

June 19, 2019

Jaime Thompson
City of Yakima
2220 E. Viola
Yakima, WA 98901

Subject: June 2019 Bioassay Report

Dear Jaime,

Enclosed are results for the chronic whole effluent toxicity test using the test species *Pimephales promelas* (fathead minnow) conducted with samples collected in June 2019.

The highest concentration with no observed effect (NOEC) was 100 percent effluent for both survival and reproduction, indicating no statistically significant difference occurred between the control and the acute critical effluent concentration (ACEC) of 53.8 percent effluent or the chronic critical effluent concentration (CCEC) of 9.88 percent effluent.

The enclosed computer disk contains a pdf copy of the final report and a copy of the statistical analyses. Please forward the disk to WDOE. Please contact us if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Eric Tollefson". The signature is written in a cursive, slightly slanted style.

Eric Tollefson
Rainier Environmental



**Whole Effluent Toxicity Test Report:
City of Yakima**

June 2019 Chronic Testing

Report date: June 19, 2019

Submitted to:

City of Yakima
2220 E. Viola
Yakima, WA 98901

Rainier Environmental
5013 Pacific Hwy East
Suite 20
Tacoma, WA 98424

1.0 INTRODUCTION

A chronic toxicity test was conducted using effluent samples collected from City of Yakima Wastewater Treatment Plant in June 2019. The bioassay was conducted using the test organism *Pimephales promelas* (fathead minnow). Testing was performed at Rainier Environmental Laboratory located in Tacoma, Washington.

2.0 METHODS

2.1 Sample Collection and Transport

Three 24-hr. composite effluent samples were collected into 10-liter (L) LDPE cubitainers by City of Yakima personnel. The samples were packed in a cooler containing ice and shipped overnight to Rainier Environmental. Appropriate chain-of-custody procedures were employed during collection and transport.

2.2 Sample Receipt

Upon arrival at Rainier Environmental, the coolers were opened, samples inspected, and the contents verified against information provided on the chain-of-custody forms. Receipt temperature was measured and recorded on the chain-of-custody form for each sample. Standard water quality parameters were measured and recorded on a sample check-in sheet (Appendix C). Samples were stored at 4°C in the dark until used for testing.

2.3 Test Methods

A chronic toxicity test was conducted according to procedures presented by USEPA (2002). The method is summarized in Table 1. This test involved a 7-day exposure and was evaluated for survival and growth.

Table 1. Summary of methods for the fathead minnow 7-day survival and growth test.

| | |
|--|--|
| Test initiation date and time | 6/4/2019; 1040h |
| Test termination date and time | 6/11/2019; 1045h |
| Test organism | <i>Pimephales promelas</i> |
| Test organism source | Aquatic BioSystems; Fort Collins, CO |
| Test organism age | < 24 hours |
| Test type | Static renewal |
| Feeding | <i>Artemia</i> nauplii, twice daily |
| Test chamber | 500 mL plastic cup |
| Test solution volume | 250 mL |
| Test temperature | 25 ± 1°C |
| Dilution water | Moderately hard synthetic water |
| Test concentrations (mg/L sample) | 100, 53.8, 25, 12.5, 9.88, control |
| Number of organisms/chamber | 10 |
| Number of replicates | 4 |
| Photoperiod | 16 hours light/8 hours dark |
| Aeration | None |
| Test protocol | EPA-821-R-02-013 |
| Test acceptability criteria for controls | ≥ 80% survival; average dry weight ≥ 0.25 mg |
| Reference toxicant | Sodium chloride |

3.0 RESULTS

Details of standard water quality measurements conducted upon receipt of samples are provided in Table 2.

Table 2. Sample information.

| Sample ID | WET I | WET II | WET 3 |
|--------------------------------------|-----------------|-----------------|-----------------|
| Log-in Number | 19-077 | 19-079 | 19-081 |
| Collection date and time | 6/3/2019; 0800h | 6/5/2019; 0800h | 6/7/2019; 0800h |
| Receipt date and time | 6/4/2019; 1000h | 6/6/2019; 1030h | 6/8/2019; 1005h |
| Receipt temperature (°C) | 2.0 | 1.2 | 0.6 |
| Dissolved oxygen (mg/L) | 7.3 | 6.7 | 7.1 |
| pH | 6.78 | 7.25 | 7.13 |
| Conductivity (µS/cm) | 574 | 634 | 623 |
| Hardness (mg/L CaCO ₃) | 124 | 108 | 132 |
| Alkalinity (mg/L CaCO ₃) | 44 | 64 | 60 |
| Total Chlorine (mg/L) | <0.03 | <0.03 | <0.03 |
| Total Ammonia (mg/L) | 1.4 | 1.5 | <1.0 |

Results for the chronic toxicity test are summarized in Table 3. The highest concentration with no observed effect (NOEC) was 100 percent effluent for both survival and growth (evaluated on the basis of dry weight divided by initial count for biomass and final count for dry weight) at the end of the exposure. There was no statistically significant difference between the control and the acute critical effluent concentration (ACEC) of 53.8 percent effluent or the chronic critical effluent concentration (CCEC) of 9.88 percent effluent. Statistical summaries for the test, copies of the laboratory bench sheets, control quality control plots, sample check-in sheets, and chain-of-custody forms, are provided in Appendices A through D.

