from past over-applications of nitrogen and transport it to the drinking water aquifer.

Fields with at least two operable sensors throughout the season that indicated proper management of irrigation amounts were present in LD-SU05, LD-SU08, CP-SU01, GDS-SU04, GDS-SU05, GDS-SU08, GDS-SU09, and GDS-SU12. Only eight of the 39 irrigated fields had operable sensors that were able to verify irrigation applications in accordance with the Consent Order requirements.

The effectiveness of the irrigation water management effort was limited in 2019 because many of the moisture sensors were damaged and inoperable. In 2019, there were effectively no operable moisture monitors at four fields: GDS-SU02, GDS-SU03, LD-SU02, and LD-SU07. Eleven other fields appear to have had only one operable sensor at the 3-foot depth during all or part of the year. EPA has directed the Dairies to replace inoperable sensors.

Based on data from sensor stations that were operating, 17 fields exceeded field capacity at least once. A few exceedances may have been due to spring wet weather conditions unrelated to field irrigation. It is impossible to eliminate the discharge of nitrate-laden water from all fields all the time, but the duration of discharges due to irrigation can be managed if enough data is properly collected and utilized.

The Dairies continued to implement controls and monitoring for their off-site shipments of manure. In areas where groundwater nitrate levels are known by the Dairies to exceed the MCL (10 mg/L nitrate-N), those controls include the collection of soil testing data collected prior to shipment of manure or compost to that off-site application field (see Appendices E, F, and G).

1 Introduction

This annual report was prepared by: 1) Cow Palace, LLC; 2) George DeRuyter & Son Dairy, LLC, D&A Dairy, LLC (also known as D and A Dairy, L.L.C.), and George & Margaret, LLC; and 3) Liberty Dairy, LLC, and its associated dairy facility H&S Bosma Dairy (collectively referred to as the Yakima Valley Dairies [Dairies]). Dairy locations are shown in Figure 1.

This report outlines activities undertaken by the Dairies pursuant to Administrative Order on Consent (Consent Order) Docket No. SDWA-10-2013-0080 (EPA 2013) and Statement of Work (SOW) during the calendar year 2019, which covers the period from January 1 to December 31, 2019. This report includes the information required by Section III.K.2 of the SOW.

The goal of the work conducted in accordance with the Consent Order is to achieve drinking water quality that meets the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) for nitrate of 10 milligrams per liter (mg/L) in the drinking water aquifer beneath and downgradient of the Dairies. The objectives of the work conducted in accordance with the SOW are as follows:

1. Expeditiously provide a permanent, safe alternative drinking water supply to residents using private drinking water wells that exceed the MCL for nitrate (nitrate as nitrogen, or N03-N) and are on or within 1 mile downgradient of the Dairies.
2. Take specific actions to further control potential sources of nitrogen at the Dairies.
3. Establish a network of monitoring wells to measure the effectiveness of the nitrogen source reduction actions on water quality in the shallow alluvial aquifer that serves as an underground source of drinking water.
4. Ensure effective nutrient management at the Dairies to reduce the introduction of nitrate to an underground source of drinking water.

In 2019, EPA and the Dairies corresponded via face-to-face meetings, document submittals, and EPA comment letters regarding a number of actions pursuant to the Consent Order. EPA comment letters are noted (as applicable) throughout this report.

2 Alternative Drinking Water Supply

2.1 Evaluation and Treatment System Installations

In 2013, the Dairies consultant, Inland Earth Sciences (IES), conducted testing of groundwater at residences located downgradient of the Dairies. Groundwater testing was performed at 141 locations where access was obtained from the property owners (Figure 2). At 75 of these locations, groundwater nitrate concentrations were below the MCL.

At the remaining locations, the Dairies offered to fund the installation and maintenance of reverse osmosis (RO) treatment systems or to provide bottled water. A total of 36 residents accepted the offer for a new RO system, and 9 residents were supplied with bottled water. In addition, the Dairies also committed to maintain RO systems at an additional 15 residences where RO systems had been previously installed by the residences.

2.2 Ongoing Treatment System Maintenance

Maintenance information for the RO systems is summarized in Table 1. In 2019, the Dairies continued to fund the maintenance of 44 RO systems at 42 households within the 1-mile downgradient boundary of the Dairies. Five of these households are provided with bottled water, in addition to a RO system. Bottled water is provided to an additional three households without RO systems.

During 2019, this work was implemented by Independent Water Service, Inc. As of year-end 2019, the total number of households being serviced under the Consent Order is 41. This includes the following updates:

- One residence has become vacant.
- Residents of one household could not be contacted.
- Two of the households have two RO systems installed each.
- Three residences listed as previously having an RO system installed no longer have an RO system installed.

3 Actions to Further Control Potential Sources of Nitrogen

This section describes the status of actions taken to control potential sources of nitrogen from the Dairies, apart from the management of application fields. Application field management is discussed in Section 5.

3.1 Solid Separators

Section III.F.4 of the SOW requires the Dairies to take action within 60 days of the Effective Date of the Consent Order to reduce nitrate contributions from solid separators at each Dairy. Actions must include the following: 1) relocating solid separators onto an impervious surface; 2) installing a berm and containing areas receiving solids; and 3) directing leachate to storage ponds or lagoons.

In 2013, a review was conducted of the solid separator areas at each Dairy. Results indicated solid separator areas at each Dairy were found to be in compliance with the requirements of the SOW, as described in the *2013 Annual Report* (IES 2016).

In 2019, the solids separation systems at each Dairy included the following:

- Slope screen separator and centrifuge system at Cow Palace Dairy
- Centrifuge system at Liberty/H&S Bosma Dairies
- Dissolved-air flotation (DAF) system at George DeRuyter & Son/D&A Dairies

3.2 Backflow Prevention

Section III.F.5 of the SOW requires the Dairies to install and maintain backflow prevention devices within 30 days of the Effective Date of the Consent Order to protect wells at each Dairy.

In 2013, the presence of backflow prevention devices at each Dairy was confirmed, as described in the *2013 Annual Report* (IES 2016). The Dairies' backflow prevention devices are detailed as follows:

- Liberty Dairy and H&S Bosma Dairy had pre-existing backflow preventers on its three production wells.
- Cow Palace Dairy also had existing backflow preventers on its four production wells.
- George DeRuyter & Son Dairy and D&A Dairy had a total of three production wells. Two of the three wells had previously installed backflow preventers. The third was installed in 2014.

In 2019, the backflow prevention devices remained operational.

3.3 Cow Pens

Section III.F.10 of the SOW requires the Dairies to minimize the ponding of liquid in the cow pen areas to reduce infiltration of nitrogen-rich water.

In 2019, the Dairies continued implementing cow pen management actions at each Dairy to prevent liquid ponding and infiltration. Pens were graded to ensure liquid generated in the pens was

conveyed to each Dairy's lagoon system. Low spots occurring over time as a result of cow traffic were regraded and filled to prevent ponding. Cow pens were scraped on a weekly basis to remove accumulated manure and bedding material from the areas. Additionally, feed-mixing areas are located on asphalt or concrete surfaces, and Dairies with free stalls (Liberty/H&S Bosma Dairies and George DeRuyter & Son/D&A Dairies) are equipped with concrete flush lanes.

3.4 Roof Runoff

Section III.F.11 of the SOW requires the Dairies to confirm that roof runoff is not allowed to pond on the ground and infiltrate; roof runoff must either be kept separated from contaminated areas or directed to lagoons.

In 2019, roof runoff continued to be conveyed to the Dairies' lagoon systems. Roof runoff in animal operation areas is conveyed to the cow pens and feed lanes either by gutter or direct runoff from the roof surface. From the cow pens and feed lanes, the roof runoff is directed to the lagoon system. Roof runoff in feed-mixing areas is conveyed to the drains associated with the silage piles. Roof runoff controls are described in the *2013 Annual Report* (IES 2016).

3.5 Elimination of Furrow Irrigation

Section III.F.8 of the SOW requires the Dairies to eliminate furrow irrigation at each Dairy within 2 years of the Effective Date of the Consent Order. Furrow irrigation, also known as flood irrigation, is an age-old irrigation technique that irrigates fields by running water in furrows between the crop rows. Furrow irrigation results in over-saturation of parts of the field and has been shown to result in a higher incidence of water and nutrient transport below the root zone in comparison to sprinkler irrigation.

In 2013, the Dairies had several crop fields that still employed furrow irrigation. Furrow irrigation was eliminated at each Dairy by converting these remaining fields to sprinkler systems, as described in the 2013 Annual Report (IES 2016).

In 2019, no furrow irrigation was used by the Dairies.

3.6 Lagoons

Section III.F.6 of the SOW requires the Dairies to submit to EPA a Lagoon Review Report within 60 days of the Effective Date of the Consent Order demonstrating the existing lagoons were constructed to the current Washington Natural Resources Conservation Service (NRCS) 313 standard. The Dairies submitted Lagoon Review Reports (ARCADIS 2013a, 2013b, 2013c) that were approved by EPA on July 11, 2013. Save for one lagoon, Cow Palace Lagoon No. 4, the Dairies did not provide documentation that showed that their other 40 lagoons were designed and built to meet current NRCS standards.

For the 40 lagoons that did not meet the current NRCS 313 standard, the Dairies were required to submit a Lagoon Evaluation Plan to assess whether the lagoons met the standard. In 2014, the Dairies submitted a Lagoon Evaluation Method Determination QAPP (ARCADIS 2014) and Lagoon Evaluation QAPPs (IES 2014a, 2014b, 2014c). However, on February 6, 2015, the Dairies notified EPA of their election to forgo testing of the lagoons and instead begin lining them in accordance with the requirements in the Consent Order.

In 2019, the Dairies lined several lagoons in accordance with Section III.F.6 of the SOW.

3.6.1 Cow Palace Dairy

Cow Palace Dairy has elected to line its manure storage lagoons with a double-membrane liner system. This system includes two high-density polyethylene (HDPE) liners separated by a drainage layer. The drainage layer can consist of a layer of geocomposite material (as used for the Northwest Catch Basin [NW Catch Basin] lined in 2016) or a lower membrane liner with a dimpled surface that allows drainage between the liners without the need for a geocomposite (as used on Consolidated Lagoon No. 2). A leak detection system is installed between the liners to detect and collect accumulations of leachate associated with leaks in the upper liner should they occur. Monitoring of leachate production from this system is used to determine when repairs of the upper liner are required.

Cow Palace Dairy is also upgrading its lagoon network to expand storage capacity in some lagoons (e.g., the consolidation and expansion of Lagoon Nos. 2 and 3 in 2017) and eliminate other unneeded lagoons. To date, this has resulted in abandonment of one of the Cow Palace Dairy lagoons (the Northeast Catch Basin [NE Catch Basin]).

In 2019, design and construction activities conducted included the finalization and implementation of the lining design for Lagoon No. 1 and the development and implementation of the lining design for the Safety Debris Catch Basin (completed in January 2020). Lagoon operations and maintenance (O&M) activities were performed for the other existing lined lagoons. These activities are described in more detail in Sections 3.6.1, 3.6.2, and 3.6.3. The status of the Cow Palace Dairy lagoon program is summarized in Figure 3.

3.6.1.1 Lining Design for Cow Palace Dairy Lagoon No. 1

In early 2018, pre-design investigations were conducted for Lagoon No. 1, including surveys and soil testing. In March 2018, Cow Palace Dairy submitted 90% lagoon lining design documents for Lagoon No. 1, and in April 2018, EPA approved the 90% design as the 100% design. Cow Palace Dairy subsequently requested and obtained EPA approval to adjust the schedule for its lagoon programs to expedite the lining of the NE Catch Basin and defer the lining of Lagoon No. 1.

Construction of lining at Lagoon No. 1 also required permits from the Washington State Department of Ecology Dam Safety Office (DSO). Permit submittals included a hydraulic engineering report with

downstream flood analysis; engineered construction drawings and technical specifications; a construction inspection plan; an emergency action plan; and an operations, maintenance, and monitoring plan. On September 6, 2019, final approval of permit submittals and a DSO permit were issued.

Construction began at Lagoon No. 1 in late September 2019, including site preparation, excavation and grading, subgrade preparation, anchor trench excavation, inlet piping installation, liner system installation, and leak detection system startup and testing. Lagoon lining work for Lagoon No. 1 was completed on September 23, 2019. The Lagoon No. 1 work was reviewed and approved by DSO in early February 2020, after which the lagoon was returned to service.

3.6.1.2 Lining Design and Implementation for Cow Palace Dairy Safety Debris Catch Basin

The Safety Debris Catch Basin is located northeast of Lagoon No. 1. It is a relatively small catch basin that is primarily used for overflow storage during large precipitation events. The catch basin as lined has an operating capacity of approximately 0.72 million gallons.

Pre-design testing began in March 2019, and the lining design for the Safety Debris Catch Basin was complete by April 2019. This included finalization of pre-design testing, submittal of design documents, and procurement of Yakima County permits. On July 17, 2019, EPA approved the final design (EPA Letter 206).

Construction activities for the Safety Debris Catch Basin included site preparation, excavation and grading, subgrade preparation, anchor trench excavation, inlet piping installation, liner system installation, and leak detection system startup and testing. Construction at the Safety Debris Catch Basin was completed in early February 2020, and the lagoon was returned to service.

3.6.1.3 Operations and Maintenance of Existing Lined Lagoons

In 2019, Cow Palace Dairy staff continued with the O&M of its lagoon system per the *Cow Palace Dairy Facility Operations, Maintenance, and Monitoring Plan* (WET 2018). O&M activities for existing lined lagoons included the following:

- **NW Catch Basin:** The NW Catch Basin was lined in 2016. Lagoon inspections and maintenance activities were completed in accordance with the O&M plan for this lagoon during 2019. No leachate production was noted during 2019 (Table 2). No significant maintenance or repair activities were required.
- **Consolidated Lagoon No. 2:** This lagoon was expanded (including consolidation with former Lagoon No. 3) and lined in 2017. Lagoon inspections and maintenance activities were completed in accordance with the O&M plan for this lagoon during 2019. No leachate production was noted during 2019 (Table 2). No significant maintenance or repair activities were required.

- **Lagoon No. 4:** This lagoon was previously shown to comply with applicable Natural Resource Conservation Service design requirements for waste storage lagoons. It has a clay-amended soil liner. Lagoon inspections and maintenance activities were completed during 2019. No significant maintenance or repair activities were required.

3.6.1.4 Schedule for Future Lagoon Upgrades

In December 2019, Cow Palace Dairy notified EPA of the lagoon upgrade work to be conducted in 2020. Cow Palace Dairy proposed to line or abandon its final two lagoons (Settling Basins A and B). Consistent with the schedule letter, the approach will be finalized prior to May 15, 2020, and the construction work will be completed prior to year-end 2020.

3.6.1.5 Submittals and Approvals

In 2019, Cow Palace Dairy submitted the following documents related to lagoon construction:

- *Cow Palace Northeast Catch Basin Completion Report* (Anchor QEA 2019a) – Submitted January 31, 2019
- *Cow Palace Dairy Safety Debris Catch Basin Basis of Design Report, 90% Design Submittal* (Anchor QEA 2019b) – Submitted May 15, 2019
- *Cow Palace Dairy Safety Debris Catch Basin Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019c) – Submitted June 20, 2019
- *Cow Palace Dairy Safety Debris Catch Basin Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019d) – Resubmitted July 10, 2019
- *Cow Palace – Notification Regarding Proposed Updates to Nutrient Recovery Methods and Potential for Abandonment of Two Manure Storage Lagoons* (Anchor QEA 2019e) – Submitted December 31, 2019
- *Request for Extension – Cow Palace Safety Debris Catch Basin and Completion Report* (Anchor QEA 2019f) – Submitted December 31, 2019

Also in 2019, the following two documents related to Cow Palace Dairy lagoons were approved by EPA:

- *Plan for 2019 Lagoon Retrofits and Request for Extension for Completion of NE Catch Basin Abandonment – Cow Palace, LLC* (Anchor QEA 2018a) – Approved March 18, 2019 (EPA Letter 189)
- *Cow Palace Dairy Safety Debris Catch Basin Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019d) – Approved July 17, 2019 (EPA Letter 206)

3.6.2 Liberty/H&S Bosma Dairies

Liberty/H&S Bosma Dairies have elected to line their manure storage lagoons with a hybrid double-liner system. This system includes an HDPE liner placed over the top of a geosynthetic clay liner (GCL). In this system, each liner protects and reinforces the other. The upper HDPE liner protects the

lower GCL from drying out or being eroded by lagoon maintenance activities. The GCL helps add durability to the lining system in that the GCL can self-seal from small punctures. In this application, the GCL also has a long operational life. Leak detection surveys for the upper liner are performed using a combination of visual and electronic leak detection surveys in alternating years.

Liberty/H&S Bosma Dairies are also upgrading their lagoon network to expand storage capacity in some lagoons, consolidate smaller lagoons, and eliminate other unneeded lagoons. To date, this has triggered the consolidation of three Liberty Dairy lagoons in 2017 (now called Consolidated Lagoon No. 15); the abandonment of four H&S Bosma Dairy lagoons, which began in 2018; and the consolidation of three H&S Bosma Dairy lagoons in 2019 (now called Consolidated Lagoon No. 10).

In 2019, design and construction activities conducted included the following:

- Finalization and implementation of the lining designs for Lagoon No. 6 and Consolidated Lagoon No. 10 (including former Lagoon Nos. 10, 11, and 13)
- Construction of lining systems for Lagoon No. 6 and Consolidated Lagoon No. 10
- Follow-up abandonment activities for H&S Bosma Dairy Lagoon Nos. 8, 9, 19, and 20

These activities are described in more detail in Sections 3.7.1 and 3.7.2. The status of the Liberty/H&S Bosma Dairies lagoon program is summarized in Figure 3.

3.6.2.1 Lining Design and Implementation for H&S Bosma Dairy Lagoon No. 6 and Consolidated Lagoon No. 10

Construction of Lagoon No. 6 and Consolidated Lagoon No. 10 was performed in 2019, consistent with a modified schedule approved by EPA. Pre-design data collection activities related to H&S Bosma Dairy Lagoon No. 6 and Consolidated Lagoon No. 10 were conducted in 2018, consistent with the *Lagoon Pre-Design Data Collection Quality Assurance Project Plan (QAPP)* (Anchor QEA 2017a), which was approved by EPA on February 2, 2017. In July 2018, the 100% lagoon lining design documents for Liberty/H&S Bosma Dairies were submitted to EPA. Throughout the winter of 2018/2019, Lagoon No. 10 remained free of manure. Final design documents for the lining design for Lagoon No. 6 and Consolidated Lagoon No. 10 were submitted to EPA in July and October, respectively.

Construction work began at Lagoon No. 6 and Consolidated Lagoon No. 10 in September 2019. This work included site preparation, excavation and grading, subgrade preparation, anchor trench excavation, inlet and outlet piping installation, liner system installation, and leak detection system testing.

Construction activities were completed by December 3, 2019, and the two lagoons were returned to service. The combined as-built report was submitted to EPA in December 2019 (Anchor QEA 2019g). That document was resubmitted in early January 2020 (Anchor QEA 2020a).

3.6.2.2 Abandonment of H&S Bosma Dairy Lagoon Nos. 8, 9, 19, and 20

The abandonments of Lagoon Nos. 8, 9, 19, and 20 were initiated in 2018 and completed during 2019. Soil removal activities were initially described in the draft *H&S Bosma Dairy Lagoon Nos. 8, 9, 19, and 20 Lagoon Abandonment Completion Report* (Anchor QEA 2019h). That report was initially submitted to EPA on July 8, 2019. It was resubmitted to EPA on October 16, 2019 (Anchor QEA 2019i) with updates responding to EPA Letter 215. Following receipt of additional comments from EPA (EPA Letter 217), compost area drainage improvements were completed in December 2019, and the report was resubmitted in early February 2020 (Anchor QEA 2020b).

3.6.2.3 Operations and Maintenance Activities for Existing Lined Lagoons

Liberty Dairy performs routine weekly inspections of Consolidated Lagoon No. 15 and the Red Water Pond, as described in the *Liberty Dairy Consolidated Lagoon No. 15 Operations, Maintenance, and Monitoring Plan* (Anchor QEA 2017b) and the *Liberty Dairy Red Water Pond Operations, Maintenance, and Monitoring Plan* (Anchor QEA 2018b) The routine inspections include visual inspections of the following:

- The liner for evidence of slumps of bulges
- Damage to the liner (e.g., holes, tears, or damaged seams)
- The perimeter of the lagoon, looking specifically for signs of access from animals or workers, damage to fencing/barrier, presence of trees or vegetation, wind damage, or rodent activity
- The embankments, looking for signs of erosion
- The protective fence or barrier and signage
- Inlet and outlet piping to check for obstructions or damage
- Accumulation of solids in the lagoon
- The agitation equipment to ensure that it is properly secured with the tethered lines and positioned away from the side slopes and bottom of the lagoon
- Gas venting piping to check for obstructions or damage

Records of the weekly inspections conducted in 2019 are included in Appendix A.

Additionally, a visual leak detection inspection was performed during summer 2019 for Consolidated Lagoon No. 15 and the Red Water Pond. Electronic leak detection surveys will be conducted in 2020.

3.6.2.4 Submittals and Approvals

In 2019, Liberty/H&S Bosma Dairies submitted the following documents related to lagoon construction:

- *Liberty Dairy Red Water Pond Completion Report* (Anchor QEA 2019j) – Submitted January 31, 2019

- *Request for Extension – Completion of Lagoon Abandonments at H&S Bosma Dairy* (Anchor QEA 2019k) – Submitted February 1, 2019
- *Request for Extension – Completion of Lagoon Abandonments at H&S Bosma Dairy* (Anchor QEA 2019l) – Submitted March 1, 2019
- *H&S Bosma Dairy Lagoon No. 6 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019m) – Submitted March 1, 2019
- *Status Update and Extension Request – Lagoon Abandonments at H&S Bosma Dairy* (Anchor QEA 2019n) – Submitted March 31, 2019
- *Status Update and Anticipated Schedule – Lagoon Abandonments at H&S Bosma Dairy* (Anchor QEA 2019o) – Submitted April 14, 2019
- *Schedule Update – Lagoon Abandonments at H&S Bosma Dairy* (Anchor QEA 2019p) – Submitted May 15, 2019
- *Completion of Abandonments at Lagoons 19 and 20 and Status of Abandonments at Lagoons 8 and 9 at H&S Bosma Dairy* (Anchor QEA 2019q) – Submitted May 31, 2019
- *Completion of Abandonment at Lagoon 9 at H&S Bosma Dairy* (Anchor QEA 2019r) – Submitted June 7, 2019
- *H&S Bosma Dairy Lagoon No. 6 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019s) – Resubmitted June 25, 2019
- *H&S Bosma Dairy Consolidated Lagoon No. 10 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019t) – Submitted June 25, 2019
- *H&S Bosma Dairy Lagoon Nos. 8, 9, 19, and 20 Lagoon Abandonment Completion Report* (Anchor QEA 2019h) – Submitted July 8, 2019
- *H&S Bosma Dairy Consolidated Lagoon No. 10 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019u) – Resubmitted July 10, 2019
- *H&S Bosma Dairy Lagoon No. 6 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019v) – Resubmitted August 30, 2019
- *H&S Bosma Dairy Lagoon No. 6 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019w) – Resubmitted September 16, 2019
- *H&S Bosma Dairy Lagoon No. 6 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019x) – Resubmitted October 2, 2019
- *H&S Bosma Dairy Lagoon Nos. 8, 9, 19, and 20 Lagoon Abandonment Completion Report* (Anchor QEA 2019i) – Resubmitted October 16, 2019
- *Plan for 2020 Lagoon Retrofits – Liberty Dairy and H&S Bosma Dairy* (Anchor QEA 2019y) – Submitted December 27, 2019
- *H&S Bosma Dairy Lagoon No. 6 and Consolidated Lagoon No. 10 Completion Report* (Anchor QEA 2019g) – Submitted December 31, 2019
- The *H&S Bosma Dairy Lagoon No. 6 and Consolidated Lagoon No. 10 Completion Report* (Anchor QEA 2020a) was resubmitted in early 2020. This document remains under review by EPA.

Also in 2019, the following three documents related to Liberty/H&S Bosma Dairies lagoons were approved by EPA:

- *2018 Lagoon Abandonment Extension Request and Plan for 2019 Lagoon Retrofits – Liberty Dairy and H&S Bosma Dairy* (Anchor QEA 2018c) – Approved March 20, 2019 (EPA Letter 190)
- *Status Update and Anticipated Schedule – Lagoon Abandonments at H&S Bosma Dairy* (Anchor QEA 2019o) – Approved April 17, 2019 (EPA Letter 194)
- *H&S Bosma Dairy Consolidated Lagoon No. 10 Basis of Design Report, 100% Design Submittal* (Anchor QEA 2019u) – EPA-modified version approved July 17, 2019 (EPA Letter 205)

3.6.3 George DeRuyter & Son/D&A Dairies

George DeRuyter & Son/D&A Dairies have elected to line their manure storage lagoons with the same double-liner system used at the Liberty/H&S Bosma Dairies. That system includes an HDPE liner placed over the top of a GCL. Leak detection surveys for the upper liner are performed using a combination of visual and electronic leak detection surveys in alternating years.

George DeRuyter & Son/D&A Dairies are upgrading their lagoon network to optimize the storage capacity of their lagoon system, with expansions and consolidations where appropriate. To date, this has included the 2017 consolidation and lining of Lagoon Nos. 3 and 4 at D&A Dairy and the expansion of the Stormwater Catch Basin at George DeRuyter & Son Dairy in 2018.

During 2018 and 2019, George DeRuyter & Son/D&A Dairies completed repairs and upgrades of the existing manure digestor and DAF unit. The repairs were necessary to restore proper functioning of the digester and DAF unit, both of which are required for achieving proper nutrient recovery. Upgrades to the digester support the production and pipeline reinjection of clean, low-carbon biogas for off-site production of sustainable biofuels. The repairs and upgrades were completed with technical assistance from Promus Energy LLC and Regenis.

Between 2018 and early 2020, George DeRuyter & Son Dairy also constructed and operated a full-scale pilot test of an in-lagoon nitrification/denitrification (NDN) treatment system to reduce nitrogen concentrations in the Dairy's liquid manure (Appendix B). The work was partly supported by a grant from the Washington State Conservation Commission. Construction and NDN startup were completed by July 30, 2019. A 6-month pilot test was then completed through early February 2020.

These activities are described in more detail in Sections 3.8.1, 3.8.2, and 3.8.3. The status of the George DeRuyter & Son/D&A Dairies lagoon program is summarized in Figure 3.

3.6.3.1 Repair and Upgrade of Manure Digester

George DeRuyter & Son Dairy has operated a large (over 3 million gallons) three-lane manure digester since 2006. The digester was initially operated to produce biogas, which was in turn used to

produce electrical power for sale. However, changes to the pricing structure for that power made it uneconomical to operate the electrical production machinery, and the biogas was flared. During 2017, digester operations were discontinued when a portion of the digester roof collapsed due to corrosion damage.

During 2017 and 2018, the Dairies worked with Regenis, an experienced digester company, and Promus Energy LLC, a sustainable biofuels marketing company, to develop a biogas production agreement. Under that agreement, the digester was to be repaired and upgraded (along with the DAF unit) and returned to biogas production. Instead of producing electricity, the gas was to be cleaned (principally for the removal of sulfur) and then injected into natural gas supply lines. This process would produce biofuels for cars, trucks, and buses in various markets.

As communicated to EPA in letters and meetings, the implementation of the digester project and NDN treatment pilot required large capital investments by George DeRuyter & Son Dairy. The work also required all of the Dairy's manure storage lagoons to be online throughout 2018 and 2019 to facilitate manure management during the complex project. Following extensive discussion and submittal of project information, EPA approved the NDN pilot study and the changes to the lagoon lining schedule. In mid-2018, digester repairs were initiated by George DeRuyter & Son Dairy and included the following:

- Removing damaged roofing panels
- Removing accumulated manures
- Inspecting and replacing other digester components
- Installing and grouting the new roof panels
- Applying a corrosion-resistant sealant to the interior of the three digester bays
- Installing new operational control equipment
- Upgrading the flare- and gas-handling equipment
- Procuring a new digester heater
- Procuring gas-cleaning equipment and associated permits
- Coordinating with Yakima County to procure a natural gas line extension to George DeRuyter & Son Dairy

In May 2019, repairs of the digester were complete, and the digester was returned to biogas production. Initial gas production rates were between 300 and 400 cubic feet per minute of gas containing over 65% methane. Occasional upsets in digester performance occurred during September, October, and December 2019 due to excess sand or grit in the digestate and other problems. During these upsets, the DAF unit was not able to accept digestate from the digester. An operator from Regenis operates the digester and associated equipment, including the digester and screens, and oversees operation of the DAF unit.

As of early 2020, the digester and DAF remain in good operation. All gas-cleaning equipment has been installed, and low-carbon biogas is being trucked to an off-site pipeline injection point. On-site injection of the cleaned biogas will begin as soon as Yakima County completes the gas line extension out to the Dairy. Completion of the gas line extension project is currently anticipated to occur in late 2020 or early 2021.

3.6.3.2 Repair and Upgrades of Dissolved-Air Flotation Unit

While the digester was offline for repairs, the DAF unit was not functioning properly, and its use was suspended. In parallel with the digester repairs and upgrades, the DAF unit was overhauled. This included cleaning and inspections, followed by procurement and installation of replacement parts.

In May 2019, DAF unit operations resumed. Other than occasional equipment upsets, the DAF has remained online since that time. The DAF operations are overseen by the operator from Regenis.

3.6.3.3 Design and Installation of Pilot NDN Treatment System

The NDN functions using two biological treatment steps, each separated from each other in different lagoon compartments. In the first step, ammonia and organic nitrogen in the manure are converted to nitrate. In the second step, the nitrate is destroyed by conversion to inert nitrogen gas. The manure is recirculated through the treatment system compartments multiple times as needed to obtain the desired nitrogen removal efficiency.

In October 2018, EPA approved the NDN treatment pilot, including a provision establishing a 40% target for reduction of total nitrogen. The initial estimated completion date for NDN construction and startup was December 31, 2018, but the digester and DAF unit repairs took longer to complete than expected. In April, June, and July 2019, EPA granted extension requests to support completion of the digester and NDN projects (EPA Letters 195, 200, and 209).

Anchor QEA began baseline testing of the DAF effluent in May 2019, and construction of the NDN system was completed in July 2019. The capacity of the NDN treatment unit in Lagoon No. 1 was 4.3 million gallons. The lagoon was divided into three sections by placement of an anchored T-shaped curtain assembly, detailed as follows:

- **Section 1 – Mixed Anaerobic Zone:** The mixed anaerobic zone is located in the northwestern quadrant and comprises about 25% of the Lagoon No. 1 working volume. Warm DAF effluent (approximately 90°F) enters the treatment unit here, mixing with recirculated, treated manure from Section 3. The elevated biochemical oxygen demand from the DAF effluent provides an energy source for microbes that denitrify (remove and convert to inert nitrogen gas) the nitrate present in the recirculated manure.
- **Section 2 – Aeration Zone:** The aeration zone is located in the northeastern and southeastern quadrants of Lagoon No. 1 and comprises about 50% of the Lagoon No. 1

working volume. Two large air compressors and several dozen air diffusers are used to introduce oxygen into the manure. This aeration mixes the manure and provides the oxygen necessary for microbes to convert ammonia in the manure to nitrate.

- **Section 3 – Quiet Zone:** The quiet zone is located in the southwestern quadrant of Lagoon No. 1 and comprises about 25% of the Lagoon No. 1 working volume. This quadrant is used for the settling of NDN biosolids. Treated manure is either recirculated to Section 1 (a portion of the manure) or discharged by pumping or gravity overflow from the NDN and transferred to manure storage (a portion of the manure). NDN effluent is collected from this quadrant.

The 6-month pilot testing period extended from July 30, 2019, when the NDN became fully operational, through February 1, 2020. Data collection activities associated with the NDN were conducted as outlined in the *NDN QAPP* (Anchor QEA 2018d), which was approved by EPA on March 21, 2019.

A pilot study report has been prepared (included in Appendix A) summarizing NDN operations during the 6-month pilot test. Highlights of the NDN pilot study included the following:

- **Treated Volumes:** During the steady-state treatment operations (after the startup/acclimation period), the manure treatment volumes averaged approximately 92,200 gallons per day.
- **Hydraulic Retention Time:** The hydraulic retention time averaged 47 days, with an estimated recirculation rate of 150% (each volume of manure was run through the three NDN treatment unit sections an average of 2.5 times).
- **Startup Period Duration:** Biological activity within the treatment unit reached high levels by the end of the 2-month startup/acclimation period (August and September).
- **Total Nitrogen Removal Rates:** Following the startup period, the total nitrogen removal rates during the pilot study averaged 40%, with the majority of that removal attributable to ammonia oxidation and subsequent denitrification. Removal rates generally correlated with temperature, with higher removal rates in the warmer months of October and November and lower removal rates during the coldest winter months of December and January.
- **NDN Operational Temperatures:** Other manure storage lagoons at the Dairy froze over during December and January. In contrast, the NDN treatment system did not, helped by residual heat in the DAF effluent and the heat generated by the air compressors. The lowest NDN operating temperatures (51°F) were noted in January. These temperatures had begun to increase again by February.
- **Phosphorus Removal:** Removal rates for total phosphorus were significant, averaging 65% during the pilot study. Phosphorus removal is attributable primarily to settling of particulates in the quiet zone.

The complete testing results are contained in the *NDN Pilot Study Report – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2020c; Appendix A). The Dairy currently intends to continue data

collection and NDN monitoring through October 2020 to provide a full 12 months of operational data. The extended testing period will help confirm long-term performance expectations and better understand temperature/performance relationships and other factors relevant to long-term implementation of the technology.

3.6.3.4 Operations and Maintenance Activities for Existing Lined Lagoons

D&A Dairy and George DeRuyter & Son Dairy perform routine weekly inspections of Consolidated Lagoon No. 3 and the Stormwater Catch Basin, as provided in the *D&A Dairy Consolidated Lagoon No. 3 Operations, Maintenance, and Monitoring Plan* (Anchor QEA 2017c) and *George DeRuyter & Son Stormwater Catch Basin and D&A Dairy Lagoon Nos. 1 and 2 Modified Operations, Maintenance, and Monitoring Plan* (Anchor QEA 2019z). The routine inspections include visual inspections of the following:

- The liner for evidence of slumps of bulges
- Damage to the liner (e.g., holes, tears, or damaged seams)
- The perimeter of the lagoon, looking specifically for signs of access from animals or workers, damage to fencing/barrier, presence of trees or vegetation, wind damage, or rodent activity
- The embankments, looking for signs of erosion
- The protective fence or barrier and signage
- Inlet and outlet piping to check for obstructions or damage
- Accumulation of solids in the lagoon
- The agitation equipment to ensure that it is properly secured with the tethered lines and positioned away from the side slopes and bottom of the lagoon
- Gas venting piping to check for obstructions or damage

Records of the weekly inspections conducted in 2019 are included in Appendix A.

Additionally, a visual leak detection inspection was performed during summer 2019 for Consolidated Lagoon No. 3 and the Stormwater Catch Basin. Because of the manure storage demands associated with the digester/DAF repair project and the NDN pilot testing, these lagoons could not be fully emptied during 2020. The visual inspections were conducted throughout the exposed portions of the lagoons. Electronic leak detection surveys will be conducted for these lagoons in 2020.

3.6.3.5 Submittals and Approvals

George DeRuyter & Son/D&A Dairies submitted the following documents related to lagoon construction activities in 2019:

- *George DeRuyter & Son Dairy Stormwater Catch Basin Completion Report* (Anchor QEA 2019aa) – Submitted January 31, 2019
- *Status Update and Request for Extension – Manure Digester and NDN System Completion and Testing – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2019bb) – Submitted March 31, 2019

- *Status Update and Request for Extension – Manure Digester and NDN System Completion and Testing – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2019cc) – Submitted May 31, 2019
- *Status Update and Request for Extension – NDN System Completion and Testing – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2019dd) – Submitted July 3, 2019
- *Plan for 2020 Lagoon Retrofits – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2019ee) – Submitted December 27, 2019
- *NDN Pilot Study Report – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2020c) – In Preparation

Also in 2019, the following four documents related to George DeRuyter & Son/D&A Dairies lagoons were approved by EPA:

- *NDN QAPP* (Anchor QEA 2018d) – Approved March 21, 2019 (EPA Letter 191)
- *Status Update and Request for Extension – Manure Digester and NDN System Completion and Testing – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2019bb) – Approved April 17, 2019 (EPA Letter 195)
- *Status Update and Request for Extension – Manure Digester and NDN System Completion and Testing – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2019cc) – Approved June 6, 2019 (EPA Letter 200)
- *Status Update and Request for Extension – NDN System Completion and Testing – George DeRuyter & Son/D&A Dairies* (Anchor QEA 2019dd) – Approved August 6, 2019 (EPA Letter 209)

4 Groundwater Monitoring Network

Groundwater monitoring activities continued throughout 2019. The monitoring well network at the Dairies (Figure 1 and Table 1) consists of 26 monitoring wells screened in the surficial aquifer. Most of the wells (23 wells) are screened across the shallow water table. The remaining wells (3 wells) are deeper wells that are paired with water table wells.

Figures 4 and 5 summarize potential on-site sources of nitrogen at the Dairies and identify key transport mechanisms and exposure pathways. The monitoring well network serves as a tool to evaluate how the aquifer is responding to actions taken to control these potential sources and transport pathways. The groundwater monitoring data are used by EPA to supplement and verify existing information at the Dairies.

A list of the wells in the network and well construction data are shown in Table 3 and are detailed as follows:

- Seven of the wells were installed by EPA in 2012 (EPA wells; identified as DC-01, DC-03, DC-04, DC-05, DC-07, DC-09, and DC-14).
- The remaining 19 wells were installed by the Dairies in 2013 (Consent Order wells; identified as YVD-02, YVD-03, YVD-04, YVD-05, YVD-06, YVD-07, YVD-08, YVD-09, YVD-10, YVD-11, YVD-12, YVD-13, YVD-14R, YVD-15, YVD-16, YVD-17, YVD-18, DC-03D, and DC-05D), except for well YVD-14R, which is a replacement for well YVD-14, originally installed by the Dairies in 2013.

All wells are gauged on a quarterly basis to verify groundwater flow direction and to measure horizontal and vertical hydraulic gradients.

Sixteen of the wells are monitored quarterly and 10 of the wells are monitored annually to assess nitrate concentrations and groundwater chemistry in the surficial aquifer. As of Third Quarter 2019, upgradient monitoring well YVD-02 was added to the quarterly monitoring schedule due to elevated nitrate concentrations detected in that well in Second Quarter 2019.

4.1 Groundwater Monitoring Quality Assurance Project Plan

In 2019, the Dairies operated under the updated *Groundwater Monitoring QAPP* (Anchor QEA 2018e), which was conditionally approved by EPA on February 28, 2018.

4.2 Well Installation and Maintenance

No groundwater monitoring well installations or replacements were required during 2019.

4.2.1 Dedicated Bladder Pumps

Dedicated bladder pumps were installed in each groundwater well in 2017. All bladder pumps remained operational during 2019, and no changes to the sampling methodology were required.

4.2.2 Monitoring Well Pressure Transducers

In 2013, pressure transducers were installed in six monitoring wells (DC-03, DC-05, DC-05D, YVD-03, YVD-08, and YVD-11) to supplement groundwater elevation data generated by hand-gauging activities conducted in all 26 Consent Order wells. The transducers collected water level data in 15-minute intervals. Five of the transducers are installed in wells screened in the shallow surficial aquifer; one transducer is installed in a well screened in a deeper zone of the surficial aquifer (DC-05D). The data obtained from the pressure transducer network provide additional information on short-term elevation changes, in addition to the long-term and seasonal trend data provided by the hand-gauging data.

The pressure transducers installed in each well remained operational throughout 2019. However, due to regionally decreasing groundwater elevations, the water level in well DC-03 fell below the level of the pressure transducer in the well. On July 2, 2019, the transducer was repositioned lower in the well and transducer operations were resumed.

Pressure transducer data are summarized in the figures contained in the 2019 quarterly groundwater monitoring data reports (Anchor QEA 2019ff, 2019gg, 2019hh, 2020d). Hydrographs developed from corresponding manually measured groundwater elevation data are also provided in the appendices to those reports.

4.3 Quarterly Groundwater Monitoring Data Reports

Groundwater quarterly monitoring activities were performed as described in Section III.E of the SOW and consistent with the current *Groundwater Monitoring QAPP* (Anchor QEA 2018e). In 2019, quarterly groundwater monitoring events were conducted as follows:

- First Quarter 2019 – March 17 to March 21, 2019
- Second Quarter 2019 – June 1 to June 4, 2019
- Third Quarter 2019 – September 8 to September 10, 2019
- Fourth Quarter 2019 – December 8 to December 10, 2019

2019 quarterly groundwater monitoring data reports were submitted to EPA as follows:

- *First Quarter 2019 Groundwater Monitoring Data Report Memorandum* (Anchor QEA 2019ff) – Submitted May 21, 2019
- *Second Quarter 2019 Groundwater Monitoring Data Report Memorandum* (Anchor QEA 2019gg) – Submitted August 5, 2019

- *Third Quarter 2019 Groundwater Monitoring Data Report Memorandum* (Anchor QEA 2019hh) – Submitted November 11, 2019
- *Groundwater Monitoring Data Report – Fourth Quarter 2019* (Anchor QEA 2020d) – Submitted February 10, 2020

Also in 2019, 10 quarterly groundwater monitoring data reports were approved by EPA as follows:

- *Revised Groundwater Monitoring Data Report – First Quarter 2017* (Anchor QEA 2017d) – Approved August 19, 2019 (EPA Letter 211)
- *Groundwater Monitoring Data Report – Second Quarter 2017* (Anchor QEA 2017e) – Approved August 19, 2019 (EPA Letter 211)
- *Groundwater Monitoring Data Report – Third Quarter 2017* (Anchor QEA 2017f) – Approved August 19, 2019 (EPA Letter 211)
- *Groundwater Monitoring Data Report – Fourth Quarter 2017* (Anchor QEA 2018f) – Approved August 19, 2019 (EPA Letter 211)
- *Groundwater Monitoring Data Report – First Quarter 2018* (Anchor QEA 2018g) – Approved August 19, 2019 (EPA Letter 211)
- *Groundwater Monitoring Data Report – Second Quarter 2018* (Anchor QEA 2018h) – Approved August 19, 2019 (EPA Letter 211)
- *Third Quarter 2018 Groundwater Monitoring Data Report Memorandum* (Anchor QEA 2018i) – Approved August 19, 2019 (EPA Letter 211)
- *Groundwater Monitoring Data Report – Fourth Quarter 2018* (Anchor QEA 2019ii) – Approved August 19, 2019 (EPA Letter 211)
- *First Quarter 2019 Groundwater Monitoring Data Report Memorandum* (Anchor QEA 2019ff) – Approved August 19, 2019 (EPA Letter 211)
- *Second Quarter 2019 Groundwater Monitoring Data Report Memorandum* (Anchor QEA 2019gg) – Approved August 19, 2019 (EPA Letter 211)

The quarterly groundwater monitoring data reports are included in Appendix C. Current and historical data are presented in the tables and figures of the quarterly reports and are also summarized in Section 4.4.

4.4 Summary of Findings

Historical groundwater chemistry data are presented in Table 4. Annual groundwater chemistry data for each well in 2019 are depicted in Figure 6 (nitrate concentrations), Figure 7 (nutrient concentrations), Figure 8 (anion concentrations), Figure 9 (metal concentrations), and Figure 10 (alkalinity [bicarbonate and carbonate] concentrations). A summary of groundwater elevations in the surficial aquifer through 2019 is included in Table 5. Surficial aquifer groundwater elevation contour maps for the four quarters in 2019 are presented in Figures 11a through 11d.

Time-series trend plots of nitrate concentrations in groundwater from the beginning of monitoring in 2013 through Fourth Quarter 2019 are presented in Figures 12 through 16. The results of the 2019 monitoring include the following:

- Nitrate concentrations in all northern wells and three of the four upgradient wells (DC-01, YVD-03, and YVD-04) have remained below the nitrate MCL since Third Quarter 2016 and Second Quarter 2015, respectively.
- Nitrate concentrations have been consistently below the nitrate MCL in downgradient wells DC-07 and YVD-17 since the beginning of the monitoring program.
- Nitrate was detected above the MCL for the first time in upgradient well YVD-02 in Second Quarter 2019 and remained elevated through Fourth Quarter 2019. An unlined irrigation ditch running along the north edge of adjacent DeRuyter application field GDS-SU02 may have been diluting nitrate contribution from the field. The ditch was converted to a pipe between May 2017 and June 2018 (Google Earth historical images), which may have reduced the infiltration of clean water from the ditch, unmasking downward infiltration of nitrate from the field to the water table. The DeRuyter Dairy proposed, and has stopped applying manure within 30 feet of YVD-02 to reduce potential nitrate loading from the field to the well.
- The following patterns in nitrate concentrations in the east downgradient wells, west downgradient wells, and central wells (Figures 12, 13, and 14, respectively) have been noted:
  - Between 2013 and Fourth Quarter 2019, nitrate concentrations appear to have decreased in water table wells YVD-09, YVD-10, YVD-11, YVD-15, YVD-16, DC-04, and DC-05. These observations are preliminary, as EPA has not yet approved formal trend analyses procedures for use with the project.
  - Nitrate concentrations in well YVD-08 had been increasing between 2013 and First Quarter 2019. Nitrate concentrations in YVD-08 during Third Quarter and Fourth Quarter 2019 were similar to those of First Quarter 2019, indicating that these concentrations may be stabilizing. This well is located downgradient of application fields that are in compliance with the Consent Order targets for nitrate, and two of three lagoons located nearby have already been lined by Liberty Dairy. The one remaining lagoon is scheduled for lining in 2020.
  - Nitrate concentrations in well YVD-14R increased during 2018 after remaining stable between 2013 and First Quarter 2019. Nitrate concentrations for First Quarter through Third Quarter 2019 were similar and decreased in Fourth Quarter 2019, indicating that nitrate concentrations may be stabilizing.
  - Nitrate concentrations in the remaining three water table wells (DC-03, YVD-12, and YVD-13) have remained stable between 2013 and Fourth Quarter 2019.
- There were no detections of nitrite or total Kjeldahl nitrogen (TKN) during 2019, summarized as follows:
  - There have been no nitrite detections above the method detection level (MDL) of 0.05 mg/L since First Quarter 2017.
  - There have been no TKN detections above the MDL of 0.5 mg/L during 2019.
- There were detectable phosphorus concentrations in excess of the MDL of 0.07 mg/L in only two wells (YVD-02 and YVD-10) during 2019. None of the detected concentrations exceeded 0.1 mg/L.

- Sporadic detections of ammonia were noted, but these remain suspect. During 2019, 86 ammonia measurements were taken in the Consent Order groundwater wells, and there were only four ammonia detections. This is a detection frequency of 4.6%, below the frequency of ammonia detections in field blanks. The results were sporadic (no repeated detections of ammonia in any one well) and at low levels (within 5 times the reporting limit).
  - The wells with the ammonia detections were as follows: 0.27 mg/L in well DC-03, 0.09 mg/L in well DC-04, 0.30 mg/L in well YVD-12, and 0.12 mg/L in well YVD-14R.
  - The frequency of these ammonia detections in groundwater is less than the detection frequency for ammonia in the groundwater program field blanks, suggesting that the detections may be false positive results.
  - Anchor QEA requested copies of the laboratory's detection limit studies, but the laboratory refused to provide them for review.

Groundwater in the surficial aquifer continues to flow in a northeast to southwest direction with little seasonal change in hydraulic gradient. In 2019, the average hydraulic gradient across the site was 0.024 foot per foot, with an average of 0.047 foot per foot in the topographically higher area upgradient of the Dairies, 0.011 foot per foot in the central area of the site, and 0.0043 foot per foot in the topographically lower area downgradient of the Dairies.

Vertical gradients as measured at the three shallow/deep well pairs (DC-03/DC-03D, DC-05/DC-05D, and YVD-13/YVD-18) are generally consistently upward at well pair DC-03/DC-03D. Vertical gradients were variable at well pairs YVD-13/YVD-18 and DC-05/DC-05D, with both well pairs having downward and upward vertical gradients in two quarters each. The variable vertical gradients at these two well pairs may be caused by periodic pumping cycles from domestic and irrigation wells in the vicinity.

Groundwater in the surficial aquifer in the location of the Dairies is mainly calcium-bicarbonate type (approximately 75% of the wells), with calcium-sulfate-type water present in a few wells (approximately 25%). Groundwater in one well, YVD-09, is consistently "no dominant type." This is consistent with analysis of groundwater quality from previous years of the groundwater monitoring program.

5 Actions to Ensure Effective Nutrient Management

Section III.F.1 and Section III.F.2 of the Consent Order SOW describe immediate nitrate source control actions. Per Section III.F.1, each Dairy must submit a Dairy Facility Application Field Management Plan (AFMP) to EPA and conduct pre-plant and post-harvest soil sampling, with the goal of reducing the soil nitrate level to below 45 parts per million (ppm) at the 2-foot depth. Per Section III.F.2, each Dairy must submit an Irrigation Water Management Plan (IWMP) to EPA and install flow meters and moisture sensors with the goal of minimizing water movement below the root zone.

In 2019, fall nitrate concentrations in all application fields at Cow Palace Dairy and Liberty/H&S Bosma Dairies remained below the 45 ppm target at the 2-foot depth interval (12 to 24 inches). Nitrate concentrations in four DeRuyter application fields exceeded the 45-ppm target in 2019 (see Figure 17). Fields GDS-SU06 and GDS-SU08 exceeded the target in the spring pre-plant sampling, and fields GDS-SU04, GDS-SU05, and GDS-SU08 exceeded the target in the fall post-harvest sampling (Figure 17). Field GDS-SU08 has not met the 45-ppm target since the Consent Order was signed in 2013, though nitrate concentrations at the 2-foot depth in this field have declined from 160.5 ppm in 2013 to 47.5 ppm in 2019.

The effectiveness of the irrigation water management effort was limited in 2019 because many of the moisture sensors were damaged and inoperable. The Consent Order requires at least two moisture monitoring stations in each of the 39 fields (some fields have three). In 2019 there were effectively no operable moisture monitors at four fields: GDS-SU02, GDS-SU03, LD-SU02, and LD-SU07. Eleven other fields had only one operable sensor at the 3-foot depth during all or part of the year.

5.1 Application Fields

The use of an agronomic rate to guide nutrient applications continues to be the primary management tool for achieving the goal of reducing nitrate at the 2-foot depth in each application field to less than 45 ppm. To calculate an agronomic rate, dairy nutrient sources are evaluated (through sampling and analysis procedures described in the updated *Dairy Facility AFMP* [Anchor QEA 2018j]) for total nitrogen, which principally includes ammonium nitrogen, nitrate nitrogen, and organic nitrogen. Other potential sources of nutrients, such as organic matter, irrigation water, crop residue, and past manure applications, are established through sampling and calculation and accounted for in the calculation of an agronomic rate.

Following application, only a portion of the nitrogen measured in the dairy nutrient sources is available to the crop during the growing season. Available nitrogen is calculated using the nutrient source parameters. Residual soil nitrogen is measured by soil sampling and is a critical component of an agronomic rate. Due to variation in crop physiology and rooting depth, not all of the measured

residual nitrogen within the soil will be available to the growing crop over the season. Therefore, some of the nitrogen is considered to be "positionally unavailable" or "not accessible."

As the crop develops, in-season adjustments are sometimes made using tissue samples (petioles) or soil samples. These samples can be taken to assess if current nutrient availability will be sufficient to meet crop needs to finish out the crop. If it is determined that additional nitrogen will be required to meet crop demand, then the initial agronomic rate is adjusted. An agronomic rate should not be considered to be an absolute maximum or minimum, as in-season dynamics can change. However, if applications are made outside of these parameters, then documentation of the reasons for the change in rate are required.

Application field management summary and recommendation calculations for each Dairy are provided in Tables 6, 7, and 8. Manure nutrient contents measured for various liquid and solid manure sources for pre-plant and post-harvest are summarized for each Dairy in Tables 9a to 9d (Cow Palace Dairy), Tables 10a to 10d (Liberty/H&S Bosma Dairies), and Tables 11a to 11d (George DeRuyter & Son/D&A Dairies). Other nutrient management activities and results are further described for each Dairy in Sections 5.3, 5.4, and 5.5.

5.2 Irrigation Water Management

Section III.F.2 of the Consent Order SOW requires that each Dairy must submit an IWMP to EPA and install flow meters and moisture sensors with the goal of minimizing water movement below the root zone.

As described in the IWMPs, at each Dairy, a system of data loggers and moisture sensors was installed within each field to help guide irrigation water applications with the goal of reducing the potential for the movement of water below the crop root zone. Figure 18 depicts an IWMP Conceptual Site Model (IES 2015a, 2015b, 2015c) that provides a simplified and general depiction of the forces and components involved within irrigated fields. However, it does not represent all the forces that can act on irrigation water within an irrigated system.

The Consent Order requires at least two soil moisture monitoring locations in each of the Dairies' 39 application fields. Each monitoring location, or "station," includes three sensors at different soil depths. Most fields have two sensor stations, and a some have three. The Dairies installed 82 moisture sensor stations in 2,303 acres of application fields, which on average is one station for every 28 acres. Table 12 summarizes the network of 82 irrigation sensor stations.

5.2.1 Sensor Installation and Maintenance

The Dairies did not maintain many of the soil moisture sensors in working order as required by the Consent Order. Some sensors were broken throughout the entire irrigation season and were neither

repaired nor replaced. In a few fields, all the sensors were inoperable all season, and no electronic data were collected for those fields. Many sensors were "destroyed" by Dairy field operations. The Dairies did not notify EPA of this problem in the monthly reports and did not propose a plan to remedy the problem as required by the Consent Order SOW Paragraph III.K.1, which states that monthly progress reports must "describe all problems encountered and any anticipated problems and actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays."

The maximum amount of water that is held in soil against the pull of gravity is referred to as the "field capacity" (NRCS 2017). The results of the field capacity testing and soil moisture monitoring station installation is described in the field capacity soil testing reports for irrigation water management (IES 2015a, 2015b, 2015c).

Agrimanagement, Inc., completed testing in September and October 2014 to establish field capacities of application field soils. Pessl iMetos data loggers with Decagon moisture sensors were installed during November 2014. Separate sensors were installed at 1 foot below ground surface (bgs), 2 feet bgs, and 3 feet bgs. The moisture sensors measure the volumetric water content (VWC; water volume divided by soil volume). As shown on the example provided in Figure 19, the VWC at 1 foot bgs is generally more variable during precipitation or irrigation compared to the VWC at 2 feet and 3 feet bgs. The VWC at 2 feet and 3 feet bgs is more gradual in response to the rainfall or irrigation event.

Data are collected from the moisture sensors on an hourly basis and transmitted up to four times per day via cell modem to a web application. These data are evaluated once per week, and field-specific recommendations are provided. In the event field capacity is exceeded at the 3-foot depth, the web application sends a text notification to the professional irrigation consultant (Agrimanagement) and to farm managers to notify them that field capacity has been exceeded.

In 2019, moisture sensor stations continued to be updated with new motherboards equipped with code division multiple access (CDMA) technology and new sensor interfaces as old ones failed. These necessary maintenance periods briefly interrupted data collection while the data loggers were being upgraded. These updates, coupled with interruptions caused by field activities and clogged rain gauges from nutrient applications, weed seeds, dirt, and avian and insect debris, resulted in somewhat poor data logger and sensor performance again in 2019.

5.2.2 Irrigation Monitoring Results

During 2019, the irrigation season extended from mid-April through mid-October. The weather experienced during the 2019 irrigation season was a little cooler than average to start the season in April. Cool conditions persisted through early July, when the weather returned to more typical summer temperatures. Late summer weather was average overall, while late fall temperatures were average to below average through mid-October. Annual precipitation was up slightly from 2018 (4.15 inches) at 5.31 inches for the year. With more average temperatures, season-long evapotranspiration totals were average for 2019.

The Consent Order requires at least two moisture monitoring stations in each of the 39 fields (some fields have three). As noted in Section 5.2.1, many sensors were inoperable for all or part of the irrigation season. Table 12 summarizes information regarding each sensor location, including instances when exceedances of field capacity were measured at the 3-foot soil depth. Observations include the following:

- At least one exceedance of field capacity at the 3-foot soil depth was noted in 14 fields. The Dairies will endeavor to reduce or eliminate these.
- In just three fields were all the sensors functioning throughout the irrigation season.
- There were eight fields in which at least two sensors functioned throughout the season and irrigation appeared to be relatively well controlled.
- Four fields effectively had no operable sensors for all or most of the season.
- Eleven fields had just one operable sensor for all or part of the season.

The 2019 moisture sensor data are described in individual season summary site reports for each field and are included in Appendix D.[3,4,5]

5.3 Cow Palace Dairy Application Fields

In 2019, pre-plant and post-harvest soil sampling was conducted by Agrimanagement at the seven application fields associated with Cow Palace Dairy from May 13 to May 22, 2019 (pre-plant), and from September 5 to October 15, 2019 (post-harvest). Liquid and solid manure samples were collected on April 24, 2019 (pre-plant), and on September 4, 2019 (post-harvest). A summary of 2019 pre-plant and post-harvest data is provided in Table 13. For the entirety of the 2019 season, nitrate concentrations in all application fields associated with Cow Palace Dairy were below 45 ppm at the 2-foot depth.

[3] In the line graph of each application field season report, the line between the green shading and the blue shading is field capacity at the third foot (or the green is the favorable zone, red is below favorable, and blue is above favorable).
[4] In the bar graph of each application field season report, the blue data bars represent precipitation. Overlapping data bars may appear darker (blue versus dark blue). To clarify, all blue bars represent precipitation.
[5] Certain application field season reports include notes regarding sensor performance during the season.

Cow Palace Dairy manure nutrient concentrations for total nitrogen (N), total ammonium (NH4), total phosphorus (P), and total potassium (K) from 2013 to 2019 are provided in Tables 9a, 9b, 9c, and 9d.

5.3.1 Soil Nitrate Level Summary

In 2019, based on soil sampling results collected, nitrate concentrations at the 2-foot depth interval were all below 45 ppm for both the pre-plant and post-harvest samplings (Figure 20).

Cow Palace Dairy application field soil nitrate concentrations from 2013 to 2019 are provided in Table 14, and graphic depictions of these data are presented in Figures 21a through 21g. The number of application fields with nitrate levels exceeding 45 ppm in the second foot from 2013 to 2019 is depicted in Figure 22. Average post-harvest soil nitrate concentrations measured in the seven application fields associated with Cow Palace Dairy have generally decreased since 2013 (Figure 23).

5.3.2 Application Field Management

In 2019, in addition to agronomic rate, the following management tools and strategies were used toward achieving soil nitrate concentrations below 45 ppm at the 2-foot depth interval in application fields associated with Cow Palace Dairy:

- Improved application timing to better coincide with crop nutrient uptake
- In-season tissue and soil sampling to evaluate crop nutrient uptake progress

In 2019, two fields of rye grass were rotated to alfalfa as part of a typical crop rotation. Overall, manure applications were well controlled, and as discussed in Section 5.3.1. All field nitrogen applications for 2019 were below the ranges recommended by Agrimanagement.

5.3.3 Field Moisture Management

At Cow Palace Dairy there are a total of 17 sensor locations in seven fields. In 2019, as discussed in Section 5.2.1, functioning moisture sensor stations were upgraded. However, as noted in Table 12, some of sensors were not functioning during part or all the irrigation season. EPA has directed the Dairies to repair or replace damaged sensors. The following is a summary based on available data:

- Irrigation appears to have been relatively well controlled in field CP-SU01.
- One or more exceedances of field capacity were observed at the 3-foot soil depth in fields CP-SU02, CP-SU04B, CP-SU05, and CP-SU06.
- Due to one or more damaged sensors, representative data was not obtained for fields CP-SU02, CP-SU03, CP-SU04A, CP-SU04B, and CP-SU05.
- Multiple exceedances of field capacity at the 3-foot depth were observed in fields CP-SU02 and CP-SU06.

Once exceedances were noted in fields CP-SU02, CP-SU04B, CP-SU05, and CP-SU06, water application to these fields was adjusted by turning the water off or by lengthening the time between planned applications until moisture levels decreased below field capacity. Proactive measures in 2020 and beyond are appropriate to further prevent or reduce the number of future exceedances.

5.4 Liberty/H&S Bosma Dairies Application Fields

Agrimanagement conducted soil testing at the 13 application fields associated with Liberty/H&S Bosma Dairies from May 14 to June 11, 2019 (pre-plant), and from September 20 to October 14, 2019 (post-harvest). Liquid and solid manure samples were collected on April 24, 2019 (pre-plant), and on September 4, 2019 (post-harvest). A summary of 2019 pre-plant and post-harvest data is provided in Table 15. For the entirety of the 2019 season, nitrate concentrations in all application fields associated with Liberty/H&S Bosma Dairies were below 45 ppm at the 2-foot depth.

Liberty Dairy manure nutrient concentrations for total N, total NH4, total P, and total K from 2013 to 2019 are provided in Tables 10a, 10b, 10c, and 10d.

5.4.1 Soil Nitrate Level Summary

In 2019, based on soil sampling results collected, nitrate concentrations at the 2-foot depth interval were below 45 ppm for both the pre-plant and post-harvest samplings (Figure 24).

Liberty/H&S Bosma Dairies application field soil nitrate concentrations from 2013 to 2019 are provided in Table 16, and graphic depictions of these data are presented in Figures 25a through 25m. The number of application fields with nitrate levels exceeding 45 ppm in the second foot from 2013 to 2019 is depicted in Figure 26. Average post-harvest soil nitrate concentrations measured in the 13 application fields associated with Liberty/H&S Bosma Dairies decreased substantially after 2013, reaching an apparent minimum in 2018 (Figure 27). From Fall 2013 to Fall 2019, nitrate concentrations have decreased by 65% in the first foot, 77% in the second foot, and 70% in the third foot. As discussed in Section 5.1, residual soil nitrogen measured in each field is an important element in the development of the agronomic rate for that field. The 2019 season was the third full year where the nitrate concentrations were consistently below 45 ppm at the 2-foot depth interval.

5.4.2 Application Field Management

In 2019, in addition to agronomic rate, the following management tools and strategies were used toward achieving soil nitrate concentrations below 45 ppm at the 2-foot depth interval in application fields associated with Liberty/H&S Bosma Dairies:

- Improved application timing to better coincide with crop nutrient uptake
- In-season tissue and soil sampling to evaluate crop nutrient uptake progress
- Rotation changes to provide application flexibility as well as increased nutrient uptake

- During 2019 triticale crops in several fields were allowed to grow into the soft dough stage, which resulted in higher yields and nutrient uptake.

Overall, manure applications were well controlled, and soil sample concentrations for nitrate have continued to decrease or be maintained. All field manure applications for 2019 were within the acceptable recommendation ranges.

5.4.3 Field Moisture Management

At Liberty/H&S Bosma Dairy, there are a total of 30 sensor locations in 13 fields. In 2019, as discussed in Section 5.2.1, functioning moisture sensor stations were upgraded. However, as noted in Table 12, some of sensors were not functioning during part or all the irrigation season. EPA has since directed the Dairies to repair or replace damaged sensors. The following is a summary based on available data:

- Irrigation appears to have been relatively well controlled in fields LD-SU05 and SU08S.
- One or more exceedances of field capacity were observed at the 3-foot soil depth in fields LD-SU03, LD-SU04, LD-SU06, LD-SU08N, LD-SU08S, LD-SU10, LD-SU14, and LD-SU17.
- Due to one or more damaged sensors, representative data was not obtained for fields LD-SU03, LD-SU04, LD-SU06, LD-SU07, LD-SU09, LD-SU14, and LD-SU16. Of these, there appear to have been effectively no functioning sensors in fields LD-SU02 and LD-SU07 during the irrigation season.
- Multiple exceedances of field capacity were observed at the 3-foot depth in fields LD-SU04, LD-SU08, LD-SU10, LD-SU14, and LD-SU17.

Once exceedances were noted, water application to these fields was adjusted by turning the water off or by lengthening the time between planned applications until moisture levels decreased below field capacity. Proactive measures in 2020 and beyond are appropriate to further prevent or reduce the number of future exceedances.

5.5 George DeRuyter & Son/D&A Dairies Application Fields

Soil sampling was conducted by Agrimanagement at the 14 application fields associated with George DeRuyter & Son/D&A Dairies, from May 2 to May 31, 2019 (pre-plant), and from August 2 to October 7, 2019 (post-harvest). Liquid and solid manure samples were collected on April 24, 2019 (pre-plant), and on September 4, 2019 (post-harvest). A summary of 2019 pre-plant and post-harvest data is provided in Table 17. In 2019, four application fields exceeded the 45-ppm target at the 2-foot soil depth.

George DeRuyter & Son Dairy manure nutrient concentrations for total N, total NH4, total P, and total K from 2013 to 2019 are provided in Tables 11a, 11b, 11c, and 11d.

5.5.1 Soil Nitrate Level Summary

In 2019, based on soil sampling results collected, nitrate concentrations at the 2-foot depth interval were below 45 ppm for both the pre-plant and post-harvest samplings on all fields except GDS-SU04, GDS-SU05, GDS-SU06, and GDS-SU08 (Figure 17).

George DeRuyter & Son/D&A Dairies application field soil nitrate concentrations from 2013 to 2019 are provided in Table 18, and graphic depictions of these data are presented in Figures 28a through 28n. The number of application fields with nitrate levels exceeding 45 ppm in the second foot from 2013 to 2019 is depicted in Figure 29. From Fall 2013 to Fall 2019, nitrate concentrations have decreased by 69% in the top foot, 72% in the second foot, and 63% in the third foot.

Trends for the four fields that exceeded the 45-ppm nitrate goal at least once during 2019 (Figure 30) are as follows:

- **Field GDS-SU04:** This field previously met the 45-ppm goal between Spring 2018 and Spring 2019. Manure applications were made to the field before and after the Spring 2019 pre-plant sampling. The applications to field GDS-SU04 exceeded the recommended application rate in Spring 2019 due to emergency applications to prevent lagoon overtopping. Fall 2019 measurements exceeded the 45-ppm goal.
- **Field GDS-SU05:** This field previously met the 45-ppm goal between Spring 2018 and Spring 2019. Results for Fall 2019 showed that this field barely exceeded the 45-ppm goal (measured value of 45.37 ppm).
- **Field GDS-SU06:** The applications to field GDS-SU06 exceeded the recommended application rate in Spring 2019 due to emergency applications to prevent lagoon overtopping. This field slightly exceeded the 45-ppm goal in Spring 2019 at 52.4 ppm but met the 45-ppm goal by Fall 2019 at 35.02 ppm.
- **Field GDS-SU08:** The applications to field GDS-SU08 exceeded the recommended application rate in Spring 2019 due to emergency applications to prevent lagoon overtopping. While this field has exceeded the 45-ppm goal in past years, nitrate concentrations have been on a steady decline since Fall 2016 (103.2 ppm) to Fall 2019 (47.53 ppm).

All four of these fields are subject to ongoing nutrient management and monitoring activities under the Consent Order and under parallel Washington State permit requirements.

5.5.2 Application Field Management

In 2019, in addition to agronomic rate, the following management tools and strategies were used toward achieving soil nitrate concentrations below 45 ppm at the 2-foot depth interval in application fields associated with George DeRuyter & Son/D&A Dairies:

- Improved application timing to better coincide with crop nutrient uptake

- In-season tissue and soil sampling to evaluate crop nutrient uptake progress
- Rotation changes to provide application flexibility

Fields GDS-SU04, GDS-SU05, GDS-SU06, and GDS-SU08 exceeded the 45-ppm nitrate target at the 2-foot soil depth. Emergency applications of liquid manure to these fields in Spring 2019 to prevent lagoon overtopping likely contributed to these fields not meeting the target. All other field manure applications for 2019 were within the acceptable recommendation ranges.

5.5.3 Field Moisture Management

At George DeRuyter & Son/D&A Dairies, there are a total of 35 sensor locations in 14 fields. In 2019, as discussed in Section 5.2.1, functioning moisture sensor stations were upgraded. However, as noted in Table 12, some of sensors were not functioning during part or all the irrigation season. EPA has directed the Dairies to repair or replace damaged sensors. The following is a summary based on available data:

- Irrigation appears to have been relatively well controlled in fields GDS-SU09 and GDS-SU12.
- One or more exceedances of field capacity were observed at the 3-foot soil depth in fields GDS-SU01, GDS-SU03, GDS-SU04, GDS-SU07, GDS-SU10, GDS-SU11, GDS-SU13, and GDS-SU14.
- Due to one or more damaged sensors, representative data was not obtained for fields GDS-SU01, GDS-SU02, GDS-SU03, GDS-SU05, GDS-SU06, GDS-SU07, GDS-SU08, GDS-SU10, GDS-SU11, GDS-SU13, and GDS-SU14.
- There appear to have been effectively no functioning sensors in fields GDS-SU02 and GDS-SU03 during the irrigation season.
- Multiple exceedances of field capacity at the 3-foot depth were observed in fields GDS-SU03, GDS-SU04, GDS-SU07, GDS-SU10, GDS-SU13, and GDS-SU14.
- One field (GDS-SU03) has no 3-foot depth sensor (too rocky to install), and exceedance data are reported from the 2-foot depth.
- One field (GDS-SU07) appears to exhibit residual winter/spring soil moisture prior to the beginning of irrigation applications.

Once exceedances were noted, water application to these fields was adjusted by turning the water off or by lengthening the time between planned applications until moisture levels decreased below field capacity. Proactive measures in 2020 and beyond are appropriate to further prevent or reduce the number of future exceedances.

5.6 Off-Site Transfers

Under Section III.F.7 of the SOW, the Dairies must endeavor to avoid transporting manure to locations where the nitrate concentrations in groundwater is known by the Dairies to currently

exceed 10 mg/L. Application of manure on fields in such areas is allowed only if post-harvest soil sampling data indicate nitrate concentrations at the 2-foot depth are below the 45-ppm target.

The Dairies have access to current groundwater quality in areas within and within 1 mile downgradient of the Dairies. This knowledge is available near the existing Consent Order groundwater monitoring network and near the residential wells that were sampled in 2013 as described in Section 2 (Figure 3).

In 2019, a portion of the manure and composted manure from each Dairy was transferred off site for use as a nutrient supplement. Prior to transferring manure to off-site application fields within the 1-mile downgradient boundary of the Dairies, nutrient data were collected from these fields to monitor nutrient levels, therein minimizing the risk of nitrogen over-application in a manner that could potentially contribute to groundwater nitrate contamination. Compost from the Dairies was primarily transferred outside of the 1-mile downgradient boundary of the Dairies.

5.6.1 Off-Site Liquid Manure Transfers

In 2019, the Dairies applied liquid manure to off-site application fields to support crop production at the respective locations. Off-site applications of liquid manure totaled 13,050,767 gallons. These details are described in Tables 19, 20, and 21; locations are shown in Figure 31; and soil sample results are provided in Appendices E, F, and G.

The Dairies are continuing to optimize off-site tracking and nutrient monitoring with the goal of providing consistent collection of post-harvest soil samples from the 2-foot depth and avoiding over-application of liquid manure, which could potentially contribute to areas of existing groundwater nitrate contamination.

In 2019, off-site nutrient monitoring activities were conducted for off-site liquid manure transfers as follows:

- For Cow Palace Dairy, nutrient monitoring data were collected from 12 of 12 fields receiving liquid manure transfers from the Dairy. Each field receiving liquid manure applications exhibited nitrate concentrations at the 2-foot depth below the 45-ppm target.
- For Liberty/H&S Bosma Dairies, nutrient monitoring data were collected from 10 of 10 fields receiving liquid manure transfers from the Dairies. Each field receiving liquid manure applications exhibited nitrate concentrations at the 2-foot depth below the 45-ppm target. Three sections of fields exhibited nitrate concentrations at the 2-foot depth above the 45-ppm target, and no application was recommended for these sections.
- For George DeRuyter & Son/D&A Dairies, nutrient monitoring data were collected from 11 of 11 fields receiving liquid manure transfers from the Dairies. Each field receiving liquid manure applications exhibited nitrate concentrations at the 2-foot depth below the 45-ppm target.

Two sections of fields exhibited nitrate concentrations at the 2-foot depth above the 45-ppm target, and no application was recommended for these sections.[6]

5.6.2 Off-Site Solid Manure Transfers

In 2019, off-site solid manure transfers included sales to agricultural users, as well as transfers to off-site compost manufacturers. Off-site transfers of solid manure totaled 15,341 tons (including both manure solids and unfinished compost). These details are described in Tables 22, 23, and 24; locations are shown in Figure 32. In 2019, off-site nutrient monitoring activities were conducted for off-site solid manure transfers as follows:

- For Cow Palace Dairy, off-site solid manure transfers were to locations outside the 1-mile downgradient boundary; therefore, nutrient monitoring activities were not required under the Consent Order.
- For Liberty/H&S Bosma Dairies, no off-site solid manure transfers were conducted.
- For George DeRuyter & Son/D&A Dairies, off-site solid manure transfers were to locations outside the 1-mile downgradient boundary; therefore, nutrient monitoring activities were not required under the Consent Order.

5.6.3 Compost Production

The Dairies use much of their solid manure to produce organic compost. The compost is produced through windrow composting performed by the Dairies, as well as by third parties using on-site and off-site composting areas. The produced compost is a commercial product that is either used by the Dairies or sold as a soil amendment for horticultural use (i.e., landscaping, nurseries, and tree production) or agricultural use (including organic farming and other agricultural crop production) as a soil amendment.

During compost production, nitrogen in raw manure is transformed into more complex and stable humus-like organic matter, and odors, pathogens, weeds, and other unwanted materials that may be present in raw manure are greatly reduced or destroyed (DeLuca and DeLuca 1997; Rynk 1992). Moisture levels in raw manure are reduced during composting by approximately 50%, and approximately 30% to 60% of the readily available nitrogen volatizes (DeLuca and DeLuca 1997). Compared to the application of raw manure and inorganic fertilizers, the application of composted manure results in reduced risks of nitrogen leaching to infiltrating water. Although site-specific reasons vary, generally the primary reasons for this are as follows: 1) the reduction in total nitrogen content during composting; 2) conversion of the nitrogen to more complex and stable forms that are released in the subsurface at a slower and a more consistent rate; and 3) increase in the humus and

[6] Off-site applications were performed by the landowner and exact quantities applied to each field are unavailable; fields with nitrate concentrations greater than 45 ppm should not receive manure applications because these fields have no recommendation to apply.

organic matter content of the soil of the application field, improving both the ability of the soils to sequester nitrogen and regulate moisture content.

Most of the compost produced from solid manure generated by the Dairies is used in areas beyond the 1-mile downgradient boundary. Approximately 56,972 tons of finished compost produced from manure solids generated by the Dairies was sold for off-site use (this represents about 113,944 tons of wet manure solids prior to moisture and solids losses occurring during the compost process). Of this quantity, about 7,800 tons (approximately 14%) was used within the 1-mile downgradient boundary. The majority (approximately 86%) was used outside of the 1-mile downgradient boundary, and approximately 64% was used outside of Yakima County.

During 2019, finished compost was shipped by the Dairies to one property located within the 1-mile downgradient boundary. Transfer quantity and location details are described in Table 25 and Figure 33. The Dairies are unaware of any data indicating this shipment was to a location where nitrate concentrations in groundwater exceeded 10 mg/L.

The most developed markets for organic compost produced from the Dairies' manure solids currently include horticulture/landscape uses, production of organic root crops (typically not grown in the Sunnyside/Yakima area), organic fruit-tree growing (principally apples), and organic viticulture. Organic compost is relatively expensive in comparison to the cost of traditional chemical fertilizers and some other compost products that are higher in nitrogen levels (e.g., composted chicken manure). However, markets for organic compost continue to emerge as both organic and traditional growers gain experience with compost application and as the benefits of the compost amendment to crop production and soil conservation are documented in the agricultural community.

6 Other Reports, Plans, and Actions

6.1 Annual Reports

In 2019, the Dairies submitted the following documents related to annual reporting:

- *2018 Annual Report* (Anchor QEA 2019jj) – Submitted March 1, 2019
- *Revisions to 2018 Annual Report – Request for 2-Week Extension* (Anchor QEA 2019kk) – Submitted August 5, 2019
- *Response to July 10 Comment Letter (EPA Letter 202) Regarding the 2018 Annual Report* (Anchor QEA 2019ll) – Submitted August 21, 2019
- *2018 Annual Report* (Anchor QEA 2019mm) – Resubmitted August 21, 2019
- *2018 Annual Report* (Anchor QEA 2020e) – Resubmitted February 16, 2020

Also in 2019, the following document related to annual reporting was approved by EPA:

- *Revisions to 2018 Annual Report – Request for 2-Week Extension* (Anchor QEA 2019kk) – Approved August 6, 2019 (EPA Letter 210)
- *2018 Annual Report* (Anchor QEA 2019jj) – Approved February 6, 2020 (EPA Letter 218)

6.2 Quality Assurance Project Plans

Per Section III.A of the SOW, the Dairies must submit to EPA a QAPP prior to commencing any monitoring, sampling, field measurements, or laboratory sample analyses.

Each QAPP is prepared in accordance with *Guidance for QAPPs* (EPA 2001) and *EPA Requirements for QAPPs* (EPA 2002), as well as applicable amendments. The project data quality objectives are developed for use in the QAPP in accordance with *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA 2006).

In 2019, the following activities were performed regarding QAPPs:

- The revised draft George DeRuyter & Son/D&A Dairies *NDN QAPP* (Anchor QEA 2018d) was approved on March 21, 2019 (EPA Letter 191), as further discussed in Section 3.8.5.

6.3 Health and Safety Plan

Per Section III.B of the SOW, the Dairies must submit to EPA a health and safety plan (HASP) at least 14 days in advance of initial field work for each task.

Each HASP is compliant with the Occupational Safety and Health Act and its implementing regulations. The HASP will be updated periodically, as applicable, to address changes in work or field activities. The current HASP (Anchor QEA 2016) was submitted to EPA on September 13, 2016.

In 2019, there were no changes to the current HASP, and no loss time injuries or recordable incidents occurred.

6.4 Public Involvement

Per Section III.C of the SOW, the Dairies must notify EPA of their interest in participating in the public involvement process within 30 days of the effective date of the Consent Order. On April 18, 2013, the Dairies notified EPA of their interest in participating in the public involvement process.

In 2019, no public involvement activities were performed.

7 References

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8 Certifications

Cow Palace Dairy Certification

I certify under the penalty of law that this document and attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel gathered and evaluated the information submitted. Based on my inquiry of any and persons directly responsible for gathering and analyzing the information obtained, I certify that the information contained in or accompanying this submittal is to the best of my knowledge and belief, true, accurate, and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Cow Palace, LLC

Signature	
Name	Adam Dolsen
Title	Member
Date	9-1-20

George DeRuyter & Son Dairy, D&A Dairy, and George & Margaret Certification

I certify under the penalty of law that this document and attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel gathered and evaluated the information submitted. Based on my inquiry of any and persons directly responsible for gathering and analyzing the information obtained, I certify that the information contained in or accompanying this submittal is to the best of my knowledge and belief, true, accurate, and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

George DeRuyter & Son Dairy, LLC, D&A Dairy, LLC (also known as D and A Dairy, L.L.C.), and George & Margaret, LLC

Signature	
Name	Dan DeRuyter
Title	Member
Date	10/28/20

Liberty Dairy Certification

I certify under the penalty of law that this document and attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel gathered and evaluated the information submitted. Based on my inquiry of any and persons directly responsible for gathering and analyzing the information obtained, I certify that the information contained in or accompanying this submittal is to the best of my knowledge and belief, true, accurate, and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Liberty Dairy, LLC (and its associated dairy facility H&S Bosma Dairy)

Signature	
Name	Henry Bosma
Title	Partner
Date	8-31-2020

Tables

Table 1

Reverse Osmosis Unit Maintenance Summary, 2013 to 2019

	Number of Residences
Residence Survey	
Residences identified as being located within the area of interest[a]	223
RO Unit Survey	
Residence was offered reverse osmosis treatment system, at no charge to the resident[b]	67
Residence accepted the offer of a reverse osmosis unit	36
Residence already had reverse osmosis unit installed	50
Residence accepted the offer of maintenance of an existing reverse osmosis unit	15
Nitrate Sampling and Assessment	
Residence assessed for nitrate concentration in drinking water, either by Hach test strip or lab analysis	141
Residence drinking water sample nitrate concentration was less than the nitrate MCL, either by Hach test strip or lab analysis	75
Residence drinking water sample nitrate concentration exceeded the nitrate MCL based on laboratory analysis	66
Sampling and Assessments Unavailable	
Residence refusal, no response or vacant[c]	31
Maintenance post-2013 RO System Survey	
Residence RO systems maintained, 2016	36
Residence RO systems maintained, 2017	51[d]
Residence RO systems maintained, 2018	51[e]
Residence RO systems maintained, 2019[f]	5[g]

Notes:

Data compiled from 2013, 2016, and 2017 Annual Reports (IES 2016a; Anchor QEA 2017e and 2018e)

a. RW-1007 and RW-1205 are duplicates in the source spreadsheet; these were originally listed as separate RW numbers but are the same residence.

b. RW-1055A and RW-1055 are separate houses that share a well (Table 8 in IES 2016a)

c. Four lots did not have homes onsite; one parcel "did not exist."

d. Maintenance activities during 2017 included 66 home site visits.

e. Maintenance activities were funded in conjunction with work performed in parallel agreements with CARE for additional areas outside the 1-mile perimeter.

f. Coordination of maintenance activities will be transferred to Anchor QEA in 2020.

g. Maintenance data as provided by the Clean Drinking Water Project on September, 12 2019

MCL: maximum contaminant level

RO: reverse osmosis

Table 2

Cow Palace Lagoons Lined Prior to 2019 – Summary of Gallons Measured During 2019

Lagoon ID	Liquid Manure Pumped (gallons)
Northwest Arms Catch Basin	0.0
Lagoon No. 2	0.0

Table 3
Groundwater Monitoring Well Construction Data

Well ID	Coordinates[1]		Ground Surface Elevation[2] (feet NAVD88)	Surface Completion	Well Depth (feet bgs)	Casing and Screen Material	Screen Slot Size (inches)	Screen Length (feet)	Depth to Top of Screen (feet bgs)	Depth to Bottom of Screen (feet bgs)	Elevation of Top of Screen (feet NAVD88)	Elevation of Base of Screen (feet NAVD88)	Depth to Top of Filter Pack (feet bgs)	Depth to Bottom of Filter Pack (feet bgs)
	Latitude	Longitude												
Monitoring Wells														
DC-01	46.41879473	-120.13818510	1,199.64	Flush	160.0	Schedule 40 PVC	0.020	20.0	140.0	160.0	1,059.6	1,039.6	136.0	160.0
DC-03	46.38628888	-120.14614525	911.04	Flush	85.0	Schedule 40 PVC	0.020	20.0	62.5	82.5	848.5	828.5	58.5	85.0
DC-03D	46.38622013	-120.14605399	908.83	Stick-up	116.1	Schedule 40 PVC	0.020	9.5	106.1	115.6	802.7	793.2	100.0	116.5
DC-04	46.38244597	-120.13112916	877.62	Flush	51.0	Schedule 40 PVC	0.020	20.0	29.5	49.5	848.1	828.1	24.5	51.0
DC-05	46.38235835	-120.12023653	912.35	Flush	86.0	Schedule 40 PVC	0.020	20.0	63.5	83.5	848.9	828.9	59.5	86.0
DC-05D	46.38251688	-120.12020991	913.55	Stick-up	126.8	Schedule 40 PVC	0.020	9.5	116.8	126.3	796.8	787.3	114.0	128.0
DC-07	46.38961248	-120.14167140	889.78	Flush	61.0	Schedule 40 PVC	0.020	20.0	38.5	58.5	851.3	831.3	34.5	61.0
DC-09	46.40422954	-120.12085803	1,048.97	Flush	196.0	Schedule 40 PVC	0.020	20.0	173.5	193.5	875.5	855.5	169.5	196.0
DC-14	46.40424001	-120.13968549	1,036.92	Flush	151.0	Schedule 40 PVC	0.020	20.0	128.5	148.5	908.4	888.4	124.5	151.0
YVD-02	46.42260142	-120.11369707	1,285.81	Stick-up	35.0	Schedule 40 PVC	0.020	19.5	15.0	34.5	1,270.8	1,251.3	13.0	36.0
YVD-03	46.41422690	-120.13963782	1,118.15	Stick-up	200.1	Schedule 40 PVC	0.020	19.5	180.1	199.6	938.1	918.6	176.0	202.0
YVD-04	46.40806206	-120.15622396	1,116.06	Stick-up	245.2	Schedule 40 PVC	0.020	19.5	225.2	244.7	890.9	871.4	220.0	248.0
YVD-05	46.40445691	-120.14279042	1,052.26	Flush	182.2	Schedule 40 PVC	0.020	19.5	162.2	181.7	890.1	870.6	156.0	208.0
YVD-06	46.40767071	-120.13719080	1,053.88	Flush	169.0	Schedule 40 PVC	0.020	19.5	149.0	168.5	904.9	885.4	144.0	170.0
YVD-07	46.40443244	-120.12520522	1,070.59	Stick-up	168.3	Schedule 40 PVC	0.020	19.5	148.3	167.8	922.3	902.8	145.0	169.0
YVD-08	46.39691976	-120.15277093	1,011.92	Stick-up	182.5	Schedule 40 PVC	0.020	19.5	162.5	182.0	849.4	829.9	155.0	188.0
YVD-09	46.39683198	-120.14407816	964.28	Stick-up	122.3	Schedule 40 PVC	0.020	19.5	102.3	121.8	862.0	842.5	9.5	128.0
YVD-10	46.39697787	-120.13616530	955.45	Stick-up	103.1	Schedule 40 PVC	0.020	19.5	83.1	102.6	872.4	852.9	76.0	103.5
YVD-11	46.39344626	-120.12362653	965.51	Stick-up	116.9	Schedule 40 PVC	0.020	19.5	96.9	116.4	868.6	849.1	94.0	117.3
YVD-12	46.38972988	-120.16699550	959.51	Stick-up	151.4	Schedule 40 PVC	0.020	19.5	131.4	150.9	828.1	808.6	127.0	154.0
YVD-13	46.38970847	-120.15167317	963.07	Stick-up	141.0	Schedule 40 PVC	0.020	19.5	121.0	140.5	842.1	822.6	117.0	148.0
YVD-14R	46.389532	-120.145124	918.80	Stick-up	93.0	Schedule 40 PVC	0.020	20.0	72.0	92.0	846.8	826.8	69.0	93.0
YVD-15	46.38980233	-120.13715271	938.08	Stick-up	105.1	Schedule 40 PVC	0.020	19.5	85.1	104.6	853.0	833.5	81.0	128.0
YVD-16	46.38958628	-120.11478279	972.99	Stick-up	122.1	Schedule 40 PVC	0.020	19.5	102.1	121.6	870.9	851.4	100.5	127.0
YVD-17	46.38076091	-120.14206677	864.28	Stick-up	47.7	Schedule 40 PVC	0.020	19.5	27.7	47.2	836.6	817.1	25.0	58.0
YVD-18	46.38975797	-120.15167075	963.42	Stick-up	179.9	Schedule 40 PVC	0.020	9.5	169.9	179.4	793.5	784.0	166.0	181.5
Decommissioned Wells														
YVD-14	46.38953605	-120.14506741	917.64	Stick-up	91.0	Schedule 40 PVC	0.020	19.5	71.0	90.5	846.6	827.1	66.0	98.0

Notes:
1. Latitude and longitude in decimal degrees based on World Geodetic Survey 1984.
2. Vertical elevation based on NAVD88.
bgs: below ground surface
NAVD88: North American Vertical Datum of 1988
PVC: polyvinyl chloride

