

**ADDENDUM TO FACT SHEET FOR STATE WASTE DISCHARGE
PERMIT ST0501320**

Skagit Valley Farms Cooling

Date of Public Notice: November 26, 2024

DRAFT

I. General Information

Facility: Skagit Valley Farms Cooling (SVFC)

Facility Location: 11263 Pulver Road, Burlington, WA 98233

Discharge Location: 1.5 acres of pasture, Section 31, T35N, R4E.

This is an addendum to the permit and fact sheet for the State Waste Discharge Permit No. ST0501320, issued on June 25, 2020. This permit modification includes changes in the characteristics of the discharge beyond those previously authorized. Therefore, in accordance with WAC 173-216-090(5), Ecology will hold a public comment period for this permit.

On September 8, 2023, Skagit Valley Farms Cooling (SVFC) submitted a written request for:

i) lowering of permit fees for the following reasons:

SVFC installed a new water recirculation system in late 2023 that significantly reduces the amount of daily discharge water. Even under the current system, their discharge volume is considerably below the original permit allowance.

SVFC decommissioned the ice maker and removed 90 tons of ice melt runoff annually. SVFC eliminated two water-intensive crops, namely Broccoli and Cauliflower, from their processing program. Brussels Sprouts is the only commodity currently processed in the plant.

ii) reduction in monitoring

II. Modifications to the Permit

The permittee requested a change to the fee category for this facility, as there is a reduction in the actual discharge volume. The permit fees are based on the permitted maximum discharge and not on the actual discharge volume. The permitted maximum discharge for SVFC remains at 33,000 gpd. Therefore, no change to the permit fee category has been made.

Ecology reviewed the permit limits and early warning values, reviewed the monitoring frequency, added MW-4 to Special Condition S2.B, and clarified that the irrigation wet well pump station is at the same location as Outfall 001, MP-01.

Ecology also used the updated permit template for the modified permit, which includes accessibility requirements. All changes in the modified permit, except formatting changes, are identified with gray highlighting.

The following changes are made to the permit:

1. Change of effluent limit for Total Dissolved Solids applied to MP01

Ecology is changing the effluent limit for Total Dissolved Solids (TDS) at Outfall 001 (monitoring point MP01). The average monthly TDS effluent limit is changed from 250 milligrams per liter (mg/L) to 457 mg/L.

Due to the lack of availability of facility data, the TDS data included in the 2018 permit application were from a similar facility, and the average monthly limit was set at one-half of the groundwater standard. Since the issuance of the permit, the facility has collected data on the actual wastewater generated at the facility. The Water Quality Standards for Groundwaters of Washington State (WAC 173-200-050(3)(b)(i)) anti-degradation policy allows for natural concentrations to be substituted for the groundwater standards when the natural groundwater concentrations are higher than the groundwater quality standards. This is the justification used to raise the TDS limit. The average natural background for TDS (based on 30 samples from MW-1, MW-2, MW-3, and MW-4) is 356 mg/L with a maximum of 644 mg/L (see Table 2 in Appendix D). Therefore, the average monthly limit was raised from 250 mg/L to 457 mg/L (See Appendix D, Tables 4 through Table 6 for limit derivation). The daily maximum limit will remain at 500 mg/L groundwater quality standard.

2. Change of Early Warning Values

Early warning values are calculated using the method detailed by EPA in Appendix E of the Technical Support Document for Water Quality-based Toxics Control (USEPA, 1991). This Appendix details the methods used for normal and natural log statistical distributions. The previous limits were established based on the groundwater standards. As a permit requirement, the facility installed four monitoring wells around the land treatment area. They have now collected approximately two years of quarterly groundwater data between September 30, 2021 and June 4, 2023. This data was statistically evaluated and used to calculate the new early warning values included in the permit.