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-01	DC-01-130104	01/04/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-01	DC-01-130924	09/24/2013	N	SWI0178	**88.9**	-	-	**32.5**	-	-	**6.10**	-	-	**43.0**	-	-	**44**	-	-	0.5	U	-
DC-01	DC-01-131211	12/11/2013	N	SWL0063	**91.4**	-	-	**32.6**	-	-	**5.94**	-	-	**41.9**	-	-	**47.8**	-	-	5	U	-
DC-01	DC-01-140318	03/18/2014	N	SXC0095	**90.5**	-	-	**31.4**	-	-	**5.93**	-	-	**40.2**	-	-	**48.2**	-	-	5	U	-
DC-01	DC-01-140602	06/02/2014	N	SXF0017	**88.6**	-	-	**31.9**	-	-	**6.74**	-	-	**41.8**	-	-	**41.4**	-	-	2	U	-
DC-01	DC-01-140923	09/23/2014	N	SXI0158	**89.4**	-	-	**31.2**	-	-	**6.02**	-	-	**44.3**	J+	MSD	**41.8**	-	-	5	U	-
DC-01	DC-01-141216	12/16/2014	N	SXL0121	**92.8**	-	-	**34.0**	-	-	**6.18**	-	-	**43.1**	-	-	**85.7**	-	-	5	U	-
DC-01	DC-01-150316	03/16/2015	N	5904471	**91.0**	-	-	**32.0**	-	-	**6.50**	-	-	**44.0**	-	-	**44**	-	-	5	U	-
DC-01	DC-01-150616	06/16/2015	N	59010751	**91.0**	J+	MSD	**33.0**	J+	MSD	**6.20**	J+	MSD	**42.0**	J+	MSD	**42**	-	-	5	U	-
DC-01	DC-01-150923	09/23/2015	N	59020281	**83.0**	-	-	**32.0**	-	-	**6.00**	-	-	**43.0**	-	-	**37**	-	-	5	U	-
DC-01	YVD-D1-150923	09/23/2015	FD	59020281	**85.0**	-	-	**33.0**	-	-	**6.10**	-	-	**43.0**	-	-	**43**	-	-	0.5	U	-
DC-01	DC-01-151214	12/14/2015	N	59025431	**97.0**	-	-	**34.0**	-	-	**6.80**	-	-	**48.0**	-	-	**38**	-	-	5	U	-
DC-01	DC-01-160308	03/08/2016	N	59029711	**83.0**	-	-	**30.0**	-	-	**6.20**	-	-	**42.0**	-	-	**40**	-	-	5	U	-
DC-01	DC-01-160620	6/20/2016	N	59037101	**83.0**	-	-	**31.0**	-	-	**6.50**	-	-	**46.0**	-	-	**40**	-	-	5	U	-
DC-01	DC-01-160928	9/28/2016	N	K1611629	**80.6**	-	-	**28.5**	-	-	**5.76**	-	-	**41.6**	-	-	**34.0**	-	-	**0.25**	-	-
DC-01	DC-01-161212	12/12/2016	N	K1615045	**81.1**	-	-	**27.9**	-	-	**5.52**	-	-	**40.4**	-	-	**31.9**	-	-	**0.39**	-	-
DC-01	YVD-030817-18	3/8/2017	N	K1702324	**80.8**	-	-	**27**	-	-	**5.13**	-	-	**37.4**	-	-	**32.6**	-	-	**0.39**	-	-
DC-01	YVD-060417-03	6/4/2017	N	K1705702	**83.4**	-	-	**26.2**	-	-	**5.22**	-	-	**37.4**	-	-	**32.9**	-	-	**0.40**	-	-
DC-01	YVD-060417-05	6/4/2017	FD	K1705702	**83.0**	-	-	**25.7**	-	-	**5.08**	-	-	**36.9**	-	-	**33.2**	-	-	**0.38**	-	-
DC-01	YVD-092517-13	9/25/2017	N	K1710333	**78.9**	-	-	**26.1**	-	-	**5.31**	-	-	**39.1**	-	-	**33.2**	-	-	**0.37**	-	-
DC-01	YVD-120617-31	12/6/2017	N	K1713157	**83.7**	-	-	**28.1**	-	-	**5.56**	-	-	**40.6**	-	-	**33.2**	-	-	**0.37**	-	-
DC-01	YVD-060418-19	6/4/2018	N	874662	**80.5**	-	-	**28.75**	-	-	**5.80**	-	-	**42.4**	-	-	**34.6**	-	-	**0.36**	-	-
DC-01	YVD-060219-03	6/2/2019	N	991939	**76.5**	-	-	**26.15**	-	-	**5.50**	-	-	**39.0**	-	-	46.3	U	FBK	0.99	U	FBK
DC-03	DC-03-130102	01/02/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-03	DC-03-130918	09/18/2013	N	SWI0138	**284**	-	-	**73.7**	-	-	**2.73**	-	-	**173**	-	-	**176**	-	-	5	U	-
DC-03	DC-03-131212	12/12/2013	N	SWL0078	**280**	-	-	**75.0**	-	-	**3.29**	-	-	**172**	-	-	**172**	-	-	5	U	-
DC-03	YVD-D3-131212	12/12/2013	FD	SWL0078	**292**	-	-	**77.3**	-	-	**3.53**	-	-	**181**	-	-	**142**	-	-	5	U	-
DC-03	DC-03-140319	03/19/2014	N	SXC0107	**261**	-	-	**66.8**	-	-	**2.91**	-	-	**165**	-	-	**159**	J	FDP	5	U	-
DC-03	YVD-D3-140319	03/19/2014	FD	SXC0107	**261**	-	-	**66.7**	-	-	**2.81**	-	-	**166**	-	-	**128**	J	FDP	5	U	-
DC-03	DC-03-140604	06/04/2014	N	SXF0025	**259**	-	-	**67.7**	-	-	**3.11**	-	-	**177**	-	-	**201**	-	-	10	U	-
DC-03	DC-03-140924	09/24/2014	N	SXI0173	**291**	-	-	**77.1**	-	-	**3.28**	-	-	**178**	-	-	**147**	-	-	5	U	-
DC-03	DC-03-141217	12/17/2014	N	SXL0144	**274**	-	-	**74.9**	-	-	**3.76**	-	-	**185**	-	-	**157**	-	-	10	U	-
DC-03	YVD-D4-141217	12/17/2014	FD	SXL0144	**271**	-	-	**72.6**	-	-	**3.19**	-	-	**180**	-	-	**182**	-	-	5	U	-
DC-03	DC-03-150318	03/18/2015	N	5904651	**260**	-	-	**73.0**	-	-	**3.30**	J-	MSD	**180**	-	-	**160**	-	-	5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-01	DC-01-130104	01/04/2013	N	EPA01	**9.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-01	DC-01-130924	09/24/2013	N	SWI0178	**11.1**	-	-	0.2	U	-	**223**	-	-	-	-	-	0.1	U	-	0.25	U	-
DC-01	DC-01-131211	12/11/2013	N	SWL0063	**11.5**	-	-	2	U	-	**280**	J-	MSD	-	-	-	-	R	MSD	0.2	U	-
DC-01	DC-01-140318	03/18/2014	N	SXC0095	**11.2**	-	-	2	U	-	**250**	J-	MSD	-	-	-	**0.101**	-	-	**0.304**	-	-
DC-01	DC-01-140602	06/02/2014	N	SXF0017	**9.76**	-	-	0.8	U	-	**224**	J-	MSD	-	-	-	0.1	U	-	**0.45**	-	-
DC-01	DC-01-140923	09/23/2014	N	SXI0158	**9**	-	-	2	U	-	**216**	-	-	-	-	-	-	R	MSD	0.25	U	-
DC-01	DC-01-141216	12/16/2014	N	SXL0121	**18.9**	-	-	2	U	-	**463**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-01	DC-01-150316	03/16/2015	N	5904471	**11**	-	-	2	U	-	**220**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-01	DC-01-150616	06/16/2015	N	59010751	**9.5**	-	-	2	U	-	**200**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-01	DC-01-150923	09/23/2015	N	59020281	**8.6**	-	-	2	U	-	**200**	-	-	-	-	-	**0.13**	-	-	-	R	MSD
DC-01	YVD-D1-150923	09/23/2015	FD	59020281	**10**	-	-	0.2	U	-	**210**	-	-	-	-	-	0.1	U	-	-	R	MSD
DC-01	DC-01-151214	12/14/2015	N	59025431	**8.8**	-	-	2	U	-	**220**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-01	DC-01-160308	03/08/2016	N	59029711	**8.6**	-	-	2	U	-	**210**	J+	MSD	-	-	-	-	R	FBK, FDP	-	R	MSD
DC-01	DC-01-160620	6/20/2016	N	59037101	**9.2**	-	-	2	U	-	**220**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-01	DC-01-160928	9/28/2016	N	K1611629	**9.15**	-	-	0.10	U	-	**193**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
DC-01	DC-01-161212	12/12/2016	N	K1615045	**8.89**	J	HTQ	0.10	UJ	HTQ	**191**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-01	YVD-030817-18	3/8/2017	N	K1702324	**9.0**	-	-	0.10	U	-	**175**	-	-	-	-	-	1	U	-	0.5	U	-
DC-01	YVD-060417-03	6/4/2017	N	K1705702	**8.2**	-	-	0.10	U	-	**203**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-01	YVD-060417-05	6/4/2017	FD	K1705702	**8.2**	-	-	0.10	U	-	**203**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-01	YVD-092517-13	9/25/2017	N	K1710333	**8.41**	-	-	0.10	U	-	**194**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-01	YVD-120617-31	12/6/2017	N	K1713157	**8.81**	-	-	0.10	U	-	**182**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-01	YVD-060418-19	6/4/2018	N	874662	**8.60**	-	-	0.05	U	-	**171**	-	-	0.07	U	FBK	-	-	-	0.5	UJ	MSD
DC-01	YVD-060219-03	6/2/2019	N	991939	**8.60**	-	-	0.05	U	-	**168**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-03	DC-03-130102	01/02/2013	N	EPA01	**190**	-	-	-	-	-	-	-	-	-	-	-	0.1	U	-	-	-	-
DC-03	DC-03-130918	09/18/2013	N	SWI0138	**166**	-	-	2	U	-	**176**	-	-	-	-	-	0.1	U	-	0.25	U	-
DC-03	DC-03-131212	12/12/2013	N	SWL0078	**174**	-	-	2	U	-	**176**	-	-	-	-	-	0.02	U	-	0.2	U	-
DC-03	YVD-D3-131212	12/12/2013	FD	SWL0078	**182**	-	-	2	U	-	**160**	-	-	-	-	-	0.02	U	-	0.8311	U	ERL
DC-03	DC-03-140319	03/19/2014	N	SXC0107	**195**	-	-	2	U	-	**189**	J	FDP	-	-	-	0.1	U	-	**0.938**	J-	MSD
DC-03	YVD-D3-140319	03/19/2014	FD	SXC0107	**164**	-	-	2	U	-	**150**	J	FDP	-	-	-	0.1	U	-	**0.718**	J-	MSD
DC-03	DC-03-140604	06/04/2014	N	SXF0025	**234**	-	-	4	U	-	**214**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-03	DC-03-140924	09/24/2014	N	SXI0173	**170**	-	-	2	U	-	**166**	-	-	-	-	-	0.1	U	-	**2.27**	J+	MSD
DC-03	DC-03-141217	12/17/2014	N	SXL0144	**193**	-	-	4	U	-	**182**	-	-	-	-	-	**0.18**	J+	FBK, MBK	-	R	MSD
DC-03	YVD-D4-141217	12/17/2014	FD	SXL0144	**156**	-	-	10	U	-	**211**	-	-	-	-	-	0.1	U	-	-	R	MSD
DC-03	DC-03-150318	03/18/2015	N	5904651	**180**	-	-	2	U	-	**160**	-	-	-	-	-	0.1	U	-	**0.45**	J-	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-01	DC-01-130104	01/04/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-01	DC-01-130924	09/24/2013	N	SWI0178	-	-	-	-	-	-	**0.123**	-	-	-	-	-	**110**	-	-	**110**	-	-
DC-01	DC-01-131211	12/11/2013	N	SWL0063	-	-	-	-	-	-	-	-	-	**0.186**	-	-	**159**	-	-	**160**	-	-
DC-01	DC-01-140318	03/18/2014	N	SXC0095	**0.079**	-	-	-	-	-	-	-	-	-	-	-	**159**	-	-	**160**	-	-
DC-01	DC-01-140602	06/02/2014	N	SXF0017	**0.81**	-	-	-	-	-	-	-	-	-	-	-	**164**	-	-	**165**	-	-
DC-01	DC-01-140923	09/23/2014	N	SXI0158	**0.12**	-	-	-	-	-	-	-	-	-	-	-	**154**	-	-	**155**	-	-
DC-01	DC-01-141216	12/16/2014	N	SXL0121	0.1	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
DC-01	DC-01-150316	03/16/2015	N	5904471	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
DC-01	DC-01-150616	06/16/2015	N	59010751	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
DC-01	DC-01-150923	09/23/2015	N	59020281	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
DC-01	YVD-D1-150923	09/23/2015	FD	59020281	0.25	U	-	-	-	-	-	-	-	-	-	-	**160**	-	-	**160**	-	-
DC-01	DC-01-151214	12/14/2015	N	59025431	**0.3**	J	FDP	-	-	-	-	-	-	-	-	-	**170**	J	FDP	**170**	J	FDP
DC-01	DC-01-160308	03/08/2016	N	59029711	**0.26**	-	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
DC-01	DC-01-160620	6/20/2016	N	59037101	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
DC-01	DC-01-160928	9/28/2016	N	K1611629	-	-	-	**0.009**	J	-	-	-	-	-	-	-	**147**	-	-	**147**	-	-
DC-01	DC-01-161212	12/12/2016	N	K1615045	-	-	-	**0.040**	-	-	-	-	-	-	-	-	**144**	-	-	**144**	-	-
DC-01	YVD-030817-18	3/8/2017	N	K1702324	-	-	-	**0.008**	J	-	-	-	-	-	-	-	**148**	-	-	**148**	-	-
DC-01	YVD-060417-03	6/4/2017	N	K1705702	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**147**	-	-	**147**	-	-
DC-01	YVD-060417-05	6/4/2017	FD	K1705702	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**147**	-	-	**147**	-	-
DC-01	YVD-092517-13	9/25/2017	N	K1710333	-	-	-	0.010	U	-	-	-	-	-	-	-	**148**	-	-	**148**	-	-
DC-01	YVD-120617-31	12/6/2017	N	K1713157	-	-	-	**0.010**	-	-	-	-	-	-	-	-	**146**	-	-	**146**	-	-
DC-01	YVD-060418-19	6/4/2018	N	874662	-	-	-	-	-	-	-	-	-	0.07	U	-	**141**	-	-	**141**	-	-
DC-01	YVD-060219-03	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**142**	-	-	**142**	-	-
DC-03	DC-03-130102	01/02/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-03	DC-03-130918	09/18/2013	N	SWI0138	-	-	-	-	-	-	0.1	U	-	-	-	-	**435**	-	-	**435**	-	-
DC-03	DC-03-131212	12/12/2013	N	SWL0078	-	-	-	-	-	-	-	-	-	**0.221**	-	-	**474**	-	-	**475**	-	-
DC-03	YVD-D3-131212	12/12/2013	FD	SWL0078	-	-	-	-	-	-	-	-	-	**0.244**	-	-	**459**	-	-	**460**	-	-
DC-03	DC-03-140319	03/19/2014	N	SXC0107	**0.057**	-	-	-	-	-	-	-	-	-	-	-	**459**	-	-	**460**	-	-
DC-03	YVD-D3-140319	03/19/2014	FD	SXC0107	**0.062**	-	-	-	-	-	-	-	-	-	-	-	**469**	-	-	**470**	-	-
DC-03	DC-03-140604	06/04/2014	N	SXF0025	**0.12**	-	-	-	-	-	-	-	-	-	-	-	**425**	-	-	**425**	-	-
DC-03	DC-03-140924	09/24/2014	N	SXI0173	**0.073**	J+	FBK	-	-	-	-	-	-	-	-	-	**409**	-	-	**410**	-	-
DC-03	DC-03-141217	12/17/2014	N	SXL0144	0.1	UJ	MSD	-	-	-	-	-	-	-	-	-	**429**	-	-	**430**	-	-
DC-03	YVD-D4-141217	12/17/2014	FD	SXL0144	**0.13**	J-	MSD	-	-	-	-	-	-	-	-	-	**423**	-	-	**425**	-	-
DC-03	DC-03-150318	03/18/2015	N	5904651	0.25	U	-	-	-	-	-	-	-	-	-	-	**420**	-	-	**420**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-03	YVD-D4-150318	03/18/2015	FD	5904651	**270**	-	-	**74.0**	-	-	**3.60**	J-	MSD	**180**	-	-	**150**	-	-	2.5	U	-
DC-03	DC-03-150617	06/17/2015	N	59011021	**290**	-	-	**78.0**	J	RPD	**3.60**	J	RPD	**190**	J	RPD	**170**	-	-	5	U	-
DC-03	YVD-D4-150617	06/17/2015	FD	59011021	**290**	-	-	**77.0**	J	RPD	**3.60**	J	RPD	**190**	J	RPD	**180**	-	-	5	U	-
DC-03	DC-03-150925	09/25/2015	N	59020431	**270**	-	-	**73.0**	-	-	**3.30**	-	-	**180**	-	-	**140**	-	-	10	U	-
DC-03	YVD-D4-150925	09/25/2015	FD	59020431	**260**	-	-	**69.0**	-	-	**3.20**	-	-	**180**	-	-	**140**	-	-	0.5	U	-
DC-03	DC-03-151216	12/16/2015	N	59025501	**260**	-	-	**75.0**	-	-	**3.50**	-	-	**160**	-	-	**170**	-	-	5	U	-
DC-03	YVD-D4-151216	12/16/2015	FD	59025501	**250**	-	-	**75.0**	-	-	**3.50**	-	-	**160**	-	-	**160**	-	-	2.5	U	-
DC-03	DC-03-160310	03/10/2016	N	59029941	**270**	-	-	**72.0**	-	-	**3.10**	-	-	**180**	-	-	**150**	-	-	5	U	-
DC-03	YVD-D4-160310	03/10/2016	FD	59029941	**270**	-	-	**72.0**	-	-	**3.00**	-	-	**180**	-	-	**160**	-	-	5	U	-
DC-03	DC-03-160623	6/23/2016	N	59037371	**270**	-	-	**73.0**	-	-	**3.50**	-	-	**190**	-	-	**150**	-	-	5	U	-
DC-03	YVD-D4-160623	6/23/2016	FD	59037371	**250**	-	-	**71.0**	-	-	**3.30**	-	-	**180**	-	-	**160**	-	-	2.5	U	-
DC-03	DC-03-160927	9/27/2016	N	K1611565	**265**	-	-	**72.4**	-	-	**2.85**	-	-	**182**	-	-	**136**	-	-	**0.20**	J	-
DC-03	DC-03-D2-160927	9/27/2016	FD	K1611565	**262**	-	-	**71.9**	-	-	**2.87**	-	-	**183**	-	-	**137**	-	-	**0.19**	J	-
DC-03	DC-03-161212	12/12/2016	N	K1615029	**254**	-	-	**65.7**	-	-	**3.05**	-	-	**167**	-	-	**131**	-	-	**0.24**	-	-
DC-03	YVD-030817-13	3/8/2017	N	K1702324	**267**	-	-	**66.0**	-	-	**2.58**	-	-	**159**	-	-	**150**	-	-	**0.22**	-	-
DC-03	YVD-060517-02	6/5/2017	N	K1705702	**271**	-	-	**61.6**	-	-	**2.49**	-	-	**157**	-	-	**152**	-	-	**0.24**	-	-
DC-03	YVD-060517-04	6/5/2017	FD	K1705702	**269**	-	-	**70.6**	-	-	**2.49**	-	-	**158**	-	-	**152**	-	-	**0.28**	-	-
DC-03	YVD-092617-22	9/26/2017	N	K1710333	**279**	-	-	**68.9**	-	-	**2.92**	-	-	**159**	-	-	**154**	-	-	**0.24**	-	-
DC-03	YVD-120417-10	12/4/2017	N	K1713026	**274**	-	-	**69.4**	-	-	**2.76**	-	-	**161**	-	-	**161**	-	-	**0.24**	-	-
DC-03	YVD-031818-04	3/18/2018	N	870610	**280**	-	-	**67.00**	-	-	**3.01**	-	-	**180**	-	-	**156**	-	-	**0.19**	-	-
DC-03	YVD-060418-22	6/4/2018	N	874860	**266**	-	-	**67.00**	-	-	**3.34**	-	-	**174**	-	-	**152**	-	-	**0.19**	-	-
DC-03	YVD-090918-17	9/9/2018	N	880601	**267**	-	-	**65.50**	-	-	**2.82**	-	-	**160**	-	-	**133**	-	-	**0.20**	-	-
DC-03	YVD-121018-03	12/10/2018	N	884857	**263**	-	-	**65.50**	J	MSD	**3.24**	-	-	**170**	-	-	**142**	-	-	0.20	U	FBK
DC-03	YVD-031819-19	3/18/2019	N	988273	**276**	-	-	**66.00**	-	-	**3.19**	-	-	**178**	-	-	**150**	-	-	**0.19**	-	-
DC-03	YVD-060419-32	6/4/2019	N	992242	**282**	-	-	**70.00**	-	-	**3.02**	-	-	**172**	-	-	**155**	-	-	**0.27**	-	-
DC-03	YVD-091019-23	9/10/2019	N	998438	**285**	-	-	**74.00**	-	-	**3.06**	-	-	**159**	-	-	**132**	-	-	**0.15**	-	-
DC-03	YVD-121019-22	12/10/2019	N	902321	**261**	-	-	**65.50**	-	-	**3.60**	-	-	**164**	-	-	**121**	-	-	**0.17**	-	-
DC-03D	DC-03D-130918	09/18/2013	N	SWI0138	**198**	-	-	**44.0**	-	-	**2.71**	-	-	**62.1**	-	-	**56**	-	-	5	U	-
DC-03D	DC-03D-131212	12/12/2013	N	SWL0073	**194**	-	-	**43.3**	-	-	**2.67**	-	-	**59.7**	-	-	**67.9**	-	-	5	U	-
DC-03D	DC-03D-140319	03/19/2014	N	SXC0107	**200**	-	-	**43.9**	-	-	**2.67**	-	-	**57.5**	-	-	**65.9**	-	-	5	U	-
DC-03D	DC-03D-140603	06/03/2014	N	SXF0017	**179**	-	-	**40.9**	-	-	**2.66**	-	-	**59.0**	-	-	**65.5**	-	-	2	U	-
DC-03D	DC-03D-140923	09/23/2014	N	SXI0173	**216**	-	-	**46.6**	-	-	**3.40**	-	-	**67.8**	-	-	**59.5**	-	-	2.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-03	YVD-D4-150318	03/18/2015	FD	5904651	**180**	-	-	1	U	-	**160**	-	-	-	-	-	**0.12**	-	-	**0.53**	J-	MSD
DC-03	DC-03-150617	06/17/2015	N	59011021	**180**	J-	MSD, FDP	2	U	-	**170**	-	-	-	-	-	0.1	U	-	-	R	MSD
DC-03	YVD-D4-150617	06/17/2015	FD	59011021	**10**	J-	MSD, FDP	2	U	-	**180**	-	-	-	-	-	0.1	U	-	-	R	MSD
DC-03	DC-03-150925	09/25/2015	N	59020431	**180**	-	-	4	U	-	**150**	-	-	-	-	-	**0.1**	-	-	0.25	U	-
DC-03	YVD-D4-150925	09/25/2015	FD	59020431	**180**	-	-	4	U	-	**160**	-	-	-	-	-	**0.2**	-	-	0.25	U	-
DC-03	DC-03-151216	12/16/2015	N	59025501	**200**	-	-	2	U	-	**130**	-	-	-	-	-	**0.18**	J-	MSD	-	R	MSD
DC-03	YVD-D4-151216	12/16/2015	FD	59025501	**170**	-	-	1	U	-	**130**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-03	DC-03-160310	03/10/2016	N	59029941	**180**	-	-	2	U	-	**170**	J	DUP	-	-	-	0.1	U	-	**0.94**	J-	FDP, MSD
DC-03	YVD-D4-160310	03/10/2016	FD	59029941	**190**	-	-	2	U	-	**180**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	FDP, MSD
DC-03	DC-03-160623	6/23/2016	N	59037371	**180**	-	-	2	U	-	**160**	-	-	-	-	-	**0.12**	J-	MSD	0.25	U	-
DC-03	YVD-D4-160623	6/23/2016	FD	59037371	**170**	-	-	1	U	-	**160**	-	-	-	-	-	**0.11**	J-	MSD	0.25	U	-
DC-03	DC-03-160927	9/27/2016	N	K1611565	**163**	-	-	0.10	U	-	**139**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
DC-03	DC-03-D2-160927	9/27/2016	FD	K1611565	**163**	-	-	0.10	U	-	**138**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
DC-03	DC-03-161212	12/12/2016	N	K1615029	**168**	J	HTQ	0.10	U	-	**112**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03	YVD-030817-13	3/8/2017	N	K1702324	**179**	-	-	**0.12**	-	-	**104**	-	-	-	-	-	1	U	-	0.5	U	-
DC-03	YVD-060517-02	6/5/2017	N	K1705702	**181**	-	-	0.10	U	-	**147**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03	YVD-060517-04	6/5/2017	FD	K1705702	**182**	-	-	0.10	U	-	**122**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03	YVD-092617-22	9/26/2017	N	K1710333	**192**	-	-	0.10	U	-	**115**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03	YVD-120417-10	12/4/2017	N	K1713026	**207**	-	-	0.10	U	-	**108**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03	YVD-031818-04	3/18/2018	N	870610	**192**	-	-	0.05	U	-	**111**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-03	YVD-060418-22	6/4/2018	N	874860	**184**	-	-	0.05	U	-	**108**	-	-	**1.22**	-	-	-	-	-	0.5	UJ	MSD
DC-03	YVD-090918-17	9/9/2018	N	880601	**157**	-	-	0.05	U	-	**136**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-03	YVD-121018-03	12/10/2018	N	884857	**180**	-	-	0.05	U	-	**134**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-03	YVD-031819-19	3/18/2019	N	988273	**186**	-	-	0.05	U	-	**148**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-03	YVD-060419-32	6/4/2019	N	992242	**178**	-	-	0.05	U	-	**152**	-	-	**0.27**	-	-	-	-	-	0.5	UJ	MSD
DC-03	YVD-091019-23	9/10/2019	N	998438	**180**	-	-	0.05	U	-	**154**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-03	YVD-121019-22	12/10/2019	N	902321	**175**	-	-	0.05	U	-	**156**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-03D	DC-03D-130918	09/18/2013	N	SWI0138	**46.4**	-	-	2	U	-	**101**	-	-	-	-	-	0.1	U	-	**0.255**	-	-
DC-03D	DC-03D-131212	12/12/2013	N	SWL0073	**38.9**	-	-	2	U	-	**99.1**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
DC-03D	DC-03D-140319	03/19/2014	N	SXC0107	**42.5**	-	-	2	U	-	**106**	-	-	-	-	-	**0.127**	-	-	**0.427**	J-	MSD
DC-03D	DC-03D-140603	06/03/2014	N	SXF0017	**42**	-	-	0.8	U	-	**103**	J-	MSD	-	-	-	0.1	U	-	**0.468**	-	-
DC-03D	DC-03D-140923	09/23/2014	N	SXI0173	**38**	-	-	1	U	-	**89.4**	-	-	-	-	-	0.1	U	-	0.25	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-03	YVD-D4-150318	03/18/2015	FD	5904651	0.25	U	-	-	-	-	-	-	-	-	-	-	**410**	-	-	**410**	-	-
DC-03	DC-03-150617	06/17/2015	N	59011021	0.25	U	-	-	-	-	-	-	-	-	-	-	**460**	-	-	**460**	-	-
DC-03	YVD-D4-150617	06/17/2015	FD	59011021	0.25	U	-	-	-	-	-	-	-	-	-	-	**450**	-	-	**450**	-	-
DC-03	DC-03-150925	09/25/2015	N	59020431	0.25	U	-	-	-	-	-	-	-	-	-	-	**390**	-	-	**390**	-	-
DC-03	YVD-D4-150925	09/25/2015	FD	59020431	0.25	U	-	-	-	-	-	-	-	-	-	-	**460**	-	-	**460**	-	-
DC-03	DC-03-151216	12/16/2015	N	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**400**	-	-	**400**	-	-
DC-03	YVD-D4-151216	12/16/2015	FD	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**380**	-	-	**380**	-	-
DC-03	DC-03-160310	03/10/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**460**	-	-	**460**	-	-
DC-03	YVD-D4-160310	03/10/2016	FD	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**480**	-	-	**480**	-	-
DC-03	DC-03-160623	6/23/2016	N	59037371	0.25	U	-	-	-	-	-	-	-	-	-	-	**420**	-	-	**420**	-	-
DC-03	YVD-D4-160623	6/23/2016	FD	59037371	0.25	U	-	-	-	-	-	-	-	-	-	-	**410**	-	-	**410**	-	-
DC-03	DC-03-160927	9/27/2016	N	K1611565	-	-	-	**0.006**	J	-	-	-	-	-	-	-	**425**	-	-	**425**	-	-
DC-03	DC-03-D2-160927	9/27/2016	FD	K1611565	-	-	-	0.010	U	-	-	-	-	-	-	-	**427**	-	-	**427**	-	-
DC-03	DC-03-161212	12/12/2016	N	K1615029	-	-	-	**0.199**	-	-	-	-	-	-	-	-	**371**	-	-	**371**	-	-
DC-03	YVD-030817-13	3/8/2017	N	K1702324	-	-	-	**0.006**	J	-	-	-	-	-	-	-	**381**	-	-	**381**	-	-
DC-03	YVD-060517-02	6/5/2017	N	K1705702	-	-	-	**0.022**	-	-	-	-	-	-	-	-	**358**	-	-	**358**	-	-
DC-03	YVD-060517-04	6/5/2017	FD	K1705702	-	-	-	**0.019**	-	-	-	-	-	-	-	-	**360**	-	-	**360**	-	-
DC-03	YVD-092617-22	9/26/2017	N	K1710333	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**329**	-	-	**329**	-	-
DC-03	YVD-120417-10	12/4/2017	N	K1713026	-	-	-	0.017	U	MBK	-	-	-	-	-	-	**333**	-	-	**333**	-	-
DC-03	YVD-031818-04	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**374**	-	-	**374**	-	-
DC-03	YVD-060418-22	6/4/2018	N	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	**358**	-	-	**358**	-	-
DC-03	YVD-090918-17	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**460**	-	-	**460**	-	-
DC-03	YVD-121018-03	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**415**	-	-	**415**	-	-
DC-03	YVD-031819-19	3/18/2019	N	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	**435**	-	-	**435**	-	-
DC-03	YVD-060419-32	6/4/2019	N	992242	-	-	-	-	-	-	-	-	-	0.07	U	-	**406**	-	-	**406**	-	-
DC-03	YVD-091019-23	9/10/2019	N	998438	-	-	-	-	-	-	-	-	-	0.07	U	-	**463**	-	-	**463**	-	-
DC-03	YVD-121019-22	12/10/2019	N	902321	-	-	-	-	-	-	-	-	-	0.07	U	-	**433**	-	-	**433**	-	-
DC-03D	DC-03D-130918	09/18/2013	N	SWI0138	-	-	-	-	-	-	0.1	U	-	-	-	-	**509**	-	-	**510**	-	-
DC-03D	DC-03D-131212	12/12/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	0.06	U	-	**559**	-	-	**560**	-	-
DC-03D	DC-03D-140319	03/19/2014	N	SXC0107	0.05	U	-	-	-	-	-	-	-	-	-	-	**564**	-	-	**565**	-	-
DC-03D	DC-03D-140603	06/03/2014	N	SXF0017	**0.074**	J+	FBK	-	-	-	-	-	-	-	-	-	**542**	-	-	**543**	-	-
DC-03D	DC-03D-140923	09/23/2014	N	SXI0173	**0.098**	-	-	-	-	-	-	-	-	-	-	-	**514**	-	-	**515**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-03D	DC-03D-141217	12/17/2014	N	SXL0121	**203**	-	-	**46.8**	-	-	**2.92**	-	-	**60.7**	-	-	**62.8**	-	-	2.5	U	-
DC-03D	DC-03D-150317	03/17/2015	N	5904651	**210**	-	-	**48.0**	-	-	**3.00**	J-	MSD	**68.0**	-	-	**63**	-	-	2.5	U	-
DC-03D	DC-03D-150617	06/17/2015	N	59011021	**210**	-	-	**48.0**	J	RPD	**3.20**	J	RPD	**68.0**	J	RPD	**71**	-	-	2.5	U	-
DC-03D	DC-03D-150925	09/25/2015	N	59020431	**200**	-	-	**47.0**	-	-	**3.00**	-	-	**65.0**	-	-	**58**	-	-	10	U	-
DC-03D	DC-03D-151216	12/16/2015	N	59025501	**210**	-	-	**50.0**	-	-	**3.20**	-	-	**69.0**	-	-	**70**	-	-	2.5	U	-
DC-03D	DC-03D-160310	03/10/2016	N	59029941	**200**	-	-	**47.0**	-	-	**3.00**	-	-	**68.0**	-	-	**65**	-	-	2.5	U	-
DC-03D	DC-03D-160623	6/23/2016	N	59037371	**200**	-	-	**47.0**	-	-	**3.00**	-	-	**70.0**	-	-	**65**	-	-	5	U	-
DC-03D	DC-03D-160927	9/27/2016	N	K1611565	**188**	-	-	**47.1**	-	-	**2.73**	-	-	**63.0**	-	-	**58.7**	-	-	**0.10**	J	-
DC-03D	DC-03D-161212	12/12/2016	N	K1615029	**200**	-	-	**44.8**	-	-	**2.98**	-	-	**65.0**	-	-	**57.8**	-	-	**0.12**	J	-
DC-03D	YVD-030817-14	3/8/2017	N	K1702324	**196**	-	-	**43.4**	-	-	**2.75**	-	-	**61.3**	-	-	**59.5**	-	-	**0.16**	J	-
DC-03D	YVD-030817-16	3/8/2017	FD	K1702324	**194**	-	-	**42.7**	-	-	**2.69**	-	-	**60.2**	-	-	**59.1**	-	-	**0.17**	J	-
DC-03D	YVD-060517-09	6/5/2017	N	K1705702	**203**	-	-	**41.3**	-	-	**2.66**	-	-	**59.7**	-	-	**58.7**	-	-	**0.13**	J	-
DC-03D	YVD-092617-24	9/26/2017	N	K1710333	**194**	-	-	**44.2**	-	-	**3.16**	-	-	**67.1**	-	-	**60.1**	-	-	**0.12**	J	-
DC-03D	YVD-120417-08	12/4/2017	N	K1713026	**195**	-	-	**41.5**	-	-	**2.64**	-	-	**60.9**	-	-	**57.9**	-	-	**0.17**	J	-
DC-03D	YVD-031818-02	3/18/2018	N	870610	**199**	-	-	**42.65**	-	-	**3.02**	-	-	**70.0**	-	-	**66.1**	-	-	0.10	U	-
DC-03D	YVD-060418-24	6/4/2018	N	874860	**187**	-	-	**42.85**	-	-	**3.24**	-	-	**67.0**	-	-	**64.7**	-	-	**0.10**	-	-
DC-03D	YVD-090918-15	9/9/2018	N	880601	**200**	-	-	**42.90**	-	-	**3.01**	-	-	**68.0**	-	-	**69.5**	-	-	**0.10**	-	-
DC-03D	YVD-121018-05	12/10/2018	N	884857	**191**	-	-	**42.50**	J	MSD	**3.18**	-	-	**67.0**	-	-	**62.1**	-	-	0.10	U	FBK
DC-03D	YVD-031819-17	3/18/2019	N	988273	**192**	-	-	**41.55**	-	-	**3.16**	-	-	**66.5**	-	-	**61.4**	-	-	**0.13**	-	-
DC-03D	YVD-060419-30	6/4/2019	N	992242	**186**	-	-	**40.35**	-	-	**2.94**	-	-	**65.5**	-	-	**59.6**	-	-	0.10	U	-
DC-03D (FD)	YVD-060419-31	6/4/2019	FD	992242	**182**	-	-	**40.70**	-	-	**2.96**	-	-	**66.0**	-	-	**60.6**	-	-	0.10	U	-
DC-03D	YVD-091019-21	9/10/2019	N	998438	**186**	-	-	**40.95**	-	-	**2.99**	-	-	**65.0**	-	-	**58.4**	-	-	0.10	U	-
DC-03D (FD)	YVD-091019-22	9/10/2019	FD	998438	**186**	-	-	**41.15**	-	-	**2.98**	-	-	**65.0**	-	-	**58.3**	-	-	0.10	U	-
DC-03D	YVD-121019-20	12/10/2019	N	902321	**182**	-	-	**39.85**	-	-	**3.18**	-	-	**61.5**	-	-	**65.0**	-	-	0.1	U	-
DC-04	DC-04-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-04	DC-04-130920	09/20/2013	N	SWI0142	**141**	-	-	**25.5**	-	-	**3.45**	-	-	**32.1**	-	-	**39.4**	-	-	5	U	-
DC-04	DC-04-130924	09/24/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-04	DC-04-131212	12/12/2013	N	SWL0073	**148**	-	-	**28.4**	-	-	**3.51**	-	-	**31.7**	-	-	**41.1**	-	-	5	U	-
DC-04	DC-04-140318	03/18/2014	N	SXC0107	**153**	-	-	**28.0**	-	-	**3.58**	-	-	**30.4**	-	-	**42**	-	-	5	U	-
DC-04	DC-04-140603	06/03/2014	N	SXF0017	**134**	-	-	**28.9**	-	-	**3.65**	-	-	**32.3**	-	-	**36.2**	-	-	2	U	-
DC-04	DC-04-140923	09/23/2014	N	SXI0173	**174**	-	-	**34.2**	-	-	**4.51**	-	-	**35.5**	-	-	**39.7**	-	-	2.5	U	-
DC-04	DC-04-141217	12/17/2014	N	SXL0121	**182**	-	-	**35.7**	-	-	**4.34**	-	-	**34.9**	-	-	**42.7**	-	-	2.5	U	-
DC-04	DC-04-150317	03/17/2015	N	5904651	**180**	-	-	**34.0**	-	-	**3.90**	J-	MSD	**36.0**	-	-	**41**	-	-	2.5	U	-
DC-04	DC-04-150617	06/17/2015	N	59010961	**180**	-	-	**34.0**	-	-	**4.10**	J+	MSD	**36.0**	J+	MSD	**46**	-	-	5	U	-
DC-04	DC-04-150924	09/24/2015	N	59020391	**160**	-	-	**36.0**	-	-	**3.90**	-	-	**33.0**	-	-	**48**	-	-	2.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-03D	DC-03D-141217	12/17/2014	N	SXL0121	**38.6**	-	-	1	U	-	**92.2**	-	-	-	-	-	0.1	U	-	**0.282**	J-	MSD
DC-03D	DC-03D-150317	03/17/2015	N	5904651	**37**	-	-	1	U	-	**87**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-03D	DC-03D-150617	06/17/2015	N	59011021	**42**	J-	MSD	1	U	-	**93**	-	-	-	-	-	0.1	U	-	-	R	MSD
DC-03D	DC-03D-150925	09/25/2015	N	59020431	**33**	-	-	4	U	-	**86**	-	-	-	-	-	0.1	U	-	0.25	U	-
DC-03D	DC-03D-151216	12/16/2015	N	59025501	**36**	-	-	1	U	-	**94**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-03D	DC-03D-160310	03/10/2016	N	59029941	**37**	-	-	1	U	-	**90**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	FDP, MSD
DC-03D	DC-03D-160623	6/23/2016	N	59037371	**36**	-	-	2	U	-	**89**	-	-	-	-	-	**0.11**	J-	MSD	0.25	U	-
DC-03D	DC-03D-160927	9/27/2016	N	K1611565	**32.8**	-	-	0.10	U	-	**90.9**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
DC-03D	DC-03D-161212	12/12/2016	N	K1615029	**33.8**	J	HTQ	0.10	U	-	**90.7**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03D	YVD-030817-14	3/8/2017	N	K1702324	**32.9**	-	-	**0.05**	J	-	**80.8**	-	-	-	-	-	1	U	-	0.5	U	-
DC-03D	YVD-030817-16	3/8/2017	FD	K1702324	**32.8**	-	-	**0.04**	J	-	**79.6**	-	-	-	-	-	1	U	-	0.5	U	-
DC-03D	YVD-060517-09	6/5/2017	N	K1705702	**31.9**	-	-	0.10	U	-	**91.6**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03D	YVD-092617-24	9/26/2017	N	K1710333	**33.2**	-	-	0.10	U	-	**101**	-	-	-	-	-	0.050	U	-	-	R	MSD
DC-03D	YVD-120417-08	12/4/2017	N	K1713026	**33.6**	-	-	0.10	U	-	**86.7**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-03D	YVD-031818-02	3/18/2018	N	870610	**32.6**	-	-	0.05	U	-	**86.1**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-03D	YVD-060418-24	6/4/2018	N	874860	**31.0**	-	-	0.05	U	-	**82.1**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-03D	YVD-090918-15	9/9/2018	N	880601	**32.9**	-	-	0.05	U	-	**88.6**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-03D	YVD-121018-05	12/10/2018	N	884857	**34.8**	-	-	0.05	U	-	**83.0**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-03D	YVD-031819-17	3/18/2019	N	988273	**35.4**	-	-	0.05	U	-	**82.0**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-03D	YVD-060419-30	6/4/2019	N	992242	**36.6**	-	-	0.05	U	-	**81.8**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-03D (FD)	YVD-060419-31	6/4/2019	FD	992242	**37.2**	-	-	0.05	U	-	**82.6**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-03D	YVD-091019-21	9/10/2019	N	998438	**36.4**	-	-	0.05	U	-	**81.7**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-03D (FD)	YVD-091019-22	9/10/2019	FD	998438	**36.5**	-	-	0.05	U	-	**81.7**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-03D	YVD-121019-20	12/10/2019	N	902321	**36.2**	-	-	0.05	U	-	**80.9**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-04	DC-04-130103	01/03/2013	N	EPA01	**26.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-04	DC-04-130920	09/20/2013	N	SWI0142	-	-	-	-	-	-	**93.6**	-	-	-	-	-	0.1	U	-	**3.03**	-	-
DC-04	DC-04-130924	09/24/2013	N	SWI0175	**31.7**	-	-	2	U	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-04	DC-04-131212	12/12/2013	N	SWL0073	**36.7**	-	-	2	U	-	**110**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
DC-04	DC-04-140318	03/18/2014	N	SXC0107	**37.3**	-	-	2	U	-	**107**	-	-	-	-	-	0.1	U	-	**0.707**	J-	MSD
DC-04	DC-04-140603	06/03/2014	N	SXF0017	**36.4**	-	-	0.8	U	-	**104**	J-	MSD	-	-	-	0.1	U	-	**0.645**	-	-
DC-04	DC-04-140923	09/23/2014	N	SXI0173	**37.8**	-	-	1	U	-	**108**	-	-	-	-	-	0.1	U	-	**0.524**	J+	MSD
DC-04	DC-04-141217	12/17/2014	N	SXL0121	**40.8**	-	-	1	U	-	**120**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-04	DC-04-150317	03/17/2015	N	5904651	**39**	-	-	1	U	-	**110**	-	-	-	-	-	0.1	U	-	**0.33**	J-	MSD
DC-04	DC-04-150617	06/17/2015	N	59010961	**42**	-	-	2	U	-	**110**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-04	DC-04-150924	09/24/2015	N	59020391	**48**	J+	MSD	1	U	-	**140**	J-	MSD	-	-	-	0.1	UJ	MSD	**0.25**	J-	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-03D	DC-03D-141217	12/17/2014	N	SXL0121	0.1	U	-	-	-	-	-	-	-	-	-	-	**514**	-	-	**515**	-	-
DC-03D	DC-03D-150317	03/17/2015	N	5904651	0.25	U	-	-	-	-	-	-	-	-	-	-	**530**	-	-	**530**	-	-
DC-03D	DC-03D-150617	06/17/2015	N	59011021	0.25	U	-	-	-	-	-	-	-	-	-	-	**530**	-	-	**530**	-	-
DC-03D	DC-03D-150925	09/25/2015	N	59020431	0.25	U	-	-	-	-	-	-	-	-	-	-	**610**	-	-	**610**	-	-
DC-03D	DC-03D-151216	12/16/2015	N	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**590**	-	-	**590**	-	-
DC-03D	DC-03D-160310	03/10/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**580**	-	-	**580**	-	-
DC-03D	DC-03D-160623	6/23/2016	N	59037371	0.25	U	-	-	-	-	-	-	-	-	-	-	**530**	-	-	**530**	-	-
DC-03D	DC-03D-160927	9/27/2016	N	K1611565	-	-	-	**0.006**	J	-	-	-	-	-	-	-	**546**	-	-	**546**	-	-
DC-03D	DC-03D-161212	12/12/2016	N	K1615029	-	-	-	**0.085**	-	-	-	-	-	-	-	-	**544**	-	-	**544**	-	-
DC-03D	YVD-030817-14	3/8/2017	N	K1702324	-	-	-	**0.008**	J	-	-	-	-	-	-	-	**537**	-	-	**537**	-	-
DC-03D	YVD-030817-16	3/8/2017	FD	K1702324	-	-	-	**0.008**	J	-	-	-	-	-	-	-	**555**	-	-	**555**	-	-
DC-03D	YVD-060517-09	6/5/2017	N	K1705702	-	-	-	**0.006**	J	-	-	-	-	-	-	-	**533**	-	-	**533**	-	-
DC-03D	YVD-092617-24	9/26/2017	N	K1710333	-	-	-	**0.011**	-	-	-	-	-	-	-	-	**537**	-	-	**537**	-	-
DC-03D	YVD-120417-08	12/4/2017	N	K1713026	-	-	-	0.011	U	MBK	-	-	-	-	-	-	**525**	-	-	**525**	-	-
DC-03D	YVD-031818-02	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**529**	-	-	**529**	-	-
DC-03D	YVD-060418-24	6/4/2018	N	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	**533**	-	-	**533**	-	-
DC-03D	YVD-090918-15	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**541**	-	-	**541**	-	-
DC-03D	YVD-121018-05	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**543**	-	-	**543**	-	-
DC-03D	YVD-031819-17	3/18/2019	N	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	**536**	-	-	**536**	-	-
DC-03D	YVD-060419-30	6/4/2019	N	992242	-	-	-	-	-	-	-	-	-	0.07	U	-	**499**	-	-	**499**	-	-
DC-03D (FD)	YVD-060419-31	6/4/2019	FD	992242	-	-	-	-	-	-	-	-	-	0.07	U	-	**494**	-	-	**494**	-	-
DC-03D	YVD-091019-21	9/10/2019	N	998438	-	-	-	-	-	-	-	-	-	0.07	U	-	**506**	-	-	**506**	-	-
DC-03D (FD)	YVD-091019-22	9/10/2019	FD	998438	-	-	-	-	-	-	-	-	-	0.07	U	-	**514**	-	-	**514**	-	-
DC-03D	YVD-121019-20	12/10/2019	N	902321	-	-	-	-	-	-	-	-	-	0.07	U	-	**502**	-	-	**502**	-	-
DC-04	DC-04-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-04	DC-04-130920	09/20/2013	N	SWI0142	-	-	-	-	-	-	0.1	U	-	-	-	-	**305**	-	-	**305**	-	-
DC-04	DC-04-130924	09/24/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-04	DC-04-131212	12/12/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	**0.104**	-	-	**315**	-	-	**315**	-	-
DC-04	DC-04-140318	03/18/2014	N	SXC0107	**0.13**	-	-	-	-	-	-	-	-	-	-	-	**325**	-	-	**325**	-	-
DC-04	DC-04-140603	06/03/2014	N	SXF0017	**0.24**	J+	FBK	-	-	-	-	-	-	-	-	-	**310**	-	-	**310**	-	-
DC-04	DC-04-140923	09/23/2014	N	SXI0173	**0.29**	-	-	-	-	-	-	-	-	-	-	-	**317**	-	-	**320**	-	-
DC-04	DC-04-141217	12/17/2014	N	SXL0121	**0.17**	-	-	-	-	-	-	-	-	-	-	-	**329**	-	-	**330**	-	-
DC-04	DC-04-150317	03/17/2015	N	5904651	0.25	U	-	-	-	-	-	-	-	-	-	-	**340**	-	-	**340**	-	-
DC-04	DC-04-150617	06/17/2015	N	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**330**	-	-	**330**	-	-
DC-04	DC-04-150924	09/24/2015	N	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**400**	-	-	**400**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-04	YVD-D3-150924	09/24/2015	FD	59020391	**170**	-	-	**37.0**	-	-	**4.10**	-	-	**35.0**	-	-	**53**	-	-	2.5	U	-
DC-04	DC-04-151215	12/15/2015	N	59025431	**180**	-	-	**36.0**	-	-	**4.20**	-	-	**36.0**	-	-	**46**	-	-	2.5	U	-
DC-04	DC-04-160309	03/09/2016	N	59029711	**190**	-	-	**36.0**	-	-	**4.00**	-	-	**36.0**	-	-	**53**	-	-	2.5	U	-
DC-04	DC-04-160621	6/21/2016	N	59037271	**200**	-	-	**40.0**	-	-	**4.40**	-	-	**39.0**	-	-	**50**	-	-	2.5	U	-
DC-04	DC-04-160926	9/26/2016	N	K1611506	**194**	-	-	**40.6**	-	-	**4.50**	-	-	**38.2**	-	-	**43.4**	-	-	**0.12**	J	-
DC-04	DC-04-161216	12/12/2016	N	K1615174	**214**	-	-	**39.7**	-	-	**4.11**	-	-	**36.9**	-	-	**44.7**	-	-	**0.15**	J	-
DC-04	YVD-031017-31	3/10/2017	N	K1702448	**219**	-	-	**36.3**	-	-	**3.75**	-	-	**32.4**	-	-	**43.1**	-	-	**0.16**	J	-
DC-04	YVD-031017-33	3/10/2017	FD	K1702448	**219**	-	-	**36.3**	-	-	**3.74**	-	-	**32.3**	-	-	**43.2**	-	-	**0.16**	J	-
DC-04	YVD-060617-26	6/6/2017	N	K1705833	**202**	-	-	**37.0**	-	-	**3.96**	-	-	**34.7**	-	-	**38.6**	-	-	**0.13**	J	-
DC-04	YVD-092517-06	9/25/2017	N	K1710274	**192**	-	-	**37.0**	-	-	**4.06**	-	-	**35.9**	-	-	**35.2**	-	-	**0.14**	J	-
DC-04	YVD-120517-24	12/5/2017	N	K1713091	**188**	-	-	**32.7**	-	-	**3.62**	-	-	**32.7**	-	-	**34.3**	-	-	**0.12**	J	-
DC-04	YVD-031818-07	3/18/2018	N	870610	**182**	-	-	**32.10**	-	-	**4.02**	-	-	**35.6**	-	-	**34.5**	-	-	0.10	U	-
DC-04	YVD-060418-18	6/4/2018	N	874662	**182**	-	-	**33.55**	-	-	**4.18**	-	-	**34.4**	-	-	**35.4**	-	-	**0.10**	-	-
DC-04	YVD-090918-18	9/9/2018	N	880601	**176**	-	-	**30.40**	-	-	**3.98**	-	-	**32.8**	-	-	**32.4**	-	-	**0.12**	-	-
DC-04	YVD-121118-18	12/11/2018	N	884939	**166**	-	-	**29.40**	-	-	**4.08**	-	-	**32.0**	-	-	**30.4**	-	-	**0.11**	-	-
DC-04	YVD-032019-21	3/20/2019	N	988477	**172**	-	-	**30.45**	-	-	**3.93**	-	-	**32.2**	-	-	**26.2**	-	-	**0.10**	-	-
DC-04	YVD-060219-14	6/2/2019	N	991939	**173**	-	-	**30.55**	-	-	**4.00**	-	-	**32.2**	-	-	22.9	U	FBK	0.10	U	-
DC-04	YVD-090919-09	9/9/2019	N	998357	**169**	-	-	**30.35**	-	-	**3.98**	-	-	**31.6**	-	-	**33.1**	-	-	0.10	U	-
DC-04	YVD-120919-07	12/9/2019	N	902276	**167**	-	-	**30.35**	-	-	**4.20**	-	-	**32.2**	J	MSD	**33.4**	-	-	0.1	U	-
DC-05	DC-05-130104	01/04/2013	N	EPA01	-		-	-		-	-		-	-		-	-		-	-		-
DC-05	DC-05-130920	09/20/2013	N	SWI0142	**129**		-	**48.5**		-	**2.88**		-	**64.2**		-	**36.7**		-	5	U	-
DC-05	DC-05-130924	09/24/2013	N	SWI0175	-		-	-		-	-		-	-		-	-		-	-		-
DC-05	DC-05-131212	12/12/2013	N	SWL0073	**130**	-	-	**50.2**	-	-	**3.92**	-	-	**64.2**	-	-	**35.9**	-	-	5	U	-
DC-05	DC-05-140318	03/18/2014	N	SXC0107	**133**	-	-	**49.7**	-	-	**2.90**	-	-	**59.4**	-	-	**33**	-	-	5	U	-
DC-05	DC-05-140603	06/03/2014	N	SXF0017	**118**	-	-	**46.7**	-	-	**3.25**	-	-	**61.3**	-	-	**31.6**	-	-	2	U	-
DC-05	DC-05-140923	09/23/2014	N	SXI0173	**140**	-	-	**53.5**	-	-	**3.86**	-	-	**71.0**	-	-	**35**	-	-	2.5	U	-
DC-05	DC-05-141217	12/17/2014	N	SXL0121	**147**	-	-	**58.9**	-	-	**3.41**	-	-	**59.0**	-	-	**34.4**	-	-	2.5	U	-
DC-05	DC-05-150317	03/17/2015	N	5904541	**150**	-	-	**58.0**	-	-	**3.00**	-	-	**61.0**	-	-	**36**	-	-	**2**	-	-
DC-05	DC-05-150616	06/16/2015	N	59010961	**140**	-	-	**57.0**	-	-	**3.00**	J+	MSD	**64.0**	J+	MSD	**35**	-	-	2	U	-
DC-05	YVD-D2-150616	06/16/2015	FD	59010961	**140**	-	-	**56.0**	-	-	**3.30**	J+	MSD	**64.0**	J+	MSD	**35**	-	-	5	U	-
DC-05	DC-05-150923	09/23/2015	N	59020391	**130**	-	-	**57.0**	-	-	**3.10**	-	-	**56.0**	-	-	**33**	-	-	2	U	-
DC-05	DC-05-151215	12/15/2015	N	59025431	**140**	-	-	**55.0**	-	-	**2.90**	-	-	**51.0**	-	-	**29**	-	-	2	U	-
DC-05	DC-05-160309	03/09/2016	N	59029711	**140**	-	-	**54.0**	-	-	**2.90**	-	-	**53.0**	-	-	**35**	-	-	2	U	-
DC-05	DC-05-160621	6/21/2016	N	59037151	**130**	-	-	**54.0**	-	-	**2.80**	-	-	**53.0**	-	-	**34**	-	-	2	U	-
DC-05	DC-05-160926	9/26/2016	N	K1611506	**119**	-	-	**49.7**	-	-	**2.89**	-	-	**54.9**	-	-	**26.5**	-	-	**0.15**	J	-
DC-05	DC-05-D1-160926	9/26/2016	FD	K1611506	**124**	-	-	**52.5**	-	-	**3.06**	-	-	**58.1**	-	-	**26.6**	-	-	**0.16**	J	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-04	YVD-D3-150924	09/24/2015	FD	59020391	**53**	J+	MSD	1	U	-	**150**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
DC-04	DC-04-151215	12/15/2015	N	59025431	**48**	-	-	1	U	-	**130**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-04	DC-04-160309	03/09/2016	N	59029711	**53**	-	-	1	U	-	**150**	J+	MSD	-	-	-	0.1	UJ	FDP	-	R	MSD
DC-04	DC-04-160621	6/21/2016	N	59037271	**50**	-	-	1	U	-	**150**	-	-	-	-	-	0.1	UJ	MSD	-	R	MSD
DC-04	DC-04-160926	9/26/2016	N	K1611506	**44.1**	-	-	0.10	U	-	**142**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
DC-04	DC-04-161216	12/12/2016	N	K1615174	**45.2**	-	-	0.10	U	-	**155**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-04	YVD-031017-31	3/10/2017	N	K1702448	**46.0**	-	-	0.10	U	-	**153**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-04	YVD-031017-33	3/10/2017	FD	K1702448	**45.7**	-	-	0.10	U	-	**152**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-04	YVD-060617-26	6/6/2017	N	K1705833	**38.4**	-	-	0.10	U	-	**129**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-04	YVD-092517-06	9/25/2017	N	K1710274	**33.7**	-	-	0.10	U	-	**140**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-04	YVD-120517-24	12/5/2017	N	K1713091	**33.8**	J	HTQ	0.10	U	-	**121**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
DC-04	YVD-031818-07	3/18/2018	N	870610	**32.9**	-	-	0.05	U	-	**115**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-04	YVD-060418-18	6/4/2018	N	874662	**33.0**	-	-	0.05	U	-	**119**	-	-	0.07	U	FBK	-	-	-	0.5	UJ	MSD
DC-04	YVD-090918-18	9/9/2018	N	880601	**30.4**	-	-	0.05	U	-	**109**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-04	YVD-121118-18	12/11/2018	N	884939	**29.4**	-	-	0.05	U	-	**102**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-04	YVD-032019-21	3/20/2019	N	988477	**29.6**	-	-	0.05	U	-	**100**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-04	YVD-060219-14	6/2/2019	N	991939	**29.1**	-	-	0.05	U	-	**103**	-	-	**0.09**	-	-	-	-	-	-	R	MSD
DC-04	YVD-090919-09	9/9/2019	N	998357	**31.4**	-	-	0.05	U	-	**102**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-04	YVD-120919-07	12/9/2019	N	902276	**31.3**	-	-	0.05	U	-	**101**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-05	DC-05-130104	01/04/2013	N	EPA01	**32**		-	-		-	-		-	-	-	-	-		-	-		-
DC-05	DC-05-130920	09/20/2013	N	SWI0142	-		-	-		-	**154**		-	-	-	-	**0.255**		-	0.25	U	-
DC-05	DC-05-130924	09/24/2013	N	SWI0175	**33.6**		-	2	U	-	-		-	-	-	-	-		-	-		-
DC-05	DC-05-131212	12/12/2013	N	SWL0073	**42.6**	-	-	2	U	-	**178**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
DC-05	DC-05-140318	03/18/2014	N	SXC0107	**33.1**	-	-	2	U	-	**150**	-	-	-	-	-	**0.131**	-	-	**0.558**	J-	MSD
DC-05	DC-05-140603	06/03/2014	N	SXF0017	**32.6**	-	-	0.8	U	-	**128**	J-	MSD	-	-	-	0.1	U	-	**0.581**	-	-
DC-05	DC-05-140923	09/23/2014	N	SXI0173	**35.8**	-	-	1	U	-	**122**	-	-	-	-	-	0.1	U	-	**0.998**	J+	MSD
DC-05	DC-05-141217	12/17/2014	N	SXL0121	**33.4**	-	-	1	U	-	**141**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-05	DC-05-150317	03/17/2015	N	5904541	**38**	J-	MSD	0.8	U	-	**140**	J-	MSD	-	-	-	0.1	U	-	**0.27**	J-	MSD
DC-05	DC-05-150616	06/16/2015	N	59010961	**37**	-	-	0.8	U	-	**120**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-05	YVD-D2-150616	06/16/2015	FD	59010961	**41**	-	-	2	U	-	**110**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-05	DC-05-150923	09/23/2015	N	59020391	**38**	J+	MSD	0.8	U	-	**110**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
DC-05	DC-05-151215	12/15/2015	N	59025431	**38**	-	-	0.8	U	-	**120**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-05	DC-05-160309	03/09/2016	N	59029711	**43**	-	-	0.8	U	-	**140**	J+	MSD	-	-	-	0.1	UJ	FDP	-	R	MSD
DC-05	DC-05-160621	6/21/2016	N	59037151	**36**	-	-	0.8	U	-	**130**	-	-	-	-	-	0.1	UJ	-	0.25	U	-
DC-05	DC-05-160926	9/26/2016	N	K1611506	**32.1**	-	-	0.10	U	-	**114**	-	-	-	-	-	0.050	U	-	-	R	MSD
DC-05	DC-05-D1-160926	9/26/2016	FD	K1611506	**32.2**	-	-	0.10	U	-	**114**	-	-	-	-	-	0.050	U	MBK	-	R	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-04	YVD-D3-150924	09/24/2015	FD	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**380**	-	-	**380**	-	-
DC-04	DC-04-151215	12/15/2015	N	59025431	0.25	UJ	FDP	-	-	-	-	-	-	-	-	-	**400**	J	FDP	**400**	J	FDP
DC-04	DC-04-160309	03/09/2016	N	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**390**	-	-	**390**	-	-
DC-04	DC-04-160621	6/21/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**360**	-	-	**360**	-	-
DC-04	DC-04-160926	9/26/2016	N	K1611506	-	-	-	**0.137**	-	-	-	-	-	-	-	-	**374**	-	-	**374**	-	-
DC-04	DC-04-161216	12/12/2016	N	K1615174	-	-	-	**0.052**	-	-	-	-	-	-	-	-	**384**	-	-	**384**	-	-
DC-04	YVD-031017-31	3/10/2017	N	K1702448	-	-	-	**0.035**	J	FDP	-	-	-	-	-	-	**375**	-	-	**375**	-	-
DC-04	YVD-031017-33	3/10/2017	FD	K1702448	-	-	-	**0.053**	J	FDP	-	-	-	-	-	-	**383**	-	-	**383**	-	-
DC-04	YVD-060617-26	6/6/2017	N	K1705833	-	-	-	**0.085**	-	-	-	-	-	-	-	-	**390**	-	-	**390**	-	-
DC-04	YVD-092517-06	9/25/2017	N	K1710274	-	-	-	**0.044**	-	-	-	-	-	-	-	-	**391**	-	-	**391**	-	-
DC-04	YVD-120517-24	12/5/2017	N	K1713091	-	-	-	**0.037**	-	-	-	-	-	-	-	-	**388**	-	-	**388**	-	-
DC-04	YVD-031818-07	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**377**	-	-	**377**	-	-
DC-04	YVD-060418-18	6/4/2018	N	874662	-	-	-	-	-	-	-	-	-	0.07	U	-	**380**	-	-	**380**	-	-
DC-04	YVD-090918-18	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**371**	-	-	**371**	-	-
DC-04	YVD-121118-18	12/11/2018	N	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	**376**	-	-	**376**	-	-
DC-04	YVD-032019-21	3/20/2019	N	988477	-	-	-	-	-	-	-	-	-	0.07	U	-	**393**	-	-	**393**	-	-
DC-04	YVD-060219-14	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**390**	-	-	**390**	-	-
DC-04	YVD-090919-09	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**387**	-	-	**387**	-	-
DC-04	YVD-120919-07	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**382**	-	-	**382**	**-**	**-**
DC-05	DC-05-130104	01/04/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-
DC-05	DC-05-130920	09/20/2013	N	SWI0142	-	-	-	-	-	-	0.1	U	-	-	-	-	**414**		-	**415**		-
DC-05	DC-05-130924	09/24/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-
DC-05	DC-05-131212	12/12/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	**0.723**	-	-	**424**	-	-	**425**	-	-
DC-05	DC-05-140318	03/18/2014	N	SXC0107	**0.06**	-	-	-	-	-	-	-	-	-	-	-	**404**	-	-	**405**	-	-
DC-05	DC-05-140603	06/03/2014	N	SXF0017	**0.28**	J+	FBK	-	-	-	-	-	-	-	-	-	**412**	-	-	**413**	-	-
DC-05	DC-05-140923	09/23/2014	N	SXI0173	**0.16**	-	-	-	-	-	-	-	-	-	-	-	**408**	-	-	**410**	-	-
DC-05	DC-05-141217	12/17/2014	N	SXL0121	**0.13**	-	-	-	-	-	-	-	-	-	-	-	**414**	-	-	**415**	-	-
DC-05	DC-05-150317	03/17/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**430**	-	-	**430**	-	-
DC-05	DC-05-150616	06/16/2015	N	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**410**	-	-	**410**	-	-
DC-05	YVD-D2-150616	06/16/2015	FD	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**410**	-	-	**410**	-	-
DC-05	DC-05-150923	09/23/2015	N	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**440**	-	-	**440**	-	-
DC-05	DC-05-151215	12/15/2015	N	59025431	0.25	UJ	FDP	-	-	-	-	-	-	-	-	-	**440**	J	FDP	**440**	J	FDP
DC-05	DC-05-160309	03/09/2016	N	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**410**	-	-	**410**	-	-
DC-05	DC-05-160621	6/21/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**390**	-	-	**390**	-	-
DC-05	DC-05-160926	9/26/2016	N	K1611506	-	-	-	**0.031**	-	-	-	-	-	-	-	-	**346**	-	-	**346**	-	-
DC-05	DC-05-D1-160926	9/26/2016	FD	K1611506	-	-	-	**0.028**	-	-	-	-	-	-	-	-	**364**	-	-	**364**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-05	DC-05-161216	12/16/2016	N	K1615174	**129**	-	-	**45.4**	-	-	**2.60**	-	-	**47.9**	-	-	**28.6**	-	-	**0.19**	J	-
DC-05	YVD-D5-161216	12/16/2016	FD	K1615174	**128**	-	-	**48.0**	-	-	**2.65**	-	-	**49.6**	-	-	**28.9**	-	-	**0.19**	J	-
DC-05	YVD-030717-09	3/7/2017	N	K1702324	**117**	-	-	**43.5**	-	-	**2.61**	-	-	**58.3**	-	-	**28.5**	-	-	**0.20**	J	-
DC-05	YVD-060717-30	6/7/2017	N	K1705833	**122**	-	-	**47.1**	-	-	**2.82**	-	-	**63.9**	-	-	**26.8**	-	-	**0.16**	J	-
DC-05	YVD-060717-32	6/7/2017	FD	K1705833	**122**	-	-	**45.8**	-	-	**2.77**	-	-	**62.6**	-	-	**26.3**	-	-	**0.16**	J	-
DC-05	YVD-092517-04	9/25/2017	N	K1710274	**126**	-	-	**49.7**	-	-	**2.99**	-	-	**62.0**	-	-	**28.1**	-	-	**0.19**	J	-
DC-05	YVD-120517-16	12/5/2017	N	K1713091	**119**	-	-	**42.5**	-	-	**2.52**	-	-	**59.1**	-	-	**31.9**	-	-	**0.18**	J	-
DC-05	YVD-120517-18	12/5/2017	FD	K1713091	**120**	-	-	**43.1**	-	-	**2.53**	-	-	**60.0**	-	-	**31.3**	-	-	**0.19**	J	-
DC-05	YVD-031818-03	3/18/2018	N	870610	**116**	-	-	**42.35**	-	-	**2.94**	-	-	**75.0**	-	-	**33.0**	-	-	0.14	U	-
DC-05	YVD-031818-05	3/18/2018	FD	870610	**116**	-	-	**42.85**	-	-	**2.94**	-	-	**75.0**	-	-	**33.1**	-	-	**0.14**	-	-
DC-05	YVD-060318-02	6/3/2018	FD	874568	**118**	-	-	**43.50**	-	-	**3.02**	-	-	**72.0**	-	-	**32.2**	-	-	**0.15**	-	-
DC-05	YVD-090918-03	9/9/2018	N	880601	**122**	-	-	**42.55**	-	-	**2.91**	-	-	**65.5**	-	-	**31.4**	-	-	**0.18**	-	-
DC-05	YVD-121118-16	12/11/2018	N	884939	**120**	-	-	**43.40**	-	-	**3.05**	-	-	**68.1**	-	-	**33.7**	-	-	**0.16**	-	-
DC-05	YVD-031719-02	3/17/2019	N	988239	**126**	-	-	**44.25**	-	-	**3.10**	-	-	**68.5**	-	-	**29.9**	-	-	0.12	U	FBK
DC-05	YVD-060219-08	6/2/2019	N	991939	**122**	-	-	**44.15**	-	-	**3.14**	-	-	**71.0**	-	-	26.2	U	FBK	0.12	U	FBK
DC-05	YVD-090919-14	9/9/2019	N	998357	**120**	-	-	**42.30**	-	-	**3.02**	-	-	**65.5**	-	-	**25.4**	-	-	**0.14**	-	-
DC-05	YVD-120919-03	12/9/2019	N	902276	**120**	-	-	**43.00**	-	-	**3.12**	-	-	**72.5**	J	MSD	**28.1**	-	-	**0.14**	-	-
DC-05D	DC-05D-130920	09/20/2013	N	SWI0142	**86.7**	-	-	**30.3**	-	-	**3.67**	-	-	**40.5**	-	-	**43.6**	-	-	5	U	-
DC-05D	DC-05D-130924	09/24/2013	N	SWI0178	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-05D	DC-05D-131211	12/11/2013	N	SWL0073	**81.8**	-	-	**28.8**	-	-	**3.52**	-	-	**37.5**	-	-	**32.3**	-	-	5	U	-
DC-05D	DC-05D-140318	03/18/2014	N	SXC0095	**86.2**	-	-	**29.4**	-	-	**3.73**	-	-	**36.7**	-	-	**33.4**	-	-	5	U	-
DC-05D	DC-05D-140602	06/02/2014	N	SXF0017	**67.4**	-	-	**24.6**	-	-	**4.99**	-	-	**34.3**	-	-	**30.6**	-	-	2	U	-
DC-05D	DC-05D-140922	09/22/2014	N	SXI0148	**83.3**	-	-	**30.2**	-	-	**3.56**	-	-	**37.8**	-	-	**30.9**	-	-	2	U	-
DC-05D	DC-05D-141216	12/16/2014	N	SXL0121	**78.9**	-	-	**29.5**	-	-	**5.18**	-	-	**36.8**	-	-	**35.9**	-	-	5	U	-
DC-05D	DC-05D-150317	03/17/2015	N	5904541	**78.0**	-	-	**29.0**	-	-	**4.60**	-	-	**39.0**	-	-	**31**	-	-	2	U	-
DC-05D	DC-05D-150616	06/16/2015	N	59010961	**79.0**	-	-	**30.0**	-	-	**4.70**	J+	MSD	**41.0**	J+	MSD	**34**	-	-	2	U	-
DC-05D	DC-05D-150923	09/23/2015	N	59020391	**74.0**	-	-	**31.0**	-	-	**4.40**	-	-	**38.0**	-	-	**31**	-	-	2	U	-
DC-05D	YVD-D2-150923	09/23/2015	FD	59020391	**73.0**	-	-	**30.0**	-	-	**4.40**	-	-	**38.0**	-	-	**33**	-	-	0.5	U	-
DC-05D	DC-05D-151215	12/15/2015	N	59025431	**78.0**	-	-	**29.0**	-	-	**4.40**	-	-	**39.0**	-	-	**30**	-	-	2	U	-
DC-05D	DC-05D-160309	03/09/2016	N	59029711	**81.0**	-	-	**30.0**	-	-	**4.30**	-	-	**41.0**	-	-	**33**	-	-	2	U	-
DC-05D	DC-05D-160621	6/21/2016	N	59037271	**78.0**	-	-	**30.0**	-	-	**4.10**	-	-	**41.0**	-	-	**32**	-	-	2	U	-
DC-05D	DC-05D-160926	9/26/2016	N	K1611506	**81.4**	-	-	**28.4**	-	-	**3.93**	-	-	**39.4**	J	MSD	**25.6**	-	-	**0.26**	-	-
DC-05D	DC-05D-161214	12/14/2016	N	K1615126	**78.1**	-	-	**27.5**	-	-	**3.90**	-	-	**38.2**	-	-	**25.7**	-	-	**0.28**	-	-
DC-05D	YVD-030717-12	3/7/2017	N	K1702324	**76.4**	-	-	**26.5**	-	-	**3.64**	-	-	**35.6**	-	-	**26.3**	-	-	**0.32**	-	-
DC-05D	YVD-060717-34	6/7/2017	N	K1705833	**79.1**	-	-	**27.3**	-	-	**3.78**	-	-	**37.4**	-	-	**23.9**	-	-	**0.29**	-	-
DC-05D	YVD-092517-02	9/25/2017	N	K1710274	**79.2**	-	-	**28.9**	-	-	**3.91**	-	-	**38.7**	-	-	**25.2**	-	-	**0.28**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-05	DC-05-161216	12/16/2016	N	K1615174	**33.7**	-	-	0.10	U	-	**108**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05	YVD-D5-161216	12/16/2016	FD	K1615174	**33.3**	-	-	0.10	U	-	**107**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05	YVD-030717-09	3/7/2017	N	K1702324	**32.9**	J	HTQ	0.10	U	-	**97.6**	-	-	-	-	-	1	U	-	0.5	U	-
DC-05	YVD-060717-30	6/7/2017	N	K1705833	**30.8**	-	-	0.10	U	-	**102**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05	YVD-060717-32	6/7/2017	FD	K1705833	**30.7**	-	-	0.10	U	-	**102**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05	YVD-092517-04	9/25/2017	N	K1710274	**30.7**	-	-	0.10	U	-	**107**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05	YVD-120517-16	12/5/2017	N	K1713091	**34.5**	J	HTQ	0.10	U	-	**88.8**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
DC-05	YVD-120517-18	12/5/2017	FD	K1713091	**33.9**	J	HTQ	0.10	U	-	**89.3**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
DC-05	YVD-031818-03	3/18/2018	N	870610	**33.6**	-	-	0.05	U	-	**97.4**	-	-	**0.10**	-	-	-	-	-	0.5	U	-
DC-05	YVD-031818-05	3/18/2018	FD	870610	**33.8**	-	-	0.05	U	-	**96.7**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-05	YVD-060318-02	6/3/2018	FD	874568	**34.4**	-	-	0.05	U	-	**88.3**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-05	YVD-090918-03	9/9/2018	N	880601	**31.5**	-	-	0.05	U	-	**95.4**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-05	YVD-121118-16	12/11/2018	N	884939	**33.2**	-	-	0.05	U	-	**92.2**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-05	YVD-031719-02	3/17/2019	N	988239	**30.4**	-	-	0.05	U	-	**117**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-05	YVD-060219-08	6/2/2019	N	991939	**28.8**	-	-	0.05	U	-	**122**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-05	YVD-090919-14	9/9/2019	N	998357	**26.7**	-	-	0.05	U	-	**129**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-05	YVD-120919-03	12/9/2019	N	902276	**29.3**	-	-	0.05	U	-	**110**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-05D	DC-05D-130920	09/20/2013	N	SWI0142	-	-	-	-	-	-	**167**	-	-	-	-	-	0.1	U	-	**0.361**	-	-
DC-05D	DC-05D-130924	09/24/2013	N	SWI0178	**14.6**	-	-	0.2	U	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-05D	DC-05D-131211	12/11/2013	N	SWL0073	**16**	-	-	2	U	-	**145**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
DC-05D	DC-05D-140318	03/18/2014	N	SXC0095	**12.8**	-	-	2	U	-	**137**	J-	MSD	-	-	-	**0.182**	-	-	0.25	U	-
DC-05D	DC-05D-140602	06/02/2014	N	SXF0017	**3.36**	-	-	0.8	U	-	**122**	J-	MSD	-	-	-	**0.163**	-	-	**0.591**	-	-
DC-05D	DC-05D-140922	09/22/2014	N	SXI0148	**11.7**	-	-	0.8	U	-	**127**	-	-	-	-	-	0.1	U	-	**0.424**	-	-
DC-05D	DC-05D-141216	12/16/2014	N	SXL0121	**7.9**	-	-	0.2	U	-	**140**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-05D	DC-05D-150317	03/17/2015	N	5904541	**7.7**	J-	MSD	0.8	U	-	**120**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-05D	DC-05D-150616	06/16/2015	N	59010961	**8.6**	-	-	0.8	U	-	**120**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-05D	DC-05D-150923	09/23/2015	N	59020391	**8.9**	J+	MSD	0.8	U	-	**120**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
DC-05D	YVD-D2-150923	09/23/2015	FD	59020391	**10**	J+	MSD	0.2	U	-	**120**	J-	MSD	-	-	-	**0.16**	J	MSD	0.25	UJ	MSD
DC-05D	DC-05D-151215	12/15/2015	N	59025431	**9.9**	-	-	0.8	U	-	**120**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-05D	DC-05D-160309	03/09/2016	N	59029711	**13**	-	-	0.8	U	-	**140**	J+	MSD	-	-	-	0.1	UJ	FDP	-	R	MSD
DC-05D	DC-05D-160621	6/21/2016	N	59037271	**12**	-	-	0.8	U	-	**130**	-	-	-	-	-	**0.13**	J-	MSD	-	R	MSD
DC-05D	DC-05D-160926	9/26/2016	N	K1611506	**11.2**	-	-	0.10	U	-	**113**	-	-	-	-	-	0.050	U	-	-	R	MSD
DC-05D	DC-05D-161214	12/14/2016	N	K1615126	**11.2**	-	-	0.10	U	-	**114**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05D	YVD-030717-12	3/7/2017	N	K1702324	**11.6**	J	HTQ	0.10	U	-	**105**	-	-	-	-	-	1	U	-	0.5	U	-
DC-05D	YVD-060717-34	6/7/2017	N	K1705833	**10.8**	-	-	0.10	U	-	**101**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05D	YVD-092517-02	9/25/2017	N	K1710274	**11.1**	-	-	0.10	U	-	**118**	-	-	-	-	-	0.050	U	-	0.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-05	DC-05-161216	12/16/2016	N	K1615174	-	-	-	**0.048**	-	-	-	-	-	-	-	-	**348**	-	-	**348**	-	-
DC-05	YVD-D5-161216	12/16/2016	FD	K1615174	-	-	-	**0.04**	-	-	-	-	-	-	-	-	**340**	-	-	**340**	-	-
DC-05	YVD-030717-09	3/7/2017	N	K1702324	-	-	-	**0.026**	-	-	-	-	-	-	-	-	**367**	-	-	**367**	-	-
DC-05	YVD-060717-30	6/7/2017	N	K1705833	-	-	-	**0.059**	J	FDP	-	-	-	-	-	-	**364**	-	-	**364**	-	-
DC-05	YVD-060717-32	6/7/2017	FD	K1705833	-	-	-	**0.031**	J	FDP	-	-	-	-	-	-	**364**	-	-	**364**	-	-
DC-05	YVD-092517-04	9/25/2017	N	K1710274	-	-	-	**0.039**	-	-	-	-	-	-	-	-	**368**	-	-	**368**	-	-
DC-05	YVD-120517-16	12/5/2017	N	K1713091	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**364**	-	-	**364**	-	-
DC-05	YVD-120517-18	12/5/2017	FD	K1713091	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**366**	-	-	**366**	-	-
DC-05	YVD-031818-03	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**364**	-	-	**364**	-	-
DC-05	YVD-031818-05	3/18/2018	FD	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**356**	-	-	**356**	-	-
DC-05	YVD-060318-02	6/3/2018	FD	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**368**	-	-	**368**	-	-
DC-05	YVD-090918-03	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**378**	-	-	**378**	-	-
DC-05	YVD-121118-16	12/11/2018	N	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	**390**	-	-	**390**	-	-
DC-05	YVD-031719-02	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**396**	-	-	**396**	-	-
DC-05	YVD-060219-08	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**400**	-	-	**400**	-	-
DC-05	YVD-090919-14	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**389**	-	-	**389**	-	-
DC-05	YVD-120919-03	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**400**	-	-	**400**	-	-
DC-05D	DC-05D-130920	09/20/2013	N	SWI0142	-	-	-	-	-	-	**0.163**	-	-	-	-	-	**214**	-	-	**215**	-	-
DC-05D	DC-05D-130924	09/24/2013	N	SWI0178	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-05D	DC-05D-131211	12/11/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	0.06	U	-	**209**	-	-	**210**	-	-
DC-05D	DC-05D-140318	03/18/2014	N	SXC0095	**0.072**	-	-	-	-	-	-	-	-	-	-	-	**209**	-	-	**210**	-	-
DC-05D	DC-05D-140602	06/02/2014	N	SXF0017	**0.56**	J+	FBK	-	-	-	-	-	-	-	-	-	**214**	-	-	**215**	-	-
DC-05D	DC-05D-140922	09/22/2014	N	SXI0148	**0.057**	-	-	-	-	-	-	-	-	-	-	-	**203**	-	-	**205**	-	-
DC-05D	DC-05D-141216	12/16/2014	N	SXL0121	**0.39**	-	-	-	-	-	-	-	-	-	-	-	**199**	-	-	**200**	-	-
DC-05D	DC-05D-150317	03/17/2015	N	5904541	**0.3**	-	-	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
DC-05D	DC-05D-150616	06/16/2015	N	59010961	**0.27**	-	-	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
DC-05D	DC-05D-150923	09/23/2015	N	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**200**	-	-	**200**	-	-
DC-05D	YVD-D2-150923	09/23/2015	FD	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**220**	-	-	**220**	-	-
DC-05D	DC-05D-151215	12/15/2015	N	59025431	0.25	UJ	FDP	-	-	-	-	-	-	-	-	-	**230**	J	FDP	**230**	J	FDP
DC-05D	DC-05D-160309	03/09/2016	N	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**220**	-	-	**220**	-	-
DC-05D	DC-05D-160621	6/21/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
DC-05D	DC-05D-160926	9/26/2016	N	K1611506	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**209**	-	-	**209**	-	-
DC-05D	DC-05D-161214	12/14/2016	N	K1615126	-	-	-	**0.015**	-	-	-	-	-	-	-	-	**202**	-	-	**202**	-	-
DC-05D	YVD-030717-12	3/7/2017	N	K1702324	-	-	-	**0.041**	-	-	-	-	-	-	-	-	**206**	-	-	**206**	-	-
DC-05D	YVD-060717-34	6/7/2017	N	K1705833	-	-	-	**0.012**	-	-	-	-	-	-	-	-	**201**	-	-	**201**	-	-
DC-05D	YVD-092517-02	9/25/2017	N	K1710274	-	-	-	**0.024**	J	FDP	-	-	-	-	-	-	**207**	-	-	**207**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-05D	YVD-092517-03	9/25/2017	FD	K1710274	**80.6**	-	-	**29.1**	-	-	**4.02**	-	-	**38.9**	-	-	**24.9**	-	-	**0.27**	-	-
DC-05D	YVD-120517-20	12/5/2017	N	K1713091	**81.2**	-	-	**27.1**	-	-	**3.69**	-	-	**37.6**	-	-	**26.6**	-	-	**0.28**	-	-
DC-05D	YVD-031818-08	3/18/2018	N	870610	**82.0**	-	-	**27.50**	-	-	**3.97**	-	-	**41.2**	-	-	**27.4**	-	-	**0.25**	-	-
DC-05D	YVD-060318-03	6/3/2018	N	874568	**78.5**	-	-	**27.95**	-	-	**4.12**	-	-	**39.6**	-	-	**27.4**	-	-	**0.35**	-	-
DC-05D	YVD-060318-05	6/3/2018	FD	874568	**78.5**	-	-	**28.00**	-	-	**4.14**	-	-	**39.6**	-	-	**27.4**	-	-	**0.26**	-	-
DC-05D	YVD-090918-02	9/9/2018	N	880601	**79.5**	-	-	**26.75**	-	-	**4.00**	-	-	**38.0**	-	-	**26.8**	-	-	**0.25**	-	-
DC-05D	YVD-121118-14	12/11/2018	N	884939	**78.5**	-	-	**26.50**	-	-	**4.15**	-	-	**38.0**	-	-	**25.7**	-	-	**0.24**	-	-
DC-05D	YVD-031719-04	3/17/2019	N	988239	**79.0**	-	-	**26.85**	-	-	**4.06**	-	-	**38.2**	-	-	**26.6**	-	-	0.22	U	FBK
DC-05D (FD)	YVD-031719-06	3/17/2019	FD	988239	**81.5**	-	-	**27.05**	-	-	**4.11**	-	-	**38.6**	-	-	**26.4**	-	-	0.22	U	FBK
DC-05D	YVD-060219-10	6/2/2019	N	991939	**78.0**	-	-	**26.70**	-	-	**4.00**	-	-	**37.8**	-	-	26.0	U	FBK	0.25	U	FBK
DC-05D	YVD-090919-12	9/9/2019	N	998357	**78.5**	-	-	**26.15**	-	-	**3.96**	-	-	**35.4**	-	-	**26.5**	-	-	**0.30**	-	-
DC-05D	YVD-120919-05	12/9/2019	N	902276	**76.5**	-	-	**26.20**	-	-	**3.97**	-	-	**36.6**	J	MSD	**26.3**	-	-	**0.28**	-	-
DC-07	DC-07-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-07	DC-07-130918	09/18/2013	N	SWI0123	**122**	-	-	**18.4**	-	-	1.00	U	-	**45.7**	-	-	**30.5**	-	-	5	U	-
DC-07	YVD-D1-130918	09/18/2013	FD	SWI0123	**122**	-	-	**18.5**	-	-	1.00	U	-	**46.1**	-	-	**32.8**	-	-	5	U	-
DC-07	DC-07-131210	12/10/2013	N	SWL0055	**27.5**	-	-	**11.5**	-	-	**3.82**	-	-	**38.4**	-	-	**31**	-	-	5	U	-
DC-07	DC-07-140316	03/16/2014	N	SXC0081	**88.4**	-	-	**15.4**	-	-	**1.04**	-	-	**33.5**	-	-	**26.5**	-	-	2	U	-
DC-07	DC-07-140602	06/02/2014	N	SXF0008	**93.7**	-	-	**16.5**	-	-	1.00	U	-	**36.3**	-	-	**28.2**	-	-	2	U	-
DC-07	DC-07-140922	09/22/2014	N	SXI0148	**87.1**	-	-	**16.1**	-	-	1.00	U	-	**33.7**	-	-	**29.8**	-	-	2	U	-
DC-07	DC-07-141216	12/16/2014	N	SXL0108	**83.6**	-	-	**15.1**	-	-	1.00	U	-	**30.6**	-	-	**24.2**	-	-	2	U	-
DC-07	YVD-D2-141216	12/16/2014	FD	SXL0108	**84.2**	-	-	**15.1**	-	-	1.00	U	-	**30.8**	-	-	**25.6**	-	-	0.5	U	-
DC-07	DC-07-150317	03/17/2015	N	5904541	**94.0**	-	-	**17.0**	-	-	**1.00**	-	-	**35.0**	-	-	**29**	-	-	2	U	-
DC-07	DC-07-150617	06/17/2015	N	59011021	**97.0**	-	-	**17.0**	J	RPD	1.00	U	-	**37.0**	J	RPD	**32**	-	-	2	U	-
DC-07	DC-07-150924	09/24/2015	N	59020391	**76.0**	-	-	**15.0**	-	-	1.00	U	-	**33.0**	-	-	**30**	-	-	2	U	-
DC-07	DC-07-151215	12/15/2015	N	59025501	**87.0**	-	-	**16.0**	-	-	1.00	U	-	**34.0**	-	-	**29**	-	-	2	U	-
DC-07	DC-07-160309	03/09/2016	N	59029941	**91.0**	-	-	**17.0**	-	-	**1.10**	-	-	**36.0**	-	-	**31**	-	-	2	U	-
DC-07	DC-07-160621	6/21/2016	N	59037271	**96.0**	-	-	**18.0**	-	-	**1.20**	-	-	**38.0**	-	-	**33**	-	-	2	U	-
DC-07	DC-07-160926	9/26/2016	N	K1611565	**82.3**	-	-	**15.0**	-	-	**1.06**	-	-	**36.6**	-	-	**24.4**	-	-	0.2	U	-
DC-07	DC-07-161214	12/14/2016	N	K1615083	**77.0**	-	-	**13.1**	-	-	**1.05**	-	-	**32.0**	-	-	**19.2**	-	-	0.2	U	-
DC-07	YVD-030917-25	3/9/2017	N	K1702448	**87.9**	-	-	**14.4**	-	-	**1.03**	-	-	**32.1**	-	-	**21.4**	-	-	0.2	U	-
DC-07	YVD-060617-18	6/6/2017	N	K1705754	**82.8**	-	-	**14.3**	-	-	**1.10**	-	-	**34.6**	-	-	**24.5**	-	-	**0.11**	J	-
DC-07	YVD-092517-12	9/25/2017	N	K1710333	**86.1**	-	-	**13.9**	-	-	**1.14**	-	-	**34.5**	-	-	**25.4**	-	-	**0.09**	J	-
DC-07	YVD-120417-14	12/4/2017	N	K1713026	**80.9**	-	-	**13.3**	-	-	**1.17**	-	-	**33.0**	-	-	**25.7**	-	-	**0.18**	J	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-05D	YVD-092517-03	9/25/2017	FD	K1710274	**11**	-	-	0.10	U	-	**115**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-05D	YVD-120517-20	12/5/2017	N	K1713091	**11.9**	J	HTQ	0.10	U	-	**112**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
DC-05D	YVD-031818-08	3/18/2018	N	870610	**12.6**	-	-	0.05	U	-	**108**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-05D	YVD-060318-03	6/3/2018	N	874568	**12.5**	-	-	0.05	U	-	**105**	-	-	0.08	U	FBK	-	-	-	0.5	U	-
DC-05D	YVD-060318-05	6/3/2018	FD	874568	**13.4**	-	-	0.05	U	-	**105**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-05D	YVD-090918-02	9/9/2018	N	880601	**12.2**	-	-	0.05	U	-	**107**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-05D	YVD-121118-14	12/11/2018	N	884939	**12.4**	-	-	0.05	U	-	**102**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-05D	YVD-031719-04	3/17/2019	N	988239	**12.8**	-	-	0.05	U	-	**110**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-05D (FD)	YVD-031719-06	3/17/2019	FD	988239	**12.6**	-	-	0.05	U	-	**109**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-05D	YVD-060219-10	6/2/2019	N	991939	**13.8**	-	-	0.05	U	-	**109**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-05D	YVD-090919-12	9/9/2019	N	998357	**12.5**	-	-	0.05	U	-	**105**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-05D	YVD-120919-05	12/9/2019	N	902276	**12.9**	-	-	0.05	U	-	**105**	-	-	0.07	U	-				0.5	UJ	MSD
DC-07	DC-07-130103	01/03/2013	N	EPA01	**2.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-07	DC-07-130918	09/18/2013	N	SWI0123	**4.3**	-	-	2	U	-	**168**	-	-	-	-	-	0.1	U	-	0.25	U	-
DC-07	YVD-D1-130918	09/18/2013	FD	SWI0123	**4.3**	-	-	2	U	-	**179**	-	-	-	-	-	0.1	U	-	0.25	U	-
DC-07	DC-07-131210	12/10/2013	N	SWL0055	**4.7**	-	-	2	U	-	**117**	-	-	-	-	-	0.02	UJ	MSD	0.4366	UJ	ERL, MSD
DC-07	DC-07-140316	03/16/2014	N	SXC0081	**4.72**	-	-	0.8	U	-	**78.9**	-	-	-	-	-	**0.116**	-	-	0.25	U	-
DC-07	DC-07-140602	06/02/2014	N	SXF0008	0.8	U	-	0.8	U	-	**105**	-	-	-	-	-	0.1	U	-	**0.34**	-	-
DC-07	DC-07-140922	09/22/2014	N	SXI0148	**4.88**	-	-	0.8	U	-	**98.2**	-	-	-	-	-	0.1	U	-	**0.487**	-	-
DC-07	DC-07-141216	12/16/2014	N	SXL0108	**2.8**	-	-	0.8	U	-	**80.4**	-	-	-	-	-	0.1	U	-	**0.261**	-	-
DC-07	YVD-D2-141216	12/16/2014	FD	SXL0108	**2.92**	-	-	0.2	U	-	**82.1**	-	-	-	-	-	0.1	U	-	**0.305**	-	-
DC-07	DC-07-150317	03/17/2015	N	5904541	**4.6**	J-	MSD	0.8	U	-	**83**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-07	DC-07-150617	06/17/2015	N	59011021	**4**	J-	MSD	0.8	U	-	**93**	-	-	-	-	-	0.1	U	-	**0.28**	J-	MSD
DC-07	DC-07-150924	09/24/2015	N	59020391	**2.7**	J+	MSD	0.8	U	-	**95**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
DC-07	DC-07-151215	12/15/2015	N	59025501	**2.5**	-	-	0.8	U	-	**70**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-07	DC-07-160309	03/09/2016	N	59029941	**2.2**	-	-	0.8	U	-	**78**	J	DUP	-	-	-	0.1	U	-	-	R	FBK, FDP, MSD
DC-07	DC-07-160621	6/21/2016	N	59037271	**4.8**	-	-	0.8	U	-	**96**	-	-	-	-	-	**0.1**	J-	MSD	-	R	MSD
DC-07	DC-07-160926	9/26/2016	N	K1611565	**2.74**	-	-	0.10	U	-	**92.3**	-	-	-	-	-	0.050	U	-	-	R	MSD
DC-07	DC-07-161214	12/14/2016	N	K1615083	**1.44**	-	-	0.10	U	-	**72.4**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-07	YVD-030917-25	3/9/2017	N	K1702448	**2.58**	-	-	0.10	U	-	**59.8**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-07	YVD-060617-18	6/6/2017	N	K1705754	**2.42**	-	-	0.10	U	-	**70.4**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-07	YVD-092517-12	9/25/2017	N	K1710333	**2.34**	-	-	0.10	U	-	**94.2**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-07	YVD-120417-14	12/4/2017	N	K1713026	**2.92**	-	-	0.10	U	-	**81.9**	-	-	-	-	-	0.050	U	-	0.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-05D	YVD-092517-03	9/25/2017	FD	K1710274	-	-	-	**0.008**	J	FDP	-	-	-	-	-	-	**207**	-	-	**207**	-	-
DC-05D	YVD-120517-20	12/5/2017	N	K1713091	-	-	-	**0.013**	-	-	-	-	-	-	-	-	**202**	-	-	**202**	-	-
DC-05D	YVD-031818-08	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**198**	-	-	**198**	-	-
DC-05D	YVD-060318-03	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**203**	-	-	**203**	-	-
DC-05D	YVD-060318-05	6/3/2018	FD	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**202**	-	-	**202**	-	-
DC-05D	YVD-090918-02	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**204**	-	-	**204**	-	-
DC-05D	YVD-121118-14	12/11/2018	N	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	**204**	-	-	**204**	-	-
DC-05D	YVD-031719-04	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**204**	-	-	**204**	-	-
DC-05D (FD)	YVD-031719-06	3/17/2019	FD	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**206**	-	-	**206**	-	-
DC-05D	YVD-060219-10	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**206**	-	-	**206**	-	-
DC-05D	YVD-090919-12	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**205**	-	-	**205**	-	-
DC-05D	YVD-120919-05	12/9/2019	N	902276										0.07	U	-	**201**	-	-	**201**	-	-
DC-07	DC-07-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-07	DC-07-130918	09/18/2013	N	SWI0123	-	-	-	-	-	-	0.1	U	-	-	-	-	**315**	-	-	**315**	-	-
DC-07	YVD-D1-130918	09/18/2013	FD	SWI0123	-	-	-	-	-	-	0.1	U	-	-	-	-	**295**	-	-	**295**	-	-
DC-07	DC-07-131210	12/10/2013	N	SWL0055	-	-	-	-	-	-	-	-	-	**0.0648**	-	-	**260**	-	-	**260**	-	-
DC-07	DC-07-140316	03/16/2014	N	SXC0081	**0.11**	-	-	-	-	-	-	-	-	-	-	-	**260**	-	-	**260**	-	-
DC-07	DC-07-140602	06/02/2014	N	SXF0008	**0.12**	-	-	-	-	-	-	-	-	-	-	-	**245**	-	-	**245**	-	-
DC-07	DC-07-140922	09/22/2014	N	SXI0148	**0.19**	-	-	-	-	-	-	-	-	-	-	-	**215**	-	-	**215**	-	-
DC-07	DC-07-141216	12/16/2014	N	SXL0108	0.1	U	-	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
DC-07	YVD-D2-141216	12/16/2014	FD	SXL0108	0.1	U	-	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
DC-07	DC-07-150317	03/17/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**240**	-	-	**240**	-	-
DC-07	DC-07-150617	06/17/2015	N	59011021	0.25	U	-	-	-	-	-	-	-	-	-	-	**230**	-	-	**230**	-	-
DC-07	DC-07-150924	09/24/2015	N	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**240**	-	-	**240**	-	-
DC-07	DC-07-151215	12/15/2015	N	59025501	**0.41**	J-	MSD	-	-	-	-	-	-	-	-	-	**240**	-	-	**240**	-	-
DC-07	DC-07-160309	03/09/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**280**	-	-	**280**	-	-
DC-07	DC-07-160621	6/21/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**250**	-	-	**250**	-	-
DC-07	DC-07-160926	9/26/2016	N	K1611565	-	-	-	**0.057**	-	-	-	-	-	-	-	-	**204**	-	-	**204**	-	-
DC-07	DC-07-161214	12/14/2016	N	K1615083	-	-	-	**0.078**	-	-	-	-	-	-	-	-	**218**	-	-	**218**	-	-
DC-07	YVD-030917-25	3/9/2017	N	K1702448	-	-	-	**0.093**	-	-	-	-	-	-	-	-	**255**	-	-	**255**	-	-
DC-07	YVD-060617-18	6/6/2017	N	K1705754	-	-	-	**0.061**	-	-	-	-	-	-	-	-	**232**	-	-	**232**	-	-
DC-07	YVD-092517-12	9/25/2017	N	K1710333	-	-	-	**0.058**	-	-	-	-	-	-	-	-	**235**	-	-	**235**	-	-
DC-07	YVD-120417-14	12/4/2017	N	K1713026	-	-	-	**0.064**	-	-	-	-	-	-	-	-	**221**	-	-	**221**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-07	YVD-060318-17	6/3/2018	N	874568	**90.5**	-	-	**15.85**	-	-	**1.52**	-	-	**37.8**	-	-	**28.5**	-	-	0.10	U	-
DC-07	YVD-060319-20	6/3/2019	N	992053	**120**	-	-	**20.20**	-	-	**0.82**	-	-	**44.0**	-	-	**20.4**	-	-	0.10	U	-
DC-09	DC-09-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-09	DC-09-130923	09/23/2013	N	SWI0178	**34.0**	-	-	**8.4**	-	-	**2.75**	-	-	**39.7**	-	-	-	-	-	-	-	-
DC-09	DC-09-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	**16.2**	-	-	0.5	U	-
DC-09	DC-09-131211	12/11/2013	N	SWL0063	**34.8**	-	-	**7.9**	-	-	**2.48**	-	-	**39.1**	-	-	**17.4**	-	-	0.5	U	-
DC-09	DC-09-140317	03/17/2014	N	SXC0095	**35.4**	-	-	**8.4**	-	-	**2.88**	-	-	**36.5**	-	-	**15.6**	-	-	**0.82**	-	-
DC-09	DC-09-140602	06/02/2014	N	SXF0008	**33.9**	-	-	**8.3**	-	-	**2.92**	-	-	**38.1**	-	-	**15.9**	-	-	0.5	U	-
DC-09	YVD-D3-140602	06/02/2014	FD	SXF0008	**34.2**	-	-	**8.7**	-	-	**3.08**	-	-	**37.9**	-	-	**15.8**	-	-	0.5	U	-
DC-09	DC-09-140923	09/23/2014	N	SXI0158	**32.2**	-	-	**6.8**	-	-	**1.94**	-	-	**38.9**	J+	MSD	**15.8**	-	-	0.5	U	-
DC-09	DC-09-141216	12/16/2014	N	SXL0108	**35.3**	-	-	**8.0**	-	-	**2.48**	-	-	**39.1**	-	-	**16.3**	-	-	0.5	U	-
DC-09	DC-09-150316	03/16/2015	N	5904541	**36.0**	-	-	**8.0**	-	-	**2.60**	-	-	**43.0**	-	-	**17**	-	-	**0.6**	-	-
DC-09	DC-09-150616	06/16/2015	N	59010751	**34.0**	J+	MSD	**8.1**	J+	MSD	**2.30**	J+	MSD	**38.0**	J+	MSD	**16**	-	-	0.5	U	-
DC-09	DC-09-150923	09/23/2015	N	59020281	**33.0**	-	-	**8.1**	-	-	**2.50**	-	-	**40.0**	-	-	**16**	-	-	0.5	U	-
DC-09	DC-09-151214	12/14/2015	N	59025431	**34.0**	-	-	**8.2**	-	-	**2.70**	-	-	**40.0**	-	-	**16**	-	-	0.5	U	-
DC-09	DC-09-160308	03/08/2016	N	59029711	**35.0**	-	-	**8.8**	-	-	**3.30**	-	-	**39.0**	-	-	**16**	-	-	0.5	U	-
DC-09	YVD-D2-160308	03/08/2016	FD	59029711	**34.0**	-	-	**8.6**	-	-	**3.10**	-	-	**39.0**	-	-	**16**	-	-	0.5	U	-
DC-09	DC-09-160621	6/21/2016	N	59037151	**32.0**	-	-	**7.5**	-	-	**2.20**	-	-	**41.0**	-	-	**17**	-	-	**0.51**	-	-
DC-09	DC-09-160929	9/29/2016	N	K1611704	**30.6**	-	-	**6.25**	-	-	**2.00**	-	-	**39.3**	-	-	**14.8**	-	-	**0.38**	-	-
DC-09	DC-09-D4-160929	9/29/2016	FD	K1611704	**30.4**	-	-	**6.22**	-	-	**1.98**	-	-	**38.8**	-	-	**14.9**	-	-	**0.38**	-	-
DC-09	DC-09-161215	12/15/2016	N	K1615126	**33.0**	-	-	**6.65**	-	-	**1.99**	-	-	**38.9**	-	-	**15.0**	-	-	**0.41**	-	-
DC-09	YVD-D4-161215	12/15/2016	FD	K1615126	**32.8**	-	-	**6.62**	-	-	**1.98**	-	-	**37.8**	-	-	**15.0**	-	-	**0.42**	-	-
DC-09	YVD-031317-36	3/13/2017	N	K1702489	**33.8**	-	-	**6.75**	-	-	**2.00**	-	-	**38.8**	-	-	**14.6**	-	-	**0.44**	-	-
DC-09	YVD-060717-27	6/7/2017	N	K1705833	**33.3**	-	-	**6.88**	-	-	**1.97**	-	-	**39.3**	-	-	**14.7**	-	-	**0.40**	-	-
DC-09	YVD-092617-23	9/26/2017	N	K1710333	**32.9**	-	-	**6.71**	-	-	**1.98**	-	-	**38.5**	-	-	**14.7**	-	-	**0.40**	-	-
DC-09	YVD-120417-09	12/4/2017	N	K1713026	**33.0**	-	-	**6.50**	-	-	**1.86**	-	-	**37.3**	-	-	**15.1**	-	-	**0.43**	-	-
DC-09	YVD-060418-25	6/4/2018	N	874860	**33.4**	-	-	**7.30**	-	-	**2.08**	-	-	**40.2**	-	-	**14.1**	-	-	**0.39**	-	-
DC-09	YVD-060319-19	6/3/2019	N	992053	**34.5**	-	-	**7.25**	-	-	**2.06**	-	-	**39.2**	-	-	**13.1**	-	-	**0.39**	-	-
DC-14	DC-14-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-14	DC-14-130917	09/17/2013	N	SWI0113	**121**	-	-	**32.3**	-	-	**5.85**	-	-	**94.9**	-	-	**80.2**	-	-	0.5	U	-
DC-14	DC-14-131211	12/11/2013	N	SWL0063	**91.2**	-	-	**23.9**	-	-	**4.71**	-	-	**94.0**	-	-	**64.4**	-	-	5	U	-
DC-14	DC-14-140318	03/18/2014	N	SXC0095	**107**	-	-	**28.4**	-	-	**5.25**	-	-	**87.0**	-	-	**71.8**	-	-	5	U	-
DC-14	DC-14-140602	06/02/2014	N	SXF0017	**95.9**	-	-	**26.3**	-	-	**5.37**	-	-	**83.2**	-	-	**56.1**	-	-	1	U	-
DC-14	DC-14-140923	09/23/2014	N	SXI0158	**106**	-	-	**27.6**	-	-	**4.95**	-	-	**88.6**	J+	MSD	**63.7**	-	-	1	U	-
DC-14	DC-14-141216	12/16/2014	N	SXL0108	**110**	-	-	**31.5**	-	-	**5.57**	-	-	**84.5**	-	-	**74.4**	-	-	1	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-07	YVD-060318-17	6/3/2018	N	874568	**6.90**	-	-	0.05	U	-	**93.4**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-07	YVD-060319-20	6/3/2019	N	992053	**2.95**	-	-	0.05	U	-	**49.5**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-09	DC-09-130103	01/03/2013	N	EPA01	**6**	-	-	-	-	-	-	-	-	-	-	-	0.1	U	-	-	-	-
DC-09	DC-09-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	-	-	-	-	-	-	0.1	U	-	**0.447**	-	-
DC-09	DC-09-130926	09/26/2013	N	SWI0190	**6.02**	-	-	0.2	U	-	**30.7**	-	-	-	-	-	-	-	-	-	-	-
DC-09	DC-09-131211	12/11/2013	N	SWL0063	**6.78**	-	-	0.2	U	-	**34.4**	J-	MSD	-	-	-	-	R	MSD	0.2	U	-
DC-09	DC-09-140317	03/17/2014	N	SXC0095	**5.85**	-	-	0.2	U	-	**28.8**	J-	MSD	-	-	-	0.1	U	-	**0.251**	-	-
DC-09	DC-09-140602	06/02/2014	N	SXF0008	**6.18**	-	-	0.2	U	-	**29.4**	-	-	-	-	-	**0.106**	-	-	**0.279**	-	-
DC-09	YVD-D3-140602	06/02/2014	FD	SXF0008	**5.97**	-	-	0.2	U	-	**29.1**	-	-	-	-	-	0.1	U	-	**0.359**	-	-
DC-09	DC-09-140923	09/23/2014	N	SXI0158	**6.01**	-	-	0.2	U	-	**29.6**	-	-	-	-	-	-	R	MSD	0.25	U	-
DC-09	DC-09-141216	12/16/2014	N	SXL0108	**5.94**	-	-	0.2	U	-	**30.2**	-	-	-	-	-	0.1	U	-	0.25	U	-
DC-09	DC-09-150316	03/16/2015	N	5904541	**5.9**	J-	MSD	0.2	U	-	**29**	J-	MSD	-	-	-	**0.15**	-	-	0.25	UJ	MSD
DC-09	DC-09-150616	06/16/2015	N	59010751	**5.8**	-	-	0.2	U	-	**28**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-09	DC-09-150923	09/23/2015	N	59020281	**5.8**	-	-	0.2	U	-	**30**	-	-	-	-	-	0.1	U	-	-	R	MSD
DC-09	DC-09-151214	12/14/2015	N	59025431	**5.9**	-	-	0.2	U	-	**31**	-	-	-	-	-	-	R	MSD	-	R	MSD
DC-09	DC-09-160308	03/08/2016	N	59029711	**5.7**	-	-	0.2	U	-	**31**	J+	MSD	-	-	-	-	R	FBK,	-	R	MSD
DC-09	YVD-D2-160308	03/08/2016	FD	59029711	**5.7**	-	-	0.2	U	-	**31**	J+	MSD	-	-	-	0.1	UJ	FDP	-	R	MSD
DC-09	DC-09-160621	6/21/2016	N	59037151	**5.9**	-	-	0.2	U	-	**32**	-	-	-	-	-	0.1	UJ	-	0.25	U	-
DC-09	DC-09-160929	9/29/2016	N	K1611704	**5.53**	-	-	0.10	U	-	**29.8**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
DC-09	DC-09-D4-160929	9/29/2016	FD	K1611704	**5.53**	-	-	0.10	U	-	**29.6**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
DC-09	DC-09-161215	12/15/2016	N	K1615126	**5.62**	-	-	0.10	U	-	**30.6**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-09	YVD-D4-161215	12/15/2016	FD	K1615126	**5.61**	-	-	0.10	U	-	**30.6**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-09	YVD-031317-36	3/13/2017	N	K1702489	**5.54**	-	-	0.10	U	-	**28.2**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-09	YVD-060717-27	6/7/2017	N	K1705833	**5.55**	-	-	0.10	U	-	**30.3**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-09	YVD-092617-23	9/26/2017	N	K1710333	**5.47**	-	-	0.10	U	-	**32.5**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-09	YVD-120417-09	12/4/2017	N	K1713026	**5.80**	-	-	0.10	U	-	**30.6**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-09	YVD-060418-25	6/4/2018	N	874860	**5.29**	-	-	0.05	U	-	**29.2**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-09	YVD-060319-19	6/3/2019	N	992053	**5.23**	-	-	0.05	U	-	**27.6**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-14	DC-14-130103	01/03/2013	N	EPA01	**26**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-14	DC-14-130917	09/17/2013	N	SWI0113	**12**	-	-	0.2	U	-	**34.2**	-	-	-	-	-	**0.115**	-	-	**0.31**	-	-
DC-14	DC-14-131211	12/11/2013	N	SWL0063	**5.8**	-	-	2	U	-	**33.9**	J-	MSD	-	-	-	-	R	MSD	0.2	U	-
DC-14	DC-14-140318	03/18/2014	N	SXC0095	**10.6**	-	-	2	U	-	**35.7**	J-	MSD	-	-	-	0.1	U	-	0.25	U	-
DC-14	DC-14-140602	06/02/2014	N	SXF0017	**6.46**	-	-	0.4	U	-	**24.2**	J-	MSD	-	-	-	0.1	U	-	**0.367**	-	-
DC-14	DC-14-140923	09/23/2014	N	SXI0158	**8.9**	-	-	0.4	U	-	**25.9**	-	-	-	-	-	-	R	MSD	**0.315**	-	-
DC-14	DC-14-141216	12/16/2014	N	SXL0108	**10.4**	-	-	0.4	U	-	**29.8**	-	-	-	-	-	0.1	U	-	0.25	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-07	YVD-060318-17	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**202**	-	-	**202**	-	-
DC-07	YVD-060319-20	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**349**	-	-	**349**	-	-
DC-09	DC-09-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-09	DC-09-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	0.1	U	-	-	-	-	**44.7**	-	-	**45**	-	-
DC-09	DC-09-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-09	DC-09-131211	12/11/2013	N	SWL0063	-	-	-	-	-	-	-	-	-	**0.125**	-	-	**129**	-	-	**130**	-	-
DC-09	DC-09-140317	03/17/2014	N	SXC0095	**0.18**	-	-	-	-	-	-	-	-	-	-	-	**144**	-	-	**145**	-	-
DC-09	DC-09-140602	06/02/2014	N	SXF0008	**0.22**	J	FDP	-	-	-	-	-	-	-	-	-	**129**	-	-	**130**	-	-
DC-09	YVD-D3-140602	06/02/2014	FD	SXF0008	**0.16**	J	FDP	-	-	-	-	-	-	-	-	-	**129**	-	-	**130**	-	-
DC-09	DC-09-140923	09/23/2014	N	SXI0158	0.05	U	-	-	-	-	-	-	-	-	-	-	**124**	-	-	**125**	-	-
DC-09	DC-09-141216	12/16/2014	N	SXL0108	**0.13**	-	-	-	-	-	-	-	-	-	-	-	**129**	-	-	**130**	-	-
DC-09	DC-09-150316	03/16/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
DC-09	DC-09-150616	06/16/2015	N	59010751	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
DC-09	DC-09-150923	09/23/2015	N	59020281	0.25	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
DC-09	DC-09-151214	12/14/2015	N	59025431	**0.3**	J	FDP	-	-	-	-	-	-	-	-	-	**150**	J	FDP	**150**	J	FDP
DC-09	DC-09-160308	03/08/2016	N	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
DC-09	YVD-D2-160308	03/08/2016	FD	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
DC-09	DC-09-160621	6/21/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
DC-09	DC-09-160929	9/29/2016	N	K1611704	-	-	-	**0.016**	-	-	-	-	-	-	-	-	**129**	-	-	**129**	-	-
DC-09	DC-09-D4-160929	9/29/2016	FD	K1611704	-	-	-	**0.013**	-	-	-	-	-	-	-	-	**128**	-	-	**128**	-	-
DC-09	DC-09-161215	12/15/2016	N	K1615126	-	-	-	**0.009**	J	-	-	-	-	-	-	-	**127**	-	-	**127**	-	-
DC-09	YVD-D4-161215	12/15/2016	FD	K1615126	-	-	-	**0.007**	J	-	-	-	-	-	-	-	**127**	-	-	**127**	-	-
DC-09	YVD-031317-36	3/13/2017	N	K1702489	-	-	-	**0.024**	-	-	-	-	-	-	-	-	**124**	-	-	**124**	-	-
DC-09	YVD-060717-27	6/7/2017	N	K1705833	-	-	-	**0.029**	-	-	-	-	-	-	-	-	**126**	-	-	**126**	-	-
DC-09	YVD-092617-23	9/26/2017	N	K1710333	-	-	-	0.010	U	-	-	-	-	-	-	-	**132**	-	-	**132**	-	-
DC-09	YVD-120417-09	12/4/2017	N	K1713026	-	-	-	0.014	U	MBK	-	-	-	-	-	-	**129**	-	-	**129**	-	-
DC-09	YVD-060418-25	6/4/2018	N	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	**127**	-	-	**127**	-	-
DC-09	YVD-060319-19	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**128**	-	-	**128**	-	-
DC-14	DC-14-130103	01/03/2013	N	EPA01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DC-14	DC-14-130917	09/17/2013	N	SWI0113	-	-	-	-	-	-	**0.199**	-	-	-	-	-	**454**	-	-	**455**	-	-
DC-14	DC-14-131211	12/11/2013	N	SWL0063	-	-	-	-	-	-	-	-	-	**0.167**	-	-	**434**	-	-	**435**	-	-
DC-14	DC-14-140318	03/18/2014	N	SXC0095	**0.26**	-	-	-	-	-	-	-	-	-	-	-	**494**	-	-	**495**	-	-
DC-14	DC-14-140602	06/02/2014	N	SXF0017	**0.42**	J+	FBK	-	-	-	-	-	-	-	-	-	**425**	-	-	**425**	-	-
DC-14	DC-14-140923	09/23/2014	N	SXI0158	**0.3**	-	-	-	-	-	-	-	-	-	-	-	**424**	-	-	**425**	-	-
DC-14	DC-14-141216	12/16/2014	N	SXL0108	**0.14**	-	-	-	-	-	-	-	-	-	-	-	**429**	-	-	**430**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-14	DC-14-150316	03/16/2015	N	5904541	**140**	-	-	**38.0**	-	-	**6.10**	-	-	**100**	-	-	**80**	-	-	1	U	-
DC-14	DC-14-150616	06/16/2015	N	59010961	**120**	-	-	**33.0**	-	-	**6.50**	J+	MSD	**85.0**	J+	MSD	**76**	-	-	1	U	-
DC-14	DC-14-150924	09/24/2015	N	59020391	**130**	-	-	**42.0**	-	-	**6.30**	-	-	**92.0**	-	-	**96**	-	-	1	U	-
DC-14	DC-14-151214	12/14/2015	N	59025351	**150**	-	-	**43.0**	-	-	**6.60**	-	-	**100**	-	-	**90**	-	-	1	U	-
DC-14	YVD-D1-151214	12/14/2015	FD	59025351	**150**	-	-	**43.0**	-	-	**6.60**	-	-	**100**	-	-	**85**	-	-	0.5	U	-
DC-14	DC-14-160309	03/09/2016	N	59029711	**130**	-	-	**38.0**	-	-	**6.60**	-	-	**95.0**	-	-	**82**	-	-	1	U	-
DC-14	DC-14-160620	6/20/2016	N	59037151	**120**	-	-	**36.0**	-	-	**6.00**	-	-	**92.0**	-	-	**75**	-	-	1	U	-
DC-14	DC-14-160929	9/29/2016	N	K1611704	**97.2**	-	-	**28.9**	-	-	**4.75**	-	-	**74.9**	-	-	**56.4**	-	-	**0.30**	-	-
DC-14	DC-14-161216	12/16/2016	N	K1615174	**93.3**	-	-	**22.3**	-	-	**4.37**	-	-	**68.8**	-	-	**53.9**	-	-	**0.36**	-	-
DC-14	YVD-031317-38	3/14/2017	N	K1702542	**91.0**	-	-	**24.4**	-	-	**4.57**	-	-	**68.4**	-	-	**49.6**	-	-	**0.34**	-	-
DC-14	YVD-060617-19	6/6/2017	N	K1705754	**97.7**	-	-	**24.4**	-	-	**4.40**	-	-	**65.2**	-	-	**49.2**	-	-	**0.34**	-	-
DC-14	YVD-092517-11	9/25/2017	N	K1710274	**98.2**	-	-	**24.5**	-	-	**4.63**	-	-	**64.3**	-	-	**43.3**	-	-	**0.34**	-	-
DC-14	YVD-120617-27	12/6/2017	N	K1713157	**100**	-	-	**23.5**	-	-	**4.49**	-	-	**60.5**	-	-	**46.4**	-	-	**0.35**	-	-
DC-14	YVD-120617-29	12/6/2017	FD	K1713157	**97.7**	-	-	**22.8**	-	-	**4.44**	-	-	**60.6**	-	-	**46.0**	-	-	**0.34**	-	-
DC-14	YVD-031918-20	3/19/2018	N	870634	**95.0**	-	-	**22.55**	-	-	**4.56**	-	-	**58.0**	-	-	**47.9**	-	-	**0.31**	-	-
DC-14	YVD-060518-28	6/5/2018	N	874860	**92.0**	-	-	**23.45**	-	-	**4.62**	-	-	**56.0**	-	-	**56.5**	-	-	**0.31**	-	-
DC-14	YVD-060518-30	6/5/2018	FD	874860	**97.5**	-	-	**24.55**	-	-	**4.78**	-	-	**57.5**	-	-	-	R	PRS	-	R	PRS
DC-14	YVD-090918-08	9/9/2018	N	880601	**104**	-	-	**25.00**	-	-	**4.80**	-	-	**54.0**	-	-	**63.5**	-	-	**0.29**	-	-
DC-14 (FD)	YVD-090918-10	9/9/2018	FD	880601	**105**	-	-	**25.05**	-	-	**4.78**	-	-	**53.5**	-	-	**70.8**	-	-	**0.29**	-	-
DC-14	YVD-121018-07	12/10/2018	N	884857	**105**	-	-	**25.70**	J	MSD	**4.92**	-	-	**55.5**	-	-	**72.8**	-	-	0.28	U	FBK
DC-14	YVD-031719-09	3/17/2019	N	988239	**118**	-	-	**27.80**	-	-	**5.05**	-	-	**53.5**	-	-	**83.8**	-	-	0.25	U	FBK
DC-14	YVD-060319-17	6/3/2019	N	992053	**122**	-	-	**29.65**	-	-	**5.15**	-	-	**53.5**	-	-	**79.7**	-	-	**0.22**	-	-
DC-14	YVD-091019-18	9/10/2019	N	998438	**132**	-	-	**32.25**	-	-	**5.20**	-	-	**53.5**	-	-	**89.5**	-	-	**0.24**	-	-
DC-14	YVD-120919-14	12/9/2019	N	902276	**134**	-	-	**32.85**	-	-	**5.40**			**54.5**	J	MSD	**95.2**			**0.32**		
YVD-02	YVD-02-130924	09/24/2013	N	SWI0178	**20.4**	-	-	**5.9**	-	-	**3.50**	-	-	**8.6**	-	-	**3.85**	-	-	0.5	U	-
YVD-02	YVD-02-140316	03/16/2014	N	SXC0081	**90.8**	-	-	**71.7**	-	-	**12.60**	-	-	**88.6**	-	-	**3.93**	-	-	**1.02**	-	-
YVD-02	YVD-02-140602	06/02/2014	N	SXF0008	**62.7**	-	-	**48.7**	-	-	**8.53**	-	-	**23.0**	-	-	**2.75**	-	-	0.5	U	-
YVD-02	YVD-02-140921	09/21/2014	N	SXI0148	**29.6**	-	-	**13.7**	J	FDP	**4.53**	-	-	**11.6**	J	FDP	**2.64**	-	-	0.5	U	-
YVD-02	YVD-D1-140921	09/21/2014	FD	SXI0148	**35.8**	-	-	**18.2**	J	FDP	**5.05**	-	-	**15.7**	J	FDP	**2.2**	-	-	0.5	U	-
YVD-02	YVD-02-141215	12/15/2014	N	SXL0103	**35.7**	-	-	**17.4**	-	-	**5.35**	-	-	**16.1**	-	-	**2.9**	J+	MSD	0.5	U	-
YVD-02	YVD-02-150615	06/15/2015	N	59010751	**32.0**	J+	MSD	**16.0**	J+	MSD	**4.10**	J+	MSD	**12.0**	J+	MSD	**2.6**	-	-	0.5	U	-
YVD-02	YVD-02-150923	09/23/2015	N	59020281	**28.0**	-	-	**17.0**	-	-	**4.80**	-	-	**14.0**	-	-	**2.5**	-	-	0.5	U	-
YVD-02	YVD-02-151214	12/14/2015	N	59025351	**38.0**	-	-	**23.0**	-	-	**6.30**	-	-	**25.0**	-	-	**2.6**	-	-	0.5	U	-
YVD-02	YVD-02-160308	03/08/2016	N	59029521	**32.0**	-	-	**20.0**	-	-	**5.80**	-	-	**22.0**	-	-	**3**	-	-	**0.57**	-	-
YVD-02	YVD-02-160620	6/20/2016	N	59037101	**25.0**	-	-	**10.0**	-	-	**4.20**	-	-	**9.7**	-	-	**2.9**	-	-	0.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-14	DC-14-150316	03/16/2015	N	5904541	**18**	J-	MSD	0.4	U	-	**38**	J-	MSD	-	-	-	**0.16**	-	-	0.25	UJ	MSD
DC-14	DC-14-150616	06/16/2015	N	59010961	**12**	-	-	0.4	U	-	**29**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
DC-14	DC-14-150924	09/24/2015	N	59020391	**22**	J+	MSD	0.4	U	-	**42**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
DC-14	DC-14-151214	12/14/2015	N	59025351	**21**	-	-	0.4	U	-	**39**	-	-	-	-	-	-	R	MSD	0.25	UJ	MSD
DC-14	YVD-D1-151214	12/14/2015	FD	59025351	**22**	-	-	0.2	U	-	**41**	-	-	-	-	-	-	R	MSD	0.25	UJ	MSD
DC-14	DC-14-160309	03/09/2016	N	59029711	**16**	-	-	0.4	U	-	**39**	J+	MSD	-	-	-	0.1	UJ	FDP	-	R	MSD
DC-14	DC-14-160620	6/20/2016	N	59037151	**16**	-	-	0.4	U	-	**38**	-	-	-	-	-	0.1	U	-	0.25	U	-
DC-14	DC-14-160929	9/29/2016	N	K1611704	**7.19**	-	-	0.10	U	-	**23.1**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
DC-14	DC-14-161216	12/16/2016	N	K1615174	**4.45**	-	-	0.10	U	-	**21.9**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-14	YVD-031317-38	3/14/2017	N	K1702542	**4.34**	-	-	0.10	U	-	**20.8**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-14	YVD-060617-19	6/6/2017	N	K1705754	**3.86**	-	-	0.10	U	-	**26.9**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-14	YVD-092517-11	9/25/2017	N	K1710274	**2.41**	-	-	0.10	U	-	**23.9**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-14	YVD-120617-27	12/6/2017	N	K1713157	**2.52**	-	-	0.10	U	-	**20.3**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
DC-14	YVD-120617-29	12/6/2017	FD	K1713157	**2.52**	-	-	0.10	U	-	**20.0**	-	-	-	-	-	0.050	U	-	0.5	U	-
DC-14	YVD-031918-20	3/19/2018	N	870634	**2.86**	-	-	0.05	U	-	**17.8**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-14	YVD-060518-28	6/5/2018	N	874860	**4.00**	-	-	0.05	U	-	**16.1**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-14	YVD-060518-30	6/5/2018	FD	874860	-	R	PRS	-	R	PRS	-	R	PRS	0.07	U	-	-	-	-	0.5	UJ	MBK
DC-14	YVD-090918-08	9/9/2018	N	880601	**4.08**	-	-	0.05	U	-	**16.0**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-14 (FD)	YVD-090918-10	9/9/2018	FD	880601	**4.00**	-	-	0.05	U	-	**15.3**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-14	YVD-121018-07	12/10/2018	N	884857	**4.60**	-	-	0.05	U	-	**14.9**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-14	YVD-031719-09	3/17/2019	N	988239	**5.00**	-	-	0.05	U	-	**15.1**	-	-	0.07	U	-	-	-	-	-	R	MSD
DC-14	YVD-060319-17	6/3/2019	N	992053	**5.35**	-	-	0.05	U	-	**13.6**	-	-	0.07	U	-	-	-	-	0.5	U	-
DC-14	YVD-091019-18	9/10/2019	N	998438	**7.70**	-	-	0.05	U	-	**17.1**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
DC-14	YVD-120919-14	12/9/2019	N	902276	**8.00**	-	-	0.05	U	-	**20.3**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-02	YVD-02-130924	09/24/2013	N	SWI0178	**0.41**	-	-	0.2	U	-	**5.77**	-	-	-	-	-	**0.146**	-	-	0.25	U	-
YVD-02	YVD-02-140316	03/16/2014	N	SXC0081	0.2	U	-	0.2	U	-	**66.9**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-02	YVD-02-140602	06/02/2014	N	SXF0008	0.2	U	-	0.2	U	-	**3.12**	-	-	-	-	-	0.1	U	-	**0.49**	-	-
YVD-02	YVD-02-140921	09/21/2014	N	SXI0148	0.2	U	-	0.2	U	-	**13.8**	-	-	-	-	-	0.1	U	-	**0.274**	-	-
YVD-02	YVD-D1-140921	09/21/2014	FD	SXI0148	0.2	U	-	0.2	U	-	**15.6**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-02	YVD-02-141215	12/15/2014	N	SXL0103	**0.22**	J	DUP	0.2	U	-	**33.6**	J+	MSD, DUP	-	-	-	0.1	U	-	**0.358**	-	-
YVD-02	YVD-02-150615	06/15/2015	N	59010751	**0.23**	-	-	0.2	U	-	**3.2**	J-	MSD	-	-	-	**0.11**	-	-	0.25	UJ	MSD
YVD-02	YVD-02-150923	09/23/2015	N	59020281	0.2	U	-	0.2	U	-	**9.5**	-	-	-	-	-	0.1	U	-	**0.25**	J-	MSD
YVD-02	YVD-02-151214	12/14/2015	N	59025351	0.2	U	-	0.2	U	-	**24**	-	-	-	-	-	-	R	MSD	**0.76**	J-	MSD
YVD-02	YVD-02-160308	03/08/2016	N	59029521	0.2	U	-	0.2	U	-	**54**	-	-	-	-	-	0.1	UJ	RPD	**0.25**	J-	MSD
YVD-02	YVD-02-160620	6/20/2016	N	59037101	**0.31**	-	-	0.2	U	-	**8**	J-	MSD	-	-	-	0.1	U	-	**0.35**	J-	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
DC-14	DC-14-150316	03/16/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**490**	-	-	**490**	-	-
DC-14	DC-14-150616	06/16/2015	N	59010961	**0.3**	-	-	-	-	-	-	-	-	-	-	-	**430**	-	-	**430**	-	-
DC-14	DC-14-150924	09/24/2015	N	59020391	**0.31**	-	-	-	-	-	-	-	-	-	-	-	**470**	-	-	**470**	-	-
DC-14	DC-14-151214	12/14/2015	N	59025351	**0.35**	-	-	-	-	-	-	-	-	-	-	-	**550**	-	-	**550**	-	-
DC-14	YVD-D1-151214	12/14/2015	FD	59025351	**0.38**	-	-	-	-	-	-	-	-	-	-	-	**540**	-	-	**540**	-	-
DC-14	DC-14-160309	03/09/2016	N	59029711	**0.33**	-	-	-	-	-	-	-	-	-	-	-	**490**	-	-	**490**	-	-
DC-14	DC-14-160620	6/20/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**460**	-	-	**460**	-	-
DC-14	DC-14-160929	9/29/2016	N	K1611704	-	-	-	**0.009**	J	-	-	-	-	-	-	-	**394**	-	-	**394**	-	-
DC-14	DC-14-161216	12/16/2016	N	K1615174	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**361**	-	-	**361**	-	-
DC-14	YVD-031317-38	3/14/2017	N	K1702542	-	-	-	**0.074**	-	-	-	-	-	-	-	-	**359**	-	-	**359**	-	-
DC-14	YVD-060617-19	6/6/2017	N	K1705754	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**386**	-	-	**386**	-	-
DC-14	YVD-092517-11	9/25/2017	N	K1710274	-	-	-	**0.005**	J	-	-	-	-	-	-	-	**382**	-	-	**382**	-	-
DC-14	YVD-120617-27	12/6/2017	N	K1713157	-	-	-	**0.020**	-	-	-	-	-	-	-	-	**378**	-	-	**378**	-	-
DC-14	YVD-120617-29	12/6/2017	FD	K1713157	-	-	-	**0.021**	-	-	-	-	-	-	-	-	**372**	-	-	**372**	-	-
DC-14	YVD-031918-20	3/19/2018	N	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**372**	-	-	**372**	-	-
DC-14	YVD-060518-28	6/5/2018	N	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	**370**	-	-	**370**	-	-
DC-14	YVD-060518-30	6/5/2018	FD	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	-	R	PRS	-	R	PRS
DC-14	YVD-090918-08	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**368**	-	-	**368**	-	-
DC-14 (FD)	YVD-090918-10	9/9/2018	FD	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**363**	-	-	**363**	-	-
DC-14	YVD-121018-07	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**376**	-	-	**376**	-	-
DC-14	YVD-031719-09	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**395**	-	-	**395**	-	-
DC-14	YVD-060319-17	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**395**	-	-	**395**	-	-
DC-14	YVD-091019-18	9/10/2019	N	998438	-	-	-	-	-	-	-	-	-	0.07	U	-	**427**	-	-	**427**	-	-
DC-14	YVD-120919-14	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**438**	-	-	**438**	-	-
YVD-02	YVD-02-130924	09/24/2013	N	SWI0178	-	-	-	-	-	-	**0.124**	-	-	-	-	-	**54.9**	-	-	**55**	-	-
YVD-02	YVD-02-140316	03/16/2014	N	SXC0081	**0.54**	-	-	-	-	-	-	-	-	-	-	-	**199**	-	-	**200**	-	-
YVD-02	YVD-02-140602	06/02/2014	N	SXF0008	**3.8**	-	-	-	-	-	-	-	-	-	-	-	**82.2**	-	-	**82.5**	-	-
YVD-02	YVD-02-140921	09/21/2014	N	SXI0148	**1.2**	J	FDP	-	-	-	-	-	-	-	-	-	**89.4**	-	-	**90**	-	-
YVD-02	YVD-D1-140921	09/21/2014	FD	SXI0148	**0.86**	J	FDP	-	-	-	-	-	-	-	-	-	**89.4**	-	-	**90**	-	-
YVD-02	YVD-02-141215	12/15/2014	N	SXL0103	**0.61**	-	-	-	-	-	-	-	-	-	-	-	**94.7**	-	-	**95**	-	-
YVD-02	YVD-02-150615	06/15/2015	N	59010751	**1.1**	-	-	-	-	-	-	-	-	-	-	-	**75**	J+	FBK	**75**	J+	FBK
YVD-02	YVD-02-150923	09/23/2015	N	59020281	**1**	J+	FBK		-	-	-	-	-	-	-	-	**95**	-	-	**95**	-	-
YVD-02	YVD-02-151214	12/14/2015	N	59025351	**0.68**	-	-	-	-	-	-	-	-	-	-	-	**100**	-	-	**100**	-	-
YVD-02	YVD-02-160308	03/08/2016	N	59029521	**0.59**	-	-	-	-	-	-	-	-	-	-	-	**110**	J	FDP	**110**	J	FDP
YVD-02	YVD-02-160620	6/20/2016	N	59037101	**0.52**	-	-	-	-	-	-	-	-	-	-	-	**75**	-	-	**75**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-02	YVD-02-160928	9/28/2016	N	K1611629	**17.2**	-	-	**4.6**	-	-	**3.41**	-	-	**5.07**	-	-	**2.79**	J	DUP	**0.16**	J	-
YVD-02	YVD-030817-15	3/8/2017	N	K1702324	**30.2**	-	-	**7.2**	-	-	**3.51**	-	-	**7.06**	-	-	**3.85**	-	-	**0.21**	-	-
YVD-02	YVD-060617-14	6/6/2017	N	K1705754	**20.9**	-	-	**4.85**	-	-	**3.00**	-	-	**5.95**	-	-	**3.03**	-	-	**0.16**	J	-
YVD-02	YVD-060617-16	6/6/2017	FD	K1705754	**20.2**	-	-	**4.74**	-	-	**3.00**	-	-	**5.91**	-	-	**2.95**	-	-	**0.15**	J	-
YVD-02	YVD-092617-20	9/26/2017	N	K1710333	**17.7**	-	-	**4.64**	-	-	**3.06**	-	-	**5.20**	-	-	**2.63**	-	-	**0.15**	J	-
YVD-02	YVD-120417-02	12/4/2017	N	K1713026	**20.0**	-	-	**7.43**	-	-	**3.18**	-	-	**9.59**	-	-	**2.37**	-	-	**0.29**	-	-
YVD-02	YVD-120417-04	12/4/2017	FD	K1713026	**19.6**	-	-	**7.74**	-	-	**3.08**	-	-	**9.58**	-	-	**2.20**	-	-	**0.31**	-	-
YVD-02	YVD-061218-32	6/12/2018	N	875438	-	R	NR	-	R	NR	-	R	NR	-	R	NR	-	R	NR	-	R	NR
YVD-02	YVD-060419-28	6/4/2019	N	992242	**54.0**	-	-	**19.55**	-	-	**5.15**	-	-	**14.8**	-	-	**12.5**	-	-	**0.18**	-	-
YVD-02	YVD-070219-33	7/2/2019	N	994356	**87.0**	-	-	**32.35**	-	-	**6.50**	-	-	**26.8**	-	-	**13.0**	-	-	**0.19**	-	-
YVD-02	YVD-091019-19	9/10/2019	N	998438	**97.0**	-	-	**26.95**	-	-	**6.60**	-	-	**21.6**	-	-	**11.3**	-	-	**0.13**	-	-
YVD-02	YVD-121019-23	12/10/2019	N	902321	**85.0**	-	-	**31.60**	-	-	**7.10**	-	-	**38.3**	-	-	**11.6**	-	-	**0.33**	-	-
YVD-03	YVD-03-130916	09/16/2013	N	SWI0113	**57.5**	-	-	**24.3**	-	-	**9.00**	-	-	**43.0**	-	-	**14**	-	-	**0.74**	-	-
YVD-03	YVD-03-131210	12/10/2013	N	SWL0063	**48.7**	-	-	**20.4**	-	-	**6.67**	-	-	**40.2**	-	-	**14.3**	-	-	1	U	-
YVD-03	YVD-03-140317	03/17/2014	N	SXC0081	**51.2**	-	-	**18.2**	-	-	**4.10**	-	-	**37.6**	-	-	**13.3**	-	-	**1.03**	-	-
YVD-03	YVD-03-140602	06/02/2014	N	SXF0008	**46.4**	-	-	**16.8**	-	-	**3.93**	-	-	**36.8**	-	-	**10.7**	-	-	0.5	U	-
YVD-03	YVD-03-140923	09/23/2014	N	SXI0158	**52.2**	-	-	**19.5**	-	-	**4.66**	J	FDP	**40.7**	J+	MSD	**11.8**	-	-	**0.62**	-	-
YVD-03	YVD-D3-140923	09/23/2014	FD	SXI0158	**45.4**	-	-	**16.2**	-	-	**3.62**	J	FDP	**38.0**	J+	MSD	**12.1**	-	-	**0.65**	-	-
YVD-03	YVD-03-141215	12/15/2014	N	SXL0108	**51.7**	-	-	**19.3**	-	-	**4.47**	-	-	**39.1**	-	-	**12.9**	-	-	**0.54**	-	-
YVD-03	YVD-03-150316	03/16/2015	N	5904541	**46.0**	-	-	**17.0**	-	-	**3.90**	-	-	**39.0**	-	-	**13**	-	-	**0.84**	-	-
YVD-03	YVD-03-150616	06/16/2015	N	59010751	**50.0**	J+	MSD	**20.0**	J+	MSD	**6.10**	J+	MSD	**37.0**	J+	MSD	**12**	-	-	**0.68**	-	-
YVD-03	YVD-03-150922	09/22/2015	N	59020141	**43.0**	-	-	**19.0**	-	-	**6.50**	-	-	**40.0**	-	-	**14**	-	-	**0.66**	-	-
YVD-03	YVD-03-151214	12/14/2015	N	59025351	**49.0**	-	-	**22.0**	-	-	**7.80**	-	-	**43.0**	-	-	**14**	-	-	**0.74**	-	-
YVD-03	YVD-03-160307	03/07/2016	N	59029521	**43.0**	-	-	**20.0**	-	-	**7.10**	-	-	**40.0**	-	-	**13**	-	-	**0.72**	-	-
YVD-03	YVD-03-160620	6/20/2016	N	59037151	**46.0**	-	-	**21.0**	-	-	**7.70**	-	-	**40.0**	-	-	**14**	-	-	**0.76**	-	-
YVD-03	YVD-03-160929	9/29/2016	N	K1611758	**43.2**	-	-	**18.3**	-	-	**6.89**	-	-	**41.4**	-	-	**11.7**	-	-	**0.61**	-	-
YVD-03	YVD-03-161213	12/13/2016	N	K1615045	**40.0**	-	-	**17.4**	-	-	**6.57**	-	-	**38.9**	-	-	**11.6**	-	-	**0.69**	-	-
YVD-03	YVD-030617-02	3/6/2017	N	K1702228	**41.6**	-	-	**17.3**	-	-	**6.53**	-	-	**38.5**	-	-	**11.4**	-	-	**0.60**	-	-
YVD-03	YVD-030617-03	3/6/2017	FD	K1702228	**41.5**	-	-	**17.3**	-	-	**6.48**	-	-	**38.4**	-	-	**11.6**	-	-	**0.65**	-	-
YVD-03	YVD-060517-13	6/5/2017	N	K1705702	**41.9**	-	-	**18.1**	-	-	**6.27**	-	-	**36.4**	-	-	**11.9**	-	-	**0.66**	-	-
YVD-03	YVD-092517-05	9/25/2017	N	K1710274	**41.6**	-	-	**18.7**	-	-	**6.85**	-	-	**40.9**	-	-	**11.6**	-	-	**0.66**	-	-
YVD-03	YVD-120517-19	12/5/2017	N	K1713091	**41.9**	-	-	**17.4**	-	-	**6.39**	-	-	**38.0**	-	-	**11.1**	-	-	**0.64**	-	-
YVD-03	YVD-060518-27	6/5/2018	N	874860	**39.0**	-	-	**17.4**	-	-	**6.70**	-	-	**39.3**	-	-	**11.3**	-	-	**0.62**	-	-
YVD-03	YVD-060219-07	6/2/2019	N	991939	**40.3**	-	-	**17.2**	-	-	**6.65**	-	-	**38.5**	-	-	8.19	U	FBK	0.44	U	FBK

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-02	YVD-02-160928	9/28/2016	N	K1611629	**0.13**	-	-	0.10	U	-	**3.13**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-02	YVD-030817-15	3/8/2017	N	K1702324	**5.40**	-	-	0.10	U	-	**11.7**	-	-	-	-	-	1	U	-	0.5	U	-
YVD-02	YVD-060617-14	6/6/2017	N	K1705754	**0.20**	-	-	0.10	U	-	**3.43**	J	FDP	-	-	-	0.050	U	-	0.5	U	-
YVD-02	YVD-060617-16	6/6/2017	FD	K1705754	**0.20**	-	-	0.10	U	-	**12.2**	J	FDP	-	-	-	0.050	U	-	0.5	U	-
YVD-02	YVD-092617-20	9/26/2017	N	K1710333	**0.17**	-	-	0.10	U	-	**4.79**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-02	YVD-120417-02	12/4/2017	N	K1713026	**0.22**	-	-	0.10	U	-	**16.1**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-02	YVD-120417-04	12/4/2017	FD	K1713026	**0.20**	-	-	0.10	U	-	**15.8**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-02	YVD-061218-32	6/12/2018	N	875438	-	R	NR	-	R	NR	-	R	NR	-	R	NR	-	-	-	-	R	NR
YVD-02	YVD-060419-28	6/4/2019	N	992242	**33.9**	J	HTQ	**0.24**	-	-	**39.9**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-02	YVD-070219-33	7/2/2019	N	994356	**36.1**	-	-	**0.90**	-	-	**47.5**	-	-	0.07	U	-	-	-	-	NS	-	-
YVD-02	YVD-091019-19	9/10/2019	N	998438	**43.6**	-	-	0.05	U	-	**40.4**	-	-	0.07	U	-	-	-	-	UJ	MSD	-
YVD-02	YVD-121019-23	12/10/2019	N	902321	**38.9**	-	-	0.05	U	-	**62.2**	-	-	0.07	U	-				0.5	U	-
YVD-03	YVD-03-130916	09/16/2013	N	SWI0113	**4.75**	-	-	**0.49**	-	-	**70.7**	-	-	-	-	-	0.1	U	-	**0.488**	-	-
YVD-03	YVD-03-131210	12/10/2013	N	SWL0063	**5.96**	-	-	0.4	U	-	**54.8**	J-	MSD	-	-	-	-	R	MSD	0.2	U	-
YVD-03	YVD-03-140317	03/17/2014	N	SXC0081	**4.75**	-	-	0.2	U	-	**38**	-	-	-	-	-	**0.249**	-	-	0.25	U	-
YVD-03	YVD-03-140602	06/02/2014	N	SXF0008	**3.86**	-	-	0.2	U	-	**36**	-	-	-	-	-	0.1	U	-	**0.261**	-	-
YVD-03	YVD-03-140923	09/23/2014	N	SXI0158	**3.97**	-	-	0.2	U	-	**34.7**	-	-	-	-	-	-	R	MSD	0.25	U	-
YVD-03	YVD-D3-140923	09/23/2014	FD	SXI0158	**4.04**	-	-	0.2	U	-	**34.4**	-	-	-	-	-	-	R	MSD	0.25	U	-
YVD-03	YVD-03-141215	12/15/2014	N	SXL0108	**4.27**	-	-	0.2	U	-	**37**	-	-	-	-	-	0.1	U	-	**0.4**	-	-
YVD-03	YVD-03-150316	03/16/2015	N	5904541	**4.1**	J-	MSD	0.2	U	-	**33**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-03	YVD-03-150616	06/16/2015	N	59010751	**4**	-	-	0.2	U	-	**41**	J-	MSD	-	-	-	**0.12**	-	-	0.25	UJ	MSD
YVD-03	YVD-03-150922	09/22/2015	N	59020141	**4.9**	-	-	0.2	U	-	**51**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-03	YVD-03-151214	12/14/2015	N	59025351	**4.9**	-	-	0.2	U	-	**51**	-	-	-	-	-	-	R	MSD	0.25	UJ	MSD
YVD-03	YVD-03-160307	03/07/2016	N	59029521	**4.6**	-	-	0.2	U	-	**47**	-	-	-	-	-	0.1	UJ	RPD	0.25	UJ	MSD
YVD-03	YVD-03-160620	6/20/2016	N	59037151	**4.6**	-	-	0.2	U	-	**61**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-03	YVD-03-160929	9/29/2016	N	K1611758	**4.39**	-	-	0.10	U	-	**44.4**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-03	YVD-03-161213	12/13/2016	N	K1615045	**4.47**	-	-	0.10	U	-	**43.3**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-03	YVD-030617-02	3/6/2017	N	K1702228	**4.42**	-	-	0.10	U	-	**40.7**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-03	YVD-030617-03	3/6/2017	FD	K1702228	**4.48**	-	-	0.10	U	-	**40.7**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-03	YVD-060517-13	6/5/2017	N	K1705702	**4.61**	-	-	0.10	U	-	**46.4**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-03	YVD-092517-05	9/25/2017	N	K1710274	**4.45**	-	-	0.10	U	-	**46.3**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-03	YVD-120517-19	12/5/2017	N	K1713091	**4.52**	-	-	0.10	U	-	**50.8**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
YVD-03	YVD-060518-27	6/5/2018	N	874860	**4.70**	-	-	0.05	U	-	**41.7**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-03	YVD-060219-07	6/2/2019	N	991939	**3.16**	-	-	0.05	U	-	**26.1**	-	-	0.07	U	-	-	-	-	-	R	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-02	YVD-02-160928	9/28/2016	N	K1611629	-	-	-	**0.092**	-	-	-	-	-	-	-	-	**72**	-	-	**72**	-	-
YVD-02	YVD-030817-15	3/8/2017	N	K1702324	-	-	-	**0.099**	-	-	-	-	-	-	-	-	**103**	-	-	**103**	-	-
YVD-02	YVD-060617-14	6/6/2017	N	K1705754	-	-	-	**0.093**	-	-	-	-	-	-	-	-	**81**	-	-	**81**	-	-
YVD-02	YVD-060617-16	6/6/2017	FD	K1705754	-	-	-	**0.081**	-	-	-	-	-	-	-	-	**67**	-	-	**67**	-	-
YVD-02	YVD-092617-20	9/26/2017	N	K1710333	-	-	-	**0.09**	-	-	-	-	-	-	-	-	**75**	-	-	**75**	-	-
YVD-02	YVD-120417-02	12/4/2017	N	K1713026	-	-	-	**0.080**	-	-	-	-	-	-	-	-	**89**	-	-	**89**	-	-
YVD-02	YVD-120417-04	12/4/2017	FD	K1713026	-	-	-	**0.074**	-	-	-	-	-	-	-	-	**93**	-	-	**93**	-	-
YVD-02	YVD-061218-32	6/12/2018	N	875438	-	-	-	-	-	-	-	-	-	-	R	NR	-	R	NR	-	R	NR
YVD-02	YVD-060419-28	6/4/2019	N	992242	-	-	-	-	-	-	-	-	-	**0.10**	-	-	**191**	-	-	**191**	-	-
YVD-02	YVD-070219-33	7/2/2019	N	994356	-	-	-	-	-	-	-	-	-	0.07	U	-	**204**	-	-	**204**	-	-
YVD-02	YVD-091019-19	9/10/2019	N	998438	-	-	-	-	-	-	-	-	-	**0.07**	-	-	**200**	-	-	**200**	-	-
YVD-02	YVD-121019-23	12/10/2019	N	902321										0.07	U	-	**226**	-	-	**226**	-	-
YVD-03	YVD-03-130916	09/16/2013	N	SWI0113	-	-	-	-	-	-	**0.89**	-	-	-	-	-	**209**	-	-	**210**	-	-
YVD-03	YVD-03-131210	12/10/2013	N	SWL0063	-	-	-	-	-	-	-	-	-	**1.02**	-	-	**214**	-	-	**215**	-	-
YVD-03	YVD-03-140317	03/17/2014	N	SXC0081	**0.23**	-	-	-	-	-	-	-	-	-	-	-	**219**	-	-	**220**	-	-
YVD-03	YVD-03-140602	06/02/2014	N	SXF0008	**0.3**	-	-	-	-	-	-	-	-	-	-	-	**206**	-	-	**208**	-	-
YVD-03	YVD-03-140923	09/23/2014	N	SXI0158	**0.33**	J	FDP	-	-	-	-	-	-	-	-	-	**199**	-	-	**200**	-	-
YVD-03	YVD-D3-140923	09/23/2014	FD	SXI0158	**0.24**	J	FDP	-	-	-	-	-	-	-	-	-	**199**	-	-	**200**	-	-
YVD-03	YVD-03-141215	12/15/2014	N	SXL0108	**0.76**	-	-	-	-	-	-	-	-	-	-	-	**199**	-	-	**200**	-	-
YVD-03	YVD-03-150316	03/16/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
YVD-03	YVD-03-150616	06/16/2015	N	59010751	**0.59**	-	-	-	-	-	-	-	-	-	-	-	**200**	-	-	**200**	-	-
YVD-03	YVD-03-150922	09/22/2015	N	59020141	0.25	U	-	-	-	-	-	-	-	-	-	-	**220**	-	-	**220**	-	-
YVD-03	YVD-03-151214	12/14/2015	N	59025351	**0.78**	-	-	-	-	-	-	-	-	-	-	-	**230**	-	-	**230**	-	-
YVD-03	YVD-03-160307	03/07/2016	N	59029521	**0.34**	-	-	-	-	-	-	-	-	-	-	-	**150**	J	FDP	**150**	J	FDP
YVD-03	YVD-03-160620	6/20/2016	N	59037151	**0.47**	-	-	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-03	YVD-03-160929	9/29/2016	N	K1611758	-	-	-	**0.047**	-	-	-	-	-	-	-	-	**196**	-	-	**196**	-	-
YVD-03	YVD-03-161213	12/13/2016	N	K1615045	-	-	-	**0.11**	-	-	-	-	-	-	-	-	**189**	-	-	**189**	-	-
YVD-03	YVD-030617-02	3/6/2017	N	K1702228	-	-	-	**0.083**	J	FDP	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-03	YVD-030617-03	3/6/2017	FD	K1702228	-	-	-	**0.061**	J	FDP	-	-	-	-	-	-	**192**	-	-	**192**	-	-
YVD-03	YVD-060517-13	6/5/2017	N	K1705702	-	-	-	**0.045**	-	-	-	-	-	-	-	-	**189**	-	-	**189**	-	-
YVD-03	YVD-092517-05	9/25/2017	N	K1710274	-	-	-	**0.038**	-	-	-	-	-	-	-	-	**193**	-	-	**193**	-	-
YVD-03	YVD-120517-19	12/5/2017	N	K1713091	-	-	-	**0.047**	-	-	-	-	-	-	-	-	**181**	-	-	**181**	-	-
YVD-03	YVD-060518-27	6/5/2018	N	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	**188**	-	-	**188**	-	-
YVD-03	YVD-060219-07	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**185**	-	-	**185**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-04	YVD-04-130916	09/16/2013	N	SWI0113	**37.4**	-	-	**11.2**	-	-	**4.23**	-	-	**49.2**	-	-	**14.9**	-	-	0.5	U	-
YVD-04	YVD-04-131210	12/10/2013	N	SWL0063	**38.2**	-	-	**11.7**	-	-	**4.44**	-	-	**49.9**	-	-	**15**	-	-	1	U	-
YVD-04	YVD-04-140317	03/17/2014	N	SXC0081	**37.7**	-	-	**11.6**	-	-	**4.46**	-	-	**47.8**	-	-	**15.1**	-	-	**0.63**	-	-
YVD-04	YVD-04-140602	06/02/2014	N	SXF0008	**36.8**	-	-	**11.5**	-	-	**4.41**	-	-	**50.5**	-	-	**14.3**	-	-	1	U	-
YVD-04	YVD-04-140923	09/23/2014	N	SXI0158	**37.8**	-	-	**11.5**	-	-	**4.49**	-	-	**52.2**	J+	MSD	**15.3**	-	-	0.5	U	-
YVD-04	YVD-04-141215	12/15/2014	N	SXL0108	**38.8**	-	-	**12.4**	-	-	**4.62**	-	-	**50.0**	-	-	**15.2**	-	-	0.5	U	-
YVD-04	YVD-04-150315	03/15/2015	N	5904471	**38.0**	-	-	**12.0**	-	-	**4.70**	-	-	**52.0**	-	-	**16**	-	-	0.5	U	-
YVD-04	YVD-04-150615	06/15/2015	N	59010751	**38.0**	J+	MSD	**8.5**	J+	MSD	**4.70**	J+	MSD	**49.0**	J+	MSD	**15**	-	-	0.5	U	-
YVD-04	YVD-04-150922	09/22/2015	N	59020141	**36.0**	-	-	**11.0**	-	-	**4.60**	-	-	**51.0**	-	-	**15**	-	-	0.5	U	-
YVD-04	YVD-04-151213	12/13/2015	N	59025351	**39.0**	-	-	**12.0**	-	-	**4.90**	-	-	**53.0**	-	-	**15**	-	-	0.5	U	-
YVD-04	YVD-04-160307	03/07/2016	N	59029521	**36.0**	-	-	**12.0**	-	-	**4.60**	-	-	**51.0**	-	-	**14**	-	-	0.5	U	-
YVD-04	YVD-04-160620	6/20/2016	N	59037101	**36.0**	-	-	**12.0**	-	-	**4.80**	-	-	**53.0**	-	-	**15**	-	-	0.5	U	-
YVD-04	YVD-D1-160620	6/20/2016	FD	59037101	**35.0**	-	-	**12.0**	-	-	**4.50**	-	-	**51.0**	-	-	**15**	-	-	0.5	U	-
YVD-04	YVD-04-160928	9/28/2016	N	K1611629	**34.7**	-	-	**10.7**	-	-	**4.42**	-	-	**48.5**	-	-	**13.2**	-	-	**0.21**	-	-
YVD-04	YVD-04-D3-160928	9/28/2016	FD	K1611629	**34.7**	-	-	**10.9**	-	-	**4.49**	-	-	**49.9**	-	-	**13.2**	-	-	**0.20**	-	-
YVD-04	YVD-04-161213	12/13/2016	N	K1615045	**35.2**	-	-	**10.9**	-	-	**4.43**	-	-	**47.5**	-	-	**13.2**	-	-	**0.23**	-	-
YVD-04	YVD-031017-28	3/10/2017	N	K1702448	**37.8**	-	-	**10.9**	-	-	**4.25**	-	-	**46.7**	-	-	**13.2**	-	-	**0.21**	-	-
YVD-04	YVD-060517-11	6/5/2017	N	K1705702	**36.5**	-	-	**9.85**	-	-	**4.05**	-	-	**44.4**	-	-	**13.0**	-	-	**0.22**	-	-
YVD-04	YVD-092517-07	9/25/2017	N	K1710274	**37.2**	-	-	**11.7**	-	-	**4.62**	-	-	**51.1**	-	-	**12.9**	-	-	**0.21**	-	-
YVD-04	YVD-120417-13	12/4/2017	N	K1713091	**36.5**	-	-	**10.9**	-	-	**4.29**	-	-	**49.9**	-	-	**13.2**	-	-	**0.24**	-	-
YVD-04	YVD-060418-21	6/4/2018	N	874662	**37.0**	-	-	**11.65**	-	-	**4.46**	-	-	**51.0**	-	-	**12.3**	-	-	**0.19**	-	-
YVD-04	YVD-060219-05	6/2/2019	N	991939	**36.2**	-	-	**11.10**	-	-	**4.52**	-	-	**49.0**	-	-	22.9	U	FBK	0.79	U	FBK
YVD-05	YVD-05-130917	09/17/2013	N	SWI0113	**66.0**	-	-	**31.0**	-	-	**6.95**	-	-	**46.2**	-	-	**10.2**	-	-	0.5	U	-
YVD-05	YVD-05-131211	12/11/2013	N	SWL0063	**41.5**	-	-	**17.0**	-	-	**3.33**	-	-	**45.5**	-	-	**10**	-	-	1	U	-
YVD-05	YVD-05-140317	03/17/2014	N	SXC0081	**33.7**	-	-	**13.5**	-	-	**2.75**	-	-	**43.1**	-	-	**8.4**	-	-	**1.3**	-	-
YVD-05	YVD-05-140601	06/01/2014	N	SXF0008	**30.8**	-	-	**13.2**	-	-	**2.84**	-	-	**43.9**	-	-	**8.4**	-	-	1	U	-
YVD-05	YVD-05-140922	09/22/2014	N	SXI0148	**31.6**	-	-	**13.7**	-	-	**2.75**	-	-	**45.1**	-	-	**7.6**	-	-	1	U	-
YVD-05	YVD-05-141215	12/15/2014	N	SXL0103	**36.9**	-	-	**17.0**	-	-	**4.21**	-	-	**45.5**	-	-	**4.56**	J+	MSD, FDP	1	U	-
YVD-05	YVD-D1-141215	12/15/2014	FD	SXL0103	**34.2**	-	-	**15.0**	-	-	**3.54**	-	-	**44.9**	-	-	**7.8**	J+	MSD, FDP	0.5	U	-
YVD-05	YVD-05-150316	03/16/2015	N	5904471	**33.0**	-	-	**15.0**	-	-	**3.60**	-	-	**47.0**	-	-	**8**	-	-	1	U	-
YVD-05	YVD-05-150616	06/16/2015	N	59010751	**35.0**	J+	MSD	**16.0**	J+	MSD	**4.00**	J+	MSD	**47.0**	J+	MSD	**8.9**	-	-	1	U	-
YVD-05	YVD-05-150922	09/22/2015	N	59020281	**42.0**	-	-	**20.0**	-	-	**4.90**	-	-	**51.0**	-	-	**8.8**	-	-	1	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-04	YVD-04-130916	09/16/2013	N	SWI0113	**4.45**	-	-	0.2	U	-	**39.1**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-04	YVD-04-131210	12/10/2013	N	SWL0063	**4.64**	-	-	0.4	U	-	**42.2**	J-	MSD	-	-	-	-	R	MSD	0.2	U	-
YVD-04	YVD-04-140317	03/17/2014	N	SXC0081	**4.03**	-	-	0.2	U	-	**35.2**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-04	YVD-04-140602	06/02/2014	N	SXF0008	**3.78**	-	-	0.4	U	-	**36.2**	-	-	-	-	-	**0.113**	-	-	0.25	U	-
YVD-04	YVD-04-140923	09/23/2014	N	SXI0158	**3.87**	-	-	0.2	U	-	**35.8**	-	-	-	-	-	-	R	MSD	0.25	U	-
YVD-04	YVD-04-141215	12/15/2014	N	SXL0108	**3.81**	-	-	0.2	U	-	**35.8**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-04	YVD-04-150315	03/15/2015	N	5904471	**4.3**	-	-	0.2	U	-	**34**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-04	YVD-04-150615	06/15/2015	N	59010751	**4**	-	-	0.2	U	-	**34**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-04	YVD-04-150922	09/22/2015	N	59020141	**3.9**	-	-	0.2	U	-	**35**	-	-	-	-	-	**0.13**	-	-	0.25	UJ	MSD
YVD-04	YVD-04-151213	12/13/2015	N	59025351	**4.1**	-	-	0.2	U	-	**36**	-	-	-	-	-	-	R	MSD	0.25	UJ	MSD
YVD-04	YVD-04-160307	03/07/2016	N	59029521	**3.7**	-	-	0.2	U	-	**34**	-	-	-	-	-	0.1	UJ	RPD	0.25	UJ	MSD
YVD-04	YVD-04-160620	6/20/2016	N	59037101	**4**	-	-	0.2	U	-	**35**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-04	YVD-D1-160620	6/20/2016	FD	59037101	**4**	-	-	0.2	U	-	**36**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-04	YVD-04-160928	9/28/2016	N	K1611629	**3.67**	-	-	0.10	U	-	**31.4**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-04	YVD-04-D3-160928	9/28/2016	FD	K1611629	**3.68**	-	-	0.10	U	-	**32.2**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-04	YVD-04-161213	12/13/2016	N	K1615045	**3.74**	-	-	0.10	U	-	**31.7**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-04	YVD-031017-28	3/10/2017	N	K1702448	**3.70**	-	-	0.10	U	-	**32.9**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-04	YVD-060517-11	6/5/2017	N	K1705702	**3.53**	-	-	0.10	U	-	**33.4**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-04	YVD-092517-07	9/25/2017	N	K1710274	**3.57**	-	-	0.10	U	-	**32.7**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-04	YVD-120417-13	12/4/2017	N	K1713091	**3.79**	-	-	0.10	U	-	**32.5**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
YVD-04	YVD-060418-21	6/4/2018	N	874662	**4.10**	-	-	0.05	U	-	**30.4**	-	-	0.08	U	FBK	-	-	-	0.5	UJ	MSD
YVD-04	YVD-060219-05	6/2/2019	N	991939	**3.85**	-	-	0.05	U	-	**30.6**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-05	YVD-05-130917	09/17/2013	N	SWI0113	**4.9**	-	-	0.2	U	-	**76.8**	-	-	-	-	-	**0.112**	-	-	**0.435**	-	-
YVD-05	YVD-05-131211	12/11/2013	N	SWL0063	**4.36**	-	-	0.4	U	-	**68.4**	J-	MSD	-	-	-	-	R	MSD	0.2	U	-
YVD-05	YVD-05-140317	03/17/2014	N	SXC0081	**3.3**	-	-	0.4	U	-	**52.7**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-05	YVD-05-140601	06/01/2014	N	SXF0008	**3**	-	-	0.4	U	-	**50.5**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-05	YVD-05-140922	09/22/2014	N	SXI0148	**2.82**	-	-	0.4	U	-	**48.1**	-	-	-	-	-	0.1	U	-	**0.259**	-	-
YVD-05	YVD-05-141215	12/15/2014	N	SXL0103	**1.5**	J	FDP, DUP	0.4	U	-	**27.7**	J+	MSD, FDP, DUP	-	-	-	0.1	U	-	**0.272**	-	-
YVD-05	YVD-D1-141215	12/15/2014	FD	SXL0103	**2.65**	J	FDP, DUP	0.2	U	-	**46**	J+	MSD, FDP, DUP	-	-	-	0.1	U	-	**0.264**	-	-
YVD-05	YVD-05-150316	03/16/2015	N	5904471	**2.8**	-	-	0.4	U	-	**47**	-	-	-	-	-	0.1	U	-	0.25	UJ	-
YVD-05	YVD-05-150616	06/16/2015	N	59010751	**3.1**	-	-	0.4	U	-	**49**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	-
YVD-05	YVD-05-150922	09/22/2015	N	59020281	**3**	-	-	0.4	U	-	**51**	-	-	-	-	-	0.1	U	-	-	R	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-04	YVD-04-130916	09/16/2013	N	SWI0113	-	-	-	-	-	-	0.1	U	-	-	-	-	**184**	-	-	**185**	-	-
YVD-04	YVD-04-131210	12/10/2013	N	SWL0063	-	-	-	-	-	-	-	-	-	**0.112**	-	-	**203**	-	-	**205**	-	-
YVD-04	YVD-04-140317	03/17/2014	N	SXC0081	**0.078**	-	-	-	-	-	-	-	-	-	-	-	**209**	-	-	**210**	-	-
YVD-04	YVD-04-140602	06/02/2014	N	SXF0008	**0.053**	-	-	-	-	-	-	-	-	-	-	-	**191**	-	-	**193**	-	-
YVD-04	YVD-04-140923	09/23/2014	N	SXI0158	**0.061**	-	-	-	-	-	-	-	-	-	-	-	**188**	-	-	**190**	-	-
YVD-04	YVD-04-141215	12/15/2014	N	SXL0108	0.1	U	-	-	-	-	-	-	-	-	-	-	**188**	-	-	**190**	-	-
YVD-04	YVD-04-150315	03/15/2015	N	5904471	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-04	YVD-04-150615	06/15/2015	N	59010751	0.25	U	-	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-04	YVD-04-150922	09/22/2015	N	59020141	0.25	U	-	-	-	-	-	-	-	-	-	-	**200**	-	-	**200**	-	-
YVD-04	YVD-04-151213	12/13/2015	N	59025351	**0.39**	-	-	-	-	-	-	-	-	-	-	-	**200**	-	-	**200**	-	-
YVD-04	YVD-04-160307	03/07/2016	N	59029521	0.25	U	-	-	-	-	-	-	-	-	-	-	**250**	J	FDP	**250**	J	FDP
YVD-04	YVD-04-160620	6/20/2016	N	59037101	0.25	U	-	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-04	YVD-D1-160620	6/20/2016	FD	59037101	0.25	U	-	-	-	-	-	-	-	-	-	-	**180**	-	-	**180**	-	-
YVD-04	YVD-04-160928	9/28/2016	N	K1611629	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**187**	-	-	**187**	-	-
YVD-04	YVD-04-D3-160928	9/28/2016	FD	K1611629	-	-	-	**0.008**	J	-	-	-	-	-	-	-	**185**	-	-	**185**	-	-
YVD-04	YVD-04-161213	12/13/2016	N	K1615045	-	-	-	**0.026**	-	-	-	-	-	-	-	-	**181**	-	-	**181**	-	-
YVD-04	YVD-031017-28	3/10/2017	N	K1702448	-	-	-	**0.018**	-	-	-	-	-	-	-	-	**167**	-	-	**167**	-	-
YVD-04	YVD-060517-11	6/5/2017	N	K1705702	-	-	-	**0.006**	J	-	-	-	-	-	-	-	**182**	-	-	**182**	-	-
YVD-04	YVD-092517-07	9/25/2017	N	K1710274	-	-	-	**0.026**	-	-	-	-	-	-	-	-	**188**	-	-	**188**	-	-
YVD-04	YVD-120417-13	12/4/2017	N	K1713091	-	-	-	**0.013**	-	-	-	-	-	-	-	-	**185**	-	-	**185**	-	-
YVD-04	YVD-060418-21	6/4/2018	N	874662	-	-	-	-	-	-	-	-	-	0.07	U	-	**179**	-	-	**179**	-	-
YVD-04	YVD-060219-05	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**181**	-	-	**181**	-	-
YVD-05	YVD-05-130917	09/17/2013	N	SWI0113	-	-	-	-	-	-	**1.62**	-	-	-	-	-	**184**	-	-	**185**	-	-
YVD-05	YVD-05-131211	12/11/2013	N	SWL0063	-	-	-	-	-	-	-	-	-	**0.462**	-	-	**174**	-	-	**175**	-	-
YVD-05	YVD-05-140317	03/17/2014	N	SXC0081	**0.14**	-	-	-	-	-	-	-	-	-	-	-	**174**	-	-	**175**	-	-
YVD-05	YVD-05-140601	06/01/2014	N	SXF0008	**0.15**	-	-	-	-	-	-	-	-	-	-	-	**164**	-	-	**165**	-	-
YVD-05	YVD-05-140922	09/22/2014	N	SXI0148	**0.2**	-	-	-	-	-	-	-	-	-	-	-	**159**	-	-	**160**	-	-
YVD-05	YVD-05-141215	12/15/2014	N	SXL0103	**0.29**	J	FDP	-	-	-	-	-	-	-	-	-	**154**	-	-	**155**	-	-
YVD-05	YVD-D1-141215	12/15/2014	FD	SXL0103	**0.44**	J	FDP	-	-	-	-	-	-	-	-	-	**153**	-	-	**155**	-	-
YVD-05	YVD-05-150316	03/16/2015	N	5904471	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**160**	-	-	**160**	-	-
YVD-05	YVD-05-150616	06/16/2015	N	59010751	**0.51**	-	-	-	-	-	-	-	-	-	-	-	**170**	-	-	**170**	-	-
YVD-05	YVD-05-150922	09/22/2015	N	59020281	**0.8**	-	-	-	-	-	-	-	-	-	-	-	**160**	-	-	**160**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-05	YVD-05-151214	12/14/2015	N	59025351	**37.0**	-	-	**17.0**	-	-	**4.30**	-	-	**52.0**	-	-	**7.9**	-	-	1	U	-
YVD-05	YVD-05-160307	03/07/2016	N	59029521	**32.0**	-	-	**15.0**	-	-	**3.60**	-	-	**48.0**	-	-	**8.3**	-	-	1	U	-
YVD-05	YVD-D1-160307	03/07/2016	FD	59029521	**32.0**	-	-	**15.0**	-	-	**3.60**	-	-	**48.0**	-	-	**8.7**	-	-	**0.59**	-	-
YVD-05	YVD-05-160620	6/20/2016	N	59037151	**31.0**	-	-	**14.0**	-	-	**3.40**	-	-	**48.0**	-	-	**9.1**	-	-	1	U	-
YVD-05	YVD-05-160928	9/28/2016	N	K1611698	**32.1**	-	-	**13.8**	-	-	**3.54**	-	-	**48.5**	-	-	**8.37**	-	-	**0.44**	-	-
YVD-05	YVD-05-161215	12/15/2016	N	K1615174	**33.3**	-	-	**13.1**	-	-	**3.37**	-	-	**46.5**	-	-	**8.30**	-	-	**0.48**	-	-
YVD-05	YVD-031317-32	3/13/2017	N	K1702489	**31.4**	-	-	**14.1**	-	-	**3.44**	-	-	**46.0**	-	-	**7.89**	-	-	**0.49**	-	-
YVD-05	YVD-031317-34	3/13/2017	FD	K1702489	**31.4**	-	-	**14.0**	-	-	**3.38**	-	-	**45.6**	-	-	**7.92**	-	-	**0.48**	-	-
YVD-05	YVD-060617-23	6/6/2017	N	K1705754	**31.6**	-	-	**13.9**	-	-	**3.51**	-	-	**48.1**	-	-	**8.12**	-	-	**0.47**	-	-
YVD-05	YVD-092517-09	9/25/2017	N	K1710274	**35.3**	-	-	**14.6**	-	-	**3.61**	-	-	**48.4**	-	-	**8.01**	-	-	**0.47**	-	-
YVD-05	YVD-120517-15	12/5/2017	N	K1713091	**31.3**	-	-	**13.5**	-	-	**3.36**	-	-	**46.5**	-	-	**7.92**	-	-	**0.51**	-	-
YVD-05	YVD-060518-29	6/5/2018	N	874860	**31.6**	-	-	**14.15**	-	-	**3.58**	-	-	**46.4**	-	-	**8.29**	-	-	**0.44**	-	-
YVD-05	YVD-060219-09	6/2/2019	N	991939	**33.2**	-	-	**14.35**	-	-	**3.62**	-	-	**44.2**	-	-	6.43	U	FBK	0.31	U	FBK
YVD-06	YVD-06-130917	09/17/2013	N	SWI0113	**46.0**	-	-	**12.8**	-	-	**4.07**	-	-	**17.6**	-	-	**3.13**	-	-	0.5	U	-
YVD-06	YVD-06-131209	12/09/2013	N	SWL0055	**31.2**	J	FDP	**5.3**	J	FDP	**1.76**	-	-	**13.0**	J	FDP	**2.73**	-	-	0.5	U	-
YVD-06	YVD-D1-131209	12/09/2013	FD	SWL0055	**38.9**	J	FDP	**6.6**	J	FDP	**2.24**	-	-	**16.5**	J	FDP	8	U	-	5	U	-
YVD-06	YVD-06-140316	03/16/2014	N	SXC0081	**40.1**	-	-	**7.6**	-	-	**2.68**	-	-	**16.2**	-	-	**3.47**	-	-	**0.58**	-	-
YVD-06	YVD-D1-140316	03/16/2014	FD	SXC0081	**40.5**	-	-	**7.8**	-	-	**2.74**	-	-	**16.6**	-	-	**3.16**	-	-	**0.55**	-	-
YVD-06	YVD-06-140601	06/01/2014	N	SXF0008	**37.8**	-	-	**6.5**	-	-	**2.28**	-	-	**16.7**	-	-	**2.88**	J	DUP	0.5	U	-
YVD-06	YVD-D1-140601	06/01/2014	FD	SXF0008	**38.3**	-	-	**6.6**	-	-	**2.30**	-	-	**16.9**	-	-	**2.95**	-	-	0.5	U	-
YVD-06	YVD-06-140921	09/21/2014	N	SXI0148	**41.3**	-	-	**8.5**	-	-	**2.69**	-	-	**17.4**	-	-	**2.45**	-	-	0.5	U	-
YVD-06	YVD-06-141215	12/15/2014	N	SXL0103	**40.3**	-	-	**7.8**	-	-	**2.58**	-	-	**16.9**	-	-	**2.5**	J+	MSD	0.5	U	-
YVD-06	YVD-06-150316	03/16/2015	N	5904471	**38.0**	-	-	**6.8**	-	-	**2.20**	-	-	**17.0**	-	-	**2.8**	-	-	0.5	U	-
YVD-06	YVD-06-150616	06/16/2015	N	59010751	**40.0**	J+	MSD	**7.0**	J+	MSD	**2.20**	J+	MSD	**17.0**	J+	MSD	**2.7**	-	-	0.5	U	-
YVD-06	YVD-06-150922	09/22/2015	N	59020141	**41.0**	-	-	**9.8**	-	-	**3.10**	-	-	**17.0**	-	-	**2.8**	-	-	0.5	U	-
YVD-06	YVD-06-151214	12/14/2015	N	59025351	**42.0**	-	-	**7.3**	-	-	**2.40**	-	-	**18.0**	-	-	**2.4**	-	-	0.5	U	-
YVD-06	YVD-06-160307	03/07/2016	N	59029521	**38.0**	-	-	**7.2**	-	-	**2.50**	-	-	**17.0**	-	-	**2.8**	-	-	0.5	U	-
YVD-06	YVD-06-160620	6/20/2016	N	59037151	**37.0**	-	-	**6.6**	-	-	**2.30**	-	-	**17.0**	-	-	**3.1**	-	-	0.5	U	-
YVD-06	YVD-06-160929	9/29/2016	N	K1611704	**35.7**	-	-	**6.1**	-	-	**2.26**	-	-	**17.1**	-	-	**2.64**	-	-	**0.20**	-	-
YVD-06	YVD-06-161215	12/15/2016	N	K1615126	**33.5**	-	-	**5.7**	-	-	**2.12**	-	-	**17.1**	-	-	**3.14**	-	-	**0.23**	-	-
YVD-06	YVD-030617-04	3/6/2017	N	K1702228	**35.2**	-	-	**5.8**	-	-	**2.20**	-	-	**17.0**	-	-	**2.83**	-	-	**0.29**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-05	YVD-05-151214	12/14/2015	N	59025351	**2.8**	-	-	0.4	U	-	**48**	-	-	-	-	-	-	R	MSD	**0.6**	J-	MSD
YVD-05	YVD-05-160307	03/07/2016	N	59029521	**2.7**	-	-	0.4	U	-	**47**	-	-	-	-	-	0.1	UJ	RPD	0.25	UJ	MSD
YVD-05	YVD-D1-160307	03/07/2016	FD	59029521	**2.9**	-	-	0.2	U	-	**48**	-	-	-	-	-	0.1	UJ	RPD	0.25	UJ	MSD
YVD-05	YVD-05-160620	6/20/2016	N	59037151	**3**	-	-	0.4	U	-	**49**	-	-	-	-	-	0.1	U	-	0.25	U	MSD
YVD-05	YVD-05-160928	9/28/2016	N	K1611698	**3.12**	-	-	0.10	U	-	**46.7**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
YVD-05	YVD-05-161215	12/15/2016	N	K1615174	**3.15**	-	-	0.10	U	-	**49.0**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-05	YVD-031317-32	3/13/2017	N	K1702489	**2.88**	-	-	0.10	U	-	**41.5**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-05	YVD-031317-34	3/13/2017	FD	K1702489	**2.91**	-	-	0.10	U	-	**41.4**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-05	YVD-060617-23	6/6/2017	N	K1705754	**2.90**	-	-	0.10	U	-	**48.0**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-05	YVD-092517-09	9/25/2017	N	K1710274	**2.82**	-	-	0.10	U	-	**46.6**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-05	YVD-120517-15	12/5/2017	N	K1713091	**2.81**	-	-	0.10	U	-	**41.8**	-	-	-	-	-	0.050	U	MBK	0.5	UJ	MSD
YVD-05	YVD-060518-29	6/5/2018	N	874860	**2.79**	-	-	0.05	U	-	**43.6**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-05	YVD-060219-09	6/2/2019	N	991939	**2.18**	-	-	0.05	U	-	**43.6**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-06	YVD-06-130917	09/17/2013	N	SWI0113	**0.51**	-	-	0.2	U	-	**8.14**	-	-	-	-	-	0.1	U	-	**0.4**	-	-
YVD-06	YVD-06-131209	12/09/2013	N	SWL0055	**0.49**	J	FDP	0.2	U	-	**8.53**	-	-	-	-	-	0.02	UJ	MSD	**0.62**	J	FBK, MSD, FDP
YVD-06	YVD-D1-131209	12/09/2013	FD	SWL0055	**6.4**	J	FDP	2	U	-	**9.1**	-	-	-	-	-	0.02	UJ	MSD	**0.4**	J	FBK, MSD, FDP
YVD-06	YVD-06-140316	03/16/2014	N	SXC0081	**0.61**	-	-	0.2	U	-	**8.33**	-	-	-	-	-	0.1	U	-	**0.297**	-	-
YVD-06	YVD-D1-140316	03/16/2014	FD	SXC0081	**0.62**	-	-	0.2	U	-	**8.18**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-06	YVD-06-140601	06/01/2014	N	SXF0008	**0.51**	-	-	0.2	U	-	**7.59**	-	-	-	-	-	**0.172**	-	-	0.25	U	-
YVD-06	YVD-D1-140601	06/01/2014	FD	SXF0008	**0.56**	-	-	0.2	U	-	**7.63**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-06	YVD-06-140921	09/21/2014	N	SXI0148	**0.44**	-	-	0.2	U	-	**7.98**	-	-	-	-	-	**0.139**	-	-	**0.359**	-	-
YVD-06	YVD-06-141215	12/15/2014	N	SXL0103	**0.45**	J	DUP	0.2	U	-	**7.47**	J+	MSD, DUP	-	-	-	0.1	U	-	0.25	U	-
YVD-06	YVD-06-150316	03/16/2015	N	5904471	**0.99**	-	-	0.2	U	-	**10**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-06	YVD-06-150616	06/16/2015	N	59010751	**0.53**	-	-	0.2	U	-	**7.9**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-06	YVD-06-150922	09/22/2015	N	59020141	**0.51**	-	-	0.2	U	-	**7.9**	-	-	-	-	-	**0.11**	-	-	0.25	UJ	MSD
YVD-06	YVD-06-151214	12/14/2015	N	59025351	**0.51**	-	-	0.2	U	-	**8**	-	-	-	-	-	-	R	MSD	**0.57**	J-	MSD
YVD-06	YVD-06-160307	03/07/2016	N	59029521	**0.51**	-	-	0.2	U	-	**7.8**	-	-	-	-	-	0.1	UJ	RPD	0.25	UJ	MSD
YVD-06	YVD-06-160620	6/20/2016	N	59037151	**0.53**	-	-	0.2	U	-	**8.1**	-	-	-	-	-	0.1	U	-	**0.42**	-	-
YVD-06	YVD-06-160929	9/29/2016	N	K1611704	**0.55**	-	-	0.10	U	-	**8.55**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-06	YVD-06-161215	12/15/2016	N	K1615126	**0.70**	-	-	0.10	U	-	**10.2**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-06	YVD-030617-04	3/6/2017	N	K1702228	**0.61**	-	-	0.10	U	-	**8.38**	-	-	-	-	-	**0.021**	J	-	0.5	U	FBK

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-05	YVD-05-151214	12/14/2015	N	59025351	**0.65**	-	-	-	-	-	-	-	-	-	-	-	**180**	-	-	**180**	-	-
YVD-05	YVD-05-160307	03/07/2016	N	59029521	0.25	U	-	-	-	-	-	-	-	-	-	-	**160**	J	FDP	**160**	J	FDP
YVD-05	YVD-D1-160307	03/07/2016	FD	59029521	0.25	U	-	-	-	-	-	-	-	-	-	-	**170**	J	FDP	**170**	J	FDP
YVD-05	YVD-05-160620	6/20/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**170**	-	-	**170**	-	-
YVD-05	YVD-05-160928	9/28/2016	N	K1611698	-	-	-	**0.01**	-	-	-	-	-	-	-	-	**171**	-	-	**171**	-	-
YVD-05	YVD-05-161215	12/15/2016	N	K1615174	-	-	-	**0.04**	-	-	-	-	-	-	-	-	**163**	-	-	**163**	-	-
YVD-05	YVD-031317-32	3/13/2017	N	K1702489	-	-	-	**0.03**	-	-	-	-	-	-	-	-	**166**	-	-	**166**	-	-
YVD-05	YVD-031317-34	3/13/2017	FD	K1702489	-	-	-	**0.02**	-	-	-	-	-	-	-	-	**168**	-	-	**168**	-	-
YVD-05	YVD-060617-23	6/6/2017	N	K1705754	-	-	-	**0.016**	-	-	-	-	-	-	-	-	**168**	-	-	**168**	-	-
YVD-05	YVD-092517-09	9/25/2017	N	K1710274	-	-	-	**0.012**	-	-	-	-	-	-	-	-	**173**	-	-	**173**	-	-
YVD-05	YVD-120517-15	12/5/2017	N	K1713091	-	-	-	**0.015**	-	-	-	-	-	-	-	-	**171**	-	-	**171**	-	-
YVD-05	YVD-060518-29	6/5/2018	N	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	**170**	-	-	**170**	-	-
YVD-05	YVD-060219-09	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**176**	-	-	**176**	-	-
YVD-06	YVD-06-130917	09/17/2013	N	SWI0113	-	-	-	-	-	-	**0.41**	-	-	-	-	-	**149**	-	-	**150**	-	-
YVD-06	YVD-06-131209	12/09/2013	N	SWL0055	-	-	-	-	-	-	-	-	-	0.06	U	-	**154**	-	-	**155**	-	-
YVD-06	YVD-D1-131209	12/09/2013	FD	SWL0055	-	-	-	-	-	-	-	-	-	0.06	U	-	**159**	-	-	**160**	-	-
YVD-06	YVD-06-140316	03/16/2014	N	SXC0081	**0.14**	-	-	-	-	-	-	-	-	-	-	-	**174**	-	-	**175**	-	-
YVD-06	YVD-D1-140316	03/16/2014	FD	SXC0081	**0.13**	-	-	-	-	-	-	-	-	-	-	-	**159**	-	-	**160**	-	-
YVD-06	YVD-06-140601	06/01/2014	N	SXF0008	**0.064**	-	-	-	-	-	-	-	-	-	-	-	**156**	-	-	**158**	-	-
YVD-06	YVD-D1-140601	06/01/2014	FD	SXF0008	**0.057**	-	-	-	-	-	-	-	-	-	-	-	**153**	-	-	**155**	-	-
YVD-06	YVD-06-140921	09/21/2014	N	SXI0148	**0.18**	-	-	-	-	-	-	-	-	-	-	-	**149**	-	-	**150**	-	-
YVD-06	YVD-06-141215	12/15/2014	N	SXL0103	0.1	U	-	-	-	-	-	-	-	-	-	-	**149**	-	-	**150**	-	-
YVD-06	YVD-06-150316	03/16/2015	N	5904471	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
YVD-06	YVD-06-150616	06/16/2015	N	59010751	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
YVD-06	YVD-06-150922	09/22/2015	N	59020141	0.25	U	-	-	-	-	-	-	-	-	-	-	**170**	-	-	**170**	-	-
YVD-06	YVD-06-151214	12/14/2015	N	59025351	0.25	U	-	-	-	-	-	-	-	-	-	-	**170**	-	-	**170**	-	-
YVD-06	YVD-06-160307	03/07/2016	N	59029521	0.25	U	-	-	-	-	-	-	-	-	-	-	**160**	J	FDP	**160**	J	FDP
YVD-06	YVD-06-160620	6/20/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
YVD-06	YVD-06-160929	9/29/2016	N	K1611704	-	-	-	**0.022**	-	-	-	-	-	-	-	-	**145**	-	-	**145**	-	-
YVD-06	YVD-06-161215	12/15/2016	N	K1615126	-	-	-	**0.010**	-	-	-	-	-	-	-	-	**136**	-	-	**136**	-	-
YVD-06	YVD-030617-04	3/6/2017	N	K1702228	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**142**	-	-	**142**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-06	YVD-060617-21	6/6/2017	N	K1705754	**36.9**	-	-	**6.07**	-	-	**2.17**	-	-	**16.3**	-	-	**2.54**	-	-	**0.19**	J	-
YVD-06	YVD-092617-17	9/26/2017	N	K1710333	**35.0**	-	-	**5.82**	-	-	**1.97**	-	-	**15.6**	-	-	**2.94**	-	-	**0.23**	-	-
YVD-06	YVD-092617-18	9/26/2017	FD	K1710333	**34.6**	-	-	**5.77**	-	-	**2.03**	-	-	**16.1**	-	-	**2.95**	-	-	**0.22**	-	-
YVD-06	YVD-120517-17	12/5/2017	N	K1713091	**34.7**	-	-	**5.81**	-	-	**2.11**	-	-	**17.3**	-	-	**3.23**	-	-	**0.25**	-	-
YVD-06	YVD-060318-15	6/3/2018	N	874568	**37.5**	-	-	**6.45**	-	-	**2.36**	-	-	**17.3**	-	-	**2.69**	-	-	**0.18**	-	-
YVD-06	YVD-060219-11	6/2/2019	N	991939	**35.6**	-	-	**6.05**	-	-	**2.20**	-	-	**16.6**	-	-	2.50	U	FBK	0.15	U	FBK
YVD-07	YVD-07-130923	09/23/2013	N	SWI0178	**27.7**	-	-	**16.2**	-	-	**5.03**	-	-	**37.7**	-	-	-	-	-	-	-	-
YVD-07	YVD-07-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	**7.53**	-	-	0.5	U	-
YVD-07	YVD-07-131210	12/10/2013	N	SWL0055	**99.2**	-	-	**16.0**	-	-	1.00	U	-	**40.4**	-	-	**8.46**	-	-	**0.55**	-	-
YVD-07	YVD-07-140316	03/16/2014	N	SXC0081	**33.4**	-	-	**14.1**	-	-	**4.45**	-	-	**42.5**	-	-	**11.6**	-	-	**0.83**	-	-
YVD-07	YVD-07-140604	06/04/2014	N	SXF0025	**38.4**	-	-	**18.3**	-	-	**5.57**	-	-	**44.5**	-	-	**9.74**	-	-	1	U	-
YVD-07	YVD-07-140922	09/22/2014	N	SXI0158	**31.4**	-	-	**12.7**	-	-	**4.05**	-	-	**42.7**	J+	MSD	**10.3**	-	-	1	U	-
YVD-07	YVD-07-141216	12/16/2014	N	SXL0108	**29.9**	-	-	**12.2**	-	-	**3.83**	-	-	**40.6**	-	-	**8.76**	-	-	1	U	-
YVD-07	YVD-07-150316	03/16/2015	N	5904541	**37.0**	-	-	**15.0**	-	-	**4.30**	-	-	**50.0**	-	-	**15**	-	-	1	U	-
YVD-07	YVD-D2-150316	03/16/2015	FD	5904541	**35.0**	-	-	**14.0**	-	-	**4.30**	-	-	**48.0**	-	-	**16**	-	-	**0.65**	-	-
YVD-07	YVD-07-150616	06/16/2015	N	59010751	**34.0**	J+	MSD	**14.0**	J+	MSD	**4.20**	J+	MSD	**43.0**	J+	MSD	**13**	-	-	0.5	U	-
YVD-07	YVD-D1-150616	06/16/2015	FD	59010751	**35.0**	J+	MSD	**14.0**	J+	MSD	**4.20**	J+	MSD	**44.0**	J+	MSD	**14**	-	-	0.5	U	-
YVD-07	YVD-07-150923	09/23/2015	N	59020281	**33.0**	-	-	**14.0**	-	-	**4.20**	-	-	**48.0**	-	-	**9.9**	-	-	1	U	-
YVD-07	YVD-07-151214	12/14/2015	N	59025431	**30.0**	-	-	**13.0**	-	-	**4.50**	-	-	**48.0**	-	-	**6.7**	-	-	1	U	-
YVD-07	YVD-07-160308	03/08/2016	N	59029711	**25.0**	-	-	**11.0**	-	-	**4.00**	-	-	**42.0**	-	-	**6.7**	-	-	1	U	-
YVD-07	YVD-07-160621	6/21/2016	N	59037151	**19.0**	-	-	**9.0**	-	-	**3.50**	-	-	**37.0**	-	-	**6.2**	-	-	1	U	-
YVD-07	YVD-07-160929	9/29/2016	N	K1611704	**17.8**	-	-	**7.14**	-	-	**3.31**	-	-	**34.0**	-	-	**5.3**	-	-	**0.40**	-	-
YVD-07	YVD-07-161213	12/13/2016	N	K1615083	**25.9**	-	-	**10.2**	-	-	**3.59**	-	-	**36.6**	-	-	**6.38**	-	-	**0.40**	-	-
YVD-07	YVD-030717-07	3/7/2017	N	K1702324	**17.6**	-	-	**6.47**	-	-	**2.83**	-	-	**31.4**	-	-	**5.34**	-	-	**0.43**	-	-
YVD-07	YVD-060517-15	6/5/2017	N	K1705754	**19.4**	-	-	**7.31**	-	-	**2.98**	-	-	**32.9**	-	-	**6.07**	-	-	**0.39**	-	-
YVD-07	YVD-092617-21	9/26/2017	N	K1710333	**25.4**	-	-	**9.27**	-	-	**3.26**	-	-	**34.0**	-	-	**7.45**	-	-	**0.35**	-	-
YVD-07	YVD-120417-11	12/4/2017	N	K1713026	**29.5**	-	-	**11.1**	-	-	**3.56**	-	-	**36.1**	-	-	**8.32**	-	-	**0.37**	-	-
YVD-07	YVD-060418-23	6/4/2018	N	874662	**34.0**	-	-	**13.35**	-	-	**3.76**	-	-	**39.4**	-	-	**10.5**	-	-	**0.30**	-	-
YVD-07	YVD-060319-16	6/3/2019	N	992053	**31.0**	-	-	**11.75**	-	-	**3.76**	-	-	**35.8**	-	-	**5.83**	-	-	**0.17**	-	-
YVD-08	YVD-08-130919	09/19/2013	N	SWI0138	**126**	-	-	**43.8**	-	-	**6.03**	-	-	**88.3**	-	-	**145**	-	-	5	U	-
YVD-08	YVD-08-131211	12/11/2013	N	SWL0063	**134**	-	-	**53.8**	-	-	**7.55**	-	-	**82.2**	-	-	**123**	-	-	5	U	-
YVD-08	YVD-08-140317	03/17/2014	N	SXC0095	**122**	-	-	**42.0**	-	-	**5.30**	-	-	**75.1**	-	-	**128**	-	-	5	U	-
YVD-08	YVD-08-140602	06/02/2014	N	SXF0017	**138**	-	-	**64.6**	-	-	**11.20**	-	-	**78.3**	-	-	**118**	-	-	2	U	-
YVD-08	YVD-08-140923	09/23/2014	N	SXI0173	**103**	-	-	**36.3**	-	-	**5.87**	-	-	**76.9**	-	-	**122**	-	-	2.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-06	YVD-060617-21	6/6/2017	N	K1705754	**0.51**	-	-	0.10	U	-	**8.44**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-06	YVD-092617-17	9/26/2017	N	K1710333	**0.62**	-	-	0.10	U	-	**9.61**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-06	YVD-092617-18	9/26/2017	FD	K1710333	**0.62**	-	-	0.10	U	-	**9.58**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-06	YVD-120517-17	12/5/2017	N	K1713091	**0.73**	-	-	0.10	U	-	**9.87**	-	-	-	-	-	0.050	U	MBK	0.5	UJ	MSD
YVD-06	YVD-060318-15	6/3/2018	N	874568	**0.56**	-	-	0.05	U	-	**7.86**	-	-	0.09	U	FBK	-	-	-	0.5	U	-
YVD-06	YVD-060219-11	6/2/2019	N	991939	**0.51**	-	-	0.05	U	-	**6.42**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-07	YVD-07-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	-	-	-	-	-	-	0.1	U	-	**0.395**	-	-
YVD-07	YVD-07-130926	09/26/2013	N	SWI0190	**4.4**	-	-	0.2	U	-	**37.4**	-	-	-	-	-	-	-	-	-	-	-
YVD-07	YVD-07-131210	12/10/2013	N	SWL0055	**5.3**	-	-	0.2	U	-	**50**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
YVD-07	YVD-07-140316	03/16/2014	N	SXC0081	**3.9**	-	-	0.2	U	-	**69.2**	-	-	-	-	-	**0.116**	-	-	0.25	U	-
YVD-07	YVD-07-140604	06/04/2014	N	SXF0025	**3.36**	-	-	0.4	U	-	**57**	-	-	-	-	-	0.1	U	-	**0.348**	J-	MSD
YVD-07	YVD-07-140922	09/22/2014	N	SXI0158	**5.52**	-	-	0.4	U	-	**51.8**	-	-	-	-	-	-	R	MSD	0.25	U	-
YVD-07	YVD-07-141216	12/16/2014	N	SXL0108	**2.92**	-	-	0.4	U	-	**51.2**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-07	YVD-07-150316	03/16/2015	N	5904541	**4**	J-	MSD	0.4	U	-	**73**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-07	YVD-D2-150316	03/16/2015	FD	5904541	**4.2**	J-	MSD	0.2	U	-	**70**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-07	YVD-07-150616	06/16/2015	N	59010751	**3.3**	-	-	0.4	U	-	**74**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-07	YVD-D1-150616	06/16/2015	FD	59010751	**3.5**	-	-	0.2	U	-	**74**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-07	YVD-07-150923	09/23/2015	N	59020281	**4.7**	-	-	0.4	U	-	**68**	-	-	-	-	-	**0.22**	-	-	-	R	MSD
YVD-07	YVD-07-151214	12/14/2015	N	59025431	**2.4**	-	-	0.4	U	-	**59**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-07	YVD-07-160308	03/08/2016	N	59029711	**1.8**	-	-	0.4	U	-	**49**	J+	MSD	-	-	-	**1.1**	J+	FBK, FDP	0.25	U	-
YVD-07	YVD-07-160621	6/21/2016	N	59037151	**1.2**	-	-	0.4	U	-	**31**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-07	YVD-07-160929	9/29/2016	N	K1611704	**1.37**	-	-	0.10	U	-	**37.1**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-07	YVD-07-161213	12/13/2016	N	K1615083	**2.15**	-	-	0.10	U	-	**64.0**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-07	YVD-030717-07	3/7/2017	N	K1702324	**1.74**	J	HTQ	0.10	UJ	HTQ	**25.4**	-	-	-	-	-	1	U	-	0.5	U	-
YVD-07	YVD-060517-15	6/5/2017	N	K1705754	**2.07**	-	-	0.10	U	-	**33.5**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-07	YVD-092617-21	9/26/2017	N	K1710333	**3.47**	-	-	0.10	U	-	**51.0**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-07	YVD-120417-11	12/4/2017	N	K1713026	**4.40**	-	-	0.10	U	-	**56.5**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-07	YVD-060418-23	6/4/2018	N	874662	**3.34**	-	-	0.05	U	-	**63.5**	-	-	0.47	U	FBK	-	-	-	0.5	UJ	MSD
YVD-07	YVD-060319-16	6/3/2019	N	992053	**1.86**	-	-	0.05	U	-	**27.6**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-08	YVD-08-130919	09/19/2013	N	SWI0138	**8**	-	-	2	U	-	**105**	-	-	-	-	-	0.1	U	-	**0.935**	J+	FBK
YVD-08	YVD-08-131211	12/11/2013	N	SWL0063	**22.5**	-	-	2	U	-	**273**	J-	MSD	-	-	-	-	R	MSD	0.75	U	ERL
YVD-08	YVD-08-140317	03/17/2014	N	SXC0095	**14.3**	-	-	2	U	-	**173**	J-	MSD	-	-	-	**0.146**	-	-	**0.702**	-	-
YVD-08	YVD-08-140602	06/02/2014	N	SXF0017	**14.7**	-	-	0.8	U	-	**175**	J-	MSD	-	-	-	0.1	U	-	**1.12**	-	-
YVD-08	YVD-08-140923	09/23/2014	N	SXI0173	**8.1**	-	-	1	U	-	**107**	-	-	-	-	-	0.1	U	-	**0.867**	J+	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-06	YVD-060617-21	6/6/2017	N	K1705754	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**144**	-	-	**144**	-	-
YVD-06	YVD-092617-17	9/26/2017	N	K1710333	-	-	-	**0.009**	J	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-06	YVD-092617-18	9/26/2017	FD	K1710333	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-06	YVD-120517-17	12/5/2017	N	K1713091	-	-	-	**0.021**	-	-	-	-	-	-	-	-	**137**	-	-	**137**	-	-
YVD-06	YVD-060318-15	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**138**	-	-	**138**	-	-
YVD-06	YVD-060219-11	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**134**	-	-	**134**	-	-
YVD-07	YVD-07-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	**0.516**	-	-	-	-	-	**79.4**	-	-	**80**	-	-
YVD-07	YVD-07-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-07	YVD-07-131210	12/10/2013	N	SWL0055	-	-	-	-	-	-	-	-	-	0.06	U	-	**135**	-	-	**135**	-	-
YVD-07	YVD-07-140316	03/16/2014	N	SXC0081	**0.22**	-	-	-	-	-	-	-	-	-	-	-	**134**	-	-	**135**	-	-
YVD-07	YVD-07-140604	06/04/2014	N	SXF0025	**0.69**	-	-	-	-	-	-	-	-	-	-	-	**137**	-	-	**138**	-	-
YVD-07	YVD-07-140922	09/22/2014	N	SXI0158	**0.2**	-	-	-	-	-	-	-	-	-	-	-	**134**	-	-	**135**	-	-
YVD-07	YVD-07-141216	12/16/2014	N	SXL0108	0.1	U	-	-	-	-	-	-	-	-	-	-	**133**	-	-	**135**	-	-
YVD-07	YVD-07-150316	03/16/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-07	YVD-D2-150316	03/16/2015	FD	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-07	YVD-07-150616	06/16/2015	N	59010751	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
YVD-07	YVD-D1-150616	06/16/2015	FD	59010751	0.25	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-07	YVD-07-150923	09/23/2015	N	59020281	0.25	U	-	-	-	-	-	-	-	-	-	-	**160**	-	-	**160**	-	-
YVD-07	YVD-07-151214	12/14/2015	N	59025431	**0.97**	J	FDP	-	-	-	-	-	-	-	-	-	**140**	J	FDP	**140**	J	FDP
YVD-07	YVD-07-160308	03/08/2016	N	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-07	YVD-07-160621	6/21/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**100**	-	-	**100**	-	-
YVD-07	YVD-07-160929	9/29/2016	N	K1611704	-	-	-	**0.020**	-	-	-	-	-	-	-	-	**113**	-	-	**113**	-	-
YVD-07	YVD-07-161213	12/13/2016	N	K1615083	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**120**	-	-	**120**	-	-
YVD-07	YVD-030717-07	3/7/2017	N	K1702324	-	-	-	**0.019**	-	-	-	-	-	-	-	-	**107**	-	-	**107**	-	-
YVD-07	YVD-060517-15	6/5/2017	N	K1705754	-	-	-	**0.004**	J	-	-	-	-	-	-	-	**105**	-	-	**105**	-	-
YVD-07	YVD-092617-21	9/26/2017	N	K1710333	-	-	-	**0.022**	-	-	-	-	-	-	-	-	**116**	-	-	**116**	-	-
YVD-07	YVD-120417-11	12/4/2017	N	K1713026	-	-	-	**0.022**	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
YVD-07	YVD-060418-23	6/4/2018	N	874662	-	-	-	-	-	-	-	-	-	0.07	U	-	**126**	-	-	**126**	-	-
YVD-07	YVD-060319-16	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**127**	-	-	**127**	-	-
YVD-08	YVD-08-130919	09/19/2013	N	SWI0138	-	-	-	-	-	-	0.1	U	-	-	-	-	**354**	-	-	**355**	-	-
YVD-08	YVD-08-131211	12/11/2013	N	SWL0063	-	-	-	-	-	-	-	-	-	**1.46**	-	-	**259**	-	-	**260**	-	-
YVD-08	YVD-08-140317	03/17/2014	N	SXC0095	**0.13**	-	-	-	-	-	-	-	-	-	-	-	**294**	-	-	**295**	-	-
YVD-08	YVD-08-140602	06/02/2014	N	SXF0017	**2.7**	-	-	-	-	-	-	-	-	-	-	-	**279**	-	-	**280**	-	-
YVD-08	YVD-08-140923	09/23/2014	N	SXI0173	**0.35**	-	-	-	-	-	-	-	-	-	-	-	**249**	-	-	**250**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-08	YVD-08-141216	12/16/2014	N	SXL0108	**111**	-	-	**41.4**	-	-	**5.92**	-	-	**77.2**	-	-	**126**	-	-	2.5	U	-
YVD-08	YVD-08-150317	03/17/2015	N	5904541	**110**	-	-	**40.0**	-	-	**5.90**	-	-	**77.0**	-	-	**120**	-	-	2.5	U	-
YVD-08	YVD-D3-150317	03/17/2015	FD	5904541	**100**	-	-	**39.0**	-	-	**5.70**	-	-	**76.0**	-	-	**130**	-	-	0.5	U	-
YVD-08	YVD-08-150617	06/17/2015	N	59010961	**110**	-	-	**40.0**	-	-	**6.00**	J+	MSD	**82.0**	J+	MSD	**120**	-	-	2.5	U	-
YVD-08	YVD-D3-150617	06/17/2015	FD	59010961	**110**	-	-	**39.0**	-	-	**5.70**	J+	MSD	**77.0**	J+	MSD	**140**	-	-	5	U	-
YVD-08	YVD-08-150924	09/24/2015	N	59020391	**110**	-	-	**44.0**	-	-	**5.60**	-	-	**82.0**	-	-	**120**	-	-	2.5	U	-
YVD-08	YVD-08-151215	12/15/2015	N	59025501	**120**	-	-	**44.0**	-	-	**6.20**	-	-	**85.0**	-	-	**120**	-	-	2.5	U	-
YVD-08	YVD-D3-151215	12/15/2015	FD	59025501	**120**	-	-	**46.0**	-	-	**6.20**	-	-	**85.0**	-	-	**110**	-	-	5	U	-
YVD-08	YVD-08-160310	03/10/2016	N	59029941	**120**	-	-	**44.0**	-	-	**5.60**	-	-	**87.0**	-	-	**120**	-	-	2.5	U	-
YVD-08	YVD-08-160622	6/22/2016	N	59037271	**120**	-	-	**46.0**	-	-	**5.90**	-	-	**87.0**	-	-	**110**	-	-	2.5	U	-
YVD-08	YVD-D3-160622	6/22/2016	FD	59037271	**120**	-	-	**46.0**	-	-	**6.00**	-	-	**88.0**	-	-	**120**	-	-	0.5	U	-
YVD-08	YVD-08-160927	9/27/2016	N	K1611565	**120**	-	-	**47.0**	-	-	**4.95**	-	-	**84.7**	-	-	**96.0**	-	-	**0.18**	J	-
YVD-08	YVD-08-161213	12/13/2016	N	K1615045	**122**	-	-	**41.9**	-	-	**5.10**	-	-	**84.5**	-	-	**89.3**	-	-	**0.23**	-	-
YVD-08	YVD-030917-24	3/9/2017	N	K1702448	**136**	-	-	**44.4**	-	-	**4.95**	-	-	**83.4**	-	-	**95.2**	-	-	**0.20**	J	-
YVD-08	YVD-060717-29	6/7/2017	N	K1705833	**139**	-	-	**48.3**	-	-	**5.13**	-	-	**92.1**	-	-	**94.3**	-	-	**0.17**	J	-
YVD-08	YVD-092617-19	9/26/2017	N	K1710333	**137**	-	-	**44.3**	-	-	**5.12**	-	-	**89.3**	-	-	**98.0**	-	-	**0.19**	J	-
YVD-08	YVD-120517-23	12/5/2017	N	K1713157	**147**	-	-	**48.1**	-	-	**5.23**	-	-	**93.2**	-	-	**98.8**	-	-	**0.20**	J	-
YVD-08	YVD-031918-15	3/19/2018	N	870634	**134**	-	-	**45.95**	-	-	**5.40**	-	-	**90.5**	-	-	**103**	-	-	**0.15**	-	-
YVD-08	YVD-060518-31	6/5/2018	N	874860	**136**	-	-	**47.45**	-	-	**5.55**	-	-	**98.0**	-	-	**99.0**	-	-	**0.16**	-	-
YVD-08	YVD-090918-04	9/9/2018	N	880601	**146**	-	-	**49.15**	-	-	**5.70**	-	-	**99.5**	-	-	**103**	-	-	**0.18**	-	-
YVD-08	YVD-121118-19	12/11/2018	N	884939	**138**	-	-	**45.85**	-	-	**6.00**	-	-	**98.5**	-	-	**117**	-	-	**0.16**	-	-
YVD-08	YVD-031719-03	3/17/2019	N	988239	**138**	-	-	**46.30**	-	-	**5.50**	-	-	**96.0**	-	-	**119**	-	-	0.22	U	FBK
YVD-08	YVD-060319-21	6/3/2019	N	992053	**138**	-	-	**46.10**	-	-	**5.55**	-	-	**97.5**	-	-	**100**	-	-	**0.10**	-	-
YVD-08	YVD-090919-02	9/9/2019	N	998357	**139**	-	-	**45.70**	-	-	**5.45**	-	-	**91.5**	-	-	**89.8**	-	-	**0.15**	-	-
YVD-08	YVD-120919-02	12/9/2019	N	902276	**132**	-	-	**44.60**	-	-	**5.55**	-	-	**96.5**	J	MSD	**95.6**	-	-	**0.16**	-	-
YVD-08 (FD)	YVD-120919-04	12/9/2019	FD	902276	**130**	-	-	**44.50**	-	-	**5.55**	-	-	**96.0**	J	MSD	**94.3**	-	-	**0.15**	-	-
YVD-09	YVD-09-130919	09/19/2013	N	SWI0138	**107**	-	-	**39.3**	-	-	**8.21**	-	-	**189**	-	-	**96.3**	-	-	5	U	-
YVD-09	YVD-09-131212	12/12/2013	N	SWL0078	**109**	-	-	**42.0**	-	-	**9.21**	-	-	**176**	-	-	**87.2**	-	-	5	U	-
YVD-09	YVD-09-140319	03/19/2014	N	SXC0107	**109**	-	-	**40.8**	-	-	**9.33**	-	-	**173**	-	-	**104**	-	-	**5.5**		-
YVD-09	YVD-09-140603	06/03/2014	N	SXF0025	**113**	-	-	**44.5**	-	-	**10.10**	-	-	**193**	-	-	**89.8**	-	-	5	U	-
YVD-09	YVD-09-140924	09/24/2014	N	SXI0173	**118**	-	-	**41.7**	-	-	**8.88**	-	-	**203**	-	-	**68.2**	-	-	5	U	-
YVD-09	YVD-09-141217	12/17/2014	N	SXL0121	**130**	-	-	**56.3**	-	-	**12.90**	-	-	**187**	-	-	**85**	-	-	5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-08	YVD-08-141216	12/16/2014	N	SXL0108	**14**	-	-	1	U	-	**140**	-	-	-	-	-	0.1	U	-	**0.369**	-	-
YVD-08	YVD-08-150317	03/17/2015	N	5904541	**13**	J-	MSD	1	U	-	**130**	J-	MSD	-	-	-	0.1	U	-	**0.39**	J-	MSD
YVD-08	YVD-D3-150317	03/17/2015	FD	5904541	**14**	J-	MSD	0.2	U	-	**150**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-08	YVD-08-150617	06/17/2015	N	59010961	**19**	-	-	1	U	-	**140**	-	-	-	-	-	**0.14**	-	-	**0.26**	J-	MSD, FDP
YVD-08	YVD-D3-150617	06/17/2015	FD	59010961	**19**	-	-	0.2	U	-	**170**	-	-	-	-	-	0.1	U	-	**0.86**	J-	MSD, FDP
YVD-08	YVD-08-150924	09/24/2015	N	59020391	**20**	J+	MSD	1	U	-	**170**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
YVD-08	YVD-08-151215	12/15/2015	N	59025501	**26**	-	-	1	U	-	**190**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-08	YVD-D3-151215	12/15/2015	FD	59025501	**26**	-	-	0.2	U	-	**180**	-	-	-	-	-	**0.15**	J-	MSD	-	R	MSD
YVD-08	YVD-08-160310	03/10/2016	N	59029941	**32**	-	-	1	U	-	**210**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	FDP, MSD
YVD-08	YVD-08-160622	6/22/2016	N	59037271	**34**	-	-	1	U	-	**200**	-	-	-	-	-	0.1	UJ	MSD	-	R	MSD
YVD-08	YVD-D3-160622	6/22/2016	FD	59037271	**34**	-	-	0.2	U	-	**200**	-	-	-	-	-	0.1	UJ	FBK, MSD	-	R	MSD
YVD-08	YVD-08-160927	9/27/2016	N	K1611565	**30.6**	-	-	0.10	U	-	**193**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
YVD-08	YVD-08-161213	12/13/2016	N	K1615045	**34.5**	J	HTQ	0.10	U	-	**182**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-08	YVD-030917-24	3/9/2017	N	K1702448	**37.3**	J	HTQ	0.10	U	-	**203**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-08	YVD-060717-29	6/7/2017	N	K1705833	**44.0**	-	-	0.10	U	-	**194**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-08	YVD-092617-19	9/26/2017	N	K1710333	**38.6**	J	HTQ	0.10	U	-	**213**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-08	YVD-120517-23	12/5/2017	N	K1713157	**49.3**	-	-	0.10	U	-	**184**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-08	YVD-031918-15	3/19/2018	N	870634	**46.3**	-	-	0.05	U	-	**183**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-08	YVD-060518-31	6/5/2018	N	874860	**53.0**	-	-	0.05	U	-	**197**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-08	YVD-090918-04	9/9/2018	N	880601	**54.4**	-	-	0.05	U	-	**195**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-08	YVD-121118-19	12/11/2018	N	884939	**59.4**	-	-	0.05	U	-	**207**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-08	YVD-031719-03	3/17/2019	N	988239	**54.8**	-	-	0.05	U	-	**203**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-08	YVD-060319-21	6/3/2019	N	992053	**50.0**	-	-	0.05	U	-	**190**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-08	YVD-090919-02	9/9/2019	N	998357	**62.0**	-	-	0.05	U	-	**184**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-08	YVD-120919-02	12/9/2019	N	902276	**61.8**	-	-	0.05	U	-	**177**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-08 (FD)	YVD-120919-04	12/9/2019	FD	902276	**61.6**	-	-	0.05	U	-	**173**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-09	YVD-09-130919	09/19/2013	N	SWI0138	**74.7**	-	-	2	U	-	**236**	-	-	-	-	-	0.1	U	-	-	R	FBK
YVD-09	YVD-09-131212	12/12/2013	N	SWL0078	**64.4**	-	-	2	U	-	**193**	-	-	-	-	-	0.02	U	-	0.661	U	ERL
YVD-09	YVD-09-140319	03/19/2014	N	SXC0107	**62.4**	-	-	2	U	-	**214**	-	-	-	-	-	0.1	U	-	**0.653**	J-	MSD
YVD-09	YVD-09-140603	06/03/2014	N	SXF0025	**57.1**	-	-	2	U	-	**214**	-	-	-	-	-	0.1	U	-	**0.613**	J-	MSD
YVD-09	YVD-09-140924	09/24/2014	N	SXI0173	**48**	-	-	2	U	-	**166**	-	-	-	-	-	0.1	U	-	**0.502**	J+	MSD
YVD-09	YVD-09-141217	12/17/2014	N	SXL0121	**53.9**	-	-	2	U	-	**223**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-08	YVD-08-141216	12/16/2014	N	SXL0108	**0.34**	-	-	-	-	-	-	-	-	-	-	-	**264**	-	-	**265**	-	-
YVD-08	YVD-08-150317	03/17/2015	N	5904541	**0.67**	-	-	-	-	-	-	-	-	-	-	-	**230**	-	-	**230**	-	-
YVD-08	YVD-D3-150317	03/17/2015	FD	5904541	**0.49**	-	-	-	-	-	-	-	-	-	-	-	**240**	-	-	**240**	-	-
YVD-08	YVD-08-150617	06/17/2015	N	59010961	**0.53**	-	-	-	-	-	-	-	-	-	-	-	**280**	J	FDP	**280**	J	FDP
YVD-08	YVD-D3-150617	06/17/2015	FD	59010961	**0.39**	-	-	-	-	-	-	-	-	-	-	-	**220**	J	FDP	**220**	J	FDP
YVD-08	YVD-08-150924	09/24/2015	N	59020391	**0.31**	-	-	-	-	-	-	-	-	-	-	-	**260**	-	-	**260**	-	-
YVD-08	YVD-08-151215	12/15/2015	N	59025501	**0.33**	J-	MSD	-	-	-	-	-	-	-	-	-	**260**	-	-	**260**	-	-
YVD-08	YVD-D3-151215	12/15/2015	FD	59025501	**0.27**	J-	MSD	-	-	-	-	-	-	-	-	-	**250**	-	-	**250**	-	-
YVD-08	YVD-08-160310	03/10/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**240**	-	-	**240**	-	-
YVD-08	YVD-08-160622	6/22/2016	N	59037271	**0.31**	-	-	-	-	-	-	-	-	-	-	-	**230**	-	-	**230**	-	-
YVD-08	YVD-D3-160622	6/22/2016	FD	59037271	**0.28**	-	-	-	-	-	-	-	-	-	-	-	**230**	-	-	**230**	-	-
YVD-08	YVD-08-160927	9/27/2016	N	K1611565	-	-	-	**0.049**	-	-	-	-	-	-	-	-	**239**	-	-	**239**	-	-
YVD-08	YVD-08-161213	12/13/2016	N	K1615045	-	-	-	**0.058**	-	-	-	-	-	-	-	-	**222**	-	-	**222**	-	-
YVD-08	YVD-030917-24	3/9/2017	N	K1702448	-	-	-	**0.018**	-	-	-	-	-	-	-	-	**263**	-	-	**263**	-	-
YVD-08	YVD-060717-29	6/7/2017	N	K1705833	-	-	-	**0.025**	-	-	-	-	-	-	-	-	**236**	-	-	**236**	-	-
YVD-08	YVD-092617-19	9/26/2017	N	K1710333	-	-	-	**0.01**	-	-	-	-	-	-	-	-	**271**	-	-	**271**	-	-
YVD-08	YVD-120517-23	12/5/2017	N	K1713157	-	-	-	**0.013**	-	-	-	-	-	-	-	-	**233**	-	-	**233**	-	-
YVD-08	YVD-031918-15	3/19/2018	N	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**250**	-	-	**250**	-	-
YVD-08	YVD-060518-31	6/5/2018	N	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	**238**	-	-	**238**	-	-
YVD-08	YVD-090918-04	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**237**	-	-	**237**	-	-
YVD-08	YVD-121118-19	12/11/2018	N	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	**227**	-	-	**227**	-	-
YVD-08	YVD-031719-03	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**234**	-	-	**234**	-	-
YVD-08	YVD-060319-21	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**240**	-	-	**240**	-	-
YVD-08	YVD-090919-02	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**226**	-	-	**226**	-	-
YVD-08	YVD-120919-02	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**227**	-	-	**227**	-	-
YVD-08 (FD)	YVD-120919-04	12/9/2019	FD	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**226**	-	-	**226**	-	-
YVD-09	YVD-09-130919	09/19/2013	N	SWI0138	-	-	-	-	-	-	-	R	FBK	-	-	-	**369**	-	-	**370**	-	-
YVD-09	YVD-09-131212	12/12/2013	N	SWL0078	-	-	-	-	-	-	-	-	-	**0.647**	-	-	**384**	-	-	**385**	-	-
YVD-09	YVD-09-140319	03/19/2014	N	SXC0107	**0.53**	-	-	-	-	-	-	-	-	-	-	-	**388**	-	-	**390**	-	-
YVD-09	YVD-09-140603	06/03/2014	N	SXF0025	**0.72**	-	-	-	-	-	-	-	-	-	-	-	**367**	-	-	**368**	-	-
YVD-09	YVD-09-140924	09/24/2014	N	SXI0173	**0.32**	J+	FBK	-	-	-	-	-	-	-	-	-	**359**	-	-	**360**	-	-
YVD-09	YVD-09-141217	12/17/2014	N	SXL0121	**1.3**	-	-	-	-	-	-	-	-	-	-	-	**359**	-	-	**360**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-09	YVD-09-150318	03/18/2015	N	5904651	**110**	-	-	**46.0**	-	-	**9.30**	J-	MSD	**190**	-	-	**74**	-	-	5	U	-
YVD-09	YVD-09-150617	06/17/2015	N	59010961	**110**	-	-	**43.0**	-	-	**9.80**	J+	MSD	**190**	J+	MSD	**89**	-	-	5	U	-
YVD-09	YVD-09-150923	09/23/2015	N	59020391	**110**	-	-	**46.0**	-	-	**9.60**	-	-	**180**	-	-	**78**	-	-	0.5	U	-
YVD-09	YVD-09-151215	12/15/2015	N	59025501	**110**	-	-	**42.0**	-	-	**9.60**	-	-	**190**	-	-	**77**	-	-	5	U	-
YVD-09	YVD-09-160310	03/10/2016	N	59029941	**110**	-	-	**42.0**	-	-	**9.20**	-	-	**190**	-	-	**72**	-	-	5	U	-
YVD-09	YVD-09-160622	6/22/2016	N	59037271	**100**	-	-	**42.0**	-	-	**8.90**	-	-	**190**	-	-	**76**	-	-	5	U	-
YVD-09	YVD-09-160929	9/29/2016	N	K1611704	**103**	-	-	**41.2**	-	-	**7.62**	-	-	**184**	-	-	**66.7**	-	-	**0.34**	-	-
YVD-09	YVD-09-161213	12/13/2016	N	K1615045	**107**	-	-	**38.1**	-	-	**8.42**	-	-	**185**	-	-	**59.8**	-	-	**0.40**	-	-
YVD-09	YVD-D2-161213	12/13/2016	FD	K1615045	**108**	-	-	**37.1**	-	-	**8.04**	-	-	**181**	-	-	**61.4**	-	-	**0.40**	-	-
YVD-09	YVD-031317-35	3/13/2017	N	K1702489	**108**	-	-	**39.2**	-	-	**7.78**	-	-	**185**	-	-	**63.9**	-	-	**0.37**	-	-
YVD-09	YVD-060517-08	6/5/2017	N	K1705702	**110**	-	-	**39.4**	-	-	**6.98**	-	-	**163**	-	-	**62.6**	-	-	**0.39**	-	-
YVD-09	YVD-092617-29	9/26/2017	N	K1710381	**109**	-	-	**37.2**	-	-	**8.07**	-	-	**175**	-	-	**61.0**	-	-	**0.38**	-	-
YVD-09	YVD-092617-30	9/26/2017	FD	K1710381	**109**	-	-	**37.4**	-	-	**8.11**	-	-	**176**	-	-	**61.1**	-	-	**0.38**	-	-
YVD-09	YVD-120517-21	12/5/2017	N	K1713091	**108**	-	-	**35.9**	-	-	**7.27**	-	-	**174**	-	-	**63.0**	-	-	**0.38**	-	-
YVD-09	YVD-031918-18	3/19/2018	N	870634	**108**	-	-	**35.90**	-	-	**7.80**	-	-	**166**	-	-	**69.2**	-	-	**0.34**	-	-
YVD-09	YVD-060318-13	6/3/2018	N	874568	**107**	-	-	**37.75**	-	-	**8.35**	-	-	**182**	-	-	**63.4**	-	-	**0.36**	-	-
YVD-09	YVD-090918-06	9/9/2018	N	880601	**108**	-	-	**35.90**	-	-	**8.10**	-	-	**174**	-	-	**71.0**	-	-	**0.35**	-	-
YVD-09	YVD-121118-15	12/11/2018	N	884939	**102**	-	-	**34.25**	-	-	**8.60**	-	-	**172**	-	-	**65.6**	-	-	**0.34**	-	-
YVD-09 (FD)	YVD-121118-17	12/11/2018	FD	884939	**103**	-	-	**34.55**	-	-	**8.75**	-	-	**175**	-	-	**68.0**	-	-	**0.33**	-	-
YVD-09	YVD-031719-05	3/17/2019	N	988239	**104**	-	-	**35.75**	-	-	**8.05**	-	-	**166**	-	-	**67.4**	-	-	0.31	U	FBK
YVD-09	YVD-060319-15	6/3/2019	N	992053	**104**	-	-	**35.65**	-	-	**8.00**	-	-	**166**	-	-	**43.4**	-	-	**0.36**	-	-
YVD-09	YVD-090919-04	9/9/2019	N	998357	**110**	-	-	**36.45**	-	-	**8.20**	-	-	**160**	-	-	**64.7**	-	-	**0.33**	-	-
YVD-09	YVD-120919-06	12/9/2019	N	902276	**106**	-	-	**35.75**	-	-	**8.40**	-	-	**166**	J	MSD	**69.1**	-	-	**0.37**	-	-
YVD-10	YVD-10-130917	09/17/2013	N	SWI0123	**216**	-	-	**51.8**	-	-	**3.28**	-	-	**104**	-	-	**95.4**	-	-	5	U	-
YVD-10	YVD-10-131212	12/12/2013	N	SWL0078	**202**	-	-	**55.6**	-	-	**4.49**	-	-	**102**	-	-	**91.4**	-	-	5	U	-
YVD-10	YVD-10-140319	03/19/2014	N	SXC0107	**218**	-	-	**54.0**	-	-	**3.93**	-	-	**96.8**	-	-	**86.8**	-	-	5	U	-
YVD-10	YVD-10-140603	06/03/2014	N	SXF0025	**232**	-	-	**58.6**	-	-	**4.07**	-	-	**103**	-	-	**94.3**	-	-	5	U	-
YVD-10	YVD-10-140924	09/24/2014	N	SXI0173	**276**	-	-	**65.8**	-	-	**3.86**	-	-	**116**	-	-	**115**	-	-	5	U	-
YVD-10	YVD-10-141217	12/17/2014	N	SXL0144	**248**	-	-	**60.4**	-	-	**3.88**	-	-	**110**	-	-	**97.9**	-	-	5	U	-
YVD-10	YVD-10-150318	03/18/2015	N	5904651	**400**	-	-	**92.0**	-	-	**4.00**	J-	MSD	**130**	-	-	**180**	-	-	5	U	-
YVD-10	YVD-10-150617	06/17/2015	N	59010961	**390**	-	-	**95.0**	-	-	**4.60**	J+	MSD	**130**	J+	MSD	**39**	-	-	5	U	-
YVD-10	YVD-10-150923	09/23/2015	N	59020391	**330**	-	-	**89.0**	-	-	**4.30**	-	-	**120**	-	-	**160**	-	-	5	U	-
YVD-10	YVD-10-151214	12/14/2015	N	59025351	**350**	-	-	**84.0**	-	-	**4.30**	-	-	**120**	-	-	**150**	-	-	5	U	-
YVD-10	YVD-10-160309	03/09/2016	N	59029711	**310**	-	-	**73.0**	-	-	**4.10**	-	-	**120**	-	-	**140**	-	-	5	U	-
YVD-10	YVD-10-160621	6/21/2016	N	59037271	**270**	-	-	**73.0**	-	-	**4.50**	-	-	**110**	-	-	**120**	-	-	5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-09	YVD-09-150318	03/18/2015	N	5904651	**47**	-	-	2	U	-	**190**	-	-	-	-	-	**0.14**	-	-	0.25	UJ	MSD
YVD-09	YVD-09-150617	06/17/2015	N	59010961	**54**	-	-	2	U	-	**230**	-	-	-	-	-	**0.14**	-	-	**0.37**	J-	MSD
YVD-09	YVD-09-150923	09/23/2015	N	59020391	**56**	J+	MSD	0.2	U	-	**270**	J-	MSD	-	-	-	**0.21**	J	MSD	**0.26**	J-	MSD
YVD-09	YVD-09-151215	12/15/2015	N	59025501	**52**	-	-	2	U	-	**250**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-09	YVD-09-160310	03/10/2016	N	59029941	**48**	-	-	2	U	-	**250**	J	DUP	-	-	-	**0.12**	-	-	0.25	UJ	FDP, MSD
YVD-09	YVD-09-160622	6/22/2016	N	59037271	**49**	-	-	2	U	-	**260**	-	-	-	-	-	0.1	UJ	MSD	-	R	MSD
YVD-09	YVD-09-160929	9/29/2016	N	K1611704	**43.2**	-	-	0.10	U	-	**243**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-09	YVD-09-161213	12/13/2016	N	K1615045	**42.8**	J	HTQ	0.10	U	-	**238**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-09	YVD-D2-161213	12/13/2016	FD	K1615045	**43.3**	J	HTQ	0.10	U	-	**240**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-09	YVD-031317-35	3/13/2017	N	K1702489	**44.3**	-	-	**0.04**	J	-	**225**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-09	YVD-060517-08	6/5/2017	N	K1705702	**44.6**	-	-	0.10	U	-	**237**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-09	YVD-092617-29	9/26/2017	N	K1710381	**44.1**	J	HTQ	0.10	U	-	**223**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-09	YVD-092617-30	9/26/2017	FD	K1710381	**44.1**	J	HTQ	0.10	U	-	**224**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-09	YVD-120517-21	12/5/2017	N	K1713091	**46.9**	-	-	0.10	U	-	**211**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
YVD-09	YVD-031918-18	3/19/2018	N	870634	**48.5**	-	-	0.05	U	-	**180**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-09	YVD-060318-13	6/3/2018	N	874568	**50.6**	-	-	0.05	U	-	**182**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-09	YVD-090918-06	9/9/2018	N	880601	**51.4**	-	-	0.05	U	-	**172**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-09	YVD-121118-15	12/11/2018	N	884939	**52.8**	-	-	0.05	U	-	**166**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-09 (FD)	YVD-121118-17	12/11/2018	FD	884939	**54.6**	-	-	0.05	U	-	**170**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-09	YVD-031719-05	3/17/2019	N	988239	**56.0**	-	-	0.05	U	-	**162**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-09	YVD-060319-15	6/3/2019	N	992053	**53.3**	-	-	0.05	U	-	**146**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-09	YVD-090919-04	9/9/2019	N	998357	**58.2**	-	-	0.05	U	-	**148**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-09	YVD-120919-06	12/9/2019	N	902276	**57.0**	-	-	0.05	U	-	**143**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-10	YVD-10-130917	09/17/2013	N	SWI0123	**95**		-	2	U	-	**199**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-10	YVD-10-131212	12/12/2013	N	SWL0078	**86.9**	-	-	2	U	-	**174**	-	-	-	-	-	0.02	U	-	0.6495	U	ERL
YVD-10	YVD-10-140319	03/19/2014	N	SXC0107	**77.6**	-	-	2	U	-	**163**	-	-	-	-	-	**0.109**	-	-	**0.507**	J-	MSD
YVD-10	YVD-10-140603	06/03/2014	N	SXF0025	**86.1**	-	-	2	U	-	**188**	-	-	-	-	-	**0.105**	-	-	**0.577**	J-	MSD
YVD-10	YVD-10-140924	09/24/2014	N	SXI0173	**97.2**	-	-	2	U	-	**217**	-	-	-	-	-	0.1	U	-	**0.443**	J+	MSD
YVD-10	YVD-10-141217	12/17/2014	N	SXL0144	**78.7**	-	-	2	U	-	**180**	-	-	-	-	-	0.5	U	-	-	R	MSD
YVD-10	YVD-10-150318	03/18/2015	N	5904651	**120**	-	-	2	U	-	**370**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-10	YVD-10-150617	06/17/2015	N	59010961	**20**	-	-	2	U	-	**110**	-	-	-	-	-	**0.12**	-	-	**0.44**	J-	MSD
YVD-10	YVD-10-150923	09/23/2015	N	59020391	**120**	J+	MSD	2	U	-	**370**	J-	MSD	-	-	-	**0.72**	J	MSD	0.25	UJ	MSD
YVD-10	YVD-10-151214	12/14/2015	N	59025351	**120**	-	-	2	U	-	**360**	-	-	-	-	-	-	R	MSD	0.25	UJ	MSD
YVD-10	YVD-10-160309	03/09/2016	N	59029711	**98**	-	-	2	U	-	**280**	J+	MSD	-	-	-	0.1	UJ	FDP	-	R	MSD
YVD-10	YVD-10-160621	6/21/2016	N	59037271	**96**	-	-	2	U	-	**240**	-	-	-	-	-	**0.11**	J-	MSD	-	R	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-09	YVD-09-150318	03/18/2015	N	5904651	**0.38**	-	-	-	-	-	-	-	-	-	-	-	**350**	-	-	**350**	-	-
YVD-09	YVD-09-150617	06/17/2015	N	59010961	**0.36**	-	-	-	-	-	-	-	-	-	-	-	**350**	-	-	**350**	-	-
YVD-09	YVD-09-150923	09/23/2015	N	59020391	**0.27**	-	-	-	-	-	-	-	-	-	-	-	**330**	-	-	**330**	-	-
YVD-09	YVD-09-151215	12/15/2015	N	59025501	**0.25**	J-	MSD	-	-	-	-	-	-	-	-	-	**340**	-	-	**340**	-	-
YVD-09	YVD-09-160310	03/10/2016	N	59029941	**0.33**	-	-	-	-	-	-	-	-	-	-	-	**360**	-	-	**360**	-	-
YVD-09	YVD-09-160622	6/22/2016	N	59037271	**0.29**	-	-	-	-	-	-	-	-	-	-	-	**350**	-	-	**350**	-	-
YVD-09	YVD-09-160929	9/29/2016	N	K1611704	-	-	-	**0.016**	-	-	-	-	-	-	-	-	**347**	-	-	**347**	-	-
YVD-09	YVD-09-161213	12/13/2016	N	K1615045	-	-	-	**0.048**	-	-	-	-	-	-	-	-	**340**	-	-	**340**	-	-
YVD-09	YVD-D2-161213	12/13/2016	FD	K1615045	-	-	-	**0.078**	-	-	-	-	-	-	-	-	**340**	-	-	**340**	-	-
YVD-09	YVD-031317-35	3/13/2017	N	K1702489	-	-	-	**0.025**	-	-	-	-	-	-	-	-	**329**	-	-	**329**	-	-
YVD-09	YVD-060517-08	6/5/2017	N	K1705702	-	-	-	**0.007**	J	-	-	-	-	-	-	-	**341**	-	-	**341**	-	-
YVD-09	YVD-092617-29	9/26/2017	N	K1710381	-	-	-	**0.029**	-	-	-	-	-	-	-	-	**351**	-	-	**351**	-	-
YVD-09	YVD-092617-30	9/26/2017	FD	K1710381	-	-	-	**0.039**	-	-	-	-	-	-	-	-	**415**	-	-	**415**	-	-
YVD-09	YVD-120517-21	12/5/2017	N	K1713091	-	-	-	**0.009**	J	-	-	-	-	-	-	-	**351**	-	-	**351**	-	-
YVD-09	YVD-031918-18	3/19/2018	N	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**350**	-	-	**350**	-	-
YVD-09	YVD-060318-13	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**348**	-	-	**348**	-	-
YVD-09	YVD-090918-06	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**354**	-	-	**354**	-	-
YVD-09	YVD-121118-15	12/11/2018	N	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	**358**	-	-	**358**	-	-
YVD-09 (FD)	YVD-121118-17	12/11/2018	FD	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	**357**	-	-	**357**	-	-
YVD-09	YVD-031719-05	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**356**	-	-	**356**	-	-
YVD-09	YVD-060319-15	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**353**	-	-	**353**	-	-
YVD-09	YVD-090919-04	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**363**	-	-	**363**	-	-
YVD-09	YVD-120919-06	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U		**356**	-	-	**356**	-	-
YVD-10	YVD-10-130917	09/17/2013	N	SWI0123	-	-	-	-	-	-	**0.148**	-	-	-	-	-	**464**	-	-	**465**	-	-
YVD-10	YVD-10-131212	12/12/2013	N	SWL0078	-	-	-	-	-	-	-	-	-	**1.4**	-	-	**459**	-	-	**460**	-	-
YVD-10	YVD-10-140319	03/19/2014	N	SXC0107	**0.77**	-	-	-	-	-	-	-	-	-	-	-	**489**	-	-	**490**	-	-
YVD-10	YVD-10-140603	06/03/2014	N	SXF0025	**0.8**	-	-	-	-	-	-	-	-	-	-	-	**487**	-	-	**488**	-	-
YVD-10	YVD-10-140924	09/24/2014	N	SXI0173	**0.48**	J+	FBK	-	-	-	-	-	-	-	-	-	**523**	-	-	**525**	-	-
YVD-10	YVD-10-141217	12/17/2014	N	SXL0144	**0.69**	J-	MSD	-	-	-	-	-	-	-	-	-	**503**	-	-	**505**	-	-
YVD-10	YVD-10-150318	03/18/2015	N	5904651	**0.42**	-	-	-	-	-	-	-	-	-	-	-	**590**	-	-	**590**	-	-
YVD-10	YVD-10-150617	06/17/2015	N	59010961	**0.72**	-	-	-	-	-	-	-	-	-	-	-	**600**	-	-	**600**	-	-
YVD-10	YVD-10-150923	09/23/2015	N	59020391	**0.56**	-	-	-	-	-	-	-	-	-	-	-	**620**	-	-	**620**	-	-
YVD-10	YVD-10-151214	12/14/2015	N	59025351	**0.58**	-	-	-	-	-	-	-	-	-	-	-	**600**	-	-	**600**	-	-
YVD-10	YVD-10-160309	03/09/2016	N	59029711	**0.42**	-	-	-	-	-	-	-	-	-	-	-	**520**	-	-	**520**	-	-
YVD-10	YVD-10-160621	6/21/2016	N	59037271	**0.71**	-	-	-	-	-	-	-	-	-	-	-	**510**	-	-	**510**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-10	YVD-10-160929	9/29/2016	N	K1611698	**286**	-	-	**63.1**	-	-	**2.48**	-	-	**114**	-	-	**105**	-	-	0.2	U	MBK
YVD-10	YVD-10-161212	12/12/2016	N	K1615029	**303**	-	-	**66.9**	-	-	**2.68**	-	-	**118**	-	-	**141**	-	-	**0.10**	J	-
YVD-10	YVD-030917-27	3/9/2017	N	K1702448	**569**	-	-	**128**	-	-	**2.89**	-	-	**133**	-	-	**173**	-	-	**0.09**	J	-
YVD-10	YVD-060617-22	6/6/2017	N	K1705754	**349**	-	-	**76.7**	-	-	**2.57**	-	-	**119**	-	-	**125**	-	-	**0.14**	J	-
YVD-10	YVD-092617-31	9/26/2017	N	K1710381	**316**	-	-	**66.7**	-	-	**2.56**	-	-	**111**	-	-	**113**	-	-	**0.09**	J	-
YVD-10	YVD-120517-30	12/5/2017	N	K1713091	**327**	-	-	**67.3**	-	-	**2.37**	-	-	**114**	-	-	**128**	-	-	**0.11**	J	-
YVD-10	YVD-031818-06	3/18/2018	N	870610	**296**	-	-	**61.00**	-	-	**2.60**	-	-	**123**	-	-	**121**	-	-	0.10	U	-
YVD-10	YVD-060318-06	6/3/2018	N	874568	**298**	-	-	**65.00**	-	-	**2.93**	-	-	**118**	-	-	**122**	-	-	0.10	U	-
YVD-10	YVD-090918-13	9/9/2018	N	880601	**308**	-	-	**63.50**	-	-	**2.58**	-	-	**114**	-	-	**128**	-	-	**0.10**	-	-
YVD-10	YVD-121018-08	12/10/2018	N	884857	**274**	-	-	**58.00**	J	MSD	**2.64**	-	-	**112**	-	-	**124**	-	-	0.10	U	FBK
YVD-10	YVD-031819-16	3/18/2019	N	988273	**276**	-	-	**58.00**	-	-	**2.62**	-	-	**108**	-	-	**141**	-	-	**0.10**	-	-
YVD-10	YVD-060319-18	6/3/2019	N	992053	**297**	-	-	**63.00**	-	-	**2.56**	-	-	**106**	-	-	**135**	-	-	0.10	U	-
YVD-10	YVD-091019-20	9/10/2019	N	998438	**256**	-	-	**54.50**	-	-	**2.49**	-	-	**104**	-	-	**92.0**	-	-	0.10	U	-
YVD-10	YVD-121019-21	12/10/2019	N	902321	**286**	-	-	**59.50**	-	-	**2.94**	-	-	**102**	-	-	**114**	-	-	0.1	U	-
YVD-11	YVD-11-130923	09/23/2013	N	SWI0178	**183**	-	-	**51.9**	-	-	**5.44**	J	FDP	**23.2**	-	-	-	-	-	-	-	-
YVD-11	YVD-D2-130923	09/23/2013	FD	SWI0178	**175**	-	-	**46.0**	-	-	**3.60**	J	FDP	**23.0**	-	-	-	-	-	-	-	-
YVD-11	YVD-11-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	**54.7**	-	-	5	U	-
YVD-11	YVD-D3-130926	09/26/2013	FD	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	**61.4**	-	-	5	U	-
YVD-11	YVD-11-131212	12/12/2013	N	SWL0073	**171**	-	-	**43.4**	-	-	**3.37**	-	-	**23.2**	-	-	**58.7**	-	-	5	U	-
YVD-11	YVD-11-140318	03/18/2014	N	SXC0107	**183**	-	-	**44.4**	-	-	**3.15**	-	-	**22.2**	-	-	**61.6**	-	-	5	U	-
YVD-11	YVD-11-140603	06/03/2014	N	SXF0017	**176**	-	-	**50.3**	-	-	**5.38**	-	-	**26.1**	-	-	**67.2**	-	-	5	U	-
YVD-11	YVD-11-140924	09/24/2014	N	SXI0173	**193**	-	-	**47.9**	-	-	**3.86**	-	-	**25.6**	-	-	**67.2**	-	-	2.5	U	-
YVD-11	YVD-11-141217	12/17/2014	N	SXL0121	**198**	-	-	**53.6**	-	-	**4.77**	-	-	**25.6**	-	-	**72.1**	-	-	5	U	-
YVD-11	YVD-11-150317	03/17/2015	N	5904651	**190**	-	-	**51.0**	-	-	**4.30**	J-	MSD	**26.0**	-	-	**76**	-	-	5	U	-
YVD-11	YVD-11-150616	06/16/2015	N	59010961	**200**	-	-	**50.0**	-	-	**3.20**	J+	MSD	**27.0**	J+	MSD	**86**	-	-	5	U	-
YVD-11	YVD-11-150923	09/23/2015	N	59020281	**200**	-	-	**55.0**	-	-	**3.40**	-	-	**25.0**	-	-	**90**	-	-	5	U	-
YVD-11	YVD-11-151215	12/15/2015	N	59025431	**210**	-	-	**60.0**	-	-	**5.20**	-	-	**25.0**	-	-	**100**	-	-	5	U	-
YVD-11	YVD-D2-151215	12/15/2015	FD	59025431	**210**	-	-	**58.0**	-	-	**4.90**	-	-	**25.0**	-	-	**98**	-	-	0.5	U	-
YVD-11	YVD-11-160309	03/09/2016	N	59029711	**200**	-	-	**53.0**	-	-	**3.30**	-	-	**25.0**	-	-	**99**	-	-	5	U	-
YVD-11	YVD-11-160621	6/21/2016	N	59037151	**200**	-	-	**56.0**	-	-	**3.50**	-	-	**27.0**	-	-	**120**	-	-	5	U	-
YVD-11	YVD-11-160927	9/27/2016	N	K1611629	**204**	-	-	**52.6**	-	-	**3.13**	-	-	**26.1**	-	-	**82.0**	-	-	**0.18**	J	-
YVD-11	YVD-11-161214	12/14/2016	N	K1615126	**209**	-	-	**57.8**	-	-	**4.82**	-	-	**25.6**	-	-	**82.5**	-	-	**0.19**	J	-
YVD-11	YVD-031317-37	3/13/2017	N	K1702489	**235**	-	-	**62.1**	-	-	**3.02**	-	-	**25.5**	-	-	**102**	-	-	**0.21**	-	-
YVD-11	YVD-060517-10	6/5/2017	N	K1705702	**271**	-	-	**69.1**	-	-	**2.98**	-	-	**24.9**	-	-	**129**	-	-	**0.18**	J	-
YVD-11	YVD-092617-26	9/26/2017	N	K1710381	**276**	-	-	**68.6**	-	-	**3.24**	-	-	**28.8**	-	-	**135**	-	-	**0.17**	J	-
YVD-11	YVD-120417-06	12/4/2017	N	K1713026	**248**	-	-	**58.6**	-	-	**2.78**	-	-	**25.8**	-	-	**110**	-	-	**0.16**	J	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-10	YVD-10-160929	9/29/2016	N	K1611698	**84**	-	-	0.10	U	-	**223**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
YVD-10	YVD-10-161212	12/12/2016	N	K1615029	**109**	J	HTQ	0.10	U	-	**191**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-10	YVD-030917-27	3/9/2017	N	K1702448	**123**	J	HTQ	0.10	U	-	**799**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-10	YVD-060617-22	6/6/2017	N	K1705754	**99.4**	-	-	0.10	U	-	**368**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-10	YVD-092617-31	9/26/2017	N	K1710381	**93.9**	J	HTQ	0.10	U	-	**265**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-10	YVD-120517-30	12/5/2017	N	K1713091	**109**	J	HTQ	0.10	U	-	**224**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
YVD-10	YVD-031818-06	3/18/2018	N	870610	**91.4**	-	-	0.05	U	-	**202**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-10	YVD-060318-06	6/3/2018	N	874568	**92.0**	-	-	0.05	U	-	**208**	-	-	0.08	U	FBK	-	-	-	0.5	U	-
YVD-10	YVD-090918-13	9/9/2018	N	880601	**90.0**	-	-	0.05	U	-	**238**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-10	YVD-121018-08	12/10/2018	N	884857	**87.0**	-	-	0.05	U	-	**196**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-10	YVD-031819-16	3/18/2019	N	988273	**81.6**	-	-	0.05	U	-	**196**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-10	YVD-060319-18	6/3/2019	N	992053	**74.4**	-	-	0.05	U	-	**220**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-10	YVD-091019-20	9/10/2019	N	998438	**69.0**	-	-	0.05	U	-	**165**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-10	YVD-121019-21	12/10/2019	N	902321	**84.4**	-	-	0.05	U	-	**199**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-11	YVD-11-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	-	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-11	YVD-D2-130923	09/23/2013	FD	SWI0178	-	-	-	-	-	-	-	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-11	YVD-11-130926	09/26/2013	N	SWI0190	**38.4**	-	-	2	U	-	**207**	-	-	-	-	-	-	-	-	-	-	-
YVD-11	YVD-D3-130926	09/26/2013	FD	SWI0190	**46.2**	-	-	2	U	-	**228**	-	-	-	-	-	-	-	-	-	-	-
YVD-11	YVD-11-131212	12/12/2013	N	SWL0073	**49.9**	-	-	2	U	-	**208**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
YVD-11	YVD-11-140318	03/18/2014	N	SXC0107	**43.7**	-	-	2	U	-	**193**	-	-	-	-	-	0.1	U	-	**0.503**	J-	MSD
YVD-11	YVD-11-140603	06/03/2014	N	SXF0017	**49.1**	-	-	2	U	-	**203**	J-	MSD	-	-	-	0.1	U	-	**0.564**	-	-
YVD-11	YVD-11-140924	09/24/2014	N	SXI0173	**46.6**	-	-	1	U	-	**159**	-	-	-	-	-	0.1	U	-	**0.453**	J+	MSD
YVD-11	YVD-11-141217	12/17/2014	N	SXL0121	**49.1**	-	-	2	U	-	**158**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-11	YVD-11-150317	03/17/2015	N	5904651	**52**	-	-	2	U	-	**150**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-11	YVD-11-150616	06/16/2015	N	59010961	**56**	-	-	2	U	-	**140**	-	-	-	-	-	0.1	U	-	**0.31**	J-	MSD
YVD-11	YVD-11-150923	09/23/2015	N	59020281	**66**	-	-	2	U	-	**130**	-	-	-	-	-	**0.12**	-	-	-	R	MSD
YVD-11	YVD-11-151215	12/15/2015	N	59025431	**74**	-	-	2	U	-	**140**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-11	YVD-D2-151215	12/15/2015	FD	59025431	**70**	-	-	0.2	U	-	**130**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-11	YVD-11-160309	03/09/2016	N	59029711	**65**	-	-	2	U	-	**140**	J+	MSD	-	-	-	**0.14**	J	FDP	-	R	MSD
YVD-11	YVD-11-160621	6/21/2016	N	59037151	**71**	-	-	2	U	-	**130**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-11	YVD-11-160927	9/27/2016	N	K1611629	**48.9**	J	HTQ	0.10	U	-	**100**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-11	YVD-11-161214	12/14/2016	N	K1615126	**55.5**	-	-	0.10	U	-	**104**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-11	YVD-031317-37	3/13/2017	N	K1702489	**77.3**	-	-	**0.06**	J	-	**99.8**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-11	YVD-060517-10	6/5/2017	N	K1705702	**97.1**	-	-	0.10	U	-	**133**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-11	YVD-092617-26	9/26/2017	N	K1710381	**103**	J	HTQ	0.10	UJ	HTQ	**219**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-11	YVD-120417-06	12/4/2017	N	K1713026	**84.8**	-	-	0.10	U	-	**124**	-	-	-	-	-	0.050	U	-	0.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-10	YVD-10-160929	9/29/2016	N	K1611698	-	-	-	**0.028**	-	-	-	-	-	-	-	-	**513**	-	-	**513**	-	-
YVD-10	YVD-10-161212	12/12/2016	N	K1615029	-	-	-	**0.074**	-	-	-	-	-	-	-	-	**524**	-	-	**524**	-	-
YVD-10	YVD-030917-27	3/9/2017	N	K1702448	-	-	-	**0.066**	-	-	-	-	-	-	-	-	**637**	-	-	**637**	-	-
YVD-10	YVD-060617-22	6/6/2017	N	K1705754	-	-	-	**0.036**	-	-	-	-	-	-	-	-	**525**	-	-	**525**	-	-
YVD-10	YVD-092617-31	9/26/2017	N	K1710381	-	-	-	**0.011**	-	-	-	-	-	-	-	-	**523**	-	-	**523**	-	-
YVD-10	YVD-120517-30	12/5/2017	N	K1713091	-	-	-	**0.023**	-	-	-	-	-	-	-	-	**540**	-	-	**540**	-	-
YVD-10	YVD-031818-06	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**527**	-	-	**527**	-	-
YVD-10	YVD-060318-06	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**543**	-	-	**543**	-	-
YVD-10	YVD-090918-13	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**557**	-	-	**557**	-	-
YVD-10	YVD-121018-08	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**544**	-	-	**544**	-	-
YVD-10	YVD-031819-16	3/18/2019	N	988273	-	-	-	-	-	-	-	-	-	**0.07**	-	-	**527**	-	-	**527**	-	-
YVD-10	YVD-060319-18	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**568**	-	-	**568**	-	-
YVD-10	YVD-091019-20	9/10/2019	N	998438	-	-	-	-	-	-	-	-	-	0.07	U	-	**584**	-	-	**584**	-	-
YVD-10	YVD-121019-21	12/10/2019	N	902321	-	-	-	-	-	-	-	-	-	0.07	U	-	**576**	-	-	**576**	-	-
YVD-11	YVD-11-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	0.1	UJ	FDP	-	-	-	**254**	J	FDP	**255**	J	FDP
YVD-11	YVD-D2-130923	09/23/2013	FD	SWI0178	-	-	-	-	-	-	**0.753**	J	FDP	-	-	-	**199**	J	FDP	**200**	J	FDP
YVD-11	YVD-11-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-11	YVD-D3-130926	09/26/2013	FD	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-11	YVD-11-131212	12/12/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	**0.245**	-	-	**294**	-	-	**295**	-	-
YVD-11	YVD-11-140318	03/18/2014	N	SXC0107	**0.17**	-	-	-	-	-	-	-	-	-	-	-	**324**	-	-	**325**	-	-
YVD-11	YVD-11-140603	06/03/2014	N	SXF0017	**0.84**	-	-	-	-	-	-	-	-	-	-	-	**312**	-	-	**313**	-	-
YVD-11	YVD-11-140924	09/24/2014	N	SXI0173	**0.17**	J+	FBK	-	-	-	-	-	-	-	-	-	**294**	-	-	**295**	-	-
YVD-11	YVD-11-141217	12/17/2014	N	SXL0121	**0.46**	-	-	-	-	-	-	-	-	-	-	-	**289**	-	-	**290**	-	-
YVD-11	YVD-11-150317	03/17/2015	N	5904651	**0.3**	-	-	-	-	-	-	-	-	-	-	-	**290**	-	-	**290**	-	-
YVD-11	YVD-11-150616	06/16/2015	N	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**290**	-	-	**290**	-	-
YVD-11	YVD-11-150923	09/23/2015	N	59020281	0.25	U	-	-	-	-	-	-	-	-	-	-	**310**	-	-	**310**	-	-
YVD-11	YVD-11-151215	12/15/2015	N	59025431	**0.59**	J	FDP	-	-	-	-	-	-	-	-	-	**110**	J	FDP	**110**	J	FDP
YVD-11	YVD-D2-151215	12/15/2015	FD	59025431	**1.5**	J	FDP	-	-	-	-	-	-	-	-	-	**360**	J	FDP	**360**	J	FDP
YVD-11	YVD-11-160309	03/09/2016	N	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**340**	-	-	**340**	-	-
YVD-11	YVD-11-160621	6/21/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**340**	-	-	**340**	-	-
YVD-11	YVD-11-160927	9/27/2016	N	K1611629	-	-	-	**0.071**	-	-	-	-	-	-	-	-	**375**	-	-	**375**	-	-
YVD-11	YVD-11-161214	12/14/2016	N	K1615126	-	-	-	**0.421**	-	-	-	-	-	-	-	-	**352**	-	-	**352**	-	-
YVD-11	YVD-031317-37	3/13/2017	N	K1702489	-	-	-	**0.016**	-	-	-	-	-	-	-	-	**353**	-	-	**353**	-	-
YVD-11	YVD-060517-10	6/5/2017	N	K1705702	-	-	-	**0.029**	-	-	-	-	-	-	-	-	**341**	-	-	**341**	-	-
YVD-11	YVD-092617-26	9/26/2017	N	K1710381	-	-	-	**0.006**	J	-	-	-	-	-	-	-	**347**	-	-	**347**	-	-
YVD-11	YVD-120417-06	12/4/2017	N	K1713026	-	-	-	0.015	U	MBK	-	-	-	-	-	-	**361**	-	-	**361**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-11	YVD-031918-12	3/19/2018	N	870634	**223**	-	-	**51.50**	-	-	**2.98**	-	-	**26.0**	-	-	**91.4**	-	-	**0.11**	-	-
YVD-11	YVD-031918-14	3/19/2018	FD	870634	**222**	-	-	**50.50**	-	-	**2.94**	-	-	**25.8**	-	-	**89.1**	-	-	**0.12**	-	-
YVD-11	YVD-060418-14	6/4/2018	N	874662	**224**	-	-	**57.00**	-	-	**3.26**	-	-	**28.4**	-	-	**114**	-	-	**0.12**	-	-
YVD-11	YVD-060418-16	6/4/2018	FD	874662	**231**	-	-	**57.50**	-	-	**3.28**	-	-	**28.9**	-	-	**114**	-	-	**0.12**	-	-
YVD-11	YVD-090918-05	9/9/2018	N	880601	**223**	-	-	**53.00**	-	-	**3.05**	-	-	**28.2**	-	-	**102**	-	-	**0.20**	-	-
YVD-11	YVD-121018-10	12/10/2018	N	884857	**182**	-	-	**44.90**	J	MSD	**2.88**	-	-	**27.4**	-	-	**75.6**	-	-	0.14	U	FBK
YVD-11	YVD-031819-18	3/18/2019	N	988273	**158**	-	-	**38.85**	-	-	**2.76**	-	-	**26.2**	-	-	**38.6**	-	-	**0.12**	-	-
YVD-11	YVD-060219-02	6/2/2019	N	991939	**156**	-	-	**38.30**	-	-	**2.60**	-	-	**25.4**	-	-	49.2	U	FBK	0.59	U	FBK
YVD-11 (FD)	YVD-060219-04	6/2/2019	FD	991939	**156**	-	-	**38.70**	-	-	**2.68**	-	-	**25.6**	-	-	49.8	U	FBK	0.60	U	FBK
YVD-11	YVD-090919-05	9/9/2019	N	998357	**164**	-	-	**39.95**	-	-	**2.66**	-	-	**27.2**	-	-	**52.2**	-	-	**0.12**	-	-
YVD-11	YVD-120919-13	12/9/2019	N	902276	**162**	-	-	**39.70**	-	-	**2.76**	-	-	**29.6**	J	MSD	**46.1**	-	-	**0.11**	-	-
YVD-12	YVD-12-130919	09/19/2013	N	SWI0142	**98.6**	-	-	**37.5**	-	-	**3.14**	-	-	**77.3**	-	-	**98.2**	-	-	5	U	-
YVD-12	YVD-12-130925	09/25/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-12	YVD-12-131211	12/11/2013	N	SWL0073	**93.5**	-	-	**36.2**	-	-	**3.63**	-	-	**73.2**	-	-	**97**	-	-	5	U	-
YVD-12	YVD-12-140318	03/18/2014	N	SXC0095	**92.9**	-	-	**35.9**	-	-	**3.27**	-	-	**73.4**	-	-	**95.2**	-	-	5	U	-
YVD-12	YVD-12-140603	06/03/2014	N	SXF0017	**92.6**	-	-	**34.9**	-	-	**2.96**	-	-	**70.7**	-	-	**8.33**	-	-	0.5	U	-
YVD-12	YVD-12-140922	09/22/2014	N	SXI0148	**98.4**	-	-	**39.1**	-	-	**3.13**	-	-	**77.9**	-	-	**78.5**	-	-	5	U	-
YVD-12	YVD-D2-140922	09/22/2014	FD	SXI0148	**99.3**	-	-	**39.0**	-	-	**3.00**	-	-	**77.8**	-	-	**82.4**	-	-	2	U	-
YVD-12	YVD-12-141216	12/16/2014	N	SXL0121	**99.3**	-	-	**39.6**	-	-	**3.23**	-	-	**71.8**	-	-	**84.1**	-	-	5	U	-
YVD-12	YVD-12-150317	03/17/2015	N	5904541	**93.0**	-	-	**37.0**	-	-	**3.60**	-	-	**73.0**	-	-	**75**	-	-	5	U	-
YVD-12	YVD-12-150617	06/17/2015	N	59010961	**90.0**	-	-	**35.0**	-	-	**2.60**	J+	MSD	**83.0**	J+	MSD	**84**	-	-	5	U	-
YVD-12	YVD-12-150924	09/24/2015	N	59020391	**92.0**	-	-	**39.0**	-	-	**3.50**	-	-	**73.0**	-	-	**78**	-	-	5	U	-
YVD-12	YVD-12-151216	12/16/2015	N	59025501	**95.0**	-	-	**37.0**	-	-	**3.10**	-	-	**74.0**	-	-	**76**	-	-	5	U	-
YVD-12	YVD-12-160309	03/09/2016	N	59029941	**95.0**	-	-	**35.0**	-	-	**2.60**	-	-	**73.0**	-	-	**73**	-	-	5	U	-
YVD-12	YVD-D3-160309	03/09/2016	FD	59029941	**95.0**	-	-	**36.0**	-	-	**2.50**	-	-	**72.0**	-	-	**79**	-	-	0.5	U	-
YVD-12	YVD-12-160622	6/22/2016	N	59037271	**89.0**	-	-	**36.0**	-	-	**2.90**	-	-	**72.0**	-	-	**90**	-	-	5	U	-
YVD-12	YVD-12-160929	9/29/2016	N	K1611704	**88.9**	-	-	**37.2**	-	-	**2.28**	-	-	**67.7**	-	-	**83.5**	-	-	**0.33**	-	-
YVD-12	YVD-12-161213	12/13/2016	N	K1615083	**93.4**	-	-	**33.6**	-	-	**2.29**	-	-	**67.9**	-	-	**81.7**	-	-	**0.33**	-	-
YVD-12	YVD-030917-20	3/9/2017	N	K1702404	**97.3**	-	-	**35.4**	-	-	**2.27**	-	-	**67.4**	-	-	**91.7**	-	-	**0.38**	-	-
YVD-12	YVD-060617-25	6/6/2017	N	K1705833	**98.4**	-	-	**35.8**	-	-	**2.24**	-	-	**66.5**	-	-	**94.1**	-	-	**0.32**	-	-
YVD-12	YVD-092517-15	9/25/2017	N	K1710333	**97.6**	-	-	**34.2**	-	-	**2.27**	-	-	**64.4**	-	-	**94.7**	-	-	**0.34**	-	-
YVD-12	YVD-120417-03	12/4/2017	N	K1713026	**89.7**	-	-	**32.9**	-	-	**2.06**	-	-	**70.8**	-	-	**85.4**	-	-	**0.41**	-	-
YVD-12	YVD-031918-13	3/19/2018	N	870610	**98.0**	-	-	**35.25**	-	-	**2.30**	-	-	**70.5**	-	-	**97.7**	-	-	**0.35**	-	-
YVD-12	YVD-060318-11	6/3/2018	N	874568	**103**	-	-	**38.35**	-	-	**2.58**	-	-	**68.0**	-	-	**100**	-	-	**0.34**	-	-
YVD-12	YVD-090918-16	9/9/2018	N	880601	**110**	-	-	**38.65**	-	-	**2.52**	-	-	**67.0**	-	-	**105**	-	-	**0.33**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-11	YVD-031918-12	3/19/2018	N	870634	**61.8**	-	-	0.05	U	-	**103**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-11	YVD-031918-14	3/19/2018	FD	870634	**61.2**	-	-	0.05	U	-	**100**	-	-	0.07	U	-	-	-	-	-	-	-
YVD-11	YVD-060418-14	6/4/2018	N	874662	**68.6**	-	-	0.05	U	-	**91.2**	-	-	0.34	U	FBK	-	-	-	0.5	UJ	MSD
YVD-11	YVD-060418-16	6/4/2018	FD	874662	**68.2**	-	-	0.05	U	-	**90.0**	-	-	0.08	U	FBK	-	-	-	**0.6**	J	MSD
YVD-11	YVD-090918-05	9/9/2018	N	880601	**62.8**	-	-	0.05	U	-	**90.6**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-11	YVD-121018-10	12/10/2018	N	884857	**41.1**	-	-	0.05	U	-	**75.4**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-11	YVD-031819-18	3/18/2019	N	988273	**20.2**	-	-	0.05	U	-	**60.4**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-11	YVD-060219-02	6/2/2019	N	991939	**26.4**	-	-	0.05	U	-	**58.2**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-11 (FD)	YVD-060219-04	6/2/2019	FD	991939	**26.7**	-	-	0.05	U	-	**58.4**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-11	YVD-090919-05	9/9/2019	N	998357	**32.8**	-	-	0.05	U	-	**60.4**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-11	YVD-120919-13	12/9/2019	N	902276	**27.8**	-	-	0.05	U	-	**57.2**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-12	YVD-12-130919	09/19/2013	N	SWI0142	-	-	-	-	-	-	**245**	-	-	-	-	-	0.1	U	-	-	R	FBK
YVD-12	YVD-12-130925	09/25/2013	N	SWI0175	**15**	-	-	2	U	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-12	YVD-12-131211	12/11/2013	N	SWL0073	**20.1**	-	-	2	U	-	**262**	-	-	-	-	-	0.02	UJ	MSD	-	R	MSD, FBK
YVD-12	YVD-12-140318	03/18/2014	N	SXC0095	**17**	-	-	2	U	-	**236**	J-	MSD	-	-	-	**0.248**	-	-	**0.564**	-	-
YVD-12	YVD-12-140603	06/03/2014	N	SXF0017	**1.44**	-	-	0.2	U	-	**21.3**	J-	MSD	-	-	-	0.1	U	-	**0.415**	-	-
YVD-12	YVD-12-140922	09/22/2014	N	SXI0148	**13.3**	-	-	2	U	-	**200**	-	-	-	-	-	0.1	U	-	**0.669**	-	-
YVD-12	YVD-D2-140922	09/22/2014	FD	SXI0148	**15.5**	-	-	0.8	U	-	**200**	-	-	-	-	-	0.1	U	-	**0.653**	-	-
YVD-12	YVD-12-141216	12/16/2014	N	SXL0121	**15.1**	-	-	2	U	-	**228**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-12	YVD-12-150317	03/17/2015	N	5904541	**14**	J-	MSD	2	U	-	**190**	J-	MSD	-	-	-	0.1	U	-	**0.56**	J-	MSD
YVD-12	YVD-12-150617	06/17/2015	N	59010961	**12**	-	-	2	U	-	**180**	-	-	-	-	-	0.1	U	-	**0.35**	J-	MSD
YVD-12	YVD-12-150924	09/24/2015	N	59020391	**15**	J+	MSD	2	U	-	**210**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
YVD-12	YVD-12-151216	12/16/2015	N	59025501	**14**	-	-	2	U	-	**180**	-	-	-	-	-	-	R	MSD	**0.58**	J-	MSD
YVD-12	YVD-12-160309	03/09/2016	N	59029941	**13**	-	-	2	U	-	**170**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-12	YVD-D3-160309	03/09/2016	FD	59029941	**15**	-	-	0.2	U	-	**180**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-12	YVD-12-160622	6/22/2016	N	59037271	**14**	-	-	2	U	-	**180**	-	-	-	-	-	0.1	UJ	MSD	-	R	MSD
YVD-12	YVD-12-160929	9/29/2016	N	K1611704	**13.5**	-	-	0.10	U	-	**158**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-12	YVD-12-161213	12/13/2016	N	K1615083	**12.2**	-	-	0.10	U	-	**150**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-12	YVD-030917-20	3/9/2017	N	K1702404	**13.4**	-	-	0.10	U	-	**227**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
YVD-12	YVD-060617-25	6/6/2017	N	K1705833	**13.6**	-	-	0.10	U	-	**155**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-12	YVD-092517-15	9/25/2017	N	K1710333	**14.0**	-	-	0.10	U	-	**177**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-12	YVD-120417-03	12/4/2017	N	K1713026	**13.4**	-	-	0.10	U	-	**169**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-12	YVD-031918-13	3/19/2018	N	870610	**13.6**	-	-	0.05	U	-	**167**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-12	YVD-060318-11	6/3/2018	N	874568	**15.1**	-	-	0.05	U	-	**171**	-	-	0.07	U	FBK	-	-	-	0.5	U	-
YVD-12	YVD-090918-16	9/9/2018	N	880601	**15.8**	-	-	0.05	U	-	**180**	-	-	0.07	U	-	-	-	-	-	R	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-11	YVD-031918-12	3/19/2018	N	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**386**	-	-	**386**	-	-
YVD-11	YVD-031918-14	3/19/2018	FD	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**387**	-	-	**387**	-	-
YVD-11	YVD-060418-14	6/4/2018	N	874662	-	-	-	-	-	-	-	-	-	0.07	U	-	**377**	-	-	**377**	-	-
YVD-11	YVD-060418-16	6/4/2018	FD	874662	-	-	-	-	-	-	-	-	-	0.07	U	-	**380**	-	-	**380**	-	-
YVD-11	YVD-090918-05	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**395**	-	-	**395**	-	-
YVD-11	YVD-121018-10	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**410**	-	-	**410**	-	-
YVD-11	YVD-031819-18	3/18/2019	N	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	**440**	-	-	**440**	-	-
YVD-11	YVD-060219-02	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**424**	-	-	**424**	-	-
YVD-11 (FD)	YVD-060219-04	6/2/2019	FD	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**423**	-	-	**423**	-	-
YVD-11	YVD-090919-05	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**423**	-	-	**423**	-	-
YVD-11	YVD-120919-13	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**429**	-	-	**429**	-	-
YVD-12	YVD-12-130919	09/19/2013	N	SWI0142	-	-	-	-	-	-	**0.356**	J+	FBK	-	-	-	**204**	-	-	**205**	-	-
YVD-12	YVD-12-130925	09/25/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-12	YVD-12-131211	12/11/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	**0.218**	-	-	**194**	-	-	**195**	-	-
YVD-12	YVD-12-140318	03/18/2014	N	SXC0095	**0.22**	-	-	-	-	-	-	-	-	-	-	-	**204**	-	-	**205**	-	-
YVD-12	YVD-12-140603	06/03/2014	N	SXF0017	**0.28**	J+	FBK	-	-	-	-	-	-	-	-	-	**199**	-	-	**200**	-	-
YVD-12	YVD-12-140922	09/22/2014	N	SXI0148	**0.25**	-	-	-	-	-	-	-	-	-	-	-	**189**	-	-	**190**	-	-
YVD-12	YVD-D2-140922	09/22/2014	FD	SXI0148	**0.2**	-	-	-	-	-	-	-	-	-	-	-	**194**	-	-	**195**	-	-
YVD-12	YVD-12-141216	12/16/2014	N	SXL0121	**0.25**	-	-	-	-	-	-	-	-	-	-	-	**194**	-	-	**195**	-	-
YVD-12	YVD-12-150317	03/17/2015	N	5904541	**0.31**	-	-	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-12	YVD-12-150617	06/17/2015	N	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-12	YVD-12-150924	09/24/2015	N	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-12	YVD-12-151216	12/16/2015	N	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
YVD-12	YVD-12-160309	03/09/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**210**	-	-	**210**	-	-
YVD-12	YVD-D3-160309	03/09/2016	FD	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**200**	-	-	**200**	-	-
YVD-12	YVD-12-160622	6/22/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**190**	-	-	**190**	-	-
YVD-12	YVD-12-160929	9/29/2016	N	K1611704	-	-	-	**0.026**	-	-	-	-	-	-	-	-	**188**	-	-	**188**	-	-
YVD-12	YVD-12-161213	12/13/2016	N	K1615083	-	-	-	**0.018**	-	-	-	-	-	-	-	-	**183**	-	-	**183**	-	-
YVD-12	YVD-030917-20	3/9/2017	N	K1702404	-	-	-	**0.008**	J	-	-	-	-	-	-	-	**132**	-	-	**132**	-	-
YVD-12	YVD-060617-25	6/6/2017	N	K1705833	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**183**	-	-	**183**	-	-
YVD-12	YVD-092517-15	9/25/2017	N	K1710333	-	-	-	0.010	U	-	-	-	-	-	-	-	**188**	-	-	**188**	-	-
YVD-12	YVD-120417-03	12/4/2017	N	K1713026	-	-	-	0.013	U	MBK	-	-	-	-	-	-	**186**	-	-	**186**	-	-
YVD-12	YVD-031918-13	3/19/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**181**	-	-	**181**	-	-
YVD-12	YVD-060318-11	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**178**	-	-	**178**	-	-
YVD-12	YVD-090918-16	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**185**	-	-	**185**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-12	YVD-121018-13	12/10/2018	N	884857	**106**	-	-	**37.65**	J	MSD	**2.52**	-	-	**69.5**	-	-	**98.9**	-	-	0.29	U	FBK
YVD-12	YVD-031719-07	3/17/2019	N	988239	**104**	-	-	**38.00**	-	-	**2.46**	-	-	**70.5**	-	-	**97.6**	-	-	0.31	U	FBK
YVD-12	YVD-060319-27	6/3/2019	N	992053	**104**	-	-	**38.05**	-	-	**2.40**	-	-	**66.5**	-	-	**96.7**	-	-	**0.24**	-	-
YVD-12	YVD-090919-16	9/9/2019	N	998357	**106**	-	-	**37.50**	-	-	**2.48**	-	-	**60.5**	-	-	**95.6**	-	-	**0.29**	-	-
YVD-12	YVD-120919-12	12/9/2019	N	902276	**104**	-	-	**38.80**	-	-	**2.48**	-	-	**67.0**	J	MSD	**97.8**	-	-	**0.32**	-	-
YVD-13	YVD-13-130919	09/19/2013	N	SWI0138	**102**	-	-	**29.9**	-	-	**4.30**	-	-	**114**	-	-	**90.3**	-	-	5	U	-
YVD-13	YVD-13-131211	12/11/2013	N	SWL0073	**101**	-	-	**29.4**	-	-	**4.16**	-	-	**110**	-	-	**77.8**	-	-	5	U	-
YVD-13	YVD-13-140318	03/18/2014	N	SXC0095	**102**	-	-	**29.3**	-	-	**4.27**	-	-	**106**	-	-	**80.3**	-	-	5	U	-
YVD-13	YVD-13-140603	06/03/2014	N	SXF0017	**94.8**	-	-	**27.7**	-	-	**3.70**	-	-	**113**	-	-	**39.7**	-	-	2	U	-
YVD-13	YVD-13-140923	09/23/2014	N	SXI0173	**104**	-	-	**29.0**	-	-	**4.40**	-	-	**118**	-	-	**81.7**	-	-	5	U	-
YVD-13	YVD-13-141217	12/17/2014	N	SXL0121	**114**	-	-	**33.1**	-	-	**4.74**	-	-	**119**	-	-	**86.5**	-	-	5	U	-
YVD-13	YVD-13-150317	03/17/2015	N	5904541	**100**	-	-	**30.0**	-	-	**4.00**	-	-	**120**	-	-	**72**	-	-	5	U	-
YVD-13	YVD-13-150617	06/17/2015	N	59010961	**110**	-	-	**30.0**	-	-	**4.40**	J+	MSD	**120**	J+	MSD	**81**	-	-	5	U	-
YVD-13	YVD-13-150924	09/24/2015	N	59020391	**98.0**	-	-	**31.0**	-	-	**4.10**	-	-	**110**	-	-	**70**	-	-	5	U	-
YVD-13	YVD-13-151216	12/16/2015	N	59025501	**100**	-	-	**30.0**	-	-	**4.30**	-	-	**120**	-	-	**69**	-	-	5	U	-
YVD-13	YVD-13-160309	03/09/2016	N	59029941	**100**	-	-	**29.0**	-	-	**4.20**	-	-	**120**	-	-	**85**	-	-	5	U	-
YVD-13	YVD-13-160622	6/22/2016	N	59037271	**100**	-	-	**30.0**	-	-	**4.20**	-	-	**120**	-	-	**76**	-	-	5	U	-
YVD-13	YVD-13-160928	9/28/2016	N	K1611698	**101**	-	-	**28.1**	-	-	**3.91**	-	-	**113**	-	-	**60.0**	-	-	**0.30**	-	-
YVD-13	YVD-13-161214	12/13/2016	N	K1615083	**100**	-	-	**27.5**	-	-	**4.02**	-	-	**111**	-	-	**57.3**	-	-	**0.33**	-	-
YVD-13	YVD-030717-08	3/7/2017	N	K1702324	**96.9**	-	-	**26.7**	-	-	**3.63**	-	-	**105**	-	-	**52.8**	-	-	**0.35**	-	-
YVD-13	YVD-030717-10	3/7/2017	FD	K1702324	**97.3**	-	-	**27.1**	-	-	**3.71**	-	-	**107**	-	-	**53.6**	-	-	**0.37**	-	-
YVD-13	YVD-060717-33	6/7/2017	N	K1705833	**99.0**	-	-	**27.9**	-	-	**3.83**	-	-	**114**	-	-	**54.6**	-	-	**0.30**	-	-
YVD-13	YVD-092617-25	9/26/2017	N	K1710333	**94.9**	-	-	**24.5**	-	-	**3.66**	-	-	**105**	-	-	**52.8**	-	-	**0.33**	-	-
YVD-13	YVD-120417-07	12/4/2017	N	K1713026	**93.4**	-	-	**24.5**	-	-	**3.41**	-	-	**102**	-	-	**53.9**	-	-	**0.36**	-	-
YVD-13	YVD-031918-19	3/19/2018	N	870634	**96.0**	-	-	**25.45**	-	-	**3.82**	-	-	**102**	-	-	**63.0**	-	-	**0.34**	-	-
YVD-13	YVD-060318-09	6/3/2018	N	874568	**91.0**	-	-	**25.90**	-	-	**4.01**	-	-	**108**	-	-	**63.3**	-	-	**0.35**	-	-
YVD-13	YVD-090918-14	9/9/2018	N	880601	**92.0**	-	-	**24.55**	-	-	**3.90**	-	-	**104**	-	-	**66.6**	-	-	**0.34**	-	-
YVD-13	YVD-121018-11	12/10/2018	N	884857	**87.5**	-	-	**24.20**	J	MSD	**3.95**	-	-	**104**	-	-	**70.8**	-	-	0.25	U	FBK
YVD-13	YVD-031819-15	3/18/2019	N	988273	**91.0**	-	-	**24.50**	-	-	**4.04**	-	-	**105**	-	-	**74.4**	-	-	**0.31**	-	-
YVD-13	YVD-060319-25	6/3/2019	N	992053	**90.0**	-	-	**24.35**	-	-	**3.87**	-	-	**103**	-	-	**40.9**	-	-	**0.23**	-	-
YVD-13	YVD-090919-10	9/9/2019	N	998357	**90.0**	-	-	**23.95**	-	-	**3.95**	-	-	**95.0**	-	-	**67.6**	-	-	**0.38**	-	-
YVD-13	YVD-120919-10	12/9/2019	N	902276	**88.0**	-	-	**24.10**	-	-	**3.90**	-	-	**102**	J	MSD	**73.4**	-	-	**0.37**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-12	YVD-121018-13	12/10/2018	N	884857	**15.5**	-	-	0.05	U	-	**170**	-	-	0.07	U	-	-	-	-	10	U	-
YVD-12	YVD-031719-07	3/17/2019	N	988239	**18.4**	-	-	0.05	U	-	**188**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-12	YVD-060319-27	6/3/2019	N	992053	**18.9**	-	-	0.05	U	-	**188**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-12	YVD-090919-16	9/9/2019	N	998357	**16.5**	-	-	0.05	U	-	**172**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-12	YVD-120919-12	12/9/2019	N	902276	**19.6**	-	-	0.05	U	-	**176**	-	-	**0.30**	-	-	-	-	-	0.5	UJ	MSD
YVD-13	YVD-13-130919	09/19/2013	N	SWI0138	**27.6**	-	-	2	U	-	**365**	-	-	-	-	-	0.1	U	-	-	R	FBK
YVD-13	YVD-13-131211	12/11/2013	N	SWL0073	**21.7**	-	-	2	U	-	**278**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
YVD-13	YVD-13-140318	03/18/2014	N	SXC0095	**24.2**	-	-	2	U	-	**312**	J-	MSD	-	-	-	**0.288**		-	**0.613**	-	-
YVD-13	YVD-13-140603	06/03/2014	N	SXF0017	**12.4**	-	-	0.8	U	-	**151**	J-	MSD	-	-	-	**0.103**		-	**0.727**	-	-
YVD-13	YVD-13-140923	09/23/2014	N	SXI0173	**26.7**	-	-	2	U	-	**328**	-	-	-	-	-	0.1	U	-	**9.13**	J+	MSD
YVD-13	YVD-13-141217	12/17/2014	N	SXL0121	**27.3**	-	-	2	U	-	**355**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-13	YVD-13-150317	03/17/2015	N	5904541	**24**	J-	MSD	2	U	-	**290**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-13	YVD-13-150617	06/17/2015	N	59010961	**27**	-	-	2	U	-	**310**	-	-	-	-	-	0.1	U	-	**0.68**	J-	MSD
YVD-13	YVD-13-150924	09/24/2015	N	59020391	**26**	J+	MSD	2	U	-	**330**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
YVD-13	YVD-13-151216	12/16/2015	N	59025501	**26**	-	-	2	U	-	**310**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-13	YVD-13-160309	03/09/2016	N	59029941	**32**	-	-	2	U	-	**390**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	FDP, MSD
YVD-13	YVD-13-160622	6/22/2016	N	59037271	**28**	-	-	2	U	-	**390**	-	-	-	-	-	0.1	UJ	MSD	-	R	MSD
YVD-13	YVD-13-160928	9/28/2016	N	K1611698	**23.5**	J	HTQ	0.10	U	-	**321**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
YVD-13	YVD-13-161214	12/13/2016	N	K1615083	**23.1**	-	-	0.10	U	-	**313**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-13	YVD-030717-08	3/7/2017	N	K1702324	**23.3**	J	HTQ	**0.05**	J	HTQ	**277**	-	-	-	-	-	1	U	-	0.5	U	-
YVD-13	YVD-030717-10	3/7/2017	FD	K1702324	**23.7**	J	HTQ	**0.04**	J	HTQ	**280**	-	-	-	-	-	1	U	-	0.5	U	-
YVD-13	YVD-060717-33	6/7/2017	N	K1705833	**22.7**	-	-	0.10	U	-	**282**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-13	YVD-092617-25	9/26/2017	N	K1710333	**23.2**	-	-	0.10	U	-	**298**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-13	YVD-120417-07	12/4/2017	N	K1713026	**24.3**	-	-	0.10	U	-	**271**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-13	YVD-031918-19	3/19/2018	N	870634	**25.8**	-	-	0.05	U	-	**249**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-13	YVD-060318-09	6/3/2018	N	874568	**25.2**	-	-	0.05	U	-	**235**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-13	YVD-090918-14	9/9/2018	N	880601	**26.1**	-	-	0.05	U	-	**222**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-13	YVD-121018-11	12/10/2018	N	884857	**28.6**	-	-	0.05	U	-	**225**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-13	YVD-031819-15	3/18/2019	N	988273	**29.1**	-	-	0.05	U	-	**223**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-13	YVD-060319-25	6/3/2019	N	992053	**28.0**	-	-	0.05	U	-	**201**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-13	YVD-090919-10	9/9/2019	N	998357	**31.0**	-	-	0.05	U	-	**197**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-13	YVD-120919-10	12/9/2019	N	902276	**30.9**	-	-	0.05	U	-	**191**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-12	YVD-121018-13	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**184**	-	-	**184**	-	-
YVD-12	YVD-031719-07	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**189**	-	-	**189**	-	-
YVD-12	YVD-060319-27	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**185**	-	-	**185**	-	-
YVD-12	YVD-090919-16	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**185**	-	-	**185**	-	-
YVD-12	YVD-120919-12	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**190**	-	-	**190**	-	-
YVD-13	YVD-13-130919	09/19/2013	N	SWI0138	-	-	-	-	-	-	-	R	FBK	-	-	-	**134**	-	-	**135**	-	-
YVD-13	YVD-13-131211	12/11/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	**0.11**	-	-	**139**	-	-	**140**	-	-
YVD-13	YVD-13-140318	03/18/2014	N	SXC0095	**0.17**	-	-	-	-	-	-	-	-	-	-	-	**134**	-	-	**135**	-	-
YVD-13	YVD-13-140603	06/03/2014	N	SXF0017	**0.078**	J+	FBK	-	-	-	-	-	-	-	-	-	**129**	-	-	**130**	-	-
YVD-13	YVD-13-140923	09/23/2014	N	SXI0173	0.05	U	-	-	-	-	-	-	-	-	-	-	**124**	-	-	**125**	-	-
YVD-13	YVD-13-141217	12/17/2014	N	SXL0121	0.1	U	-	-	-	-	-	-	-	-	-	-	**124**	-	-	**125**	-	-
YVD-13	YVD-13-150317	03/17/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
YVD-13	YVD-13-150617	06/17/2015	N	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-13	YVD-13-150924	09/24/2015	N	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
YVD-13	YVD-13-151216	12/16/2015	N	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-13	YVD-13-160309	03/09/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**140**	-	-	**140**	-	-
YVD-13	YVD-13-160622	6/22/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
YVD-13	YVD-13-160928	9/28/2016	N	K1611698	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**133**	-	-	**133**	-	-
YVD-13	YVD-13-161214	12/13/2016	N	K1615083	-	-	-	**0.047**	-	-	-	-	-	-	-	-	**132**	-	-	**132**	-	-
YVD-13	YVD-030717-08	3/7/2017	N	K1702324	-	-	-	**0.010**	J	-	-	-	-	-	-	-	**138**	-	-	**138**	-	-
YVD-13	YVD-030717-10	3/7/2017	FD	K1702324	-	-	-	**0.009**	J	-	-	-	-	-	-	-	**139**	-	-	**139**	-	-
YVD-13	YVD-060717-33	6/7/2017	N	K1705833	-	-	-	**0.014**	-	-	-	-	-	-	-	-	**134**	-	-	**134**	-	-
YVD-13	YVD-092617-25	9/26/2017	N	K1710333	-	-	-	0.010	U	-	-	-	-	-	-	-	**142**	-	-	**142**	-	-
YVD-13	YVD-120417-07	12/4/2017	N	K1713026	-	-	-	0.015	U	MBK	-	-	-	-	-	-	**141**	-	-	**141**	-	-
YVD-13	YVD-031918-19	3/19/2018	N	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**138**	-	-	**138**	-	-
YVD-13	YVD-060318-09	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**137**	-	-	**137**	-	-
YVD-13	YVD-090918-14	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**140**	-	-	**140**	-	-
YVD-13	YVD-121018-11	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**142**	-	-	**142**	-	-
YVD-13	YVD-031819-15	3/18/2019	N	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	**153**	-	-	**153**	-	-
YVD-13	YVD-060319-25	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**142**	-	-	**142**	-	-
YVD-13	YVD-090919-10	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**143**	-	-	**143**	-	-
YVD-13	YVD-120919-10	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**138**	-	-	**138**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-14	YVD-14-130918	09/18/2013	N	SWI0123	**260**	-	-	**65.4**	-	-	**3.45**	-	-	**110**	-	-	**118**	-	-	5	U	-
YVD-14	YVD-14-131212	12/12/2013	N	SWL0078	**249**	-	-	**65.6**	-	-	**3.29**	-	-	**108**	-	-	**104**	-	-	5	U	-
YVD-14	YVD-14-140319	03/19/2014	N	SXC0107	**248**	-	-	**64.5**	-	-	**3.37**	-	-	**102**	-	-	**108**	-	-	5	U	-
YVD-14	YVD-14-140604	06/04/2014	N	SXF0025	**240**	-	-	**63.2**	-	-	**3.46**	-	-	**112**	-	-	**109**	-	-	5	U	-
YVD-14	YVD-14-140924	09/24/2014	N	SXI0173	**268**	-	-	**72.0**	-	-	**4.10**	-	-	**124**	-	-	**110**	-	-	5	U	-
YVD-14	YVD-14-141217	12/17/2014	N	SXL0121	**252**	-	-	**70.9**	-	-	**3.83**	-	-	**113**	-	-	**110**	-	-	5	U	-
YVD-14	YVD-14-150318	03/18/2015	N	5904651	**260**	-	-	**70.0**	-	-	**3.60**	J-	MSD	**130**	-	-	**110**	-	-	5	U	-
YVD-14R	YVD-14R-151216	12/16/2015	N	59025501	**250**	-	-	**69.0**	-	-	**4.40**	-	-	**120**	-	-	**110**	-	-	5	U	-
YVD-14R	YVD-14R-160309	03/09/2016	N	59029941	**250**	-	-	**67.0**	-	-	**4.40**	-	-	**130**	-	-	**110**	-	-	5	U	-
YVD-14R	YVD-14R-160622	6/22/2016	N	59037271	**230**	-	-	**67.0**	-	-	**4.30**	-	-	**130**	-	-	**110**	-	-	5	U	-
YVD-14R	YVD-14R-160928	9/28/2016	N	K1611698	**252**	-	-	**65.9**	-	-	**4.05**	-	-	**126**	-	-	**95.7**	-	-	**0.16**	J	-
YVD-14R	YVD-14R-161212	12/12/2016	N	K1615029	**251**	-	-	**65.7**	-	-	**4.09**	-	-	**119**	-	-	**94.7**	-	-	**0.24**	-	-
YVD-14R	YVD-D1-161212	12/12/2016	FD	K1615029	**255**	-	-	**66.5**	-	-	**4.17**	-	-	**121**	-	-	**93.3**	-	-	**0.19**	-	-
YVD-14R	YVD-030917-19	3/9/2017	N	K1702404	**257**	-	-	**66.1**	-	-	**3.80**	-	-	**117**	-	-	**97.0**	-	-	**0.18**	J	-
YVD-14R	YVD-030917-21	3/9/2017	FD	K1702404	**251**	-	-	**65.2**	-	-	**3.75**	-	-	**115**	-	-	**95.0**	-	-	**0.19**	J	-
YVD-14R	YVD-060517-06	6/5/2017	N	K1705702	**243**	-	-	**62.3**	-	-	**3.53**	-	-	**110**	-	-	**98.4**	-	-	**0.20**	-	-
YVD-14R	YVD-092517-14	9/25/2017	N	K1710333	**238**	-	-	**61.2**	-	-	**3.85**	-	-	**121**	-	-	**99.8**	-	-	**0.18**	J	-
YVD-14R	YVD-120417-12	12/4/2017	N	K1713026	**230**	-	-	**59.3**	-	-	**3.54**	-	-	**116**	-	-	**98.3**	-	-	**0.22**	-	-
YVD-14R	YVD-031818-11	3/18/2018	N	870610	**232**	-	-	**60.00**	-	-	**3.96**	-	-	**127**	-	-	**102**	-	-	**0.13**	-	-
YVD-14R	YVD-060318-04	6/3/2018	N	874568	**233**	-	-	**63.00**	-	-	**4.18**	-	-	**130**	-	-	**105**	-	-	**0.15**	-	-
YVD-14R	YVD-090918-09	9/9/2018	N	880601	**250**	-	-	**63.50**	-	-	**4.09**	-	-	**130**	-	-	**115**	-	-	**0.18**	-	-
YVD-14R	YVD-121018-02	12/10/2018	N	884857	**256**	-	-	**66.00**	J	MSD	**4.39**	-	-	**131**	-	-	**133**	-	-	0.15	U	FBK
YVD-14R (FD)	YVD-121018-04	12/10/2018	FD	884857	**254**	-	-	**66.00**	J	MSD	**4.36**	-	-	**131**	-	-	**132**	-	-	0.15	U	FBK
YVD-14R	YVD-031819-12	3/18/2019	N	988273	**277**	-	-	**71.50**	-	-	**4.56**	-	-	**136**	-	-	**151**	-	-	**0.44**	J	DUP
YVD-14R (FD)	YVD-031819-14	3/18/2019	FD	988273	**275**	-	-	**70.50**	-	-	**4.57**	-	-	**136**	-	-	**148**	-	-	**0.13**	J	DUP
YVD-14R	YVD-060319-22	6/3/2019	N	992053	**284**	-	-	**73.50**	-	-	**4.42**	-	-	**136**	-	-	**149**	-	-	**0.22**	-	-
YVD-14R (FD)	YVD-060319-24	6/3/2019	FD	992053	**270**	-	-	**71.50**	-	-	**4.38**	-	-	**132**	-	-	**130**	-	-	0.10	U	-
YVD-14R	YVD-090919-13	9/9/2019	N	998357	**280**	-	-	**73.00**	-	-	**4.48**	-	-	**129**	-	-	**130**	-	-	**0.13**	-	-
YVD-14R	YVD-121019-15	12/10/2019	N	902321	**255**	-	-	**66.50**	-	-	**4.71**	-	-	**128**	-	-	**128**	-	-	**0.13**	-	-
YVD-14R (FD)	YVD-121019-17	12/10/2019	FD	902321	**256**	-	-	**66.50**	-	-	**4.75**	-	-	**128**	-	-	**128**	-	-	**0.13**	-	-
YVD-15	YVD-15-130917	09/17/2013	N	SWI0123	**125**	-	-	**51.6**	-	-	**2.73**	-	-	**127**	-	-	**62.8**	-	-	5	U	-
YVD-15	YVD-15-131212	12/12/2013	N	SWL0078	**131**	-	-	**59.4**	-	-	**4.48**	-	-	**114**	-	-	**120**	-	-	5	U	-
YVD-15	YVD-15-140319	03/19/2014	N	SXC0107	**124**	-	-	**57.9**	-	-	**5.23**	-	-	**93.5**	-	-	**54.9**	-	-	5	U	-
YVD-15	YVD-15-140603	06/03/2014	N	SXF0025	**138**	-	-	**64.7**	-	-	**5.20**	-	-	**110**	-	-	**82.5**	-	-	5	U	-
YVD-15	YVD-15-140924	09/24/2014	N	SXI0173	**132**	-	-	**56.9**	-	-	**3.11**	-	-	**135**	-	-	**58.7**	-	-	5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-14	YVD-14-130918	09/18/2013	N	SWI0123	**112**	-	-	2	U	-	**213**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-14	YVD-14-131212	12/12/2013	N	SWL0078	**105**	-	-	2	U	-	**186**	-	-	-	-	-	0.02	U	-	0.7957	U	ERL
YVD-14	YVD-14-140319	03/19/2014	N	SXC0107	**101**	-	-	2	U	-	**190**	-	-	-	-	-	0.1	U	-	**0.562**	J-	MSD
YVD-14	YVD-14-140604	06/04/2014	N	SXF0025	**102**	-	-	2	U	-	**191**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-14	YVD-14-140924	09/24/2014	N	SXI0173	**96.7**	-	-	2	U	-	**178**	-	-	-	-	-	**0.107**	-	-	0.25	U	-
YVD-14	YVD-14-141217	12/17/2014	N	SXL0121	**96.1**	-	-	2	U	-	**185**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-14	YVD-14-150318	03/18/2015	N	5904651	**91**	-	-	2	U	-	**180**	-	-	-	-	-	**0.11**	-	-	0.25	UJ	MSD
YVD-14R	YVD-14R-151216	12/16/2015	N	59025501	**98**	-	-	2	U	-	**160**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-14R	YVD-14R-160309	03/09/2016	N	59029941	**100**	-	-	2	U	-	**180**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	FDP, MSD
YVD-14R	YVD-14R-160622	6/22/2016	N	59037271	**110**	-	-	2	U	-	**150**	-	-	-	-	-	0.1	UJ	MSD	-	R	MSD
YVD-14R	YVD-14R-160928	9/28/2016	N	K1611698	**92.1**	J	HTQ	0.10	U	-	**140**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
YVD-14R	YVD-14R-161212	12/12/2016	N	K1615029	**92.3**	J	HTQ	0.10	UJ	HTQ	**158**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-14R	YVD-D1-161212	12/12/2016	FD	K1615029	**92.3**	J	HTQ	0.10	UJ	HTQ	**155**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-14R	YVD-030917-19	3/9/2017	N	K1702404	**91.1**	-	-	0.10	U	-	**147**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-14R	YVD-030917-21	3/9/2017	FD	K1702404	**92.2**	J	HTQ	0.10	U	-	**151**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-14R	YVD-060517-06	6/5/2017	N	K1705702	**95.7**	-	-	0.10	U	-	**142**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-14R	YVD-092517-14	9/25/2017	N	K1710333	**97.3**	-	-	0.10	U	-	**138**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-14R	YVD-120417-12	12/4/2017	N	K1713026	**96.7**	-	-	0.10	U	-	**124**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-14R	YVD-031818-11	3/18/2018	N	870610	**90.2**	-	-	0.05	U	-	**128**	-	-	**0.17**	-	-	-	-	-	0.5	U	-
YVD-14R	YVD-060318-04	6/3/2018	N	874568	**96.5**	-	-	0.05	U	-	**123**	-	-	0.19	U	FBK	-	-	-	0.5	U	-
YVD-14R	YVD-090918-09	9/9/2018	N	880601	**115**	-	-	0.05	U	-	**125**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-14R	YVD-121018-02	12/10/2018	N	884857	**117**	-	-	0.05	U	-	**139**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-14R (FD)	YVD-121018-04	12/10/2018	FD	884857	**115**	-	-	0.05	U	-	**136**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-14R	YVD-031819-12	3/18/2019	N	988273	**138**	-	-	0.05	U	-	**147**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-14R (FD)	YVD-031819-14	3/18/2019	FD	988273	**135**	-	-	0.05	U	-	**145**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-14R	YVD-060319-22	6/3/2019	N	992053	**136**	-	-	0.05	U	-	**145**	-	-	**0.12**	U	-	-	-	-	0.5	UJ	MSD
YVD-14R (FD)	YVD-060319-24	6/3/2019	FD	992053	**138**	-	-	0.05	U	-	**131**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-14R	YVD-090919-13	9/9/2019	N	998357	**140**	-	-	0.05	U	-	**133**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-14R	YVD-121019-15	12/10/2019	N	902321	**126**	-	-	0.05	U	-	**123**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-14R (FD)	YVD-121019-17	12/10/2019	FD	902321	**125**	-	-	0.05	U	-	**124**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-15	YVD-15-130917	09/17/2013	N	SWI0123	**72.5**	-	-	2	U	-	**51.5**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-15	YVD-15-131212	12/12/2013	N	SWL0078	**71.2**	-	-	2	U	-	**114**	-	-	-	-	-	0.02	U	-	0.2	U	-
YVD-15	YVD-15-140319	03/19/2014	N	SXC0107	**47.4**	-	-	2	U	-	**44.7**	-	-	-	-	-	**0.112**	-	-	**0.553**	J-	MSD
YVD-15	YVD-15-140603	06/03/2014	N	SXF0025	**88.1**	-	-	2	U	-	**39**	-	-	-	-	-	0.1	U	-	**0.475**	J-	MSD
YVD-15	YVD-15-140924	09/24/2014	N	SXI0173	**54.8**	-	-	2	U	-	**50.7**	-	-	-	-	-	**0.246**	-	-	**1.19**	J+	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-14	YVD-14-130918	09/18/2013	N	SWI0123	-	-	-	-	-	-	0.1	U	-	-	-	-	**605**	-	-	**605**	-	-
YVD-14	YVD-14-131212	12/12/2013	N	SWL0078	-	-	-	-	-	-	-	-	-	0.06	U	-	**544**	-	-	**545**	-	-
YVD-14	YVD-14-140319	03/19/2014	N	SXC0107	0.05	U	-	-	-	-	-	-	-	-	-	-	**634**	-	-	**635**	-	-
YVD-14	YVD-14-140604	06/04/2014	N	SXF0025	**0.078**	-	-	-	-	-	-	-	-	-	-	-	**569**	-	-	**570**	-	-
YVD-14	YVD-14-140924	09/24/2014	N	SXI0173	**0.087**	J+	FBK	-	-	-	-	-	-	-	-	-	**554**	-	-	**555**	-	-
YVD-14	YVD-14-141217	12/17/2014	N	SXL0121	0.1	U	-	-	-	-	-	-	-	-	-	-	**539**	-	-	**540**	-	-
YVD-14	YVD-14-150318	03/18/2015	N	5904651	0.25	U	-	-	-	-	-	-	-	-	-	-	**530**	-	-	**530**	-	-
YVD-14R	YVD-14R-151216	12/16/2015	N	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**550**	-	-	**550**	-	-
YVD-14R	YVD-14R-160309	03/09/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**600**	-	-	**600**	-	-
YVD-14R	YVD-14R-160622	6/22/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**490**	-	-	**490**	-	-
YVD-14R	YVD-14R-160928	9/28/2016	N	K1611698	-	-	-	**0.015**	-	-	-	-	-	-	-	-	**535**	-	-	**535**	-	-
YVD-14R	YVD-14R-161212	12/12/2016	N	K1615029	-	-	-	**0.058**	-	-	-	-	-	-	-	-	**578**	-	-	**578**	-	-
YVD-14R	YVD-D1-161212	12/12/2016	FD	K1615029	-	-	-	**0.092**	-	-	-	-	-	-	-	-	**571**	-	-	**571**	-	-
YVD-14R	YVD-030917-19	3/9/2017	N	K1702404	-	-	-	**0.020**	-	-	-	-	-	-	-	-	**526**	-	-	**526**	-	-
YVD-14R	YVD-030917-21	3/9/2017	FD	K1702404	-	-	-	**0.019**	-	-	-	-	-	-	-	-	**514**	-	-	**514**	-	-
YVD-14R	YVD-060517-06	6/5/2017	N	K1705702	-	-	-	**0.038**	-	-	-	-	-	-	-	-	**505**	-	-	**505**	-	-
YVD-14R	YVD-092517-14	9/25/2017	N	K1710333	-	-	-	**0.018**	-	-	-	-	-	-	-	-	**515**	-	-	**515**	-	-
YVD-14R	YVD-120417-12	12/4/2017	N	K1713026	-	-	-	**0.024**	-	-	-	-	-	-	-	-	**504**	-	-	**504**	-	-
YVD-14R	YVD-031818-11	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**514**	-	-	**514**	-	-
YVD-14R	YVD-060318-04	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**521**	-	-	**521**	-	-
YVD-14R	YVD-090918-09	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**532**	-	-	**532**	-	-
YVD-14R	YVD-121018-02	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**528**	-	-	**528**	-	-
YVD-14R (FD)	YVD-121018-04	12/10/2018	FD	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**528**	-	-	**528**	-	-
YVD-14R	YVD-031819-12	3/18/2019	N	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	**531**	-	-	**531**	-	-
YVD-14R (FD)	YVD-031819-14	3/18/2019	FD	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	**532**	-	-	**532**	-	-
YVD-14R	YVD-060319-22	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**542**	-	-	**542**	-	-
YVD-14R (FD)	YVD-060319-24	6/3/2019	FD	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**538**	-	-	**538**	-	-
YVD-14R	YVD-090919-13	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**560**	-	-	**560**	-	-
YVD-14R	YVD-121019-15	12/10/2019	N	902321	-	-	-	-	-	-	-	-	-	0.07	U	-	**533**	-	-	**533**	-	-
YVD-14R (FD)	YVD-121019-17	12/10/2019	FD	902321	-	-	-	-	-	-	-	-	-	0.07	U	-	**543**	-	-	**543**	-	-
YVD-15	YVD-15-130917	09/17/2013	N	SWI0123	-	-	-	-	-	-	0.1	U	-	-	-	-	**514**	-	-	**515**	-	-
YVD-15	YVD-15-131212	12/12/2013	N	SWL0078	-	-	-	-	-	-	-	-	-	**0.238**	-	-	**494**	-	-	**495**	-	-
YVD-15	YVD-15-140319	03/19/2014	N	SXC0107	**0.22**	-	-	-	-	-	-	-	-	-	-	-	**534**	-	-	**535**	-	-
YVD-15	YVD-15-140603	06/03/2014	N	SXF0025	**0.31**	-	-	-	-	-	-	-	-	-	-	-	**509**	-	-	**510**	-	-
YVD-15	YVD-15-140924	09/24/2014	N	SXI0173	**0.072**	J+	FBK	-	-	-	-	-	-	-	-	-	**541**	-	-	**545**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-15	YVD-15-141217	12/17/2014	N	SXL0121	**175**	-	-	**81.6**	-	-	**3.67**	-	-	**60.3**	-	-	**57.6**	-	-	5	U	-
YVD-15	YVD-15-150317	03/17/2015	N	5904651	**280**	-	-	**130.0**	-	-	**8.40**	J-	MSD	**160**	-	-	**65**	-	-	5	U	-
YVD-15	YVD-15-150617	06/17/2015	N	59011021	**140**	-	-	**66.0**	J	RPD	**4.60**	J	RPD	**110**	J	RPD	**42**	-	-	0.5	U	-
YVD-15	YVD-15-150925	09/25/2015	N	59020431	**98.0**	-	-	**46.0**	-	-	**3.90**	-	-	**80.0**	-	-	**22**	-	-	5	U	-
YVD-15	YVD-15-151215	12/15/2015	N	59025431	**120**	-	-	**59.0**	-	-	**4.10**	-	-	**80.0**	-	-	**37**	-	-	5	U	-
YVD-15	YVD-15-160309	03/09/2016	N	59029711	**120**	-	-	**60.0**	-	-	**4.20**	-	-	**75.0**	-	-	**32**	-	-	5	U	-
YVD-15	YVD-15-160621	6/21/2016	N	59037271	**110**	-	-	**56.0**	-	-	**3.50**	-	-	**74.0**	-	-	**26**	-	-	5	U	-
YVD-15	YVD-15-160928	9/28/2016	N	K1611629	**112**	-	-	**50.9**	-	-	**3.15**	-	-	**66.2**	-	-	**22.5**	-	-	**0.29**	-	-
YVD-15	YVD-15-161215	12/15/2016	N	K1615126	**113**	-	-	**50.4**	-	-	**3.40**	-	-	**59.1**	-	-	**22.1**	-	-	**0.32**	-	-
YVD-15	YVD-030917-23	3/9/2017	N	K1702404	**119**	-	-	**52.9**	-	-	**2.95**	-	-	**55.3**	-	-	**23.0**	-	-	**0.34**	-	-
YVD-15	YVD-060617-20	6/6/2017	N	K1705754	**126**	-	-	**54.6**	-	-	**2.98**	-	-	**62.9**	-	-	**21.8**	-	-	**0.32**	-	-
YVD-15	YVD-092517-10	9/25/2017	N	K1710333	**112**	-	-	**50.2**	-	-	**3.21**	-	-	**74.5**	-	-	**22.1**	-	-	**0.35**	-	-
YVD-15	YVD-120517-28	12/5/2017	N	K1713091	**112**	-	-	**48.0**	-	-	**2.89**	-	-	**78.6**	-	-	**21.8**	-	-	**0.34**	-	-
YVD-15	YVD-031818-09	3/18/2018	N	870610	**104**	-	-	**46.60**	-	-	**3.25**	-	-	**94.5**	-	-	**21.7**	-	-	**0.32**	-	-
YVD-15	YVD-060318-08	6/3/2018	N	874568	**100**	-	-	**45.50**	-	-	**3.36**	-	-	**97.5**	-	-	**22.0**	-	-	**0.34**	-	-
YVD-15	YVD-090918-11	9/9/2018	N	880601	**97.5**	-	-	**42.70**	-	-	**3.18**	-	-	**99.0**	-	-	**22.8**	-	-	**0.35**	-	-
YVD-15	YVD-121018-06	12/10/2018	N	884857	**92.5**	-	-	**41.00**	J	MSD	**3.25**	-	-	**97.5**	-	-	**24.3**	-	-	0.33	U	FBK
YVD-15	YVD-031719-10	3/17/2019	N	988239	**91.5**	-	-	**39.75**	-	-	**3.22**	-	-	**96.0**	-	-	**21.1**	-	-	0.31	U	FBK
YVD-15	YVD-060419-29	6/4/2019	N	992242	**92.0**	-	-	**40.80**	-	-	**3.18**	-	-	**100**	-	-	**19.5**	-	-	**0.30**	-	-
YVD-15	YVD-090919-11	9/9/2019	N	998357	**91.0**	-	-	**39.40**	-	-	**3.14**	-	-	**92.0**	-	-	**21.8**	-	-	**0.34**	-	-
YVD-15	YVD-121019-19	12/10/2019	N	902321	**88.0**	-	-	**38.65**	-	-	**3.40**	-	-	**91.5**	-	-	**20.5**	-	-	**0.37**	-	-
YVD-16	YVD-16-130923	09/23/2013	N	SWI0178	**85.0**	-	-	**32.9**	-	-	**6.16**	-	-	**81.7**	-	-	-	-	-	-	-	-
YVD-16	YVD-16-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	**44.1**	-	-	5	U	-
YVD-16	YVD-16-131212	12/12/2013	N	SWL0073	**87.7**	-	-	**32.1**	-	-	**5.25**	-	-	**79.8**	-	-	**46.7**	-	-	5	U	-
YVD-16	YVD-16-140318	03/18/2014	N	SXC0107	**105.0**	-	-	**53.2**	-	-	**15.00**	-	-	**75.5**	-	-	**46.1**	-	-	5	U	-
YVD-16	YVD-16-140603	06/03/2014	N	SXF0017	**86.3**	-	-	**37.0**	-	-	**8.47**	-	-	**78.4**	-	-	**36.7**	-	-	2	U	-
YVD-16	YVD-16-140923	09/23/2014	N	SXI0173	**99.2**	-	-	**38.9**	-	-	**7.48**	-	-	**94.1**	-	-	**38**	-	-	2.5	U	-
YVD-16	YVD-16-141217	12/17/2014	N	SXL0121	**94.9**	-	-	**37.1**	-	-	**6.77**	-	-	**83.7**	-	-	**37.9**	-	-	2.5	U	-
YVD-16	YVD-D3-141217	12/17/2014	FD	SXL0121	**92.9**	-	-	**36.2**	-	-	**6.27**	-	-	**81.7**	-	-	**39.9**	-	-	0.5	U	-
YVD-16	YVD-16-150317	03/17/2015	N	5904651	**93.0**	-	-	**34.0**	-	-	**6.10**	J-	MSD	**87.0**	-	-	**39**	-	-	2.5	U	-
YVD-16	YVD-16-150616	06/16/2015	N	59010961	**96.0**	-	-	**35.0**	-	-	**6.20**	J+	MSD	**91.0**	J+	MSD	**43**	-	-	2.5	U	-
YVD-16	YVD-16-150923	09/23/2015	N	59020281	**88.0**	-	-	**37.0**	-	-	**6.50**	-	-	**85.0**	-	-	**39**	-	-	2.5	U	-
YVD-16	YVD-16-151215	12/15/2015	N	59025431	**89.0**	-	-	**34.0**	-	-	**5.70**	-	-	**85.0**	-	-	**38**	-	-	2.5	U	-
YVD-16	YVD-16-160309	03/09/2016	N	59029711	**90.0**	-	-	**36.0**	-	-	**7.40**	-	-	**86.0**	-	-	**39**	-	-	2.5	U	-
YVD-16	YVD-16-160621	6/21/2016	N	59037151	**85.0**	-	-	**33.0**	-	-	**5.90**	-	-	**86.0**	-	-	**42**	-	-	2.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-15	YVD-15-141217	12/17/2014	N	SXL0121	**66.9**	-	-	2	U	-	**53.4**	-	-	-	-	-	0.1	U	-	**0.414**	J-	MSD
YVD-15	YVD-15-150317	03/17/2015	N	5904651	**67**	-	-	2	U	-	**53**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-15	YVD-15-150617	06/17/2015	N	59011021	**39**	J-	MSD, HTQ	0.2	U	-	**59**	-	-	-	-	-	0.1	U	-	-	R	MSD
YVD-15	YVD-15-150925	09/25/2015	N	59020431	**14**	-	-	2	U	-	**47**	-	-	-	-	-	0.1	U	-	2.5	U	-
YVD-15	YVD-15-151215	12/15/2015	N	59025431	**38**	-	-	2	U	-	**40**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-15	YVD-15-160309	03/09/2016	N	59029711	**36**	-	-	2	U	-	**65**	J+	MSD	-	-	-	0.1	UJ	FDP	-	R	MSD
YVD-15	YVD-15-160621	6/21/2016	N	59037271	**31**	-	-	2	U	-	**86**	-	-	-	-	-	**0.13**	J-	MSD	-	R	MSD
YVD-15	YVD-15-160928	9/28/2016	N	K1611629	**26.6**	-	-	0.10	U	-	**108**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-15	YVD-15-161215	12/15/2016	N	K1615126	**25.5**	-	-	0.10	U	-	**108**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-15	YVD-030917-23	3/9/2017	N	K1702404	**25.0**	J	HTQ	0.10	U	-	**125**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-15	YVD-060617-20	6/6/2017	N	K1705754	**23.0**	-	-	0.10	U	-	**143**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-15	YVD-092517-10	9/25/2017	N	K1710333	**21.8**	-	-	0.10	U	-	**167**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-15	YVD-120517-28	12/5/2017	N	K1713091	**22.7**	J	HTQ	0.10	U	-	**145**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
YVD-15	YVD-031818-09	3/18/2018	N	870610	**24.4**	-	-	0.05	U	-	**129**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-15	YVD-060318-08	6/3/2018	N	874568	**27.0**	-	-	0.05	U	-	**118**	-	-	0.07	U	FBK	-	-	-	0.5	U	-
YVD-15	YVD-090918-11	9/9/2018	N	880601	**24.4**	-	-	0.05	U	-	**110**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-15	YVD-121018-06	12/10/2018	N	884857	**26.3**	-	-	0.05	U	-	**111**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-15	YVD-031719-10	3/17/2019	N	988239	**24.3**	-	-	0.05	U	-	**110**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-15	YVD-060419-29	6/4/2019	N	992242	**23.6**	-	-	0.05	U	-	**114**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-15	YVD-090919-11	9/9/2019	N	998357	**23.4**	-	-	0.05	U	-	**103**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-15	YVD-121019-19	12/10/2019	N	902321	**23.5**	-	-	0.05	U	-	**96.9**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-16	YVD-16-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	-	-	-	-	-	-	0.1	U	-	**0.375**	-	-
YVD-16	YVD-16-130926	09/26/2013	N	SWI0190	**28.8**	-	-	2	U	-	**140**	-	-	-	-	-	-	-	-	-	-	-
YVD-16	YVD-16-131212	12/12/2013	N	SWL0073	**28.8**	-	-	2	U	-	**163**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
YVD-16	YVD-16-140318	03/18/2014	N	SXC0107	**23.5**	-	-	2	U	-	**130**	-	-	-	-	-	0.1	U	-	**1.01**	J-	MSD
YVD-16	YVD-16-140603	06/03/2014	N	SXF0017	**21.9**	-	-	0.8	U	-	**131**	J-	MSD	-	-	-	0.1	U	-	**0.741**	-	-
YVD-16	YVD-16-140923	09/23/2014	N	SXI0173	**21.4**	-	-	1	U	-	**114**	-	-	-	-	-	0.1	U	-	**0.747**	J+	MSD
YVD-16	YVD-16-141217	12/17/2014	N	SXL0121	**20.6**	-	-	1	U	-	**118**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-16	YVD-D3-141217	12/17/2014	FD	SXL0121	**22.4**	-	-	0.2	U	-	**130**	-	-	-	-	-	0.1	U	-	**0.29**	J-	MSD
YVD-16	YVD-16-150317	03/17/2015	N	5904651	**22**	-	-	1	U	-	**120**	-	-	-	-	-	**0.11**	-	-	**0.29**	J-	MSD
YVD-16	YVD-16-150616	06/16/2015	N	59010961	**23**	-	-	1	U	-	**120**	-	-	-	-	-	**0.1**	-	-	0.25	UJ	MSD
YVD-16	YVD-16-150923	09/23/2015	N	59020281	**23**	-	-	1	U	-	**130**	-	-	-	-	-	0.1	U	-	-	R	MSD
YVD-16	YVD-16-151215	12/15/2015	N	59025431	**22**	-	-	1	U	-	**120**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-16	YVD-16-160309	03/09/2016	N	59029711	**23**	-	-	1	U	-	**130**	J+	MSD	-	-	-	**0.15**	J	FDP	-	R	MSD
YVD-16	YVD-16-160621	6/21/2016	N	59037151	**22**	-	-	1	U	-	**120**	-	-	-	-	-	0.1	U	-	0.25	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-15	YVD-15-141217	12/17/2014	N	SXL0121	**0.17**	-	-	-	-	-	-	-	-	-	-	-	**518**	-	-	**520**	-	-
YVD-15	YVD-15-150317	03/17/2015	N	5904651	**0.27**	-	-	-	-	-	-	-	-	-	-	-	**550**	-	-	**550**	-	-
YVD-15	YVD-15-150617	06/17/2015	N	59011021	0.25	U	-	-	-	-	-	-	-	-	-	-	**550**	-	-	**550**	-	-
YVD-15	YVD-15-150925	09/25/2015	N	59020431	0.25	U	-	-	-	-	-	-	-	-	-	-	**480**	-	-	**480**	-	-
YVD-15	YVD-15-151215	12/15/2015	N	59025431	0.25	UJ	FDP	-	-	-	-	-	-	-	-	-	**540**	J	FDP	**540**	J	FDP
YVD-15	YVD-15-160309	03/09/2016	N	59029711	0.25	U	-	-	-	-	-	-	-	-	-	-	**520**	-	-	**520**	-	-
YVD-15	YVD-15-160621	6/21/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**430**	-	-	**430**	-	-
YVD-15	YVD-15-160928	9/28/2016	N	K1611629	-	-	-	**0.023**	-	-	-	-	-	-	-	-	**401**	-	-	**401**	-	-
YVD-15	YVD-15-161215	12/15/2016	N	K1615126	-	-	-	**0.095**	-	-	-	-	-	-	-	-	**395**	-	-	**395**	-	-
YVD-15	YVD-030917-23	3/9/2017	N	K1702404	-	-	-	**0.011**	-	-	-	-	-	-	-	-	**395**	-	-	**395**	-	-
YVD-15	YVD-060617-20	6/6/2017	N	K1705754	-	-	-	**0.017**	-	-	-	-	-	-	-	-	**399**	-	-	**399**	-	-
YVD-15	YVD-092517-10	9/25/2017	N	K1710333	-	-	-	0.010	U	-	-	-	-	-	-	-	**412**	-	-	**412**	-	-
YVD-15	YVD-120517-28	12/5/2017	N	K1713091	-	-	-	**0.013**	-	-	-	-	-	-	-	-	**414**	-	-	**414**	-	-
YVD-15	YVD-031818-09	3/18/2018	N	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	**397**	-	-	**397**	-	-
YVD-15	YVD-060318-08	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**401**	-	-	**401**	-	-
YVD-15	YVD-090918-11	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**395**	-	-	**395**	-	-
YVD-15	YVD-121018-06	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**400**	-	-	**400**	-	-
YVD-15	YVD-031719-10	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**394**	-	-	**394**	-	-
YVD-15	YVD-060419-29	6/4/2019	N	992242	-	-	-	-	-	-	-	-	-	0.07	U	-	**390**	-	-	**390**	-	-
YVD-15	YVD-090919-11	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**407**	-	-	**407**	-	-
YVD-15	YVD-121019-19	12/10/2019	N	902321	-	-	-	-	-	-	-	-	-	0.07	U	-	**400**	-	-	**400**	-	-
YVD-16	YVD-16-130923	09/23/2013	N	SWI0178	-	-	-	-	-	-	0.1	U	-	-	-	-	**189**	-	-	**190**	-	-
YVD-16	YVD-16-130926	09/26/2013	N	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-16	YVD-16-131212	12/12/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	0.06	U	-	**309**	-	-	**310**	-	-
YVD-16	YVD-16-140318	03/18/2014	N	SXC0107	**1.4**	-	-	-	-	-	-	-	-	-	-	-	**298**	-	-	**300**	-	-
YVD-16	YVD-16-140603	06/03/2014	N	SXF0017	**0.83**	-	-	-	-	-	-	-	-	-	-	-	**287**	-	-	**288**	-	-
YVD-16	YVD-16-140923	09/23/2014	N	SXI0173	**0.22**	-	-	-	-	-	-	-	-	-	-	-	**303**	-	-	**305**	-	-
YVD-16	YVD-16-141217	12/17/2014	N	SXL0121	**0.25**	J	FDP	-	-	-	-	-	-	-	-	-	**298**	-	-	**300**	-	-
YVD-16	YVD-D3-141217	12/17/2014	FD	SXL0121	**0.1**	J	FDP	-	-	-	-	-	-	-	-	-	**308**	-	-	**310**	-	-
YVD-16	YVD-16-150317	03/17/2015	N	5904651	0.25	U	-	-	-	-	-	-	-	-	-	-	**310**	-	-	**310**	-	-
YVD-16	YVD-16-150616	06/16/2015	N	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**310**	-	-	**310**	-	-
YVD-16	YVD-16-150923	09/23/2015	N	59020281	0.25	U	-	-	-	-	-	-	-	-	-	-	**330**	-	-	**330**	-	-
YVD-16	YVD-16-151215	12/15/2015	N	59025431	0.25	UJ	FDP	-	-	-	-	-	-	-	-	-	**350**	J	FDP	**350**	J	FDP
YVD-16	YVD-16-160309	03/09/2016	N	59029711	**0.27**	-	-	-	-	-	-	-	-	-	-	-	**300**	-	-	**300**	-	-
YVD-16	YVD-16-160621	6/21/2016	N	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**300**	-	-	**300**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-16	YVD-D2-160621	6/21/2016	FD	59037151	**86.0**	-	-	**34.0**	-	-	**6.00**	-	-	**88.0**	-	-	**40**	-	-	0.5	U	-
YVD-16	YVD-16-160928	9/28/2016	N	K1611629	**92.4**	-	-	**33.2**	-	-	**5.69**	-	-	**90.2**	-	-	**33.3**	-	-	**0.22**	-	-
YVD-16	YVD-16-161215	12/15/2016	N	K1615126	**88.4**	-	-	**31.1**	-	-	**5.59**	-	-	**82.5**	-	-	**33.7**	-	-	**0.24**	-	-
YVD-16	YVD-030917-22	3/9/2017	N	K1702404	**87.1**	-	-	**31.2**	-	-	**5.16**	-	-	**79.8**	-	-	**33.9**	-	-	**0.25**	-	-
YVD-16	YVD-060517-12	6/5/2017	N	K1705754	**86.8**	-	-	**31.6**	-	-	**5.08**	-	-	**83.0**	-	-	**33.6**	-	-	**0.25**	-	-
YVD-16	YVD-092617-28	9/26/2017	N	K1710381	**89.0**	-	-	**31.7**	-	-	**5.44**	-	-	**84.1**	-	-	**32.8**	-	-	**0.23**	-	-
YVD-16	YVD-120517-22	12/5/2017	N	K1713091	**87.9**	-	-	**30.1**	-	-	**5.17**	-	-	**80.1**	-	-	**33.3**	-	-	**0.24**	-	-
YVD-16	YVD-031918-16	3/19/2018	N	870634	**88.5**	-	-	**30.25**	-	-	**5.25**	-	-	**79.0**	-	-	**34.4**	-	-	**0.20**	-	-
YVD-16	YVD-060318-10	6/3/2018	N	874568	**90.0**	-	-	**32.80**	-	-	**5.55**	-	-	**88.0**	-	-	**34.9**	-	-	**0.22**	-	-
YVD-16	YVD-090918-07	9/9/2018	N	880601	**89.5**	-	-	**30.55**	-	-	**5.20**	-	-	**83.5**	-	-	**35.7**	-	-	**0.21**	-	-
YVD-16	YVD-121118-20	12/11/2018	N	884939	**89.5**	-	-	**31.05**	-	-	**5.85**	-	-	**84.0**	-	-	**32.6**	-	-	**0.19**	-	-
YVD-16	YVD-031719-08	3/17/2019	N	988239	**88.5**	-	-	**30.65**	-	-	**5.45**	-	-	**82.0**	-	-	**35.4**	-	-	0.18	U	FBK
YVD-16	YVD-060219-06	6/2/2019	N	991939	**88.5**	-	-	**30.90**	-	-	**5.45**	-	-	**80.5**	-	-	24.6	U	FBK	0.17	U	FBK
YVD-16	YVD-090919-07	9/9/2019	N	998357	**86.5**	-	-	**30.40**	-	-	**5.30**	-	-	**77.0**	-	-	**36.9**	-	-	**0.21**	-	-
YVD-16	YVD-120919-11	12/9/2019	N	902276	**86.0**	-	-	**30.35**	-	-	**5.35**	-	-	**79.5**	J	MSD	**36.7**	-	-	**0.24**	-	-
YVD-17	YVD-17-130919	09/19/2013	N	SWI0142	**72.7**	-	-	**35.8**	-	-	**8.32**	-	-	**12.2**	-	-	**3.1**	-	-	0.5	U	-
YVD-17	YVD-17-130924	09/24/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-17	YVD-17-131210	12/10/2013	N	SWL0055	**54.2**	-	-	**28.4**	-	-	**5.25**	-	-	**7.9**	-	-	**2.98**	-	-	0.5	U	-
YVD-17	YVD-17-140316	03/16/2014	N	SXC0081	**36.0**	-	-	**17.6**	-	-	**1.73**	-	-	**6.1**	-	-	**3.45**	-	-	**0.65**	-	-
YVD-17	YVD-17-140601	06/01/2014	N	SXF0008	**42.3**	-	-	**18.5**	-	-	**2.22**	-	-	**8.7**	-	-	**3.17**	-	-	0.5	U	-
YVD-17	YVD-17-140922	09/22/2014	N	SXI0148	**47.5**	-	-	**21.2**	-	-	**2.91**	-	-	**9.9**	-	-	**2.87**	-	-	0.5	U	-
YVD-17	YVD-17-141215	12/15/2014	N	SXL0103	**42.1**	-	-	**17.8**	-	-	**1.84**	-	-	**9.2**	-	-	**2.99**	J+	MSD	0.5	U	-
YVD-17	YVD-17-150316	03/16/2015	N	5904471	**33.0**	-	-	**17.0**	-	-	**1.40**	-	-	**6.3**	-	-	**3.5**	-	-	**0.5**	-	-
YVD-17	YVD-D1-150316	03/16/2015	FD	5904471	**33.0**	-	-	**17.0**	-	-	**1.50**	-	-	**6.2**	-	-	**3.5**	-	-	**0.51**	-	-
YVD-17	YVD-17-150617	06/17/2015	N	59010961	**41.0**	-	-	**18.0**	-	-	**1.80**	J+	MSD	**8.7**	J+	MSD	**3**	-	-	0.5	U	-
YVD-17	YVD-17-150924	09/24/2015	N	59020391	**40.0**	-	-	**18.0**	-	-	**2.00**	-	-	**9.0**	-	-	**3.1**	-	-	**0.6**	-	-
YVD-17	YVD-17-151216	12/16/2015	N	59025501	**38.0**	-	-	**17.0**	-	-	**1.40**	-	-	**8.0**	-	-	**2.6**	-	-	0.5	U	-
YVD-17	YVD-17-160310	03/10/2016	N	59029941	**35.0**	-	-	**16.0**	-	-	**1.20**	-	-	**6.4**	-	-	**2.8**	-	-	0.5	U	-
YVD-17	YVD-17-160623	6/23/2016	N	59037371	**39.0**	-	-	**18.0**	-	-	**1.60**	-	-	**8.3**	-	-	**3.4**	-	-	0.5	U	-
YVD-17	YVD-17-160926	9/26/2016	N	K1611565	**40.8**	-	-	**17.3**	-	-	**1.59**	-	-	**8.3**	-	-	**2.91**	-	-	**0.32**	-	-
YVD-17	YVD-17-161215	12/15/2016	N	K1615174	**39.6**	-	-	**15.8**	-	-	**1.46**	-	-	**7.4**	-	-	**2.42**	-	-	**0.34**	-	-
YVD-17	YVD-031017-29	3/10/2017	N	K1702448	**36.6**	-	-	**15.7**	-	-	**0.26**	-	-	**5.4**	-	-	**2.65**	-	-	**0.33**	-	-
YVD-17	YVD-060617-24	6/6/2017	N	K1705754	**40.2**	-	-	**15.8**	-	-	**1.16**	-	-	**7.81**	-	-	**2.40**	-	-	**0.35**	-	-
YVD-17	YVD-092517-08	9/25/2017	N	K1710274	**43.1**	-	-	**16.4**	-	-	**1.73**	-	-	**9.5**	-	-	**2.89**	-	-	**0.37**	-	-
YVD-17	YVD-120517-26	12/5/2017	N	K1713091	**43.6**	-	-	**15.4**	-	-	**1.55**	-	-	**9.87**	-	-	**2.71**	-	-	**0.39**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-16	YVD-D2-160621	6/21/2016	FD	59037151	**22**	-	-	0.2	U	-	**120**	-	-	-	-	-	0.1	U	-	0.25	U	-
YVD-16	YVD-16-160928	9/28/2016	N	K1611629	**19.7**	-	-	0.10	U	-	**110**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-16	YVD-16-161215	12/15/2016	N	K1615126	**19.7**	-	-	0.10	U	-	**112**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-16	YVD-030917-22	3/9/2017	N	K1702404	**20.1**	J	HTQ	0.10	U	-	**113**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-16	YVD-060517-12	6/5/2017	N	K1705754	**19.7**	-	-	0.10	U	-	**117**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-16	YVD-092617-28	9/26/2017	N	K1710381	**19.1**	J	HTQ	0.10	U	-	**115**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-16	YVD-120517-22	12/5/2017	N	K1713091	**19.8**	J	HTQ	0.10	U	-	**110**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD
YVD-16	YVD-031918-16	3/19/2018	N	870634	**20.3**	-	-	0.05	U	-	**106**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-16	YVD-060318-10	6/3/2018	N	874568	**20.7**	-	-	0.05	U	-	**104**	-	-	0.07	U	FBK	-	-	-	0.5	U	-
YVD-16	YVD-090918-07	9/9/2018	N	880601	**21.4**	-	-	0.05	U	-	**107**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-16	YVD-121118-20	12/11/2018	N	884939	**21.8**	-	-	0.05	U	-	**106**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-16	YVD-031719-08	3/17/2019	N	988239	**22.5**	-	-	0.05	U	-	**109**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-16	YVD-060219-06	6/2/2019	N	991939	**23.3**	-	-	0.05	U	-	**106**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-16	YVD-090919-07	9/9/2019	N	998357	**22.9**	-	-	0.05	U	-	**107**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-16	YVD-120919-11	12/9/2019	N	902276	**23.5**	-	-	0.05	U	-	**106**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-17	YVD-17-130919	09/19/2013	N	SWI0142	-	-	-	-	-	-	**6.48**	-	-	-	-	-	0.1	U	-	2.5	U	-
YVD-17	YVD-17-130924	09/24/2013	N	SWI0175	**0.8**	-	-	0.2	U	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-17	YVD-17-131210	12/10/2013	N	SWL0055	**0.68**	-	-	0.2	U	-	**6.64**	-	-	-	-	-	0.02	UJ	MSD	-	R	FBK,
YVD-17	YVD-17-140316	03/16/2014	N	SXC0081	**1.07**	-	-	0.2	U	-	**6.42**	-	-	-	-	-	**0.166**	-	-	0.25	U	-
YVD-17	YVD-17-140601	06/01/2014	N	SXF0008	**0.67**	-	-	0.2	U	-	**5.74**	-	-	-	-	-	0.1	U	-	**0.287**	-	-
YVD-17	YVD-17-140922	09/22/2014	N	SXI0148	**0.96**	-	-	0.2	U	-	**5.08**	-	-	-	-	-	0.1	U	-	**0.293**	-	-
YVD-17	YVD-17-141215	12/15/2014	N	SXL0103	**0.66**	J	DUP	0.2	U	-	**6.01**	J+	MSD,	-	-	-	0.1	U	-	0.25	U	-
YVD-17	YVD-17-150316	03/16/2015	N	5904471	**1.1**	-	-	0.2	U	-	**5.7**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-17	YVD-D1-150316	03/16/2015	FD	5904471	**1.2**	-	-	0.2	U	-	**5.7**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-17	YVD-17-150617	06/17/2015	N	59010961	**0.59**	-	-	0.2	U	-	**5.4**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-17	YVD-17-150924	09/24/2015	N	59020391	0.2	U	-	**1.2**	-	-	**5.6**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
YVD-17	YVD-17-151216	12/16/2015	N	59025501	**0.55**	-	-	0.2	U	-	**5.4**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-17	YVD-17-160310	03/10/2016	N	59029941	**0.32**	-	-	0.2	U	-	**4.8**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	FDP
YVD-17	YVD-17-160623	6/23/2016	N	59037371	**0.55**	-	-	0.2	U	-	**5.3**	-	-	-	-	-	-	R	MSD	0.25	U	-
YVD-17	YVD-17-160926	9/26/2016	N	K1611565	**1.16**	-	-	0.10	U	-	**7.9**	-	-	-	-	-	0.050	U	MBK	-	R	MSD
YVD-17	YVD-17-161215	12/15/2016	N	K1615174	**0.59**	-	-	0.10	U	-	**6.0**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-17	YVD-031017-29	3/10/2017	N	K1702448	**0.42**	-	-	0.10	U	-	**6.26**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-17	YVD-060617-24	6/6/2017	N	K1705754	**0.50**	-	-	0.10	U	-	**6.02**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-17	YVD-092517-08	9/25/2017	N	K1710274	**0.99**	-	-	0.10	U	-	**7.17**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-17	YVD-120517-26	12/5/2017	N	K1713091	**0.71**	-	-	0.10	U	-	**7.53**	-	-	-	-	-	0.050	U	-	0.5	UJ	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-16	YVD-D2-160621	6/21/2016	FD	59037151	0.25	U	-	-	-	-	-	-	-	-	-	-	**300**	-	-	**300**	-	-
YVD-16	YVD-16-160928	9/28/2016	N	K1611629	-	-	-	**0.016**	-	-	-	-	-	-	-	-	**301**	-	-	**301**	-	-
YVD-16	YVD-16-161215	12/15/2016	N	K1615126	-	-	-	**0.068**	-	-	-	-	-	-	-	-	**298**	-	-	**298**	-	-
YVD-16	YVD-030917-22	3/9/2017	N	K1702404	-	-	-	**0.045**	-	-	-	-	-	-	-	-	**295**	-	-	**295**	-	-
YVD-16	YVD-060517-12	6/5/2017	N	K1705754	-	-	-	**0.021**	-	-	-	-	-	-	-	-	**298**	-	-	**298**	-	-
YVD-16	YVD-092617-28	9/26/2017	N	K1710381	-	-	-	**0.016**	-	-	-	-	-	-	-	-	**309**	-	-	**309**	-	-
YVD-16	YVD-120517-22	12/5/2017	N	K1713091	-	-	-	**0.048**	-	-	-	-	-	-	-	-	**294**	-	-	**294**	-	-
YVD-16	YVD-031918-16	3/19/2018	N	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**297**	-	-	**297**	-	-
YVD-16	YVD-060318-10	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**314**	-	-	**314**	-	-
YVD-16	YVD-090918-07	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**309**	-	-	**309**	-	-
YVD-16	YVD-121118-20	12/11/2018	N	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	**306**	-	-	**306**	-	-
YVD-16	YVD-031719-08	3/17/2019	N	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	**300**	-	-	**300**	-	-
YVD-16	YVD-060219-06	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**301**	-	-	**301**	-	-
YVD-16	YVD-090919-07	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**303**	-	-	**303**	-	-
YVD-16	YVD-120919-11	12/9/2019	N	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	**296**	-	-	**296**	-	-
YVD-17	YVD-17-130919	09/19/2013	N	SWI0142	-	-	-	-	-	-	**3.64**	-	-	-	-	-	**213**	-	-	**215**	-	-
YVD-17	YVD-17-130924	09/24/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-17	YVD-17-131210	12/10/2013	N	SWL0055	-	-	-	-	-	-	-	-	-	**1.61**	-	-	**169**	-	-	**170**	-	-
YVD-17	YVD-17-140316	03/16/2014	N	SXC0081	**0.3**	-	-	-	-	-	-	-	-	-	-	-	**144**	-	-	**145**	-	-
YVD-17	YVD-17-140601	06/01/2014	N	SXF0008	**0.52**	-	-	-	-	-	-	-	-	-	-	-	**169**	-	-	**170**	-	-
YVD-17	YVD-17-140922	09/22/2014	N	SXI0148	**0.36**	-	-	-	-	-	-	-	-	-	-	-	**183**	-	-	**185**	-	-
YVD-17	YVD-17-141215	12/15/2014	N	SXL0103	**0.19**	-	-	-	-	-	-	-	-	-	-	-	**168**	-	-	**170**	-	-
YVD-17	YVD-17-150316	03/16/2015	N	5904471	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
YVD-17	YVD-D1-150316	03/16/2015	FD	5904471	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
YVD-17	YVD-17-150617	06/17/2015	N	59010961	**0.25**	-	-	-	-	-	-	-	-	-	-	-	**160**	-	-	**160**	-	-
YVD-17	YVD-17-150924	09/24/2015	N	59020391	**0.26**	-	-	-	-	-	-	-	-	-	-	-	**170**	-	-	**170**	-	-
YVD-17	YVD-17-151216	12/16/2015	N	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**180**	-	-	**180**	-	-
YVD-17	YVD-17-160310	03/10/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**150**	-	-	**150**	-	-
YVD-17	YVD-17-160623	6/23/2016	N	59037371	0.25	U	-	-	-	-	-	-	-	-	-	-	**170**	-	-	**170**	-	-
YVD-17	YVD-17-160926	9/26/2016	N	K1611565	-	-	-	**0.095**	-	-	-	-	-	-	-	-	**182**	-	-	**182**	-	-
YVD-17	YVD-17-161215	12/15/2016	N	K1615174	-	-	-	**0.103**	-	-	-	-	-	-	-	-	**154**	-	-	**157**	J	-
YVD-17	YVD-031017-29	3/10/2017	N	K1702448	-	-	-	**0.038**	-	-	-	-	-	-	-	-	**142**	-	-	**156**	J	-
YVD-17	YVD-060617-24	6/6/2017	N	K1705754	-	-	-	**0.055**	-	-	-	-	-	-	-	-	**167**	-	-	**167**	-	-
YVD-17	YVD-092517-08	9/25/2017	N	K1710274	-	-	-	**0.046**	-	-	-	-	-	-	-	-	**179**	-	-	**179**	-	-
YVD-17	YVD-120517-26	12/5/2017	N	K1713091	-	-	-	**0.036**	-	-	-	-	-	-	-	-	**187**	-	-	**187**	-	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-17	YVD-060418-20	6/4/2018	N	874662	**39.1**	-	-	**16.5**	-	-	**0.78**	-	-	**7.20**	-	-	**2.87**	-	-	**0.30**	-	-
YVD-17	YVD-060219-12	6/2/2019	N	991939	**35.0**	-	-	**15.15**	-	-	0.62	U	-	**5.95**	-	-	2.91	U	FBK	0.24	U	FBK
YVD-18	YVD-18-130919	09/19/2013	N	SWI0142	**42.9**	-	-	**13.7**	-	-	**3.22**	-	-	**78.3**	-	-	**61.4**	-	-	5	U	-
YVD-18	YVD-18-130925	09/25/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-18	YVD-18-131211	12/11/2013	N	SWL0073	**50.4**	-	-	**17.1**	-	-	**3.02**	-	-	**71.3**	-	-	**62.9**	-	-	5	U	-
YVD-18	YVD-D2-131211	12/11/2013	FD	SWL0073	**50.2**	-	-	**16.7**	-	-	**3.06**	-	-	**70.9**	-	-	**66.5**	-	-	5	U	-
YVD-18	YVD-18-140318	03/18/2014	N	SXC0095	**51.7**	-	-	**16.5**	-	-	**3.30**	-	-	**77.5**	-	-	**66.7**	-	-	5	U	-
YVD-18	YVD-D2-140318	03/18/2014	FD	SXC0095	**52.0**	-	-	**16.6**	-	-	**3.26**	-	-	**78.0**	-	-	**62.1**	-	-	5	U	-
YVD-18	YVD-18-140603	06/03/2014	N	SXF0017	**46.8**	-	-	**15.4**	-	-	**3.24**	-	-	**77.7**	-	-	**64**	-	-	2	U	-
YVD-18	YVD-18-140923	09/23/2014	N	SXI0173	**48.5**	-	-	**15.6**	-	-	**3.80**	-	-	**81.6**	-	-	**54.7**	-	-	2.5	U	-
YVD-18	YVD-18-141216	12/16/2014	N	SXL0121	**52.7**	-	-	**17.7**	-	-	**3.63**	-	-	**81.8**	-	-	**59.6**	-	-	2.5	U	-
YVD-18	YVD-18-150317	03/17/2015	N	5904541	**56.0**	-	-	**19.0**	-	-	**3.50**	-	-	**87.0**	-	-	**64**	-	-	2.5	U	-
YVD-18	YVD-18-150617	06/17/2015	N	59010961	**55.0**	-	-	**18.0**	-	-	**4.10**	J+	MSD	**86.0**	J+	MSD	**65**	-	-	2.5	U	-
YVD-18	YVD-18-150924	09/24/2015	N	59020391	**52.0**	-	-	**19.0**	-	-	**3.50**	-	-	**77.0**	-	-	**63**	-	-	2.5	U	-
YVD-18	YVD-18-151216	12/16/2015	N	59025501	**60.0**	-	-	**20.0**	-	-	**4.00**	-	-	**91.0**	-	-	**66**	-	-	2.5	U	-
YVD-18	YVD-18-160309	03/09/2016	N	59029941	**62.0**	-	-	**21.0**	-	-	**3.80**	-	-	**89.0**	-	-	**63**	-	-	2.5	U	-
YVD-18	YVD-18-160622	6/22/2016	N	59037271	**55.0**	-	-	**19.0**	-	-	**3.70**	-	-	**86.0**	-	-	**61**	-	-	2.5	U	-
YVD-18	YVD-18-160928	9/28/2016	N	K1611629	**58.2**	-	-	**19.7**	-	-	**3.75**	-	-	**83.8**	-	-	**56.8**	-	-	**0.36**	-	-
YVD-18	YVD-18-161214	12/14/2016	N	K1615083	**62.5**	-	-	**19.6**	-	-	**3.69**	-	-	**82.5**	-	-	**56.3**	-	-	**0.38**	-	-
YVD-18	YVD-D3-161214	12/14/2016	FD	K1615083	**60.6**	-	-	**20.1**	-	-	**3.82**	-	-	**84.0**	-	-	**56.4**	-	-	**0.37**	-	-
YVD-18	YVD-030617-05	3/6/2017	N	K1702324	**65.4**	-	-	**20.5**	-	-	**3.39**	-	-	**78.8**	-	-	**55.9**	-	-	**0.40**	-	-
YVD-18	YVD-060717-31	6/7/2017	N	K1705833	**65.2**	-	-	**21.4**	-	-	**3.82**	-	-	**81.8**	-	-	**57.0**	-	-	**0.34**	-	-
YVD-18	YVD-092617-27	9/26/2017	N	K1710333	**58.5**	-	-	**18.3**	-	-	**3.64**	-	-	**77.0**	-	-	**54.8**	-	-	**0.38**	-	-
YVD-18	YVD-120417-05	12/4/2017	N	K1713026	**62.6**	-	-	**20.0**	-	-	**3.62**	-	-	**81.6**	-	-	**58.9**	-	-	**0.40**	-	-
YVD-18	YVD-031918-17	3/19/2018	N	870634	**67.5**	-	-	**22.00**	-	-	**3.78**	-	-	**83.0**	-	-	**68.2**	-	-	**0.34**	-	-
YVD-18	YVD-060318-07	6/3/2018	N	874568	**70.0**	-	-	**23.30**	-	-	**4.18**	-	-	**88.5**	-	-	**65.9**	-	-	**0.33**	-	-
YVD-18	YVD-090918-12	9/9/2018	N	880601	**67.5**	-	-	**22.05**	-	-	**4.20**	-	-	**78.0**	-	-	**67.1**	-	-	**0.35**	-	-
YVD-18	YVD-121018-09	12/10/2018	N	884857	**68.0**	-	-	**22.00**	J	MSD	**4.10**	-	-	**87.0**	-	-	**66.8**	-	-	0.32	U	FBK
YVD-18	YVD-031819-13	3/18/2019	N	988273	**75.0**	-	-	**23.70**	-	-	**4.22**	-	-	**88.0**	-	-	**74.5**	-	-	**0.73**	-	-
YVD-18	YVD-060319-23	6/3/2019	N	992053	**75.0**	-	-	**23.35**	-	-	**4.09**	-	-	**86.0**	-	-	**71.0**	-	-	**0.25**	-	-
YVD-18	YVD-090919-06	9/9/2019	N	998357	**65.0**	-	-	**20.65**	-	-	**4.08**	-	-	**76.5**	-	-	**61.5**	-	-	**0.38**	-	-
YVD-18 (FD)	YVD-090919-08	9/9/2019	FD	998357	**65.5**	-	-	**20.75**	-	-	**4.09**	-	-	**77.0**	-	-	**60.9**	-	-	**0.38**	-	-
YVD-18	YVD-120919-08	12/9/2019	N	902276	**70.0**			**22.95**			**4.18**			**86.0**	J	MSD	**68.1**			**0.34**		