Ecology set current permit early warning values (average monthly values) for arsenic and manganese at 0.25 micrograms per liter ($\mu\text{g/L}$) and 0.025 mg/L (25 $\mu\text{g/L}$), respectively. These values are half their respective groundwater standards. Data collected from the groundwater monitoring wells provide actual concentrations in the groundwater beneath the land treatment area. Comparing this groundwater data to groundwater standards shows that the 95th percentile arsenic concentrations are close to half the groundwater standard while manganese concentrations are much higher than the standard.

The anti-degradation policy allows for natural concentrations to be substituted for the groundwater standards when the natural groundwater concentrations are higher than the groundwater quality standards. Therefore, the original average monthly early warning value of 0.25 $\mu\text{g/L}$ for arsenic is being changed to an average monthly value of 0.26 $\mu\text{g/L}$ and a new daily maximum of 0.37 $\mu\text{g/L}$ is being added. Manganese in the local groundwater is significantly above the groundwater standard of 0.05 mg/L with an average concentration of 6.59 mg/L for all wells. For this reason, the early warning values for manganese are changed from 0.025 mg/L to 16 mg/L average monthly, and a daily maximum of 22 mg/L is being added (See Appendix D, Table 4 for limit calculations). A discussion of limit derivation can be found in Appendix D of the original Fact Sheet).

3. Change in Monitoring Frequency

The Permittee requested a re-evaluation of monitoring frequency for monitoring point MP01. Ecology has reviewed monitoring data at MP01 between July 1, 2020, and January 1, 2023. Ecology approves a reduction in monitoring frequency from monthly to quarterly at MP01 for the following parameters (Table 1).

Ecology changed the monitoring frequency for ammonia – nitrogen, arsenic, total phosphorous, ortho-phosphate, oil & grease, and Northwest total petroleum hydrocarbon - diesel range (NWTPH-Dx) from monthly to quarterly.

The Permittee also requested that monitoring for Total Coliform increase from annually to semi-annually to align with sampling for other parameters. Ecology approves this request.

Table 1. Parameters with reduced monitoring

| Parameter | Justification |
|-------------------|---|
| Ammonia | Ammonia monitoring was established for data collection purposes and as a safeguard should there be a release to surface water. Measured concentrations at MP01 to date have been below 1.5 mg/L, which is low risk to surface water. This allows for reducing monitoring frequency. |
| Arsenic | Concentrations at MP01 have consistently been below the early warning value for MP01 and 10 samples have been below the detection limit. This allows for reducing monitoring frequency. |
| Total Phosphorous | Total phosphorous monitoring was established for data collection purposes and as a safeguard should there be a release to surface water. The data collected shows that total phosphorous is present in the effluent, but there is no groundwater quality standard for total phosphorus. In addition, there are no connections to surface water near the land application site that could be impacted by this discharge. Monitoring is still recommended, but the frequency can be reduced due to low risk to surface water. |
| Ortho-phosphate | Ortho-phosphate monitoring was established for data collection purposes and as a safeguard should there be a release to surface water. The data collected shows that ortho-phosphate is present in the effluent, but there is no groundwater quality standard for ortho-phosphate. In addition, there are no connections to surface water near the land application site that could be impacted by this discharge. Monitoring is still recommended, but the frequency can be reduced due to low risk to surface water. |
| Oil & Grease | Oil & grease monitoring was established for data collection purposes and as a safeguard should there be a release to surface water. Data collected to date show concentrations less than 30 mg/L and averaging less than 10 mg/L. As there is no groundwater quality standard for Oil & Grease and no nearby water bodies that could be impacted by the discharge, monitoring is still recommended, but the frequency can be reduced. |

| Parameter | Justification |
|-----------|---|
| NWTPH-Dx | NWTPH-Dx monitoring was established for data collection purposes. The collected data has been below 3 mg/L or below the detection limit. Eight (8) samples were below the detection limit. This allows for reducing monitoring frequency. |

As this is the first permit cycle Ecology believes it is inappropriate to reduce groundwater monitoring to anything less than quarterly, therefore groundwater monitoring frequencies were kept at a minimum of quarterly. These changes are marked in Table 3 of the permit. The other effluent monitoring parameters show consistent detections and will therefore remain at a monthly frequency.