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-17	YVD-060418-20	6/4/2018	N	874662	**0.66**	-	-	0.05	U	-	**6.54**	-	-	0.09	U	FBK	-	-	-	0.5	UJ	MSD
YVD-17	YVD-060219-12	6/2/2019	N	991939	**0.49**	-	-	0.05	U	-	**3.50**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-18	YVD-18-130919	09/19/2013	N	SWI0142	-	-	-	-	-	-	**122**	-	-	-	-	-	0.1	U	-	-	R	FBK
YVD-18	YVD-18-130925	09/25/2013	N	SWI0175	**13.6**	-	-	2	U	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-18	YVD-18-131211	12/11/2013	N	SWL0073	**14.2**	J	FDP	2	U	-	**116**	-	-	-	-	-	0.02	UJ	MSD	1.5	UJ	MSD
YVD-18	YVD-D2-131211	12/11/2013	FD	SWL0073	**23.5**	J	FDP	2	U	-	**129**	-	-	-	-	-	0.02	UJ	MSD	0.2	UJ	MSD
YVD-18	YVD-18-140318	03/18/2014	N	SXC0095	**18.8**	-	-	2	U	-	**147**	J-	MSD	-	-	-	**0.134**	J	FDP	**0.358**	-	-
YVD-18	YVD-D2-140318	03/18/2014	FD	SXC0095	**17.1**	-	-	2	U	-	**140**	J-	MSD	-	-	-	**0.28**	J	FDP	**0.342**	-	-
YVD-18	YVD-18-140603	06/03/2014	N	SXF0017	**16.9**	-	-	0.8	U	-	**135**	J-	MSD	-	-	-	0.1	U	-	**0.796**	-	-
YVD-18	YVD-18-140923	09/23/2014	N	SXI0173	**13.8**	-	-	1	U	-	**111**	-	-	-	-	-	0.1	U	-	**0.335**	J+	MSD
YVD-18	YVD-18-141216	12/16/2014	N	SXL0121	**16.5**	-	-	1	U	-	**131**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-18	YVD-18-150317	03/17/2015	N	5904541	**20**	J-	MSD	1	U	-	**140**	J-	MSD	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-18	YVD-18-150617	06/17/2015	N	59010961	**17**	-	-	1	U	-	**120**	-	-	-	-	-	0.1	U	-	0.25	UJ	MSD
YVD-18	YVD-18-150924	09/24/2015	N	59020391	**20**	J+	MSD	1	U	-	**140**	J-	MSD	-	-	-	0.1	UJ	MSD	0.25	UJ	MSD
YVD-18	YVD-18-151216	12/16/2015	N	59025501	**23**	-	-	1	U	-	**150**	-	-	-	-	-	-	R	MSD	-	R	MSD
YVD-18	YVD-18-160309	03/09/2016	N	59029941	**22**	-	-	1	U	-	**150**	J	DUP	-	-	-	0.1	U	-	0.25	UJ	FDP, MSD
YVD-18	YVD-18-160622	6/22/2016	N	59037271	**21**	-	-	1	U	-	**140**	-	-	-	-	-	0.1	UJ	MSD	-	R	MSD
YVD-18	YVD-18-160928	9/28/2016	N	K1611629	**20.5**	-	-	0.10	U	-	**135**	-	-	-	-	-	0.050	U	MBK	0.5	U	-
YVD-18	YVD-18-161214	12/14/2016	N	K1615083	**21.5**	-	-	0.10	U	-	**139**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-18	YVD-D3-161214	12/14/2016	FD	K1615083	**21.5**	-	-	0.10	U	-	**142**	-	-	-	-	-	**0.115**	-	-	0.5	U	-
YVD-18	YVD-030617-05	3/6/2017	N	K1702324	**23.7**	J	HTQ	**0.04**	J	HTQ	**140**	-	-	-	-	-	1	U	-	0.5	U	-
YVD-18	YVD-060717-31	6/7/2017	N	K1705833	**22.9**	-	-	0.10	U	-	**135**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-18	YVD-092617-27	9/26/2017	N	K1710333	**21.6**	-	-	0.10	U	-	**137**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-18	YVD-120417-05	12/4/2017	N	K1713026	**24.4**	-	-	0.10	U	-	**144**	-	-	-	-	-	0.050	U	-	0.5	U	-
YVD-18	YVD-031918-17	3/19/2018	N	870634	**27.7**	-	-	0.05	U	-	**161**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-18	YVD-060318-07	6/3/2018	N	874568	**26.3**	-	-	0.05	U	-	**147**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-18	YVD-090918-12	9/9/2018	N	880601	**26.0**	-	-	0.05	U	-	**127**	-	-	0.07	U	-	-	-	-	-	R	MSD
YVD-18	YVD-121018-09	12/10/2018	N	884857	**27.0**	-	-	0.05	U	-	**145**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-18	YVD-031819-13	3/18/2019	N	988273	**29.8**	-	-	0.05	U	-	**171**	-	-	0.07	U	-	-	-	-	0.5	U	-
YVD-18	YVD-060319-23	6/3/2019	N	992053	**28.4**	-	-	0.05	U	-	**161**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-18	YVD-090919-06	9/9/2019	N	998357	**28.4**	-	-	0.05	U	-	**130**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-18 (FD)	YVD-090919-08	9/9/2019	FD	998357	**28.3**	-	-	0.05	U	-	**130**	-	-	0.07	U	-	-	-	-	0.5	UJ	MSD
YVD-18	YVD-120919-08	12/9/2019	N	902276	**28.8**			0.05	U		**157**			0.07	U					0.5	UJ	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
YVD-17	YVD-060418-20	6/4/2018	N	874662	-	-	-	-	-	-	-	-	-	0.07	U	-	**160**	-	-	**160**	-	-
YVD-17	YVD-060219-12	6/2/2019	N	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	**149**	-	-	**149**	-	-
YVD-18	YVD-18-130919	09/19/2013	N	SWI0142	-	-	-	-	-	-	0.1	U	-	-	-	-	**119**	-	-	**120**	-	-
YVD-18	YVD-18-130925	09/25/2013	N	SWI0175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YVD-18	YVD-18-131211	12/11/2013	N	SWL0073	-	-	-	-	-	-	-	-	-	0.06	U	-	**109**	-	-	**110**	-	-
YVD-18	YVD-D2-131211	12/11/2013	FD	SWL0073	-	-	-	-	-	-	-	-	-	0.06	U	-	**114**	-	-	**115**	-	-
YVD-18	YVD-18-140318	03/18/2014	N	SXC0095	**0.068**	-	-	-	-	-	-	-	-	-	-	-	**119**	-	-	**120**	-	-
YVD-18	YVD-D2-140318	03/18/2014	FD	SXC0095	**0.082**	-	-	-	-	-	-	-	-	-	-	-	**124**	-	-	**125**	-	-
YVD-18	YVD-18-140603	06/03/2014	N	SXF0017	**0.071**	J+	FBK	-	-	-	-	-	-	-	-	-	**117**	-	-	**118**	-	-
YVD-18	YVD-18-140923	09/23/2014	N	SXI0173	**0.086**	-	-	-	-	-	-	-	-	-	-	-	**114**	-	-	**115**	-	-
YVD-18	YVD-18-141216	12/16/2014	N	SXL0121	0.1	U	-	-	-	-	-	-	-	-	-	-	**114**	-	-	**115**	-	-
YVD-18	YVD-18-150317	03/17/2015	N	5904541	0.25	U	-	-	-	-	-	-	-	-	-	-	**110**	-	-	**110**	-	-
YVD-18	YVD-18-150617	06/17/2015	N	59010961	0.25	U	-	-	-	-	-	-	-	-	-	-	**110**	-	-	**110**	-	-
YVD-18	YVD-18-150924	09/24/2015	N	59020391	0.25	U	-	-	-	-	-	-	-	-	-	-	**120**	-	-	**120**	-	-
YVD-18	YVD-18-151216	12/16/2015	N	59025501	0.25	UJ	MSD	-	-	-	-	-	-	-	-	-	**120**	-	-	**120**	-	-
YVD-18	YVD-18-160309	03/09/2016	N	59029941	0.25	U	-	-	-	-	-	-	-	-	-	-	**120**	-	-	**120**	-	-
YVD-18	YVD-18-160622	6/22/2016	N	59037271	0.25	U	-	-	-	-	-	-	-	-	-	-	**130**	-	-	**130**	-	-
YVD-18	YVD-18-160928	9/28/2016	N	K1611629	-	-	-	**0.013**	-	-	-	-	-	-	-	-	**114**	-	-	**114**	-	-
YVD-18	YVD-18-161214	12/14/2016	N	K1615083	-	-	-	**0.043**	-	-	-	-	-	-	-	-	**111**	-	-	**111**	-	-
YVD-18	YVD-D3-161214	12/14/2016	FD	K1615083	-	-	-	**0.019**	-	-	-	-	-	-	-	-	**111**	-	-	**111**	-	-
YVD-18	YVD-030617-05	3/6/2017	N	K1702324	-	-	-	**0.024**	-	-	-	-	-	-	-	-	**110**	-	-	**110**	-	-
YVD-18	YVD-060717-31	6/7/2017	N	K1705833	-	-	-	**0.018**	-	-	-	-	-	-	-	-	**114**	-	-	**114**	-	-
YVD-18	YVD-092617-27	9/26/2017	N	K1710333	-	-	-	**0.018**	-	-	-	-	-	-	-	-	**115**	-	-	**115**	-	-
YVD-18	YVD-120417-05	12/4/2017	N	K1713026	-	-	-	0.017	U	MBK	-	-	-	-	-	-	**114**	-	-	**114**	-	-
YVD-18	YVD-031918-17	3/19/2018	N	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	**111**	-	-	**111**	-	-
YVD-18	YVD-060318-07	6/3/2018	N	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	**110**	-	-	**110**	-	-
YVD-18	YVD-090918-12	9/9/2018	N	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	**112**	-	-	**112**	-	-
YVD-18	YVD-121018-09	12/10/2018	N	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	**115**	-	-	**115**	-	-
YVD-18	YVD-031819-13	3/18/2019	N	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	**118**	-	-	**118**	-	-
YVD-18	YVD-060319-23	6/3/2019	N	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	**118**	-	-	**118**	-	-
YVD-18	YVD-090919-06	9/9/2019	N	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**115**	-	-	**115**	-	-
YVD-18 (FD)	YVD-090919-08	9/9/2019	FD	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	**114**	-	-	**114**	-	-
YVD-18	YVD-120919-08	12/9/2019	N	902276										0.07	U		**113**			**113**		

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Equipment Blank	YVD-EB-130918	09/18/2013	EB	SWI0123	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-130925	09/25/2013	EB	SWI0175	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-131212	12/12/2013	EB	SWL0078	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-140317	03/17/2014	EB	SXC0081	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-140318	03/18/2014	EB	SXC0095	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-140319	03/19/2014	EB	SXC0107	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-140604	06/04/2014	EB	SXF0025	1	U	-	0.5	U	-	1	U	-	0.5	U	-	**1.46**	-	-	0.5	U	-
Equipment Blank	YVD-EB-140924	09/24/2014	EB	SXI0173	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-141217	12/17/2014	EB	SXL0144	1	U	-	0.5	U	-	1	U	-	0.5	U	-	**0.9**	-	-	0.5	U	-
Equipment Blank	YVD-EB-150617	06/17/2015	EB	59011021	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-150925	09/25/2015	EB	59020431	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-151216	12/16/2015	EB	59025501	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-160310	03/10/2016	EB	59029941	1	U	-	0.5	U	-	1	U	-	**1.1**	-	-	**1.1**	-	-	**0.67**	-	-
Equipment Blank	YVD-EB-160623	6/23/2016	EB	59037371	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Equipment Blank	YVD-EB-160926	9/26/2016	EB	K1611506	**0.097**	-	-	**0.0346**	-	-	**0.1**	J	-	**0.13**	J	-	0.2	U	-	0.2	U	-
Equipment Blank	YVD-EB-160927	9/27/2016	EB	K1611629	**0.011**	J	-	**0.0004**	J	-	0.2	U	-	**0.04**	J	-	0.1	U	-	0.1	U	-
Equipment Blank	YVD-EB-160928	9/28/2016	EB	K1611629	**0.05**	J	-	0.05	U	-	0.2	U	-	**0.04**	J	-	**0.03**	J	-	0.1	U	-
Equipment Blank	YVD-EB1-161214	12/14/2016	EB	K1615083	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.2	U	-	0.2	U	-
Equipment Blank	YVD-EB2-161215	12/15/2016	EB	K1615126	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	MBK	0.2	U	-	0.2	U	-
Equipment Blank	YVD-EB3-161216	12/16/2016	EB	K1615174	0.035	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	MBK	0.2	U	-	0.2	U	-
Field Blank	YVD-F1-130916	09/16/2013	FB	SWI0113	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-130917	09/17/2013	FB	SWI0113	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-130918	09/18/2013	FB	SWI0123	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-130918	09/18/2013	FB	SWI0138	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F5-130919	09/19/2013	FB	SWI0142	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F6-130923	09/23/2013	FB	SWI0178	1	U	-	0.5	U	-	1	U	-	0.5	U	-	-	-	-	-	-	-
Field Blank	YVD-F7-130924	09/24/2013	FB	SWI0175	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F7-130926	09/26/2013	FB	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-131209	12/09/2013	FB	SWL0055	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-131210	12/10/2013	FB	SWL0063	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-131211	12/11/2013	FB	SWL0073	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-131212	12/12/2013	FB	SWL0078	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-140316	03/16/2014	FB	SXC0081	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-140317	03/17/2014	FB	SXC0095	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-140318	03/18/2014	FB	SXC0107	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-140319	03/19/2014	FB	SXC0107	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Equipment Blank	YVD-EB-130918	09/18/2013	EB	SWI0123	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Equipment Blank	YVD-EB-130925	09/25/2013	EB	SWI0175	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Equipment Blank	YVD-EB-131212	12/12/2013	EB	SWL0078	0.2	U	-	0.2	U	-	0.5	U	-	0.02	U	-	0.02	U	-	0.2	U	-
Equipment Blank	YVD-EB-140317	03/17/2014	EB	SXC0081	0.2	U	-	0.2	U	-	0.5	U	-	**0.124**	-	-	**0.124**	-	-	0.25	U	-
Equipment Blank	YVD-EB-140318	03/18/2014	EB	SXC0095	0.2	U	-	0.2	U	-	0.5	U	-	**0.13**	-	-	**0.13**	-	-	0.25	U	-
Equipment Blank	YVD-EB-140319	03/19/2014	EB	SXC0107	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Equipment Blank	YVD-EB-140604	06/04/2014	EB	SXF0025	0.2	U	-	0.2	U	-	**1.24**	-	-	0.1	U	-	0.1	U	-	0.25	U	-
Equipment Blank	YVD-EB-140924	09/24/2014	EB	SXI0173	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	**1.2**	-	-
Equipment Blank	YVD-EB-141217	12/17/2014	EB	SXL0144	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Equipment Blank	YVD-EB-150617	06/17/2015	EB	59011021	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	**0.37**	-	-
Equipment Blank	YVD-EB-150925	09/25/2015	EB	59020431	0.2	U	-	0.2	U	-	0.5	U	-	**0.1**	-	-	**0.1**	-	-	**0.38**	-	-
Equipment Blank	YVD-EB-151216	12/16/2015	EB	59025501	0.2	U	-	0.2	U	-	0.5	U	-	**0.12**	J-	MSD	**0.12**	J-	MSD	0.25	U	-
Equipment Blank	YVD-EB-160310	03/10/2016	EB	59029941	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	**1.9**	-	-
Equipment Blank	YVD-EB-160623	6/23/2016	EB	59037371	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	**0.43**	-	-
Equipment Blank	YVD-EB-160926	9/26/2016	EB	K1611506	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	MBK	0.050	U	MBK	-	R	MSD
Equipment Blank	YVD-EB-160927	9/27/2016	EB	K1611629	0.05	UJ	HTQ	0.05	UJ	HTQ	**0.08**	J	-	0.050	U	MBK	0.050	U	MBK	0.5	U	-
Equipment Blank	YVD-EB-160928	9/28/2016	EB	K1611629	0.05	U	-	0.05	U	-	**0.51**	-	-	0.050	U	MBK	0.050	U	MBK	0.5	U	-
Equipment Blank	YVD-EB1-161214	12/14/2016	EB	K1615083	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Equipment Blank	YVD-EB2-161215	12/15/2016	EB	K1615126	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Equipment Blank	YVD-EB3-161216	12/16/2016	EB	K1615174	0.1	U	-	0.10	U	-	**0.4**	-	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-F1-130916	09/16/2013	FB	SWI0113	0.2	U	-	0.2	U	-	**0.53**	-	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-130917	09/17/2013	FB	SWI0113	0.2	U	-	0.2	U	-	**0.51**	-	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-130918	09/18/2013	FB	SWI0123	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F4-130918	09/18/2013	FB	SWI0138	0.2	U	-	0.2	U	-	0.5	U	-	**0.12**	-	-	**0.12**	-	-	0.25	U	-
Field Blank	YVD-F5-130919	09/19/2013	FB	SWI0142	-	-	-	-	-	-	0.5	U	-	0.1	U	-	0.1	U	-	**0.373**	-	-
Field Blank	YVD-F6-130923	09/23/2013	FB	SWI0178	-	-	-	-	-	-	-	-	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F7-130924	09/24/2013	FB	SWI0175	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F7-130926	09/26/2013	FB	SWI0190	0.2	U	-	0.2	U	-	0.5	U	-	-	-	-	-	-	-	-	-	-
Field Blank	YVD-F1-131209	12/09/2013	FB	SWL0055	0.2	U	-	0.2	U	-	0.5	U	-	0.02	U	-	0.02	U	-	**0.33**	-	-
Field Blank	YVD-F2-131210	12/10/2013	FB	SWL0063	0.2	U	-	0.2	U	-	0.5	U	-	0.02	U	-	0.02	U	-	**3.7**	-	-
Field Blank	YVD-F3-131211	12/11/2013	FB	SWL0073	0.2	U	-	0.2	U	-	0.5	U	-	0.02	U	-	0.02	U	-	**0.43**	-	-
Field Blank	YVD-F4-131212	12/12/2013	FB	SWL0078	0.2	U	-	0.2	U	-	0.5	U	-	0.02	U	-	0.02	U	-	0.2	U	-
Field Blank	YVD-F1-140316	03/16/2014	FB	SXC0081	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-140317	03/17/2014	FB	SXC0095	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-140318	03/18/2014	FB	SXC0107	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F4-140319	03/19/2014	FB	SXC0107	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Equipment Blank	YVD-EB-130918	09/18/2013	EB	SWI0123	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-130925	09/25/2013	EB	SWI0175	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-131212	12/12/2013	EB	SWL0078	-	-	-	-	-	-	-	-	-	0.06	U	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-140317	03/17/2014	EB	SXC0081	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-140318	03/18/2014	EB	SXC0095	-	-	-	**0.05**	-	-	-	-	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-140319	03/19/2014	EB	SXC0107	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-140604	06/04/2014	EB	SXF0025	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-140924	09/24/2014	EB	SXI0173	-	-	-	**0.062**	-	-	-	-	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-141217	12/17/2014	EB	SXL0144	-	-	-	0.1	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-150617	06/17/2015	EB	59011021	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Equipment Blank	YVD-EB-150925	09/25/2015	EB	59020431	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Equipment Blank	YVD-EB-151216	12/16/2015	EB	59025501	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Equipment Blank	YVD-EB-160310	03/10/2016	EB	59029941	-	-	-	0.25	U	-	-	-	-	-	-	-	**15**	-	-	**15**	-	-
Equipment Blank	YVD-EB-160623	6/23/2016	EB	59037371	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Equipment Blank	YVD-EB-160926	9/26/2016	EB	K1611506	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Equipment Blank	YVD-EB-160927	9/27/2016	EB	K1611629	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Equipment Blank	YVD-EB-160928	9/28/2016	EB	K1611629	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Equipment Blank	YVD-EB1-161214	12/14/2016	EB	K1615083	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Equipment Blank	YVD-EB2-161215	12/15/2016	EB	K1615126	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Equipment Blank	YVD-EB3-161216	12/16/2016	EB	K1615174	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-F1-130916	09/16/2013	FB	SWI0113	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F2-130917	09/17/2013	FB	SWI0113	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-130918	09/18/2013	FB	SWI0123	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F4-130918	09/18/2013	FB	SWI0138	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F5-130919	09/19/2013	FB	SWI0142	-	-	-	-	-	-	**0.243**	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F6-130923	09/23/2013	FB	SWI0178	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F7-130924	09/24/2013	FB	SWI0175	-	-	-	-	-	-	0.1	U	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F7-130926	09/26/2013	FB	SWI0190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Blank	YVD-F1-131209	12/09/2013	FB	SWL0055	-	-	-	-	-	-	-	-	-	0.06	U	-	4	U	-	4	U	-
Field Blank	YVD-F2-131210	12/10/2013	FB	SWL0063	-	-	-	-	-	-	-	-	-	0.06	U	-	4	U	-	4	U	-
Field Blank	YVD-F3-131211	12/11/2013	FB	SWL0073	-	-	-	-	-	-	-	-	-	0.06	U	-	4	U	-	4	U	-
Field Blank	YVD-F4-131212	12/12/2013	FB	SWL0078	-	-	-	-	-	-	-	-	-	0.06	U	-	4	U	-	4	U	-
Field Blank	YVD-F1-140316	03/16/2014	FB	SXC0081	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F2-140317	03/17/2014	FB	SXC0095	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-140318	03/18/2014	FB	SXC0107	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F4-140319	03/19/2014	FB	SXC0107	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-F1-140601	06/01/2014	FB	SXF0008	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-140602	06/02/2014	FB	SXF0017	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-140603	06/03/2014	FB	SXF0025	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-140921	09/21/2014	FB	SXI0148	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-140922	09/22/2014	FB	SXI0148	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-140923	09/23/2014	FB	SXI0158	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-140924	09/24/2014	FB	SXI0173	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-141215	12/15/2014	FB	SXL0103	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-141215	12/15/2014	FB	SXL0108	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-141216	12/16/2014	FB	SXL0121	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-141217	12/17/2014	FB	SXL0144	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-150315	03/15/2015	FB	5904471	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-150316	03/16/2015	FB	5904541	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-150317	03/17/2015	FB	5904651	**1.2**	-	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-150615	06/15/2015	FB	59010751	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-150616	06/16/2015	FB	59010961	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-150617	06/17/2015	FB	59011021	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-150922	09/22/2015	FB	59020141	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-150923	09/23/2015	FB	59020281	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-150923	09/23/2015	FB	59020391	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-150924	09/24/2015	FB	59020391	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F5-150925	09/25/2015	FB	59020431	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-151213	12/13/2015	FB	59025351	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-151214	12/14/2015	FB	59025431	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-151215	12/15/2015	FB	59025501	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-151216	12/16/2015	FB	59025501	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-160307	03/07/2016	FB	59029521	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-160308	03/08/2016	FB	59029711	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-160309	03/09/2016	FB	59029941	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-160310	03/10/2016	FB	59029941	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F1-160620	6/20/2016	FB	59037101	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F2-160621	6/21/2016	FB	59037151	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F3-160622	6/22/2016	FB	59037271	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-F4-160623	6/23/2016	FB	59037371	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Field Blank	YVD-FB-160926	9/26/2016	FB	K1611506	0.02	U	MBK	**0.0025**	J	-	**0.08**	J	-	**0.03**	J	-	0.2	U	-	0.2	U	-
Field Blank	YVD-FB-160927	9/27/2016	FB	K1611565	0.02	U	MBK	0.05	U	-	0.2	U	-	0.2	U	-	0.2	U	-	0.2	U	-
Field Blank	YVD-FB-160928	9/28/2016	FB	K1611629	**0.05**	J	-	0.05	U	-	0.2	U	-	**0.05**	J	-	0.1	U	-	0.1	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-F1-140601	06/01/2014	FB	SXF0008	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-140602	06/02/2014	FB	SXF0017	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-140603	06/03/2014	FB	SXF0025	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F1-140921	09/21/2014	FB	SXI0148	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-140922	09/22/2014	FB	SXI0148	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-140923	09/23/2014	FB	SXI0158	0.2	U	-	0.2	U	-	0.5	U	-	**0.128**	-	-	**0.128**	-	-	0.25	U	-
Field Blank	YVD-F4-140924	09/24/2014	FB	SXI0173	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F1-141215	12/15/2014	FB	SXL0103	0.2	UJ	DUP	0.2	U	-	0.5	UJ	DUP	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-141215	12/15/2014	FB	SXL0108	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-141216	12/16/2014	FB	SXL0121	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F4-141217	12/17/2014	FB	SXL0144	-	R	HTQ	-	R	HTQ	0.5	U	-	**0.101**	-	-	**0.101**	-	-	0.25	U	-
Field Blank	YVD-F1-150315	03/15/2015	FB	5904471	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-150316	03/16/2015	FB	5904541	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-150317	03/17/2015	FB	5904651	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F1-150615	06/15/2015	FB	59010751	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-150616	06/16/2015	FB	59010961	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-150617	06/17/2015	FB	59011021	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F1-150922	09/22/2015	FB	59020141	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	**0.26**	-	-
Field Blank	YVD-F2-150923	09/23/2015	FB	59020281	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-150923	09/23/2015	FB	59020391	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F4-150924	09/24/2015	FB	59020391	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F5-150925	09/25/2015	FB	59020431	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F1-151213	12/13/2015	FB	59025351	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-151214	12/14/2015	FB	59025431	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-151215	12/15/2015	FB	59025501	0.2	U	-	0.2	U	-	0.5	U	-	-	R	MSD	-	R	MSD	0.25	U	-
Field Blank	YVD-F4-151216	12/16/2015	FB	59025501	0.2	U	-	0.2	U	-	0.5	U	-	-	R	MSD	-	R	MSD	0.25	U	-
Field Blank	YVD-F1-160307	03/07/2016	FB	59029521	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-160308	03/08/2016	FB	59029711	0.2	U	-	0.2	U	-	0.5	U	-	**0.19**	-	-	**0.19**	-	-	0.25	U	-
Field Blank	YVD-F3-160309	03/09/2016	FB	59029941	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	**0.3**	-	-
Field Blank	YVD-F4-160310	03/10/2016	FB	59029941	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F1-160620	6/20/2016	FB	59037101	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F2-160621	6/21/2016	FB	59037151	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-F3-160622	6/22/2016	FB	59037271	0.2	U	-	0.2	U	-	0.5	U	-	**0.22**	-	-	**0.22**	-	-	**0.36**	-	-
Field Blank	YVD-F4-160623	6/23/2016	FB	59037371	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Field Blank	YVD-FB-160926	9/26/2016	FB	K1611506	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	MBK	0.050	U	MBK	-	R	MSD
Field Blank	YVD-FB-160927	9/27/2016	FB	K1611565	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	MBK	0.050	U	MBK	-	R	MSD
Field Blank	YVD-FB-160928	9/28/2016	FB	K1611629	0.05	U	-	0.05	U	-	**3.61**	-	-	0.050	U	MBK	0.050	U	MBK	0.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-F1-140601	06/01/2014	FB	SXF0008	-	-	-	0.05	U	-	-	-	-	-	-	-	**4.25**	-	-	**4.25**	-	-
Field Blank	YVD-F2-140602	06/02/2014	FB	SXF0017	-	-	-	**0.061**	-	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-140603	06/03/2014	FB	SXF0025	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F1-140921	09/21/2014	FB	SXI0148	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F2-140922	09/22/2014	FB	SXI0148	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-140923	09/23/2014	FB	SXI0158	-	-	-	0.05	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F4-140924	09/24/2014	FB	SXI0173	-	-	-	**0.054**	-	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F1-141215	12/15/2014	FB	SXL0103	-	-	-	0.1	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F2-141215	12/15/2014	FB	SXL0108	-	-	-	0.1	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-141216	12/16/2014	FB	SXL0121	-	-	-	0.1	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F4-141217	12/17/2014	FB	SXL0144	-	-	-	0.1	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F1-150315	03/15/2015	FB	5904471	-	-	-	0.25	U	-	-	-	-	-	-	-	**15**	-	-	**15**	-	-
Field Blank	YVD-F2-150316	03/16/2015	FB	5904541	-	-	-	0.25	U	-	-	-	-	-	-	-	**7.5**	-	-	**7.5**	-	-
Field Blank	YVD-F3-150317	03/17/2015	FB	5904651	-	-	-	0.25	U	-	-	-	-	-	-	-	**4.5**	-	-	**4.5**	-	-
Field Blank	YVD-F1-150615	06/15/2015	FB	59010751	-	-	-	0.25	U	-	-	-	-	-	-	-	**10**	-	-	**10**	-	-
Field Blank	YVD-F2-150616	06/16/2015	FB	59010961	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F3-150617	06/17/2015	FB	59011021	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F1-150922	09/22/2015	FB	59020141	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F2-150923	09/23/2015	FB	59020281	-	-	-	**0.26**	-	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-150923	09/23/2015	FB	59020391	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F4-150924	09/24/2015	FB	59020391	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F5-150925	09/25/2015	FB	59020431	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F1-151213	12/13/2015	FB	59025351	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F2-151214	12/14/2015	FB	59025431	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F3-151215	12/15/2015	FB	59025501	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F4-151216	12/16/2015	FB	59025501	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F1-160307	03/07/2016	FB	59029521	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F2-160308	03/08/2016	FB	59029711	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-160309	03/09/2016	FB	59029941	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F4-160310	03/10/2016	FB	59029941	-	-	-	0.25	U	-	-	-	-	-	-	-	**13**	-	-	**13**	-	-
Field Blank	YVD-F1-160620	6/20/2016	FB	59037101	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F2-160621	6/21/2016	FB	59037151	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Field Blank	YVD-F3-160622	6/22/2016	FB	59037271	-	-	-	0.25	U	-	-	-	-	-	-	-	**5**	-	-	**5**	-	-
Field Blank	YVD-F4-160623	6/23/2016	FB	59037371	-	-	-	0.25	U	-	-	-	-	-	-	-	**10**	-	-	**10**	-	-
Field Blank	YVD-FB-160926	9/26/2016	FB	K1611506	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-FB-160927	9/27/2016	FB	K1611565	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-FB-160928	9/28/2016	FB	K1611629	-	-	-	0.01	U	-	-	-	-	-	-	-	15	U	-	15	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-FB-160929	9/29/2016	FB	K1611698	**0.07**	J	-	0.05	U	-	0.2	U	-	**0.05**	J	-	0.2	U	-	0.2	U	-
Field Blank	YVD-FB1-161212	12/12/2016	FB	K1615029	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	MBK	0.2	U	-	0.2	U	-
Field Blank	YVD-FB2-161213	12/13/2016	FB	K1615045	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	MBK	0.2	U	-	0.2	U	-
Field Blank	YVD-FB3-161214	12/14/2016	FB	K1615083	0.021	U	MBK	0.0053	U	-	0.21	U	-	0.21	U	MBK	0.2	U	-	0.2	U	-
Field Blank	YVD-FB4-161215	12/15/2016	FB	K1615126	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	MBK	0.2	U	-	0.2	U	-
Field Blank	YVD-FB5-161216	12/16/2016	FB	K1615174	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	MBK	0.2	U	-	0.2	U	-
Field Blank	YVD-030617-01	3/6/2017	FB	K1702228	0.021	U	MBK	0.0053	U	MBK	**0.08**	J	-	**0.04**	J	-	0.2	U	-	0.2	U	-
Field Blank	YVD-030717-06	3/7/2017	FB	K1702324	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.2	U	-	0.2	U	-
Field Blank	YVD-030817-11	3/8/2017	FB	K1702324	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.2	U	-	0.2	U	-
Field Blank	YVD-030917-17	3/9/2017	FB	K1702404	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.2	U	-	0.2	U	-
Field Blank	YVD-031017-26	3/10/2017	FB	K1702448	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.2	U	-	0.2	U	-
Field Blank	YVD-031317-30	3/13/2017	FB	K1702489	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.2	U	-	0.2	U	-
Field Blank	YVD-060417-01	6/4/2017	FB	K1705702	0.025	U	MBK	0.0053	U	MBK	0.021	U	-	**0.11**	J	-	21	U	-	0.2	U	-
Field Blank	YVD-060517-07	6/5/2017	FB	K1705702	0.029	U	MBK	0.0053	U	MBK	**0.06**	J	-	**0.11**	J	-	0.2	U	-	0.2	U	-
Field Blank	YVD-060617-17	6/6/2017	FB	K1705754	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.2	U	-	0.2	U	-
Field Blank	YVD-060717-28	6/7/2017	FB	K1705833	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	**0.02**	J	-	0.2	U	-	0.2	U	-
Field Blank	YVD-092517-01	9/25/2017	FB	K1710274	0.021	U	MBK	**0.0018**	J	-	0.21	U	MBK	0.21	U	MBK	0.20	U	-	0.20	U	-
Field Blank	YVD-092617-16	9/26/2017	FB	K1710333	0.026	U	MBK	0.0076	U	MBK	**0.09**	J	-	0.21	U	MBK	0.20	U	-	0.20	U	-
Field Blank	YVD-120417-01	12/4/2017	FB	K1713026	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	-	0.20	U	-	0.20	U	-
Field Blank	YVD-120517-32	12/5/2017	FB	K1713091	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	**0.07**	J	-	**0.42**	-	-	0.20	U	-
Field Blank	YVD-120617-25	12/6/2017	FB	K1713157	0.021	U	MBK	0.0053	U	MBK	0.21	U	-	0.21	U	MBK	0.20	U	-	0.20	U	-
Field Blank	YVD-031818-01	3/18/2018	FB	870610	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-031918-10	3/19/2018	FB	870634	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-060318-01	6/3/2018	FB	874568	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-060418-12	6/4/2018	FB	874568	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-060518-26	6/5/2018	FB	874860	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-061218-33	6/12/2018	FB	875438	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-090918-01	9/9/2018	FB	880601	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-121018-01	12/10/2018	FB	884857	0.4	U	-	0.06	UJ	MSD	0.62	U	-	0.7	U	-	**0.28**	-	-	**0.10**	-	-
Field Blank	YVD-121118-12	12/11/2018	FB	884939	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	**0.14**	-	-	0.1	U	-
Field Blank	YVD-031719-01	3/17/2019	FB	988239	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	**0.22**	-	-	0.12	U	-
Field Blank	YVD-031819-11	3/18/2019	FB	988273	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-032019-20	3/20/2019	FB	988477	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-060219-01	6/2/2019	FB	991939	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	**11.0**	-	-	**0.63**	-	-
Field Blank	YVD-060319-13	6/3/2019	FB	992053	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	**0.31**	-	-	0.1	U	-
Field Blank	YVD-060419-26	6/4/2019	FB	992242	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-090919-01	9/9/2019	FB	998357	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-FB-160929	9/29/2016	FB	K1611698	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	MBK	0.050	U	MBK	-	R	MSD
Field Blank	YVD-FB1-161212	12/12/2016	FB	K1615029	0.1	U	HTQ	0.10	UJ	HTQ	0.2	U	MBK	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-FB2-161213	12/13/2016	FB	K1615045	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-FB3-161214	12/14/2016	FB	K1615083	0.1	U	-	0.10	U	-	**0.35**	-	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-FB4-161215	12/15/2016	FB	K1615126	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-FB5-161216	12/16/2016	FB	K1615174	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-030617-01	3/6/2017	FB	K1702228	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	**0.2**	J	-
Field Blank	YVD-030717-06	3/7/2017	FB	K1702324	0.1	UJ	HTQ	0.10	UJ	HTQ	0.2	U	-	1	U	-	1	U	-	0.5	U	-
Field Blank	YVD-030817-11	3/8/2017	FB	K1702324	0.1	U	-	0.10	U	-	0.03	J	-	1	U	-	1	U	-	0.5	U	-
Field Blank	YVD-030917-17	3/9/2017	FB	K1702404	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-031017-26	3/10/2017	FB	K1702448	0.1	U	-	0.10	U	-	0.26	-	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-031317-30	3/13/2017	FB	K1702489	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-060417-01	6/4/2017	FB	K1705702	5.3	U	-	21	U	-	5.3	U	-	0.050	U	-	0.050	U	-	**0.7**	-	-
Field Blank	YVD-060517-07	6/5/2017	FB	K1705702	0.1	U	-	0.10	U	-	**0.25**	-	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-060617-17	6/6/2017	FB	K1705754	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-060717-28	6/7/2017	FB	K1705833	0.1	U	-	0.10	U	-	0.2	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-092517-01	9/25/2017	FB	K1710274	0.10	U	-	0.10	U	-	0.20	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-092617-16	9/26/2017	FB	K1710333	0.10	U	-	0.10	U	-	**0.86**	-	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-120417-01	12/4/2017	FB	K1713026	0.10	U	-	0.10	U	-	0.20	U	-	0.050	U	-	0.050	U	-	0.5	U	-
Field Blank	YVD-120517-32	12/5/2017	FB	K1713091	0.10	U	HTQ	0.10	UJ	HTQ	**0.71**	-	-	0.050	U	-	0.050	U	-	0.5	UJ	MSD
Field Blank	YVD-120617-25	12/6/2017	FB	K1713157	0.10	U	-	0.10	U	-	0.20	U	-	0.050	U	MBK	0.050	U	MBK	0.5	U	-
Field Blank	YVD-031818-01	3/18/2018	FB	870610	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-031918-10	3/19/2018	FB	870634	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-060318-01	6/3/2018	FB	874568	0.05	U	-	0.05	U	-	0.1	U	-	**0.18**	-	-	-	-	-	0.5	U	-
Field Blank	YVD-060418-12	6/4/2018	FB	874568	0.05	U	-	0.05	U	-	0.1	U	-	**0.08**	-	-	-	-	-	0.5	U	-
Field Blank	YVD-060518-26	6/5/2018	FB	874860	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	UJ	MSD
Field Blank	YVD-061218-33	6/12/2018	FB	875438	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-090918-01	9/9/2018	FB	880601	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	-	R	MSD
Field Blank	YVD-121018-01	12/10/2018	FB	884857	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-121118-12	12/11/2018	FB	884939	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-031719-01	3/17/2019	FB	988239	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-031819-11	3/18/2019	FB	988273	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-032019-20	3/20/2019	FB	988477	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	-	R	MSD
Field Blank	YVD-060219-01	6/2/2019	FB	991939	0.05	U	-	0.05	U	-	**0.46**	-	-	0.07	U	-	-	-	-	-	R	MSD
Field Blank	YVD-060319-13	6/3/2019	FB	992053	**0.08**	-	-	0.05	U	-	**0.34**	-	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-060419-26	6/4/2019	FB	992242	0.05	U	-	0.05	U	-	**0.13**	-	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-090919-01	9/9/2019	FB	998357	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	UJ	MSD

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-FB-160929	9/29/2016	FB	K1611698	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-FB1-161212	12/12/2016	FB	K1615029	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-FB2-161213	12/13/2016	FB	K1615045	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-FB3-161214	12/14/2016	FB	K1615083	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-FB4-161215	12/15/2016	FB	K1615126	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-FB5-161216	12/16/2016	FB	K1615174	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-030617-01	3/6/2017	FB	K1702228	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-030717-06	3/7/2017	FB	K1702324	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-030817-11	3/8/2017	FB	K1702324	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-030917-17	3/9/2017	FB	K1702404	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-031017-26	3/10/2017	FB	K1702448	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-031317-30	3/13/2017	FB	K1702489	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-060417-01	6/4/2017	FB	K1705702	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-060517-07	6/5/2017	FB	K1705702	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-060617-17	6/6/2017	FB	K1705754	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-060717-28	6/7/2017	FB	K1705833	-	-	-	0.01	U	-	-	-	-	-	-	-	2	U	-	2	U	-
Field Blank	YVD-092517-01	9/25/2017	FB	K1710274	-	-	-	0.010	U	-	-	-	-	-	-	-	2.0	U	-	2.0	U	-
Field Blank	YVD-092617-16	9/26/2017	FB	K1710333	-	-	-	0.010	U	-	-	-	-	-	-	-	2.0	U	-	2.0	U	-
Field Blank	YVD-120417-01	12/4/2017	FB	K1713026	-	-	-	0.010	U	-	-	-	-	-	-	-	15	U	MBK	15	U	-
Field Blank	YVD-120517-32	12/5/2017	FB	K1713091	-	-	-	0.010	U	-	-	-	-	-	-	-	15	U	MBK	15	U	-
Field Blank	YVD-120617-25	12/6/2017	FB	K1713157	-	-	-	0.010	U	-	-	-	-	-	-	-	15	U	MBK	15	U	-
Field Blank	YVD-031818-01	3/18/2018	FB	870610	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-031918-10	3/19/2018	FB	870634	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-060318-01	6/3/2018	FB	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-060418-12	6/4/2018	FB	874568	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-060518-26	6/5/2018	FB	874860	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-061218-33	6/12/2018	FB	875438	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-090918-01	9/9/2018	FB	880601	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-121018-01	12/10/2018	FB	884857	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-121118-12	12/11/2018	FB	884939	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-031719-01	3/17/2019	FB	988239	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-031819-11	3/18/2019	FB	988273	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-032019-20	3/20/2019	FB	988477	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-060219-01	6/2/2019	FB	991939	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-060319-13	6/3/2019	FB	992053	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-060419-26	6/4/2019	FB	992242	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-090919-01	9/9/2019	FB	998357	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Calcium			Magnesium			Potassium			Sodium			Chloride			Fluoride		
Analytical Method					EPA 200.7			EPA 200.7			EPA 200.7			EPA 200.7			EPA 300			EPA 300.0		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-090919-03	9/9/2019	FB	998357	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-
Field Blank	YVD-091019-15	9/10/2019	FB	998438	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-091019-17	9/10/2019	FB	998438	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-
Field Blank	YVD-120919-01	12/9/2019	FB	902276	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-120919-09	12/9/2019	FB	902276	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-
Field Blank	YVD-121019-16	12/10/2019	FB	902321	0.4	U	-	0.06	U	-	0.62	U	-	0.7	U	-	0.1	U	-	0.1	U	-
Field Blank	YVD-121019-18	12/10/2019	FB	902321	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-	NS	-	-
Blank Check	WW-1	4/25/2016	BC	59032861	1.7	U	-	0.83	U	-	**190**	-	-	**400**	-	-	160	U	-	100	U	-
Blank Check	DW-1	4/25/2016	BC	59032861	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-
Blank Check	DI-1	4/25/2016	BC	59032861	1	U	-	0.5	U	-	1	U	-	0.5	U	-	0.8	U	-	0.5	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Nitrate (as N)			Nitrite (as N)			Sulfate			Ammonia (as N)			Ammonia (as N)			Total Kjeldahl Nitrogen		
Analytical Method					EPA 300.0			EPA 300.0			EPA 300.0			SM 4500 NH3-G			EPA 350.1			EPA 351.2		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-090919-03	9/9/2019	FB	998357	NS	-	-	NS	-	-	NS	-	-	0.07	U	-	-	-	-	NS	-	-
Field Blank	YVD-091019-15	9/10/2019	FB	998438	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	UJ	MSD
Field Blank	YVD-091019-17	9/10/2019	FB	998438	NS	-	-	NS	-	-	NS	-	-	0.07	U	-	-	-	-	NS	-	-
Field Blank	YVD-120919-01	12/9/2019	FB	902276	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	UJ	MSD
Field Blank	YVD-120919-09	12/9/2019	FB	902276	NS	-	-	NS	-	-	NS	-	-	0.07	U	-	-	-	-	NS	-	-
Field Blank	YVD-121019-16	12/10/2019	FB	902321	0.05	U	-	0.05	U	-	0.1	U	-	0.07	U	-	-	-	-	0.5	U	-
Field Blank	YVD-121019-18	12/10/2019	FB	902321	NS	-	-	NS	-	-	NS	-	-	0.07	U	-	-	-	-	NS	-	-
Blank Check	WW-1	4/25/2016	BC	59032861	40	U	-	40	U	-	100	U	-	**0.33**	-	-	**0.33**	-	-	**1.4**	-	-
Blank Check	DW-1	4/25/2016	BC	59032861	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-
Blank Check	DI-1	4/25/2016	BC	59032861	0.2	U	-	0.2	U	-	0.5	U	-	0.1	U	-	0.1	U	-	0.25	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Analyte					Phosphorus			Phosphorus			Phosphorus			Phosphorus			Alkalinity, Bicarbonate (as CaCO3)			Alkalinity, Total (as CaCO3)		
Analytical Method					EPA 365.1			EPA 365.3			EPA 365.4			SM 4500 P-E			SM 2320B			SM 2320B		
Well ID	Sample Name	Sample Date	Sample Type	Sample Group	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code	Result (mg/L)	Qualifier	Validation Code
Field Blank	YVD-090919-03	9/9/2019	FB	998357	-	-	-	-	-	-	-	-	-	NS	-	-	NS	-	-	NS	-	-
Field Blank	YVD-091019-15	9/10/2019	FB	998438	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-091019-17	9/10/2019	FB	998438	-	-	-	-	-	-	-	-	-	NS	-	-	NS	-	-	NS	-	-
Field Blank	YVD-120919-01	12/9/2019	FB	902276	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-120919-09	12/9/2019	FB	902276	-	-	-	-	-	-	-	-	-	NS	-	-	NS	-	-	NS	-	-
Field Blank	YVD-121019-16	12/10/2019	FB	902321	-	-	-	-	-	-	-	-	-	0.07	U	-	5	U	-	5	U	-
Field Blank	YVD-121019-18	12/10/2019	FB	902321	-	-	-	-	-	-	-	-	-	NS	-	-	NS	-	-	NS	-	-
Blank Check	WW-1	4/25/2016	BC	59032861	-	-	-	0.25	U	-	-	-	-	-	-	-	**110**	-	-	**110**	-	-
Blank Check	DW-1	4/25/2016	BC	59032861	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-
Blank Check	DI-1	4/25/2016	BC	59032861	-	-	-	0.25	U	-	-	-	-	-	-	-	4	U	-	4	U	-

Table 4
Historical Groundwater Chemistry Data, 2013 to 2019

Notes:
Bold: detected result
- : not applicable
(as N): reported as nitrogen
(as CaCO3): reported as calcium carbonate
BC: blank check
DUP: Laboratory duplicate relative percent difference was outside acceptance limits.
EB: equipment blank
EPA: U.S. Environmental Protection Agency
ERL: elevated reporting limit
FB: field blank
FBK: field blank contamination
FD: field duplicate
FDP: Field duplicate relative percent difference exceeded acceptance limits.
HTQ: holding time violation
J: The compound was positively identified; however, the associated numerical value is an estimated concentration.
J-: The result is an estimated quantity, but the result may be biased low.
J+: The result is an estimated quantity, but the result may be biased high.
MBK: method blank contamination
mg/L: milligrams per liter
MSD: The matrix spike/matrix spike duplicate percent recoveries were outside acceptance limits.
N: normal sample
NR: Sample did not meet collection criteria; not a representative sample.
NS: Not sampled
PRS: Incorrect sample preservation.
R: The sample results are rejected as unusable. The compound may or may not be present in the sample.
RPD: Relative percent difference was outside acceptance limits.
SM: Standard Method
U: The compound was analyzed for but not detected. The associated value is the compound reporting limit, or the compound is considered non-detect at the listed value due to associated blank contamination.
UJ: The compound was not detected above the reported sample reporting limit; however, the reporting limit is approximate and may or may not represent the actual limit of quantitation.

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
DC-01	9/16/2013	1199.17	150.45	1048.72
DC-01	12/9/2013	1199.17	150.66	1048.51
DC-01	3/16/2014	1199.17	150.43	1048.74
DC-01	6/1/2014	1199.17	150.50	1048.67
DC-01	9/21/2014	1199.17	150.32	1048.85
DC-01	12/14/2014	1199.17	150.20	1048.97
DC-01	3/5/2015	1199.17	150.35	1048.82
DC-01	6/15/2015	1199.17	150.41	1048.76
DC-01	9/21/2015	1199.17	150.50	1048.67
DC-01	12/13/2015	1199.17	150.46	1048.71
DC-01	3/8/2016	1199.17	150.53	1048.64
DC-01	6/19/2016	1199.17	150.70	1048.47
DC-01	9/25/2016	1199.17	150.70	1048.47
DC-01	12/11/2016	1199.17	150.65	1048.52
DC-01	3/5/2017	1199.17	150.55	1048.62
DC-01	6/4/2017	1199.17	150.68	1048.49
DC-01	9/27/2017	1199.17	150.81	1048.36
DC-01	12/3/2017	1199.17	150.74	1048.43
DC-01	3/18/2018	1199.17	150.74	1048.43
DC-01	6/3/2018	1199.17	150.74	1048.43
DC-01	9/8/2018	1199.17	150.44	1048.73
DC-01	12/9/2018	1199.17	150.94	1048.23
DC-01	3/21/2019	1199.17	150.78	1048.39
DC-01	6/1/2019	1199.17	150.85	1048.32
DC-01	9/8/2019	1199.17	150.77	1048.40
DC-01	12/8/2019	1199.17	150.79	1048.38
DC-03	9/16/2013	910.58	72.43	838.15
DC-03	12/9/2013	910.58	72.55	838.03
DC-03	3/16/2014	910.58	73.62	836.96
DC-03	6/1/2014	910.58	73.25	837.33
DC-03	9/21/2014	910.58	72.26	838.32
DC-03	12/14/2014	910.58	72.40	838.18
DC-03	3/5/2015	910.58	73.60	836.98
DC-03	6/15/2015	910.58	73.12	837.46
DC-03	9/21/2015	910.58	72.35	838.23
DC-03	12/13/2015	910.58	73.64	837.94
DC-03	3/8/2016	910.58	73.99	836.59
DC-03	6/19/2016	910.58	73.84	836.74
DC-03	9/25/2016	910.58	72.87	837.71
DC-03	12/11/2016	910.58	72.93	837.65
DC-03	3/5/2017	910.58	74.20	836.38
DC-03	6/4/2017	910.58	74.21	836.37
DC-03	9/27/2017	910.58	72.81	837.77
DC-03	12/3/2017	910.58	73.11	837.47

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
DC-03	3/18/2018	910.58	74.54	836.04
DC-03	6/3/2018	910.58	74.08	836.50
DC-03	9/8/2018	910.58	73.24	837.34
DC-03	12/9/2018	910.58	73.32	837.26
DC-03	3/21/2019	910.58	75.01	835.57
DC-03	6/1/2019	910.58	74.94	835.64
DC-03	9/8/2019	910.58	73.95	836.63
DC-03	12/8/2019	910.58	74.10	836.48
DC-03D	9/16/2013	911.33	73.03	838.30
DC-03D	12/9/2013	911.33	73.16	838.17
DC-03D	3/16/2014	911.33	74.35	836.98
DC-03D	6/1/2014	911.33	73.90	837.43
DC-03D	9/21/2014	911.33	72.87	838.46
DC-03D	12/14/2014	911.33	73.13	838.20
DC-03D	3/5/2015	911.33	74.28	837.05
DC-03D	6/15/2015	911.33	73.72	837.61
DC-03D	9/21/2015	911.33	72.96	838.37
DC-03D	12/13/2015	911.33	73.31	838.02
DC-03D	3/8/2016	911.33	74.66	836.67
DC-03D	6/19/2016	911.33	74.47	836.86
DC-03D	9/25/2016	911.33	73.44	837.89
DC-03D	12/11/2016	911.33	73.73	837.60
DC-03D	3/5/2017	911.33	75.05	836.28
DC-03D	6/4/2017	911.33	74.88	836.45
DC-03D	9/27/2017	911.33	73.42	837.91
DC-03D	12/3/2017	911.33	73.80	837.53
DC-03D	3/18/2018	911.33	75.30	836.03
DC-03D	6/3/2018	911.33	74.82	836.51
DC-03D	9/8/2018	911.33	73.78	837.55
DC-03D	12/9/2018	911.33	74.01	837.32
DC-03D	3/21/2019	911.33	75.75	835.58
DC-03D	6/1/2019	911.33	75.65	835.68
DC-03D	9/8/2019	911.33	74.55	836.78
DC-03D	12/8/2019	911.33	74.79	836.54
DC-04	9/16/2013	877.22	31.75	845.47
DC-04	12/9/2013	877.22	32.61	844.61
DC-04	3/16/2014	877.22	34.55	842.67
DC-04	6/1/2014	877.22	34.65	842.57
DC-04	9/21/2014	877.22	31.99	845.23
DC-04	12/14/2014	877.22	32.98	844.24
DC-04	3/5/2015	877.22	34.31	842.91
DC-04	6/15/2015	877.22	34.70	842.52
DC-04	9/21/2015	877.22	33.61	843.61

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
DC-04	12/13/2015	877.22	34.38	842.84
DC-04	3/8/2016	877.22	35.60	841.62
DC-04	6/19/2016	877.22	34.74	842.48
DC-04	9/25/2016	877.22	33.81	843.41
DC-04	12/11/2016	877.22	34.33	842.89
DC-04	3/5/2017	877.22	35.45	841.77
DC-04	6/4/2017	877.22	35.63	841.59
DC-04	9/27/2017	877.22	34.42	842.80
DC-04	12/3/2017	877.22	35.17	842.05
DC-04	3/18/2018	877.22	36.89	840.33
DC-04	6/3/2018	877.22	37.17	840.05
DC-04	9/8/2018	877.22	36.45	840.77
DC-04	12/9/2018	877.22	36.17	841.05
DC-04	3/21/2019	877.22	37.73	839.49
DC-04	6/1/2019	877.22	38.20	839.02
DC-04	9/8/2019	877.22	36.96	840.26
DC-04	12/8/2019	877.22	36.83	840.39
DC-05	9/16/2013	911.95	67.78	844.17
DC-05	12/9/2013	911.95	68.28	843.67
DC-05	3/16/2014	911.95	69.25	842.70
DC-05	6/1/2014	911.95	70.15	841.80
DC-05	9/21/2014	911.95	69.43	842.52
DC-05	12/14/2014	911.95	68.80	843.15
DC-05	3/5/2015	911.95	69.33	842.62
DC-05	6/15/2015	911.95	70.28	841.67
DC-05	9/21/2015	911.95	69.94	842.01
DC-05	12/13/2015	911.95	69.59	842.36
DC-05	3/8/2016	911.95	70.58	841.37
DC-05	6/19/2016	911.95	71.43	840.52
DC-05	9/25/2016	911.95	71.08	840.87
DC-05	12/11/2016	911.95	70.24	841.71
DC-05	3/5/2017	911.95	70.98	840.97
DC-05	6/4/2017	911.95	71.81	840.14
DC-05	9/27/2017	911.95	71.14	840.81
DC-05	12/3/2017	911.95	70.50	841.45
DC-05	3/18/2018	911.95	71.06	840.89
DC-05	6/3/2018	911.95	71.33	840.62
DC-05	9/8/2018	911.95	71.39	840.56
DC-05	12/9/2018	911.95	70.82	841.13
DC-05	3/21/2019	911.95	71.46	840.49
DC-05	6/1/2019	911.95	71.95	840.00
DC-05	9/8/2019	911.95	72.09	839.86
DC-05	12/8/2019	911.95	71.47	840.48

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
DC-05D	9/16/2013	915.91	71.92	843.99
DC-05D	12/9/2013	915.91	72.04	843.87
DC-05D	3/16/2014	915.91	73.83	842.08
DC-05D	6/1/2014	915.91	74.80	841.11
DC-05D	9/21/2014	915.91	73.78	842.13
DC-05D	12/14/2014	915.91	73.02	842.89
DC-05D	3/5/2015	915.91	73.66	842.25
DC-05D	6/15/2015	915.91	74.71	841.20
DC-05D	9/21/2015	915.91	74.38	841.53
DC-05D	12/13/2015	915.91	73.88	842.03
DC-05D	3/8/2016	915.91	74.70	841.21
DC-05D	6/19/2016	915.91	75.71	840.20
DC-05D	9/25/2016	915.91	75.40	840.51
DC-05D	12/11/2016	915.91	74.65	841.26
DC-05D	3/5/2017	915.91	74.96	840.95
DC-05D	6/4/2017	915.91	75.94	839.97
DC-05D	9/27/2017	915.91	75.47	840.44
DC-05D	12/3/2017	915.91	74.64	841.27
DC-05D	3/18/2018	915.91	75.43	840.48
DC-05D	6/3/2018	915.91	75.46	840.45
DC-05D	9/8/2018	915.91	75.54	840.37
DC-05D	12/9/2018	915.91	75.00	840.91
DC-05D	3/21/2019	915.91	75.30	840.61
DC-05D	6/1/2019	915.91	76.26	839.65
DC-05D	9/8/2019	915.91	76.17	839.74
DC-05D	12/8/2019	915.91	75.37	840.54
DC-07	9/16/2013	889.29	44.76	844.53
DC-07	12/9/2013	889.29	44.15	845.14
DC-07	3/16/2014	889.29	44.76	844.53
DC-07	6/1/2014	889.29	35.12	
DC-07	9/21/2014	889.29	44.59	844.70
DC-07	12/14/2014	889.29	44.13	845.16
DC-07	3/5/2015	889.29	44.90	844.39
DC-07	6/15/2015	889.29	45.30	843.99
DC-07	9/21/2015	889.29	45.08	844.21
DC-07	12/13/2015	889.29	44.65	844.64
DC-07	3/8/2016	889.29	45.50	843.79
DC-07	6/19/2016	889.29	46.16	843.13
DC-07	9/25/2016	889.29	45.69	843.60
DC-07	12/11/2016	889.29	45.61	843.68
DC-07	3/5/2017	889.29	46.27	843.02
DC-07	6/4/2017	889.29	46.54	842.75
DC-07	9/27/2017	889.29	46.11	843.18
DC-07	12/3/2017	889.29	45.73	843.56

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
DC-07	3/18/2018	889.29	46.45	842.84
DC-07	6/3/2018	889.29	46.76	842.53
DC-07	9/8/2018	889.29	46.32	842.97
DC-07	12/9/2018	889.29	46.09	843.20
DC-07	3/21/2019	889.29	46.94	842.35
DC-07	6/1/2019	889.29	47.36	841.93
DC-07	9/8/2019	889.29	46.79	842.50
DC-07	12/8/2019	889.29	46.68	842.61
DC-09	9/16/2013	1048.60	147.16	901.44
DC-09	12/9/2013	1048.60	143.10	905.50
DC-09	3/16/2014	1048.60	139.81	908.79
DC-09	6/1/2014	1048.60	142.53	906.07
DC-09	9/21/2014	1048.60	143.67	904.93
DC-09	12/14/2014	1048.60	139.42	909.18
DC-09	3/5/2015	1048.60	137.83	910.77
DC-09	6/15/2015	1048.60	146.33	902.27
DC-09	9/21/2015	1048.60	151.28	897.32
DC-09	12/13/2015	1048.60	147.46	901.14
DC-09	3/8/2016	1048.60	146.70	901.90
DC-09	6/19/2016	1048.60	151.03	897.57
DC-09	9/25/2016	1048.60	151.98	896.62
DC-09	12/11/2016	1048.60	148.71	899.89
DC-09	3/5/2017	1048.60	146.24	902.36
DC-09	6/4/2017	1048.60	148.62	899.98
DC-09	9/27/2017	1048.60	151.56	897.04
DC-09	12/3/2017	1048.60	149.27	899.33
DC-09	3/18/2018	1048.60	146.19	902.41
DC-09	6/3/2018	1048.60	149.27	899.33
DC-09	9/8/2018	1048.60	151.66	896.94
DC-09	12/9/2018	1048.60	149.99	898.61
DC-09	3/21/2019	1048.60	148.87	899.73
DC-09	6/1/2019	1048.60	151.32	897.28
DC-09	9/8/2019	1048.60	155.69	892.91
DC-09	12/8/2019	1048.60	155.23	893.37
DC-14	9/16/2013	1036.61	131.08	905.53
DC-14	12/9/2013	1036.61	131.10	905.51
DC-14	3/16/2014	1036.61	130.32	906.29
DC-14	6/1/2014	1036.61	130.02	906.59
DC-14	9/21/2014	1036.61	130.25	906.36
DC-14	12/14/2014	1036.61	137.91	
DC-14	3/5/2015	1036.61	129.51	907.10
DC-14	6/15/2015	1036.61	129.37	907.24
DC-14	9/21/2015	1036.61	130.28	906.33

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
DC-14	12/13/2015	1036.61	130.71	905.90
DC-14	3/8/2016	1036.61	131.26	905.35
DC-14	6/19/2016	1036.61	131.89	904.72
DC-14	9/25/2016	1036.61	132.76	903.85
DC-14	12/11/2016	1036.61	133.45	903.16
DC-14	3/5/2017	1036.61	133.81	902.80
DC-14	6/4/2017	1036.61	133.81	902.80
DC-14	9/27/2017	1036.61	134.16	902.45
DC-14	12/3/2017	1036.61	134.48	902.13
DC-14	3/18/2018	1036.61	133.83	902.78
DC-14	6/3/2018	1036.61	133.35	903.26
DC-14	9/8/2018	1036.61	133.67	902.94
DC-14	12/9/2018	1036.61	133.67	902.94
DC-14	3/21/2019	1036.61	133.24	903.37
DC-14	6/1/2019	1036.61	132.98	903.63
DC-14	9/8/2019	1036.61	133.72	902.89
DC-14	12/8/2019	1036.61	134.60	902.01
YVD-02	9/16/2013	1288.97	24.21	1264.76
YVD-02	12/9/2013	1288.97	32.85	1256.12
YVD-02	3/16/2014	1288.97	34.45	1254.52
YVD-02	6/1/2014	1288.97	22.10	1266.87
YVD-02	9/21/2014	1288.97	26.14	1262.83
YVD-02	12/14/2014	1288.97	33.01	1255.96
YVD-02	3/5/2015	1288.97	34.42	1254.55
YVD-02	6/15/2015	1288.97	19.69	1269.28
YVD-02	9/21/2015	1288.97	25.36	1263.61
YVD-02	12/13/2015	1288.97	33.25	1255.72
YVD-02	3/8/2016	1288.97	33.93	1255.04
YVD-02	6/19/2016	1288.97	27.49	1261.48
YVD-02	9/25/2016	1288.97	27.72	1261.25
YVD-02	12/11/2016	1288.97	32.52	1256.45
YVD-02	3/5/2017	1288.97	27.34	1261.63
YVD-02	6/4/2017	1288.97	26.97	1262.00
YVD-02	9/27/2017	1288.97	28.08	1260.89
YVD-02	12/3/2017	1288.97	33.83	1255.14
YVD-02	3/18/2018	1288.97	34.07	1254.90
YVD-02	6/3/2018	1288.97	33.78	1255.19
YVD-02	9/8/2018	1288.97	29.19	1259.78
YVD-02	12/9/2018	1288.97	33.17	1255.80
YVD-02	3/21/2019	1288.97	34.44	1254.53
YVD-02	6/1/2019	1288.97	30.68	1258.29
YVD-02	9/8/2019	1288.97	32.34	1256.63
YVD-02	12/8/2019	1288.97	33.92	1255.05

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-03	9/16/2013	1120.68	189.88	930.80
YVD-03	12/9/2013	1120.68	190.42	930.26
YVD-03	3/16/2014	1120.68	189.10	931.58
YVD-03	6/1/2014	1120.68	188.97	931.71
YVD-03	9/21/2014	1120.68	189.04	931.64
YVD-03	12/14/2014	1120.68	188.73	931.95
YVD-03	3/5/2015	1120.68	187.92	932.76
YVD-03	6/15/2015	1120.68	188.70	931.98
YVD-03	9/21/2015	1120.68	189.63	931.05
YVD-03	12/13/2015	1120.68	189.85	930.83
YVD-03	3/8/2016	1120.68	190.64	930.04
YVD-03	6/19/2016	1120.68	191.31	929.37
YVD-03	9/25/2016	1120.68	191.61	929.07
YVD-03	12/11/2016	1120.68	191.25	929.43
YVD-03	3/5/2017	1120.68	190.85	929.83
YVD-03	6/4/2017	1120.68	191.20	929.48
YVD-03	9/27/2017	1120.68	191.77	928.91
YVD-03	12/3/2017	1120.68	191.61	929.07
YVD-03	3/18/2018	1120.68	191.55	929.13
YVD-03	6/3/2018	1120.68	191.40	929.28
YVD-03	9/8/2018	1120.68	191.96	928.72
YVD-03	12/9/2018	1120.68	192.59	928.09
YVD-03	3/21/2019	1120.68	191.86	928.82
YVD-03	6/1/2019	1120.68	191.85	928.83
YVD-03	9/8/2019	1120.68	192.53	928.15
YVD-03	12/8/2019	1120.68	193.62	927.06
YVD-04	9/16/2013	1118.66	220.55	898.11
YVD-04	12/9/2013	1118.66	223.50	895.16
YVD-04	3/16/2014	1118.66	222.20	896.46
YVD-04	6/1/2014	1118.66	221.04	897.62
YVD-04	9/21/2014	1118.66	220.67	897.99
YVD-04	12/14/2014	1118.66	221.30	897.36
YVD-04	3/5/2015	1118.66	220.72	897.94
YVD-04	6/15/2015	1118.66	221.61	897.05
YVD-04	9/21/2015	1118.66	221.99	896.67
YVD-04	12/13/2015	1118.66	221.71	896.95
YVD-04	3/8/2016	1118.66	220.74	897.92
YVD-04	6/19/2016	1118.66	221.50	897.16
YVD-04	9/25/2016	1118.66	221.05	897.61
YVD-04	12/11/2016	1118.66	221.07	897.59
YVD-04	3/5/2017	1118.66	220.89	897.77
YVD-04	6/4/2017	1118.66	221.83	896.83
YVD-04	9/27/2017	1118.66	222.49	896.17
YVD-04	12/3/2017	1118.66	222.38	896.28

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-04	3/18/2018	1118.66	222.37	896.29
YVD-04	6/3/2018	1118.66	222.04	896.62
YVD-04	9/8/2018	1118.66	222.29	896.37
YVD-04	12/9/2018	1118.66	222.36	896.30
YVD-04	3/21/2019	1118.66	221.67	896.99
YVD-04	6/1/2019	1118.66	221.71	896.95
YVD-04	9/8/2019	1118.66	222.06	896.60
YVD-04	12/8/2019	1118.66	222.31	896.35
YVD-05	9/16/2013	1051.78	167.50	884.28
YVD-05	12/9/2013	1051.78	166.35	885.43
YVD-05	3/16/2014	1051.78	165.40	886.38
YVD-05	6/1/2014	1051.78	165.58	886.20
YVD-05	9/21/2014	1051.78	166.01	885.77
YVD-05	12/14/2014	1051.78	165.35	886.43
YVD-05	3/5/2015	1051.78	164.86	886.92
YVD-05	6/15/2015	1051.78	166.04	885.74
YVD-05	9/21/2015	1051.78	168.04	883.74
YVD-05	12/13/2015	1051.78	167.75	884.03
YVD-05	3/8/2016	1051.78	167.71	884.07
YVD-05	6/19/2016	1051.78	168.45	883.33
YVD-05	9/25/2016	1051.78	168.97	882.81
YVD-05	12/11/2016	1051.78	168.51	883.27
YVD-05	3/5/2017	1051.78	167.98	883.80
YVD-05	6/4/2017	1051.78	168.07	883.71
YVD-05	9/27/2017	1051.78	169.83	881.95
YVD-05	12/3/2017	1051.78	169.67	882.11
YVD-05	3/18/2018	1051.78	169.38	882.40
YVD-05	6/3/2018	1051.78	169.45	882.33
YVD-05	9/8/2018	1051.78	169.85	881.93
YVD-05	12/9/2018	1051.78	169.44	882.34
YVD-05	3/21/2019	1051.78	168.86	882.92
YVD-05	6/1/2019	1051.78	169.06	882.72
YVD-05	9/8/2019	1051.78	170.22	881.56
YVD-05	12/8/2019	1051.78	170.62	881.16
YVD-06	9/16/2013	1053.51	110.65	942.86
YVD-06	12/9/2013	1053.51	108.21	945.30
YVD-06	3/16/2014	1053.51	105.98	947.53
YVD-06	6/1/2014	1053.51	106.49	947.02
YVD-06	9/21/2014	1053.51	108.02	945.49
YVD-06	12/14/2014	1053.51	106.32	947.19
YVD-06	3/5/2015	1053.51	104.68	948.83
YVD-06	6/15/2015	1053.51	106.37	947.14
YVD-06	9/21/2015	1053.51	109.01	944.50

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-06	12/13/2015	1053.51	108.72	944.79
YVD-06	3/8/2016	1053.51	108.90	944.61
YVD-06	6/19/2016	1053.51	111.03	942.48
YVD-06	9/25/2016	1053.51	112.05	941.46
YVD-06	12/15/2016	1053.51	109.70	943.81
YVD-06	3/5/2017	1053.51	107.89	945.62
YVD-06	6/4/2017	1053.51	109.14	944.37
YVD-06	9/27/2017	1053.51	110.99	942.52
YVD-06	12/3/2017	1053.51	109.30	944.21
YVD-06	3/18/2018	1053.51	106.37	947.14
YVD-06	6/3/2018	1053.51	108.02	945.49
YVD-06	9/8/2018	1053.51	109.87	943.64
YVD-06	12/9/2018	1053.51	107.99	945.52
YVD-06	3/21/2019	1053.51	106.86	946.65
YVD-06	6/1/2019	1053.51	108.32	945.19
YVD-06	9/8/2019	1053.51	110.95	942.56
YVD-06	12/8/2019	1053.51	111.11	942.40
YVD-07	9/16/2013	1073.03	157.99	915.04
YVD-07	12/9/2013	1073.03	157.26	915.77
YVD-07	3/16/2014	1073.03	153.95	919.08
YVD-07	6/1/2014	1073.03	153.87	919.16
YVD-07	9/21/2014	1073.03	155.93	917.10
YVD-07	12/14/2014	1073.03	155.40	917.63
YVD-07	3/5/2015	1073.03	153.42	919.61
YVD-07	6/15/2015	1073.03	154.30	918.73
YVD-07	9/21/2015	1073.03	157.09	915.94
YVD-07	12/13/2015	1073.03	158.05	914.98
YVD-07	3/8/2016	1073.03	157.96	915.07
YVD-07	6/19/2016	1073.03	158.75	914.28
YVD-07	9/25/2016	1073.03	160.29	912.74
YVD-07	12/11/2016	1073.03	160.00	913.03
YVD-07	3/5/2017	1073.03	157.59	915.44
YVD-07	6/4/2017	1073.03	157.56	915.47
YVD-07	9/27/2017	1073.03	159.81	913.22
YVD-07	12/3/2017	1073.03	159.30	913.73
YVD-07	3/18/2018	1073.03	156.76	916.27
YVD-07	6/3/2018	1073.03	156.44	916.59
YVD-07	9/8/2018	1073.03	158.22	914.81
YVD-07	12/9/2018	1073.03	158.27	914.76
YVD-07	3/21/2019	1073.03	156.58	916.45
YVD-07	6/1/2019	1073.03	157.05	915.98
YVD-07	9/8/2019	1073.03	159.06	913.97
YVD-07	12/8/2019	1073.03	160.48	912.55

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-08	9/16/2013	1014.38	170.83	843.55
YVD-08	12/9/2013	1014.38	171.08	843.30
YVD-08	3/16/2014	1014.38	170.66	843.72
YVD-08	6/1/2014	1014.38	170.50	843.88
YVD-08	9/21/2014	1014.38	170.50	843.88
YVD-08	12/14/2014	1014.38	170.22	844.16
YVD-08	3/5/2015	1014.38	169.83	844.55
YVD-08	6/15/2015	1014.38	170.13	844.25
YVD-08	9/21/2015	1014.38	170.67	843.71
YVD-08	12/13/2015	1014.38	170.63	843.75
YVD-08	3/8/2016	1014.38	171.00	843.38
YVD-08	6/19/2016	1014.38	171.51	842.87
YVD-08	9/25/2016	1014.38	171.75	842.63
YVD-08	12/11/2016	1014.38	171.52	842.86
YVD-08	3/5/2017	1014.38	171.16	843.22
YVD-08	6/4/2017	1014.38	171.87	842.51
YVD-08	9/27/2017	1014.38	172.30	842.08
YVD-08	12/3/2017	1014.38	171.95	842.43
YVD-08	3/18/2018	1014.38	172.17	842.21
YVD-08	6/3/2018	1014.38	172.10	842.28
YVD-08	9/8/2018	1014.38	172.36	842.02
YVD-08	12/9/2018	1014.38	172.39	841.99
YVD-08	3/21/2019	1014.38	172.03	842.35
YVD-08	6/1/2019	1014.38	172.39	841.99
YVD-08	9/8/2019	1014.38	172.56	841.82
YVD-08	12/8/2019	1014.38	172.73	841.65
YVD-09	9/16/2013	966.81	111.14	855.67
YVD-09	12/9/2013	966.81	109.93	856.88
YVD-09	3/16/2014	966.81	109.65	857.16
YVD-09	6/1/2014	966.81	109.95	856.86
YVD-09	9/21/2014	966.81	110.08	856.73
YVD-09	12/14/2014	966.81	109.90	856.91
YVD-09	3/5/2015	966.81	109.95	856.86
YVD-09	6/15/2015	966.81	110.35	856.46
YVD-09	9/21/2015	966.81	110.83	855.98
YVD-09	12/13/2015	966.81	110.89	855.92
YVD-09	3/8/2016	966.81	111.16	855.65
YVD-09	6/19/2016	966.81	111.41	855.40
YVD-09	9/25/2016	966.81	111.68	855.13
YVD-09	12/11/2016	966.81	111.84	854.97
YVD-09	3/5/2017	966.81	111.92	854.89
YVD-09	6/4/2017	966.81	112.29	854.52
YVD-09	9/27/2017	966.81	112.50	854.31
YVD-09	12/3/2017	966.81	112.59	854.22

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-09	3/18/2018	966.81	112.56	854.25
YVD-09	6/3/2018	966.81	112.28	854.53
YVD-09	9/8/2018	966.81	112.19	854.62
YVD-09	12/9/2018	966.81	111.77	855.04
YVD-09	3/21/2019	966.81	111.78	855.03
YVD-09	6/1/2019	966.81	112.03	854.78
YVD-09	9/8/2019	966.81	112.37	854.44
YVD-09	12/8/2019	966.81	112.55	854.26
YVD-10	9/16/2013	958.00	90.04	867.96
YVD-10	12/9/2013	958.00	89.20	868.80
YVD-10	3/16/2014	958.00	89.39	868.61
YVD-10	6/1/2014	958.00	90.35	867.65
YVD-10	9/21/2014	958.00	90.41	867.59
YVD-10	12/14/2014	958.00	88.76	869.24
YVD-10	3/5/2015	958.00	89.90	868.10
YVD-10	6/15/2015	958.00	91.10	866.90
YVD-10	9/21/2015	958.00	91.85	866.15
YVD-10	12/13/2015	958.00	91.52	866.48
YVD-10	3/8/2016	958.00	91.91	866.09
YVD-10	6/19/2016	958.00	92.92	865.08
YVD-10	9/25/2016	958.00	92.99	865.01
YVD-10	12/11/2016	958.00	93.02	864.98
YVD-10	3/5/2017	958.00	93.24	864.76
YVD-10	6/4/2017	958.00	93.70	864.30
YVD-10	9/27/2017	958.00	93.39	864.61
YVD-10	12/3/2017	958.00	92.86	865.14
YVD-10	3/18/2018	958.00	92.49	865.51
YVD-10	6/3/2018	958.00	92.81	865.19
YVD-10	9/8/2018	958.00	93.35	864.65
YVD-10	12/9/2018	958.00	92.50	865.50
YVD-10	3/21/2019	958.00	92.36	865.64
YVD-10	6/1/2019	958.00	93.03	864.97
YVD-10	9/8/2019	958.00	93.67	864.33
YVD-10	12/8/2019	958.00	93.44	864.56
YVD-11	9/16/2013	967.91	106.03	861.88
YVD-11	12/9/2013	967.91	105.77	862.14
YVD-11	3/16/2014	967.91	105.72	862.19
YVD-11	6/1/2014	967.91	106.07	861.84
YVD-11	9/21/2014	967.91	106.04	861.87
YVD-11	12/14/2014	967.91	106.08	861.83
YVD-11	3/5/2015	967.91	106.18	861.73
YVD-11	6/15/2015	967.91	106.67	861.24
YVD-11	9/21/2015	967.91	106.52	861.39

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-11	12/13/2015	967.91	106.88	861.03
YVD-11	3/8/2016	967.91	107.58	860.33
YVD-11	6/19/2016	967.91	108.52	859.39
YVD-11	9/25/2016	967.91	108.95	858.96
YVD-11	12/11/2016	967.91	108.90	859.01
YVD-11	3/5/2017	967.91	109.08	858.83
YVD-11	6/4/2017	967.91	109.31	858.60
YVD-11	9/27/2017	967.91	108.75	859.16
YVD-11	12/3/2017	967.91	107.73	860.18
YVD-11	3/18/2018	967.91	108.10	859.81
YVD-11	6/3/2018	967.91	108.63	859.28
YVD-11	9/8/2018	967.91	108.97	858.94
YVD-11	12/9/2018	967.91	108.16	859.75
YVD-11	3/21/2019	967.91	108.58	859.33
YVD-11	6/1/2019	967.91	109.00	858.91
YVD-11	9/8/2019	967.91	109.58	858.33
YVD-11	12/8/2019	967.91	109.63	858.28
YVD-12	9/16/2013	961.91	138.50	823.41
YVD-12	12/9/2013	961.91	138.34	823.57
YVD-12	3/16/2014	961.91	137.55	824.36
YVD-12	6/1/2014	961.91	137.61	824.30
YVD-12	9/21/2014	961.91	137.45	824.46
YVD-12	12/14/2014	961.91	137.25	824.66
YVD-12	3/5/2015	961.91	136.52	825.39
YVD-12	6/15/2015	961.91	137.85	824.06
YVD-12	9/21/2015	961.91	138.95	822.96
YVD-12	12/13/2015	961.91	138.11	823.80
YVD-12	3/8/2016	961.91	138.26	823.65
YVD-12	6/19/2016	961.91	139.23	822.68
YVD-12	9/25/2016	961.91	139.13	822.78
YVD-12	12/11/2016	961.91	138.56	823.35
YVD-12	3/5/2017	961.91	138.02	823.89
YVD-12	6/4/2017	961.91	138.90	823.01
YVD-12	9/27/2017	961.91	139.05	822.86
YVD-12	12/3/2017	961.91	138.48	823.43
YVD-12	3/18/2018	961.91	138.46	823.45
YVD-12	6/3/2018	961.91	138.75	823.16
YVD-12	9/8/2018	961.91	139.15	822.76
YVD-12	12/9/2018	961.91	139.14	822.77
YVD-12	3/21/2019	961.91	138.69	823.22
YVD-12	6/1/2019	961.91	139.27	822.64
YVD-12	9/8/2019	961.91	139.67	822.24
YVD-12	12/8/2019	961.91	139.51	822.40

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-13	9/16/2013	965.59	127.43	838.16
YVD-13	12/9/2013	965.59	127.25	838.34
YVD-13	3/16/2014	965.59	127.58	838.01
YVD-13	6/1/2014	965.59	127.59	838.00
YVD-13	9/21/2014	965.59	127.29	838.30
YVD-13	12/14/2014	965.59	127.20	838.39
YVD-13	3/5/2015	965.59	127.35	838.24
YVD-13	6/15/2015	965.59	127.60	837.99
YVD-13	9/21/2015	965.59	127.36	838.23
YVD-13	12/13/2015	965.59	127.13	838.46
YVD-13	3/8/2016	965.59	127.87	837.72
YVD-13	6/19/2016	965.59	128.17	837.42
YVD-13	9/25/2016	965.59	127.88	837.71
YVD-13	12/11/2016	965.59	127.57	838.02
YVD-13	3/5/2017	965.59	127.92	837.67
YVD-13	6/4/2017	965.59	128.49	837.10
YVD-13	9/27/2017	965.59	128.05	837.54
YVD-13	12/3/2017	965.59	127.88	837.71
YVD-13	3/18/2018	965.59	128.47	837.12
YVD-13	6/3/2018	965.59	128.44	837.15
YVD-13	9/8/2018	965.59	128.28	837.31
YVD-13	12/9/2018	965.59	127.87	837.72
YVD-13	3/21/2019	965.59	128.46	837.13
YVD-13	6/1/2019	965.59	128.88	836.71
YVD-13	9/8/2019	965.59	128.62	836.97
YVD-13	12/8/2019	965.59	128.51	837.08
YVD-14	9/16/2013	920.19	77.30	842.89
YVD-14	12/9/2013	920.19	76.97	843.22
YVD-14	3/16/2014	920.19	77.45	842.74
YVD-14	6/1/2014	920.19	77.61	842.58
YVD-14	9/21/2014	920.19	77.28	842.91
YVD-14	12/14/2014	920.19	76.90	843.29
YVD-14	3/5/2015	920.19	77.51	842.68
YVD-14	6/17/2015	NM	NM	NM
YVD-14	9/21/2015	NM	NM	NM
YVD-14R	12/13/2015	921.41	77.76	843.65
YVD-14R	3/8/2016	921.41	78.53	842.88
YVD-14R	6/19/2016	921.41	79.03	842.38
YVD-14R	9/25/2016	921.41	78.68	842.73
YVD-14R	12/11/2016	921.41	78.57	842.84
YVD-14R	3/5/2017	921.41	79.14	842.27
YVD-14R	6/4/2017	921.41	79.53	841.88
YVD-14R	9/27/2017	921.41	78.93	842.48
YVD-14R	12/3/2017	921.41	78.72	842.69

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-14R	3/18/2018	921.41	79.40	842.01
YVD-14R	6/3/2018	921.41	79.35	842.06
YVD-14R	9/8/2018	921.41	79.26	842.15
YVD-14R	12/9/2018	921.41	78.93	842.48
YVD-14R	3/21/2019	921.41	79.75	841.66
YVD-14R	6/1/2019	921.41	80.14	841.27
YVD-14R	9/8/2019	921.41	79.74	841.67
YVD-14R	12/8/2019	921.41	79.60	841.81
YVD-15	9/16/2013	940.61	90.34	850.27
YVD-15	12/9/2013	940.61	90.49	850.12
YVD-15	3/16/2014	940.61	91.62	848.99
YVD-15	6/1/2014	940.61	92.57	848.04
YVD-15	9/21/2014	940.61	88.84	851.77
YVD-15	12/14/2014	940.61	90.56	850.05
YVD-15	3/5/2015	940.61	92.03	848.58
YVD-15	6/15/2015	940.61	93.22	847.39
YVD-15	9/21/2015	940.61	93.43	847.18
YVD-15	12/13/2015	940.61	93.21	847.40
YVD-15	3/8/2016	940.61	93.83	846.78
YVD-15	6/19/2016	940.61	94.70	845.91
YVD-15	9/25/2016	940.61	94.70	845.91
YVD-15	12/11/2016	940.61	94.44	846.17
YVD-15	3/5/2017	940.61	94.96	845.65
YVD-15	6/4/2017	940.61	95.52	845.09
YVD-15	9/27/2017	940.61	95.16	845.45
YVD-15	12/3/2017	940.61	94.74	845.87
YVD-15	3/18/2018	940.61	94.96	845.65
YVD-15	6/3/2018	940.61	95.32	845.29
YVD-15	9/8/2018	940.61	95.32	845.29
YVD-15	12/9/2018	940.61	94.79	845.82
YVD-15	3/21/2019	940.61	95.36	845.25
YVD-15	6/1/2019	940.61	95.83	844.78
YVD-15	9/8/2019	940.61	95.92	844.69
YVD-15	12/8/2019	940.61	95.55	845.06
YVD-16	9/16/2013	975.90	112.95	862.95
YVD-16	12/9/2013	975.90	112.84	863.06
YVD-16	3/16/2014	975.90	112.50	863.40
YVD-16	6/1/2014	975.90	112.62	863.28
YVD-16	9/21/2014	975.90	113.02	862.88
YVD-16	12/14/2014	975.90	112.86	863.04
YVD-16	3/5/2015	975.90	112.42	863.48
YVD-16	6/15/2015	975.90	112.85	863.05
YVD-16	9/21/2015	975.90	113.95	861.95

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-16	12/13/2015	975.90	114.04	861.86
YVD-16	3/8/2016	975.90	114.51	861.39
YVD-16	6/19/2016	975.90	115.18	860.72
YVD-16	9/25/2016	975.90	115.67	860.23
YVD-16	12/11/2016	975.90	115.17	860.73
YVD-16	3/5/2017	975.90	114.90	861.00
YVD-16	6/4/2017	975.90	115.51	860.39
YVD-16	9/27/2017	975.90	115.32	860.58
YVD-16	12/3/2017	975.90	114.86	861.04
YVD-16	3/18/2018	975.90	114.49	861.41
YVD-16	6/3/2018	975.90	114.62	861.28
YVD-16	9/8/2018	975.90	115.77	860.13
YVD-16	12/9/2018	975.90	115.57	860.33
YVD-16	3/21/2019	975.90	115.14	860.76
YVD-16	6/1/2019	975.90	115.72	860.18
YVD-16	9/8/2019	975.90	116.43	859.47
YVD-16	12/8/2019	975.90	116.71	859.19
YVD-17	9/16/2013	866.73	32.07	834.66
YVD-17	12/9/2013	866.73	34.81	831.92
YVD-17	3/16/2014	866.73	37.97	828.76
YVD-17	6/1/2014	866.73	35.50	831.23
YVD-17	9/21/2014	866.73	31.86	834.87
YVD-17	12/14/2014	866.73	34.74	831.99
YVD-17	3/5/2015	866.73	37.79	828.94
YVD-17	6/15/2015	866.73	34.57	832.16
YVD-17	9/21/2015	866.73	31.92	834.81
YVD-17	12/13/2015	866.73	35.16	831.57
YVD-17	3/8/2016	866.73	37.47	829.26
YVD-17	6/19/2016	866.73	35.37	831.36
YVD-17	9/25/2016	866.73	32.31	834.42
YVD-17	12/11/2016	866.73	35.20	831.53
YVD-17	3/5/2017	866.73	37.88	828.85
YVD-17	6/4/2017	866.73	36.13	830.60
YVD-17	9/27/2017	866.73	31.22	835.51
YVD-17	12/3/2017	866.73	34.65	832.08
YVD-17	3/18/2018	866.73	38.54	828.19
YVD-17	6/3/2018	866.73	36.20	830.53
YVD-17	9/8/2018	866.73	32.64	834.09
YVD-17	12/9/2018	866.73	35.42	831.31
YVD-17	3/21/2019	866.73	39.08	827.65
YVD-17	6/1/2019	866.73	37.30	829.43
YVD-17	9/9/2019	866.73	32.69	834.04
YVD-17	12/8/2019	866.73	35.95	830.78

Table 5
Water Level and Water Table Elevations, 2013 to 2019

Well ID	Date of Measurement	Reference Point Elevation (feet NAVD88)	Depth to Water (feet BTOC)	Groundwater Elevation (feet NAVD88)
YVD-18	9/16/2013	965.74	127.49	838.25
YVD-18	12/9/2013	965.74	127.45	838.29
YVD-18	3/16/2014	965.74	127.75	837.99
YVD-18	6/1/2014	965.74	127.69	838.05
YVD-18	9/21/2014	965.74	127.33	838.41
YVD-18	12/14/2014	965.74	127.33	838.41
YVD-18	3/5/2015	965.74	127.46	838.28
YVD-18	6/15/2015	965.74	127.71	838.03
YVD-18	9/21/2015	965.74	127.42	838.32
YVD-18	12/13/2015	965.74	127.24	838.50
YVD-18	3/8/2016	965.74	128.05	837.69
YVD-18	6/19/2016	965.74	128.29	837.45
YVD-18	9/25/2016	965.74	127.92	837.82
YVD-18	12/11/2016	965.74	127.66	838.08
YVD-18	3/5/2017	965.74	128.01	837.73
YVD-18	6/4/2017	965.74	128.54	837.20
YVD-18	9/27/2017	965.74	128.14	837.60
YVD-18	12/3/2017	965.74	127.95	837.79
YVD-18	3/18/2018	965.74	128.72	837.02
YVD-18	6/3/2018	965.74	128.48	837.26
YVD-18	9/8/2018	965.74	128.35	837.39
YVD-18	12/9/2018	965.74	128.00	837.74
YVD-18	3/21/2019	965.74	128.62	837.12
YVD-18	6/1/2019	965.74	129.04	836.70
YVD-18	9/8/2019	965.74	128.71	837.03
YVD-18	12/8/2019	965.74	128.63	837.11

Notes:
BTOC: below top of casing
NAVD88: North American Vertical Datum of 1988
NM: Not measured due to well damage.

Table 6

Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2013 – Crop Year 2014

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number	F13-0488	F13-0493	F13-0494	F13-0401	F13-0400	F13-0402	F13-0495
Sample Date	9/24/2013	9/27/2013	9/27/2013	9/17/2013	9/17/2013	9/17/2013	10/1/2013
Previous Crop	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Silage Corn
Upcoming Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale
Soil Measurements (lbs/ac)							
1' Nitrate	330	219	188	68	53	41	220
2' Nitrate	254	184	179	53	143	19	199
3' Nitrate	256	219	246	66	250	17	121
1'+2' Root Zone	**584**	**403**	**367**	**121**	**196**	**60**	**419**
Calculations & Recommendations	(Calculations were not made in the fall of 2013)						
Recommended N Application (lbs/ac)	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Field Applications (lbs/ac)							
2013 September	0	0	0	0	5	0	0
2013 October	28	55	54	70	57	80	122
2013 November	0	0	20	54	0	0	0
2013 December	0	0	0	0	0	0	0
2014 January	0	0	0	0	0	0	0
2014 February	0	0	0	0	0	0	0
2014 March	0	0	49	0	0	151	0
2014 April	0	0	0	11	114	0	0
Available N Applied	**28**	**55**	**122**	**134**	**176**	**231**	**122**

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2014 – Crop Year 2014

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number	F14-0311	F14-0335	F14-0281	F14-0397	F14-0398	F14-0396	F14-0312
Sample Date	5/13/2014	5/14/2014	5/6/2014	5/23/2014	5/23/2014	5/23/2014	5/13/2014
Previous Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale
Upcoming Crop	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Sudangrass
Crop Rotation Changes	No	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	112	99	124	61	53	104	119
2' Nitrate	143	118	138	48	91	81	186
1'+2' Root Zone	**255**	**217**	**262**	**109**	**144**	**185**	**305**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	261	288	279	292	292	292	279
Soil N supply, plus organic matter release	-269	-250	-264	-158	-173	-200	-331
N used to consume past crop residue	20	20	20	0	0	0	20
N that is positionally unavailable	35	35	35	5	5	5	55
Calculated N need	**47**	**93**	**70**	**139**	**124**	**97**	**23**
Recommendations (lbs/ac)							
Initial Calculated N Application	47	93	70	139	124	97	23
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0
Adjusted N Application	**47**	**93**	**70**	**139**	**124**	**97**	**23**
Adjusted N Application Upper Range	**56**	**112**	**84**	**167**	**149**	**116**	**28**
Field Applications (lbs/ac)							
2014 May	2	2	4	0	0	0	5
2014 June	86	110	76	0	0	0	0
2014 July	34	28	36	42	50	128	0
2014 August	0	0	0	42	50	0	0
Available N Applied	**122**	**140**	**116**	**84**	**101**	**128**	**5**

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2014 – Crop Year 2015

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number	F14-0688	F14-0701	F14-0702	F14-0532	F14-0644	F14-0533	F14-0689
Sample Date	10/2/2014	10/6/2014	10/6/2014	9/15/2014	9/25/2014	9/16/2014	10/2/2014
Previous Crop	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Sudangrass
Upcoming Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Triticale
Crop Rotation Changes	No	No	No	No	No	Yes	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	175	134	171	56	67	48	157
2' Nitrate	158	125	205	62	74	16	173
3' Nitrate	176	150	222	85	126	13	138
1'+2' Root Zone	**333**	**259**	**376**	**118**	**141**	**64**	**330**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	200	200	200	240	225	200	200
Soil N supply, plus organic matter release	-471	-412	-537	-216	-263	-90	-466
N used to consume past crop residue	25	25	25	0	0		25
Additional crop removal from the 6th cutting				30	30		
Alfalfa crown N release						-25	
N that is positionally unavailable	170	150	210	40	56	13	150
Calculated N need.	**0**	**0**	**0**	**94**	**48**	**98**	**0**
Recommendations (lbs/ac)							
Initial Calculated N Application	35	40	35	94	48	98	40
+ In-season petiole adjustment (if applicable)	20	20	10	0	0	0	20
Adjusted N Application	**55**	**60**	**45**	**94**	**48**	**98**	**60**
Adjusted N Application Upper Range	**66**	**72**	**54**	**113**	**58**	**118**	**72**
Field Applications (lbs/ac)							
2014 October	29	34	31	58	51	36	49
...							
2015 March	13	13	0	0	0	44	0
2015 April	0	0	14	42	50	0	29
Available N Applied	**42**	**47**	**45**	**100**	**102**	**80**	**77**

Table 6

Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2015 – Crop Year 2015

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number	F15-0323	F15-0324	F15-0366	F15-0371	F15-0372	F15-0321	F15-0365
Sample Date	4/30/2015	4/30/2015	4/28/2015	5/14/2015	5/14/2015	5/4/2015	5/4/2015
Previous Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Triticale
Upcoming Crop	Sorghum	Sorghum	Sorghum	Alfalfa	Alfalfa	Sudangrass	Sudangrass
Crop Rotation Changes	Yes	Yes	Yes	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	51	39	60	45	57	30	32
2' Nitrate	65	84	374	10	31	25	56
1'+2' Root Zone	**116**	**123**	**434**	**55**	**88**	**55**	**88**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	215	215	215	360	330	225	225
Soil N supply (residual, OM, past manure)	-154	-163	-477	-133	-143	-113	-143
N used to consume past crop residue	20	20	20	0	0	20	20
N that is positionally unavailable	15	20	120	0	0	10	15
Calculated N need.	**96**	**92**	**0**	**227**	**187**	**142**	**117**
Recommendations (lbs/ac)							
Initial Calculated N Application	96	92	30	227	187	142	117
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0
Adjusted N Application	**96**	**92**	**30**	**227**	**187**	**142**	**117**
Adjusted N Application Upper Range	**115**	**110**	**36**	**272**	**224**	**170**	**140**
Field Applications (lbs/ac)							
2015 May	23	31	5	0	0	94	8
2015 June	22	21	25	117	0	0	0
2015 July	50	48	0	0	167	1	98
2015 August	10	10	10	111	19	6	0
Available N Applied	**105**	**111**	**40**	**228**	**185**	**101**	**105**

Table 6

Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2015 – Crop Year 2016

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F15-0576	F15-0577	F15-0694	F15-0531	F15-0532	F15-0695	F15-0546
Sample Date	9/24/2015	9/24/2015	10/1/2015	9/16/2015	9/16/2015	10/1/2015	8/26/2015
Previous Crop	Sorghum	Sorghum	Sorghum	Alfalfa	Alfalfa	Sudangrass	Sudangrass
Upcoming Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Triticale
Crop Rotation Changes	No	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	215	133	69	103	51	73	65
2' Nitrate	195	128	30	36	45	57	102
1'+2' Root Zone	**410**	**261**	**99**	**139**	**96**	**130**	**167**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	187	187	187	240	240	187	200
Soil N supply (residual, OM, past manure)	-595	-432	-240	-209	-214	-207	-237
N used to consume past crop residue	20	20	15	0	0	15	25
N that is positionally unavailable	145	135	110	35	60	55	80
Calculated N need.	**0**	**0**	**72**	**66***	**86**	**50**	**68***
Recommendations (lbs/ac)							
Initial Calculated N Application	0	30	72	66	86	50	68
+ In-season petiole adjustment (if applicable)	20	45	70	50	60	0	25
Adjusted N Application	**20**	**75**	**142**	**116**	**146**	**50**	**93**
Adjusted N Application Upper Range	**24**	**90**	**170**	**139**	**175**	**60**	**112**
Field Applications (lbs/ac)							
2015 October	0	31	46	56	106	0	59
2015 November	0	0	21	0	0	0	0
...							
2016 March	0	0	20	0	0	42	0
2016 April	21	46	47	0	0	0	0
Available N Applied	**21**	**77**	**134**	**56**	**106**	**42**	**59**
Notes							
CP-SU04 A	A math error was made in original calculations, originally recommending 63 lbs.						
CP-SU06	A math error was made in original calculations, originally recommending 48 lbs.						

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2016 – Crop Year 2016

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F16-0234	F16-0235	F16-0269	F16-0307	F16-0308	F16-0270	F16-0271
Sample Date	5/3/2016	5/3/2016	5/4/2016	5/20/2016	5/20/2016	5/5/2016	5/5/2016
Previous Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Triticale
Upcoming Crop	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Sudangrass	Sudangrass
Crop Rotation Changes	No	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	37	28	21	43	46	36	43
2' Nitrate	74	39	16	48	44	54	91
1'+2' Root Zone	**111**	**67**	**37**	**91**	**90**	**90**	**134**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	261	261	261	358	358	225	225
Soil N supply (residual, OM, past manure)	-177	-131	-99	-158	-142	-153	-202
N used to consume past crop residue	20	20	20	0	0	20	15
N that is positionally unavailable	15	15	15	15	15	15	15
Calculated N need.	**119**	**165***	**197***	**215**	**231**	**107**	**53**
Recommendations (lbs/ac)							
Initial Calculated N Application	119	165	197	195	210	107	53
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0
Adjusted N Application	**119**	**165**	**197**	**195**	**210**	**107**	**53**
Adjusted N Application Upper Range	**143**	**198**	**236**	**234**	**252**	**128**	**64**
Field Applications (lbs/ac)							
2016 May	76	74	1	0	0	0	6
2016 June	39	73	74	122	127	87	0
2016 July	0	0	97	73	76	35	55
Available N Applied	**115**	**147**	**172**	**195**	**203**	**122**	**60**
Notes							
CP-SU02	A math error was made in original calculations, originally recommending 174 lbs.						
CP-SU03	A math error was made in original calculations, originally recommending 187 lbs.						

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2016 – Crop Year 2017

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F16-0491	F16-0492	F16-0684	F16-0685	F16-0686	F16-0387	F16-0388
Sample Date	9/14/2016	9/14/2016	10/25/2016	10/25/2016	10/25/2016	8/30/2016	8/30/2016
Previous Crop	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Sudangrass	Sudangrass
Upcoming Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	No	No	Yes	Yes
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	73	60	154	38	27	80	35
2' Nitrate	59	51	49	12	12	54	23
1'+2' Root Zone	**132**	**111**	**203**	**50**	**39**	**134**	**58**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	187	225	187	225	225	210	210
Residual Nitrates (3')	-206	-88	-246	-95	-72	-182	-100
Residual Ammonium (3')	-6	-7	-8	-18	-8	-8	-7
Mineralization (past manure)	-10	-10	-5	-5	-5	-12	-12
Mineralization (organic matter)	-15	-19	-16	-18	-15	-15	-14
N used to consume past crop residue	20	0	0	0	0	15	15
N that may not be accessible	90	23	67	62	51	65	54
Calculated N need.	**60**	**124***	**0**	**151**	**176**	**73**	**146**
Recommendations (lbs/ac)							
Initial Calculated N Application	60	124	40	150	170	73	130
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0
Adjusted N Application	**60**	**124**	**40**	**150**	**170**	**73**	**130**
Adjusted N Application Upper Range	**72**	**149**	**48**	**180**	**204**	**88**	**156**
Field Applications (lbs/ac)							
2016 October	30	30	0	0	0	0	0
2016 November	30	30	38	0	23	0	0
2016 December	0	0	0	0	45	0	0
...							
2017 March	0	0	0	64	44	150	0
2017 April	0	0	0	0	74	0	130
Available N Applied	**59**	**60**	**38**	**64**	**186**	**150**	**130**
Notes							
CP-SU02	Calculations made for Alfalfa Section. Triticale's Calculated N need was 81 lbs.						

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2017 – Crop Year 2017

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F17-0231	F17-0232	F17-0334	F17-0274	F17-0275	F17-0335	F17-0336
Sample Date	5/4/2017	5/4/2017	5/26/2017	5/15/2017	5/15/2017	5/29/2017	5/29/2017
Previous Crop	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Triticale
Upcoming Crop	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	Yes	Yes	No	No	No	Yes	Yes
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	32	22	35	119	90	40	55
2' Nitrate	34	13	42	51	32	30	43
1'+2' Root Zone	**66**	**35**	**77**	**170**	**122**	**70**	**98**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	300	300	261	358	358	358	358
Residual nitrates (3')	-66	-35	-77	-170	-122	-70	-98
Residual ammonium (3')	-25	-17	-8	-26	-22	-6	-15
Mineralization (past manure)	-10	-10	-10	-10	-10	-10	-10
Mineralization (organic matter)	-52	-46	-44	-52	-42	-42	-42
N used to consume past crop residue	20	20	20	0	0	0	0
N that may not be accessible	15	15	15	15	15	15	20
Calculated N need	**182**	**227**	**157**	**115**	**177**	**245**	**213**
Recommendations (lbs/ac)							
Initial Calculated N Application	182	175	157	115	145	42	129
+ In-season petiole adjustment (if applicable)							
Adjusted N Application	**182**	**175**	**157**	**115**	**145**	**42**	**129**
Adjusted N Application Upper Range	**200**	**193**	**173**	**127**	**160**	**46**	**142**
Field Applications (lbs/ac)							
2017 May	68	66	0	0	0	0	0
2017 June	0	0	128	0	0	0	0
2017 July	0	0	40	0	0	0	0
2017 August	36	35	0	82	92	0	87
2017 September	0	35	0	0	0	47	0
Available N Applied	**104**	**135**	**169**	**82**	**92**	**47**	**87**

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2017 – Crop Year 2018

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F17-0479	F17-0480	F17-0656	F17-0567	F17-0568	F17-0481	F17-0569
Sample Date	9/26/2017	9/26/2017	10/19/2017	10/2/2017	10/2/2017	9/26/2017	10/2/2017
Previous Crop	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	Yes	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	51	57	95	56	50	35	41
2' Nitrate	34	24	73	29	24	13	19
1'+2' Root Zone	**85**	**81**	**168**	**85**	**74**	**48**	**60**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	195	211	200	187	187	211	227
Residual nitrates (3')	-127	-113	-289	-115	-106	-68	-74
Residual ammonium (3')	-7	-17	-8	-28	-23	-11	-26
Mineralization (past manure)	-10	-10	-10	-5	-5	-10	-10
Mineralization (organic matter)	-16	-17	-13	-16	-13	-15	-15
N used to consume past crop residue	0	0	20			0	0
N released from past crop residue				-40	-40		
N that may not be accessible	59	59	145	53	57	32	30
Calculated N need	**94**	**113**	**45**	**36**	**57**	**139**	**132**
Recommendations (lbs/ac)							
Initial Calculated N Application	94	113	45	36	57	44	132
+ In-season petiole adjustment (if applicable)							
Adjusted N Application	**94**	**113**	**45**	**36**	**57**	**44**	**132**
Adjusted N Application Upper Range	**103**	**124**	**50**	**40**	**63**	**48**	**145**
Field Applications (lbs/ac)							
2017 October	0	93	0	0	0	45	0
2017 November	0	0	0	37	59	0	0
2017 December	0	0	0	0	0	0	0
2018 January	0	0	0	0	0	0	0
2018 February	0	0	0	0	0	0	0
2018 March	0	0	26	0	0	0	0
2018 April	0	0	22	0	0	22	0
Available N Applied	**0**	**93**	**48**	**37**	**59**	**67**	**0**

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2018 – Crop Year 2018

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F18-0301	F18-0332	F18-0315	F18-0285	F18-0286	F18-0302	F18-0333
Sample Date	5/16/2018	5/18/2018	5/10/2018	5/14/2018	5/14/2018	5/16/2018	5/18/2018
Previous Crop	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Silage Corn	Italian Rye	Italian Rye	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	Yes	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	49	38	25	31	29	40	20
2' Nitrate	21	16	28	33	23	14	10
1'+2' Root Zone	**70**	**54**	**53**	**64**	**52**	**54**	**30**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	357	357	276	180	180	357	357
Residual nitrates (3')	-70	-54	-53	-64	-52	-54	-30
Residual ammonium (3')	-22	-16	-18	-18	-17	-25	-23
Mineralization (past manure)	-10	-10	-15	-10	-10	-15	-10
Mineralization (organic matter)	-46	-40	-54	-50	-40	-38	-38
N used to consume past crop residue	0	0	25	20	20	0	0
N released from past crop residue	0	0	0	0	0	0	0
N that may not be accessible	15	15	15	20	15	15	15
Calculated N need	**224**	**252**	**176**	**78**	**96**	**240**	**271**
Recommendations (lbs/ac)							
Initial Calculated N Application	147	147	176	78	96	54	147
+ In-season petiole adjustment (if applicable)							
Adjusted N Application	**147**	**147**	**176**	**78**	**96**	**54**	**147**
Adjusted N Application Upper Range	**162**	**162**	**194**	**86**	**106**	**59**	**162**
Field Applications (lbs/ac)							
2018 June	40	0	32	0	0	22	0
2018 July	88	97	73	0	0	22	0
2018 August	0	0	33	76	84	0	114
2018 September	25	55	0	0	0	0	25
Available N Applied	**153**	**153**	**138**	**76**	**84**	**44**	**140**

Table 6

Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2018 – Crop Year 2019

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F18-0615	F18-0617	F18-0663	F18-0517	F18-0518	F18-0530	F18-0531
Sample Date	10/9/2018	10/9/2018	10/11/2018	9/25/2018	9/25/2018	9/26/2018	9/26/2018
Previous Crop	Alfalfa	Alfalfa	Silage Corn	Italian Rye	Italian Rye	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	Yes	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	70	50	70	30	32	30	29
2' Nitrate	32	11	27	6	5	3	14
1'+2' Root Zone	**102**	**61**	**97**	**36**	**37**	**33**	**43**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	195	211	200	187	187	211	227
Residual nitrates (3')	-148	-69	-147	-43	-45	-43	-58
Residual ammonium (3')	-24	-8	-16	-6	-6	-6	-6
Mineralization (past manure)	-10	-10	-10	-10	-10	-10	-10
Mineralization (organic matter)	-18	-14	-13	-18	-16	-15	-14
N used to consume past crop residue	0	0	20	10	10	0	0
N released from past crop residue	0	0	0	0	0	0	0
N that may not be accessible	50	25	75	25	25	20	25
Calculated N need	**45**	**135**	**109**	**145**	**145**	**157**	**164**
Recommendations (lbs/ac)							
Initial Calculated N Application	45	135	109	145	145	157	150
+ In-season petiole adjustment (if applicable)							
Adjusted N Application	**45**	**135**	**109**	**145**	**145**	**157**	**150**
Adjusted N Application Upper Range	**50**	**149**	**120**	**160**	**160**	**173**	**165**
Field Applications (lbs/ac)							
2018 October	20	10	0	113	145	108	103
2018 November	20	69	0	0	0	0	49
...							
2019 April	0	0	101	0	0	77	0
Available N Applied	**40**	**79**	**101**	**113**	**145**	**185**	**152**

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2019 – Crop Year 2019

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F19-0313	F19-0344	F19-0315	F19-0271	F19-0261	F19-0346	F19-0263
Sample Date	5/20/2019	5/22/2019	5/20/2019	5/14/2019	5/13/2019	5/22/2019	5/13/2019
Previous Crop SPR 19	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Alfalfa
Upcoming Crop FALL 19	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	No	Yes	No	Yes	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	59	92	60	19	14	41	19
2' Nitrate	25	37	26	5	7	23	19
1'+2' Root Zone	**84**	**129**	**86**	**24**	**21**	**64**	**38**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	351	351	285	292	292	351	331
Residual nitrates (3')	-85	-127	-85	-24	-21	-63	-37
Residual ammonium (3')	-18	-13	-12	-15	-4	-22	-7
Mineralization (past manure)	-10	-10	-10	-5	-5	-10	-5
Mineralization (organic matter)	-50	-44	-32	-54	-40	-34	-42
N used to consume past crop residue	0	0	0	20	20	0	0
N released from past crop residue	0	0	0	0	0	0	0
N that may not be accessible	20	30	20	10	10	15	15
Calculated N need	**208**	**187**	**166**	**224**	**252**	**237**	**255**
Recommendations (lbs/ac)							
Initial Calculated N Application	208	187	166		237	148	255
+ In-season petiole adjustment (if applicable)							
Adjusted N Application	**208**	**187**	**166**	**0**	**237**	**148**	**255**
Adjusted N Application Upper Range	**229**	**206**	**183**	**0**	**261**	**163**	**281**
Field Applications (lbs/ac)							
2019 May	0	0	0	0	0	0	135
2019 June	100	92	166	0	0	97	0
2019 July	96	75	0	215	230	52	137
2019 August	0	0	0	55	45	0	0
2019 September	0	47	0	0	0	48	55
2019 October	59	0	0	0	0	0	0
Available N Applied	**255**	**214**	**166**	**270**	**275**	**197**	**327**

Table 6
Cow Palace Dairy Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2019 – Crop Year 2020

Field	CP-SU01	CP-SU02	CP-SU03	CP-SU04 A	CP-SU04 B	CP-SU05	CP-SU06
Acres	**69.0**	**71.7**	**155.4**	**71.0**	**40.1**	**37.1**	**85.0**
Report Number:	F19-0507	F19-0509	F19-0767	F19-0852	F19-0853	F19-0517	F19-0519
Sample Date	9/5/2019	9/5/2019	10/8/2019	10/15/2019	10/15/2019	9/6/2019	9/6/2019
Previous Crop FALL 19	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop SPRING 20	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	Yes	Yes	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)							
1' Nitrate	57	40	120	31	32	49	40
2' Nitrate	29	16	44	14	10	18	20
1'+2' Root Zone	**85**	**55**	**164**	**46**	**42**	**67**	**60**
Nitrogen Budget Calculations (lbs/ac)							
Projected crop N use	255	250	200	227	227	258	265
Residual nitrates (3')	-107	-64	-196	-59	-56	-77	-73
Residual ammonium (3')	-28	-23	-24	-13	-10	-12	-22
Mineralization (past manure)	-5	-5	-5	-5	-5	-5	-10
Mineralization (organic matter)	-20	-20	-15	-15	-16	-19	-18
N used to consume past crop residue	0	0	25	0	0	0	0
N released from past crop residue	0	0	0	0	0	0	0
N that may not be accessible	20	15	65	20	20	20	20
Calculated N need	**115**	**153**	**50**	**155**	**160**	**165**	**162**
Recommendations (lbs/ac)							
Initial Calculated N Application	115	153	50	124	124	59	162
+ In-season petiole adjustment (if applicable)							
Adjusted N Application	**115**	**153**	**50**	**124**	**124**	**59**	**162**
Adjusted N Application Upper Range	**127**	**168**	**55**	**136**	**136**	**65**	**178**
Field Applications (lbs/ac) (so far)							
2019 September	0	50	0	0	0	0	72
Available N Applied	**0**	**50**	**0**	**0**	**0**	**0**	**72**

Notes:

All units in pounds per acre (lb/ac).

Justification or citation for crop nitrogen uptake predictions: Historical crop yields; PNW615; PNW0611; Progene Seed Company; UC Davis Cooperative Ext.; Western Fertilizer Handbook

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2013 – Crop Year 2014

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7.0**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155.0**	**40.3**	**16.3**	**38.4**
Report Number	F13-0487	F13-0417	F13-0418	F13-0603	F13-0509	F13-0528	F13-0419	F13-0500	F13-0501	F13-0529	F13-0510	F13-0420	F13-0492
Sample Date	9/24/2013	9/20/2013	9/20/2013	10/18/2013	10/2/2013	10/4/2013	9/20/2013	10/1/2013	10/1/2013	10/4/2013	10/2/2013	9/20/2013	9/27/2013
Previous Crop	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn
Upcoming Crop	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Alfalfa	Triticale	Triticale	Triticale	Triticale
Soil Measurements (lbs/ac)													
1' Nitrate	179	138	25	324	240	296	318	253	46	247	304	263	111
2' Nitrate	170	79	189	340	215	417	353	264	18	336	203	118	232
3' Nitrate	260	62	169	381	131	620	369	271	15	183	60	95	292
1'+2' Root Zone	**349**	**217**	**214**	**664**	**455**	**713**	**671**	**517**	**64**	**583**	**507**	**381**	**343**
Calculations & Recommendations (lbs/ac)	(Calculations were not made in the fall of 2013)							(Calculations were not made in the fall of 2013)					
Recommended N Application	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Field Applications (lbs/ac)													
2013 October	10	5	7	15	0	4	19	19	0	30	0	0	0
2013 November	0	0	0	0	31	0	0	0	0	0	0	0	0
Available N Applied	**10**	**5**	**7**	**15**	**31**	**4**	**19**	**19**	**0**	**30**	**0**	**0**	**0**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2014 – Crop Year 2014

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number	F14-0297	F14-0417	F14-0418	F14-0328	F14-0336	F14-0410	F14-0279	F14-0280	F14-0337	F14-0308	F14-0338	F14-0298	F14-0419
Sample Date	5/10/2014	5/19/2014	5/19/2014	5/14/2014	5/16/2014	5/23/2014	5/6/2014	5/6/2014	5/16/2014	5/12/2014	5/16/2014	5/10/2014	5/19/2014
Previous Crop	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Alfalfa	Triticale	Triticale	Triticale	Triticale
Upcoming Crop	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Triticale	Silage Corn	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn
Crop Rotation Changes	No	No	No	No	No	No	No	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	189	58	134	158	142	313	345	187	24	187	173	277	48
2' Nitrate	198	96	144	183	221	502	386	209	23	192	114	118	70
1'+2' Root Zone	**387**	**154**	**278**	**341**	**363**	**815**	**731**	**396**	**47**	**379**	**287**	**395**	**118**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	288	252	252	315	270	270	325	297	292	315	297	252	252
Soil N supply, plus organic matter release	-404	-184	-295	-329	-364	-752	-774	-368	-72	-351	-281	-390	-131
N used to consume past crop residue	20	20	20	20	20	20	20	20	0	20	20	20	20
N that is positionally unavailable	60	35	50	50	85	100	90	60	5	65	40	40	20
Calculated N need	**0**	**123**	**27**	**56**	**11**	**0**	**0**	**9**	**225**	**49**	**76**	**0**	**161**
Recommendations (lbs/ac)													
Initial Calculated N Application	0	123	27	56	11	0	0	9	225	49	76	0	161
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**0**	**123**	**27**	**56**	**11**	**0**	**0**	**9**	**225**	**49**	**76**	**0**	**161**
Adjusted N Application Upper Range	**0**	**148**	**32**	**67**	**13**	**0**	**0**	**11**	**270**	**59**	**91**	**0**	**193**
Field Applications (lbs/ac)													
2014 May	0	0	0	0	0	0	0	0	0	43	0	0	0
2014 June	0	0	0	43	0	0	0	0	0	0	0	0	0
2014 July	0	117	34	0	0	0	0	0	0	0	65	0	159
2014 August	0	0	0	0	85	0	0	0	0	0	0	0	0
Available N Applied	**0**	**117**	**34**	**43**	**85**	**0**	**0**	**0**	**0**	**43**	**65**	**0**	**159**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2014 – Crop Year 2015

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number	F14-0691	F14-0640	F14-0641	F14-0737	F14-0474	F14-0475	F14-0476	F14-0713	F14-0648	F14-0692	F14-0738	F14-0693	F14-0714
Sample Date	10/7/2014	9/19/2014	9/19/2014	10/15/2014	8/22/2014	8/21/2014	8/21/2014	10/9/2014	9/29/2014	10/7/2014	10/15/2014	10/7/2014	10/9/2014
Previous Crop	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Triticale	Silage Corn	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn
Upcoming Crop	Triticale	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Alfalfa	Triticale	Triticale	Triticale	Triticale
Crop Rotation Changes	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	223	118	94	204	102	212	131	203	48	230	248	183	87
2' Nitrate	205	62	76	293	128	391	303	158	9	260	139	153	87
3' Nitrate	222	81	80	314	156	625	371	226	7	236	96	99	84
1'+2' Root Zone	**428**	**180**	**170**	**497**	**230**	**603**	**434**	**361**	**57**	**490**	**387**	**336**	**174**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	200	175	175	175	225	225	300	200	210	200	175	175	200
Soil N supply, plus organic matter release	-623	-253	-248	-721	-359	-1109	-759	-512	-71	-637	-422	-400	-234
N used to consume past crop residue	25	25	25	25	35	25	25	25	0	25	25	25	25
N that is positionally unavailable	210	73	73	280	195	715	323	190	5	235	90	100	75
Calculated N need	**0**	**20**	**25**	**0**	**96**	**0**	**0**	**0**	**144**	**0**	**0**	**0**	**66**
Recommendations (lbs/ac)													
Initial Calculated N Application	30	40	40	40	96	0	0	40	144	30	40	35	66
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**30**	**40**	**40**	**40**	**96**	**0**	**0**	**40**	**144**	**30**	**40**	**35**	**66**
Adjusted N Application Upper Range	**36**	**48**	**48**	**48**	**115**	**0**	**0**	**48**	**173**	**36**	**48**	**42**	**79**
Field Applications (lbs/ac)													
2014 October	30	41	66	0	0	0	0	0	0	0	42	0	62
2014 November	0	0	0	26	0	0	0	0	0	0	0	0	0
Available N Applied	**30**	**41**	**66**	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**42**	**0**	**62**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2015 – Crop Year 2015

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number	F15-0360	F15-0361	F15-0362	F15-0358	F15-0354	F15-0352	F15-0357	F15-0363	F15-0356	F15-0392	F15-0359	F15-0355	F15-0353
Sample Date	5/1/2015	5/5/2015	5/5/2015	4/29/2015	5/11/2015	5/8/2015	5/12/2015	5/5/2015	5/12/2015	4/22/2015	5/7/2015	5/11/2015	5/8/2015
Previous Crop	Triticale	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Alfalfa	Triticale	Triticale	Triticale	Triticale
Upcoming Crop	Silage Corn	Silage Corn	Silage Corn	Sorghum	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Sorghum	Sorghum	Silage Corn	Sudangrass
Crop Rotation Changes	No	No	No	Yes	No	No	No	No	No	Yes	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	121	38	63	91	131	309	123	66	19	127	225	77	36
2' Nitrate	141	49	100	236	200	371	287	75	12	188	137	74	56
1'+2' Root Zone	**262**	**87**	**163**	**327**	**331**	**680**	**410**	**141**	**31**	**315**	**362**	**151**	**92**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	270	252	234	215	292	292	295	243	240	255	215	252	200
Soil N supply (residual, OM, past manure)	-327	-157	-230	-387	-396	-740	-410	-203	-85	-372	-362	-151	-142
N used to consume past crop residue	20	20	20	20	0	0	0	20		20	20	20	20
Alfalfa crown N release									-50				
N that is positionally unavailable	40	10	20	80	40	50	85	15	5	60	65	15	10
Calculated N need	**3**	**125**	**44**	**0**	**0**	**0**	**0**	**75**	**110**	**0**	**0**	**136***	**88**
Recommendations (lbs/ac)													
Initial Calculated N Application	40	125	44	40	0	0	0	75	110	45	0	136	88
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**40**	**125**	**44**	**40**	**0**	**0**	**0**	**75**	**110**	**45**	**0**	**136**	**88**
Adjusted N Application Upper Range	**48**	**150**	**53**	**48**	**0**	**0**	**0**	**90**	**132**	**54**	**0**	**163**	**106**
Field Applications (lbs/ac)													
2015 May	42	114	57	40	0	0	0	137	0	40	0	64	0
2015 June	0	0	0	0	0	0	0	0	0	0	0	0	104
2015 July	0	0	0	0	0	0	0	0	48	0	0	0	0
Available N Applied	**42**	**114**	**57**	**40**	**0**	**0**	**0**	**137**	**48**	**40**	**0**	**64**	**104**
Notes													
LD-SU16	A math error was made in original calculations, originally recommending 66 lbs.												

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2015 – Crop Year 2016

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F15-0689	F15-0578	F15-0579	F15-0690	F15-0475	F15-0476	F15-0473	F15-0691	F15-0580	F15-0581	F15-0692	F15-0693	F15-0474
Sample Date	10/6/2015	9/25/2015	9/25/2015	10/12/2015	9/9/2015	9/9/2015	9/8/2015	10/9/2015	9/25/2015	9/25/2015	10/9/2015	10/6/2015	9/8/2015
Previous Crop	Silage Corn	Silage Corn	Silage Corn	Sorghum	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Sorghum	Sorghum	Silage Corn	Sudangrass
Upcoming Crop	Triticale	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale
Crop Rotation Changes	No	No	No	No	No	No	No	No	Yes	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	179	128	93	232	66	282	83	143	16	189	190	125	43
2' Nitrate	180	91	84	196	119	626	204	153	9	193	116	51	68
1'+2' Root Zone	**359**	**219**	**177**	**428**	**185**	**908**	**287**	**296**	**25**	**382**	**306**	**176**	**111**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	187	175	175	175	240	225	225	187	175	175	175	187	150
Soil N supply (residual, OM, past manure)	-524	-344	-352	-550	-315	-1276	-571	-536	-80	-475	-403	-337	-227
N used to consume past crop residue	20	20	20	15	0	0	0	20	20	20	20	20	20
N that is positionally unavailable	145	90	125	120	135	385	240	240	15	85	110	90	102
Calculated N need	**0**	**0**	**0**	**0**	**60**	**0**	**0**	**0**	**130**	**0**	**0**	**0**	**45**
Recommendations (lbs/ac)													
Initial Calculated N Application	0	30	30	15	60	0	0	35	130	30	35	35	45
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**0**	**30**	**30**	**15**	**60**	**0**	**0**	**35**	**130**	**30**	**35**	**35**	**45**
Adjusted N Application Upper Range	**0**	**36**	**36**	**18**	**72**	**0**	**0**	**42**	**156**	**36**	**42**	**42**	**54**
Field Applications (lbs/ac)													
2015 September	0	0	0	0	0	0	0	0	0	0	0	34	0
2015 October	0	0	0	10	44	0	0	34	0	0	34	0	13
2015 November	0	0	0	0	0	0	0	0	73	0	0	0	0
...													
2016 February	0	49	80	0	17	0	0	18	0	0	25	0	0
2016 March	0	51	100	0	0	0	0	0	0	0	0	0	0
2016 April	0	0	0	33	18	0	13	14	0	0	0	0	0
Available N Applied	**0**	**100**	**180**	**43**	**80**	**0**	**13**	**66**	**73**	**0**	**59**	**34**	**13**
Notes													
LD-SU05	October 2015 application was to sections B, G, and H (60 acres).												

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2016 – Crop Year 2016

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F16-0303	F16-0223	F16-0276	F16-0304	F16-0266	F16-0267	F16-0268	F16-0296	F16-0224	F16-0297	F16-0305	F16-0275	F16-0306
Sample Date	5/18/2016	4/27/2016	5/4/2016	5/19/2016	5/6/2016	5/6/2016	5/6/2016	5/13/2016	4/27/2016	5/13/2016	5/18/2016	5/4/2016	5/19/2016
Previous Crop	Triticale	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale
Upcoming Crop	Silage Corn	Triticale	Triticale	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Triticale	Silage Corn
Crop Rotation Changes	No	Yes	Yes	No	No	No	No	No	No	No	No	Yes	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	40	35	44	20	24	34	46	51	23	21	119	20	15
2' Nitrate	138	29	98	99	34	275	71	132	32	58	78	46	25
1'+2' Root Zone	**178**	**64**	**142**	**119**	**58**	**309**	**117**	**183**	**55**	**79**	**197**	**66**	**40**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	252	200	200	261	292	292	292	243	270	243	252	200	225
Soil N supply (residual, OM, past manure)	-258	-156	-282	-185	-122	-309	-218	-253	-134	-155	-237	-163	-91
N used to consume past crop residue	20	20	20	20	0	0	0	20	20	20	20	20	20
N that is positionally unavailable	45	15	65	20	15	15	15	30	15	15	20	15	15
Calculated N need	**59**	**79**	**3**	**116**	**185**	**0**	**89**	**40**	**171**	**123**	**55**	**72**	**169**
Recommendations (lbs/ac)													
Initial Calculated N Application	59	79	28	116	185	0	89	40	171	91	55	72	169
+ In-season petiole adjustment (if applicable)	20	0	0	30	0	0	0	25	0	0	25	0	0
Adjusted N Application	**79**	**79**	**28**	**146**	**185**	**0**	**89**	**65**	**171**	**91**	**80**	**72**	**169**
Adjusted N Application Upper Range	**95**	**95**	**34**	**175**	**222**	**0**	**107**	**78**	**205**	**109**	**96**	**86**	**203**
Field Applications (lbs/ac)													
2016 May	10	0	0	0	0	0	0	11	39	40	0	0	71
2016 June	0	0	0	21	26	0	11	9	0	0	16	0	0
2016 July	20	0	0	27	15	0	34	0	45	30	18	0	21
2016 August	0	0	0	0	20	0	0	0	0	0	0	0	0
Available N Applied	**30**	**0**	**0**	**47**	**62**	**0**	**44**	**20**	**84**	**70**	**34**	**0**	**92**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2016 – Crop Year 2017

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F16-0630	F16-0382	F16-0383	F16-0493	F16-0384	F16-0385	F16-0632	F16-0597	F16-0494	F16-0598	F16-0633	F16-0386	F16-0631
Sample Date	10/14/2016	8/29/2016	8/27/2016	9/26/2016	8/27/2016	8/29/2016	10/17/2016	10/10/2016	9/26/2016	10/10/2016	10/17/2016	8/29/2016	10/14/2016
Previous Crop	Silage Corn	Triticale	Triticale	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Triticale	Silage Corn
Upcoming Crop	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Alfalfa	Triticale
Crop Rotation Changes	No	Yes	Yes	No	No	No	No	No	No	No	No	Yes	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	85	79	68	60	41	48	112	160	62	92	89	56	57
2' Nitrate	120	29	31	110	71	197	75	121	35	120	89	24	49
1'+2' Root Zone	**205**	**108**	**99**	**170**	**112**	**245**	**187**	**281**	**97**	**212**	**178**	**80**	**106**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	187	195	195	175	270	270	225	187	175	200	175	195	150
Residual Nitrates (3')	-390	-146	-137	-388	-230	-638	-347	-442	-131	-322	-275	-110	-167
Residual Ammonium (3')	-8	-13	-24	-6	-7	-11	-7	-6	-6	-7	-12	-24	-6
Mineralization (past manure)	-5	-10	-10	-10	-13	-5	-5	-5	-10	-5	-5	-10	-5
Mineralization (organic matter)	-15	-22	-21	-15	-17	-19	-20	-15	-16	-17	-16	-22	-10
N used to consume past crop residue	20	20	20	20	0	0	0	20	20	20	20	20	20
N that may not be accessible	200	60	63	210	120	410	177	178	51	137	124	50	83
Calculated N need	**0**	**84**	**86**	**0**	**123**	**7**	**23**	**0**	**83**	**6**	**11**	**99**	**65**
Recommendations (lbs/ac)													
Initial Calculated N Application	35	84	86	35	123	35	35	30	83	35	50	99	65
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**35**	**84**	**86**	**35**	**123**	**35**	**35**	**30**	**83**	**35**	**50**	**99**	**65**
Adjusted N Application Upper Range	**42**	**101**	**103**	**42**	**148**	**42**	**42**	**36**	**100**	**42**	**60**	**119**	**78**
Field Applications (lbs/ac)													
2016 September	0	0	0	0	0	0	0	0	24	0	0	0	0
2016 October	0	0	0	0	0	0	0	0	0	34	0	0	58
2016 November	35	0	0	35	56	33	35	29	0	0	47	0	0
...													
2017 March	25	36	52	0	23	14	29	32	0	0	21	0	0
2017 April	16	45	54	70	13	14	18	18	0	0	13	0	0
Available N Applied	**76**	**81**	**107**	**105**	**92**	**61**	**82**	**80**	**24**	**34**	**81**	**0**	**58**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2017 – Crop Year 2017

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F17-0338	F17-0280	F17-0281	F17-0282	F17-0233	F17-0234	F17-0235	F17-0339	F17-0236	F17-0278	F17-0340	F17-0279	F17-0341
Sample Date	5/25/2017	5/16/2017	5/16/2017	5/11/2017	5/10/2017	5/10/2017	5/9/2017	5/25/2017	5/9/2017	5/11/2017	5/26/2017	5/16/2017	5/29/2017
Previous Crop	Triticale	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale
Upcoming Crop	Grass mix	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Grass mix	Triticale-Sudan	Silage Corn	Alfalfa	Silage Corn
Crop Rotation Changes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	No	Yes	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	22	141	98	43	57	38	119	32	14	22	29	52	14
2' Nitrate	46	65	41	86	56	66	106	67	11	68	39	29	22
1'+2' Root Zone	**68**	**206**	**139**	**129**	**113**	**104**	**225**	**99**	**25**	**90**	**68**	**81**	**36**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	252	325	300	261	325	308	308	243	275	275	243	325	225
Residual nitrates (3')	-68	-206	-139	-129	-113	-104	-225	-99	-25	-90	-68	-81	-36
Residual ammonium (3')	-14	-44	-29	-22	-40	-26	-23	-16	-27	-24	-14	-37	-15
Mineralization (past manure)	-10	-10	-10	-10	-10	-5	-10	-10	-5	-10	-10	-10	-5
Mineralization (organic matter)	-46	-50	-50	-52	-62	-50	-74	-40	-50	-48	-44	-58	-30
N used to consume past crop residue	20	0	0	20	0	0	0	20	20	20	20	0	15
N that may not be accessible	15	20	20	20	15	15	40	20	15	20	15	20	15
Calculated N need	**149**	**35**	**92**	**88**	**115**	**138**	**16**	**118**	**203**	**143**	**142**	**159**	**169**
Recommendations (lbs/ac)													
Initial Calculated N Application	149	35	92	88	115	138	16	118	166	143	142	101	155
+ In-season petiole adjustment (if applicable)													
Adjusted N Application	**149**	**35**	**92**	**88**	**115**	**138**	**16**	**118**	**166**	**143**	**142**	**101**	**155**
Adjusted N Application Upper Range	**164**	**39**	**101**	**97**	**127**	**152**	**18**	**130**	**183**	**157**	**156**	**111**	**171**
Field Applications (lbs/ac)													
2017 May	0	0	0	0	0	0	0	0	0	30	0	0	148
2017 June	39	0	0	96	28	0	0	39	238	0	51	37	0
2017 July	39	107	63	90	50	42	0	64	0	63	46	25	53
2017 August	32	0	0	0	23	20	30	0	0	0	0	0	0
2017 September	0	0	0	0	0	0	0	0	48	0	0	0	0
Available N Applied	**110**	**107**	**63**	**185**	**100**	**62**	**30**	**103**	**286**	**93**	**97**	**62**	**201**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2017 – Crop Year 2018

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F17-0650	F17-0651	F17-0668	F17-0465	F17-0669	F17-0670	F17-0652	F17-0482	F17-0466	F17-0467	F17-0483	F17-0653	F17-0468
Sample Date	10/19/2017	10/20/2017	10/23/2017	9/22/2017	10/23/2017	10/23/2017	10/20/2017	9/27/2017	9/8/2017	9/13/2017	9/27/2017	10/20/2017	9/22/2017
Previous Crop	Grass mix	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Grass mix	Triticale-Sudan	Silage Corn	Alfalfa	Silage Corn
Upcoming Crop	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Grassmix	Triticale	Triticale	Alfalfa	Triticale
Crop Rotation Changes	Yes	No	No	No	No	No	No	No	No	Yes	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	23	34	29	115	43	34	71	161	56	50	63	30	43
2' Nitrate	28	24	24	118	37	71	59	77	29	77	56	8	18
1'+2' Root Zone	**51**	**58**	**53**	**233**	**80**	**105**	**130**	**238**	**85**	**127**	**119**	**38**	**61**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	175	195	195	175	211	211	211	175	175	175	175	195	150
Residual nitrates (3')	-92	-88	-93	-381	-137	-231	-231	-331	-113	-217	-190	-46	-79
Residual ammonium (3')	-10	-18	-19	-10	-8	-10	-10	-12	-19	-17	-10	-19	-18
Mineralization (past manure)	-10	-10	-10	-15	-10	-10	-10	-5	-10	-5	-5	-10	-10
Mineralization (organic matter)	-17	-18	-17	-20	-15	-16	-29	-15	-17	-19	-16	-16	-12
N used to consume past crop residue	15	0	0	35	0	0	0	20	15	20	20	0	20
N that may not be accessible	25	15	15	165	25	138	125	116	50	117	92	25	30
Calculated N need	**86**	**76**	**71**	**0**	**66**	**82**	**56**	**0**	**81**	**54**	**66**	**129**	**81**
Recommendations (lbs/ac)													
Initial Calculated N Application	86	50	50	30	54	54	54	30	67	54	66	50	57
+ In-season petiole adjustment (if applicable)													
Adjusted N Application	**86**	**50**	**50**	**30**	**54**	**54**	**54**	**30**	**67**	**54**	**66**	**50**	**57**
Adjusted N Application Upper Range	**95**	**55**	**55**	**33**	**59**	**59**	**59**	**33**	**74**	**59**	**73**	**55**	**63**
Field Applications (lbs/ac) (so far)													
2017 September	0	0	0	0	0	0	0	0	48	27	0	0	0
2017 October	0	35	73	0	0	24	24	31	0	0	20	0	55
2017 November	38	0	0	32	44	0	0	0	0	0	20	0	0
2017 December	0	0	0	0	0	0	0	0	0	0	0	0	0
2018 January	0	0	0	0	0	0	0	0	0	0	0	0	0
2018 February	0	0	0	0	0	0	0	0	0	0	0	0	0
2018 March	20	0	0	0	0	16	0	0	0	0	18	0	0
2018 April	18	0	0	33	0	15	0	0	0	0	0	0	0
Available N Applied	**76**	**35**	**73**	**64**	**44**	**55**	**24**	**31**	**48**	**27**	**59**	**0**	**55**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2018 – Crop Year 2018

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F18-0240	F18-0320	F18-0321	F18-0241	F18-0287	F18-0288	F18-0322	F18-0389	F18-0224	F18-0225	F18-0390	F18-0323	F18-0391
Sample Date	5/4/2018	5/11/2018	5/11/2018	5/1/2018	5/14/2018	5/14/2018	5/11/2018	6/4/2018	4/26/2018	4/26/2018	5/31/2018	5/11/2018	5/31/2018
Previous Crop	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Grass mix	Triticale	Triticale	Alfalfa	Triticale
Upcoming Crop	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Grass mix	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Silage Corn
Crop Rotation Changes	No	No	No	No	No	No	No	Yes	Yes	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	22	46	50	40	28	24	49	44	17	16	48	31	7
2' Nitrate	14	15	38	76	30	95	60	78	10	64	48	11	4
1'+2' Root Zone	**36**	**61**	**88**	**116**	**58**	**119**	**109**	**122**	**27**	**80**	**96**	**42**	**11**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	257	357	357	267	325	357	341	257	306	261	248	357	211
Residual nitrates (3')	-36	-61	-88	-116	-58	-119	-109	-122	-27	-80	-96	-42	-11
Residual ammonium (3')	-12	-20	-32	-11	-22	-24	-18	-4	-17	-13	-6	-39	-4
Mineralization (past manure)	-15	-15	-10	-15	-15	-10	-15	-15	-20	-20	-10	-10	-10
Mineralization (organic matter)	-48	-54	-52	-54	-44	-42	-40	-40	-49	-58	-44	-54	-38
N used to consume past crop residue	15	0	0	25	0	0	0	20	25	25	20	0	20
N released from past crop residue	0	0	0	0	0	0	0	0	0	0	0	0	0
N that may not be accessible	15	15	15	20	15	30	20	25	10	20	20	15	15
Calculated N need	**176**	**222**	**190**	**116**	**201**	**192**	**179**	**121**	**228**	**135**	**132**	**227**	**183**
Recommendations (lbs/ac)													
Initial Calculated N Application		88	88	111	88	88	82	121	190	130	132	88	167
+ In-season petiole adjustment (if applicable)													
Adjusted N Application	**147**	**88**	**88**	**111**	**88**	**88**	**82**	**121**	**190**	**130**	**132**	**88**	**167**
Adjusted N Application Upper Range	**162**	**97**	**97**	**122**	**97**	**97**	**90**	**133**	**209**	**143**	**145**	**97**	**184**
Field Applications (lbs/ac)													
2018 May	0	0	0	0	27	21	39	0	0	141	0	0	0
2018 June	0	0	0	0	47	40	68	34	0	0	0	0	57
2018 July	66	35	28	78	0	21	0	34	0	0	26	37	0
2018 August	0	0	0	23	20	18	30	23	0	0	15	0	30
Available N Applied	**66**	**35**	**28**	**101**	**95**	**99**	**137**	**90**	**0**	**141**	**41**	**37**	**87**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2018 – Crop Year 2019

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F18-0664	F18-0720	F18-0722	F18-0665	F18-0666	F18-0724	F18-0726	F18-0519	F18-0607	F18-0609	F18-0667	F18-0668	F18-0930
Sample Date	10/12/2018	10/17/2018	10/17/2018	10/12/2018	10/12/2018	10/17/2018	10/17/2018	9/25/2018	10/8/2018	10/8/2018	10/11/2018	10/12/2018	11/2/2018
Previous Crop	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Grass mix	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Silage Corn
Upcoming Crop	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Alfalfa	Triticale
Crop Rotation Changes	No	No	No	No	No	No	No	Yes	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	48	36	29	160	37	25	58	41	30	79	69	33	44
2' Nitrate	28	9	16	165	20	138	59	88	9	70	46	8	4
1'+2' Root Zone	**76**	**45**	**45**	**325**	**57**	**163**	**117**	**129**	**39**	**149**	**115**	**41**	**48**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	210	211	227	227	227	227	227	228	187	227	227	227	192
Residual nitrates (3')	-116	-51	-61	-538	-87	-404	-269	-265	-55	-206	-168	-50	-52
Residual ammonium (3')	-36	-33	-30	-28	-27	-25	-21	-6	-24	-6	-39	-29	-14
Mineralization (past manure)	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-5
Mineralization (organic matter)	-16	-19	-18	-15	-17	-17	-24	-15	-17	-18	-17	-17	-14
N used to consume past crop residue	20	0	0	20	0	0	0	10	20	20	20	0	20
N released from past crop residue	0	0	0	0	0	-40	0	0	0	0	0	0	0
N that may not be accessible	75	20	25	285	25	280	130	160	30	90	80	20	25
Calculated N need	**127**	**118**	**133**	**0**	**111**	**11**	**33**	**102**	**131**	**97**	**93**	**141**	**152**
Recommendations (lbs/ac)													
Initial Calculated N Application	127	44	47		71	40	33	102	108	97	93	71	107
+ In-season petiole adjustment (if applicable)													
Adjusted N Application	**127**	**44**	**47**	**0**	**71**	**40**	**33**	**102**	**108**	**97**	**93**	**71**	**107**
Adjusted N Application Upper Range	**140**	**48**	**52**	**0**	**78**	**44**	**36**	**112**	**119**	**107**	**102**	**78**	**118**
Field Applications (lbs/ac)													
2018 October	34	0	0	0	0	0	35	40	0	65	0	0	43
2018 November	34	59	69	35	34	43	0	34	0	0	31	88	0
…													
2019 March	0	0	0	0	40	0	0	64	0	0	74	0	0
2019 April	35	0	0	0	0	0	0	0	0	0	0	0	0
Available N Applied	**103**	**59**	**69**	**35**	**74**	**43**	**35**	**138**	**0**	**65**	**105**	**88**	**43**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2019 – Crop Year 2019

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F19-0401	F19-0275	F19-0317	F19-0395	F19-0303	F19-0305	F19-0319	F19-0397	F19-0321	F19-0360	F19-0323	F19-0277	F19-0325
Sample Date	6/11/2019	5/14/2019	5/17/2019	6/7/2019	5/16/2019	5/16/2019	5/17/2019	6/7/2019	5/17/2019	5/23/2019	5/17/2019	5/14/2019	5/20/2019
Previous Crop	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Triticale	Alfalfa	Triticale	Triticale	Triticale	Triticale	Alfalfa	Triticale
Upcoming Crop	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Silage Corn
Crop Rotation Changes	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	17	36	50	59	30	31	65	34	20	64	31	37	15
2' Nitrate	35	12	30	143	40	98	71	60	13	124	42	12	6
1'+2' Root Zone	**51.620256**	**47.89116**	**79.349292**	**201.759858**	**70.048296**	**129.164796**	**136.612116**	**93.32253**	**32.991084**	**187.550154**	**72.701064**	**48.948462**	**21.042756**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	257	357	357	257	266	266	294	257	276	261	257	357	230
Residual nitrates (3')	-52	-49	-79	-201	-70	-131	-137	-94	-34	-190	-72	-49	-21
Residual ammonium (3')	-11	-4	-25	-7	-13	-11	-4	-6	-16	-8	-16	-11	-6
Mineralization (past manure)	-10	-10	-10	-10	-5	-5	-10	-10	-5	-10	-5	-10	-10
Mineralization (organic matter)	-56	-50	-44	-50	-36	-34	-60	-42	-38	-58	-42	-52	-36
N used to consume past crop residue	25	0	0	25	0	25	0	25	20	25	25	0	20
N released from past crop residue	0	0	0	0	-60	0	-60	0	0	0	0	0	0
N that may not be accessible	15	15	15	75	15	45	40	15	10	65	15	15	15
Calculated N need	**168**	**259**	**214**	**89**	**97**	**155**	**63**	**145**	**213**	**85**	**162**	**250**	**192**
Recommendations (lbs/ac)													
Initial Calculated N Application	138	114	114	89	97	143	63	138		75	138	114	192
+ In-season petiole adjustment (if applicable)													
Adjusted N Application	**147**	**114**	**114**	**89**	**97**	**143**	**63**	**138**	**0**	**75**	**138**	**114**	**192**
Adjusted N Application Upper Range	**162**	**125**	**125**	**98**	**107**	**157**	**69**	**152**	**0**	**83**	**152**	**125**	**211**
Field Applications (lbs/ac)													
2019 May	0	0	0	0	0	0	0	0	82	56	0	0	97
2019 June	40	0	0	51	29	18	0	41	0	0	28	0	0
2019 July	79	0	0	40	51	76	73	41	0	0	82	0	0
2019 August	39	0	0	0	22	61	0	41	0	0	27	0	0
Available N Applied	**159**	**0**	**0**	**91**	**101**	**155**	**73**	**122**	**82**	**56**	**137**	**0**	**97**

Table 7

Liberty/H&S Bosma Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2019 – Crop Year 2020

Field	LD-SU02	LD-SU03	LD-SU04	LD-SU05	LD-SU06	LD-SU07	LD-SU08 N	LD-SU08 S	LD-SU09	LD-SU10	LD-SU14	LD-SU16	LD-SU17
Acres	**68.5**	**11.8**	**7**	**143.9**	**38.9**	**94.6**	**78.1**	**79.1**	**59.4**	**155**	**40.3**	**16.3**	**38.4**
Report Number:	F19-0837	F19-0762	F19-0763	F19-0831	F19-0706	F19-0707	F19-0585	F19-0838	F19-0801	F19-0802	F19-0812	F19-0764	F19-0813
Sample Date	10/14/2019	10/4/2019	10/4/2019	10/11/2019	10/1/2019	10/1/2019	9/20/2019	10/14/2019	10/9/2019	10/9/2019	10/10/2019	10/4/2019	10/10/2019
Previous Crop	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Silage Corn
Upcoming Crop	Triticale	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Alfalfa	Triticale
Crop Rotation Changes	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)													
1' Nitrate	65	46	30	115	86	143	106	136	50	106	102	36	100
2' Nitrate	52	11	25	132	35	97	56	131	26	59	43	9	37
1'+2' Root Zone	**117.069696**	**57.347082**	**54.870984**	**246.53619**	**121.31793**	**240.543**	**161.903106**	**267.019038**	**76.13118**	**165.094038**	**145.554336**	**44.988336**	**136.495242**
Nitrogen Budget Calculations (lbs/ac)													
Projected crop N use	200	211	211	200	227	227	227	228	187	218	187	227	175
Residual nitrates (3')	-183	-68	-89	-493	-155	-333	-234	-435	-99	-232	-196	-51	-183
Residual ammonium (3')	-21	-50	-38	-13	-12	-16	-14	-8	-16	-17	-28	-45	-17
Mineralization (past manure)	-10	-10	-10	-10	-5	-10	-5	-10	-5	-10	-5	-5	-5
Mineralization (organic matter)	-18	-18	-10	-20	-15	-15	-24	-15	-17	-20	-18	-16	-13
N used to consume past crop residue	25	0	0	25	25	25	25	25	20	25	25	0	20
N released from past crop residue	0	0	0	0	0	0	0	0	0	0	0	0	0
N that may not be accessible	85	20	25	300	60	140	100	225	20	100	95	20	80
Calculated N need	**78**	**85**	**89**	**0**	**125**	**18**	**75**	**10**	**90**	**64**	**60**	**130**	**57**
Recommendations (lbs/ac)													
Initial Calculated N Application	78	64	64		125	0	75		56	64	60	68	57
+ In-season petiole adjustment (if applicable)													
Adjusted N Application	**78**	**64**	**64**	**0**	**125**	**0**	**75**	**0**	**56**	**64**	**60**	**68**	**57**
Adjusted N Application Upper Range	**86**	**70**	**70**	**0**	**138**	**0**	**83**	**0**	**62**	**70**	**66**	**75**	**63**
Field Applications (lbs/ac) (so far)													
2019 October	33	0	0	0	46	0	34	33	55	64	0	0	0
2019 November	33	0	0	32	0	0	34	0	0	0	45	0	0
Available N Applied	**65**	**0**	**0**	**32**	**46**	**0**	**67**	**33**	**55**	**64**	**45**	**0**	**0**

Notes:

All units in pounds per acre (lb/ac).

Justification or citation for crop nitrogen uptake predictions: Historical crop yields; PNW615; PNW0611; Progene Seed Company; UC Davis Cooperative Ext.; Western Fertilizer Handbook

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2013 – Crop Year 2014

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F13-0538	F13-0600	F13-0567	F13-0560	F13-0539	F13-0580	F13-0540	F13-0601	F13-0561	F13-0568	F13-0581	F13-0527	F13-0569	F13-0602
Sample Date	10/9/2013	10/17/2013	10/15/2013	10/14/2013	10/9/2013	10/16/2013	10/9/2013	10/17/2013	10/14/2013	10/15/2013	10/16/2013	10/7/2013	10/15/2013	10/17/2013
Previous Crop	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Sudangrass	Silage Corn	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Triticale	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Triticale	Triticale
Soil Measurements (lbs/ac)														
1' Nitrate	41	77	33	661	947	175	113	565	93	172	132	687	35	131
2' Nitrate	28	93	14	614	1041	326	260	610	108	136	140	527	24	120
3' Nitrate	13	52	12	673	973	419	265	583	106	78	113	388	28	77
1'+2' Root Zone	**69**	**170**	**47**	**1275**	**1988**	**501**	**373**	**1175**	**201**	**308**	**272**	**1214**	**59**	**251**
Calculations & Recommendations (lbs/ac)	(Calculations were not made in the fall of 2013)							(Calculations were not made in the fall of 2013)						
Recommended N Application	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Field Applications (lbs/ac)														
2013 October	247	0	0	17	17	11	9	0	20	0	0	0	94	0
2013 November	15	0	0	5	5	0	0	0	0	0	0	0	41	0
Available N Applied	**262**	**0**	**0**	**22**	**22**	**11**	**9**	**0**	**20**	**0**	**0**	**0**	**136**	**0**

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2014 – Crop Year 2014

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F14-0331	F14-0282	F14-0330	F14-0292	F14-0293	F14-0284	F14-0329	F14-0294	F14-0285	F14-0442	F14-0409	F14-0295	F14-0296	F14-0283
Sample Date	5/14/2014	5/6/2014	5/14/2014	5/8/2014	5/8/2014	5/6/2014	5/14/2014	5/9/2014	5/6/2014	6/17/2014	5/22/2014	5/9/2014	5/9/2014	5/6/2014
Previous Crop	Alfalfa	Triticale	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Triticale	Triticale
Upcoming Crop	Alfalfa	Sudan	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Sudangrass	Silage Corn	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	No	Yes	No	No	No	No	No	Yes	No	Yes	Yes
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	36	30	62	657	812	208	41	767	207	204	81	373	136	14
2' Nitrate	44	14	30	727	970	223	110	605	115	200	54	209	176	26
1'+2' Root Zone	**80**	**44**	**92**	**1384**	**1782**	**431**	**151**	**1372**	**322**	**404**	**135**	**582**	**312**	**40**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	292	270	292	234	260	315	292	252	315	260	292	270	292	270
Soil N supply, plus organic matter release	-120	-83	-125	-1335	-1625	-395	-179	-1336	-331	-420	-193	-518	-345	-61
N used to consume past crop residue	0	20	0	20	0	20	0	20	20	0	0	20	0	20
N that is positionally unavailable	5	5	5	172	5	75	5	135	35	5	5	60	5	5
Calculated N need	**177**	**212**	**172**	**0**	**0**	**15**	**118**	**0**	**39**	**0**	**104**	**0**	**0**	**234**
Recommendations (lbs/ac)														
Initial Calculated N Application	177	212	172	0	0	15	118	0	39	0	104	0	20	234
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**177**	**212**	**172**	**0**	**0**	**15**	**118**	**0**	**39**	**0**	**104**	**0**	**20**	**234**
Adjusted N Application Upper Range	**212**	**254**	**206**	**0**	**0**	**18**	**142**	**0**	**47**	**0**	**125**	**0**	**24**	**281**
Field Applications (lbs/ac)														
2014 May	0	164	0	0	0	0	0	0	0	0	0	0	103	92
2014 June	26	0	49	3	3	3	3	0	0	4	42	0	25	58
2014 July	42	0	43	10	5	3	2	0	0	12	19	0	0	0
2014 August	0	0	42	90	90	0	0	0	0	224	0	0	31	0
2014 September	0	0	0	0	0	0	0	0	0	42	0	0	26	0
2014 October	0	0	0	0	0	0	0	13	0	0	0	0	0	0
Available N Applied	**68**	**164**	**134**	**102**	**99**	**6**	**5**	**13**	**0**	**282**	**62**	**0**	**185**	**149**

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2014 – Crop Year 2015

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F14-0642	F14-0498	F14-0643	F14-0690	F14-0649	F14-0703	F14-0645	F14-0704	F14-0694	F14-0646	F14-0647	F14-0705	F14-0510	F14-0499
Sample Date	9/25/2014	8/29/2014	9/25/2014	10/6/2014	9/29/2014	10/8/2014	9/26/2014	10/8/2014	10/7/2014	9/26/2014	9/26/2014	10/8/2014	9/10/2014	8/29/2014
Previous Crop	Alfalfa	Sudan	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Sudangrass	Silage Corn	Alfalfa	Alfalfa
Upcoming Crop	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Triticale	Alfalfa	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa
Crop Rotation Changes	Yes	Yes	No	No	No	No	No	No	Yes	No	Yes	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	48	42	59	750	675	181	64	358	184	84	83	315	94	26
2' Nitrate	16	20	22	612	927	276	143	610	238	180	52	144	140	29
3' Nitrate	6	21	15	730	838	291	156	685	238	258	34	145	128	62
1'+2' Root Zone	**64**	**62**	**81**	**1362**	**1602**	**457**	**207**	**968**	**422**	**264**	**135**	**459**	**234**	**55**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	210	225	210	175	210	200	225	175	175	225	225	175	225	225
Soil N supply, plus organic matter release	-92	-94	-105	-1928	-2196	-657	-363	-1448	-604	-509	-183	-515	-370	-122
N used to consume past crop residue	0	20	0	25	0	25	0	25	25	0	0	25	20	25
N that is positionally unavailable	7	28	15	640	50	250	75	560	210	120	10	130	200	70
Calculated N need	**125**	**179**	**120**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**52**	**0**	**75**	**198**
Recommendations (lbs/ac)														
Initial Calculated N Application	125	179	120	40	0	40	0	40	40	0	52	40	75	198
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**125**	**179**	**120**	**40**	**0**	**40**	**0**	**40**	**40**	**0**	**52**	**40**	**75**	**198**
Adjusted N Application Upper Range	**150**	**215**	**144**	**48**	**0**	**48**	**0**	**48**	**48**	**0**	**62**	**48**	**90**	**238**
Field Applications (lbs/ac)														
2014 August	0	3	0	0	0	0	0	0	0	0	0	0	0	13
2014 September	0	101	0	0	0	0	28	0	0	0	0	0	0	73
2014 October	0	0	0	0	0	85	69	0	121	55	0	0	0	0
2014 November	0	0	0	0	0	0	0	10	0	0	0	0	0	0
2014 December	0	0	0	0	0	0	0	20	0	0	0	0	0	0
2015 January	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015 February	0	0	0	0	0	37	33	0	0	0	0	0	0	0
2015 March	0	0	0	0	0	0	0	17	0	39	0	0	0	0
2015 April	0	0	0	0	7	0	0	16	0	0	0	0	0	0
2015 May	0	0	0	0	25	0	0	0	0	0	0	0	0	0
Available N Applied	**0**	**104**	**0**	**0**	**32**	**122**	**130**	**63**	**121**	**94**	**0**	**0**	**0**	**86**
Notes														
GDS-SU05	Applications were made in corners only. 0 lbs applied to main pivot.													

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2015 – Crop Year 2015

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F15-0375	F15-0376	F15-0377	F15-0349	F15-0369	F15-0347	F15-0370	F15-0350	F15-0348	F15-0409	F15-0410	F15-0351	F15-0378	F15-0379
Sample Date	5/18/2015	5/18/2015	5/18/2015	4/28/2015	5/15/2015	4/29/2015	5/15/2015	5/1/2015	4/29/2015	6/29/2015	6/29/2015	5/1/2015	5/19/2015	5/19/2015
Previous Crop	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Triticale	Alfalfa	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa
Upcoming Crop	Idle	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	Yes	No	No	No	No	No	No	No	No	No	No	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	74	44	40	571	420	101	42	230	86	46	43	87	33	35
2' Nitrate	32	37	16	680	810	237	85	509	105	28	31	103	51	60
1'+2' Root Zone	**106**	**81**	**56**	**1251**	**1230**	**338**	**127**	**739**	**191**	**74**	**74**	**190**	**84**	**95**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	210	260	210	210	260	297	292	243	297	180	180	270	292	292
Soil N supply (residual, OM, past manure)	-194	-161	-141	-1251	-1314	-405	-191	-739	-263	-104	-105	-254	-142	-150
N used to consume past crop residue	20	0	0	20	0	20	0	20	20	0	0	20	0	0
N that is positionally unavailable	10	5	0	185	0	60	0	120	30	0	0	30	0	0
Calculated N need	**46**	**104**	**69**	**0**	**0**	**0**	**101**	**0**	**84**	**76**	**75**	**66**	**150**	**142**
Recommendations (lbs/ac)														
Initial Calculated N Application	46	104	69	30	0	45	101	30	84	76	75	66	150	142
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	20	0	0	0	0	0	0	0	0
Adjusted N Application	**46**	**104**	**69**	**30**	**0**	**65**	**101**	**30**	**84**	**76**	**75**	**66**	**150**	**142**
Adjusted N Application Upper Range	**55**	**125**	**83**	**36**	**0**	**78**	**121**	**36**	**101**	**91**	**90**	**79**	**180**	**170**
Field Applications (lbs/ac)														
2015 April	0	0	0	7	0	0	0	0	0	0	0	0	0	0
2015 May	0	9	168	35	10	0	0	0	0	0	0	0	119	0
2015 June	0	58	73	3	3	0	0	0	0	0	0	0	53	76
2015 July	0	0	155	0	0	0	0	0	0	0	0	0	0	0
2015 August	61	14	75	0	0	5	4	0	0	0	0	0	0	0
2015 September	0	66	0	0	0	0	0	0	0	0	0	0	0	0
2015 October	0	0	0	0	0	0	0	4	0	0	0	0	0	0
Available N Applied	**61**	**148**	**471**	**45**	**14**	**5**	**4**	**4**	**0**	**0**	**0**	**0**	**172**	**76**
Notes														
GDS-SU04, GDS-SU05 & GDR-SU08	Applications were made in corners only. 0 lbs applied to main pivot.													

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2015 – Crop Year 2016

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F15-0893	F15-0894	F15-0696	F15-0697	F15-0534	F15-0698	F15-0535	F15-0699	F15-0700	F15-0536	F15-0538	F15-0701	F15-0537	F15-0539
Sample Date	11/13/2015	11/13/2015	10/7/2015	10/7/2015	9/18/2015	9/29/2015	9/18/2015	10/2/2015	9/29/2015	9/15/2015	9/18/2015	10/2/2015	9/15/2015	9/15/2015
Previous Crop	Idle	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Alfalfa	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop	Triticale	Alfalfa	Triticale	Triticale	Alfalfa	Triticale	Triticale	W. Barley	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa
Crop Rotation Changes	Yes	No	Yes	No	No	No	Yes	Yes	No	No	No	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	63	98	157	328	556	145	58	326	98	22	45	16	27	28
2' Nitrate	63	45	139	283	894	221	27	356	98	40	24	43	34	44
1'+2' Root Zone	**126**	**143**	**296**	**611**	**1450**	**366**	**85**	**682**	**196**	**62**	**69**	**59**	**61**	**72**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	175	210	175	175	225	200	200	150	200	225	225	200	225	225
Soil N supply (residual, OM, past manure)	-227	-228	-481	-980	-2152	-798	-222	-1164	-349	-173	-134	-136	-163	-135
N used to consume past crop residue	15	0	-45	20	0	20	-50	20	20	0	0	20	0	0
N that is positionally unavailable	75	55	195	360	300	440	110	500	140	45	20	35	45	20
Calculated N need	**38**	**37**	**0**	**0**	**0**	**0**	**38**	**0**	**11**	**97**	**111**	**119**	**107**	**110**
Recommendations (lbs/ac)														
Initial Calculated N Application	40	40	0	0	0*	0	38	0	45	97	111	119	107	110
+ In-season petiole adjustment (if applicable)	45	40	30	0	0	35	0	0	5	0	0	0	0	0
Adjusted N Application	**85**	**80**	**30**	**0**	**0**	**35**	**38**	**0**	**50**	**97**	**111**	**119**	**107**	**110**
Adjusted N Application Upper Range	**102**	**96**	**36**	**0**	**0**	**42**	**46**	**0**	**60**	**116**	**133**	**143**	**128**	**132**
Field Applications (lbs/ac)														
2015 September	0	0	0	0	0	0	0	0	0	0	0	0	0	42
2015 October	0	0	0	0	0	0	0	0	0	0	0	19	0	43
...														
2016 March	0	0	0	0	0	0	0	0	0	0	0	0	0	34
2016 April	0	0	176	0	0	0	0	0	0	0	0	0	0	0.4
Available N Applied	**0**	**0**	**176**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**0**	**119**
Notes														
GDS-SU05	Additional recommendation was made for corners only at 50 lbs.													

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2016 – Crop Year 2016

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F16-0239	F16-0264	F16-0225	F16-0240	F16-0265	F16-0226	F16-0227	F16-0311	F16-0228	F16-0241	F16-0274	F16-0229	F16-0273	F16-0272
Sample Date	5/3/2016	5/5/2016	4/27/2016	4/29/2016	5/5/2016	4/28/2016	4/28/2016	5/23/2016	4/28/2016	5/3/2016	5/9/2016	4/29/2016	5/9/2016	5/9/2016
Previous Crop	Triticale	Alfalfa	Triticale	Triticale	Alfalfa	Triticale	Triticale	W. Barley	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	Yes	No	Yes	Yes	No	No	No	No	No	Yes	No	Yes	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	53	74	28	100	86	22	15	140	41	40	109	40	70	63
2' Nitrate	50	42	25	309	597	73	26	449	49	16	87	27	74	111
1'+2' Root Zone	**103**	**116**	**53**	**409**	**683**	**95**	**41**	**589**	**90**	**56**	**196**	**67**	**144**	**174**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	255	325	330	300	325	270	228	358	288	288	325	357	325	325
Soil N supply (residual, OM, past manure)	-204	-211	-154	-485	-844	-162	-104	-668	-168	-112	-286	-151	-228	-226
N used to consume past crop residue	0	0	0	15	0	20	0	20	20	-70	0	20	0	0
N that is positionally unavailable	15	15	15	80	0	15	15	15	15	15	15	15	15	15
Calculated N need	**66**	**129***	**191**	**0**	**0**	**143**	**139***	**0**	**155**	**121**	**54**	**241**	**112**	**114**
Recommendations (lbs/ac)														
Initial Calculated N Application	66	129	185	0	0	143	139	0	155	121	54	195	112	114
+ In-season petiole adjustment (if applicable)	0	40	0	0	0	0	0	0	0	20	0	30	0	0
Adjusted N Application	**66**	**169**	**185**	**0**	**0**	**143**	**139**	**0**	**155**	**141**	**54**	**225**	**112**	**114**
Adjusted N Application Upper Range	**79**	**203**	**222**	**0**	**0**	**172**	**167**	**0**	**186**	**169**	**65**	**270**	**134**	**137**
Field Applications (lbs/ac)														
2016 April	0	0	25	0	0	0	0	0	0	0	0	0	0	0
2016 May	0	1	18	0	0	0	0	0	0	0	58	142	0	0
2016 June	0	11	0	0	0	0	0	0	0	0	0	0	0	0
2016 July	0	1	30	0	0	0	0	0	0	0	0	43	0	34
2016 August	0	36	16	0	0	0	0	0	0	0	0	0	0	0
2016 September	0	32	0	0	0	0	0	0	0	0	0	21	0	0
2016 October	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Available N Applied	**0**	**84**	**89**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**58**	**206**	**0**	**34**
Notes														
GDS-SU02	A math error was made in original calculations, originally recommending 189 lbs.													
GDS-SU07	A math error was made in original calculations, originally recommending 199 lbs.													

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2016 – Crop Year 2017

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F16-0710	F16-0711	F16-0730	F16-0722	F16-0662	F16-0651	F16-0650	F16-0663	F16-0687	F16-0688	F16-0692	F16-0731	F16-0732	F16-0693
Sample Date	10/31/2016	10/31/2016	11/1/2016	11/1/2016	10/24/2016	10/19/2016	10/19/2016	10/24/2016	10/21/2016	10/21/2016	10/28/2016	11/2/2016	11/2/2016	10/28/2016
Previous Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	46	74	36	156	124	144	295	171	128	58	80	64	57	37
2' Nitrate	25	28	12	433	593	194	171	392	66	29	28	33	28	19
1'+2' Root Zone	**71**	**102**	**48**	**589**	**717**	**338**	**466**	**563**	**194**	**87**	**108**	**97**	**85**	**56**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	210	210	210	210	200	200	200	200	200	200	225	210	210	210
Residual Nitrates (3')	-79	-139	-62	-1040	-1515	-607	-608	-1144	-279	-118	-124	-130	-109	-78
Residual Ammonium (3')	-6	-6	-13	-11	-9	-6	-7	-7	-7	-7	-12	-9	-9	-7
Mineralization (past manure)	-10	-10	-10	-10	-5	-12	-12	-5	-10	-10	-10	-10	-10	-10
Mineralization (organic matter)	-21	-27	-24	-19	-18	-18	-14	-16	-18	-14	-28	-19	-16	-14
N used to consume past crop residue	0	0	0	0	-65	20	20	20	20	20	0	0	0	0
N that may not be accessible	20	54	27	470	20	291	176	604	117	53	28	53	46	39
Calculated N need	**114**	**82**	**128**	**0**	**0**	**0**	**0**	**0**	**23**	**124**	**79**	**95**	**112**	**140**
Recommendations (lbs/ac)														
Initial Calculated N Application	114	82	128	0	0	40	0	0	40	124	79	95	112	140
+ In-season petiole adjustment (if applicable)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted N Application	**114**	**82**	**128**	**0**	**0**	**40**	**0**	**0**	**40**	**124**	**79**	**95**	**112**	**140**
Adjusted N Application Upper Range	**137**	**98**	**154**	**0**	**0**	**48**	**0**	**0**	**48**	**149**	**95**	**114**	**134**	**168**
Field Applications (lbs/ac)														
2016 October	0	0	0	0	0	47	42	0	0	72	0	0	0	0
2016 November	33	39	41	0	0	0	0	47	0	0	45	153	0	44
2016 December	0	0	0	0	0	0	0	0	0	0	0	0	0	20
...														
2017 March	41	62	0	53	0	55	54	29	0	0	0	0	67	0
2017 April	65	0	0	24	16	0	0	0	0	0	0	107	35	60
Available N Applied	**138**	**101**	**41**	**77**	**16**	**102**	**97**	**76**	**0**	**72**	**45**	**260**	**103**	**124**

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2017 – Crop Year 2017

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F17-0345	F17-0346	F17-0347	F17-0303	F17-0276	F17-0304	F17-0305	F17-0306	F17-0353	F17-0307	F17-0277	F17-0337	F17-0354	F17-0308
Sample Date	5/31/2017	5/31/2017	5/31/2017	5/23/2017	5/17/2017	5/19/2017	5/19/2017	5/22/2017	5/30/2017	5/22/2017	5/17/2017	5/25/2017	5/30/2017	5/23/2017
Previous Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	89	80	73	101	53	48	93	112	250	70	61	93	123	60
2' Nitrate	33	43	51	242	107	82	134	206	212	54	55	24	71	31
1'+2' Root Zone	**122**	**123**	**124**	**343**	**160**	**130**	**227**	**318**	**462**	**124**	**116**	**117**	**194**	**91**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	325	325	325	325	288	297	297	357	325	315	250	357	325	325
Residual nitrates (3')	-122	-123	-124	-343	-160	-130	-227	-318	-462	-124	-116	-117	-194	-91
Residual ammonium (3')	-23	-11	-22	-29	-35	-23	-13	-23	-6	-11	-19	-21	-10	-19
Mineralization (past manure)	-10	-10	-10	-10	-5	-10	-10	-10	-10	-10	-10	-10	-10	-10
Mineralization (organic matter)	-100	-74	-76	-52	-60	-48	-42	-56	-44	-46	-64	-48	-46	-36
N used to consume past crop residue	0	0	0	0	20	20	20	20	0	20	20	0	0	0
N that may not be accessible	15	20	20	40	20	20	25	40	40	15	20	15	20	15
Calculated N need	**85**	**127**	**113**	**0**	**68**	**126**	**50**	**10**	**0**	**159**	**81**	**176**	**85**	**184**
Recommendations (lbs/ac)														
Initial Calculated N Application	85	127	113	0	68	126	50	10	0	159	81	176	85	184
+ In-season petiole adjustment (if applicable)														
Adjusted N Application	**85**	**127**	**113**	**0**	**68**	**126**	**50**	**10**	**0**	**159**	**81**	**176**	**85**	**184**
Adjusted N Application Upper Range	**94**	**140**	**124**	**0**	**75**	**139**	**55**	**11**	**0**	**175**	**89**	**194**	**94**	**202**
Field Applications (lbs/ac)														
2017 June	81	55	0	8	0	98	97	0	0	0	0	126	53	83
2017 July	0	0	0	0	0	0	0	0	0	0	0	0	0	54
Available N Applied	**81**	**55**	**0**	**8**	**0**	**98**	**97**	**0**	**0**	**0**	**0**	**126**	**53**	**137**
Notes														
GDS-SU02	A math error was made in original calculations, originally recommending 189 lbs.													
GDS-SU07	A math error was made in original calculations, originally recommending 199 lbs.													

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2017 – Crop Year 2018

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F17-0532	F17-0533	F17-0534	F17-0535	F17-0637	F17-0638	F17-0639	F17-0539	F17-0536	F17-0655	F17-0537	F17-0540	F17-0640	F17-0541
Sample Date	10/5/2017	10/5/2017	10/5/2017	10/6/2017	10/17/2017	10/18/2017	10/18/2017	10/9/2017	10/6/2017	10/19/2017	10/6/2017	10/9/2017	10/18/2017	10/9/2017
Previous Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	25	52	30	44	120	107	94	137	49	40	55	49	46	45
2' Nitrate	10	20	12	178	236	100	103	333	54	24	34	23	22	32
1'+2' Root Zone	**35**	**72**	**42**	**222**	**356**	**207**	**197**	**470**	**103**	**64**	**89**	**72**	**68**	**77**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	195	195	195	227	200	200	200	195	195	200	211	211	211	211
Residual nitrates (3')	-45	-88	-55	-518	-697	-395	-330	-866	-146	-93	-136	-121	-86	-111
Residual ammonium (3')	-24	-27	-11	-14	-19	-16	-18	-10	-19	-7	-31	-8	-17	-32
Mineralization (past manure)	-10	-10	-10	-5	-5	-10	-10	-10	-10	-10	-10	-10	-5	-10
Mineralization (organic matter)	-20	-24	-19	-18	-19	-15	-15	-17	-17	-11	-21	-17	-17	-13
N used to consume past crop residue	0	0	0	0	20	20	20	0	0	20	0	0	0	0
N that may not be accessible	20	39	26	321	393	230	175	415	69	20	73	66	20	60
Calculated N need	**116**	**85**	**126**	**0**	**0**	**14**	**22**	**0**	**72**	**119**	**86**	**121**	**106**	**105**
Recommendations (lbs/ac)														
Initial Calculated N Application	116	85	52	40	35	40	40	0	72	119	82	83	83	83
+ In-season petiole adjustment (if applicable)														
Adjusted N Application	**116**	**85**	**52**	**40**	**35**	**40**	**40**	**0**	**72**	**119**	**82**	**83**	**83**	**83**
Adjusted N Application Upper Range	**128**	**94**	**57**	**44**	**39**	**44**	**44**	**0**	**79**	**131**	**90**	**91**	**91**	**91**
Field Applications (lbs/ac) (so far)														
2017 October	79	111	0	58	0	45	44	0	0	0	0	0	0	102
2017 November	20	8	0	0	0	0	0	4	16	10	154	56	30	186
Available N Applied	**99**	**119**	**0**	**58**	**0**	**45**	**44**	**4**	**16**	**10**	**154**	**56**	**30**	**289**

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2018 – Crop Year 2018

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F18-0368	F18-0354	F18-0369	F18-0355	F18-0316	F18-0317	F18-0318	F18-0370	F18-0356	F18-0328	F18-0371	F18-0379	F18-0380	F18-0381
Sample Date	5/22/2018	5/21/2018	5/22/2018	5/21/2018	5/9/2018	5/10/2018	5/10/2018	5/22/2018	5/21/2018	5/9/2018	5/22/2018	5/24/2018	5/24/2018	5/24/2018
Previous Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale	Triticale	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	40	66	31	48	70	37	84	72	41	31	49	62	59	55
2' Nitrate	35	23	11	92	135	61	111	241	42	42	29	40	27	31
1'+2' Root Zone	**75**	**89**	**42**	**140**	**205**	**98**	**195**	**313**	**83**	**73**	**78**	**102**	**86**	**86**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	325	325	325	390	294	294	294	357	357	322	357	357	325	325
Residual nitrates (3')	-75	-89	-42	-140	-205	-98	-195	-313	-83	-73	-78	-102	-86	-86
Residual ammonium (3')	-25	-13	-38	-18	-18	-11	-12	-21	-14	-14	-20	-46	-24	-15
Mineralization (past manure)	-10	-10	-10	-10	-5	-10	-10	-10	-15	-15	-15	-10	-10	-10
Mineralization (organic matter)	-68	-62	-52	-44	-62	-48	-48	-46	-44	-44	-64	-48	-44	-36
N used to consume past crop residue	0	0	0	0	25	25	25	0	0	25	0	0	0	0
N released from past crop residue	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N that may not be accessible	15	15	15	30	65	20	50	75	15	15	15	15	15	15
Calculated N need	**162**	**166**	**198**	**208**	**94**	**172**	**104**	**42**	**216**	**216**	**195**	**166**	**176**	**193**
Recommendations (lbs/ac)														
Initial Calculated N Application	41	41	41	49	92	172	104	0	166	216	166	165	151	151
+ In-season petiole adjustment (if applicable)														
Adjusted N Application	**41**	**41**	**41**	**49**	**92**	**172**	**104**	**0**	**166**	**216**	**166**	**165**	**151**	**151**
Adjusted N Application Upper Range	**45**	**45**	**45**	**54**	**101**	**189**	**114**	**0**	**183**	**238**	**183**	**182**	**166**	**166**
Field Applications (lbs/ac)														
2018 March	74	0	0	0	63	0	0	0	72	126	0	34	71	0
Available N Applied	**74**	**0**	**0**	**0**	**63**	**0**	**0**	**0**	**72**	**126**	**0**	**34**	**71**	**0**

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2018 – Crop Year 2019

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F18-0706	F18-0708	F18-0710	F18-0769	F18-0547	F18-0553	F18-0554	F18-0739	F18-0741	F18-0555	F18-0674	F18-0743	F18-0675	F18-0676
Sample Date	10/16/2018	10/16/2018	10/16/2018	10/22/2018	9/28/2018	10/1/2018	10/1/2018	10/18/2018	10/18/2018	10/1/2018	10/15/2018	10/18/2018	10/15/2018	10/15/2018
Previous Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Silage Corn	Silage Corn	Silage Corn	Alfalfa	Alfalfa	Silage Corn	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Triticale
Crop Rotation Changes	No	No	No	No	Yes	Yes	Yes	No	No	Yes	No	No	No	Yes
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	53	38	33	67	134	240	178	171	36	137	36	46	27	31
2' Nitrate	14	8	10	105	114	248	197	238	13	86	13	11	10	11
1'+2' Root Zone	**67**	**46**	**43**	**172**	**248**	**488**	**375**	**409**	**49**	**223**	**49**	**57**	**37**	**42**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	211	211	211	227	195	195	195	211	211	195	211	211	211	200
Residual nitrates (3')	-79	-52	-51	-432	-438	-739	-591	-784	-68	-289	-65	-69	-48	-59
Residual ammonium (3')	-26	-28	-34	-14	-9	-13	-9	-22	-17	-6	-35	-22	-30	-35
Mineralization (past manure)	-10	-10	-10	-5	-10	-10	-10	-10	-10	-10	-10	-10	-10	-5
Mineralization (organic matter)	-23	-25	-20	-20	-20	-15	-14	-19	-16	-14	-23	-16	-16	-14
N used to consume past crop residue	0	0	0	0	20	20	20	0	0	20	0	0	0	0
N released from past crop residue	0	0	0	0	0	0	0	0	0	0	0	0	0	-60
N that may not be accessible	30	25	25	195	265	395	345	280	25	130	30	25	25	40
Calculated N need	**103**	**121**	**121**	**0**	**3**	**0**	**0**	**0**	**125**	**26**	**108**	**119**	**132**	**67**
Recommendations (lbs/ac)														
Initial Calculated N Application	43	43	43	40	40	0	0	0	125	50	108	119	132	67
+ In-season petiole adjustment (if applicable)														
Adjusted N Application	**43**	**43**	**43**	**40**	**40**	**0**	**0**	**0**	**125**	**50**	**108**	**119**	**132**	**67**
Adjusted N Application Upper Range	**47**	**47**	**47**	**44**	**44**	**0**	**0**	**0**	**138**	**55**	**119**	**131**	**145**	**74**
Field Applications (lbs/ac)														
2018 October	0	13	69	40	0	0	0	0	118	48	0	59	62	0
2018 November	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Available N Applied	**0**	**17**	**69**	**40**	**0**	**0**	**0**	**0**	**118**	**48**	**0**	**59**	**62**	**0**

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Pre-Plant 2019 – Crop Year 2019

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F19-0273	F19-0279	F19-0348	F19-0219	F19-0350	F19-0356	F19-0358	F19-0222	F19-0389	F19-0352	F19-0334	F19-0354	F19-0281	F19-0283
Sample Date	5/14/2019	5/15/2019	5/21/2019	5/2/2019	5/21/2019	5/23/2019	5/23/2019	5/3/2019	5/31/2019	5/21/2019	5/22/2019	5/21/2019	5/15/2019	5/15/2019
Previous Crop SPR 19	Triticale	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Forage Mix	Alfalfa	Alfalfa	Alfalfa	Triticale	Triticale
Upcoming Crop FALL 19	Forage Mix	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Forage Mix	Forage Mix
Crop Rotation Changes	Yes	No	No	No	No	No	No	No	Yes	No	No	No	Yes	Yes
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	15	44	55	154	106	157	118	173	199	48	57	40	37	17
2' Nitrate	7	14	29	130	83	211	144	234	83	37	52	45	28	11
1'+2' Root Zone	**22**	**58**	**85**	**284**	**189**	**368**	**262**	**407**	**282**	**85**	**108**	**85**	**65**	**29**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	200	200	325	359	292	260	260	331	200	292	357	357	200	200
Residual nitrates (3')	-22	-58	-86	-282	-191	-367	-263	-347	-280	-86	-108	-85	-65	-29
Residual ammonium (3')	-17	-27	-21	-21	-12	-8	-22	-17	-19	-6	-19	-23	-9	-15
Mineralization (past manure)	-5	-5	-10	-10	-10	-15	-15	-10	-15	-5	-10	-10	-5	-5
Mineralization (organic matter)	-64	-60	-52	-48	-54	-46	-42	-52	-56	-34	-54	-46	-48	-32
N used to consume past crop residue	20	20	0	0	0	0	0	0	0	0	0	0	20	20
N released from past crop residue	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N that may not be accessible	10	15	15	60	50	80	75	85	60	15	20	20	15	10
Calculated N need	**122**	**85**	**171**	**58**	**75**	**0**	**0**	**0**	**0**	**176**	**186**	**213**	**108**	**149**
Recommendations (lbs/ac)														
Initial Calculated N Application	51	47	150		52	0	0	0	0	31	31	31	51	51
+ In-season petiole adjustment (if applicable)														
Adjusted N Application	**51**	**47**	**150**	**0**	**52**	**0**	**0**	**0**	**0**	**31**	**31**	**31**	**51**	**51**
Adjusted N Application Upper Range	**56**	**52**	**165**	**0**	**57**	**0**	**0**	**0**	**0**	**34**	**34**	**34**	**56**	**56**
Field Applications (lbs/ac)														
2019 March	0	0	210	127	0	0	0	78	464	0	0	0	0	0
2019 April	0	0	0	193	43	0	0	113	0	0	0	0	0	0
2019 May	0	39	0	9	19	43	43	4	0	18	49	17	170	167
Available N Applied	**0**	**39**	**210**	**329**	**62**	**43**	**43**	**195**	**464**	**18**	**49**	**17**	**170**	**167**

Table 8

George DeRuyter & Son/D&A Dairies Application Field Management Summary and Recommendation Calculations, Crop Years 2015 to 2019

Post-Harvest 2019 – Crop Year 2020

Field	GDS-SU01	GDS-SU02	GDS-SU03	GDS-SU04	GDS-SU05	GDS-SU06	GDS-SU07	GDS-SU08	GDS-SU09	GDS-SU10	GDS-SU11	GDS-SU12	GDS-SU13	GDS-SU14
Acres	**17.8**	**99.1**	**28.4**	**135.6**	**100.6**	**84.5**	**76.6**	**165.5**	**34.6**	**38.5**	**8.1**	**40.5**	**47.0**	**65.2**
Report Number	F19-0441	F19-0688	F19-0690	F19-0692	F19-0716	F19-0717	F19-0755	F19-0776	F19-0556	F19-0777	F19-0756	F19-0778	F19-0434	F19-0435
Sample Date	8/9/2019	9/27/2019	9/27/2019	9/30/2019	10/2/2019	10/2/2019	10/3/2019	10/7/2019	9/11/2019	10/7/2019	10/3/2019	10/7/2019	8/2/2019	8/2/2019
Previous Crop FALL 19	Alfalfa	Alfalfa	Alfalfa	Triticale	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Upcoming Crop SPRING 20	Alfalfa	Alfalfa	Alfalfa	Teff	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa	Alfalfa
Crop Rotation Changes	Yes	No	No	Yes	No	No	No	No	No	No	No	No	Yes	Yes
Nitrogen Source	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure	Liquid Manure
Soil Measurements (lbs/ac)														
1' Nitrate	48	47	34	157	116	107	88	96	230	27	41	35	71	93
2' Nitrate	42	12	10	237	184	141	119	178	87	8	19	11	55	37
1'+2' Root Zone	**90**	**59**	**44**	**394**	**300**	**248**	**207**	**274**	**317**	**35**	**60**	**47**	**126**	**130**
Nitrogen Budget Calculations (lbs/ac)														
Projected crop N use	390	211	211	211	211	211	211	211	406	211	211	211	406	406
Residual nitrates (3')	-120	-69	-53	-734	-502	-374	-304	-667	-394	-48	-75	-64	-175	-150
Residual ammonium (3')	-22	-17	-26	-8	-12	-11	-22	-22	-12	-22	-30	-41	-36	-29
Mineralization (past manure)	-10	-5	-5	-10	-10	-10	-5	-10	-10	-5	-10	-5	-10	-10
Mineralization (organic matter)	-52	-24	-22	-20	-20	-18	-16	-20	-62	-13	-22	-15	-67	-77
N used to consume past crop residue	20	0	0	0	0	0	0	0	10	0	0	0	20	20
N released from past crop residue	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N that may not be accessible	65	20	20	285	160	125	95	290	120	15	25	20	80	60
Calculated N need	**271**	**116**	**125**	**0**	**0**	**0**	**0**	**0**	**58**	**138**	**99**	**106**	**218**	**220**
Recommendations (lbs/ac)														
Initial Calculated N Application	175	94	94	0	0	0	0	0	58	33		33	139	139
+ In-season petiole adjustment (if applicable)														
Adjusted N Application	**175**	**94**	**94**	**0**	**0**	**0**	**0**	**0**	**58**	**33**	**0**	**33**	**139**	**139**
Adjusted N Application Upper Range	**193**	**103**	**103**	**0**	**0**	**0**	**0**	**0**	**64**	**36**	**0**	**36**	**153**	**153**
Field Applications (lbs/ac) (so far)														
Available N Applied	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**

Notes:

All units in pounds per acre (lb/ac).