4. Adding Missing Upgradient Well to the Monitoring List

Monitoring well MW-4 was inadvertently left off the groundwater monitoring list in Section S2.B and Table 5 of the permit. This well was added to the descriptive text for this section and the title of Table 5.

5. Revision of Northwest Region Office Address and Phone Numbers

Ecology's Northwest Region Office moved to Shoreline, WA. All Ecology addresses and phone numbers referenced in the permit were updated to the new location. The changes are reflected in Section S3. B and the cover page of the permit.

6. Removal of "Continuous" DMR reporting

Special Condition S3.A.10(a.) is deleted as continuous data is reported at the monthly level. The remaining items in the list have been renumbered.

7. Appendix A Detection Level and Quantitation Level Language Change

The language in Appendix A for detection level (DL) and quantitation level (QL) has been revised to current definitions.

8. Revision of Fact Sheet Appendix B – Right to Appeal

The text was revised in the latest updates to the State Waste Discharge permit template. See Appendix B, below.

II.B. Justification

Chapter 173-216-130 (2) allows the Department of Ecology to modify State Waste Discharge Permits for good and valid cause. This permit is modified as per WAC 173-216-130 (c) to address the material changes in quantity or type of waste disposal. The changes included in this permit modification are considered major modifications, both due to the reduced monitoring frequency during the permit term and the increase in the effluent limit for TDS based on measured, natural groundwater data collected since the permit was last issued.

III. Public Process

The proposed changes involve an increase in wastewater pollutant concentrations; therefore, Ecology will print a public notice of this modification. Ecology public notices the availability of the draft permit modification at least 30 days before it issues the

modification. Ecology invites the public to review and comment on its decision to modify the permit (see Appendix A-Public Involvement Information for more details on the Public Notice procedures).

After the public comment period has closed, Ecology will prepare a Response to Comments document and attach it to this fact sheet addendum. Ecology will respond to each comment and describe the resultant changes to the permit in this document. Ecology sends a copy of the Response to Comments to all parties that submitted comments.

IV. Recommendation for Permit Issuance

Ecology proposes to retain the existing permit expiration date of June 30, 2025. The proposed modification is effective immediately.

V. References for Text and Appendices

Washington State and Ecology website general reference links:

[Laws and Regulations](#)¹

[Permit and Wastewater Related Information](#)²

Ecology. (1993). *Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems*. Retrieved from <https://apps.ecology.wa.gov/publications/documents/9336.pdf>

Ecology. (2005). *Implementation Guidance for the Ground Water Quality Standards*. Retrieved from <https://apps.ecology.wa.gov/publications/SummaryPages/9602.html>

Ecology. (2023). *Criteria for Sewage Works Design, Publication 98-37 (Orange Book)*. Retrieved from <https://apps.ecology.wa.gov/publications/SummaryPages/9837.html>

Miller, R. O., Gavlak, R., & Horneck, D. (2013). *Western States Laboratory Plant, Soil and Water Analysis Manual, Soil, Plant and Water Reference Methods for the Western Region*. Retrieved from <https://www.naptprogram.org/files/napt/publications/method-papers/western-states-methods-manual-2013.pdf>

USEPA. (1991). *Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001)*. Washington, DC.

¹ <http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx>

² <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance>

Appendix A – Public Involvement Information

Ecology proposes to modify the existing permit, as issued on June 25, 2020, to Skagit Valley Farms Cooling. The permit includes wastewater discharge limits and other conditions. The existing fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

The modified permit retains the same terms and conditions except:

- An increased Effluent Early Warning Value for arsenic based on additional background groundwater data. The value increased to 0.26 µg/L from 0.25 µg/L.
- An increased Effluent Early Warning Value for manganese based on additional background groundwater data. The value increased to 16 mg/L from 0.025 µg/L.
- An increased effluent permit limit for TDS from 250 mg/L to 457 mg/L.

Ecology will place a Public Notice of Modification on November 26, 2024 in the Skagit Valley Herald to inform the public and to invite comment on the proposed modified State Waste Discharge permit and fact sheet addendum

The notice:

- Tells where copies of the draft Permit and Fact Sheet are available for public evaluation (the closest Regional or Field Office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Urges people to submit their comments, in writing, before the end of the Comment Period
- Tells how to request a public hearing of comments about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

[Frequently Asked Questions about Effective Public Commenting³](#)

You may obtain further information from Ecology by telephone, (206) 594-0000, or by writing to the address listed below.

Water Quality Permit Coordinator Department of Ecology
Northwest Region Office
P.O. Box 330316
Shoreline, WA 98133-9716

The primary author of this permit and fact sheet is Adrienne Yang, PE.

³ <https://apps.ecology.wa.gov/publications/SummaryPages/0307023.html>

Appendix B – Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. “Date of receipt” is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours as defined in WAC 371-08-305 and -335. “Notice of appeal” is defined in WAC 371-08-340.
- Serve a copy of your appeal and this permit on Ecology on the Department of Ecology mail, in person, or by email (see addresses below).

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

Filing with the PCHB

For the most current information regarding filing with the PCHB: visit <https://eluhho.wa.gov/>⁴ or call 360-664-9160.

Service on Ecology

Street Address:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Mailing Address:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

E-Mail Address:

ecologyappeals@ecy.wa.gov

⁴ <https://eluhho.wa.gov/>

Appendix C – Intentionally Left Blank

Appendix D — Technical Calculations

Table 2 - Descriptive Statistics – All Wells (Samples from July 1, 2021 through April 4, 2023)

| Parameter ^A | Count ^B | Average | Maximum | Minimum | Median | Geomean | Std Dev ^C | Variance | CV ^D | 90th Percentile (10th) ^E | 95th Percentile (5th) ^E |