Justification or citation for crop nitrogen uptake predictions: Historical crop yields; PNW615; PNW0611; Progene Seed Company; UC Davis Cooperative Ext.; Western Fertilizer Handbook

Table 9a

Cow Palace Dairy Manure Nutrient Concentrations – Total N (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
CP-CB02	Catch Basin 02	Lagoon Water		577	243		ND	485	1		711			717	441.28
CP-Compost	Compost	Solid			11,100	13,200	12,100	10,300	12,900	8,700	11,000	10,800	12,700		11,800
CP-Compost North	Compost North													9,300	
CP-Compost South	Compost South	Solid					11,400		12,100	9,600	11,200	11,800	12,800	11,900	12,700
CP-LG01	Lagoon 01	Lagoon Water	451	621	450	619	883	629	610	721	527				
CP-LG02	Lagoon 02	Lagoon Water		557	477	531	536	541	407	669		647	678	932	1068
CP-LG03	Lagoon 03	Lagoon Water		522											
CP-LG04	Lagoon 04	Lagoon Water	645								350				
CP-SB-01	Settling Basin 01	Thick Slurry			646	1,882			1,068						
CP-Separator Material	Separator Material	Solid			2,800	13,100	2,700	3,500	6,000	8,200	6,100	3,300	4,300	5,500	3,700
CP-Settling Basin A	Settling Basin A	Liquid												3,847	4,311
CP-Straw Manure	Straw Manure	Solid			6,000	5,500		5,200		10,500					

Table 9b

Cow Palace Dairy Manure Nutrient Concentrations – Total NH4 (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
CP-CB02	Catch Basin 02	Lagoon Water		161	121		21	258	2		237			222	91
CP-Compost	Compost	Solid			329	475	475	44	105	162	254	361	533		223
CP-Compost North	Compost													353	
CP-Compost South	Compost South	Solid					217		100	26	196	269	530	497	297
CP-LG01	Lagoon 01	Lagoon Water	360	263	288	455	465	385	315	424	382				
CP-LG02	Lagoon 02	Lagoon Water		262	252	425	375	330	215	413		455	380	450	327
CP-LG03	Lagoon 03	Lagoon Water		234											
CP-LG04	Lagoon 04	Lagoon Water	59								74				
CP-SB-01	Settling Basin 01	Thick Slurry			421	540			490						
CP-Separator Material	Separator Material	Solid			81	71	695	307	670	1,045	673	583	317	855	171
CP-Settling Basin A	Settling Basin A	Liquid												1,150	1,682
CP-Straw Manure	Straw Manure	Solid			647	940		1,185		654					

Note: ppm: parts per million

Table 9c

Cow Palace Dairy Manure Nutrient Concentrations – Total P (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
CP-CB02	Catch Basin 02	Lagoon Water		87	35		34	102	6	x	98			69	67
CP-Compost	Compost	Solid			6,300	7,700	7,000	4,500	5,600	4,300	5,700	5,600	6,400		5,700
CP-Compost North	Compost													5,000	
CP-Compost South	Compost South	Solid					7,600		5,900	5,700	5,600	6,500	6,800	6,800	6,700
CP-LG01	Lagoon 01	Lagoon Water	58	59	33	124	242	90	68	109	33				
CP-LG02	Lagoon 02	Lagoon Water		53	35	68	55	65	56	87		81	71	82	72
CP-LG03	Lagoon 03	Lagoon Water		38											
CP-LG04	Lagoon 04	Lagoon Water	42								74				
CP-SB-01	Settling Basin 01	Thick Slurry			98	476			252						
CP-Separator Material	Separator Material	Solid			300	700	1,000	1,200	2,200	3,300	2,300	4,600	800	1,900	600
CP-Settling Basin A	Settling Basin A	Liquid												745	1,049
CP-Straw Manure	Straw Manure	Solid			1,700	1,600		1,700		4,700					

Table 9d

Cow Palace Dairy Manure Nutrient Concentrations – Total K (ppm as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
CP-CB02	Catch Basin 02	Lagoon Water		874	844		248	1,521	23		2,220			1,303	936
CP-Compost	Compost	Solid			25,100	28,700	22,700	19,400	26,000	17,100	19,800	20,100	22,300		21,200
CP-Compost North	Compost													15,800	
CP-Compost South	Compost South	Solid					28,400		25,500	20,800	21,300	27,700	24,500	22,400	25,300
CP-LG01	Lagoon 01	Lagoon Water	682	602	657	839	991	832	847	1,133	854				
CP-LG02	Lagoon 02	Lagoon Water		597	686	873	960	828	1,467	1,267		930	805	890	1,002
CP-LG03	Lagoon 03	Lagoon Water		605											
CP-LG04	Lagoon 04	Lagoon Water	1,140								1,493				
CP-SB-01	Settling Basin 01	Thick Slurry			942	1,136			1,521						
CP-Separator Material	Separator Material	Solid			900	1,100	1,300	1,000	2,100	1,400	1,300	2,100	1,100	13,000	1,400
CP-Settling Basin A	Settling Basin A	Liquid												2,485	
CP-Straw Manure	Straw Manure	Solid			7,100	6,900				15,100					

Note: ppm: parts per million

Table 10a

Liberty Dairy Manure Nutrient Concentrations – Total N (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
LD-Compost	Compost	Solid			9,500		11,100								
LD-Compost North	Compost	Solid								8,800	11,200	7,000	12,200	8,100	9,700
LD-Compost South	Compost South	Solid				12,500	12,100	12,000	147,000	13,600	11,600	13,400	11,200	10,600	9,400
LD-Corral Manure	Manure											5,500			
LD-LG01	Lagoon 01	Thin Slurry	1,376	2,417		2,358		808	1,301	794	1,315	1,427	1,602	1,881	1,609
LD-LG02	Lagoon 02	Lagoon Water					1,344								
LD-LG03	Lagoon 03	Lagoon Water				1,708		961							
LD-LG04	Lagoon 04	Lagoon Water								1,054					
LD-LG06	Lagoon 06	Lagoon Water			415			789		1,537				1,585	
LD-LG14	Lagoon 14	Thin Slurry	1,829	2,270	2,374	2,632	2,104		2,416	2,269	1,781	2,311	2,201	3,089	2,448
LD-LG15	Lagoon 15														2,503
LD-LG-RW	Lagoon Red Water	Lagoon Water	160				1,843								
LD-Separator	Separator	Solid			3,100		4,600	5,200	4,500	4,100	4,800	4,700	4,300	5,000	4,400

Table 10b

Liberty Dairy Manure Nutrient Concentrations – Total NH4 (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
LD-Compost	Compost	Solid			500	750	710			50	251				
LD-Compost North	Compost	Solid								163	157	20	889	8,100	96
LD-Compost South	Compost South	Solid					345	182	40			246	900	20	45
LD-Corral Manure	Manure											79			
LD-LG01	Lagoon 01	Thin Slurry	675	920		1,105		390	605	469	321	844	549	738	321
LD-LG02	Lagoon 02	Lagoon Water					715								
LD-LG03	Lagoon 03	Lagoon Water				895		485							
LD-LG04	Lagoon 04	Lagoon Water								612					
LD-LG06	Lagoon 06	Lagoon Water			167			485		840				672	
LD-LG14	Lagoon 14	Thin Slurry	920	1,125	1,010	1,265	1,025		1,305	1,095	708	1,245	1,168	1,471	685
LD-LG15	Lagoon 15														643
LD-LG-RW	Lagoon Red Water	Lagoon Water	76				800								
LD-Separator	Separator	Solid			460		620	1,185	700	1,012	631	828	633	793	677

Note: ppm: parts per million

Table 10c

Liberty Dairy Manure Nutrient Concentrations – Total P (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
LD-Compost	Compost	Solid			4,900	5,000	6,000								
LD-Compost North	Compost	Solid								4,600	5,100	5,700	4,500	4,200	5,700
LD-Compost South	Compost South	Solid					6,500	4,900	5,300	5,000	5,900	6,600	5,000	4,500	490
LD-Corral Manure	Manure											2,600			
LD-LG01	Lagoon 01	Thin Slurry	138	367		527		63	180	75	145	184	224	176	148
LD-LG02	Lagoon 02	Lagoon Water					125								
LD-LG03	Lagoon 03	Lagoon Water				246		76							
LD-LG04	Lagoon 04	Lagoon Water								117					
LD-LG06	Lagoon 06	Lagoon Water			43			53		229				107	
LD-LG14	Lagoon 14	Thin Slurry	275	481	398	1,050	310		452	436	278	543	355	566	377
LD-LG15	Lagoon 15														476
LD-LG-RW	Lagoon Red Water	Lagoon Water	28				329								
LD-Separator	Separator	Solid			800		1,500	1,800	700	1,300	1,400	1,300	1,200	1,400	1,400

Table 10d

Liberty Dairy Manure Nutrient Concentrations – Total K (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
LD-Compost	Compost	Solid			21,000	25,300	23,300								
LD-Compost North	Compost	Solid								10,100	14,400	14,600	14,100	11,800	16,900
LD-Compost South	Compost South	Solid					23,800	16,400	11,800	11,800	19,900	20,600	16,700	14,700	12,700
LD-Corral Manure												15,200			
LD-LG01	Lagoon 01	Thin Slurry	2,895	3,658		3,005		2,307	2,298	1,595	2,905	2,577	3,243	2,436	3,123
LD-LG02	Lagoon 02	Lagoon Water					3,570								
LD-LG03	Lagoon 03	Lagoon Water				2,020		2,008							
LD-LG04	Lagoon 04	Lagoon Water								1,762					
LD-LG06	Lagoon 06	Lagoon Water			1,163			1,512		2,043				2,255	
LD-LG14	Lagoon 14	Thin Slurry	3,098	3,891	3,366	3,417	3,406		2,475	2,361	2,224	3,286	2,692	2,708	2,656
LD-LG15	Lagoon 15														2,206
LD-LG-RW	Lagoon Red Water	Lagoon Water	378				2,041								
LD-Separator	Separator	Solid			3,700		3,000	3,300	2,000	2,700	3,100	3,900	3,400	3,500	3,100

Note: ppm: parts per million

Table 11a

George DeRuyter & Son Dairy Manure Nutrient Concentrations – Total N (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
GDS-Compost	Compost	Compost			12,100	5,800	14,400								
GDS-Compost North	Compost	Compost								8,100	13,600	12,400	11,600	12,200	10,300
GDS-Compost South	Compost South	Compost					9,100	16,900	16,100	10,300	11,300	11,600	11,300	10,600	11,800
GDS-DA-LG02	DA-LG02	Lagoon Water									1,047				
GDS-DA-LG03	D&A Lagoon 03	Lagoon Water		978	1,070	1,708	1,483	1,536	1,296	1,253				256	1,867
GDS-DA-LG04												959	529		
GDS-LG01	Lagoon 01	Thin Slurry	1,897												1,255
GDS-LG02	Lagoon 02	Thin Slurry		1,692	1,397	2,204	1,254	1,519	1,142	2,117		2,495	2,012	2,778	
GDS-LG03	Lagoon 03	Lagoon Water	679								1,471	2,516	2,272	3,106	
GDS-LG04	Lagoon 04	Lagoon Water								1,108					
GDS-LG05	Lagoon 05	Lagoon Water													1,448

Table 11b

George DeRuyter & Son Dairy Manure Nutrient Concentrations – Total NH4 (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
GDS-Compost	Compost	Compost			505	7	545								
GDS-Compost North	Compost	Compost								298	455	504	191	477	408
GDS-Compost South	Compost South	Compost					430	1,070	665	379	552	725	442	235	553
GDS-DA-LG02	DA-LG02	Lagoon Water									644				
GDS-DA-LG03	D&A Lagoon 03	Lagoon Water		455	480	895	715	630	695	874				33	491
GDS-DA-LG04												657	174		
GDS-LG01	Lagoon 01	Thin Slurry	1,085												294
GDS-LG02	Lagoon 02	Thin Slurry		955	785	1,250	805	920	750	1,163		1,132	908	1,175	
GDS-LG03	Lagoon 03	Lagoon Water	425								721	1,191	658	1,109	
GDS-LG04	Lagoon 04	Lagoon Water								708					
GDS-LG05	Lagoon 05	Lagoon Water													582

Note: ppm: parts per million

Table 11c

George DeRuyter & Son Dairy Manure Nutrient Concentrations – Total P (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
GDS-Compost	Compost	Compost			6,800	2,100	8,100								
GDS-Compost North	Compost	Compost								4,500	4,400	6,700	6,000	5,400	3,800
GDS-Compost South	Compost South	Compost					5,500	8,100	7,900	5,900	4,500	6,500	13,200	4,700	3,700
GDS-DA-LG02	DA-LG02	Lagoon Water									84				
GDS-DA-LG03	D&A Lagoon 03	Lagoon Water		129	106	246	109	108	111	64				7	334
GDS-DA-LG04												69	34		
GDS-LG01	Lagoon 01	Thin Slurry	206												20
GDS-LG02	Lagoon 02	Thin Slurry		159	122	210	70	91	75	184		609	293	573	
GDS-LG03	Lagoon 03	Lagoon Water	56								168	661	438	786	
GDS-LG04	Lagoon 04	Lagoon Water								54					
GDS-LG05	Lagoon 05	Lagoon Water													98

Table 11d

George DeRuyter & Son Dairy Manure Nutrient Concentrations – Total K (as analyzed), 2013–2019

Name	Source	Manure Type	Fall 2013 (ppm)	Spring 2014 (ppm)	Fall 2014 (ppm)	Spring 2015 (ppm)	Fall 2015 (ppm)	Spring 2016 (ppm)	Fall 2016 (ppm)	Spring 2017 (ppm)	Fall 2017 (ppm)	Spring 2018 (ppm)	Fall 2018 (ppm)	Spring 2019 (ppm)	Fall 2019 (ppm)
GDS-Compost	Compost	Compost			24,300	4,200	34,900								
GDS-Compost North	Compost	Compost								13,900	15,900	20,100	21,600	16,300	13,800
GDS-Compost South	Compost South	Compost					20,300	16,800	13,500	16,300	16,100	19,100	20,000	10,500	12,700
GDS-DA-LG02	DA-Lagoon 02	Lagoon Water									2,184				
GDS-DA-LG03	D&A Lagoon 03	Lagoon Water		1,139	2,126	2,020	3,169	2,404	2,589	2,230				1,111	2,781
GDS-DA-LG04												1,598	876		
GDS-LG01	Lagoon 01	Thin Slurry	2,158												2,141
GDS-LG02	Lagoon 02	Thin Slurry		2,071	1,859	2,692	2,439	2,465	2,145	1,367		2,218	2,451	2,314	
GDS-LG03	Lagoon 03	Lagoon Water	1,479								2,761	2,236	2,994	2,642	
GDS-LG04	Lagoon 04	Lagoon Water								2,520					
GDS-LG05	Lagoon 05	Lagoon Water													2440

Note: ppm: parts per million

Table 12
Irrigation Sensor Review – 2019 Field Capacity Monitoring

Field ID	Acres	Spring Previous Crop	Spring Planned Crop	Fall Previous Crop	Fall Planned Crop	Liquid Applications (gallons)	Individual Station ID	Operating Days by Sensor	Field Capacity Exceedances per Sensor [1]	Dates of Exceedances at Individual Sensors
Cow Palace Dairy										
CP-SU01	69.0	Alfalfa	Alfalfa	Alfalfa	Alfalfa Triticale	3,998,191	CP-SU01-I-1	182		
							CP-SU01-I-2	182		
							CP-SU01-I-3	182		
CP-SU02	71.7	Alfalfa	Alfalfa	Alfalfa	Alfalfa Triticale	4,574,948	CP-SU02-I-1	0		
							CP-SU02-I-2	182	11	4/28-4/29, 5/15, 5/23, 5/27, 7/26, 7/30, 8/3, 8/12, 8/19, 8/23
CP-SU03	156.3	Triticale	Silage Corn	Silage Corn	Triticale	10,547,797	CP-SU03-I-1	0		
							CP-SU03-I-2	0		
							CP-SU03-I-3	175		
CP-SU04 A	71.0	Triticale	Alfalfa	Alfalfa	Alfalfa	4,985,260	CP-SU04A-I-1	104		
							CP-SU04A-I-2	182		
CP-SU04 B	40.1	Triticale	Alfalfa	Alfalfa	Alfalfa	3,102,362	CP-SU04B-I-1	182	1	4/23
							CP-SU04B-I-2	0		
CP-SU05	32.9	Alfalfa	Alfalfa	Alfalfa	Alfalfa	3,408,402	CP-SU05-I-1	0		
							CP-SU05-I-2	182	1	4/26
CP-SU06	85.0	Alfalfa	Alfalfa	Alfalfa	Alfalfa	7,155,688	CP-SU06-I-1	182	18	5/20-6/6
							CP-SU06-I-2	0		
							CP-SU06-I-3	182	8	5/18-5/19, 6/16, 7/18, 7/30, 8/3, 8/19, 9/11
Liberty/H&S Bosma Dairies										
LD-SU02	68.5	Triticale	Silage Corn	Silage Corn	Triticale	2,737,433	LD-SU02-I-1	0		
							LD-SU02-I-2	0		
							LD-SU02-I-3	0		
LD-SU03	11.8	Alfalfa	Alfalfa	Alfalfa	Alfalfa	0	LD-SU03-I-1	182	1	7/18
							LD-SU03-I-2	100		
LD-SU04	5.4	Alfalfa	Alfalfa	Alfalfa	Alfalfa	0	LD-SU04-I-1	0		
							LD-SU04-I-2	0		
LD-SU05	143.9	Triticale	Silage Corn	Silage Corn	Triticale	2,610,089	LD-SU05-I-1	182		
							LD-SU05-I-2	182		
							LD-SU05-I-3	0		
LD-SU06	38.9	Alfalfa	Silage Corn	Silage Corn	Triticale	1,071,895	LD-SU06-I-1	118	21	4/28, 5/22, 5/25, 5/27, 6/5, 8/17-9/1
							LD-SU06-I-2	165		
LD-SU07	94.6	Triticale	Silage Corn	Grass	Triticale	2,078,751	LD-SU07-I-1	40		
							LD-SU07-I-2	0		
LD-SU08 N	78.1	Alfalfa	Silage Corn	Silage Corn	Triticale	1,694,925	LD-SU08N-I-1	11	2	5/28, 6/2
							LD-SU08N-I-2	162	43	7/26, 8/2-9/12
							LD-SU08N-I-3	0		

Table 12
Irrigation Sensor Review – 2019 Field Capacity Monitoring

Field ID	Acres	Spring Previous Crop	Spring Planned Crop	Fall Previous Crop	Fall Planned Crop	Liquid Applications (gallons)	Individual Station ID	Operating Days by Sensor	Field Capacity Exceedances per Sensor [1]	Dates of Exceedances at Individual Sensors
LD-SU08 S	79.1	Triticale	Silage Corn	Silage Corn	Triticale	2,491,072	LD-SU08S-I-1	182	1	9/17
							LD-SU08S-I-2	176		
LD-SU09	48.8	Triticale	Silage Corn	Silage Corn	Triticale	622,500	LD-SU09-I-1	182		
							LD-SU09-I-2	0		
LD-SU10	155.0	Triticale	Silage Corn	Silage Corn	Triticale	1,798,500	LD-SU10-I-1	182		
							LD-SU10-I-2	0		
							LD-SU10-I-3	0		
LD-SU14	40.3	Triticale	Silage Corn	Silage Corn	Triticale	1,490,528	LD-SU14-I-1	151	8	7/25, 8/11, 8/14, 8/23, 8/25, 8/30, 9/5, 9/7
							LD-SU14-I-2	0		
LD-SU16	16.3	Alfalfa	Alfalfa	Alfalfa	Alfalfa	0	LD-SU16-I-1	178		
							LD-SU16-I-2	0		
LD-SU17	38.4	Triticale	Silage Corn	Silage Corn	Triticale	285,000	LD-SU17-I-1	180	5	7/31-8/2, 8/20-8/21
							LD-SU17-I-2	182	5	6/23-6/24, 7/13-7/14, 8/29
George DeRuyter & Son/D&A Dairies										
GDS-SU01	17.8	Triticale	Forage Mix	Forage Mix	Alfalfa	0	GDS-SU01-I-1	148		
							GDS-SU01-I-2	0		
GDS-SU02	99.1	Alfalfa	Alfalfa	Alfalfa	Alfalfa	2,399,900	GDS-SU02-I-1	11		
							GDS-SU02-I-2	0		
GDS-SU03	24.8	Alfalfa	Alfalfa	Alfalfa	Alfalfa	1,456,500	GDS-SU03-I-1[2]	94	7	4/27, 5/5-5/6, 5/28, 6/2, 6/21, 7/2
							GDS-SU03-I-2	0		
GDS-SU04[4]	135.6	Alfalfa	Alfalfa	Alfalfa	Triticale	5,823,500	GDS-SU04-I-1	182		
							GDS-SU04-I-2	182	6	9/13-9/18
							GDS-SU04-I-3	182		
GDS-SU05	99.6	Alfalfa	Alfalfa	Alfalfa	Alfalfa	748,500	GDS-SU05-I-1	182		
							GDS-SU05-I-2	0		
							GDS-SU05-I-3	182		
GDS-SU06	84.5	Alfalfa	Alfalfa	Alfalfa	Alfalfa	445,185	GDS-SU06-I-1	182		
							GDS-SU06-I-2	0		
GDS-SU07	76.6	Alfalfa	Alfalfa	Alfalfa	Alfalfa	403,565	GDS-SU07-I-1	0		
							GDS-SU07-I-2	137		
							GDS-SU07-I-3[3]	182	33	4/12-5/14
GDS-SU08[4]	165.5	Alfalfa	Alfalfa	Alfalfa	Alfalfa	6,327,000	GDS-SU08-I-1	0		
							GDS-SU08-I-2	182		
							GDS-SU08-I-3	182		
GDS-SU09[4]	34.1	Forage Mix	Alfalfa	Alfalfa	Alfalfa	1,953,600	GDS-SU09-I-1	182		
							GDS-SU09-I-2	182		

Table 12
Irrigation Sensor Review – 2019 Field Capacity Monitoring

Field ID	Acres	Spring Previous Crop	Spring Planned Crop	Fall Previous Crop	Fall Planned Crop	Liquid Applications (gallons)	Individual Station ID	Operating Days by Sensor	Field Capacity Exceedances per Sensor [1]	Dates of Exceedances at Individual Sensors
GDS-SU10	38.1	Alfalfa	Alfalfa	Alfalfa	Alfalfa	316,500	GDS-SU10-I-1	0		
							GDS-SU10-I-2	182		
							GDS-SU10-I-3	54	3	4/23, 5/2, 6/4
GDS-SU11	8.1	Alfalfa	Alfalfa	Alfalfa	Alfalfa	38,000	GDS-SU11-I-1	165	2	9/22-9/23
							GDS-SU11-I-2	90	2	6/26-6/27
GDS-SU12	40.5	Alfalfa	Alfalfa	Alfalfa	Alfalfa	65,700	GDS-SU12-I-1	182		
							GDS-SU12-I-2	182		
GDS-SU13	46.3	Triticale	Forage Mix	Forage Mix	Alfalfa	2,138,300	GDS-SU13-I-1	182	22	6/5-6/10, 6/17-6/19, 6/27-7/3, 7/10-7/15
							GDS-SU13-I-2	182		
							GDS-SU13-I-3	0		
GDS-SU14	65.2	Triticale	Forage Mix	Forage Mix	Alfalfa	3,115,700	GDS-SU14-I-1	0		
							GDS-SU14-I-2	182	5	6/15, 7/24-7/25, 7/17-7/18
							GDS-SU14-I-3	0		
Total Cow Palace Dairy	526.0							1,917	39 2.0%	
Total Liberty/H&S Bosma Dairies	819.1							2,555	86 3.4%	
Total George DeRuyter & Son/D&A Dairies	935.8							3,793	80 2.1%	
All Dairies								**8,265**	**205** 2.5%	

Notes:

1. Number of times field capacity moisture level was exceeded at the 3-foot depth for any sensor during 2019.
2. No 3-foot depth sensor (too rocky to install); exceedance data are reported from the 2-foot depth.
3. Appears to be residual winter/spring soil moisture prior to beginning of irrigation applications.
4. Applications to GDS-SU04, -SU08, and -SU09 were emergency applications.

Table 13
2019 Cow Palace Dairy Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
CP-SU01-A-19S	Pre-Plant	5/20/2019	Primary	0 to 12	16.1	2.7	172 J	1,057 J	8	0.49	2.5
CP-SU01-B-19S	Pre-Plant	5/20/2019	Primary	12 to 24	6.4 U	2.1	94 J	1,168 J	8.6	0.29	1.1
CP-SU02-A-19S	Pre-Plant	5/22/2019	Primary	0 to 12	27.4	0.9	99 J	1,029 J	8.1	0.46	2.2
CP-SU02-B-19S	Pre-Plant	5/22/2019	Primary	12 to 24	10.5	1.8	49 J	730 J	8.8	0.33	0.9
CP-SU02-B-19S-D	Pre-Plant	5/22/2019	Duplicate	12 to 24	9.8	2	46 J	685 J	8.8	0.34	0.7
CP-SU03-A-19S	Pre-Plant	5/20/2019	Primary	0 to 12	15.6 J	2.1	130 J	757 J	8	0.36	1.6 J
CP-SU03-A-19S-D	Pre-Plant	5/20/2019	Duplicate	0 to 12	12.4 J	1.9	117 J	673 J	8.2	0.47	2.3 J
CP-SU03-B-19S	Pre-Plant	5/20/2019	Primary	12 to 24	6.6 U	0.9	38 J	246 J	8.7	0.43	0.7
CP-SU04A-A-19S	Pre-Plant	5/14/2019	Primary	0 to 12	5.6 U	3.9	95	618	7.9	0.28	2.7
CP-SU04A-B-19S	Pre-Plant	5/14/2019	Primary	12 to 24	1.5 U	3.6 U	45	375	8.4	0.1	0.9
CP-SU04A-B-19S-D	Pre-Plant	5/14/2019	Duplicate	12 to 24	1.5 U	3.6 U	48	366	8.4	0.18	0.8
CP-SU04B-A-19S	Pre-Plant	5/13/2019	Primary	0 to 12	4.1 U	3.6 U	62	620	8.2	0.34	2
CP-SU04B-B-19S	Pre-Plant	5/13/2019	Primary	12 to 24	1.9 U	3.6 U	39	338	8.5	0.16	0.9
CP-SU05-A-19S	Pre-Plant	5/22/2019	Primary	0 to 12	11.5	2.3	107 J	1,105 J	8.1	0.36	1.7
CP-SU05-B-19S	Pre-Plant	5/22/2019	Primary	12 to 24	5.9 U	3.7	55 J	646 J	8.3	0.32	1
CP-SU06-A-19S	Pre-Plant	5/13/2019	Primary	0 to 12	5.6 U	1.5	66	508	8.1	0.27	2.1
CP-SU06-B-19S	Pre-Plant	5/13/2019	Primary	12 to 24	5.1 U	3.6 U	32	282	7.8	0.31	1 J
CP-SU06-B-19S-D	Pre-Plant	5/13/2019	Duplicate	12 to 24	5.1 U	3.6 U	31	291	8.5	0.27	1.5 J
CP-SU01-A-19F	Post-Harvest	9/5/2019	Primary	0 to 12	15.36	3.6 U	112	1061	8	0.37	2
CP-SU01-A-19F-D	Post-Harvest	9/5/2019	Duplicate	0 to 12	12.52	2.8	118	1064	8	0.35	2
CP-SU01-B-19F	Post-Harvest	9/5/2019	Primary	12 to 24	7.51	3.4	85	1253	8.3	0.44	1.3
CP-SU01-C-18S	Post-Harvest	9/5/2019	Primary	24 to 36	5.48	3.5	68	1146	8.7	0.36	0.9
CP-SU02-A-19F	Post-Harvest	9/5/2019	Primary	0 to 12	11.91	3.1	85	900	8	0.34	2
CP-SU02-B-19F	Post-Harvest	9/5/2019	Primary	12 to 24	4.44	2	42	655	8.6	0.36	0.8
CP-SU02-C-19F	Post-Harvest	9/5/2019	Primary	24 to 36	2.69	1.5	26	381	8.8	0.25	0.5
CP-SU03-A-19F	Post-Harvest	10/8/2019	Primary	0 to 12	31.34	2.4	86 J	574	7.5	0.49	1.9
CP-SU03-B-19F	Post-Harvest	10/8/2019	Primary	12 to 24	11.21	1.9	44 J	227	8.6	0.43	0.3
CP-SU03-B-19F-D	Post-Harvest	10/8/2019	Duplicate	12 to 24	10.25	3.4	42 J	208	8.6	0.35	0.7
CP-SU03-C-19F	Post-Harvest	10/8/2019	Primary	24 to 36	6.74	1.9	28 J	199	8.8	0.27	0.5
CP-SU04A-A-19F	Post-Harvest	10/15/2019	Primary	0 to 12	9.15	1 U	83	543	7.9	0.37	2

Table 13
2019 Cow Palace Dairy Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
CP-SU04A-A-19F-D	Post-Harvest	10/15/2019	Duplicate	0 to 12	9.99	2.1 U	100	593	7.9	0.34	2.3
CP-SU04A-B-19F	Post-Harvest	10/15/2019	Primary	12 to 24	4.1	1.4 U	49	310	8.3	0.29	0.9
CP-SU04A-C-19F	Post-Harvest	10/15/2019	Primary	24 to 36	3.81	1.5 U	31	228	8.5	0.23	0.6
CP-SU04B-A-19F	Post-Harvest	10/15/2019	Primary	0 to 12	9.37	1.4 U	87	668	8.1	0.33	2.1
CP-SU04B-B-19F	Post-Harvest	10/15/2019	Primary	12 to 24	2.82	3.6 U	42	327	8.5	0.31	0.9
CP-SU04B-C-19F	Post-Harvest	10/15/2019	Primary	24 to 36	3.44	0.9 U	30	218	8.6	0.28	0.7
CP-SU05-A-19F	Post-Harvest	9/6/2019	Primary	0 to 12	13.68	3.6 U	77	1101	8.1	0.43	1.9
CP-SU05-B-19F	Post-Harvest	9/6/2019	Primary	12 to 24	4.77	1.3	40	598	7.9	0.33	1
CP-SU05-C-19F	Post-Harvest	9/6/2019	Primary	24 to 36	2.87	1.4	29	276	8.4	0.37	0.8
CP-SU06-A-19F	Post-Harvest	9/6/2019	Primary	0 to 12	11.98	2.7	57	574	7.7	0.39	1.8
CP-SU06-B-19F	Post-Harvest	9/6/2019	Primary	12 to 24	5.52	2	24	283	8.5	0.39	0.7
CP-SU06-C-19F	Post-Harvest	9/6/2019	Primary	24 to 36	3.59	1.8	14 U	200	8.5	0.44	0.7
CP-SU06-C-19F-D	Post-Harvest	9/6/2019	Duplicate	24 to 36	3.61	1.2	13 U	196	8.2	0.49	0.6

Notes:

J: Estimated value.

mmhos/cm: millimhos per centimeter

ppm: parts per million

U: Result is not detected at the reported value.

Table 14

Cow Palace Dairy Application Field Soil Nitrate Concentrations, 2013 to 2019

Field	Fall 2013			Spring 2014		Fall 2014			Spring 2015		Fall 2015			Spring 2016		Fall 2016		
	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot
CP-SU01	89.3	65.1	67.4	30.2	36.6	47.2	40.4	46.3	13.7	16.7	58.1	50.0	36.2	9.9	18.9	19.6	15.0	19.6
CP-SU02	66.4	52.6	57.5	29.9	33.8	40.5	35.8	39.4	11.8	24.1	40.3	36.5	34.4	8.4	11.1	18.2	14.5	23.8
CP-SU03	49.5	44.7	63.2	32.6	34.4	44.9	51.2	56.9	15.7	93.5	18.2	7.5	27.1	5.5	4.0	40.4	12.2	10.9
CP-SU04 A	19.9	15.2	18.4	18.0	13.6	16.5	17.8	23.6	13.3	2.9	30.2	10.4	10.4	12.6	13.7	11.1	3.4	12.5
CP-SU04 B	15.2	39.7	65.8	15.0	25.3	19.1	20.6	33.1	16.3	8.6	14.5	12.6	23.1	13.1	12.1	7.6	3.3	8.8
CP-SU05	11.5	5.1	4.9	28.9	20.2	13.3	4.1	3.8	8.4	6.7	20.2	15.1	9.9	10.1	15.5	22.3	14.1	13.7
CP-SU06	66.8	53.8	33.7	36.1	50.4	47.6	46.7	38.4	9.7	15.1	19.7	27.5	17.6	11.7	24.6	10.5	6.3	11.6
Average	45.5	39.5	44.4	27.2	30.6	32.7	30.9	34.5	12.7	23.9	28.7	22.8	22.7	10.2	14.3	18.5	9.8	14.4
Percent Change from Prior Year						-28%	-22%	-22%	-53%	-22%	-12%	-26%	-34%	-20%	-40%	-36%	-57%	-36%
Percent Change from Fall 2013											-37%	-42%	-49%			-59%	-75%	-68%
No. of Fields over 45 ppm in 2-Foot Depth:	3			1		2			1		1			0		0		
Annual Percent Change[1]:						-33%			0%		-50%			-100%		-100%		
						Fall to Fall			Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall		

Field	Spring 2017		Fall 2017			Spring 2018		Fall 2018			Spring 2019		Fall 2019		
	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot
CP-SU01	8.7	8.6	13.7	8.8	11.1	13.3	5.3	18.8	8.2	12.0	16.1	6.4	15.4	7.5	5.5
CP-SU02	6.8	3.7	17.3	6.8	8.5	11.6	4.5	15.1	3.2	2.0	27.4	10.5	11.9	4.4	2.7
CP-SU03	9.3	10.5	24.9	18.3	31.1	6.5	7.1	18.3	6.8	12.9	15.6	6.6	31.3	11.2	6.7
CP-SU04 A	34.9	14.5	16.5	8.3	8.4	9.1	9.5	8.8	1.7	2.0	5.6	1.5	9.1	4.1	3.8
CP-SU04 B	25.6	9.0	14.3	6.6	8.5	8.3	6.4	9.1	1.5	2.0	4.1	1.9	9.4	2.8	3.4
CP-SU05	11.2	7.8	9.7	3.3	5.8	11.0	3.7	8.3	1.6	2.1	11.5	5.9	13.7	4.8	2.9
CP-SU06	16.8	11.6	12.5	5.1	4.0	6.1	2.7	8.9	3.8	4.1	5.6	5.1	12.0	5.5	3.6
AVG	16.2	9.4	15.6	8.2	11.1	9.4	5.6	12.5	3.8	5.3	12.3	5.4	14.7	5.8	4.1
Percent Change from Prior Year	59%	-34%	-16%	-17%	-23%	-42%	-40%	-20%	-53%	-52%	30%	-3%	18%	50%	-23%
Percent Change from Fall 2013			-66%	-79%	-75%			-73%	-90%	-88%			-68%	-85%	-91%
No. of Fields over 45 ppm in 2-Foot Depth:	0		0			0		0			0		0		
	Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall		

Notes:

Red text indicates fields in the 2-foot depth over 45 ppm.

1. Annual percent change at the 2-foot depth is calculated from fall to fall or spring to spring.

ppm: parts per million

Table 15

2019 Liberty/H&S Bosma Dairies Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
LD-SU02-A-19S	Pre-Plant	6/11/2019	Primary	0 to 12	4.6 U	1.3 J	559	2,028 J	8.6	0.32	2.8
LD-SU02-B-19S	Pre-Plant	6/11/2019	Primary	12 to 24	9.5 U	1.5 J	169	2,976 J	9.1	0.41	0.9
LD-SU02-B-19S-D	Pre-Plant	6/11/2019	Duplicate	12 to 24	10 U	2.5 J	148	2,750 J	9.2	0.4	1
LD-SU03-A-19S	Pre-Plant	5/14/2019	Primary	0 to 12	9.4 U	3.6 U	216	1256	7.5	0.34	2.5
LD-SU03-B-19S	Pre-Plant	5/14/2019	Primary	12 to 24	3.3 U	3.6 U	60	1334	8.6	0.27	0.8
LD-SU04-A-19S	Pre-Plant	5/17/2019	Primary	0 to 12	14 J	3.6 J	193	1,553 J	8.4	0.39	2.2
LD-SU04-B-19S	Pre-Plant	5/17/2019	Primary	12 to 24	8.1 UJ	3.2 J	169	2,106 J	8.9	0.49	1.6
LD-SU05-A-19S	Pre-Plant	6/7/2019	Primary	0 to 12	14.9 J	1.4 J	172	1,152 J	8.2	0.41	2.5
LD-SU05-B-19S	Pre-Plant	6/7/2019	Primary	12 to 24	35.8 J	3.6 UJ	57	225 J	8.6	0.63	1
LD-SU06-A-19S	Pre-Plant	5/16/2019	Primary	0 to 12	8.4 U	3.1	133	785 J	8.2	0.54	1.8
LD-SU06-B-19S	Pre-Plant	5/16/2019	Primary	12 to 24	10 U	3.6 U	68	272 J	8.4	1.26	1.1
LD-SU07-A-19S	Pre-Plant	5/16/2019	Primary	0 to 12	8.3 U	2.4	169	915 J	8	0.66	1.7
LD-SU07-B-19S	Pre-Plant	5/16/2019	Primary	12 to 24	25.4	3.6 U	81	653 J	8.5	0.99	1
LD-SU07-B-19S-D	Pre-Plant	5/16/2019	Duplicate	12 to 24	26.4	2.3	68	671 J	8.6	0.87	0.9
LD-SU08N-A-19S	Pre-Plant	5/17/2019	Primary	0 to 12	20.4 J	3.6 UJ	419	1,806 J	8.2	0.46	3
LD-SU08N-B-19S	Pre-Plant	5/17/2019	Primary	12 to 24	19.4 J	3.6 UJ	135	1,519 J	8.7	0.62	1.1
LD-SU08N-B-19S-D	Pre-Plant	5/17/2019	Duplicate	12 to 24	19.8 J	3.6 UJ	132	1,533 J	8.6	0.72	1.1
LD-SU08S-A-19S	Pre-Plant	6/7/2019	Primary	0 to 12	8.4 UJ	1.1 J	124	1,413 J	8.5	0.41	2.1
LD-SU08S-B-19S	Pre-Plant	6/7/2019	Primary	12 to 24	14.9 J	3.6 UJ	31	452 J	8.7	0.44	0.8
LD-SU08S-B-19S-D	Pre-Plant	6/7/2019	Duplicate	12 to 24	16.2 J	0.9 J	38	425 J	8.5	0.39	0.7
LD-SU09-A-19S	Pre-Plant	5/17/2019	Primary	0 to 12	5.4 UJ	2.1 J	62	243 J	7.5	0.31	1.9
LD-SU09-B-19S	Pre-Plant	5/17/2019	Primary	12 to 24	3.3 UJ	2.1 J	30	85 J	8.2	0.26	0.7
LD-SU10-A-19S	Pre-Plant	5/23/2019	Primary	0 to 12	15.4	1.5 J	205	418 J	8.2	0.71	2.9
LD-SU10-B-19S	Pre-Plant	5/23/2019	Primary	12 to 24	29.7	3.6 U	79	140 J	8.2	0.93	1.1
LD-SU10-B-19S-D	Pre-Plant	5/23/2019	Duplicate	12 to 24	30.8	3.6 U	81	156 J	8.1	0.97	1.1
LD-SU14-A-19S	Pre-Plant	5/17/2019	Primary	0 to 12	7.7 UJ	2.7 J	79	613 J	8.4	0.45	2.1
LD-SU14-B-19S	Pre-Plant	5/17/2019	Primary	12 to 24	10.1 UJ	1.3 J	33	171 J	8.5	0.61	0.7
LD-SU16-A-19S	Pre-Plant	5/14/2019	Primary	0 to 12	9.5 U	2.2	131	685	7.8	0.33	2.6
LD-SU16-B-19S	Pre-Plant	5/14/2019	Primary	12 to 24	2.9 U	3.6 U	43	571	8.2	0.22	0.9
LD-SU16-B-19S-D	Pre-Plant	5/14/2019	Duplicate	12 to 24	2.8 U	1.4	47	582	8	0.25	1
LD-SU17-A-19S	Pre-Plant	5/20/2019	Primary	0 to 12	3.8 U	1.1	67 J	560 J	8.4	0.3	1.8
LD-SU17-B-19S	Pre-Plant	5/20/2019	Primary	12 to 24	1.6 U	3.6 U	19 J	157 J	8.6	0.24	0.7
LD-SU17-B-19S-D	Pre-Plant	5/20/2019	Duplicate	12 to 24	1.6 U	1.2	18 J	153 J	8.2	0.3	0.7
LD-SU02-A-19F	Post-Harvest	10/14/2019	Primary	0 to 12	18.05	1.9 U	316	1548	8.4	0.7	2.5
LD-SU02-B-19F	Post-Harvest	10/14/2019	Primary	12 to 24	14.21	2.2 U	149	2652	9	0.72	1 U
LD-SU02-C-19F	Post-Harvest	10/14/2019	Primary	24 to 36	17.57	1.7 U	72	2509	9	0.56	0.6 U

Table 15
2019 Liberty/H&S Bosma Dairies Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
LD-SU02-C-19F-D	Post-Harvest	10/14/2019	Duplicate	24 to 36	17.37	3.6 U	64	2537	8.9	0.76	0.7 U
LD-SU03-A-19F	Post-Harvest	10/4/2019	Primary	0 to 12	12.28	7.1	193	1168	7.8	0.48	2.5
LD-SU03-B-19F	Post-Harvest	10/4/2019	Primary	12 to 24	2.92	3.9	85	1183	8.4	0.29	0.8 U
LD-SU03-C-19F	Post-Harvest	10/4/2019	Primary	24 to 36	2.56	2.2	52	1347	8.7	0.36	0.5 U
LD-SU04-A-19F	Post-Harvest	10/4/2019	Primary	0 to 12	8.33	3.2	195	1527	7.9	0.41	1.4 U
LD-SU04-B-19F	Post-Harvest	10/4/2019	Primary	12 to 24	6.92	3.5	150	2071	8.7	0.54	1.4 U
LD-SU04-C-19F	Post-Harvest	10/4/2019	Primary	24 to 36	8.89	3.4	119	1844	8.8	0.56	1.5 U
LD-SU05-A-19F	Post-Harvest	10/11/2019	Primary	0 to 12	29.14	1.9 U	127	988	8.1	0.66	2.7
LD-SU05-B-19F	Post-Harvest	10/11/2019	Primary	12 to 24	33.01	3.6 U	38	182	8.4	0.7	0.9 U
LD-SU05-B-19F-D	Post-Harvest	10/11/2019	Duplicate	12 to 24	32.46	3.6 U	35	132	8.5	0.82	0.8 U
LD-SU05-C-19F	Post-Harvest	10/11/2019	Primary	24 to 36	63.72	1 U	23	122	8.2	1.26	0.7 U
LD-SU06-A-19F	Post-Harvest	10/1/2019	Primary	0 to 12	23.9	1.6	123	731 J	7.9	0.81	2.1
LD-SU06-B-19F	Post-Harvest	10/1/2019	Primary	12 to 24	8.83	3.6 U	56	203 J	8.4	0.73	0.6 U
LD-SU06-C-19F	Post-Harvest	10/1/2019	Primary	24 to 36	8.67	0.9	18	78 J	8.4	1.02	0.3 U
LD-SU07-A-19F	Post-Harvest	10/1/2019	Primary	0 to 12	38.21	3.2	191	1102 J	8	0.72	2
LD-SU07-A-19F-D	Post-Harvest	10/1/2019	Duplicate	0 to 12	36.5	0.9	197	1103 J	7.9	0.74	2.3
LD-SU07-B-19F	Post-Harvest	10/1/2019	Primary	12 to 24	25.19	3.6 U	33	152 J	8.5	0.71	0.5 U
LD-SU07-C-19F	Post-Harvest	10/1/2019	Primary	24 to 36	23.19	3.6 U	59	570 J	8.6	0.67	0.4 U
LD-SU08N-A-19F	Post-Harvest	9/20/2019	Primary	0 to 12	30.39	2.1	290	1612	7.8	0.63	3.2
LD-SU08N-A-19F-D	Post-Harvest	9/20/2019	Duplicate	0 to 12	35.12	1.9	297	1618	7.7	0.56	3.2
LD-SU08N-B-19F	Post-Harvest	9/20/2019	Primary	12 to 24	15.28	0.9	109	1631	8.5	0.47	1.3 U
LD-SU08N-C-19F	Post-Harvest	9/20/2019	Primary	24 to 36	18.12	0.9	59	1449	8.7	0.59	0.7 U
LD-SU08S-A-19F	Post-Harvest	10/14/2019	Primary	0 to 12	33.9	3.6 U	108	1690	8.2	0.76	2
LD-SU08S-B-19F	Post-Harvest	10/14/2019	Primary	12 to 24	32.7	1 U	39	588	8.6	0.56	0.9 U
LD-SU08S-C-19F	Post-Harvest	10/14/2019	Primary	24 to 36	40.93	3.6 U	19	148	8.5	0.87	0.6 U
LD-SU09-A-19F	Post-Harvest	10/9/2019	Primary	0 to 12	13.34	2.4	65 J	204	7.3	0.54	2.3
LD-SU09-B-19F	Post-Harvest	10/9/2019	Primary	12 to 24	6.84	1.3	32 J	98	7.9	0.54	0.9 U
LD-SU09-C-19F	Post-Harvest	10/9/2019	Primary	24 to 36	4.97	3.6 U	19 J	67	8.3	0.34	0.8 U
LD-SU10-A-19F	Post-Harvest	10/9/2019	Primary	0 to 12	25.35	1.1	211 J	357	8	0.72	2.7
LD-SU10-A-19F-D	Post-Harvest	10/9/2019	Duplicate	0 to 12	25.08	2.1	193 J	349	8	0.62	2.7
LD-SU10-B-19F	Post-Harvest	10/9/2019	Primary	12 to 24	14.31	2.4	64 J	157	8.4	0.63	0.8 U
LD-SU10-C-19F	Post-Harvest	10/9/2019	Primary	24 to 36	18.1	3.6 U	28 J	161	8.4	0.65	0.7 U
LD-SU14-A-19F	Post-Harvest	10/10/2019	Primary	0 to 12	25.35	1	133 J	696	7.9	0.63	2.5
LD-SU14-B-19F	Post-Harvest	10/10/2019	Primary	12 to 24	10.5	3	59 J	167	8.2	0.65	1 U
LD-SU14-C-19F	Post-Harvest	10/10/2019	Primary	24 to 36	12.37	2.9	23 J	106	8.3	0.75	0.6 U
LD-SU16-A-19F	Post-Harvest	10/4/2019	Primary	0 to 12	9.19	6.3	127	664	7.9	0.27	2.2

Table 15
2019 Liberty/H&S Bosma Dairies Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
LD-SU16-B-19F	Post-Harvest	10/4/2019	Primary	12 to 24	2.17	2.6	47	652	8.4	0.26	0.7 U
LD-SU16-C-19F	Post-Harvest	10/4/2019	Primary	24 to 36	1.73	2.8	34	327	8.5	0.2	0.6 U
LD-SU16-C-19F-D	Post-Harvest	10/4/2019	Duplicate	24 to 36	1.59	1.7	23	318	8.7	0.14	0.5 U
LD-SU17-A-19F	Post-Harvest	10/10/2019	Primary	0 to 12	25.99	1.3	72 J	350	7.9	0.62	1.8 U
LD-SU17-A-19F-D	Post-Harvest	10/10/2019	Duplicate	0 to 12	24.39	2.7	62 J	409	7.9	0.68	1.7 U
LD-SU17-B-19F	Post-Harvest	10/10/2019	Primary	12 to 24	9.11	1.7	23 J	108	8.2	0.39	0.8 U

Notes:

J: Estimated value.

mmhos/cm: millimhos per centimeter

ppm: parts per million

U: Result is not detected at the reported value.

UJ: The compound was not detected above the reported sample reporting limit; however, the reporting limit is approximate and may or may not represent the actual limit of quantitation.

Table 16

Liberty/H&S Bosma Dairies Application Field Soil Nitrate Concentrations, 2013 to 2019

Field	Fall 2013			Spring 2014		Fall 2014			Spring 2015		Fall 2015			Spring 2016		Fall 2016		
	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot
LD-SU02	49.8	45.9	70.3	52.5	53.5	62.0	55.4	59.9	33.6	38.1	49.7	48.7	32.3	11.1	37.2	23.7	32.3	50.1
LD-SU03	36.4	20.8	16.4	15.2	25.3	31.0	16.2	21.4	9.9	12.9	33.8	24.0	20.8	9.1	7.6	20.9	7.5	9.9
LD-SU04	70.3	51.2	45.6	37.2	38.8	26.0	20.6	21.6	17.4	27.1	25.8	22.8	29.0	12.1	26.4	18.9	8.3	10.3
LD-SU05	83.2	84.9	97.6	40.4	45.8	52.3	73.3	80.5	23.4	59.1	59.6	49.0	22.3	5.1	24.8	23.1	27.5	48.2
LD-SU06	66.8	53.8	33.7	39.4	55.3	28.3	31.9	40.0	36.5	50.1	18.4	29.7	23.6	6.7	8.5	11.3	17.7	30.3
LD-SU07	77.8	106.8	159.0	82.3	128.8	55.9	100.2	160.2	81.4	95.0	74.1	160.5	85.9	9.0	70.4	12.7	50.4	100.8
LD-SU08 N	99.4	95.5	94.5	107.9	104.3	41.0	80.8	95.0	38.5	77.6	25.8	55.1	62.6	14.5	19.3	35.0	20.4	41.1
LD-SU08 S	63.2	66.1	66.2	46.7	52.3	50.8	39.5	55.1	16.4	18.8	35.7	38.3	52.6	12.7	33.1	39.9	30.2	39.2
LD-SU09	12.0	4.6	3.6	6.4	6.0	12.6	2.2	1.7	4.9	3.1	4.3	2.3	2.0	6.0	8.2	16.3	8.9	8.4
LD-SU10	58.9	79.9	50.7	44.6	45.8	54.7	61.9	65.6	30.2	44.8	45.0	45.9	20.3	4.9	13.9	22.0	28.5	30.5
LD-SU14	75.9	49.4	14.6	43.3	27.7	61.9	33.9	23.3	56.3	33.3	47.6	28.3	15.5	29.8	19.1	22.3	21.7	23.6
LD-SU16	67.4	29.6	24.9	71.0	29.5	46.8	38.2	26.0	19.7	18.5	32.1	12.7	15.6	5.2	11.4	14.4	5.9	7.9
LD-SU17	29.2	56.5	71.2	12.7	17.0	22.8	21.3	20.4	9.6	13.6	11.3	16.5	23.5	4.0	6.1	15.1	12.0	14.8
Average	60.8	57.3	57.6	46.1	48.5	42.0	44.3	51.6	29.1	37.8	35.6	41.1	31.2	10.0	22.0	21.2	20.9	31.9
Percent Change from Prior Year						-31%	-23%	-10%	-37%	-22%	-15%	-7%	-39%	-66%	-42%	-41%	-49%	2%
Percent Change from Fall 2013											-41%	-28%	-46%			-65%	-64%	-45%
No. of Fields over 45 ppm in 2-Foot Depth:	10			7		5			4		5			1		1		
Annual Percent Change[1]:						-50% Fall to Fall			-43% Spring to Spring		0% Fall to Fall			-75% Spring to Spring		-80% Fall to Fall		

Field	Spring 2017		Fall 2017			Spring 2018		Fall 2018			Spring 2019		Fall 2019		
	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot
LD-SU02	6.1	12.3	6.5	7.7	11.1	6.2	3.8	13.3	7.5	10.8	4.6	9.5	18.0	14.2	17.6
LD-SU03	37.1	17.0	8.9	6.4	8.0	12.1	3.9	9.6	2.3	1.5	9.4	3.3	12.3	2.9	2.6
LD-SU04	27.1	11.1	8.0	6.4	10.7	13.8	10.4	8.1	4.3	4.2	14.0	8.1	8.3	6.9	8.9
LD-SU05	11.1	21.4	29.6	38.0	36.7	10.3	19.1	41.1	41.3	54.5	14.9	35.8	29.1	33.0	63.7
LD-SU06	15.8	14.1	12.0	9.2	14.6	7.8	7.4	10.3	4.9	7.7	8.4	10.0	23.9	8.8	8.7
LD-SU07	9.9	16.9	9.0	18.2	32.3	6.2	24.3	6.5	35.4	61.7	8.3	25.4	38.2	25.2	23.2
LD-SU08 N	37.3	28.7	22.1	16.0	25.8	15.3	16.2	18.2	15.0	39.8	20.4	19.4	30.4	15.3	18.1
LD-SU08 S	8.1	16.7	40.3	19.2	17.5	10.9	19.6	10.3	22.1	33.0	8.4	14.9	33.9	32.7	40.9
LD-SU09	3.7	2.8	14.7	7.4	6.9	4.4	2.6	8.0	2.2	3.8	5.4	3.3	13.3	6.8	5.0
LD-SU10	5.3	16.1	11.9	18.4	24.9	3.7	15.2	18.9	16.6	15.8	15.4	29.7	25.4	14.3	18.1
LD-SU14	7.2	9.5	15.8	13.7	17.2	11.9	11.7	17.2	11.2	12.9	7.7	10.1	25.4	10.5	12.4
LD-SU16	13.4	7.2	7.6	2.0	2.1	8.0	2.7	8.4	2.0	2.4	9.5	2.9	9.2	2.2	1.7
LD-SU17	3.8	5.4	11.2	4.3	4.5	1.8	1.0	11.6	1.0	1.0	3.8	1.6	26.0	9.1	11.4
Average	14.3	13.8	15.2	12.8	16.3	8.6	10.6	14.0	12.8	19.2	10.0	13.4	22.6	14.0	17.9
Percent Change from Prior Year	43%	-37%	-28%	-38%	-49%	-40%	-23%	-8%	-1%	17%	16%	26%	62%	10%	-7%
Percent Change from Fall 2013			-75%	-78%	-72%			-77%	-78%	-67%			-63%	-76%	-69%
No. of Fields over 45 ppm in 2-Foot Depth:	0		0			0		0			0		0		
	Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall		

Notes:

Red text indicates fields in the 2-foot depth over 45 ppm.

1. Annual percent change at the 2-foot depth is calculated from fall to fall or spring to spring.

ppm: parts per million

Table 17

2019 George DeRuyter & Son/D&A Dairies Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
GDS-SU01-A-19S	Pre-Plant	5/14/2019	Primary	0 to 12	4.6 U	4.6	101	471	7.3	0.3	3.2
GDS-SU01-A-19S-D	Pre-Plant	5/14/2019	Duplicate	0 to 12	5.6 U	1.4	112	491	7.4	0.29	3.4
GDS-SU01-B-19S	Pre-Plant	5/14/2019	Primary	12 to 24	1.7 U	3.6 U	52	172	8	0.25	1.9
GDS-SU02-A-19S	Pre-Plant	5/15/2019	Primary	0 to 12	11	4	100	641 J	7.5	0.38	3
GDS-SU02-B-19S	Pre-Plant	5/15/2019	Primary	12 to 24	3.6 U	2.7	53	258 J	8.1	0.16	1.1
GDS-SU03-A-19S	Pre-Plant	5/21/2019	Primary	0 to 12	14.7	4.2	112 J	1154 J	7.5	0.65	2.6
GDS-SU03-B-19S	Pre-Plant	5/21/2019	Primary	12 to 24	7.4 U	1.2	50 J	620 J	7.7	0.48	0.8
GDS-SU04-A-19S	Pre-Plant	5/2/2019	Primary	0 to 12	42.6	3.3	321	1803	7.9	0.93	2.4
GDS-SU04-B-19S	Pre-Plant	5/2/2019	Primary	12 to 24	34.9	2.3	99 J	1723	8.2	1.02	1.2
GDS-SU04-B-19S-D	Pre-Plant	5/2/2019	Duplicate	12 to 24	32.9	3	73 J	1665	8.2	0.91	1
GDS-SU05-A-19S	Pre-Plant	5/21/2019	Primary	0 to 12	29.6	1.9	397 J	1752 J	7.8	0.73	2.7
GDS-SU05-B-19S	Pre-Plant	5/21/2019	Primary	12 to 24	20.5	1.3	123 J	2083 J	8.5	0.79	1
GDS-SU05-B-19S-D	Pre-Plant	5/21/2019	Duplicate	12 to 24	20.4	1.8	122 J	2066 J	8.4	0.48	0.9
GDS-SU06-A-19S	Pre-Plant	5/23/2019	Primary	0 to 12	42.5	3.6 U	149	1397 J	8.1	0.73	2.3
GDS-SU06-A-19S-D	Pre-Plant	5/23/2019	Duplicate	0 to 12	41.9	1.4 J	157	1491 J	8.1	0.84	2.3
GDS-SU06-B-19S	Pre-Plant	5/23/2019	Primary	12 to 24	**52.4**	1.5 J	48	502 J	8.3	0.82	0.8
GDS-SU07-A-19S	Pre-Plant	5/23/2019	Primary	0 to 12	31.7	3 J	81	1178 J	8.1	0.82	2.1
GDS-SU07-B-19S	Pre-Plant	5/23/2019	Primary	12 to 24	41.7	3 J	29	285 J	8.1	0.9	0.9
GDS-SU08-A-19S	Pre-Plant	5/3/2019	Primary	0 to 12	49.1 J	3.4 J	294	2340	8.3	0.96	2.6
GDS-SU08-A-19S-D	Pre-Plant	5/3/2019	Duplicate	0 to 12	49.9 J	1.4 J	283	2406	7.9	1	2.7
GDS-SU08-B-19S	Pre-Plant	5/3/2019	Primary	12 to 24	**62.3 J**	1 J	86	2018	8.3	0.16	1.3
GDS-SU09-A-19S	Pre-Plant	5/31/2019	Primary	0 to 12	52 J	3.7 J	151	1084 J	7.7	0.78	2.8
GDS-SU09-A-19S-D	Pre-Plant	5/31/2019	Duplicate	0 to 12	52.8 J	1.3 J	145	1043 J	7.7	0.87	2.7
GDS-SU09-B-19S	Pre-Plant	5/31/2019	Primary	12 to 24	21.7 J	1.3 J	70	331 J	8.2	0.81	1.2
GDS-SU10-A-19S	Pre-Plant	5/21/2019	Primary	0 to 12	13.7	1.2	31 J	613 J	8.2	0.36	1.7
GDS-SU10-B-19S	Pre-Plant	5/21/2019	Primary	12 to 24	10.5	3.6 U	8 J	138 J	8.4	0.3	0.6
GDS-SU11-A-19S	Pre-Plant	5/22/2019	Primary	0 to 12	16.8	2.4	142 J	871 J	7.7	0.41	2.7
GDS-SU11-A-19S-D	Pre-Plant	5/22/2019	Duplicate	0 to 12	16.9	3.8	137 J	907 J	7.7	0.36	2.8
GDS-SU11-B-19S	Pre-Plant	5/22/2019	Primary	12 to 24	13.9	2.9	64 J	535 J	8.1	0.34	1
GDS-SU12-A-19S	Pre-Plant	5/21/2019	Primary	0 to 12	9.8	4.1	114 J	857 J	8	0.33	2.3
GDS-SU12-B-19S	Pre-Plant	5/21/2019	Primary	12 to 24	10.6	1.5	45 J	458 J	8.1	0.31	1
GDS-SU13-A-19S	Pre-Plant	5/21/2019	Primary	0 to 12	10.9	1.4	127	585 J	7.9	0.45	2.4
GDS-SU13-B-19S	Pre-Plant	5/15/2019	Primary	12 to 24	7.7 U	1.1	47	344 J	8.2	0.34	0.9
GDS-SU13-B-19S-D	Pre-Plant	5/15/2019	Duplicate	12 to 24	7.6 U	2.3	46	341 J	8.2	0.3	0.9
GDS-SU14-A-19S	Pre-Plant	5/15/2019	Primary	0 to 12	5 U	1.3	74	486 J	7.9	0.32	1.6
GDS-SU14-B-19S	Pre-Plant	5/15/2019	Primary	12 to 24	3 U	2.5	29	165 J	8.4	0.33	0.8

Table 17

2019 George DeRuyter & Son/D&A Dairies Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
GDS-SU01-A-19F	Post-Harvest	8/9/2019	Primary	0 to 12	27.54	3.5	116 J	572 J	7.1	0.39	3.1
GDS-SU01-A-19F-D	Post-Harvest	8/9/2019	Duplicate	0 to 12	26.26	3.5	124 J	599 J	7.1	0.45	3.4
GDS-SU01-B-19F	Post-Harvest	8/9/2019	Primary	12 to 24	9.56	2.7	100 J	363 J	7.5	0.35	2.3
GDS-SU01-C-19F	Post-Harvest	8/9/2019	Primary	24 to 36	5.45	1.8	60 J	158 J	8	0.3	1.4
GDS-SU02-A-19F	Post-Harvest	9/27/2019	Primary	0 to 12	11.9	2.8	90 J	466	7.5	0.35	3.3
GDS-SU02-A-19F-D	Post-Harvest	9/27/2019	Duplicate	0 to 12	12.0	1.2	46 J	437	7.5	0.32	3.3
GDS-SU02-B-19F	Post-Harvest	9/27/2019	Primary	12 to 24	2.99 U	1	50	230	8.2	0.36	1
GDS-SU02-C-19F	Post-Harvest	9/27/2019	Primary	24 to 36	2.5 U	3.6 U	28	121	8.4	0.19	0.7
GDS-SU03-A-19F	Post-Harvest	9/27/2019	Primary	0 to 12	8.99	3.3	83	1150	7.5	0.37	3
GDS-SU03-B-19F	Post-Harvest	9/27/2019	Primary	12 to 24	2.55 U	1.8	47	740	8.1	0.26	1
GDS-SU03-C-19F	Post-Harvest	9/27/2019	Primary	24 to 36	2.58 U	1.6	40	421	8.3	0.19	0.9
GDS-SU04-A-19F	Post-Harvest	9/30/2019	Primary	0 to 12	43.55	3.6 U	255	1495 J	7.8	0.99	2.6
GDS-SU04-B-19F	Post-Harvest	9/30/2019	Primary	12 to 24	**59.21**	1	74	1862 J	8.3	1.51	0.4
GDS-SU04-B-19F-D	Post-Harvest	9/30/2019	Duplicate	12 to 24	**60.11**	3.6 U	71	1731 J	8	1.34	0.5 J
GDS-SU04-C-19F	Post-Harvest	9/30/2019	Primary	24 to 36	87.12	0.9	37	1299 J	7.9	1.7	0.4
GDS-SU05-A-19F	Post-Harvest	10/2/2019	Primary	0 to 12	32.41	1.4	296 J	1876 J	8	0.91	2.7
GDS-SU05-A-19F-D	Post-Harvest	10/2/2019	Duplicate	0 to 12	34.72	1.9	144 J	1901 J	8	0.96	2.6
GDS-SU05-B-19F	Post-Harvest	10/2/2019	Primary	12 to 24	**45.4**	3.6 U	110	2329 J	8.4	1.3	1
GDS-SU05-C-19F	Post-Harvest	10/2/2019	Primary	24 to 36	53.7	1.3	317	1201 J	8.3	1.17	0.4
GDS-SU06-A-19F	Post-Harvest	10/2/2019	Primary	0 to 12	29.0	1.2	42	1388 J	8	0.8	2.4
GDS-SU06-B-19F	Post-Harvest	10/2/2019	Primary	12 to 24	35.0	3.6 U	43	526 J	8.2	1.06	0.5
GDS-SU06-C-19F	Post-Harvest	10/2/2019	Primary	24 to 36	31.1	1.3	17	225 J	8.2	0.8	0.2
GDS-SU07-A-19F	Post-Harvest	10/3/2019	Primary	0 to 12	23.57	2.3	59	819	7.9	0.66	2.2
GDS-SU07-B-19F	Post-Harvest	10/3/2019	Primary	12 to 24	34.36	1.7	10	127	7.7	1.13 J	0.6
GDS-SU07-B-19F-D	Post-Harvest	10/3/2019	Duplicate	12 to 24	33.52	2	9 U	107	8.1	0.9 J	0.6
GDS-SU07-C-19F	Post-Harvest	10/3/2019	Primary	24 to 36	27.73	2	6 U	92	8.1	0.73	0.4
GDS-SU08-A-19F	Post-Harvest	10/7/2019	Primary	0 to 12	27.08	1.8	90 J	1872	8.1	0.96	2.6
GDS-SU08-B-19F	Post-Harvest	10/7/2019	Primary	12 to 24	**47.53**	2	53 J	1591	7.7	1.62	1
GDS-SU08-C-19F	Post-Harvest	10/7/2019	Primary	24 to 36	93.22	1.8	34 J	560	8	1.83	0.9
GDS-SU08-C-19F-D	Post-Harvest	10/7/2019	Duplicate	24 to 36	97.01	2.5	30 J	523	8	1.86	0.6
GDS-SU09-A-19F	Post-Harvest	9/11/2019	Primary	0 to 12	60.14	2.2	115	1102	7.6	0.73	2.5
GDS-SU09-B-19F	Post-Harvest	9/11/2019	Primary	12 to 24	22.84	3.6 U	46	414	8.2	0.5	0.9
GDS-SU09-B-19F-D	Post-Harvest	9/11/2019	Duplicate	12 to 24	23.37	1	49	380	8.3	0.42	0.9
GDS-SU09-C-19F	Post-Harvest	9/11/2019	Primary	24 to 36	20.19	3.6 U	18	119	8.2	0.76	0.6
GDS-SU10-A-19F	Post-Harvest	10/7/2019	Primary	0 to 12	7.67	2.4	30 J	478	8.2	0.39	1.7
GDS-SU10-B-19F	Post-Harvest	10/7/2019	Primary	12 to 24	2.24 U	1.7	4 U	121	8.5	0.43	0.6

Table 17

2019 George DeRuyter & Son/D&A Dairies Application Field Soil Sample Results

Sample ID	Sample Period	Sample Date	Sample Type	Depth Interval (inches)	Nitrate (ppm)	Ammonium (ppm)	Phosphorous (ppm)	Potassium (ppm)	pH (standard units)	Electrical Conductivity (mmhos/cm)	Organic Matter (%)
GDS-SU10-C-19F	Post-Harvest	10/7/2019	Primary	24 to 36	3.56	2.1	4 U	82	8.5	0.42	0.6
GDS-SU11-A-19F	Post-Harvest	10/3/2019	Primary	0 to 12	12.3	3.8	139	831	7.4	0.32	3
GDS-SU11-B-19F	Post-Harvest	10/3/2019	Primary	12 to 24	5.05	2.4	73	451	7.9	0.22	1.4
GDS-SU11-C-19F	Post-Harvest	10/3/2019	Primary	24 to 36	4.02	2.2	42	400	8.2	0.29	1
GDS-SU12-A-19F	Post-Harvest	10/7/2019	Primary	0 to 12	8.56	4.8	105 J	753	7.6	0.27	2
GDS-SU12-B-19F	Post-Harvest	10/7/2019	Primary	12 to 24	2.7 U	2.7	48 J	376	8.3	0.18	0.8
GDS-SU12-C-19F	Post-Harvest	10/7/2019	Primary	24 to 36	4.49	2.4	35 J	361	8.3	0.33	0.8
GDS-SU13-A-19F	Post-Harvest	8/2/2019	Primary	0 to 12	21.12	4.9	146 J	795 J	7.7	0.41	2.7
GDS-SU13-B-19F	Post-Harvest	8/2/2019	Primary	12 to 24	15.33	2.5	65 J	331 J	7.8	0.29	1.4
GDS-SU13-C-19F	Post-Harvest	8/2/2019	Primary	24 to 36	14.2	2.8	41 J	220 J	7.9	0.42	1.2
GDS-SU14-A-19F	Post-Harvest	8/2/2019	Primary	0 to 12	14.59	2.8	106 J	505 J	7.7	0.46	2.1
GDS-SU14-A-19F-D	Post-Harvest	8/2/2019	Duplicate	0 to 12	14.79	2.7	108 J	544 J	7.9	0.44	2.3
GDS-SU14-B-19F	Post-Harvest	8/2/2019	Primary	12 to 24	10.56	1.8	61 J	280 J	8.1	0.29	1.4

Notes:

BOLD: Values greater than 45 ppm in the 2-foot depth interval.

J: Estimated value.

mmhos/cm: millimhos per centimeter

ppm: parts per million

U: Result is not detected at the reported value.

Table 18

George DeRuyter & Sons/D&A Dairies Application Field Soil Nitrate Concentrations, 2013 to 2019

	Fall 2013			Spring 2014		Fall 2014			Spring 2015		Fall 2015			Spring 2016		Fall 2016		
Field	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot
GDS-SU01	12.3	7.1	4.6	11.0	11.2	14.5	4.2	2.1	22.3	8.3	19.0	16.1	18.8	16.1	12.9	13.8	6.3	2.9
GDS-SU02	19.2	23.9	14.4	7.6	3.5	10.6	5.1	5.8	11.1	9.5	24.5	11.5	8.3	18.4	10.8	18.6	7.1	10.3
GDS-SU03	8.6	3.5	3.3	16.4	7.6	15.5	5.4	4.2	10.4	4.1	41.4	34.8	33.3	7.3	6.6	9.5	2.9	3.9
GDS-SU04	183.5	166.0	172.5	182.5	196.5	208.3	165.3	187.3	150.3	169.9	91.1	76.5	79.3	27.9	85.9	43.3	117.0	115.6
GDS-SU05	263.0	254.0	263.0	225.5	236.5	187.5	226.0	226.5	116.8	197.5	154.5	218.0	176.5	23.8	145.5	34.4	144.6	215.8
GDS-SU06	47.3	81.5	102.3	56.3	55.7	49.0	68.9	70.9	28.1	60.8	39.1	55.2	93.7	5.9	18.2	39.0	48.6	65.7
GDS-SU07	30.6	74.2	75.7	11.1	31.5	17.2	40.8	44.5	11.3	24.4	15.7	7.6	30.2	4.1	7.5	79.6	48.8	43.9
GDS-SU08	161.4	160.5	138.9	219.0	159.3	102.4	160.5	163.0	63.8	130.5	93.1	93.8	104.9	40.0	118.2	48.9	103.2	138.4
GDS-SU09	24.6	28.3	27.1	54.6	30.2	48.3	62.7	61.1	22.5	28.4	25.7	25.7	28.5	10.9	12.9	33.8	17.4	21.9
GDS-SU10	49.0	37.7	21.7	58.2	55.6	24.1	49.9	71.6	13.0	7.9	6.3	11.0	21.9	11.3	4.5	16.6	8.1	8.5
GDS-SU11	38.9	37.8	30.5	23.7	14.7	24.5	14.0	9.1	12.5	8.5	13.3	6.5	6.6	32.2	23.5	23.4	7.6	4.3
GDS-SU12	167.5	125.4	94.6	91.0	49.7	76.9	34.2	35.3	20.8	25.2	4.0	10.3	7.0	9.7	6.5	15.7	7.8	8.1
GDS-SU13	10.3	6.7	8.2	40.0	48.8	27.5	39.0	37.7	9.8	14.2	7.8	9.5	20.4	20.6	20.6	16.9	7.8	7.1
GDS-SU14	37.4	31.5	20.9	4.0	6.9	7.3	7.5	16.8	10.1	15.9	8.0	11.5	10.1	18.1	29.3	10.6	5.0	5.9
Average	75.3	74.2	69.8	71.5	64.8	58.1	63.1	66.9	35.9	50.4	38.8	42.0	45.7	17.6	35.9	28.9	38.0	46.6
Percent Change from Prior Year						-23%	-15%	-4%	-50%	-22%	-33%	-33%	-32%	-51%	-29%	-26%	-9%	2%
Percent Change from Fall 2013											-48%	-43%	-35%			-62%	-49%	-33%
No. of Fields over 45 ppm in 2-Foot Depth:	6			7		6			4		4			3		5		
Annual Percent Change[1]:						0%			-43%		-33%			-25%		25%		
						Fall to Fall			Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall		

	Spring 2017		Fall 2017			Spring 2018		Fall 2018			Spring 2019		Fall 2019		
Field	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot	1-foot	2-foot	1-foot	2-foot	3-foot
GDS-SU01	27.0	8.5	7.6	2.6	3.6	12.0	8.9	16.1	3.6	4.3	4.6	1.7	14.6	10.6	10.9
GDS-SU02	19.9	11.0	12.9	5.2	4.4	16.5	5.9	9.6	2.1	1.8	11.0	3.6	11.9	3.0	2.5
GDS-SU03	19.1	12.8	7.9	3.1	3.5	8.2	2.8	8.8	2.4	2.1	14.7	7.4	9.0	2.5	2.6
GDS-SU04	28.0	65.4	12.3	48.0	76.0	13.4	24.9	18.5	28.3	66.6	42.6	34.9	43.5	59.2	87.1
GDS-SU05	14.7	26.1	33.3	57.5	92.1	19.4	32.9	37.3	27.9	51.4	29.6	20.5	32.4	45.4	53.7
GDS-SU06	13.0	20.6	28.8	25.0	45.8	10.0	15.3	64.8	62.1	61.1	42.5	52.4	29.0	35.0	31.0
GDS-SU07	25.2	38.4	25.4	29.4	37.9	22.8	31.6	48.0	56.2	61.7	31.7	41.7	23.6	34.4	27.7
GDS-SU08	31.9	54.1	39.1	87.6	94.2	20.6	63.5	48.8	62.7	89.2	49.1	62.3	27.1	45.7	93.2
GDS-SU09	65.9	55.9	12.9	14.1	11.0	10.9	11.1	9.4	3.5	5.1	52.0	21.7	60.1	22.8	20.2
GDS-SU10	20.1	15.1	11.3	6.8	7.2	8.8	11.6	39.0	24.0	18.4	13.7	10.5	7.7	2.2	3.6
GDS-SU11	18.0	14.8	16.2	9.2	12.7	14.5	7.8	10.7	3.4	4.4	16.8	13.9	12.3	5.1	4.0
GDS-SU12	22.6	5.8	12.0	5.4	11.9	5.0	9.6	11.3	2.7	2.9	9.8	10.6	8.6	2.7	4.5
GDS-SU13	36.2	19.6	13.5	6.0	5.3	17.3	7.5	7.8	2.9	3.1	10.9	7.7	21.1	15.3	14.2
GDS-SU14	17.1	8.2	12.8	8.5	9.1	15.6	8.2	8.8	3.0	4.7	5.0	3.0	27.5	9.6	5.4
Average	25.6	25.5	17.6	22.0	29.6	13.9	17.3	24.2	20.3	26.9	23.9	20.9	23.5	21.0	25.8
Percent Change from Prior Year	46%	-29%	-39%	-42%	-36%	-46%	-32%	38%	-8%	-9%	71%	21%	-3%	3%	-4%
Percent Change from Fall 2013			-77%	-70%	-58%			-68%	-73%	-61%			-69%	-72%	-63%
No. of Fields over 45 ppm in 2-Foot Depth:	3		3			1		3			2		3		
Annual Percent Change[1]:	0%		-40%			-67%		0%			100%		0%		
	Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall			Spring to Spring		Fall to Fall		

Notes:

Red text indicates fields in the 2-foot depth over 45 ppm.

1. Annual percent change at the 2-foot depth is calculated from fall to fall or spring to spring.

ppm: parts per million

Table 19
2019 Cow Palace Dairy Off-Site Liquid Manure Transfers

Map Location	Farm/Facility Name	Location	Field/Sample Identifier	Liquid Manure (gallons)	Field Sample No.	Field Nitrate Concentration (ppm)[1]	Collected Depth (feet)
C1	[redacted]	SW of Liberty Rd./Kirks Rd., Granger, WA	Yard 104	280,984	CP1	15.8	2
C2		SW of Becker Rd./Jensen Rd., Toppenish, WA	[redacted]	970,672	CP2	27.0	2
C3	[redacted]	W of Hwy 97 along Pumphouse Rd., Toppenish, WA	Pumphouse RD	613,056	CP3	3.0	2
C4		NW of Wierman Rd./Branch Rd., Toppenish, WA	Wierman RD	427,862	CP4	4.8	2
C5		NE of Blue Heron Rd./Curlew Rd., Toppinish, WA	[redacted] Place	957,900	CP5	12.3	2
C6		NE of Indian Church Rd./Schuster Rd., Granger, WA	[redacted] North	549,196	CP6	4.3	2
C7		N of Satus Longhouse Rd./Totus Rd., Granger, WA	[redacted] North	536,424	CP7	2.9	2
C8		W of Satus Longhouse Rd./Totus Rd., Granger, WA	[redacted] South	408,704	CP8	2.7	2
C9	[redacted]	Sohappy Rd./Rd. 19, Toppenish, WA	[redacted] North	581,126	CP9	3.2	2
C10		N of Plank Rd./Lake Rd., Granger, WA	[redacted]	306,528	CP10	14.6	2
C11		Foster Rd./W Satus Rd., Toppenish, WA	[redacted]	485,336	CP11	3.1	2
C12		NW of Satus Rd./Plank Rd., Granger, WA	[redacted]	779,092	CP12	7.9	2
			TOTAL	**6,896,880**			

Notes:

1. Where nitrate concentrations are reported in pounds per acre, conversion to parts per million is based on a 1-foot soil bulk density of 1.25 grams per cubic centimeter, which results in a conversion factor of 3.4, typical for a lower Yakima Valley silt loam soil.

ppm: parts per million

Table 20
2019 Liberty/H&S Bosma Dairies Off-Site Liquid Manure Transfers

Map Location	Farm/Facility Name	Location	Field/Sample Identifier	Liquid Manure (gallons)[1]	Field Sample No.	Field Nitrate Concentration (ppm)[2]	Collected Depth (feet)
L1	[redacted]	North end of Bailey Rd., Zillah, WA	[redacted] 13	2,981,387	LD1	36.7	2
			[redacted] 23		LD2	30.9	2
			[redacted] East		LD3	6.5	2
			[redacted] North		LD4	9.0	2
			[redacted] Northeast		LD5	7.1	2
			[redacted] Northwest		LD6	6.1	2
			[redacted] South 55		LD7[3]	**88.7**	2
			[redacted] Southeast		LD8[3]	**46.1**	2
			[redacted] West 55		LD9[3]	**70.1**	2
			[redacted] Yellow House		LD10	7.3	2
			TOTAL	**2,981,387**			

Notes:

1. Off-site applications were performed by the landowner and exact quantities applied to each field are unavailable; fields with nitrate concentrations greater than 45 ppm should not receive manure applications because these fields have no recommendation to apply.
2. Where nitrate concentrations are reported in pounds per acre, conversion to parts per million is based on a 1-foot soil bulk density of 1.25 grams per cubic centimeter, which results in a conversion factor of 3.4, typical for a Lower Yakima Valley silt loam soil.
3. No application recommended for this section of field.

BOLD: concentration more than 45 ppm

NR: Not reported.

NS: No sample recorded.

ppm: parts per million

Table 21

2019 George DeRuyter & Son/D&A Dairies Off-Site Liquid Manure Transfers

Map Location	Farm/Facility Name	Location	Field/Sample Identifier	Liquid Manure (gallons)[1]	Field Sample No.	Field Nitrate Concentration (ppm)[2]	Collected Depth (feet)
D1	[redacted]	SE corner of Dekker Rd./Van Belle Rd., Outlook, WA	[redacted]	234,000	GDS1	9.1	2
					GDS2	8.2	2
D2	[redacted]	1130 Dekker Rd. Outlook, WA	Middle	81,000	GDS3[3]	**70.0**	2
			Northwest		GDS4	38.7	2
			Southeast		GDS5[3]	**194.8**	2
D3	[redacted]	NW of Zillah Dr./Thacker Rd., Granger, WA	East CP-N	1,116,000	GDS6	20.4	1
D4		NE of Zillah Dr./Eagle Peak Rd., Granger, WA	West CP-N	922,500	GDS7	34.0	1
		NE of Zillah Dr./Eagle Peak Rd., Granger, WA	West CP-SW	324,000	GDS8	17.5	2
D5	[redacted]	SE of Progressive Rd./South Wapato Rd., Wapato, WA	[redacted]	495,000	GDS9	1.4	2
					GDS10	10.0	2
					GDS11	31.7	2
			TOTAL	**3,172,500**			

Notes:

1. Off-site applications were performed by the landowner and exact quantities applied to each field are unavailable; fields with nitrate concentrations greater than 45 ppm should not receive manure applications because these fields have no recommendation to apply.
2. Where nitrate concentrations are reported in pounds per acre, conversion to parts per million is based on a 1-foot soil bulk density of 1.25 grams per cubic centimeter, which results in a conversion factor of 3.4, typical for a Lower Yakima Valley silt loam soil.
3. No application recommended for this section of field.

BOLD: concentration more than 45 ppm

ppm: parts per million

Table 22
2019 Cow Palace Dairy Off-Site Solid Manure Transfers

Map Location	Solid Manure (tons)[1]	Field Sample No.	Nitrate Concentration (ppm)[2]	Collected Depth (feet)
C1[3]	7,603	--	--	--
TOTAL[4]	**7,603**			

Notes:

1. Includes separator solids and unfinished compost.

2. Where nitrate concentrations are reported in pounds per acre, conversion to parts per million is based on a 1-foot soil bulk density of 1.25 grams per cubic centimeter, which results in a conversion factor of 3.4, typical for a Lower Yakima Valley silt loam soil.

3. Location outside map extents.

4. During 2019, approximately 92,283 tons of wet manure solids were used to manufacture finished compost.

-- : Not applicable; location is not within the boundary of the Dairies.

ppm: parts per million

Table 23

2019 Liberty/H&S Bosma Dairies Off-Site Solid Manure Transfers

Map Location	Solid Manure (tons)[1]	Field Sample No.	Nitrate Concentration (ppm)[2]	Collected Depth (feet)
--	0	--	--	--
TOTAL[3]	**0**			

Notes:

1. Includes separator solids and unfinished compost.

2. Where nitrate concentrations are reported in pounds per acre, conversion to parts per million is based on a 1-foot soil bulk density of 1.25 grams per cubic centimeter, which results in a conversion factor of 3.4, typical for a Lower Yakima Valley silt loam soil.

3. During 2019, approximately 21,661 tons of wet manure solids were used to manufacture finished compost.

ppm: parts per million

Table 24

2019 George DeRuyter & Son/D&A Dairies Off-Site Solid Manure Transfers

Map Location	Solid Manure (tons)[1]	Field Sample No.	Nitrate Concentration (ppm)[2]	Collected Depth (feet)
D1	7,738	--	--	--
TOTAL[3]	**7,738**			

Notes:

1. Includes DAF solids.

2. Where nitrate concentrations are reported in pounds per acre, conversion to parts per million is based on a 1-foot soil bulk density of 1.25 grams per cubic centimeter, which results in a conversion factor of 3.4, typical for a Lower Yakima Valley silt loam soil.

3. During 2019, no wet manure solids were used to manufacture finished compost.

-- : Not applicable; location is not within the boundary of the Dairies.

ppm: parts per million

Table 25
2019 Off-Site First-Party Compost Sales

Map Location	Dairy	Compost Sale (tons)	Groundwater Nitrate Concentration >10 mg/L[1]
C1	Cow Palace Dairy	7,821	No[2]
--	George DeRuyter & Son/D&A Dairies	0	--
--	Liberty/H&S Bosma Dairies	0	--

Notes:

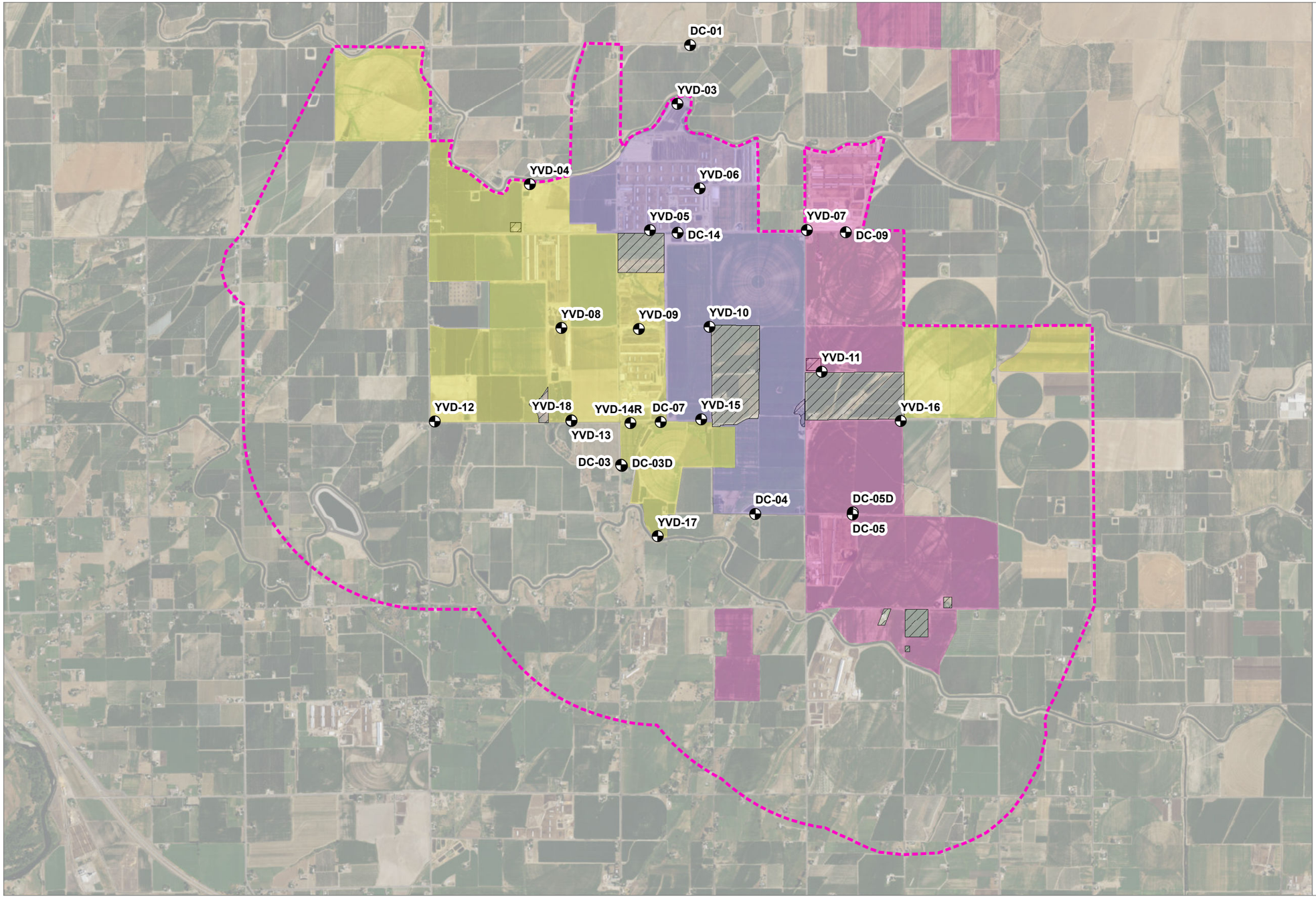
1. Yes/No determined based on most recent data collected under the Administrative Order on Consent.

2. Indeterminate

-- : Not applicable; location is not within the boundary of the Dairies.

mg/L: milligram per liter

Figures



LEGEND:

- Monitoring Well
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies
- Land Not Owned or Operated by the Dairies
- 1-mile Downgradient Boundary

NOTE(S):
Aerial Photo Source: USDA NAIP (2015).

0 2,000
Feet

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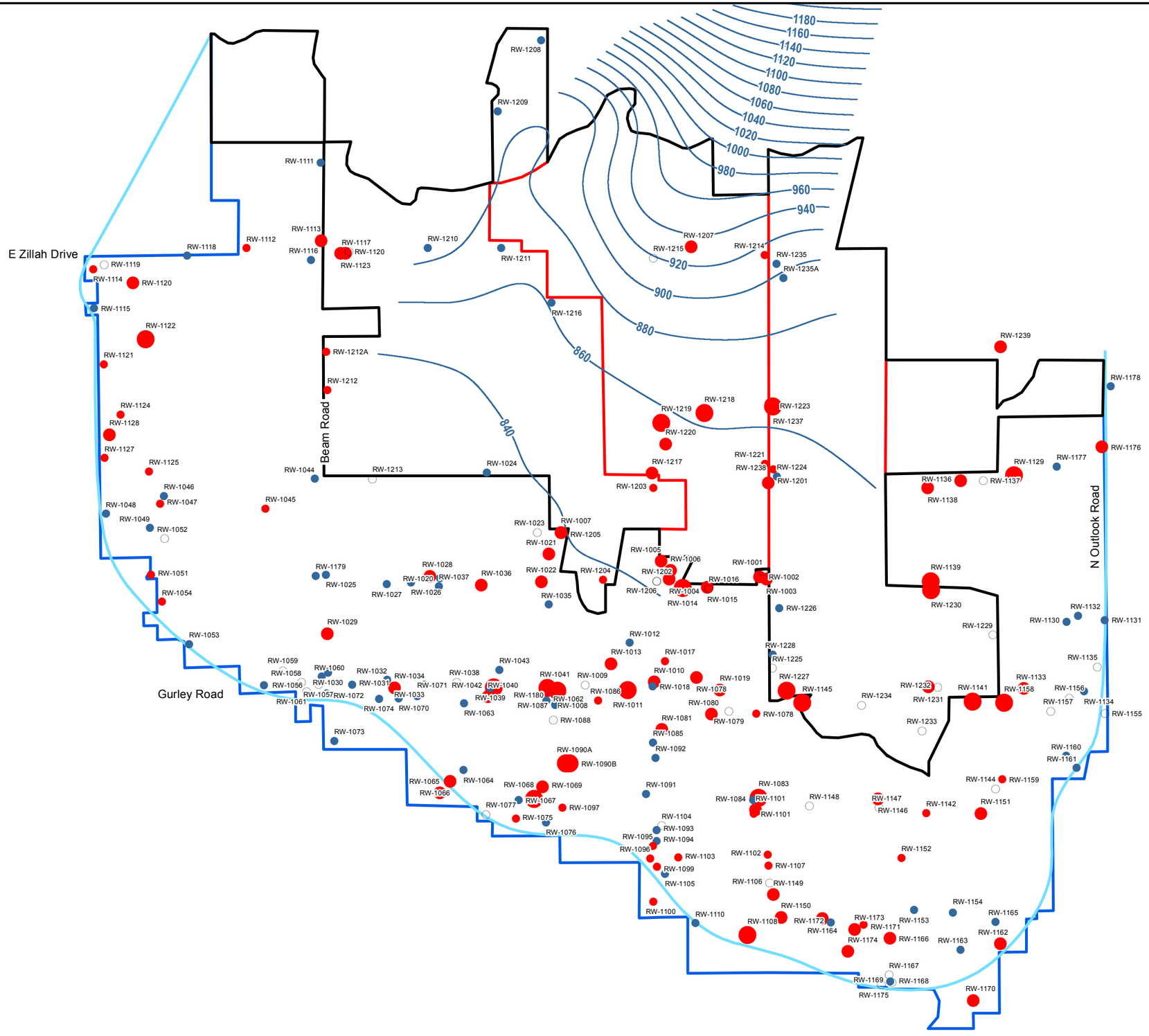
Figure 1
Dairy Locations and Monitoring Well Network
2019 Annual Report
Yakima Valley Dairies



LEGEND:

- NITRATE < 10 mg/L
- NITRATE 10 - 20 mg/L
- NITRATE > 20 mg/L
- RO SYSTEM PRESENT
- RESIDENCE NOT ASSESSED
- APPROXIMATE BOUNDARY OF DAIRY FACILITIES
- APPROXIMATE ONE MILE DOWNGRADIENT BOUNDARY
- APPROXIMATE ONE MILE DOWNGRADIENT INCLUSIVE OF PARCEL BOUNDARIES
- RESPONDENTS OWNERSHIP BOUNDARIES
- 4Q2013 GROUNDWATER POTENTIOMETRIC CONTOUR (FT AMSL), CONTOUR INTERVAL = 20 FT

0 2500' 5000'

GRAPHIC SCALE

YAKIMA VALLEY DAIRIES
SDWA-10-2013-0800
2013 ANNUAL REPORT

RESIDENTIAL WELL SAMPLING NITRATE ANALYTICAL RESULTS

INLAND EARTH SCIENCES

FIGURE **2**

CITY: KNOXVILLE DIV: ENV DB: A.SMITH PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Washington South FIPS 4602 Feet
\\PHX\common\Projects\Inland Earth Sciences\41731_Inland_Earth_Science_Yakima\GlobalGIS\Maps\2016_01\Yakima_Valley_Dairies_Sampled_Locations_Figure1B.mxd PLOTTED: 1/28/2016 11:41:16 AM BY: gbowen

Liberty/Bosma Dairy

Lagoon ID	1	2	3	4a	4b	5	6	8	9	10	(11)	(13)	12	(7)	14	15	(16)	(17)	18	19	20	RWP	VTS
										Consolidated[a]			Consolidated[a]			Consolidated[a]							
Initial Capacity (M gal)	14.4	2.6	4.3	5.6	4.1	2.9	2.45	0.6	0.3	2.0			3.7		5.3	2.6			1.9	0.4	0.3	1.2	na
Revised Capacity (M gal)	14.4	2.6	4.3	5.6	4.1	2.9	2.72	na	na	2.6			3.7		5.3	2.7			1.9	na	na	1.2	
2016																							
2017																							
2018																							
2019																							
2020							4 lagoons to be lined/abandoned in 2020																
2021							4 lagoons to be lined/abandoned in 2021																
2022							2 lagoons to be lined/abandoned in 2022																

George DeRuyter Dairy / D&A Dairy

Lagoon ID	1	2	3	4	SWCB	DIG	DAF	NDN	1	2	3	(4)	TUP	Total
											Consolidated[a]			
Initial Capacity (M gal)	4.3	10.7	5.8	4.5	0.73	n/a	n/a	n/a	2.34	4.81	2.4		1.7	37.28
Revised Capacity (M gal)	4.3	10.7	5.8	4.5	4.42	n/a	n/a	n/a	2.34	4.81	2.58		1.7	41.15
2016														
2017														
2018														
2019														
2020														
2021					Two lagoons to be lined/abandoned 2021									
2022					Three lagoons to be lined/abandoned 2022									

Cow Palace Dairy

Lagoon ID	1	2	(3)	4	SBA	SBB	CNW	CNE	SDB	Total
		Consolidated[a]								
Initial Capacity (M gal)	10.6	8.99		3.7	1.5	1.5	2.79	1.1	1.0	31.2
Revised Capacity (M gal)	10.6	24.3		3.7	1.5	1.5	2.79	na	1.0	45.4
2016										
2017				●						
2018										
2019										
2020										

Notes:

Designed
Scheduled work in progress
Lagoon Lined
Abandonment
Treatment system construction
Scheduled Lining 2020 to 2022

CNW: Catch Basin NW
CNE: Catch Basin NE
DIG: Digester
DAF: Dissolved Air Flotation Unit
NDN: Nitrification/Denitrification System
RWP: Red Water Pond
SBA: Settling Basin A
SBB: Settling Basin B
SDB: Safety Debris Basin
SWCB: Stormwater Catch Basin
TUP: Take Up Pond
VTS: Vermiculture Treatment System
● Lagoon assessed, meets applicable NRCS standards

a. Lagoon IDs show in parentheses are part of consolidated lagoons; black Lagoon IDs are the current lagoon ID number.

1. Lagoon volumes are listed based on operational volumes (with 2 feet of freeboard). Volumes are based on survey data where available. Where survey data are not available, volumes are based on the volumes listed in the Lagoon Work Plans.

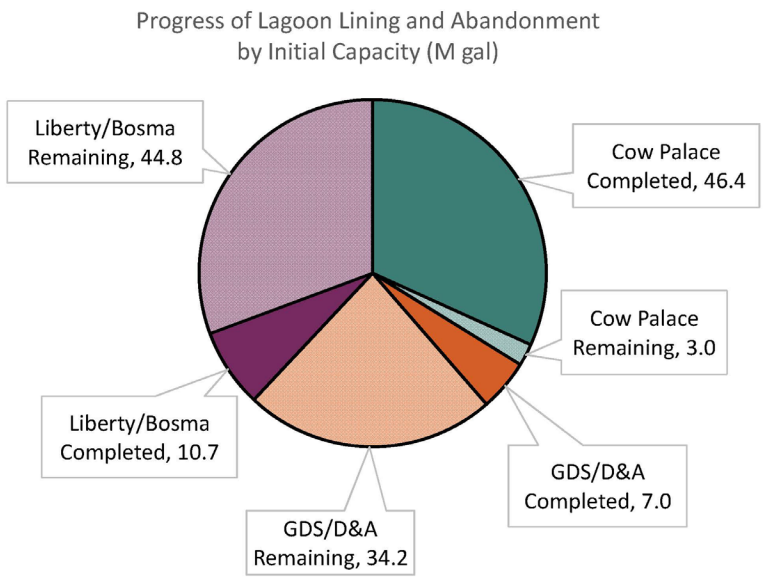


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Figure 3
Progress of Lagoon Lining and Abandonments
2019 Annual Report
Yakima Valley Dairies

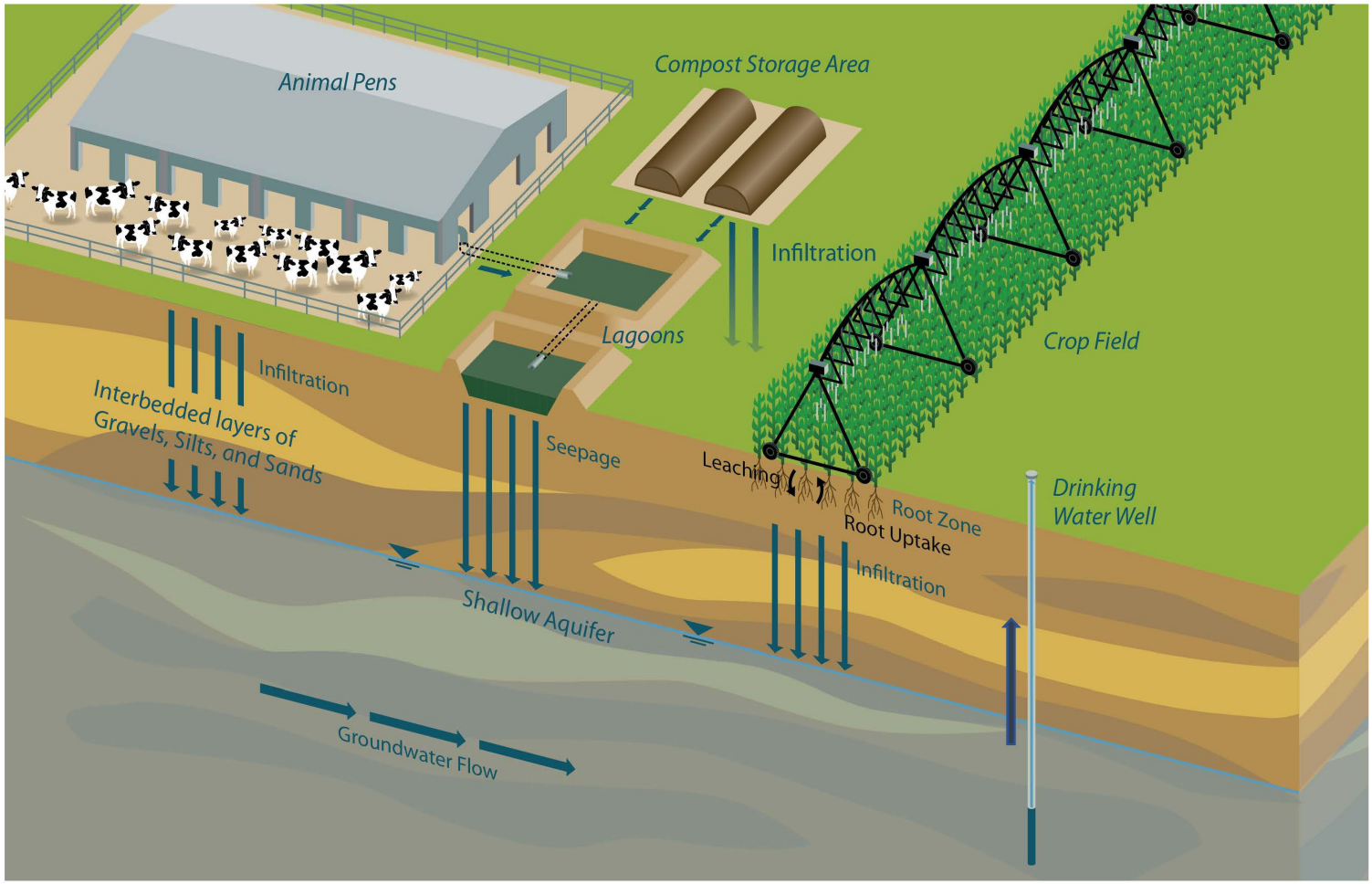

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Figure 4
Conceptual Site Model
2019 Annual Report
Yakima Valley Dairies

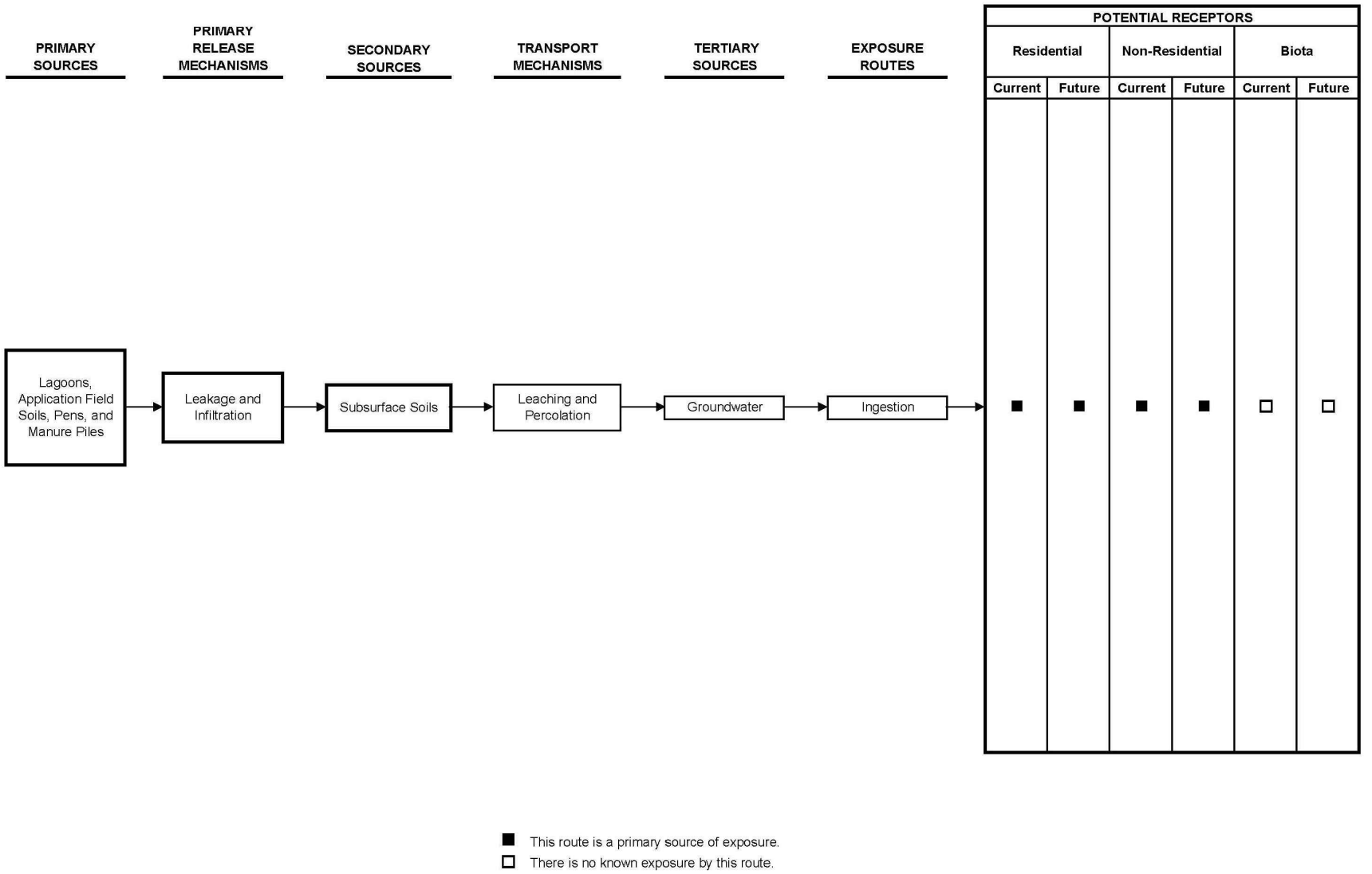

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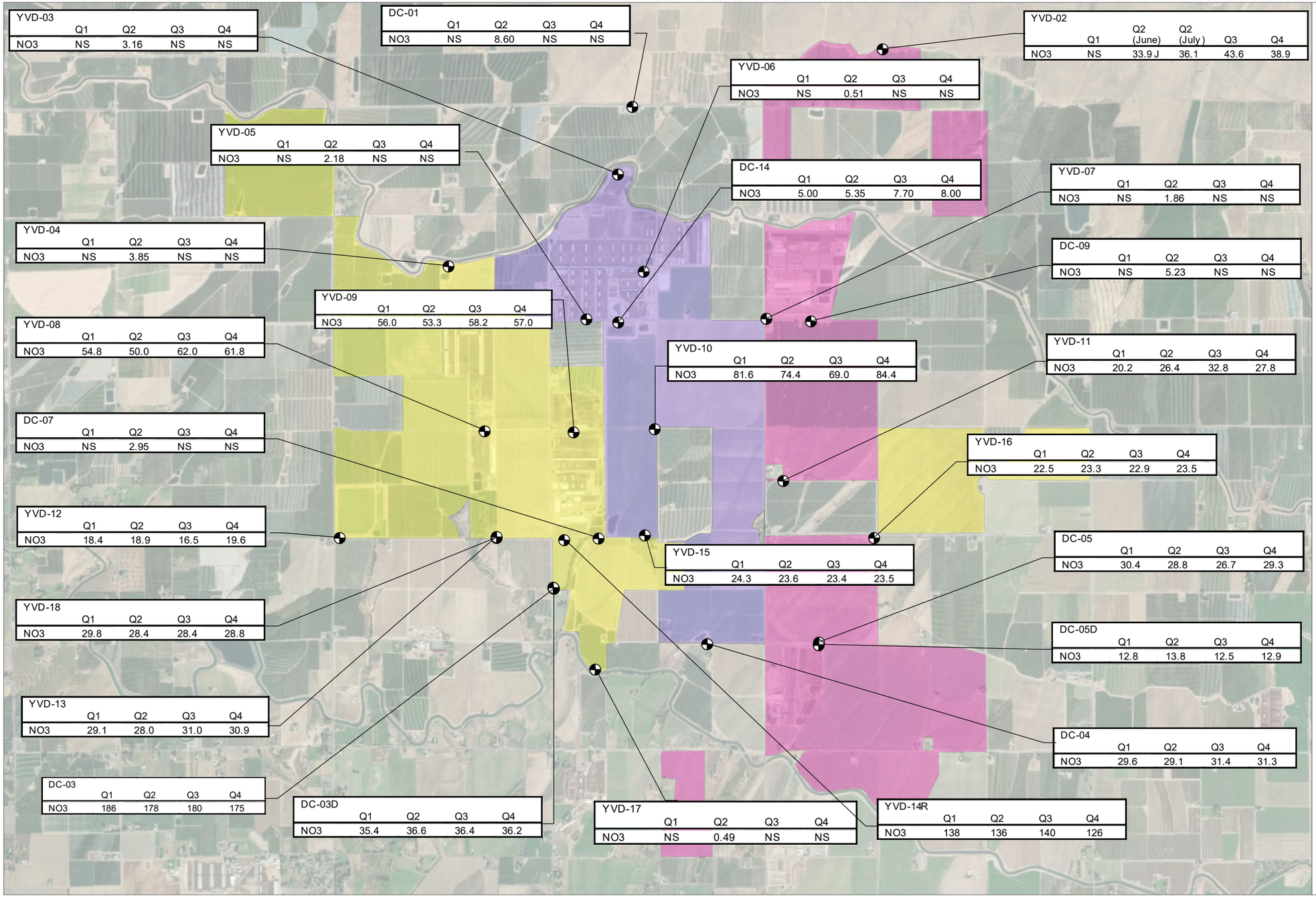
Figure 5
Conceptual Site Model Flow Chart
2019 Annual Report
Yakima Valley Dairies



Publish Date: 2020/01/31, 7:29 AM | User: alesueur
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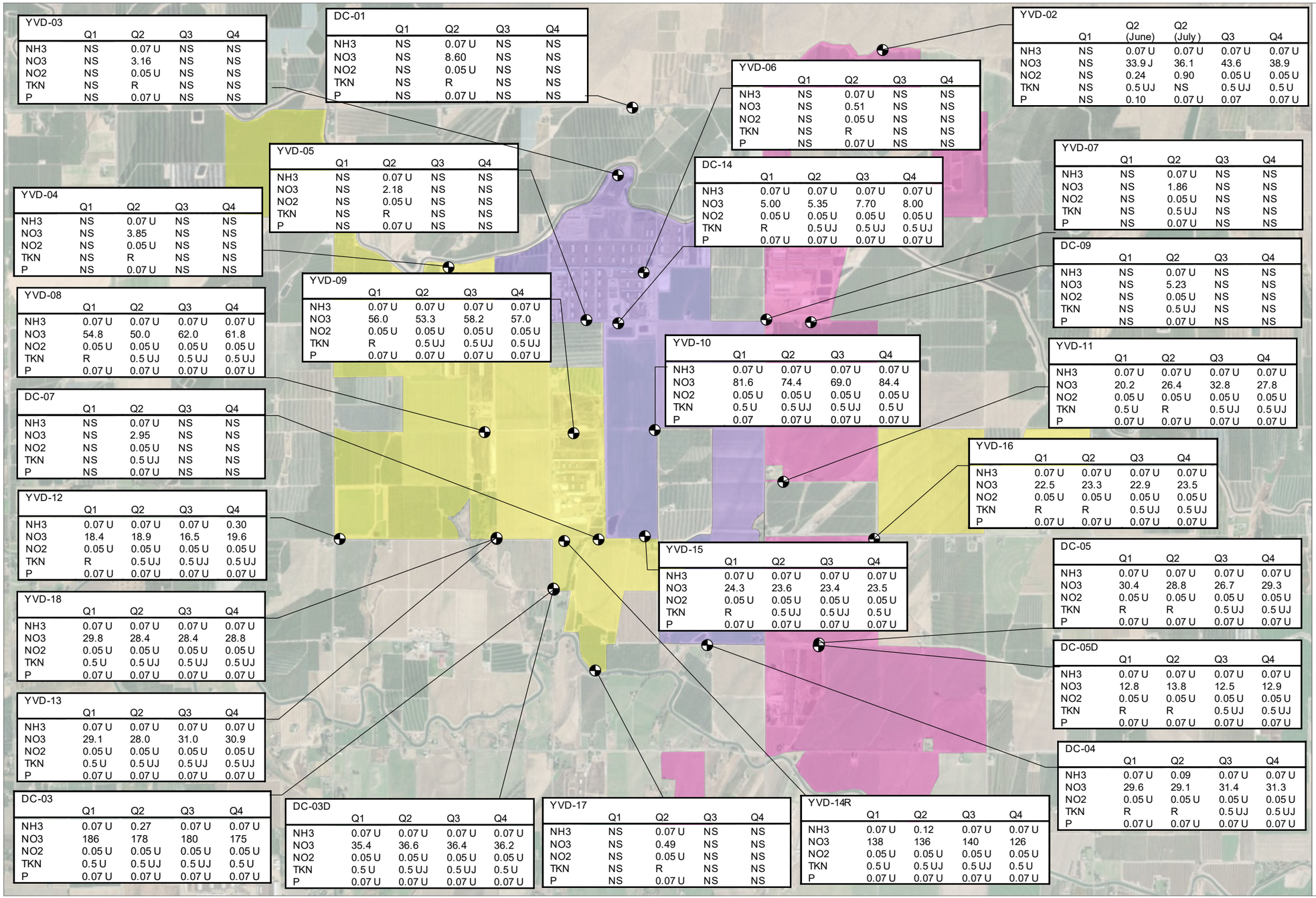
Figure 6
2019 Groundwater Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



YVD-03	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	3.16	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	R	NS	NS
P	NS	0.07 U	NS	NS

DC-01	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	8.60	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	R	NS	NS
P	NS	0.07 U	NS	NS

YVD-02	Q1	Q2 (June)	Q2 (July)	Q3	Q4
NH3	NS	0.07 U	0.07 U	0.07 U	0.07 U
NO3	NS	33.9 J	36.1	43.6	38.9
NO2	NS	0.24	0.90	0.05 U	0.05 U
TKN	NS	0.5 UJ	NS	0.5 UJ	0.5 U
P	NS	0.10	0.07 U	0.07	0.07 U

YVD-06	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	0.51	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	R	NS	NS
P	NS	0.07 U	NS	NS

YVD-05	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	2.18	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	R	NS	NS
P	NS	0.07 U	NS	NS

DC-14	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	5.00	5.35	7.70	8.00
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	0.5 UJ	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

YVD-07	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	1.86	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	0.5 UJ	NS	NS
P	NS	0.07 U	NS	NS

YVD-04	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	3.85	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	R	NS	NS
P	NS	0.07 U	NS	NS

YVD-09	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	56.0	53.3	58.2	57.0
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	0.5 UJ	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

DC-09	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	5.23	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	0.5 UJ	NS	NS
P	NS	0.07 U	NS	NS

YVD-08	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	54.8	50.0	62.0	61.8
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	0.5 UJ	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

YVD-10	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	81.6	74.4	69.0	84.4
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	0.5 U	0.5 UJ	0.5 UJ	0.5 U
P	0.07	0.07 U	0.07 U	0.07 U

YVD-11	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	20.2	26.4	32.8	27.8
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	0.5 U	R	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

DC-07	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	2.95	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	0.5 UJ	NS	NS
P	NS	0.07 U	NS	NS

YVD-16	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	22.5	23.3	22.9	23.5
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	R	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

YVD-12	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.30
NO3	18.4	18.9	16.5	19.6
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	0.5 UJ	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

YVD-15	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	24.3	23.6	23.4	23.5
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	0.5 UJ	0.5 UJ	0.5 U
P	0.07 U	0.07 U	0.07 U	0.07 U

DC-05	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	30.4	28.8	26.7	29.3
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	R	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

YVD-18	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	29.8	28.4	28.4	28.8
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

DC-05D	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	12.8	13.8	12.5	12.9
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	R	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

YVD-13	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	29.1	28.0	31.0	30.9
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

DC-04	Q1	Q2	Q3	Q4
NH3	0.07 U	0.09	0.07 U	0.07 U
NO3	29.6	29.1	31.4	31.3
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	R	R	0.5 UJ	0.5 UJ
P	0.07 U	0.07 U	0.07 U	0.07 U

DC-03	Q1	Q2	Q3	Q4
NH3	0.07 U	0.27	0.07 U	0.07 U
NO3	186	178	180	175
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	0.5 U	0.5 UJ	0.5 UJ	0.5 U
P	0.07 U	0.07 U	0.07 U	0.07 U

DC-03D	Q1	Q2	Q3	Q4
NH3	0.07 U	0.07 U	0.07 U	0.07 U
NO3	35.4	36.6	36.4	36.2
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	0.5 U	0.5 UJ	0.5 UJ	0.5 U
P	0.07 U	0.07 U	0.07 U	0.07 U

YVD-17	Q1	Q2	Q3	Q4
NH3	NS	0.07 U	NS	NS
NO3	NS	0.49	NS	NS
NO2	NS	0.05 U	NS	NS
TKN	NS	R	NS	NS
P	NS	0.07 U	NS	NS

YVD-14R	Q1	Q2	Q3	Q4
NH3	0.07 U	0.12	0.07 U	0.07 U
NO3	138	136	140	126
NO2	0.05 U	0.05 U	0.05 U	0.05 U
TKN	0.5 U	0.5 UJ	0.5 UJ	0.5 U
P	0.07 U	0.07 U	0.07 U	0.07 U

LEGEND:

- Monitoring Well
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:

1. All concentrations are in milligrams per liter (mg/L).
2. Analytical results are for samples collected quarterly during 2019.
3. Qualifiers and notations:
U: The compound was analyzed for but not detected. The associated value is the compound reporting limit or the compound is considered non-detect at the listed value due to associated blank contamination.
UJ: The compound was not detected above the reported sample reporting limit; however, the reported limit is approximate and may or may not represent the actual limit of quantitation.
R: The sample results are rejected as unusable. The compound may or may not be present in the sample.
NS: Not sampled.
4. NH3 = ammonia as nitrogen
NO3 = nitrate as nitrogen
NO2 = nitrite as nitrogen
TKN = total Kjeldahl nitrogen
P = phosphorus
5. Aerial Photo Source: Esri Online Services (2018).