|-------------------------------|--------------------|---------|---------|---------|--------|---------|----------------------|-----------|-----------------|--|---------------------------------------|
| Ammonia | 30 | 1.12 | 2.79 | 0.010 | 1.19 | 0.525 | 0.922 | 0.850 | 0.824 | 2.40 | 2.46 |
| Arsenic | 30 | 0.102 | 0.952 | 0.003 | 0.07 | 0.055 | 0.168 | 0.028 | 1.65 | 0.135 | 0.178 |
| BOD ₅ ^F | 30 | 5.01 | 17.0 | 1.00 | 4.25 | 4.00 | 3.46 | 12.0 | 0.692 | 9.03 | 10.02 |
| Chloride | 30 | 47.4 | 80.3 | 20.6 | 48.7 | 44.6 | 15.8 | 250 | 0.334 | 64.7 | 75.2 |
| Dissolved Oxygen | 30 | 6.04 | 9.34 | 2.02 | 5.84 | 5.63 | 2.16 | 4.66 | 0.358 | 8.96 | 9.16 |
| Iron | 20 | 138 | 561 | 12.7 | 99.5 | 94.7 | 128 | 16,388 | 0.927 | 229 | 322 |
| Magnesium | 15 | 39.2 | 70.8 | 22.9 | 31.6 | 36.5 | 15.9 | 252 | 0.405 | 61.4 | 66.7 |
| Manganese | 40 | 6.59 | 37.2 | 0.261 | 3.75 | 3.783 | 8.183 | 67.0 | 1.242 | 12.1 | 23.5 |
| Nitrate + Nitrite | 30 | 0.23 | 2.22 | 0.006 | 0.03 | 0.049 | 0.535 | 0.286 | 2.365 | 0.88 | 1.42 |
| Nitrogen, Total | 30 | 3.18 | 9.73 | 0.530 | 2.86 | 2.59 | 2.04 | 4.16 | 0.642 | 5.17 | 6.91 |
| ORP | 30 | 228 | 462 | 0.100 | 220 | 177 | 77.0 | 5,926 | 0.337 | 305 | 315 |
| Ortho-phosphate | 30 | 0.15 | 0.91 | 0.010 | 0.10 | 0.110 | 0.161 | 0.026 | 1.09 | 0.26 | 0.32 |
| Max pH | 30 | 6.23 | 7.00 | 4.99 | 6.22 | 6.22 | 0.327 | 0.107 | 0.052 | 6.51 | 6.72 |
| Min pH | 30 | 6.23 | 7.00 | 4.99 | 6.22 | 6.22 | 0.327 | 0.107 | 0.052 | 6.51 | 6.72 |
| Phosphorous | 30 | 5.20 | 55 | 0.119 | 2.20 | 1.90 | 10.184 | 104 | 1.958 | 10.55 | 14.38 |
| Specific Conductivity | 30 | 526 | 927 | 284 | 488 | 503 | 163 | 26,612 | 0.310 | 763 | 792 |
| Sulfate | 30 | 41.8 | 72.2 | 4.00 | 45.0 | 37.2 | 16.5 | 272 | 0.395 | 59.2 | 67.0 |
| TDS | 30 | 356 | 644 | 186 | 340 | 337 | 120 | 14,301 | 0.336 | 484 | 566 |
| TKN | 30 | 2.98 | 9.72 | 0.490 | 2.53 | 2.32 | 2.12 | 4.49 | 0.710 | 5.10 | 6.85 |
| TSS | 30 | 1,873 | 10,300 | 10.0 | 645 | 661 | 2,830 | 8,008,922 | 1.51 | 6,547 | 8,363 |
| Turbidity | 30 | 1,367 | 7,900 | 50.0 | 575 | 573 | 2,095 | 4,388,218 | 1.53 | 4,780 | 6,455 |

A All values are in milligrams per liter (mg/L); except arsenic, which is in micrograms per liter (µg/L); pH, which is in standard units (SU); and specific conductivity, which is in micromhos per centimeter (µmhos/cm).

B Statistics below include all values, including outliers.

C Std Dev: Standard Deviation.

D CV: Coefficient of Variation.

E All values are the 90th and 95th percentile, except for Min pH, which are the 10th and 5th percentiles, respectively.

F BOD₅: 5-day Biological Oxygen Demand.

Table 3 - Limit Calculations Description from EPA/505/2-90-001, Technical Support Document for Water Quality-based Toxics Control

| COLUMN | Where: | Description |
|--------|--------------------------|--|
| A | Location | Location of the sampling point. In this case it is the combined data from all wells (MW-1, MW-2, MW-3, and MW-4). |
| B | Date Range | The date range over which the samples were collected. |
| C | Parameter | The parameter analyzed. |
| D | Units | The units of the parameter value. |
| E | K | Total number of results. |
| F | NDs | Total number of non-detected samples. |
| G | k – r | Total number of detected samples. Calculated as column E minus Column F (K - NDs). |
| H | δ = NDs / k | The ratio of non-detected results to the total number of results. |
| I | μy | The estimated mean (average) of all results. Equation is: $\frac{\sum [x_i]}{k}$, $1 \leq i \leq k$. |
| | | Where: |
| | | xi = The value in Colum E if parameter is normally distributed (e.g., pH). |
| | | xi = The value in Column J (natural log) if the parameter is log-normally distributed (e.g., chloride). |
| | | xi = The value in Column K (delta-lognormal [natural log without non-detects]) if the parameter results contain non-detects (r > 0) (e.g., BOD5); OR if the parameter is some other distribution (e.g., TSS is a cube-root normal distribution). |
| | | |
| | | |
| J | σ2y | The estimated variance of all results. Equation is: $\frac{\sum [(x_i - \hat{\mu})^2]}{(k-1)}$, $1 \leq i \leq k$. xi is the same as the mean, above. |
| K | σy | The standard deviation of all results. Equation is: $\sqrt{\hat{\sigma}^2}$. |
| L | 1 – δ | Percent of parameters detected. |
| M | E(x) | The Daily Average of a log-normal distribution. Equation is: $e^{\left(\mu_y + \frac{\sigma^2_y}{2}\right)}$ |
| N | V(x) | The Variance of a log-normal distribution. Equation is: $e^{\left(2*\mu_y + e^{\sigma^2_y}\right)} * \left(e^{\sigma^2_y} - 1\right)$ |
| O | cv(x) | The Coefficient of Variation of a log-normal distribution. Equation is: $\sqrt{\left(e^{\sigma^2_y} - 1\right)}$ |
| P | Ê(X*) | The Daily Average of a delta-lognormal distribution (e.g., a log-normal distribution that contains both measured and non-detect values). Equation is: $\delta D + (1 - \delta) e^{\left(\mu_y + \frac{\sigma^2_y}{2}\right)}$ |
| Q | V^(X*) | The Variance of a delta-lognormal distribution. Equation is: $(1 - \delta) e^{\left(\mu_y + \frac{\sigma^2_y}{2}\right)} * \left[e^{\sigma^2_y} - (1 - \delta)\right] + \delta(1 - \delta)D \left[D - 2e^{\left(\mu_y + \frac{\sigma^2_y}{2}\right)} \right]$ |
| R | cv(X*) | The Coefficient of Variation of a delta-lognormal distribution. Equation is: $\frac{\sqrt{\hat{V}(X^*)}}{\hat{E}(X^*)}$ |
| S | Z*(0.95) | Z-score determined from a standard table of percentiles. For a parameter WITH NO non-detects z*(0.95) = 1.6449. For a parameter WITH non-detects z*(0.95) = $\varphi^{-1} \left[\frac{(0.95 - \delta)}{1 - \delta} \right]$; where φ-1 is the mathematical notation for z-score, δ is from Column H, and 1 – δ is from Column L. |
| T | Z*(0.99) | Z-score determined from a standard table of percentiles. For a parameter WITH NO non-detects z*(0.99) = 2.3263. For a parameter WITH non-detects z*(0.99) = $\varphi^{-1} \left[\frac{(0.99 - \delta)}{1 - \delta} \right]$; where φ-1 is the mathematical notation for z-score, δ is from Column H, and 1 – δ is from Column L. |
| U | Daily Max (X.95) | The daily maximum value at the 95 percent confidence interval. Equation is $\hat{\mu} + z_{0.95}\hat{\sigma}$, for a normal distribution; or $exp[\hat{\mu}_y + z^*_{0.95}\hat{\sigma}_y]$, for a lognormal distribution. |
| V | Daily Max (X.99) | The daily maximum value at the 99 percent confidence interval. Equation is $\hat{\mu} + z_{0.99}\hat{\sigma}$, for a normal distribution; or $exp[\hat{\mu}_y + z^*_{0.99}\hat{\sigma}_y]$, for a lognormal distribution. |
| W | Daily Max (X.95) (w NDs) | The daily maximum value at the 95 percent confidence interval. Equation is $\hat{\mu} + z^*_{0.95}\hat{\sigma}$, for a normal distribution; or $exp[\hat{\mu}_y + z^*_{0.95}\hat{\sigma}_y]$, for a lognormal distribution. Where z* is the mathematical z-score for the percent value shown in column S. |