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Figure 7
2019 Groundwater Nutrient Concentrations
2019 Annual Report
Yakima Valley Dairies

YVD-03	Q1	Q2	Q3	Q4
Cl	NS	8.19 U	NS	NS
F	NS	0.44 U	NS	NS
SO4	NS	26.1	NS	NS

DC-01	Q1	Q2	Q3	Q4
Cl	NS	46.3 U	NS	NS
F	NS	0.99 U	NS	NS
SO4	NS	168	NS	NS

YVD-02	Q1	Q2 (June)	Q2 (July)	Q3	Q4
Cl	NS	12.5	13.0	11.3	11.6
F	NS	0.18	0.19	0.13	0.33
SO4	NS	39.9	47.5	40.4	62.2

YVD-06	Q1	Q2	Q3	Q4
Cl	NS	2.5 U	NS	NS
F	NS	0.15 U	NS	NS
SO4	NS	6.42	NS	NS

YVD-05	Q1	Q2	Q3	Q4
Cl	NS	6.43 U	NS	NS
F	NS	0.31 U	NS	NS
SO4	NS	27.9	NS	NS

DC-14	Q1	Q2	Q3	Q4
Cl	83.8	79.7	89.5	95.2
F	0.25 U	0.22	0.24	0.32
SO4	15.1	13.6	17.1	20.3

YVD-07	Q1	Q2	Q3	Q4
Cl	NS	5.30	NS	NS
F	NS	0.17	NS	NS
SO4	NS	27.6	NS	NS

YVD-04	Q1	Q2	Q3	Q4
Cl	NS	22.9 U	NS	NS
F	NS	0.79 U	NS	NS
SO4	NS	30.6	NS	NS

DC-09	Q1	Q2	Q3	Q4
Cl	NS	13.1	NS	NS
F	NS	0.39	NS	NS
SO4	NS	27.6	NS	NS

YVD-09	Q1	Q2	Q3	Q4
Cl	67.4	43.4	64.7	69.1
F	0.31 U	0.36	0.33	0.37
SO4	162	146	148	143

YVD-08	Q1	Q2	Q3	Q4
Cl	119	99.8	89.8	95.6
F	0.22 U	0.10	0.15	0.16
SO4	203	190	184	177

YVD-10	Q1	Q2	Q3	Q4
Cl	141	135	92.0	114
F	0.10	0.10 U	0.10 U	0.10 U
SO4	196	220	165	199

YVD-11	Q1	Q2	Q3	Q4
Cl	38.6	49.2 U	52.2	46.1
F	0.12	0.59 U	0.12	0.11
SO4	60.4	58.2	60.4	57.2

DC-07	Q1	Q2	Q3	Q4
Cl	NS	20.4	NS	NS
F	NS	0.10 U	NS	NS
SO4	NS	49.5	NS	NS

YVD-16	Q1	Q2	Q3	Q4
Cl	35.4	24.6 U	36.9	36.7
F	0.18 U	0.17 U	0.21	0.24
SO4	109	106	107	106

YVD-12	Q1	Q2	Q3	Q4
Cl	97.6	96.7	95.6	97.8
F	0.31 U	0.24	0.29	0.32
SO4	188	174	172	176

YVD-15	Q1	Q2	Q3	Q4
Cl	21.1	19.5	21.8	20.5
F	0.31 U	0.30	0.34	0.37
SO4	110	114	103	96.9

DC-05	Q1	Q2	Q3	Q4
Cl	30.0	26.2 U	25.4	28.1
F	0.12 U	0.12 U	0.14	0.14
SO4	117	122	129	110

YVD-18	Q1	Q2	Q3	Q4
Cl	74.5	71.0	61.5	68.1
F	0.73	0.25	0.38	0.34
SO4	171	161	130	157

DC-05D	Q1	Q2	Q3	Q4
Cl	26.6	26.0 U	26.5	26.3
F	0.22 U	0.25 U	0.30	0.28
SO4	110	109	105	105

YVD-13	Q1	Q2	Q3	Q4
Cl	74.4	40.9	67.6	73.4
F	0.31	0.23	0.38	0.37
SO4	223	201	197	191

DC-04	Q1	Q2	Q3	Q4
Cl	26.2	22.9 U	33.1	33.4
F	0.10	0.10 U	0.10 U	0.10 U
SO4	100	103	102	101

DC-03	Q1	Q2	Q3	Q4
Cl	150	155	132	121
F	0.19	0.27	0.15	0.17
SO4	148	152	154	156

DC-03D	Q1	Q2	Q3	Q4
Cl	61.4	59.6	58.4	65.0
F	0.13	0.10 U	0.10 U	0.10 U
SO4	82.0	81.8	81.7	80.9

YVD-17	Q1	Q2	Q3	Q4
Cl	NS	2.91 U	NS	NS
F	NS	0.24 U	NS	NS
SO4	NS	3.50	NS	NS

YVD-14R	Q1	Q2	Q3	Q4
Cl	151	149	130	128
F	0.44 J	0.22	0.13	0.13
SO4	147	145	133	123

LEGEND:

- Monitoring Well
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:

1. All concentrations are in milligrams per liter (mg/L).
2. Analytical results are for samples collected quarterly during 2019.
3. Qualifiers and notations:
U: The compound was analyzed for but not detected. The associated value is the compound reporting limit or the compound is considered non-detect at the listed value due to associated blank contamination.
R: The sample results are rejected as unusable. The compound may or may not be present in the sample.
NS: Not sampled.
4. Cl = chloride
F = fluoride
SO4 = sulfate
5. Aerial Photo Source: Esri Online Services (2018).

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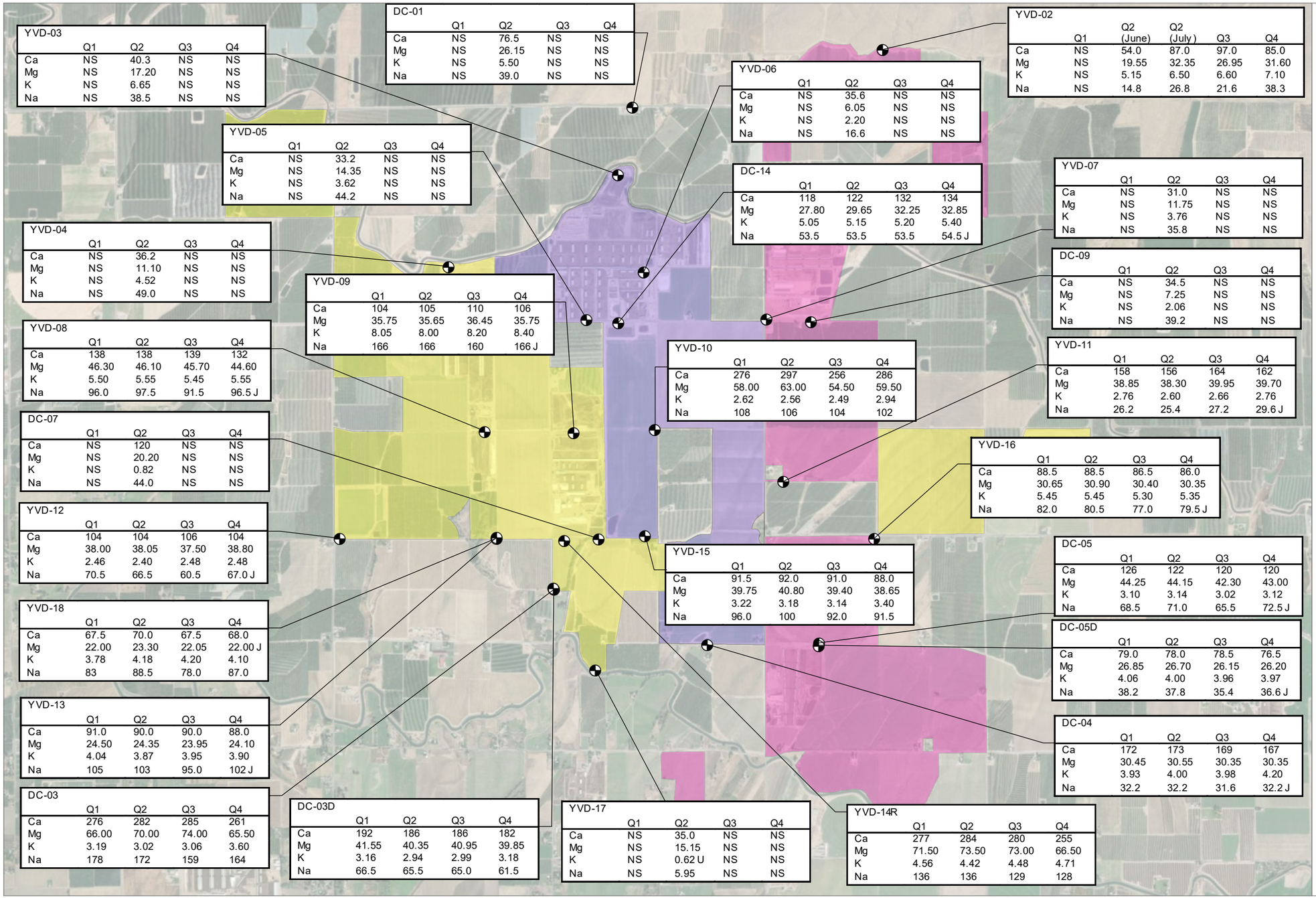
Figure 8
2019 Groundwater Anion Concentrations
2019 Annual Report
Yakima Valley Dairies



DC-01

	Q1	Q2	Q3	Q4
Ca	NS	76.5	NS	NS
Mg	NS	26.15	NS	NS
K	NS	5.50	NS	NS
Na	NS	39.0	NS	NS

YVD-02

	Q1	Q2 (June)	Q2 (July)	Q3	Q4
Ca	NS	54.0	87.0	97.0	85.0
Mg	NS	19.55	32.35	26.95	31.60
K	NS	5.15	6.50	6.60	7.10
Na	NS	14.8	26.8	21.6	38.3

YVD-03

	Q1	Q2	Q3	Q4
Ca	NS	40.3	NS	NS
Mg	NS	17.20	NS	NS
K	NS	6.65	NS	NS
Na	NS	38.5	NS	NS

YVD-05

	Q1	Q2	Q3	Q4
Ca	NS	33.2	NS	NS
Mg	NS	14.35	NS	NS
K	NS	3.62	NS	NS
Na	NS	44.2	NS	NS

YVD-06

	Q1	Q2	Q3	Q4
Ca	NS	35.6	NS	NS
Mg	NS	6.05	NS	NS
K	NS	2.20	NS	NS
Na	NS	16.6	NS	NS

DC-14

	Q1	Q2	Q3	Q4
Ca	118	122	132	134
Mg	27.80	29.65	32.25	32.85
K	5.05	5.15	5.20	5.40
Na	53.5	53.5	53.5	54.5 J

YVD-07

	Q1	Q2	Q3	Q4
Ca	NS	31.0	NS	NS
Mg	NS	11.75	NS	NS
K	NS	3.76	NS	NS
Na	NS	35.8	NS	NS

YVD-04

	Q1	Q2	Q3	Q4
Ca	NS	36.2	NS	NS
Mg	NS	11.10	NS	NS
K	NS	4.52	NS	NS
Na	NS	49.0	NS	NS

YVD-09

	Q1	Q2	Q3	Q4
Ca	104	105	110	106
Mg	35.75	35.65	36.45	35.75
K	8.05	8.00	8.20	8.40
Na	166	166	160	166 J

DC-09

	Q1	Q2	Q3	Q4
Ca	NS	34.5	NS	NS
Mg	NS	7.25	NS	NS
K	NS	2.06	NS	NS
Na	NS	39.2	NS	NS

YVD-08

	Q1	Q2	Q3	Q4
Ca	138	138	139	132
Mg	46.30	46.10	45.70	44.60
K	5.50	5.55	5.45	5.55
Na	96.0	97.5	91.5	96.5 J

YVD-10

	Q1	Q2	Q3	Q4
Ca	276	297	256	286
Mg	58.00	63.00	54.50	59.50
K	2.62	2.56	2.49	2.94
Na	108	106	104	102

YVD-11

	Q1	Q2	Q3	Q4
Ca	158	156	164	162
Mg	38.85	38.30	39.95	39.70
K	2.76	2.60	2.66	2.76
Na	26.2	25.4	27.2	29.6 J

DC-07

	Q1	Q2	Q3	Q4
Ca	NS	120	NS	NS
Mg	NS	20.20	NS	NS
K	NS	0.82	NS	NS
Na	NS	44.0	NS	NS

YVD-16

	Q1	Q2	Q3	Q4
Ca	88.5	88.5	86.5	86.0
Mg	30.65	30.90	30.40	30.35
K	5.45	5.45	5.30	5.35
Na	82.0	80.5	77.0	79.5 J

YVD-12

	Q1	Q2	Q3	Q4
Ca	104	104	106	104
Mg	38.00	38.05	37.50	38.80
K	2.46	2.40	2.48	2.48
Na	70.5	66.5	60.5	67.0 J

YVD-15

	Q1	Q2	Q3	Q4
Ca	91.5	92.0	91.0	88.0
Mg	39.75	40.80	39.40	38.65
K	3.22	3.18	3.14	3.40
Na	96.0	100	92.0	91.5

DC-05

	Q1	Q2	Q3	Q4
Ca	126	122	120	120
Mg	44.25	44.15	42.30	43.00
K	3.10	3.14	3.02	3.12
Na	68.5	71.0	65.5	72.5 J

YVD-18

	Q1	Q2	Q3	Q4
Ca	67.5	70.0	67.5	68.0
Mg	22.00	23.30	22.05	22.00 J
K	3.78	4.18	4.20	4.10
Na	83	88.5	78.0	87.0

DC-05D

	Q1	Q2	Q3	Q4
Ca	79.0	78.0	78.5	76.5
Mg	26.85	26.70	26.15	26.20
K	4.06	4.00	3.96	3.97
Na	38.2	37.8	35.4	36.6 J

YVD-13

	Q1	Q2	Q3	Q4
Ca	91.0	90.0	90.0	88.0
Mg	24.50	24.35	23.95	24.10
K	4.04	3.87	3.95	3.90
Na	105	103	95.0	102 J

DC-04

	Q1	Q2	Q3	Q4
Ca	172	173	169	167
Mg	30.45	30.55	30.35	30.35
K	3.93	4.00	3.98	4.20
Na	32.2	32.2	31.6	32.2 J

DC-03

	Q1	Q2	Q3	Q4
Ca	276	282	285	261
Mg	66.00	70.00	74.00	65.50
K	3.19	3.02	3.06	3.60
Na	178	172	159	164

DC-03D

	Q1	Q2	Q3	Q4
Ca	192	186	186	182
Mg	41.55	40.35	40.95	39.85
K	3.16	2.94	2.99	3.18
Na	66.5	65.5	65.0	61.5

YVD-17

	Q1	Q2	Q3	Q4
Ca	NS	35.0	NS	NS
Mg	NS	15.15	NS	NS
K	NS	0.62 U	NS	NS
Na	NS	5.95	NS	NS

YVD-14R

	Q1	Q2	Q3	Q4
Ca	277	284	280	255
Mg	71.50	73.50	73.00	66.50
K	4.56	4.42	4.48	4.71
Na	136	136	129	128

LEGEND:

- Monitoring Well
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:

1. All concentrations are in milligrams per liter (mg/L).
2. Analytical results are for samples collected quarterly during 2019.
3. Ca = calcium
Mg = magnesium
K = potassium
Na = sodium
4: J: the compound was positively identified; however, the associated numerical value is an estimated concentration.
R: The sample results are rejected as unusable. The compound may or may not be present in the sample.
NS: Not sampled.
5. Aerial Photo Source: Esri Online Services (2018).

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Figure 9
2019 Groundwater Metals Concentrations
2019 Annual Report
Yakima Valley Dairies

YVD-03	Q1	Q2	Q3	Q4
Bicarbonate	NS	185	NS	NS
Carbonate	NS	5 U	NS	NS

DC-01	Q1	Q2	Q3	Q4
Bicarbonate	NS	142	NS	NS
Carbonate	NS	5 U	NS	NS

YVD-02	Q1	Q2 (June)	Q2 (July)	Q3	Q4
Bicarbonate	NS	191	204	200	226
Carbonate	NS	5 U	5 U	5 U	5 U

YVD-06	Q1	Q2	Q3	Q4
Bicarbonate	NS	134	NS	NS
Carbonate	NS	5 U	NS	NS

YVD-05	Q1	Q2	Q3	Q4
Bicarbonate	NS	176	NS	NS
Carbonate	NS	5 U	NS	NS

DC-14	Q1	Q2	Q3	Q4
Bicarbonate	395	395	427	438
Carbonate	5 U	5 U	5 U	5 U

YVD-07	Q1	Q2	Q3	Q4
Bicarbonate	NS	127	NS	NS
Carbonate	NS	5 U	NS	NS

YVD-04	Q1	Q2	Q3	Q4
Bicarbonate	NS	181	NS	NS
Carbonate	NS	5 U	NS	NS

YVD-09	Q1	Q2	Q3	Q4
Bicarbonate	356	353	363	356
Carbonate	5 U	5 U	5 U	5 U

DC-09	Q1	Q2	Q3	Q4
Bicarbonate	NS	128	NS	NS
Carbonate	NS	5 U	NS	NS

YVD-08	Q1	Q2	Q3	Q4
Bicarbonate	234	240	226	227
Carbonate	5 U	5 U	5 U	5 U

YVD-10	Q1	Q2	Q3	Q4
Bicarbonate	527	568	584	576
Carbonate	5 U	5 U	5 U	5 U

YVD-11	Q1	Q2	Q3	Q4
Bicarbonate	440	424	423	429
Carbonate	5 U	5 U	5 U	5 U

DC-07	Q1	Q2	Q3	Q4
Bicarbonate	NS	349	NS	NS
Carbonate	NS	5 U	NS	NS

YVD-16	Q1	Q2	Q3	Q4
Bicarbonate	300	301	303	296
Carbonate	5 U	5 U	5 U	5 U

YVD-12	Q1	Q2	Q3	Q4
Bicarbonate	189	185	185	190
Carbonate	5 U	5 U	5 U	5 U

YVD-15	Q1	Q2	Q3	Q4
Bicarbonate	394	390	407	400
Carbonate	5 U	5 U	5 U	5 U

DC-05	Q1	Q2	Q3	Q4
Bicarbonate	396	400	389	400
Carbonate	5 U	5 U	5 U	5 U

YVD-18	Q1	Q2	Q3	Q4
Bicarbonate	118	118	115	113
Carbonate	5 U	5 U	5 U	5 U

DC-05D	Q1	Q2	Q3	Q4
Bicarbonate	204	206	205	201
Carbonate	5 U	5 U	5 U	5 U

YVD-13	Q1	Q2	Q3	Q4
Bicarbonate	153	142	143	138
Carbonate	5 U	5 U	5 U	5 U

DC-04	Q1	Q2	Q3	Q4
Bicarbonate	393	390	387	382
Carbonate	5 U	5 U	5 U	5 U

DC-03	Q1	Q2	Q3	Q4
Bicarbonate	435	406	463	433
Carbonate	5 U	5 U	5 U	5 U

DC-03D	Q1	Q2	Q3	Q4
Bicarbonate	536	499	506	502
Carbonate	5 U	5 U	5 U	5 U

YVD-17	Q1	Q2	Q3	Q4
Bicarbonate	NS	149	NS	NS
Carbonate	NS	5 U	NS	NS

YVD-14R	Q1	Q2	Q3	Q4
Bicarbonate	531	542	560	533
Carbonate	5 U	5 U	5 U	5 U

LEGEND:

- Monitoring Well
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:

1. All concentrations are in milligrams per liter (mg/L).
2. Analytical results are for samples collected quarterly during 2019.
3. Qualifiers and notations:
U: The compound was analyzed for but not detected. The associated value is the compound reporting limit or the compound is considered non-detect at the listed value due to associated blank contamination.
R: The sample results are rejected as unusable. The compound may or may not be present in the sample.
NS: Not sampled.
4. Bicarbonate = bicarbonate as CaCO3
Carbonate = calcium carbonate as CaCO3
5. Aerial Photo Source: Esri Online Services (2018).

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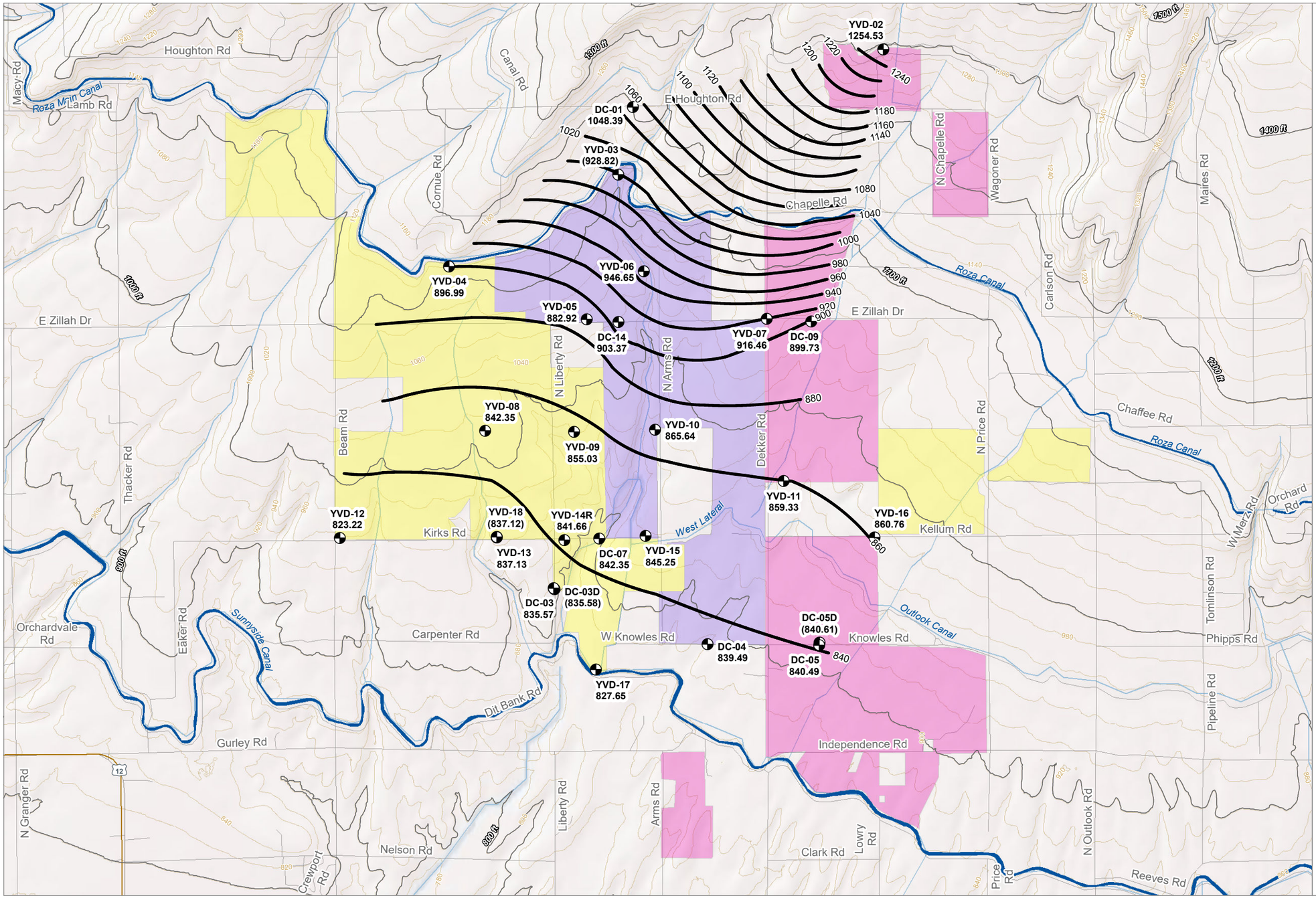
Figure 10
2019 Groundwater Alkalinity Concentrations
2019 Annual Report
Yakima Valley Dairies



LEGEND:

- AOC Monitoring Well
- Line of Equal Groundwater Surface Elevation, March 21, 2019
- Line of Equal Ground Surface Elevation (feet NAVD88; contour interval 100 feet)
- Irrigation Canal
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTE:
1. Elevations listed in parentheses indicate groundwater elevation was not contoured.
2. Basemap Source(s): Copyright:© 2014 Esri

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Figure 11a
Surficial Aquifer Groundwater Elevation Contour Map First Quarter 2019
2019 Annual Report
Yakima Valley Dairies

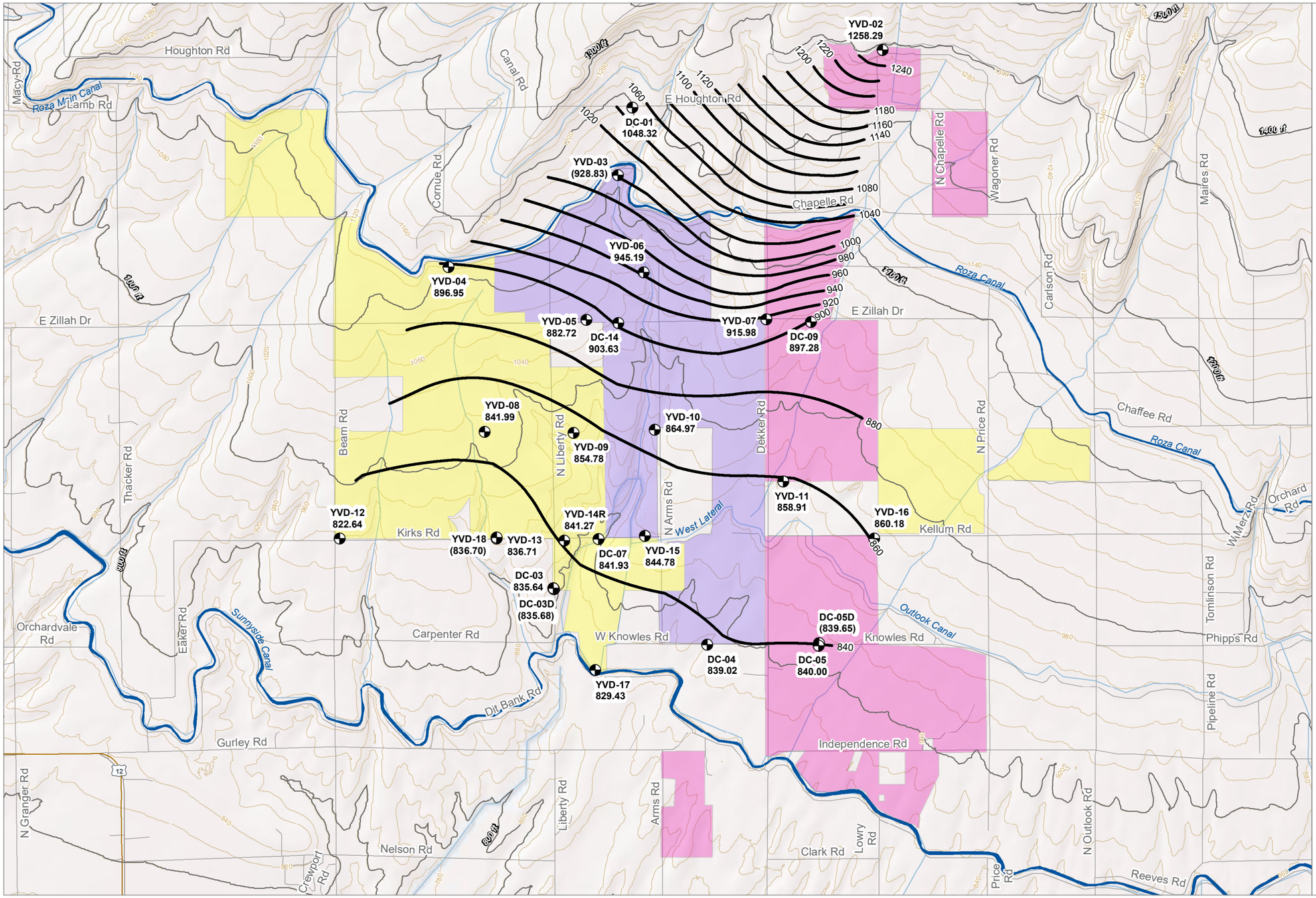

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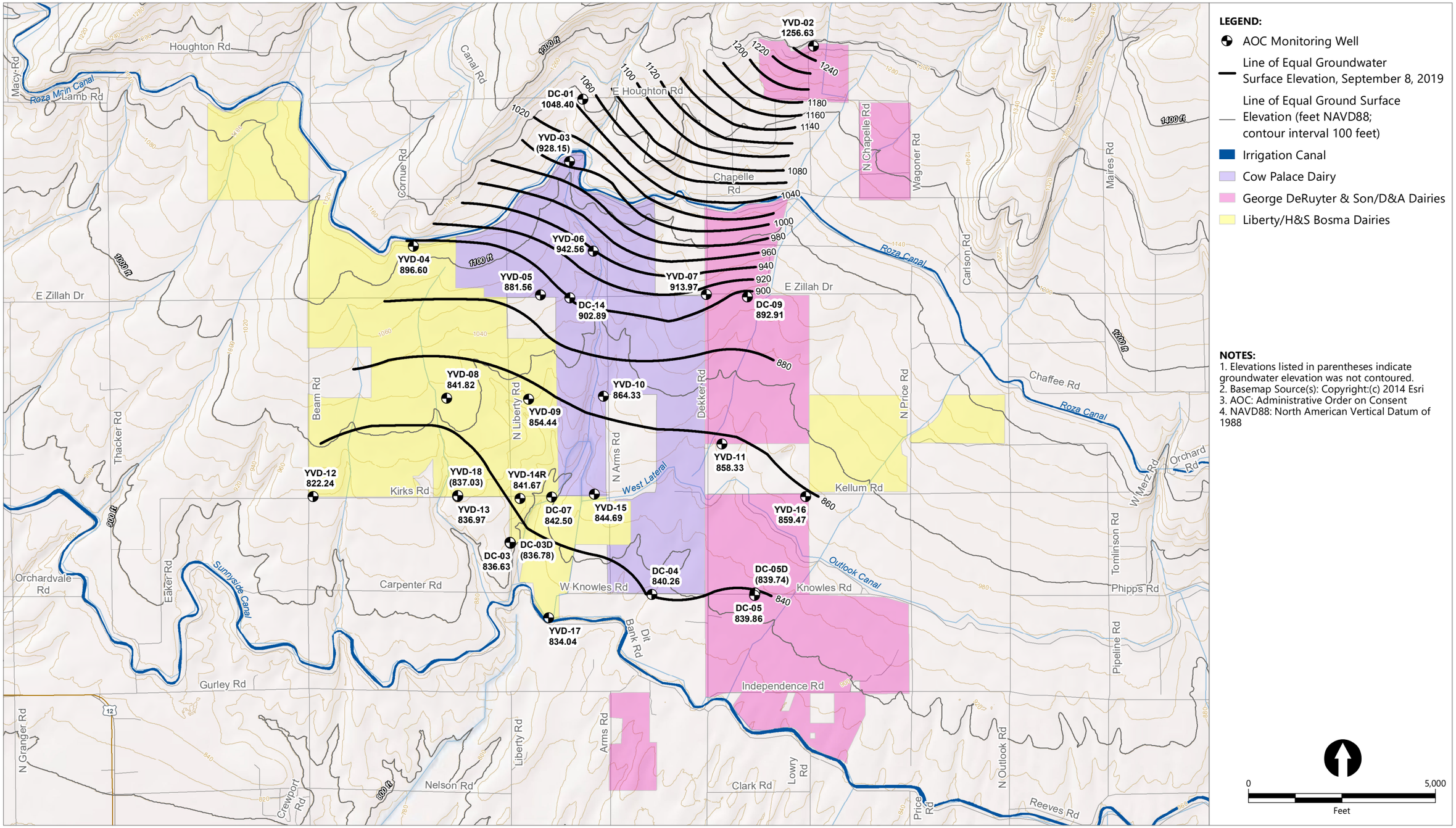
Figure 11b
Surficial Aquifer Groundwater Elevation Contour Map Second Quarter 2019
2019 Annual Report
Yakima Valley Dairies



LEGEND:

- AOC Monitoring Well
- Line of Equal Groundwater Surface Elevation, September 8, 2019
- Line of Equal Ground Surface Elevation (feet NAVD88; contour interval 100 feet)
- Irrigation Canal
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:

1. Elevations listed in parentheses indicate groundwater elevation was not contoured.
2. Basemap Source(s): Copyright:(c) 2014 Esri
3. AOC: Administrative Order on Consent
4. NAVD88: North American Vertical Datum of 1988

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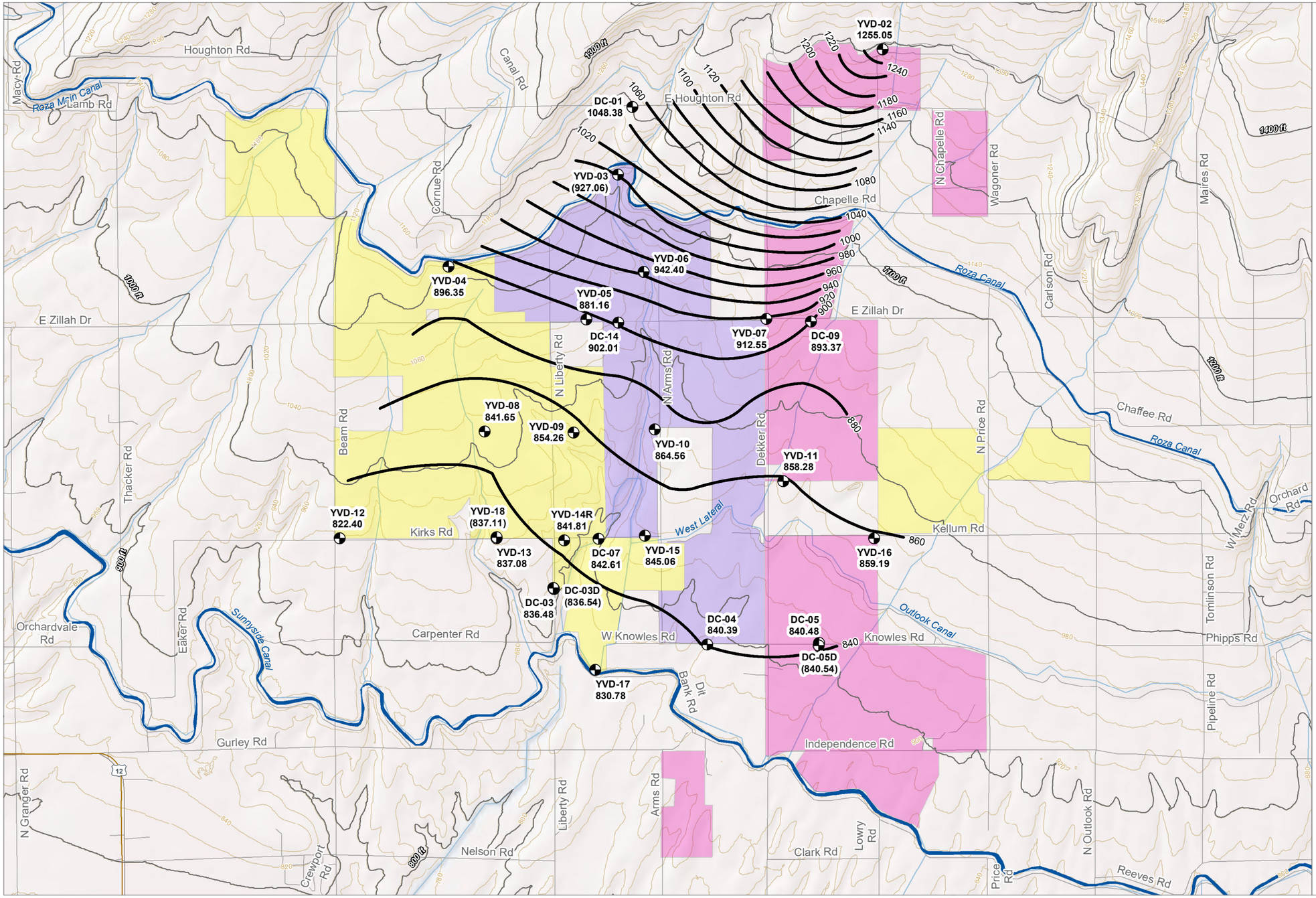
Figure 11c
Surficial Aquifer Groundwater Elevation Contour Map Third Quarter 2019
2019 Annual Report
Yakima Valley Dairies



LEGEND:

- AOC Monitoring Well
- Line of Equal Groundwater Surface Elevation, December 8, 2019
- Line of Equal Ground Surface Elevation (feet NAVD88; contour interval 100 feet)
- Irrigation Canal
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:

1. Elevations listed in parentheses indicate groundwater elevation was not contoured.
2. Basemap Source(s): Copyright:(c) 2014 Esri

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ANCHOR QEA

Figure 11d
Surficial Aquifer Groundwater Elevation Contour Map Fourth Quarter 2019
2019 Annual Report
Yakima Valley Dairies

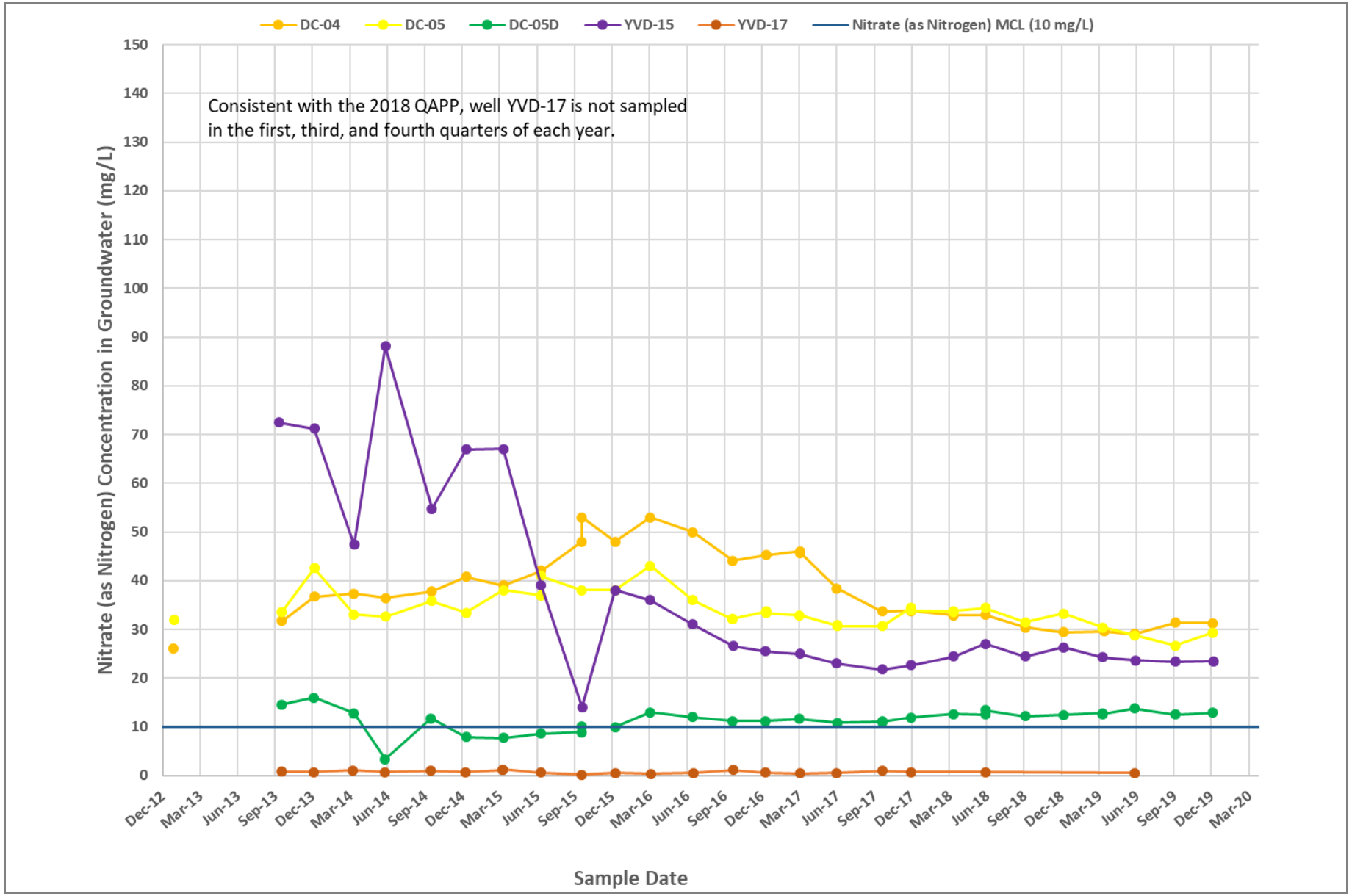

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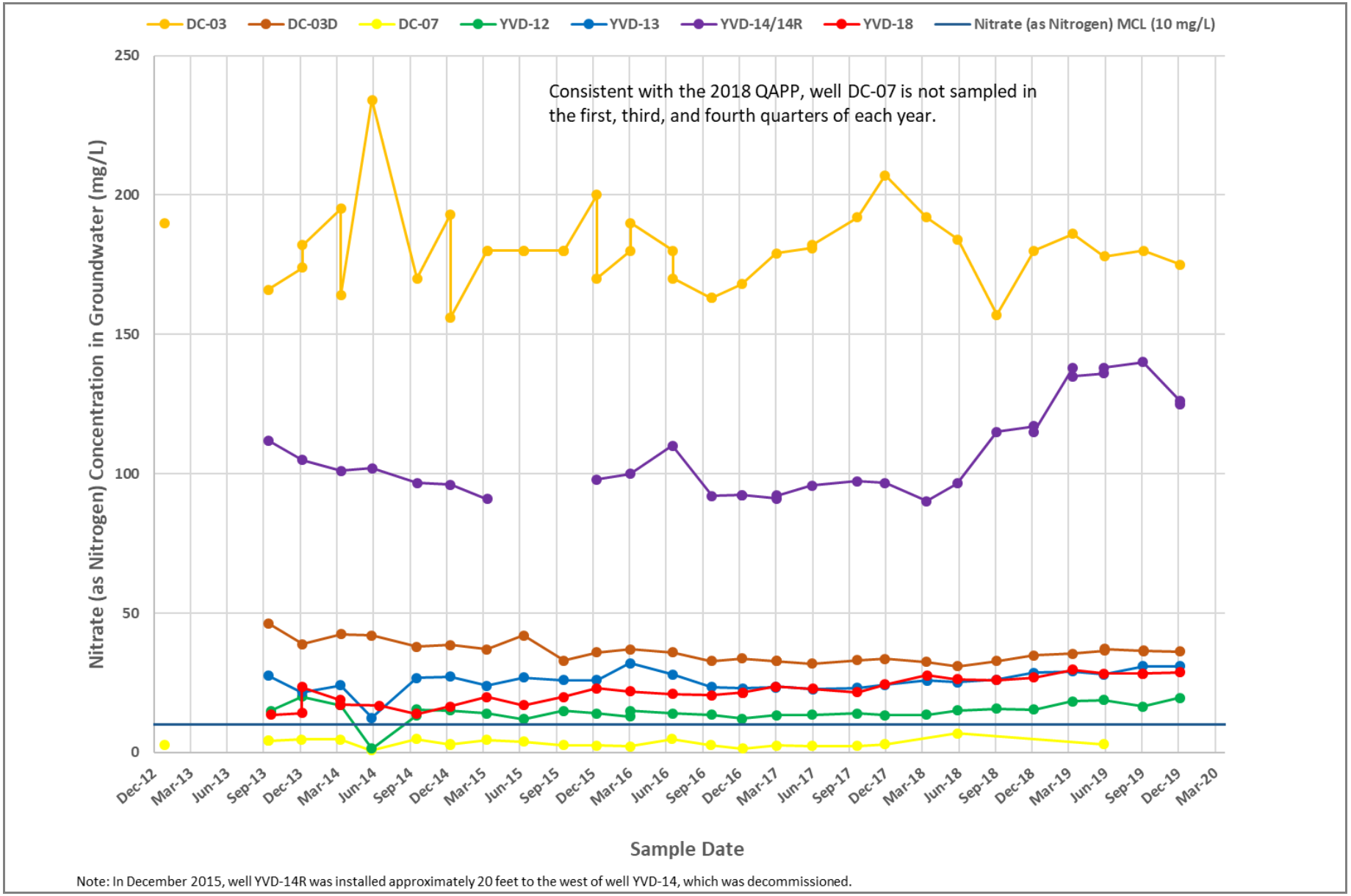
Figure 12
Groundwater Nitrate Concentrations – East Downgradient Monitoring Wells, 2013 to 2019

2019 Annual Report
Yakima Valley Dairies



Note: In December 2015, well YVD-14R was installed approximately 20 feet to the west of well YVD-14, which was decommissioned.

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Figure 13
Groundwater Nitrate Concentrations – West Downgradient Monitoring Wells, 2013 to 2019

2019 Annual Report
Yakima Valley Dairies

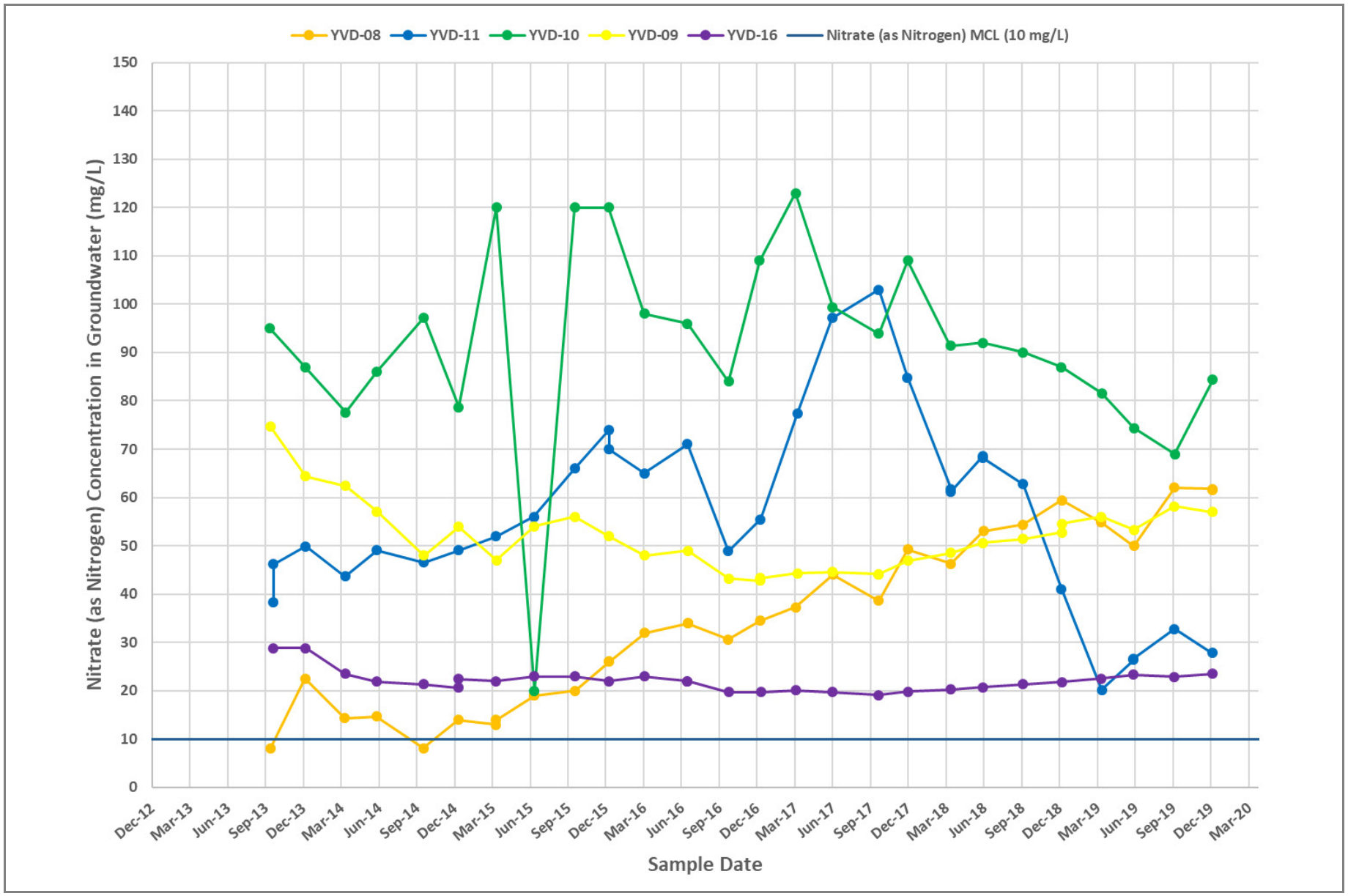

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Figure 14
Groundwater Nitrate Concentrations – Central Monitoring Wells, 2013 to 2019
2019 Annual Report
Yakima Valley Dairies

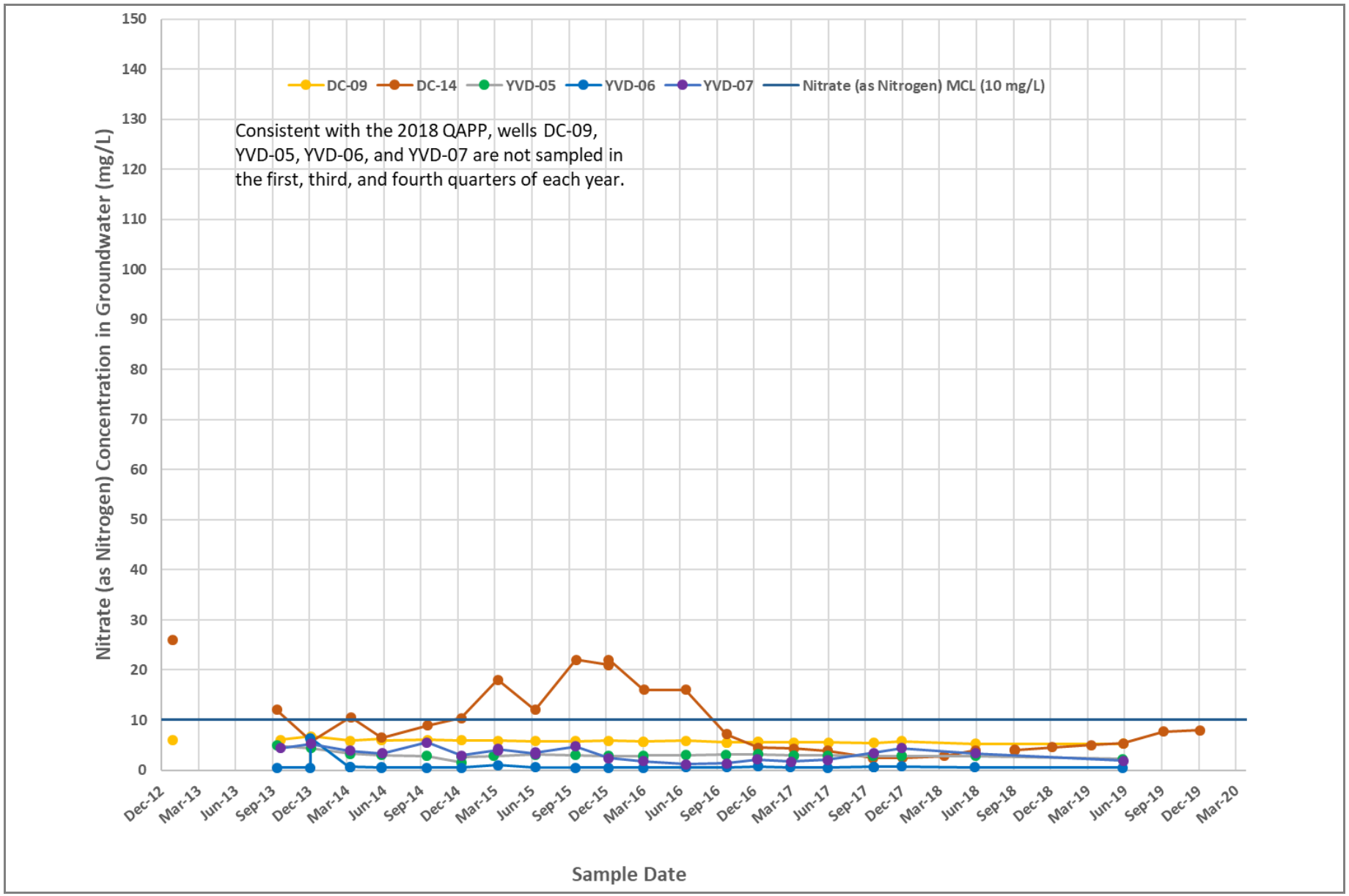

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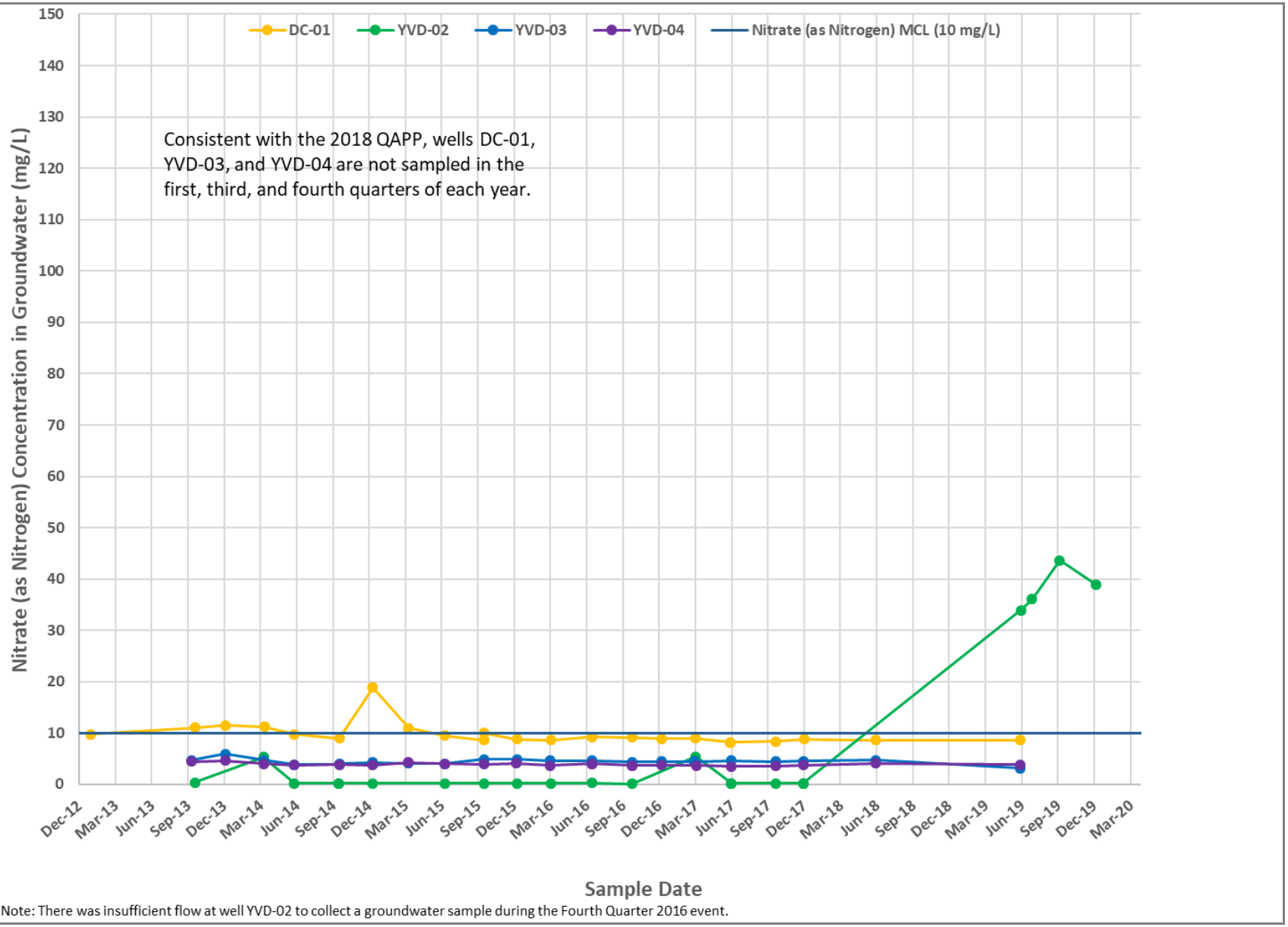
Figure 15
Groundwater Nitrate Concentrations – Northern Monitoring Wells, 2013 to 2019
2019 Annual Report
Yakima Valley Dairies



Note: There was insufficient flow at well YVD-02 to collect a groundwater sample during the Fourth Quarter 2016 event.

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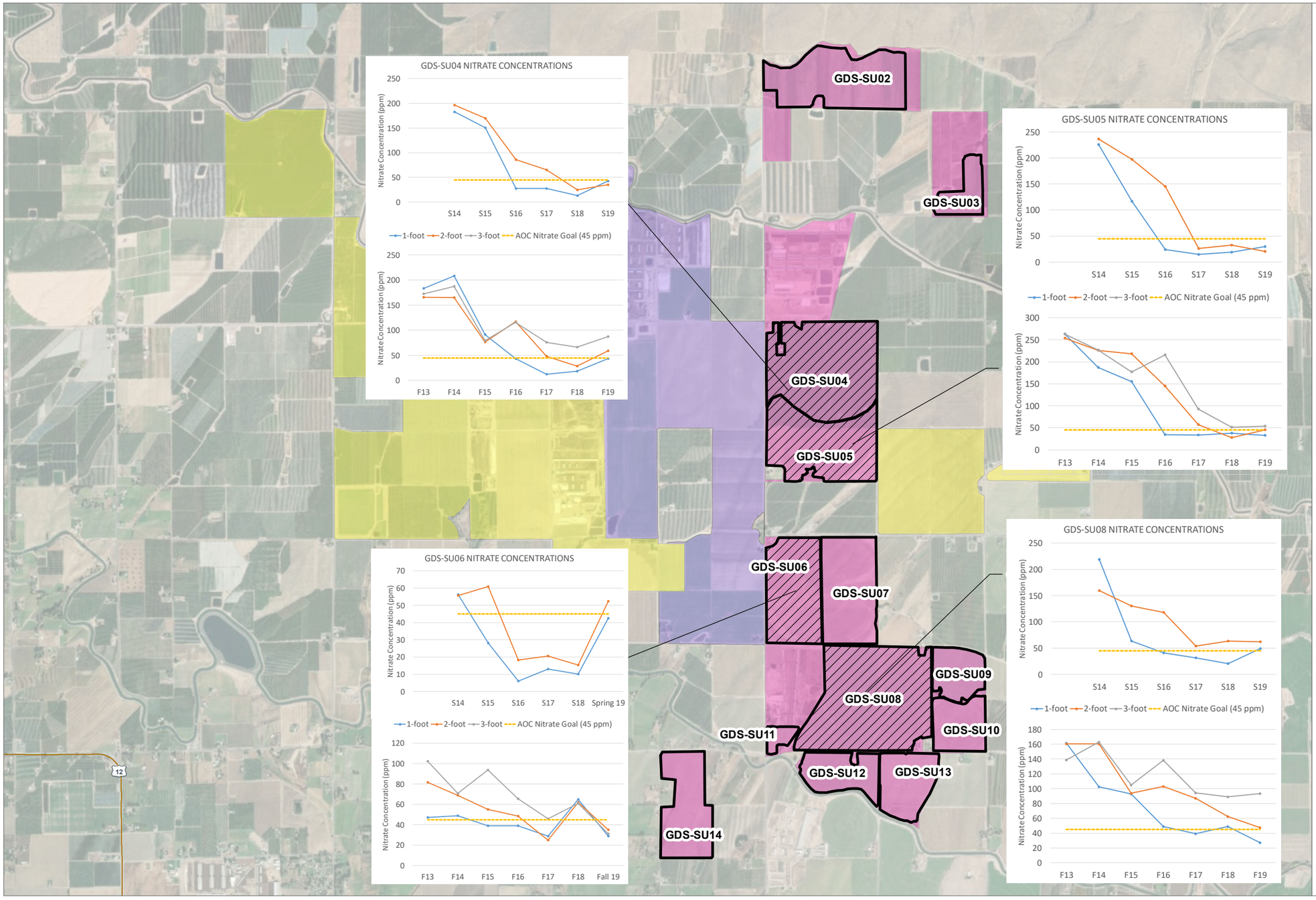
Figure 16
Groundwater Nitrate Concentrations – Upgradient Monitoring Wells, 2013 to 2019
2019 Annual Report
Yakima Valley Dairies



LEGEND:

- George DeRuyter & Son/D&A Dairies Application Fields
- NO3 Concentrations > 45 ppm in the second foot
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:
1. All lands under agricultural use are irrigated and fertilized.
2. Aerial Photo Source: Esri Online Services (2018).
3. ppm: parts per million

0 2,000
Feet

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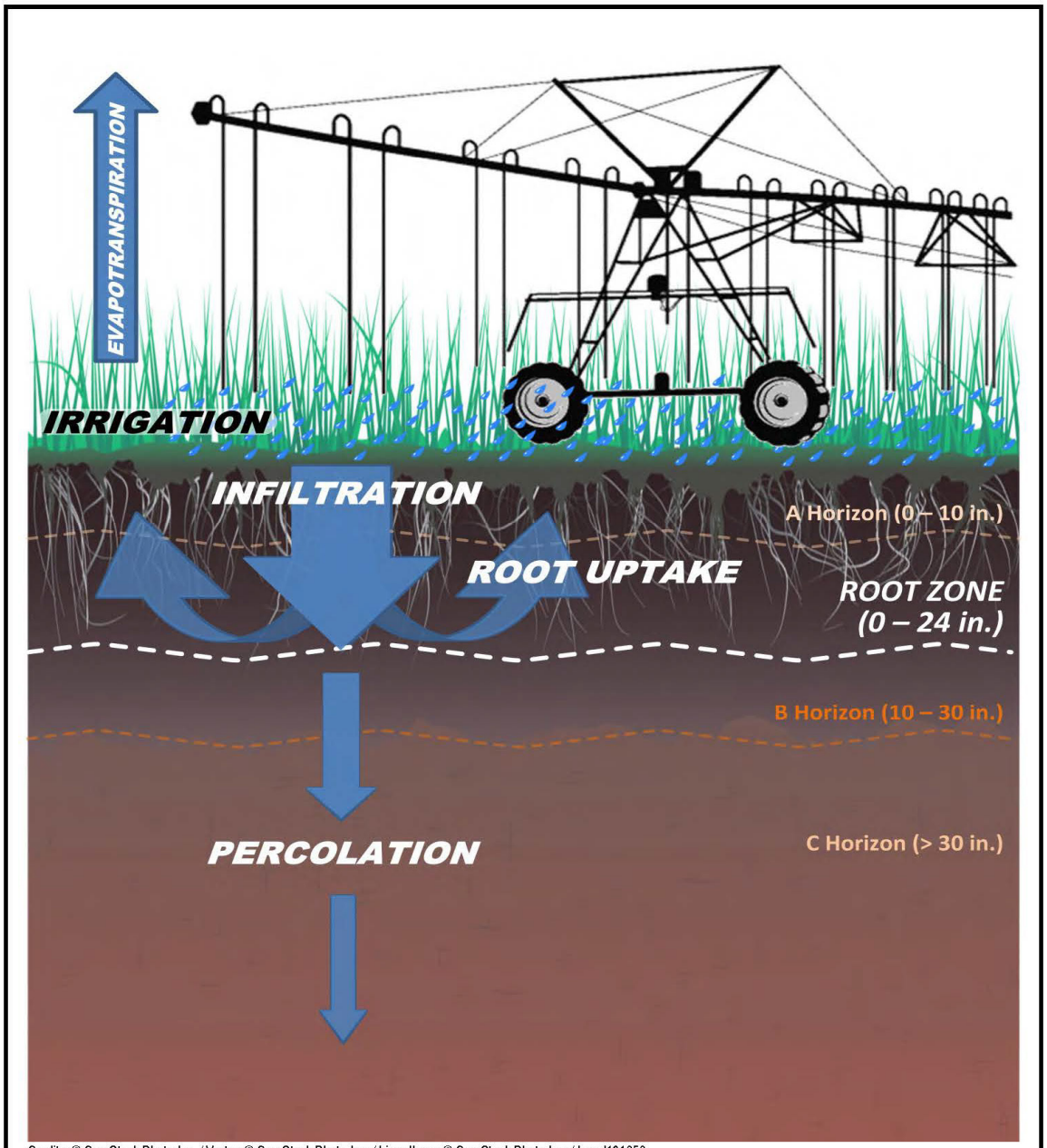
Figure 17
2019 George DeRuyter & Son/D&A Dairies Application Field Nitrate Exceedances in the Second Foot
2019 Annual Report
Yakima Valley Dairies



Credits: © Can Stock Photo Inc. / Vertyr; © Can Stock Photo Inc. / bigredlynx ; © Can Stock Photo Inc. / basel101658

FIGURE NOT TO SCALE

NOTES:

1 - Soil Horizon A - Topsoil (zone of leaching)
2 - Soil Horizon B - Subsoil (zone of accumulation)
3 - Soil Horizon C - Subsurface soil horizon consisting of soil parent material

COW PALACE DAIRY
SDWA-10-2013-0080
IRRIGATION WATER MANAGEMENT PLAN

CONCEPTUAL SITE MODEL

ARCADIS

FIGURE
56

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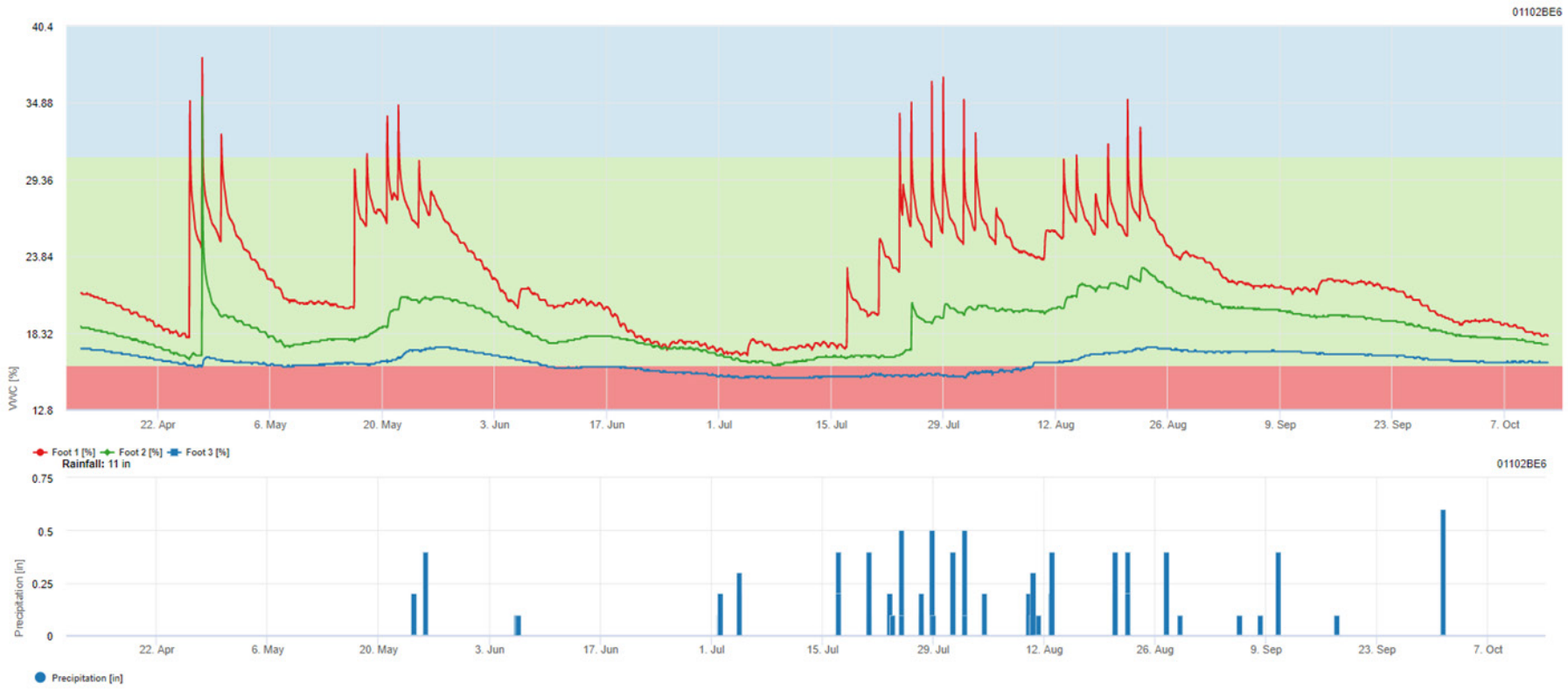

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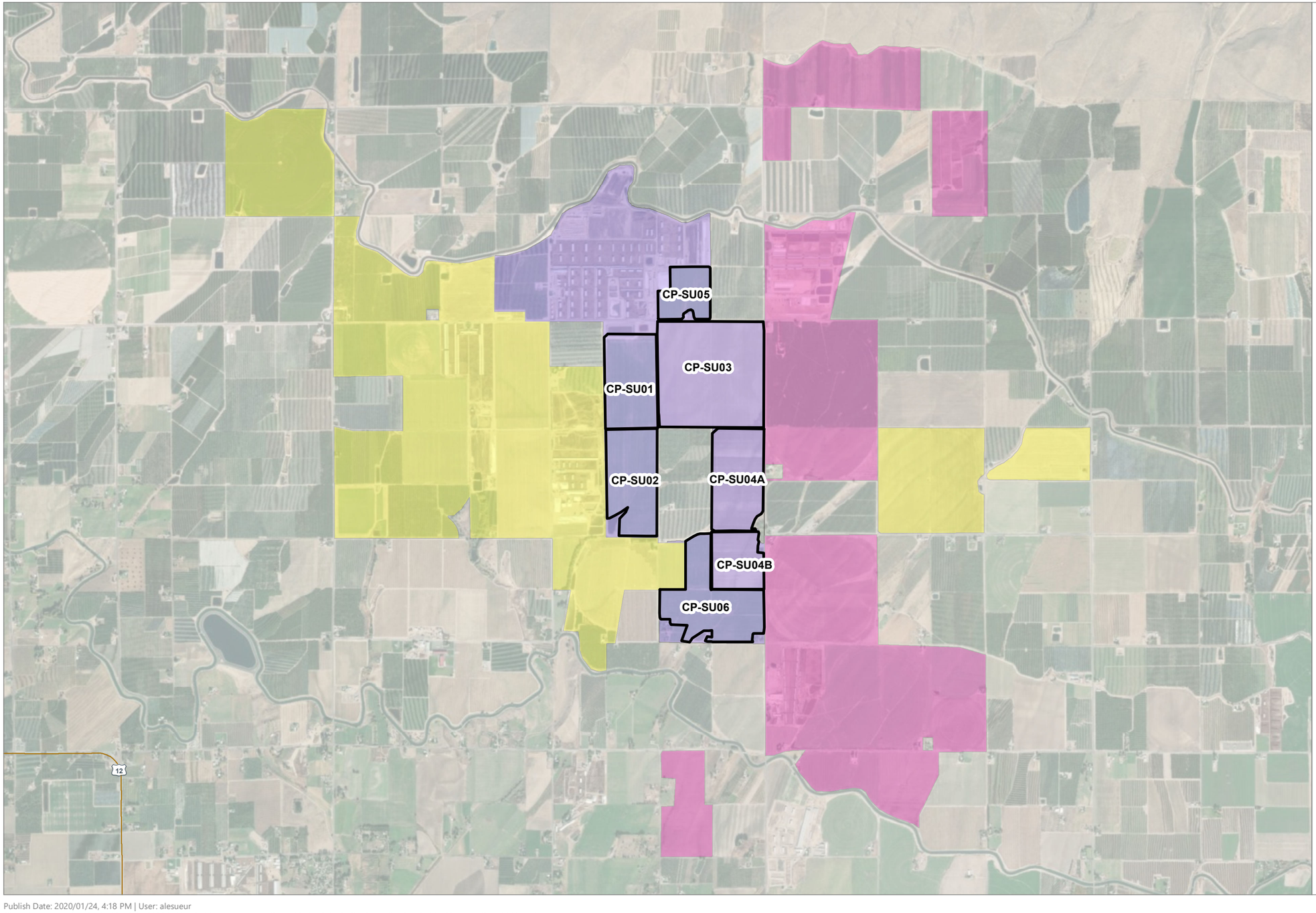
Figure 19
Moisture Sensor Data – Example

2019 Annual Report
Yakima Valley Dairies



LEGEND:

- Cow Palace Dairy Application Fields
- NO3 Concentrations > 45 ppm in the second foot
- Cow Palace Dairy
- George DeRuyter & Son/D&A Dairies
- Liberty/H&S Bosma Dairies

NOTES:
1. All lands under agricultural use are irrigated and fertilized.
2. Aerial Photo Source: Esri Online Services (2018).
3. ppm: parts per million

0 2,000
Feet

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Figure 20
2019 Cow Palace Dairy Application Field Nitrate Exceedances in the Second Foot
2019 Annual Report
Yakima Valley Dairies

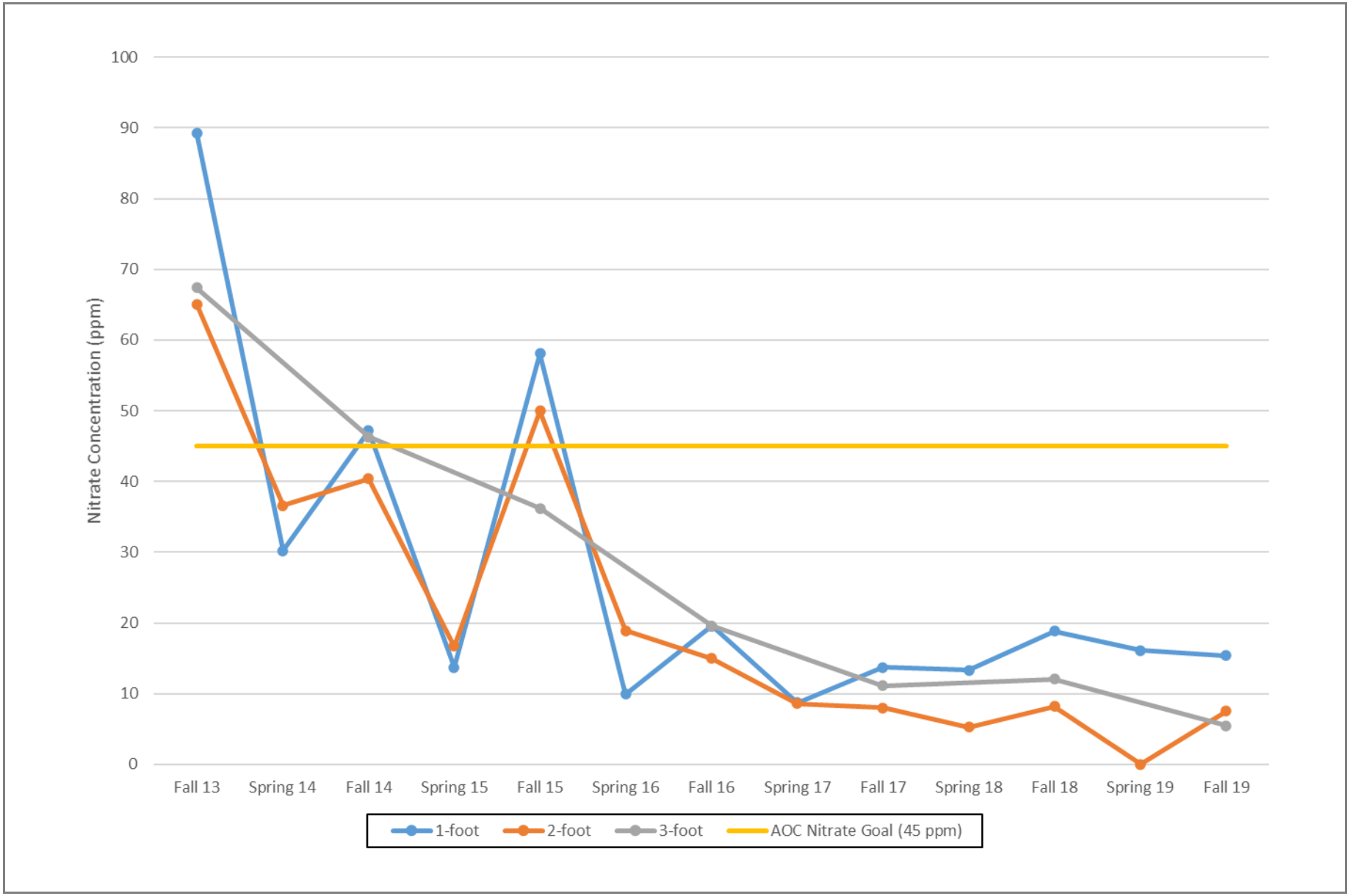

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Figure 21a
CP-SU01 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

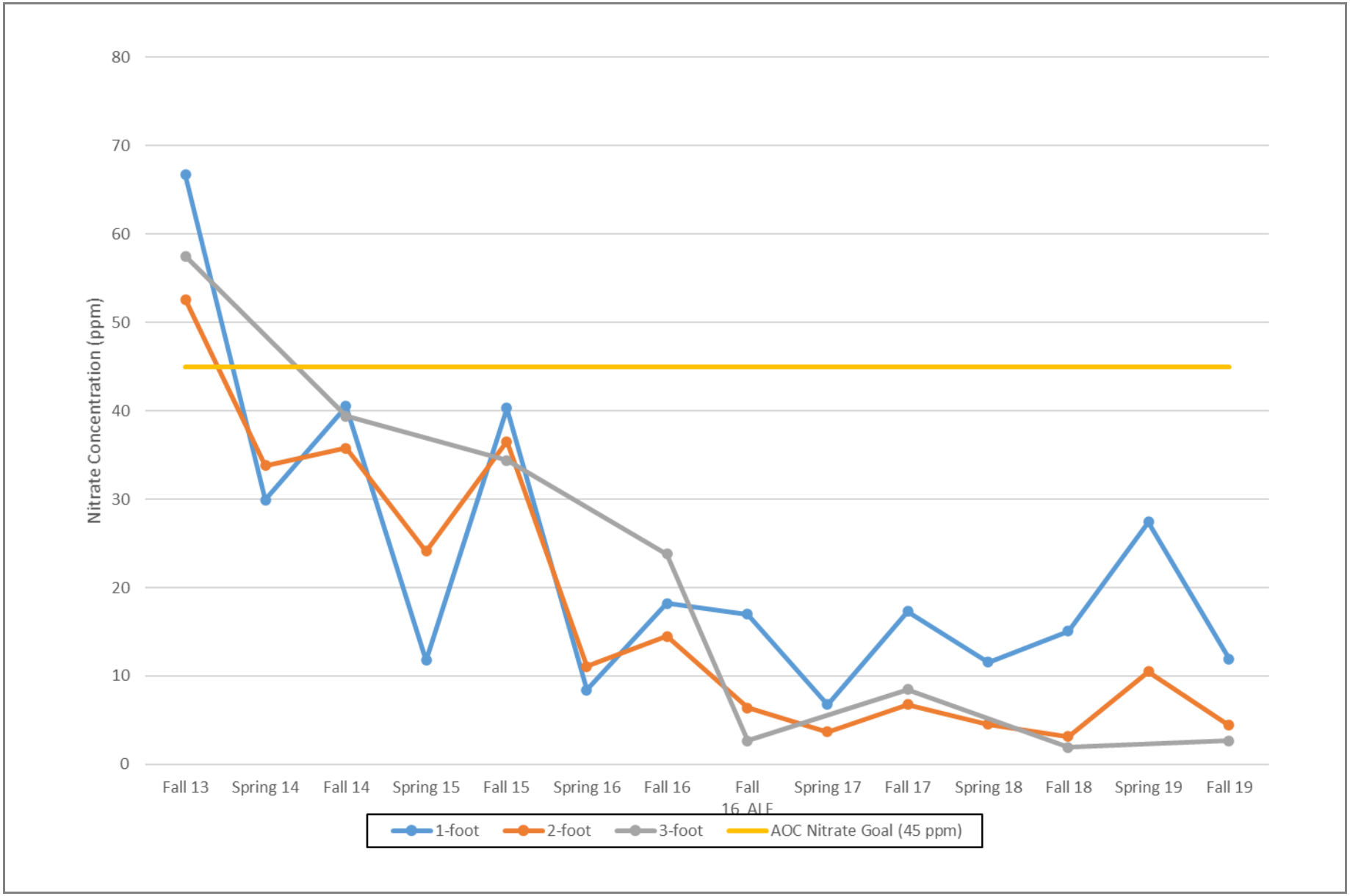

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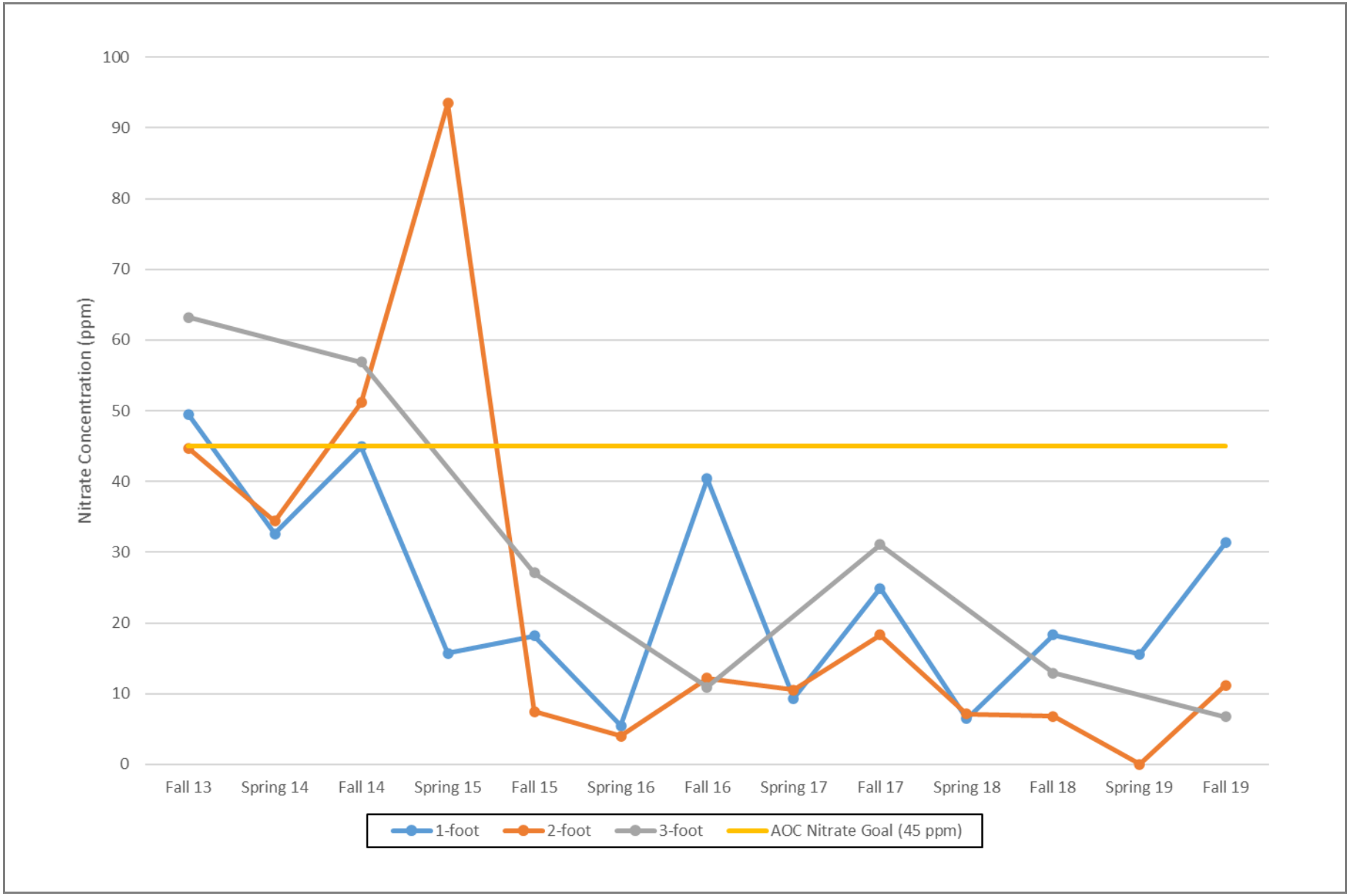
Figure 21b
CP-SU02 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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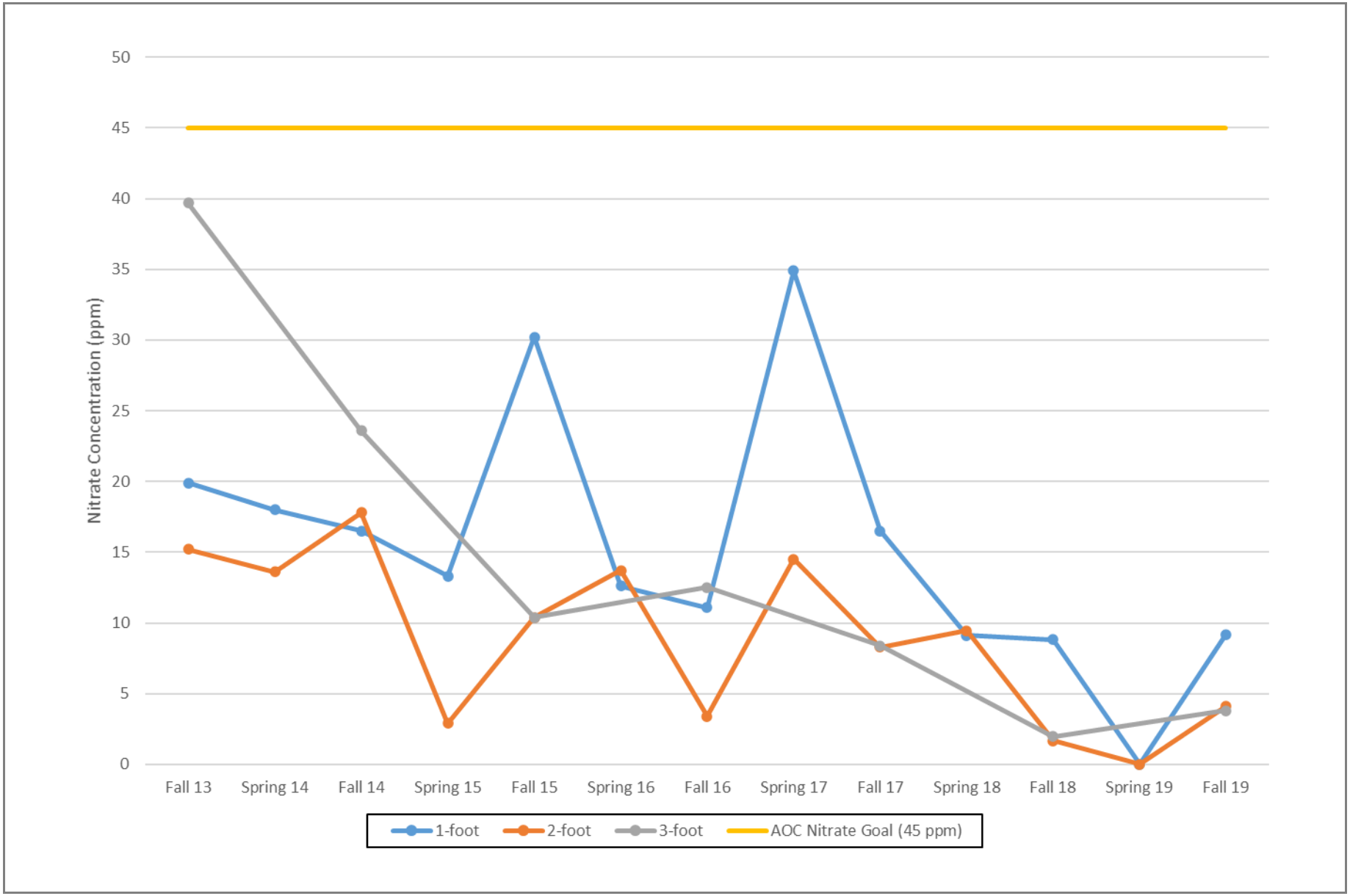
ANCHOR QEA

Figure 21c
CP-SU03 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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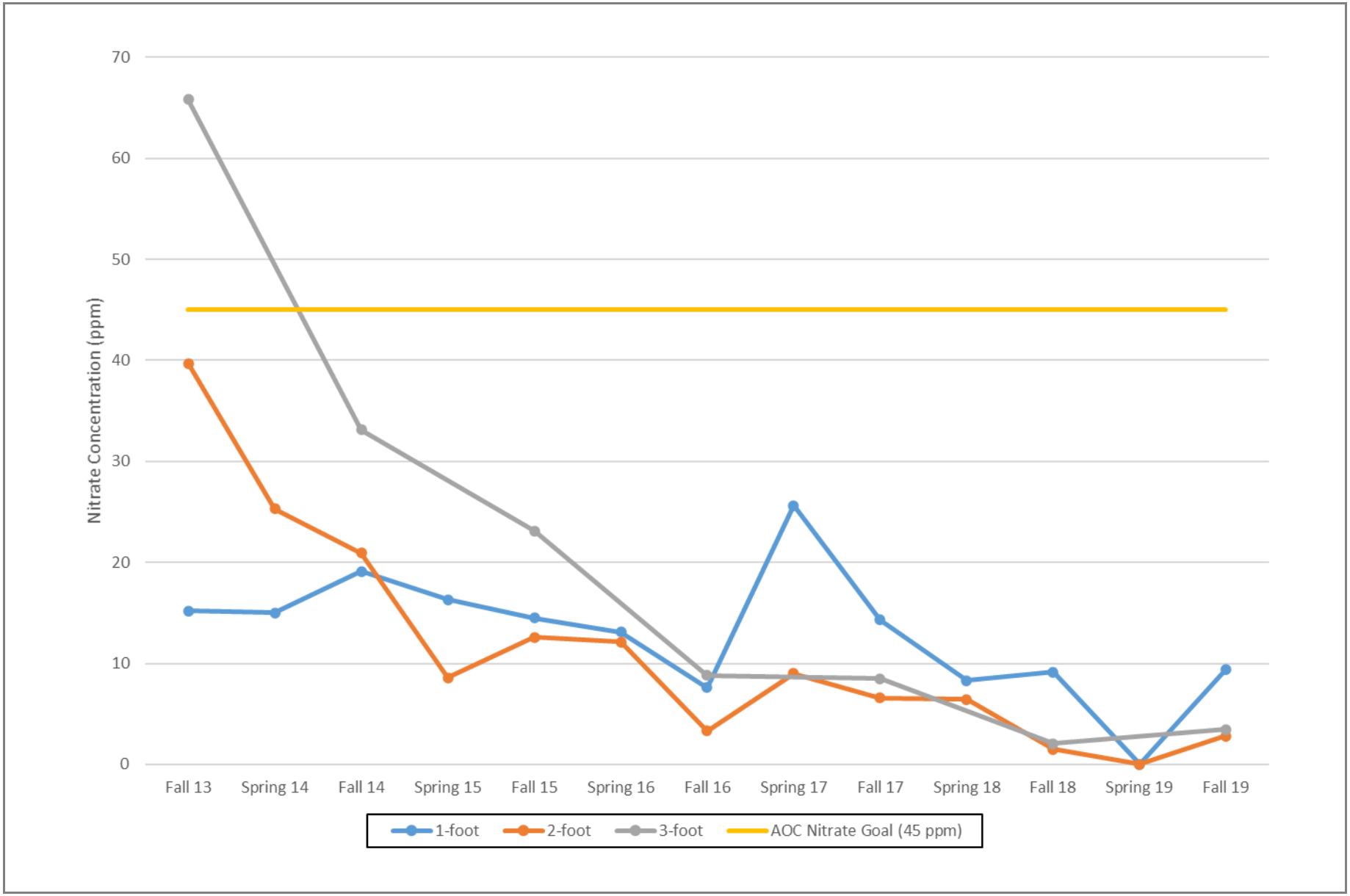
ANCHOR QEA

Figure 21d
CP-SU04A Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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ANCHOR QEA

Figure 21e
CP-SU04B Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

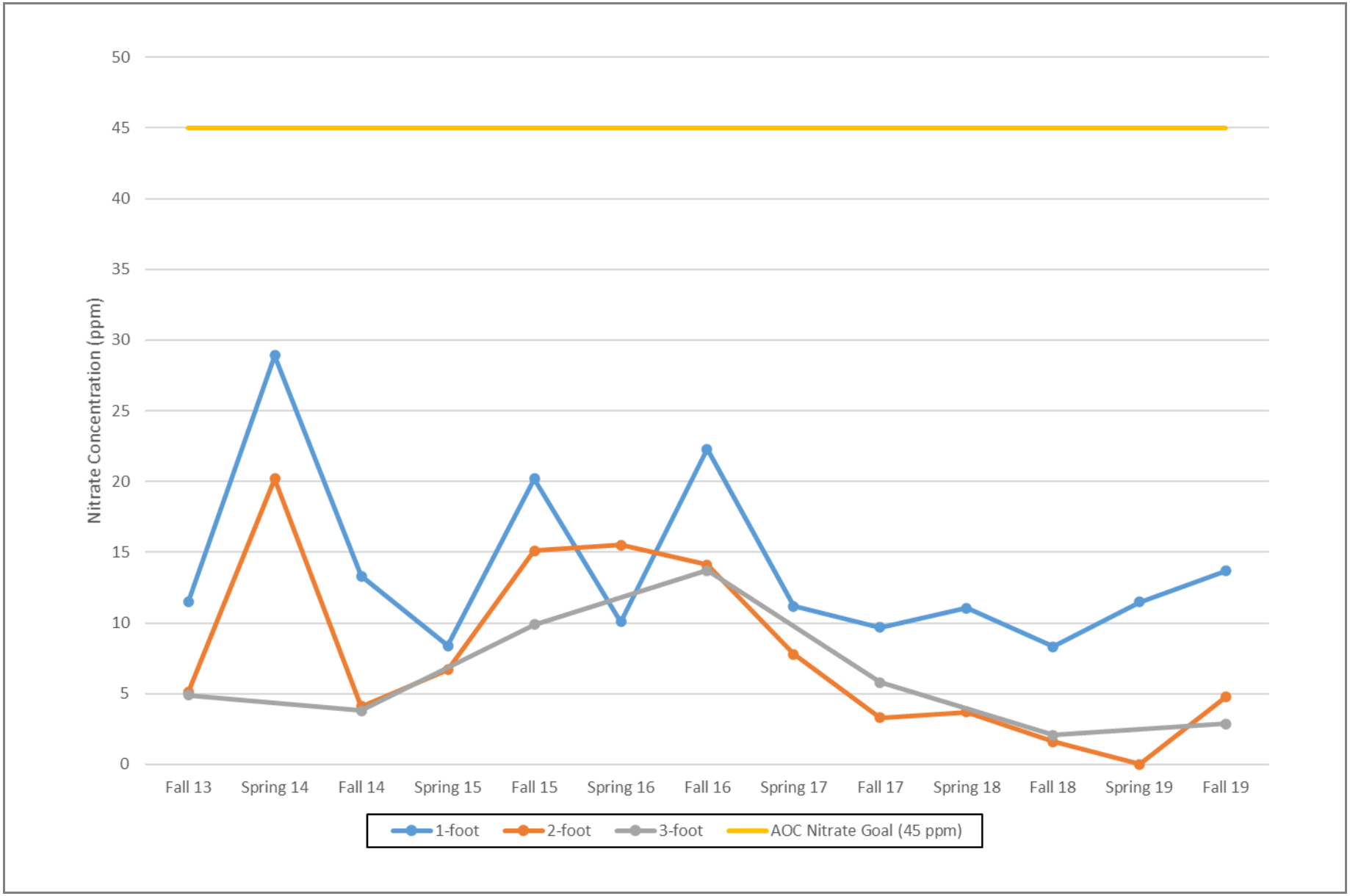

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Figure 21f
CP-SU05 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

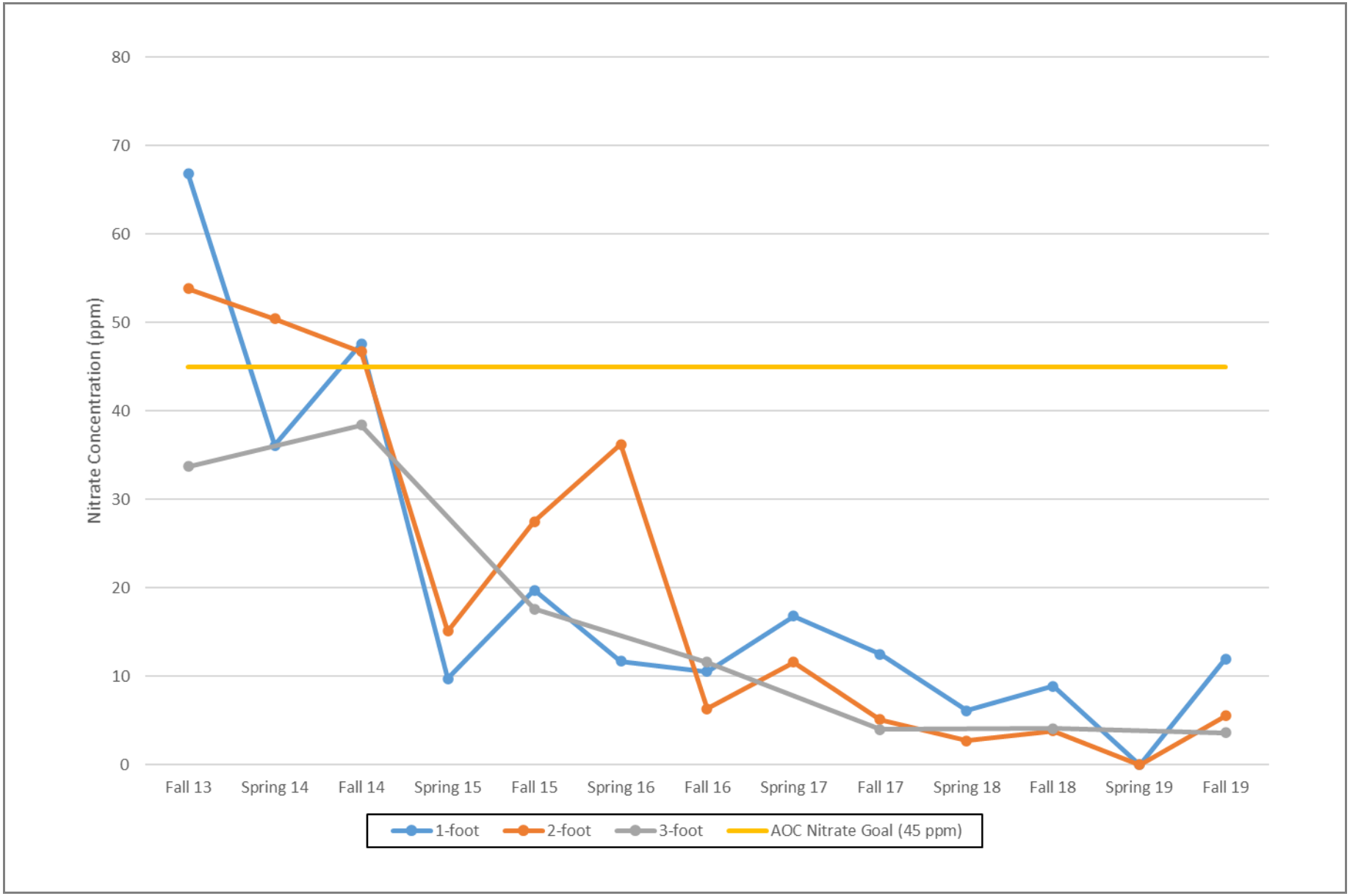

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Figure 21g
CP-SU06 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

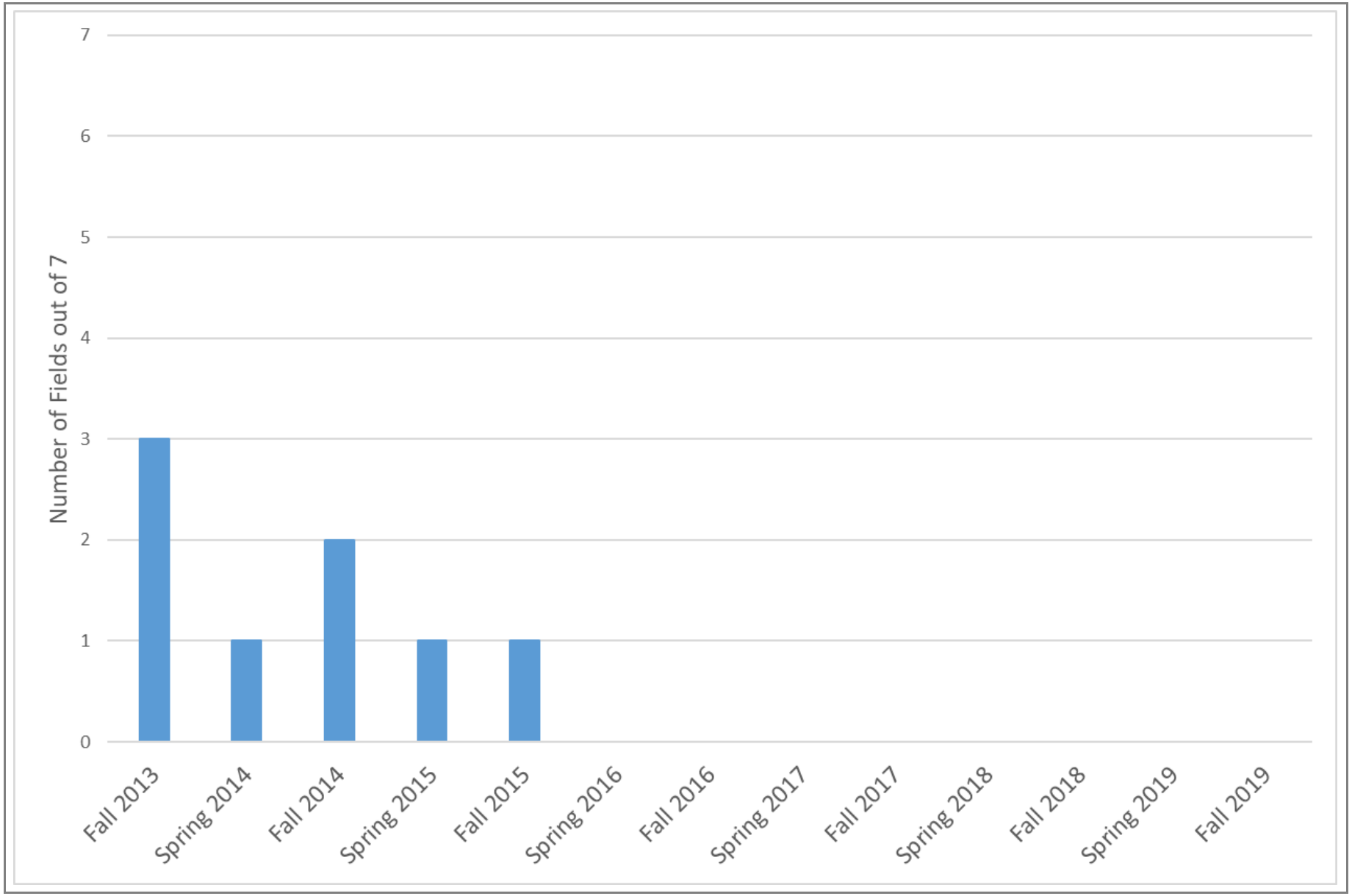

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Figure 22
Number of Fields with Soil NO3 over 45 ppm in the Second Foot, Cow Palace Dairy

2019 Annual Report
Yakima Valley Dairies

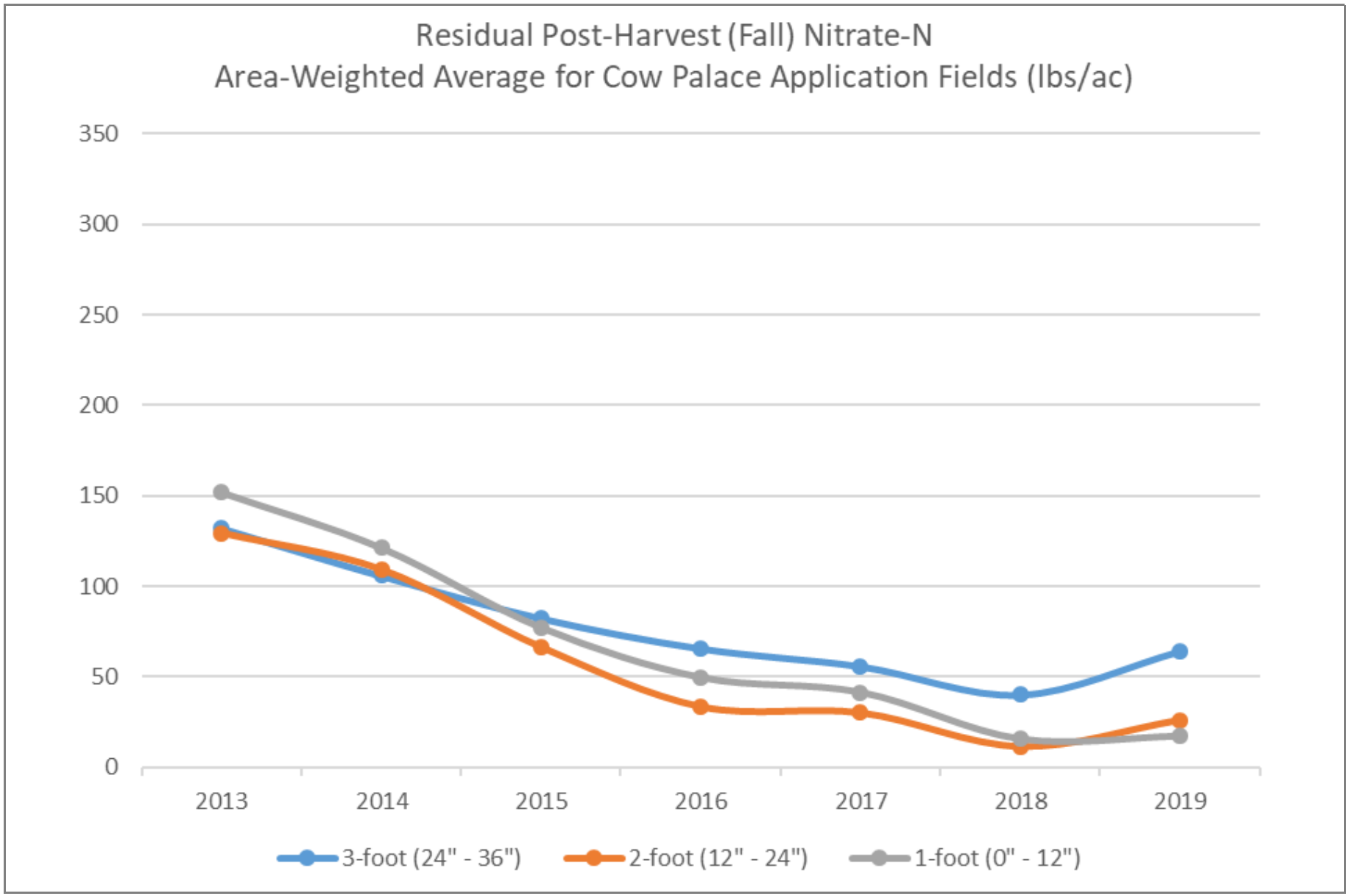

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Figure 23
Trends in Post-Harvest Nitrate Concentrations in Cow Palace Dairy Application Fields Expressed as Area-Weighted Concentrations

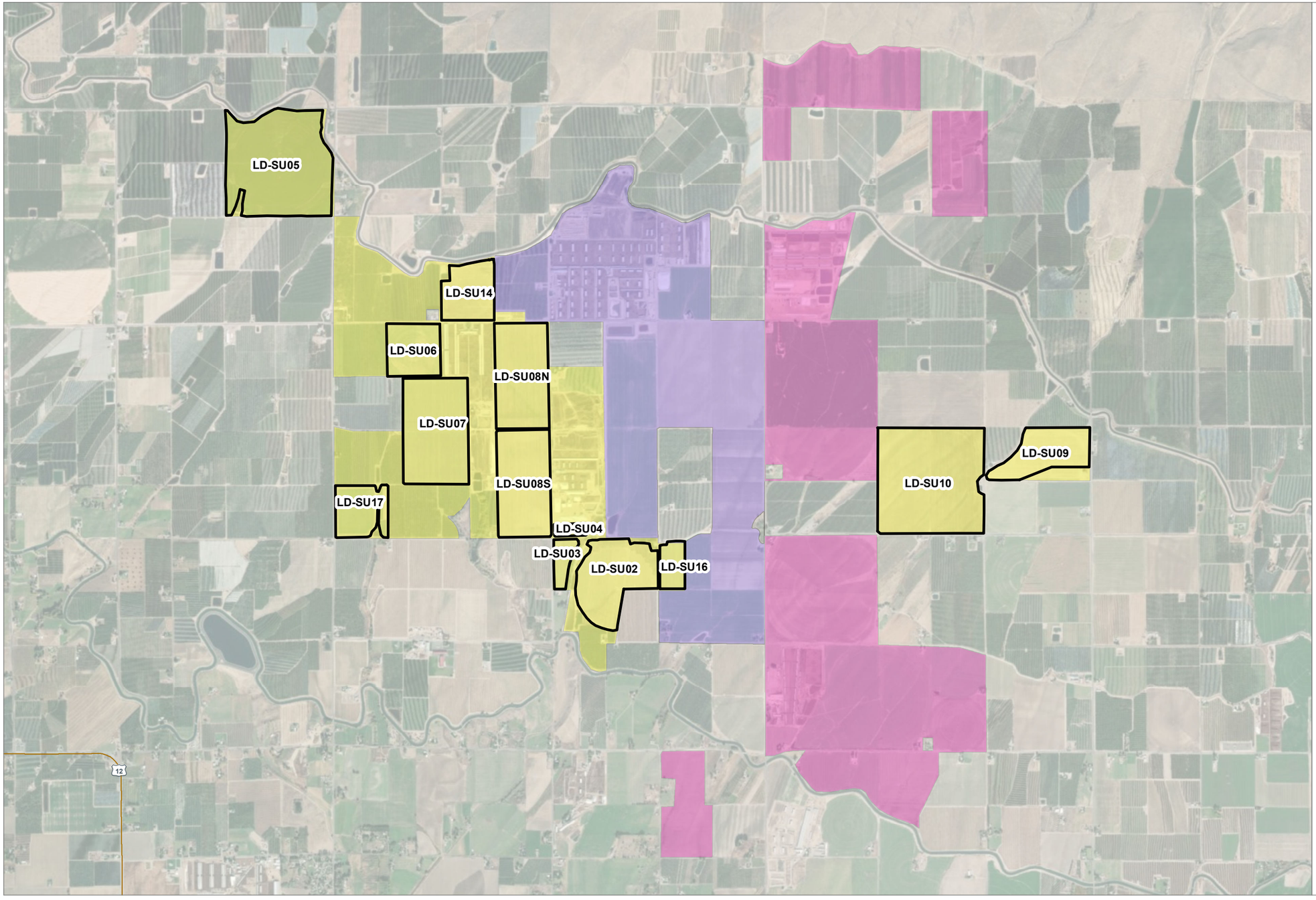

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Figure 24
2019 Liberty/H&S Bosma Dairies Application Field Nitrate Exceedances in the Second Foot
2019 Annual Report
Yakima Valley Dairies

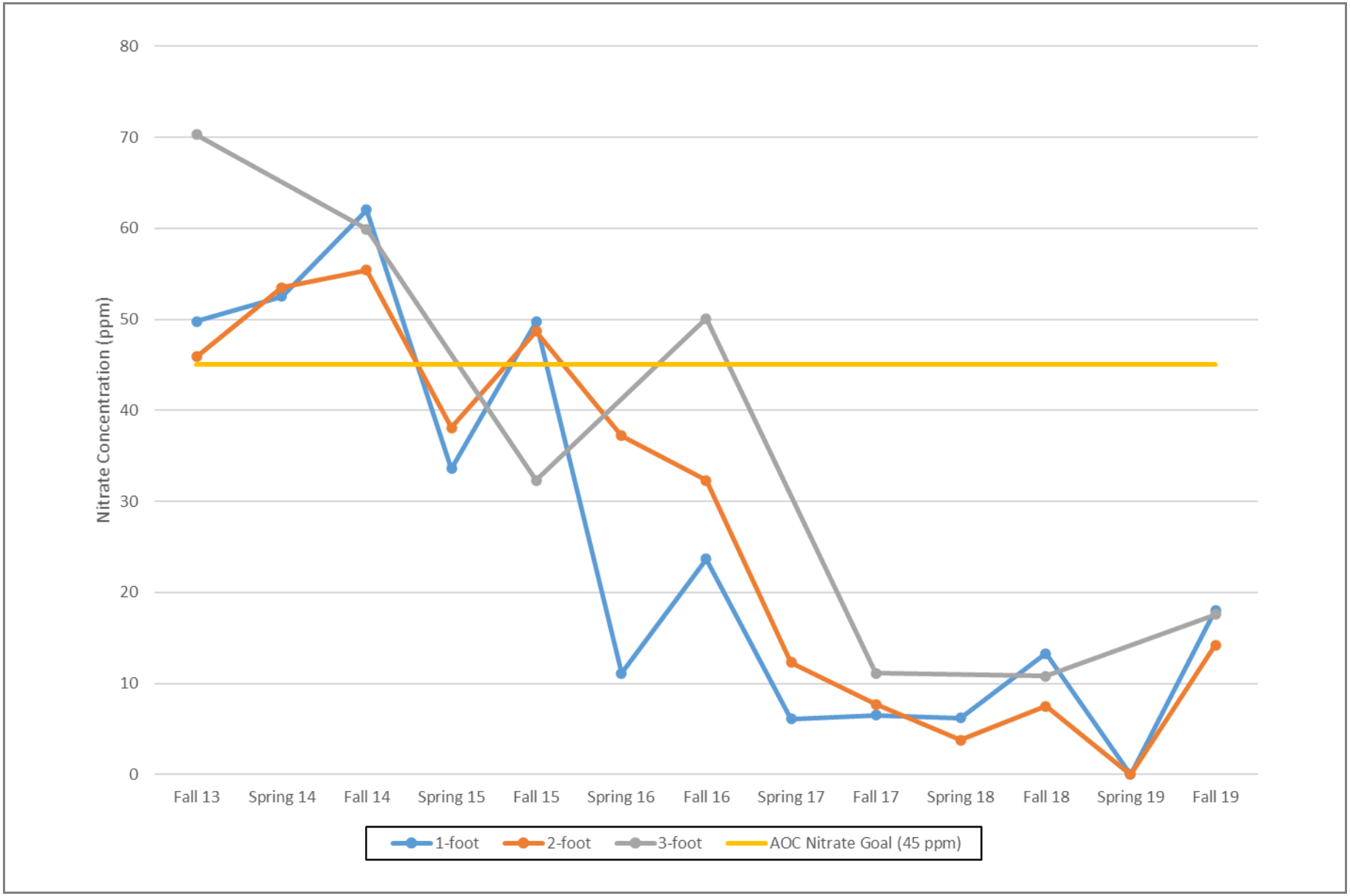

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Figure 25a
LD-SU02 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

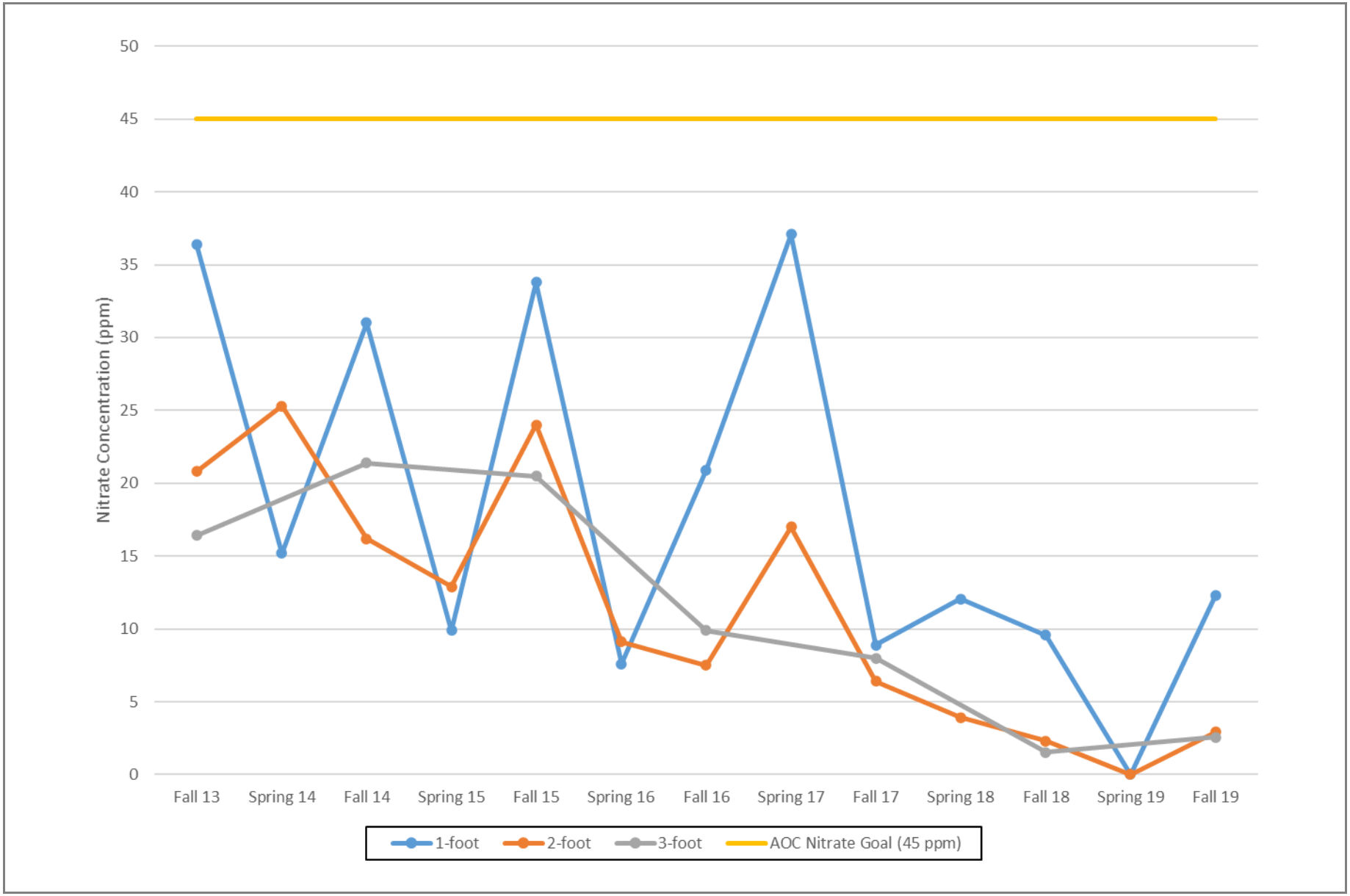

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Figure 25b
LD-SU03 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies

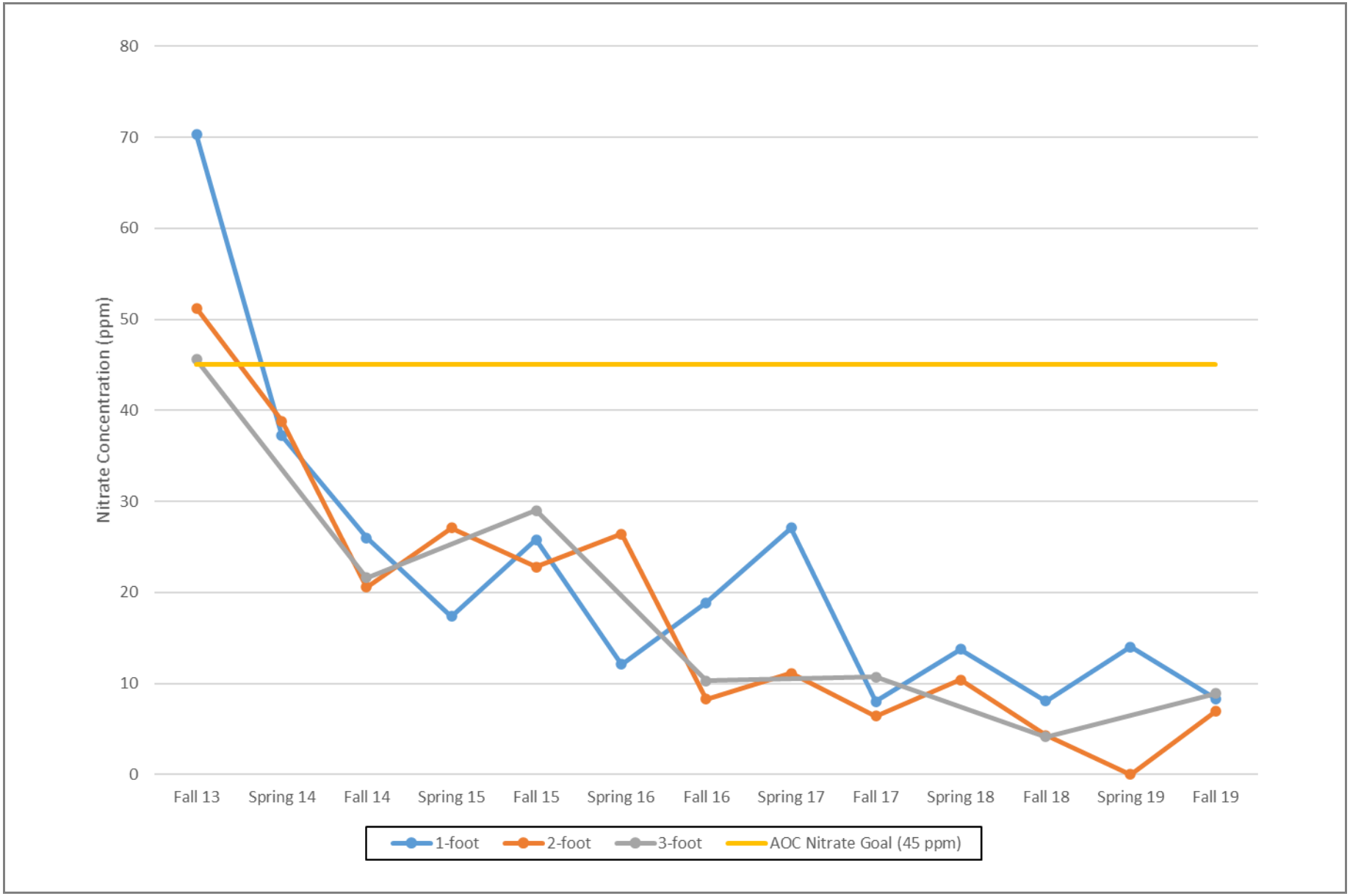

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Figure 25c
LD-SU04 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies

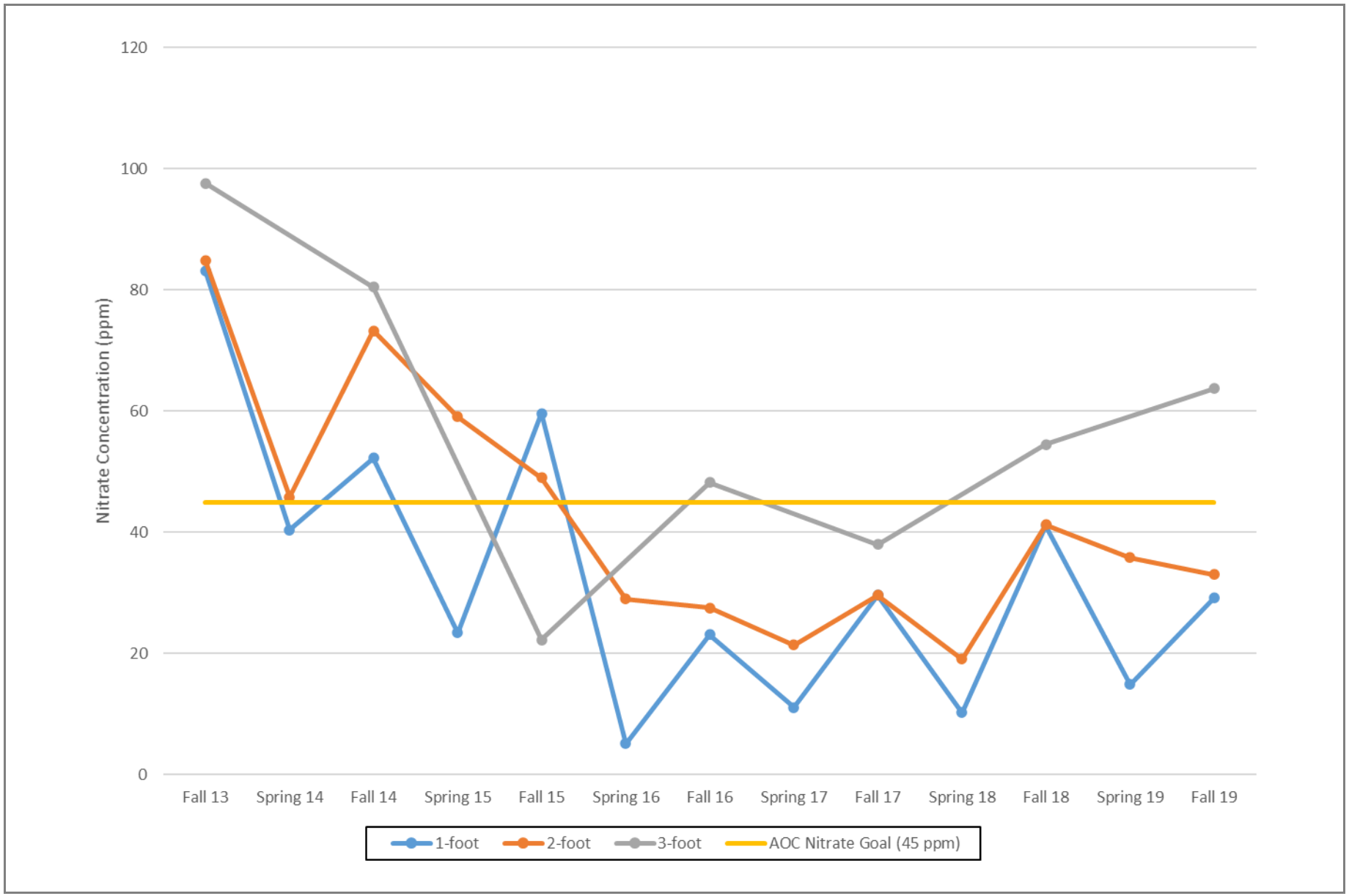

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Figure 25d
LD-SU05 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies

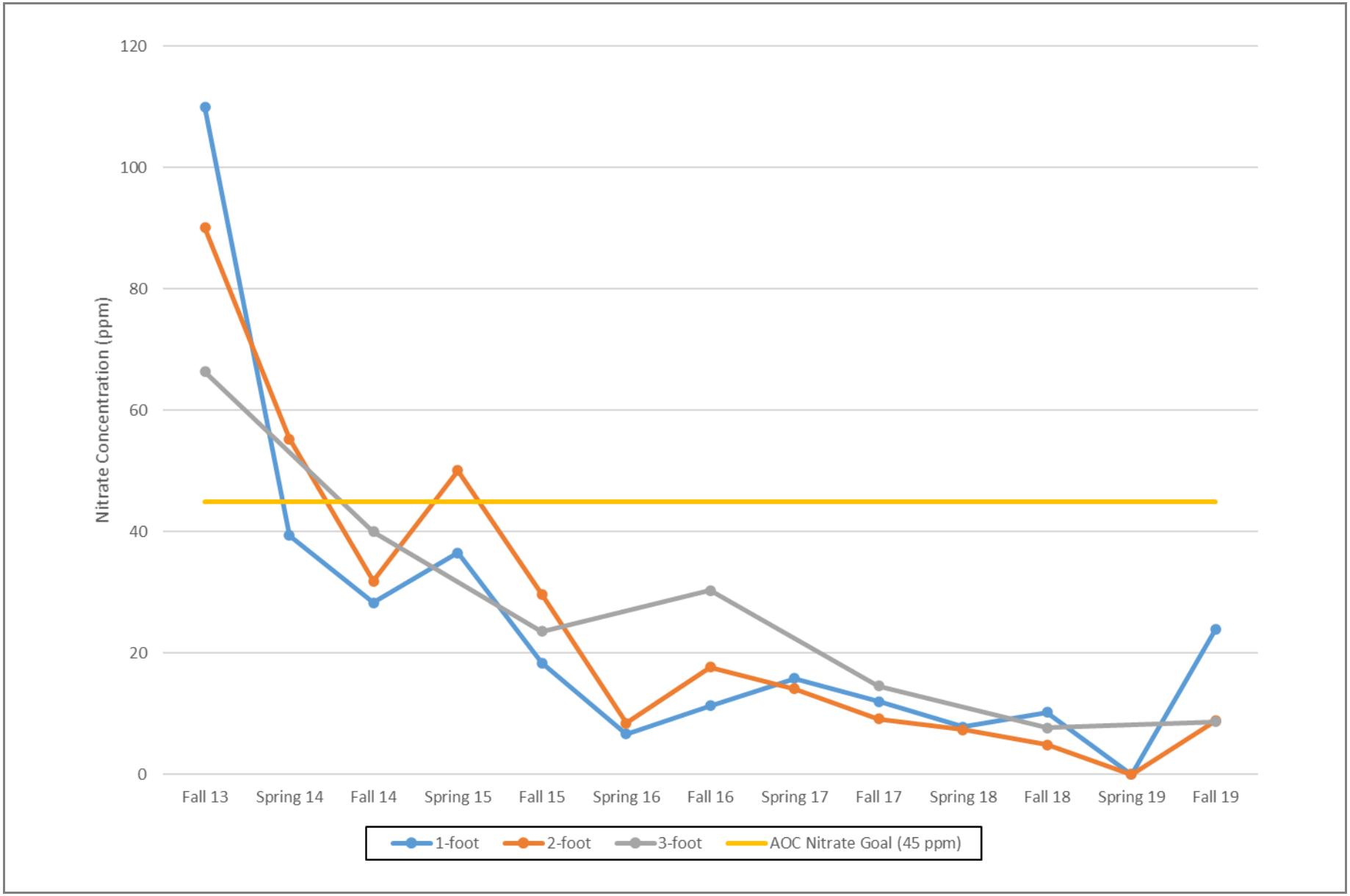

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Figure 25e
LD-SU06 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies

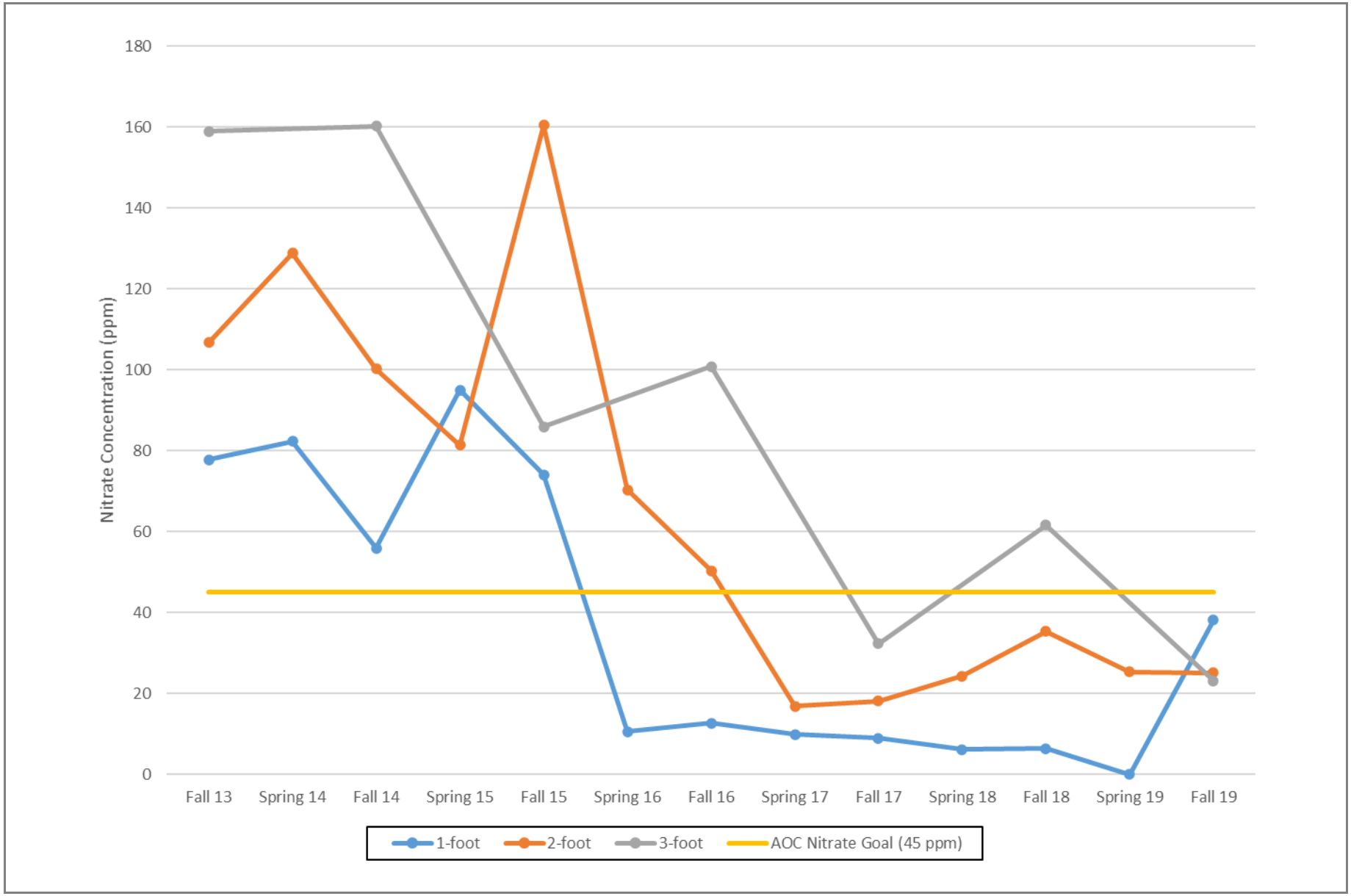

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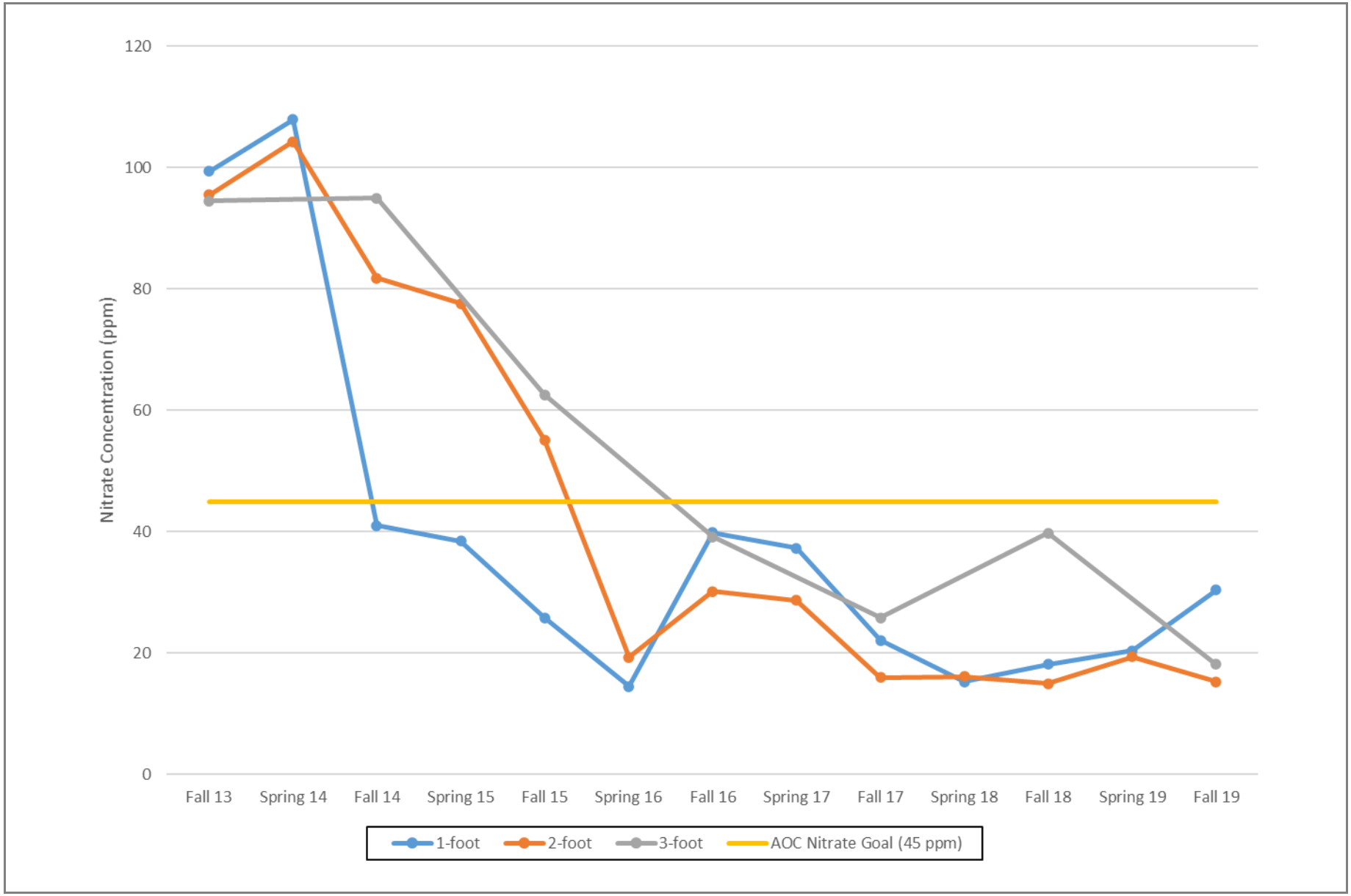
Figure 25f
LD-SU07 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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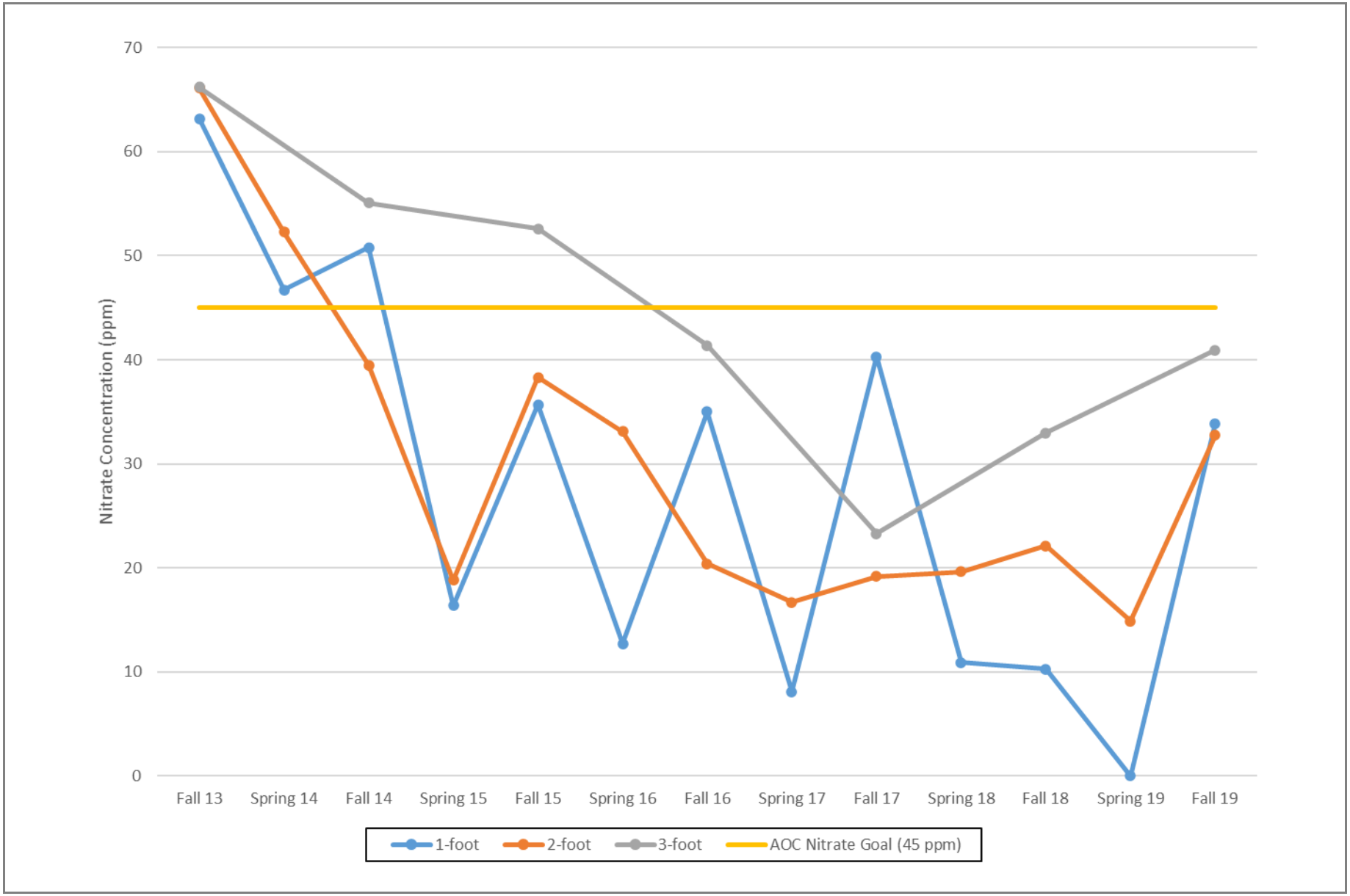
ANCHOR QEA

Figure 25g
LD-SU08N Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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ANCHOR QEA

Figure 25h
LD-SU08S Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

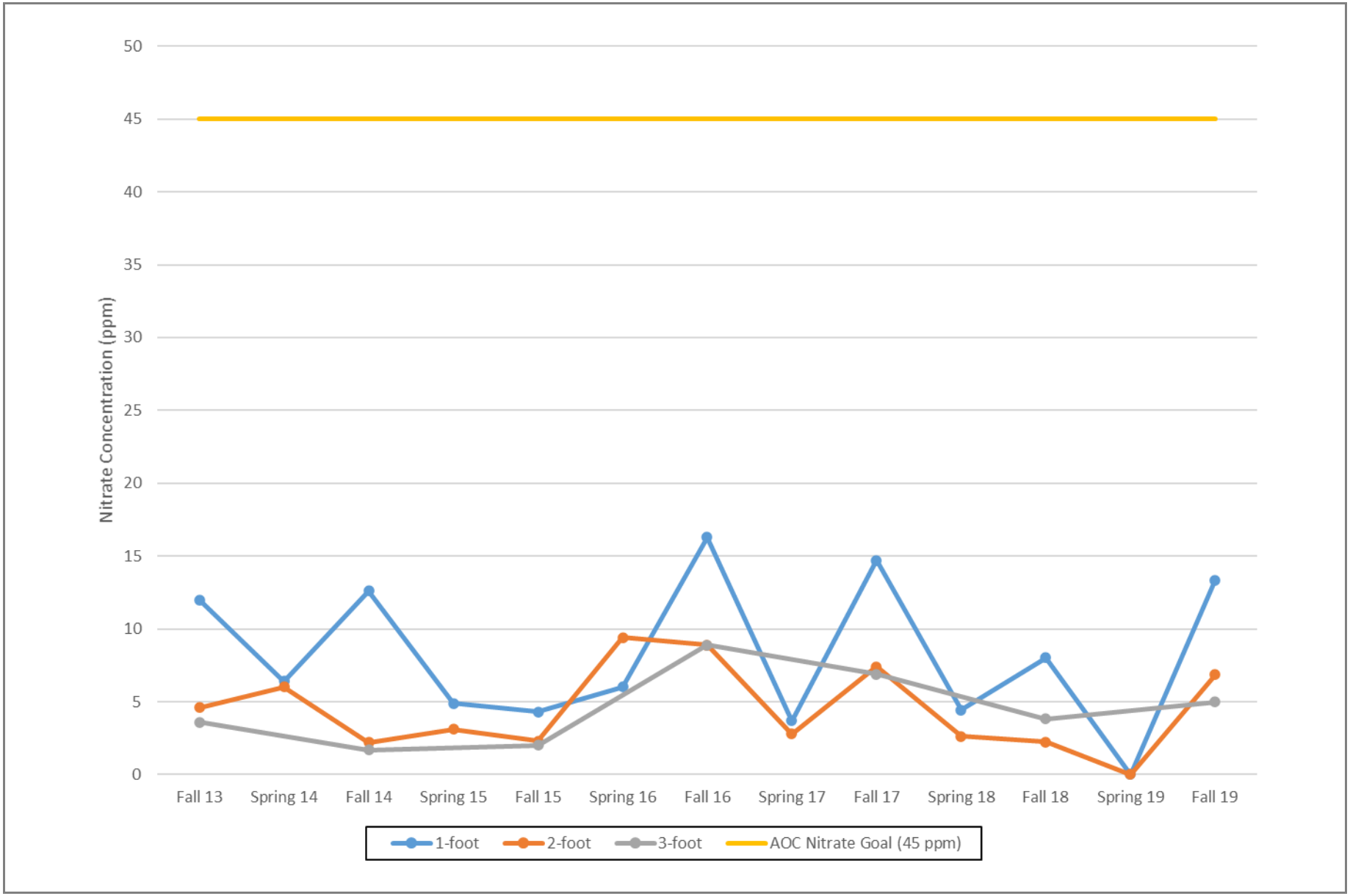

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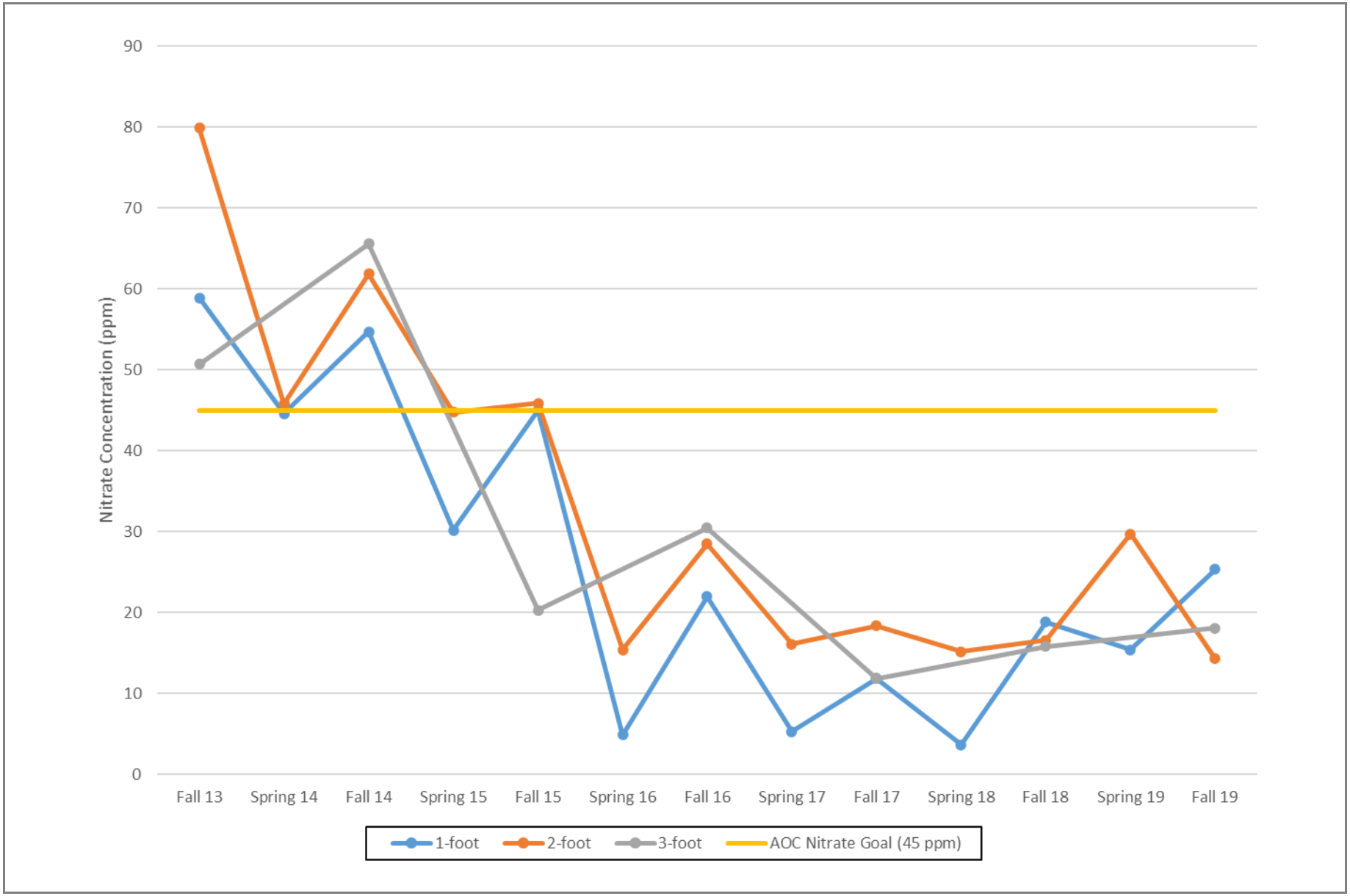
Figure 25i
LD-SU09 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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ANCHOR QEA

Figure 25j
LD-SU10 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies

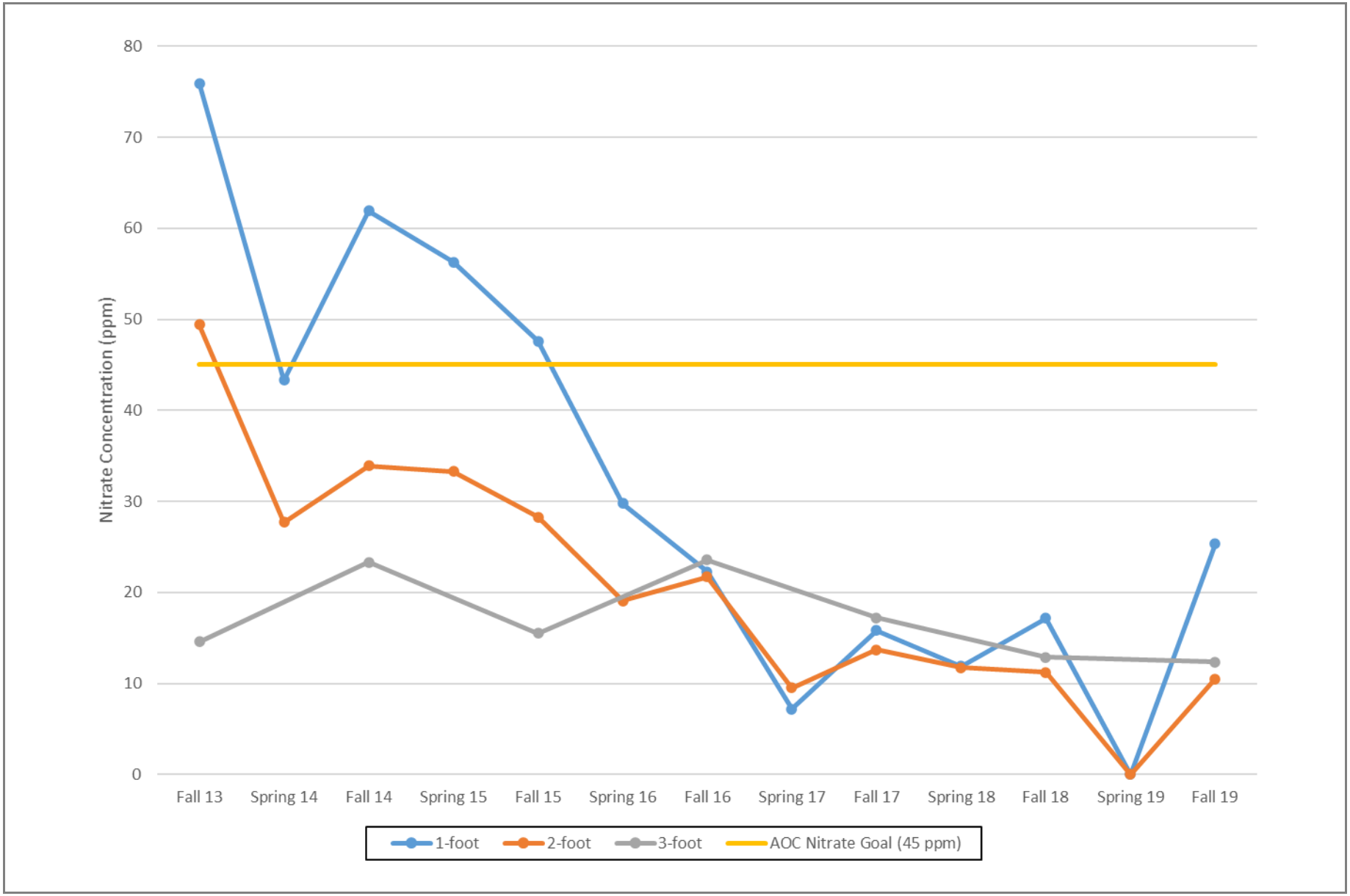

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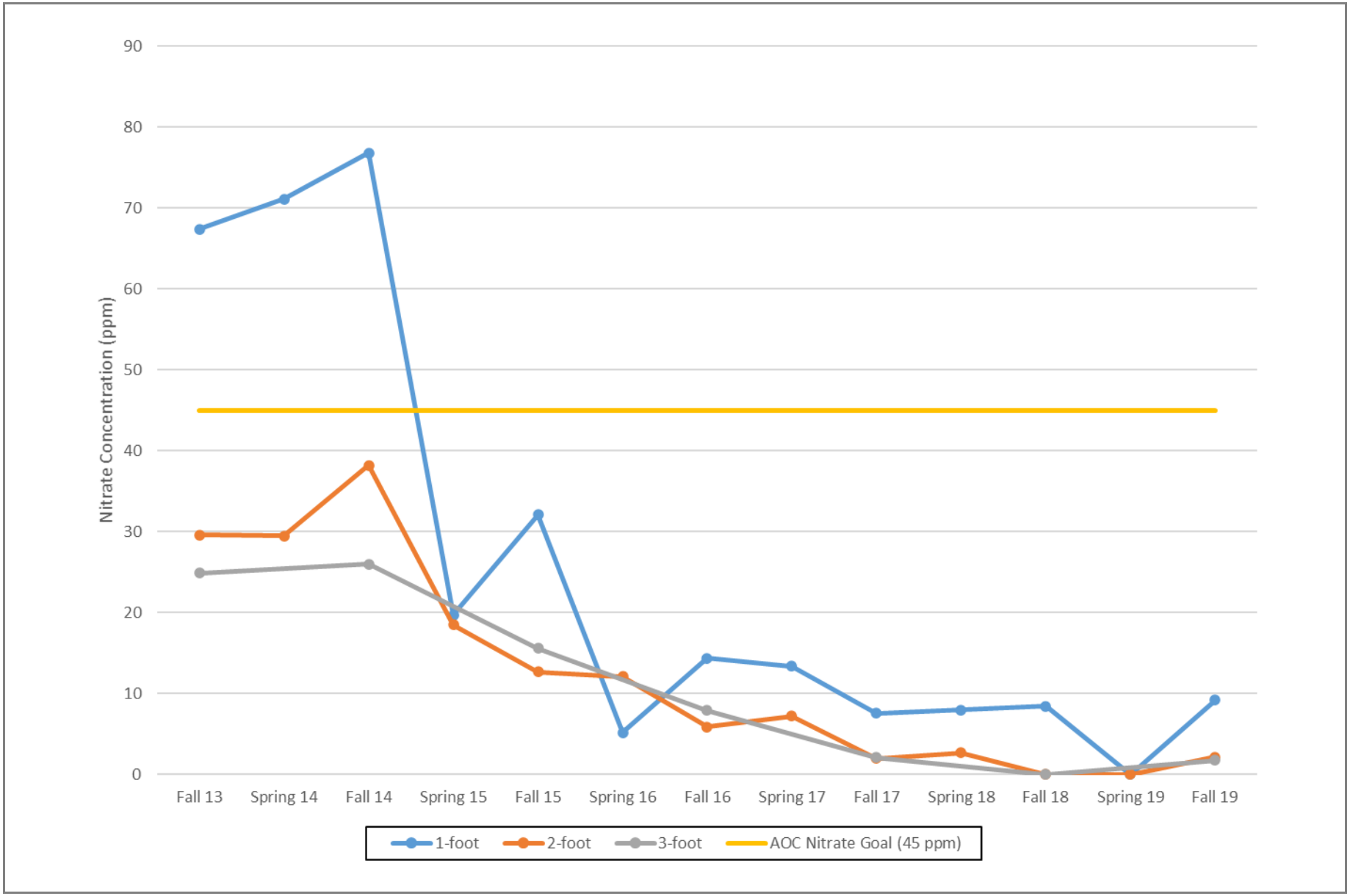
Figure 25k
LD-SU14 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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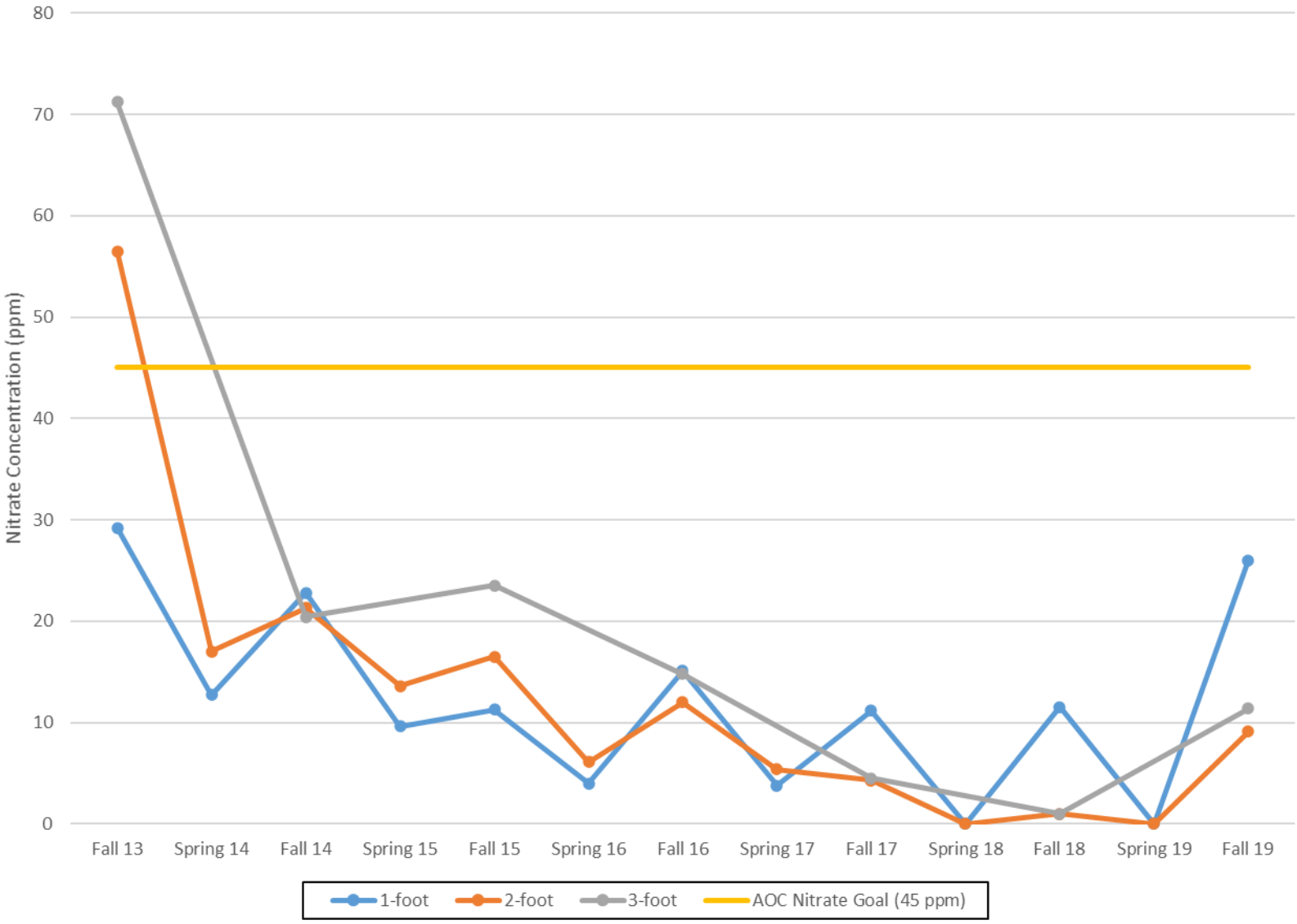
ANCHOR QEA

Figure 25l
LD-SU16 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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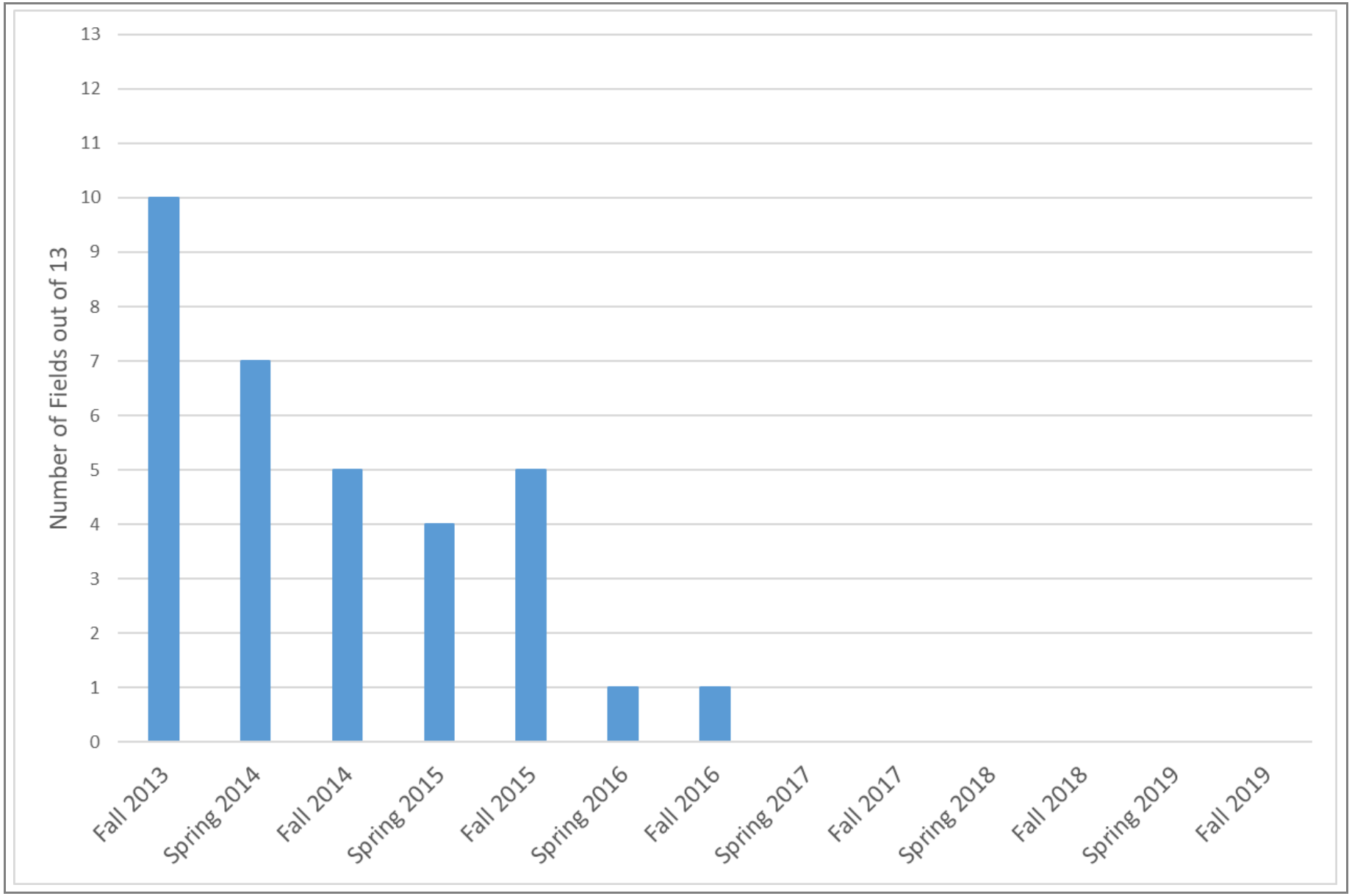
ANCHOR QEA

Figure 25m
LD-SU17 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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ANCHOR QEA

Figure 26
Number of Fields with Soil NO3 over 45 ppm in the Second Foot, Liberty Dairy
2019 Annual Report
Yakima Valley Dairies

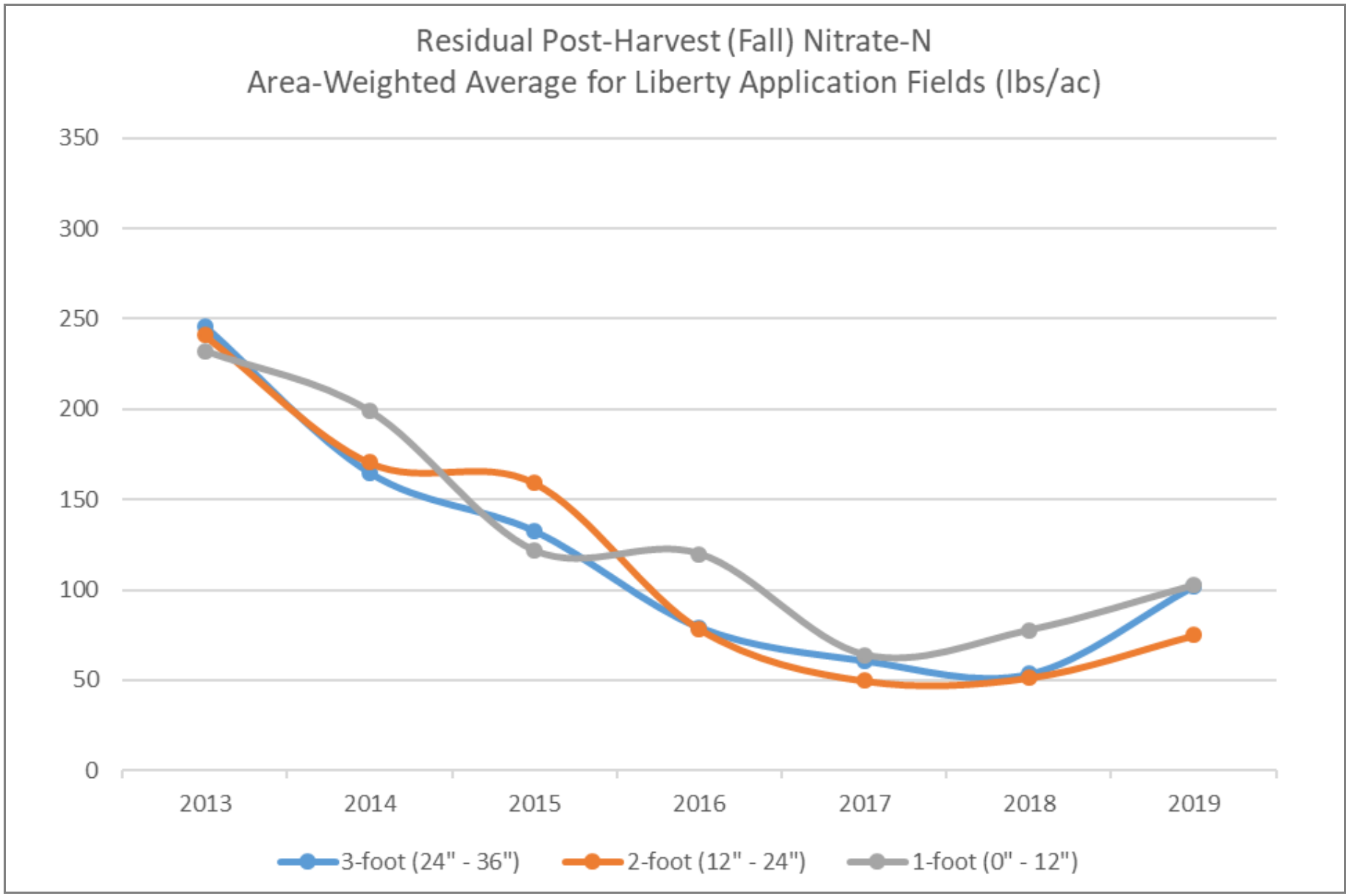

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Figure 27
Trends in Post-Harvest Nitrate Concentrations in Liberty/H&S Bosma Dairies Application Fields Expressed as Area-Weighted Concentrations

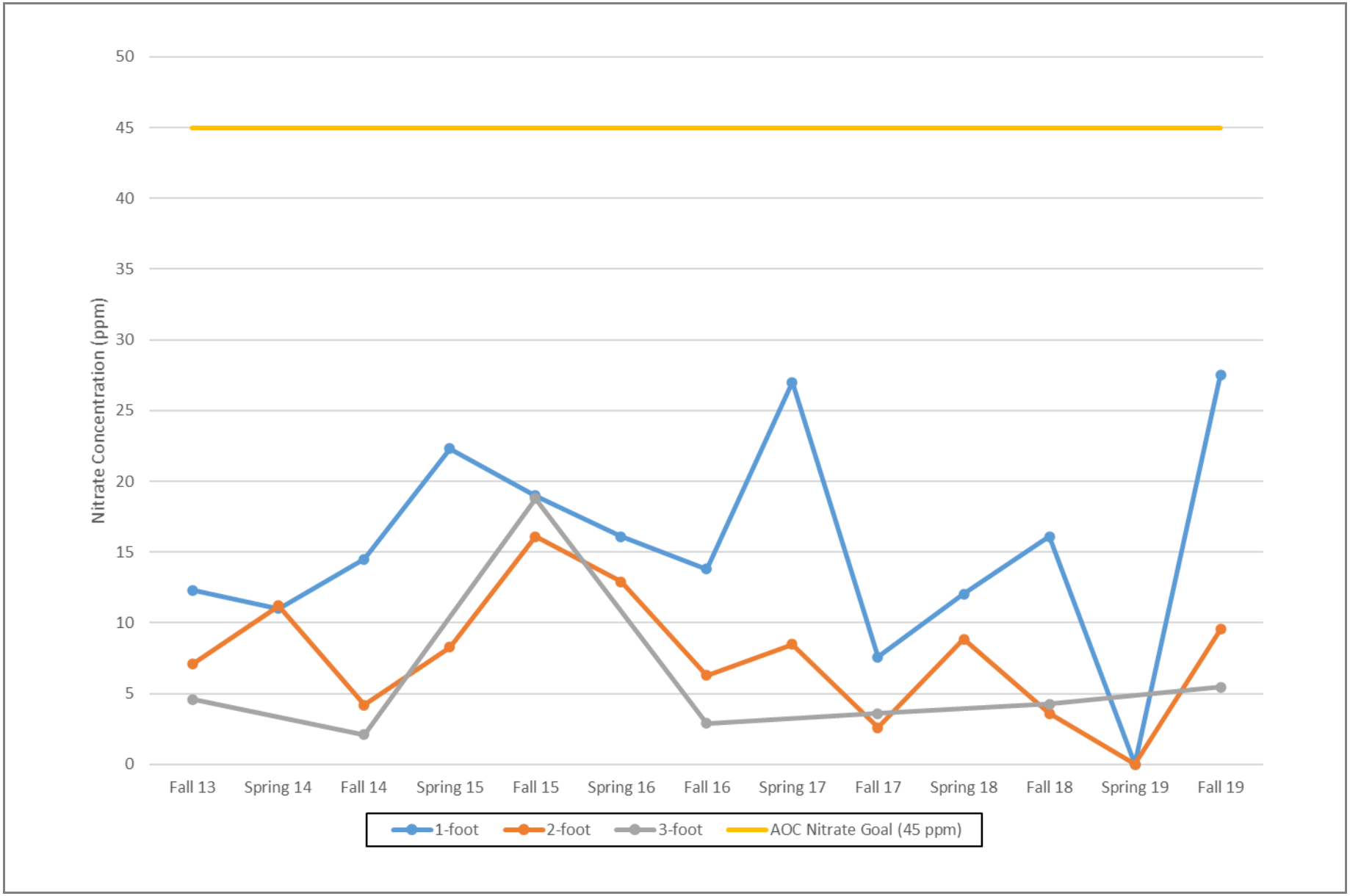

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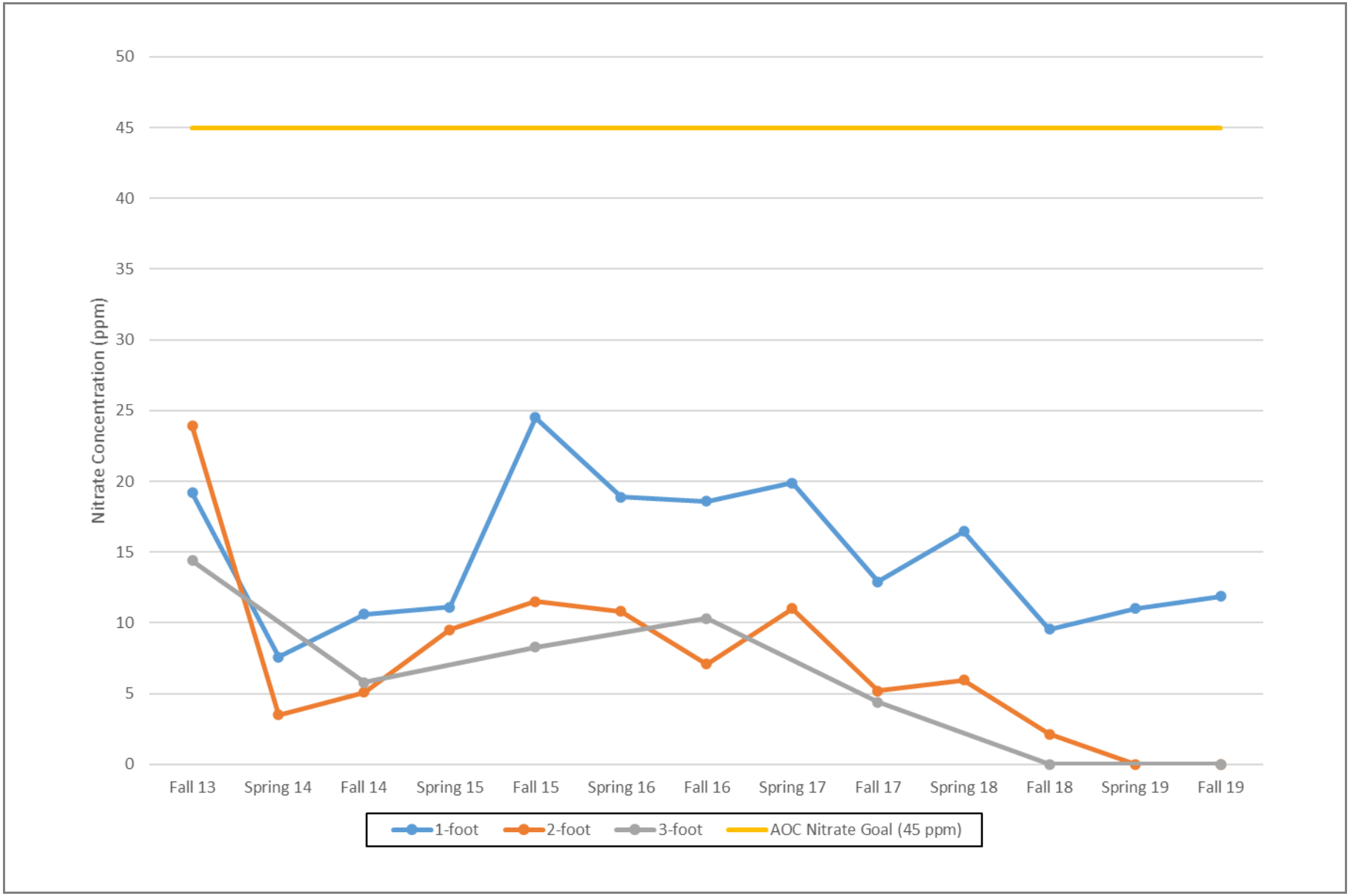
Figure 28a
GDS-SU01 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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ANCHOR QEA

Figure 28b
GDS-SU02 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

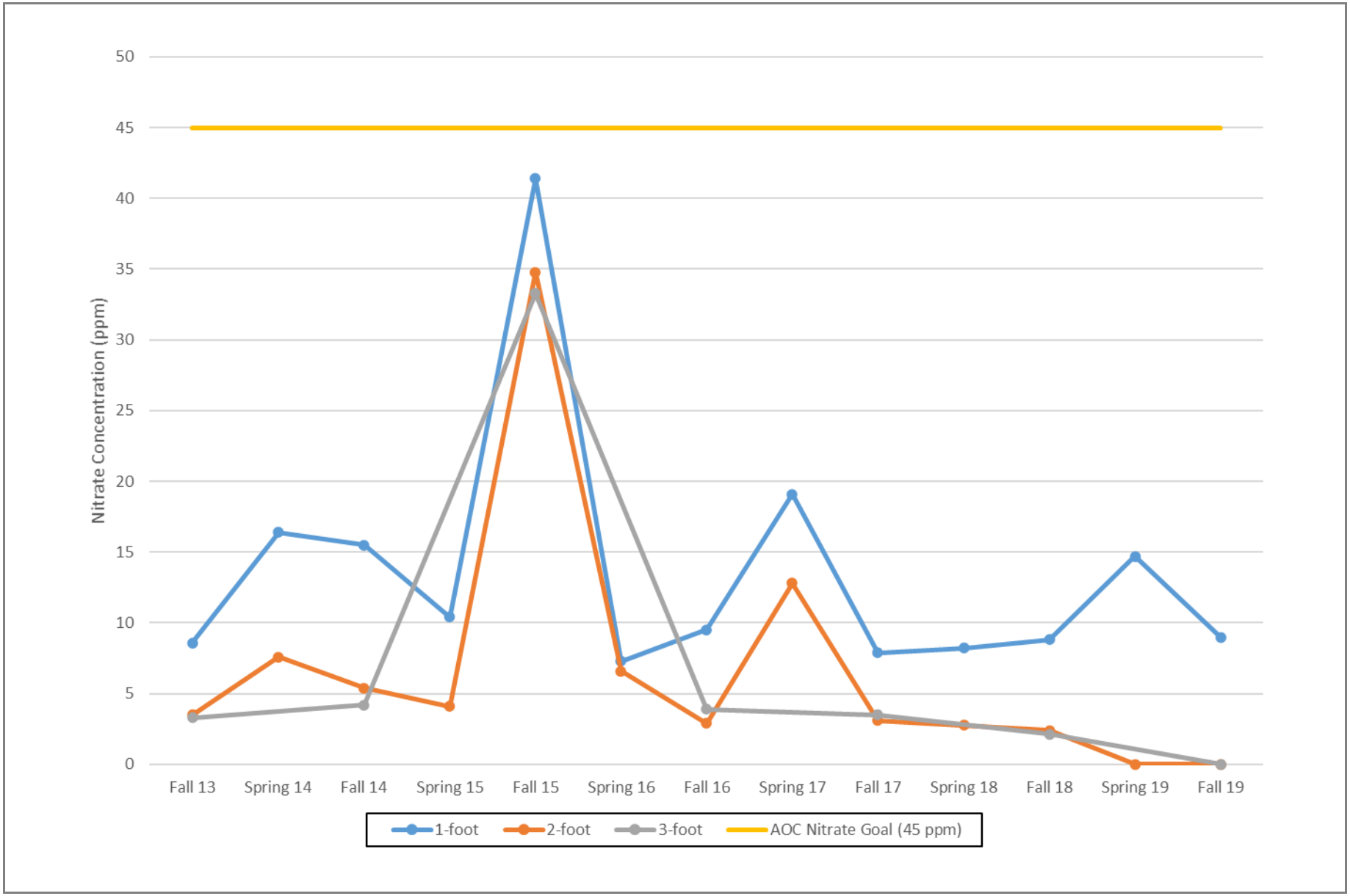

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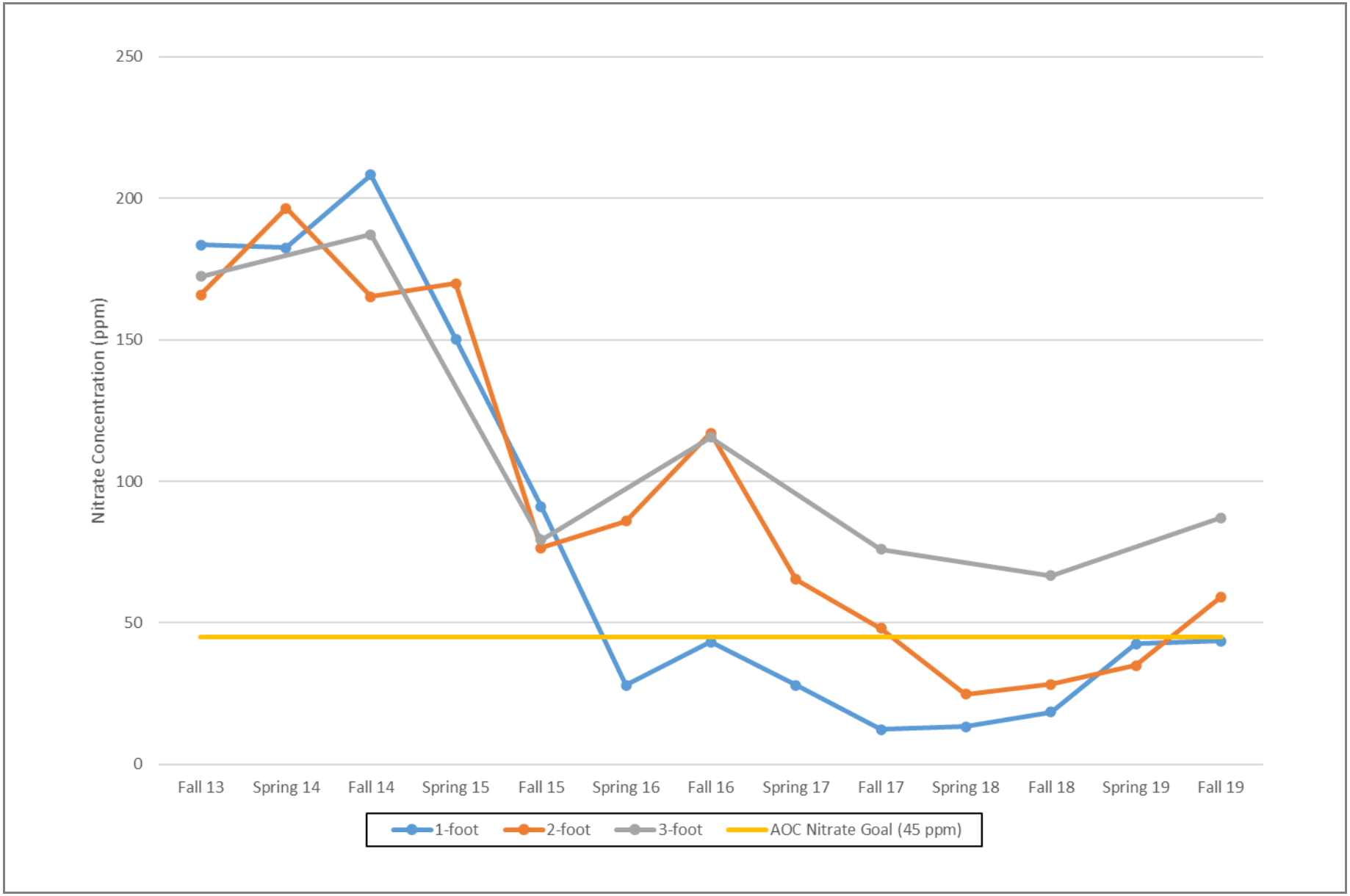
Figure 28c
GDS-SU03 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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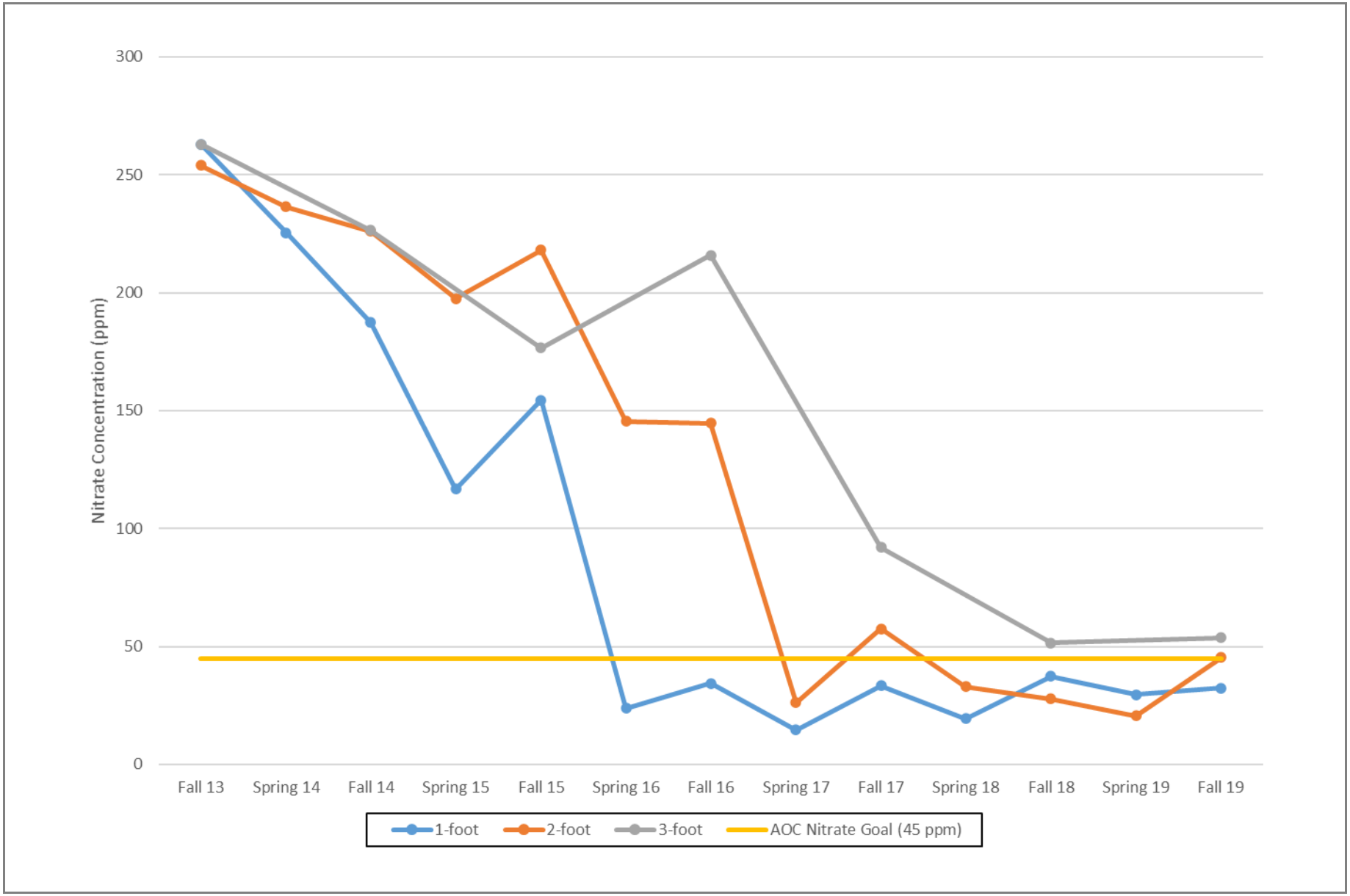
ANCHOR QEA

Figure 28d
GDS-SU04 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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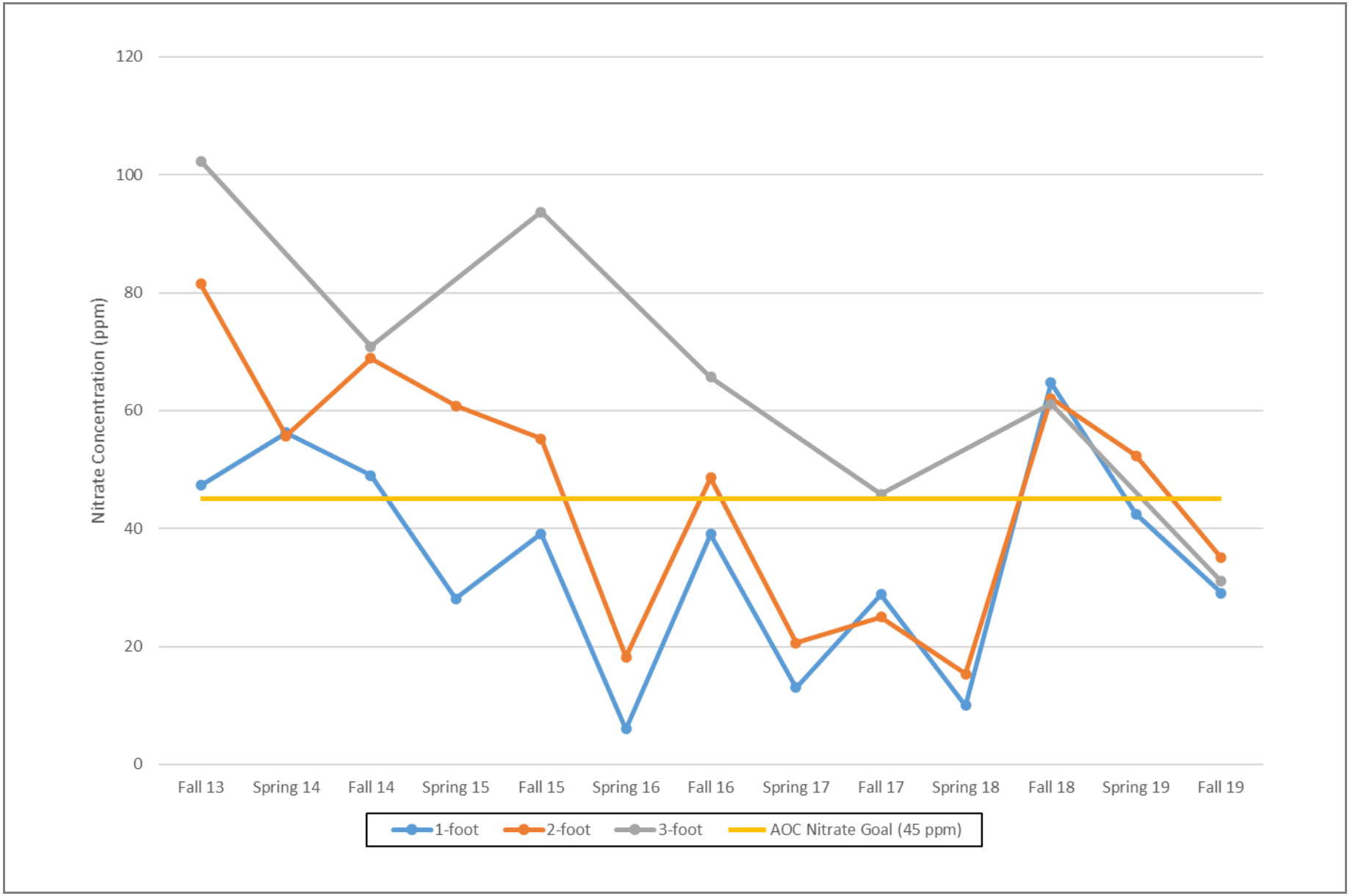
ANCHOR QEA

Figure 28e
GDS-SU05 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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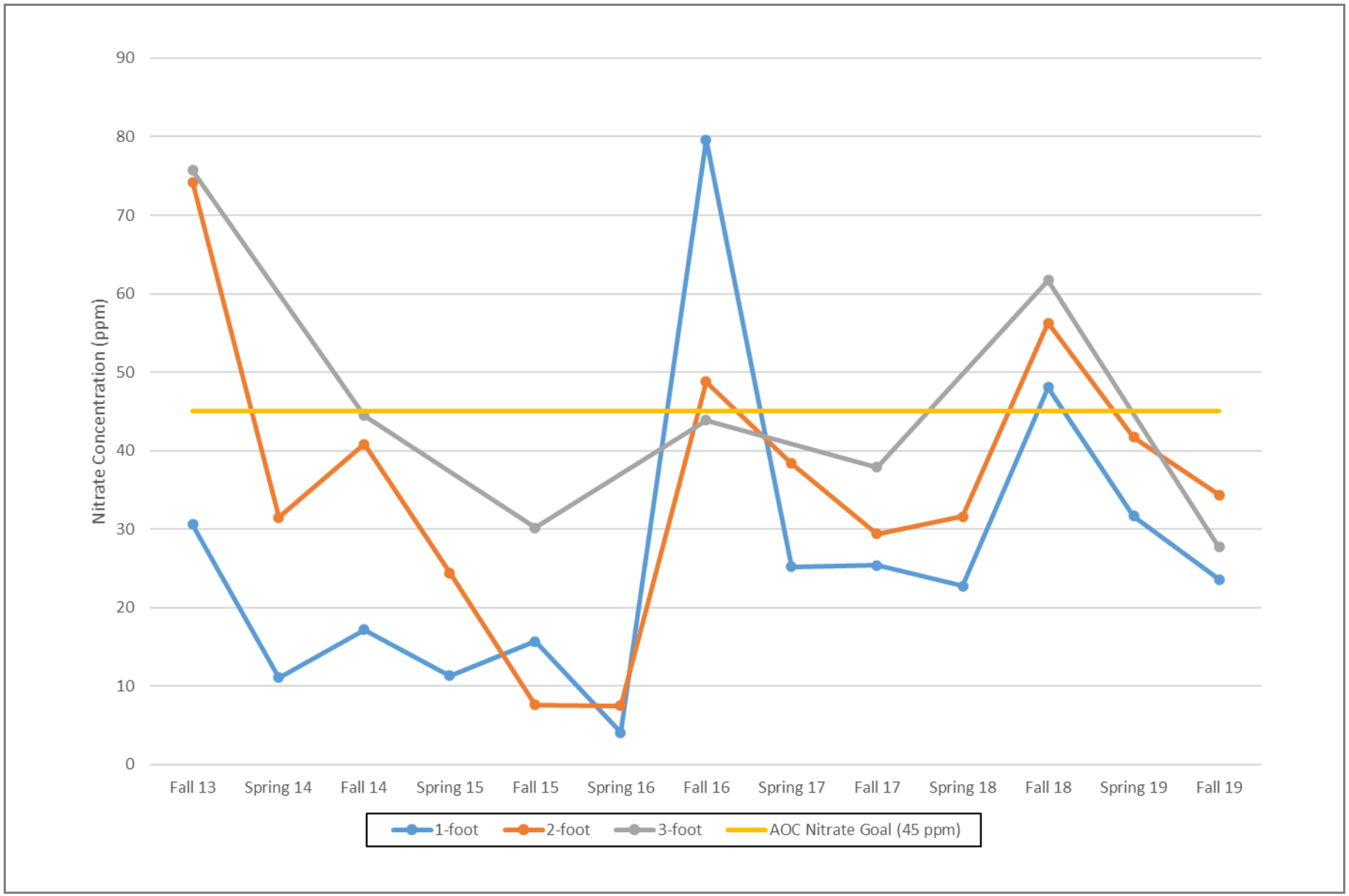
ANCHOR QEA

Figure 28f
GDS-SU06 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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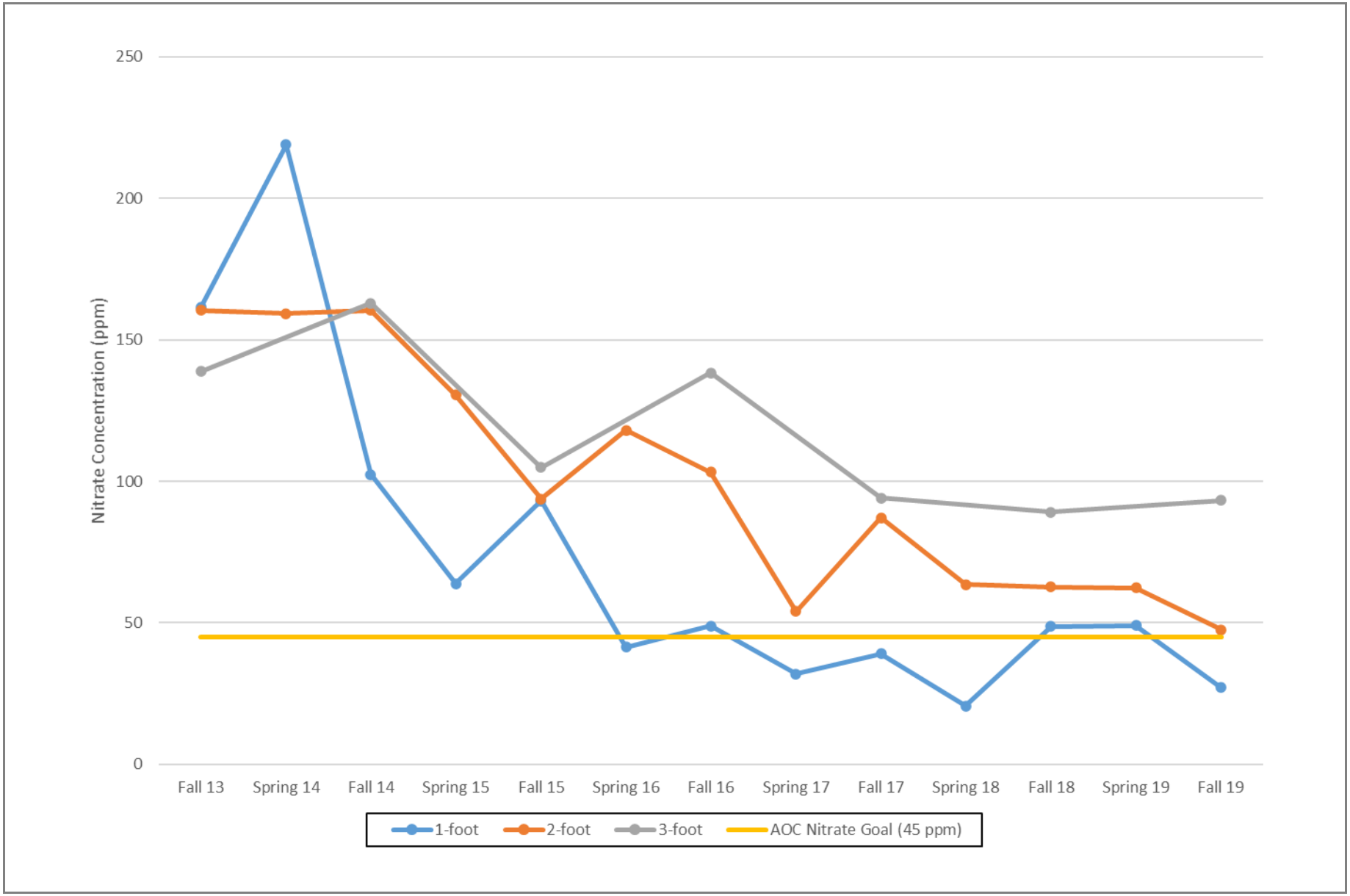
ANCHOR QEA

Figure 28g
GDS-SU07 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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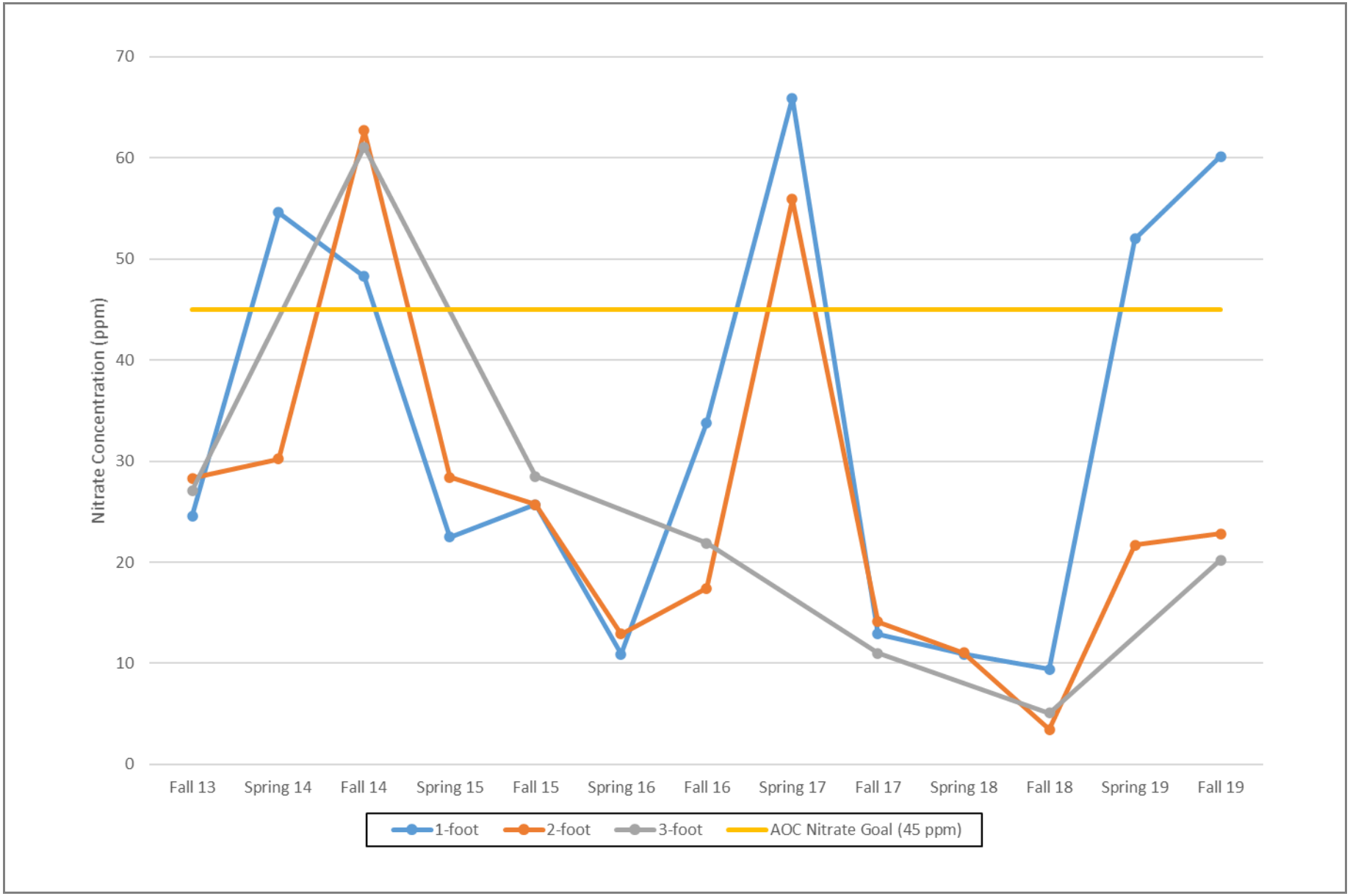
ANCHOR QEA

Figure 28h
GDS-SU08 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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ANCHOR QEA

Figure 28i
GDS-SU09 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies

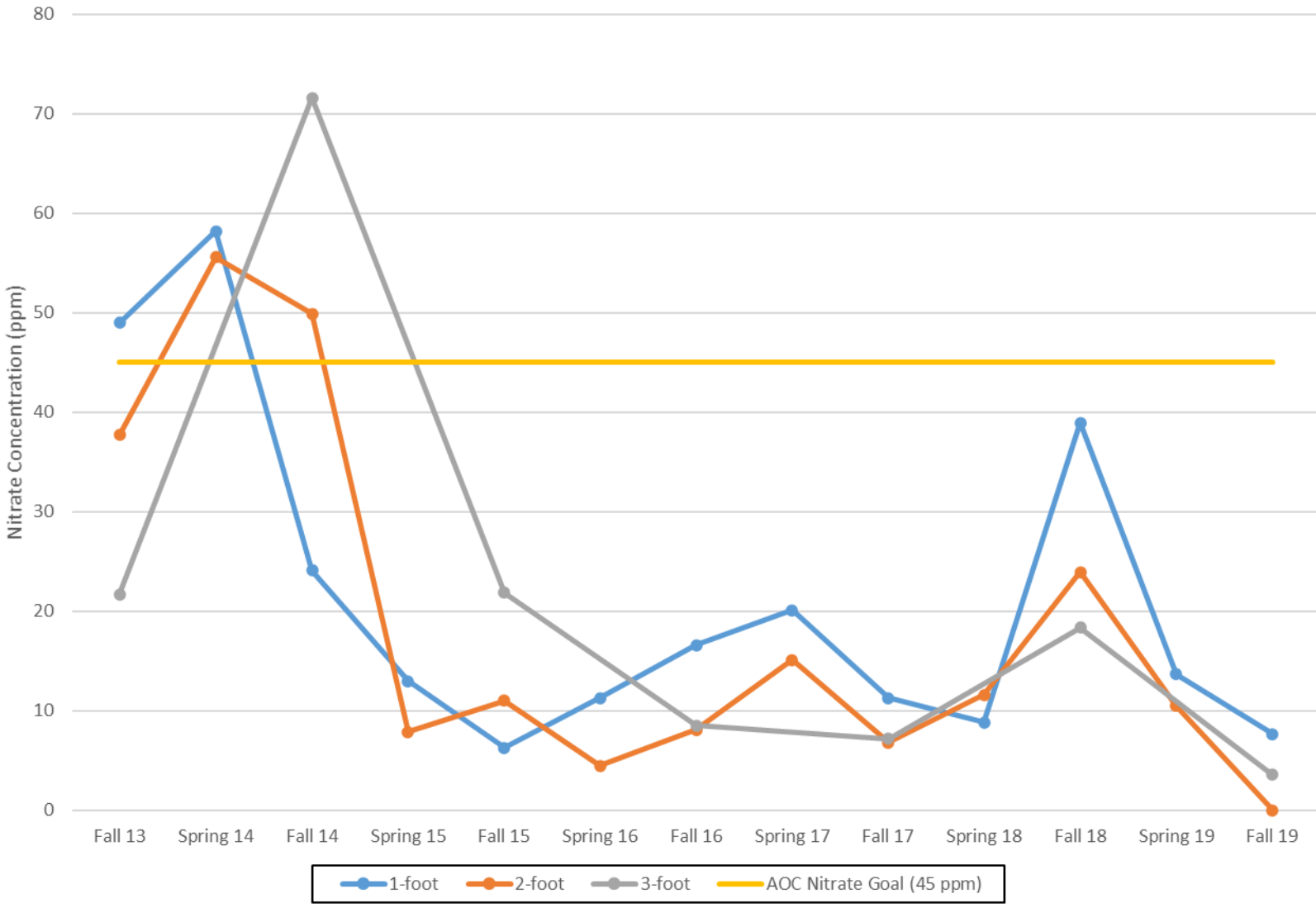

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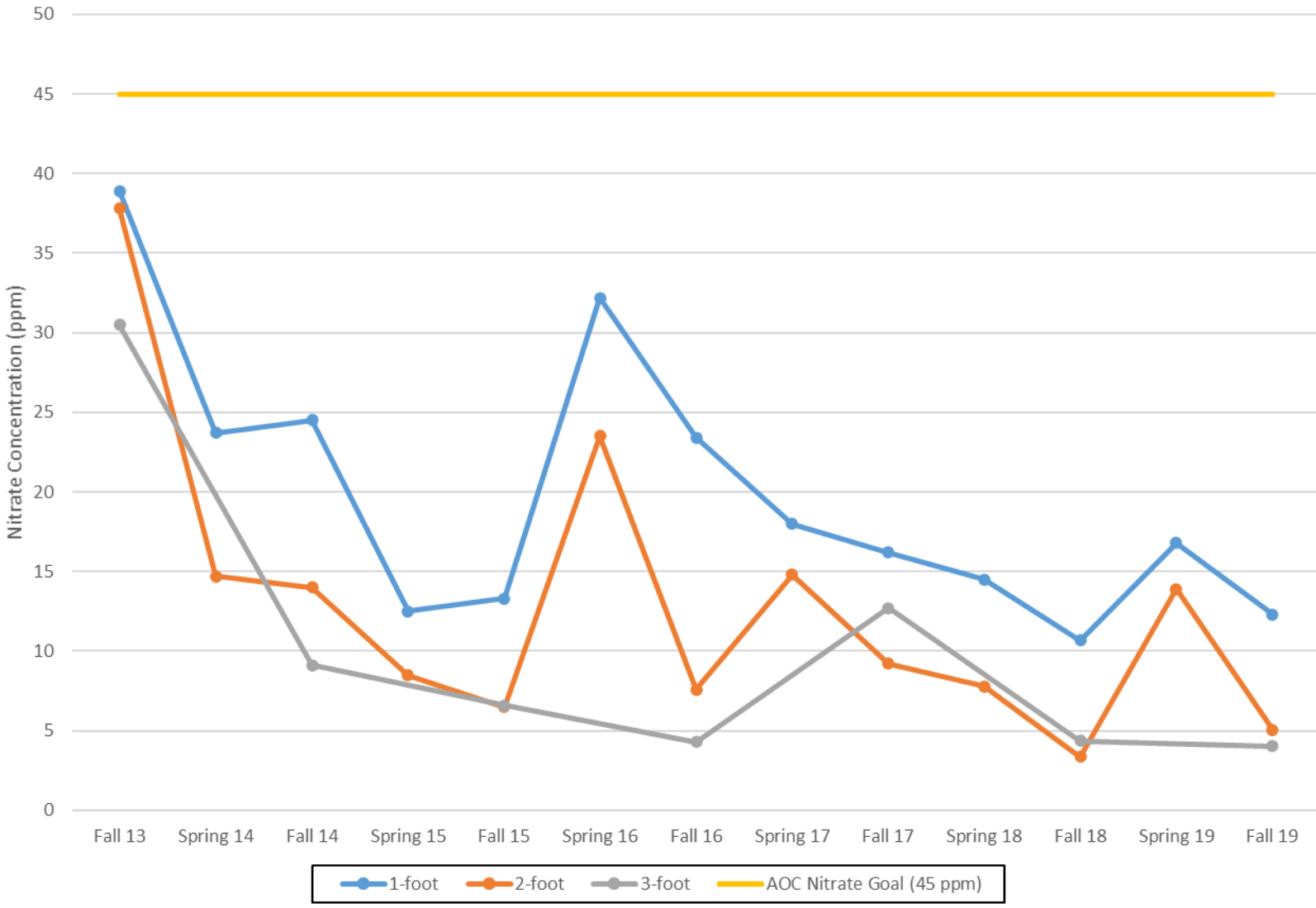
Figure 28j
GDS-SU10 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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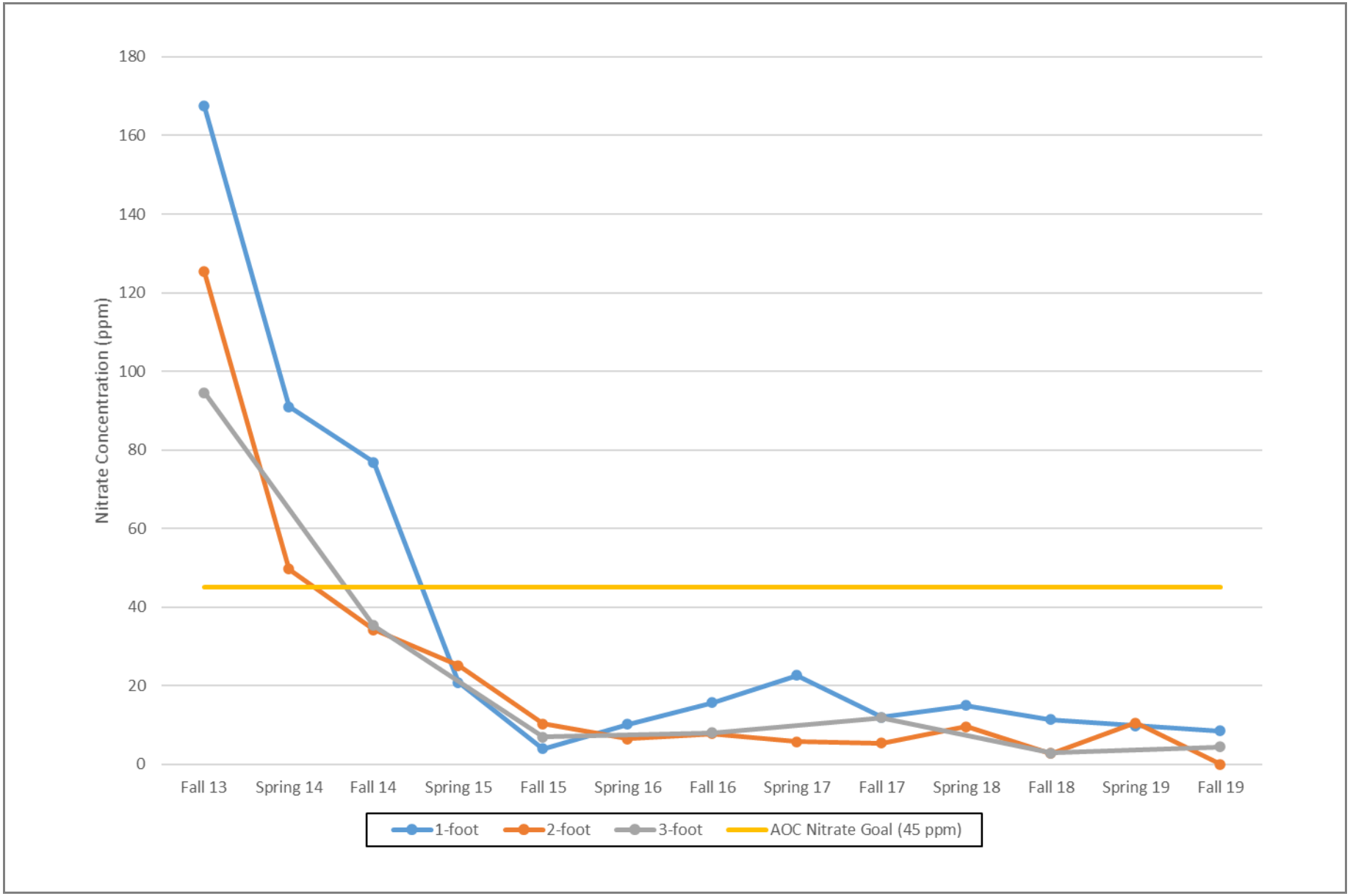
ANCHOR QEA

Figure 28k
GDS-SU11 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies



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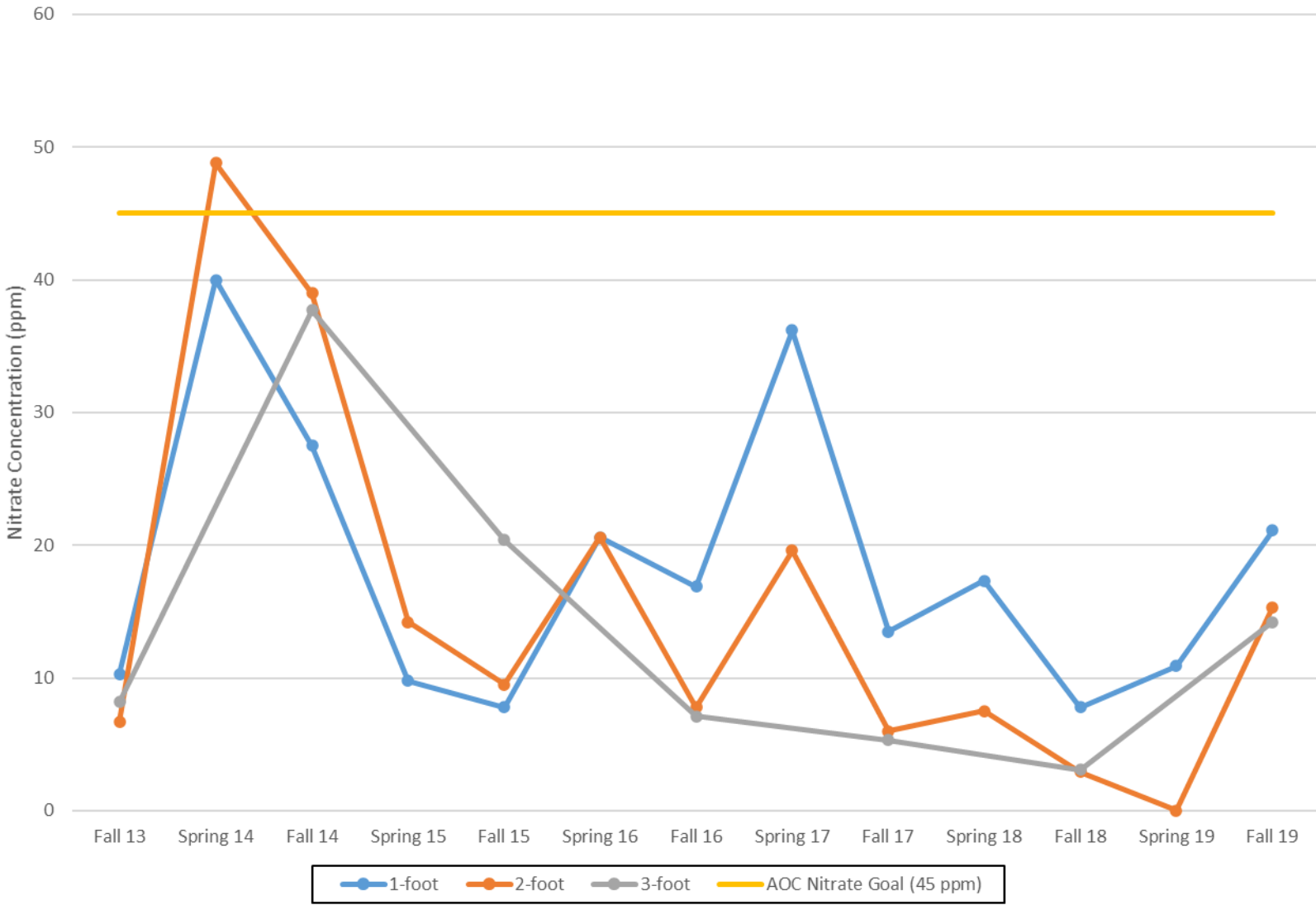
ANCHOR QEA

Figure 28l
GDS-SU12 Nitrate Concentrations
2019 Annual Report
Yakima Valley Dairies



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ANCHOR QEA

Figure 28m
GDS-SU13 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies

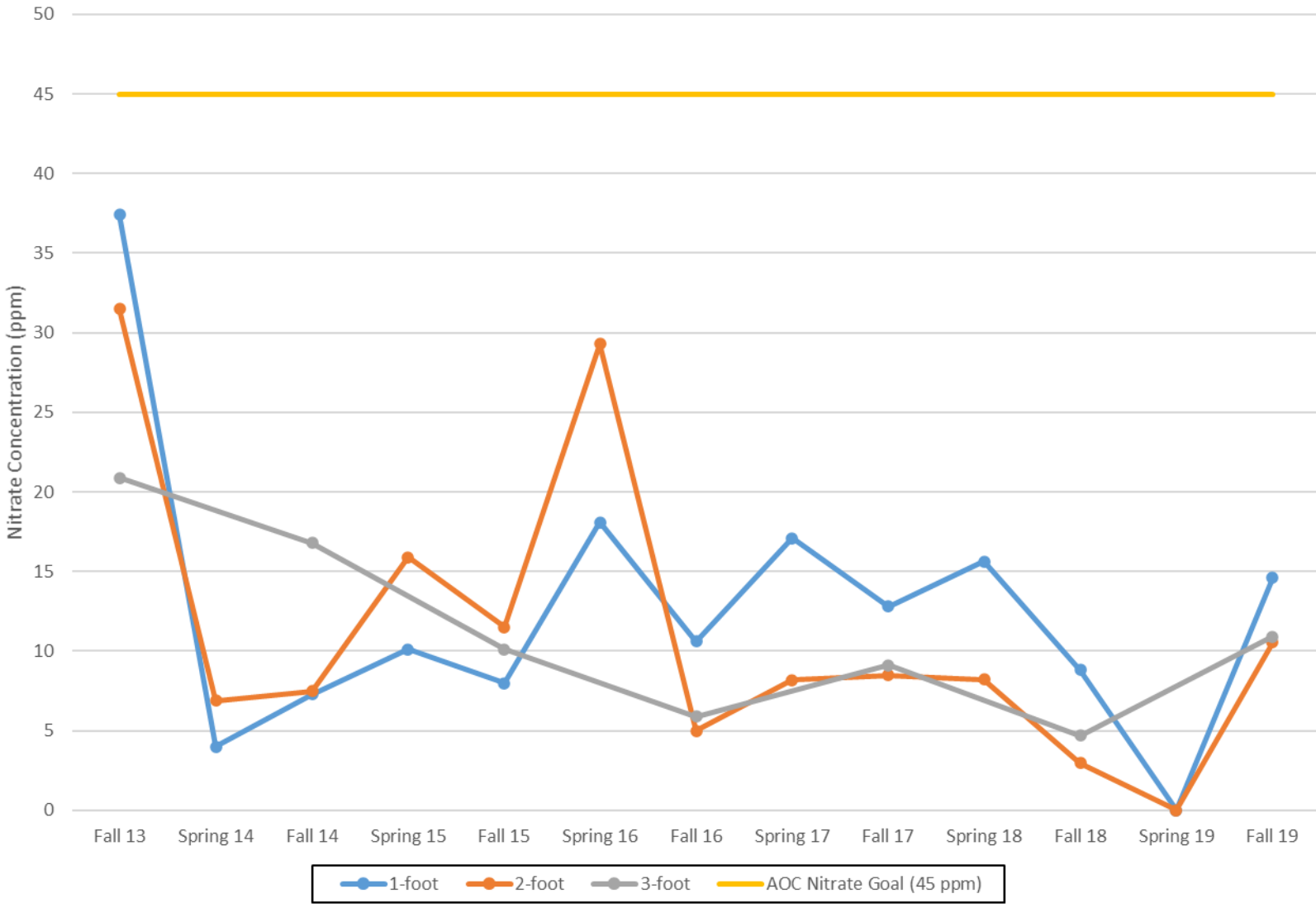

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Figure 28n
GDS-SU14 Nitrate Concentrations

2019 Annual Report
Yakima Valley Dairies

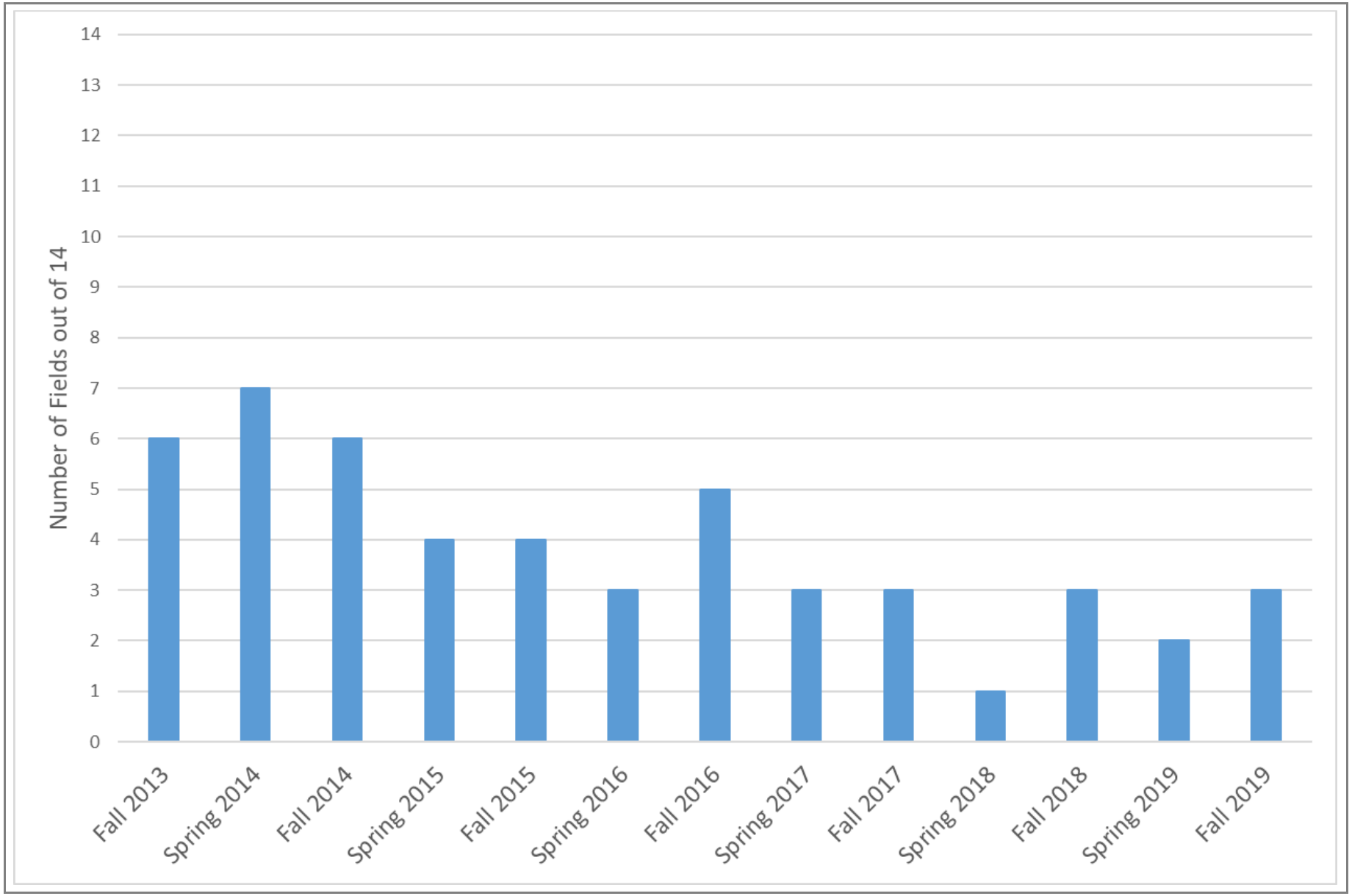

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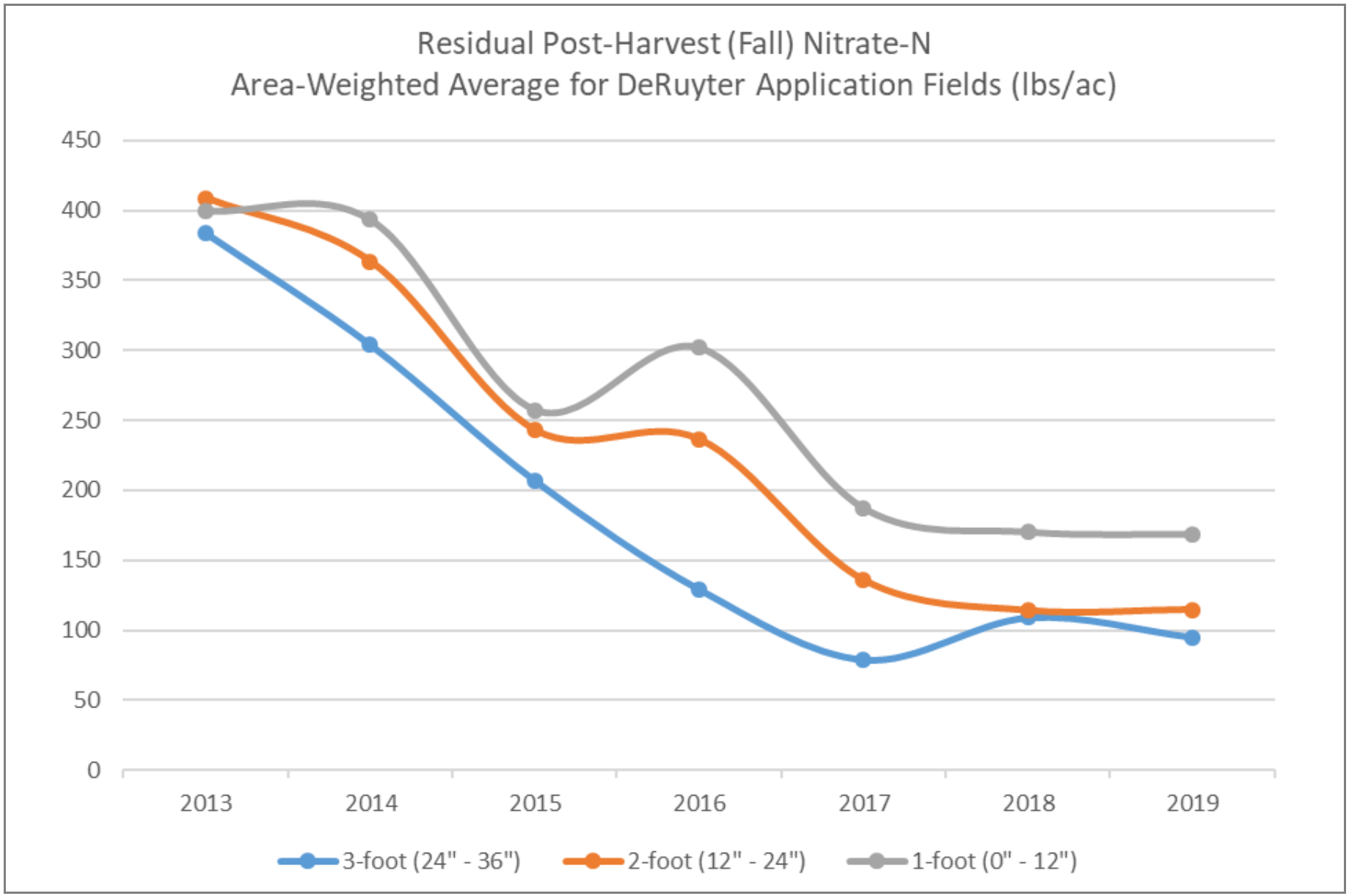
Figure 29
Number of Fields with Soil NO3 over 45 ppm in the Second Foot, George DeRuyter & Son Dairy
2019 Annual Report
Yakima Valley Dairies



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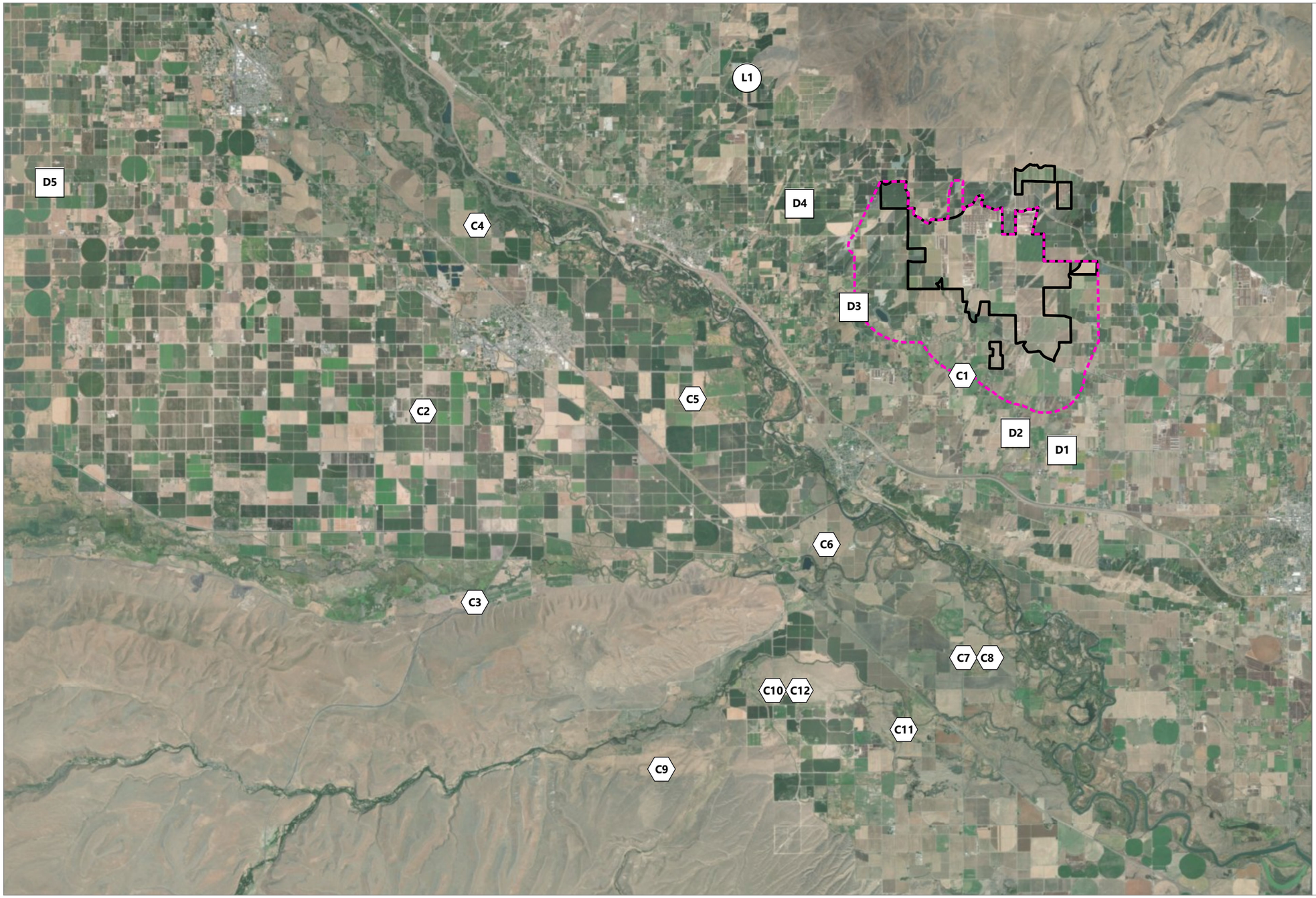

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Figure 31
2019 Off-Site Liquid Manure Transfer Locations
2019 Annual Report
Yakima Valley Dairies

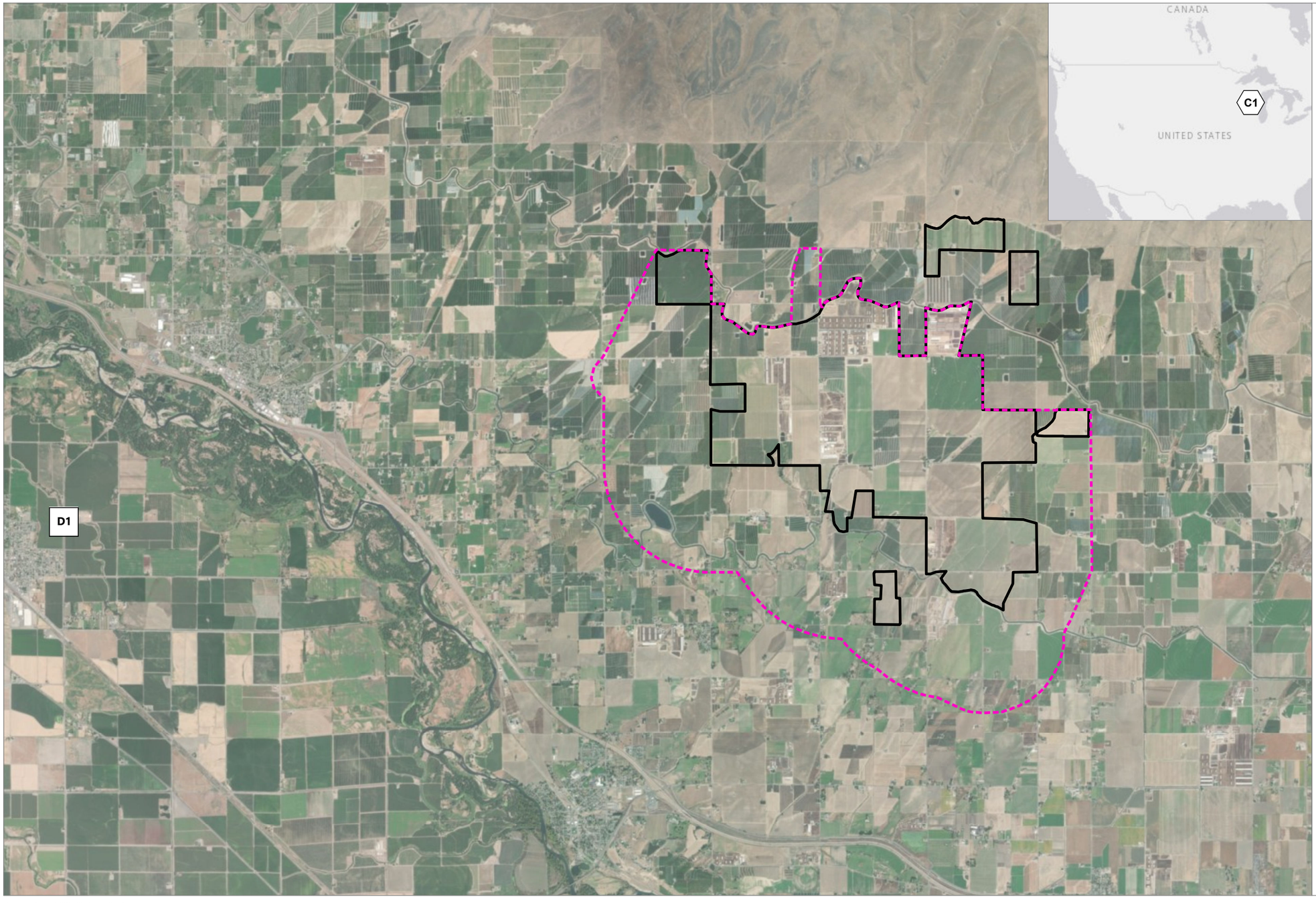

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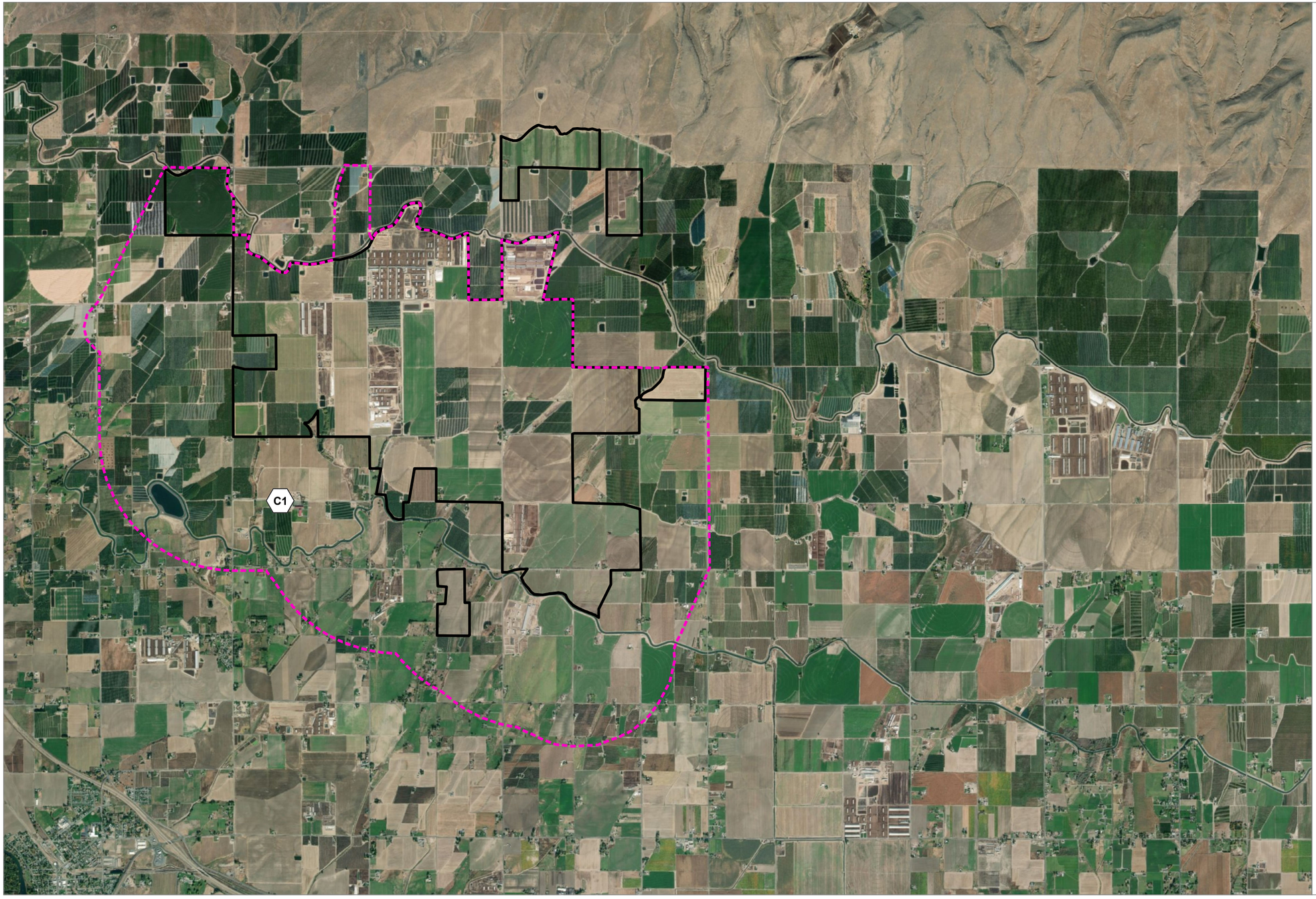
Figure 32
2019 Off-Site Solid Manure Transfer Locations
2019 Annual Report
Yakima Valley Dairies



LEGEND:

- Cow Palace Dairy
- Yakima Valley Dairies
- 1-mile Downgradient Boundary

0 1

Miles

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ANCHOR QEA

Figure 33
2019 Off-Site First-Party Compost Sales
2019 Annual Report
Yakima Valley Dairies