| COLUMN | Where: | Description |
|--|--|---|
| X | Daily Max (X.99) (w NDs) | The daily maximum value at the 99 percent confidence interval. Equation is $\hat{\mu} + z^*_{0.99}\hat{\sigma}$, for a normal distribution; or $\exp[\hat{\mu}_y + z^*_{0.99}\hat{\sigma}_y]$, for a lognormal distribution. Where z^* is the mathematical z-score for the percent value shown in column T. |
| Y | Daily Max 0.95 Variability Factor | The ratio of the calculated Daily Maximum to the average value for that parameter. The larger the value the more likely the calculated value may be biased high. For a normal distribution the equation is: $\hat{X}_{0.95}/\hat{\mu}$, where $X^{0.95}$ is the calculated Daily Max (X0.95). For log-normal distributions the equation is: $\hat{X}_{0.95}/E(X)$. For delta-lognormal distributions the equation is: $\hat{X}_{0.95}/\hat{E}(X^*)$. |
| Z | Daily Max 0.99 Variability Factor | The ratio of the calculated Daily Maximum to the average value for that parameter. The larger the value the more likely the calculated value may be biased high. For a normal distribution the equation is: $\hat{X}_{0.99}/\hat{\mu}$, where $X^{0.99}$ is the calculated Daily Max (X0.99). For log-normal distributions the equation is: $\hat{X}_{0.99}/E(X)$. For delta-lognormal distributions the equation is: $\hat{X}_{0.99}/\hat{E}(X^*)$. |
| AA | n | The average of yearly sample size. This value of “n” is the one denoted in the variables and equations. |
| AB | σ^2n | Variance of the distribution of the n-day monthly average. The equation is σ^2/n ; where σ^2 is the estimated variance (Column S), and n is the average of yearly sample size in cell AJ4. |
| AC | μ^n | Mean of the distribution of the n-day monthly average. The equation is: μ^n , the estimated mean from Column Q. |
| AD | σ^n | Standard deviation of the distribution of the n-day monthly average. The equation is: $\sqrt{\hat{\sigma}^2_n}$, where σ^2n is from Column AJ. |
| NOTE: Values for σ^2n , μ^n , and σ^n are used for normal distribution ONLY. | | |
| AE | $\hat{E}(X_n)$ | $E(x)$. From Column M for a log-normal distribution, or Column P for a delta-lognormal distribution (log-normal WITH non-detects). |
| AF | $V^n(X_n)$ | $\hat{V}(x)/n$, where $V^n(x)$ is from Column N for a log-normal distribution, or Column Q for a delta-lognormal distribution; and n is from cell AK4. |
| AG | X_n | Average of the n-day monthly average values. |
| AH | $cv^n(X_n)$ | Coefficient of variation of the distribution of the n-day monthly average. The equation is: $\hat{\sigma}^2_n/\hat{\mu}_n$, where σ^2n is from Column AB and μ^n is from Column AC for a normal distribution. Equation is $\sqrt{V(X_n)}/X_n$ for log-normal and delta-lognormal distributions. |
| AI | Average Monthly 0.95 (X0.95(n)) | The average monthly value at the 95 percent confidence interval. Equation is $\hat{\mu}_n + z_{0.95}\hat{\sigma}_n$, for a normal distribution; or $\hat{E}(X_n) + z_{0.95}\sqrt{\hat{V}(X_n)}$ for a lognormal distribution. |
| AJ | Average Monthly 0.99 (X0.99(n)) | The average monthly value at the 99 percent confidence interval. Equation is $\hat{\mu}_n + z_{0.99}\hat{\sigma}_n$, for a normal distribution; or $\hat{E}(X_n) + z_{0.99}\sqrt{\hat{V}(X_n)}$ for a lognormal distribution. |
| AK | Average Monthly 0.95 (X0.95(n)) (w/ NDs) | The average monthly value at the 95 percent confidence interval. Equation is $\hat{\mu}_n + z^*_{0.95}\hat{\sigma}_n$, for a normal distribution; or $\hat{E}(X_n) + z^*_{0.95}\sqrt{\hat{V}(X_n)}$ for a lognormal distribution. Where z^* is the mathematical z-score for the percent value shown in column S. |
| AL | Average Monthly 0.99 (X0.99(n)) (w/ NDs) | The average monthly value at the 99 percent confidence interval. Equation is $\hat{\mu}_n + z^*_{0.99}\hat{\sigma}_n$, for a normal distribution; or $\hat{E}(X_n) + z^*_{0.99}\sqrt{\hat{V}(X_n)}$ for a lognormal distribution. Where z^* is the mathematical z-score for the percent value shown in column T. |
| AM | Normality | List the normality of the distribution type (normal, log-normal, etc.). |

Table 4 - Effluent Limit Calculation Results from TSD for WQ Limits for Groundwater

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
|-----------|-------------------------|-----------|-------|--------------|-----|---------|---------------------------|---------|-------------|------------|--------------|------|------|-------|----------------|-------------------|--------|
| Location | Date Range | Parameter | Units | k (count) | NDs | k - NDs | $\delta = \text{NDs} / k$ | μy | $\sigma 2y$ | σy | $1 - \delta$ | E(X) | V(X) | cv(X) | $\hat{E}(X^*)$ | $V^{\wedge}(X^*)$ | cv(X*) |
| ALL Wells | 07/02/2021 - 04/03/2023 | Arsenic | µg/L | 30 | 0 | 30 | 0 | (2.90) | 1.34 | 1.16 | 100% | 0.11 | 0.03 | 1.68 | -- | -- | -- |
| ALL Wells | 07/02/2021 - 06/01/2023 | Manganese | mg/L | 40 | 0 | 40 | 0 | 1.33 | 1.17 | 1.08 | 100% | 6.79 | 103 | 1.49 | -- | -- | -- |
| ALL Wells | 07/02/2021 - 04/03/2023 | TDS | mg/L | 30 | 0 | 30 | 0 | 356 | 14,301 | 120 | 100% | -- | -- | -- | -- | -- | -- |

Table 5 - Effluent Limit Calculation Results from TSD for WQ Limits for Groundwater (continued)

| A | B | C | D | S | T | U | V | W | X | Y | Z | AA | AB |
|-----------|-------------------------|-----------|-------|----------|----------|---------------------|---------------------|------------------------------|------------------------------|---|--|------|---------------------|
| Location | Date Range | Parameter | Units | Z*(0.95) | Z*(0.99) | Daily Max (X.95) | Daily Max (X.99) | Daily Max (X.95) (w/ NDs) | Daily Max (X.99) (w/ NDs) | Daily Max 0.95 Variability Factor | Daily Max 0.99 Variability Factor | n | $\sigma^{\wedge}2n$ |
| ALL Wells | 07/02/2021 - 04/03/2023 | Arsenic | µg/L | 1.6449 | 2.3263 | 0.369 | 0.812 | -- | -- | 3.44 | 7.56 | 3.75 | -- |
| ALL Wells | 07/02/2021 - 06/01/2023 | Manganese | mg/L | 1.6449 | 2.3263 | 22.4 | 46.9 | -- | -- | 3.30 | 6.90 | 3.5 | -- |
| ALL Wells | 07/02/2021 - 04/03/2023 | TDS | mg/L | 1.6449 | 2.3263 | 552 | 634 | -- | -- | 1.55 | 1.78 | 3.75 | 3,814 |

Table 6 - TSD for WQ Limits – Groundwater, other groundwater constituents (continued)

| A | B | C | D | AC | AD | AE | AF | AG | AH | AI | AJ | AK | AL | AM |
|-----------|-------------------------|-----------|-------|-----------------|--------------------|------------------|------------------|-------|-----------------|--------------------------------------|--------------------------------------|--|---|-------------|
| Location | Date Range | Parameter | Units | $\mu^{\wedge}n$ | $\sigma^{\wedge}n$ | $E^{\wedge}(Xn)$ | $V^{\wedge}(Xn)$ | Xn | cv^{\wedge}(Xn) | Average Monthly 0.95 (X.95(n)) | Average Monthly 0.99 (X.99(n)) | Average Monthly 0.95 (X.95(n)) (w/ NDs) | Average Monthly 0.99 (X.99(n)) (w/ NDs) | Normality |
| ALL Wells | 07/02/2021 - 04/03/2023 | Arsenic | µg/L | -- | -- | 0.107 | 0.009 | -2.91 | -0.032 | 0.260 | 0.324 | -- | -- | Natural log |
| ALL Wells | 07/02/2021 - 06/01/2023 | Manganese | mg/L | -- | -- | 6.79 | 29.4 | 1.32 | 4.12 | 15.7 | 19.4 | -- | -- | Natural log |
| ALL Wells | 07/02/2021 - 04/03/2023 | TDS | mg/L | 356 | 61.8 | -- | -- | -- | 0.174 | 457 | 499 | -- | -- | Normal |

Appendix E — Response to Comments

[Ecology will complete this section after the public notice of draft period.]