Table 3. Summary of chronic test results.

| Species | Endpoint | NOEC ^a (% effluent) | LOEC ^b (% effluent) |
|----------------|------------|-----------------------------------|-----------------------------------|
| Fathead minnow | Survival | 100 | >100 |
| | Biomass | 100 | >100 |
| | Dry Weight | 100 | >100 |

^a No Observed Effect Concentration, ^b Lowest Observed Effect Concentration

4.0 QA/QC

Samples were received in good condition and within the temperature range specified by WDOE (2008). There were no deviations from the protocol and water quality parameters remained within the ranges specified in the test method throughout the test.

Results for the reference toxicant test used to monitor laboratory performance and test organism sensitivity are summarized in Table 4. The results for the reference toxicant test fell within the acceptable range of mean \pm two standard deviations of historical test results. The coefficients of variation (CVs) for the test are also shown in the table. Dilution water control mean and control CV for biomass were also within two standard deviations of the historical mean (Appendix B). Based on the reference toxicant and control results, test organisms appeared to be of an appropriate degree of sensitivity.

Table 4. Reference toxicant test results.

| Species | Endpoint | Date initiated | EC ₅₀ | Acceptable range (mean \pm 2 SD) | CV (%) |
|----------------|-------------|----------------|------------------|---------------------------------------|--------|
| Fathead minnow | 7d survival | 6/4/2019 | 3.24 g/L NaCl | 2.16 - 9.39 | 44.4 |
| | 7d growth | 6/4/2019 | 3.24 g/L NaCl | 1.63 - 9.03 | 53.4 |

REFERENCES

- Tidepool Scientific Software. 2000-2010. CETIS Comprehensive Environmental Toxicity Information System Software, Version 1.8.4.6.
- USEPA. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition. EPA-821-R-02-013, pp. 141-196.
- WDOE. 2008. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised December 2008.

Appendix A
Fathead minnow Chronic Toxicity Test
Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Report Date: 19 Jun-19 10:37 (p 1 of 2)
Test Code: 1906-011 | 11-0651-9917

Fathead Minnow 7-d Larval Survival and Growth Test

Rainier Environmental Laboratory

| | | | | | |
|---------------|-----------------|------------|-------------------------|----------|--------------------------|
| Batch ID: | 05-0347-3674 | Test Type: | Growth-Survival (7d) | Analyst: | Eric Tollefson |
| Start Date: | 04 Jun-19 10:40 | Protocol: | EPA/821/R-02-013 (2002) | Diluent: | Mod-Hard Synthetic Water |
| Ending Date: | 11 Jun-19 10:45 | Species: | Pimephales promelas | Brine: | |
| Duration: | 7d 0h | Source: | Aquatic Biosystems, CO | Age: | <24h |
| Sample ID: | 00-3211-8746 | Code: | 19-077 | Client: | Yakima |
| Sample Date: | 03 Jun-19 08:00 | Material: | POTW Effluent | Project: | |
| Receive Date: | 04 Jun-19 10:00 | Source: | Yakima (WA0024023) | | |
| Sample Age: | 27h (2 °C) | Station: | | | |

Comparison Summary

| Analysis ID | Endpoint | NOEL | LOEL | TOEL | PMSD | TU | Method |
|--------------|---------------------|------|------|------|-------|----|------------------------------|
| 03-6041-8783 | 7d Survival Rate | 100 | >100 | NA | 5.9% | 1 | Steel Many-One Rank Sum Test |
| 00-8636-1973 | Mean Dry Biomass-mg | 100 | >100 | NA | 12.0% | 1 | Steel Many-One Rank Sum Test |
| 03-1942-3818 | Mean Dry Weight-mg | 100 | >100 | NA | 13.5% | 1 | Steel Many-One Rank Sum Test |

Test Acceptability

| Analysis ID | Endpoint | Attribute | Test Stat | TAC Limits | Overlap | Decision |
|--------------|---------------------|--------------|-----------|------------|---------|-------------------------------|
| 03-6041-8783 | 7d Survival Rate | Control Resp | 1 | 0.8 - NL | Yes | Passes Acceptability Criteria |
| 00-8636-1973 | Mean Dry Biomass-mg | Control Resp | 0.4728 | 0.25 - NL | Yes | Passes Acceptability Criteria |
| 00-8636-1973 | Mean Dry Biomass-mg | PMSD | 0.1199 | 0.12 - 0.3 | Yes | Below Acceptability Criteria |

7d Survival Rate Summary

| C-% | Control Type | Count | Mean | 95% LCL | 95% UCL | Min | Max | Std Err | Std Dev | CV% | %Effect |
|------|----------------|-------|-------|---------|---------|-----|-----|---------|---------|-------|---------|
| 0 | Dilution Water | 4 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.0% | 0.0% |
| 9.88 | | 4 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.0% | 0.0% |
| 12.5 | | 4 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.0% | 0.0% |
| 25 | | 4 | 0.975 | 0.9563 | 0.9937 | 0.9 | 1 | 0.025 | 0.05 | 5.13% | 2.5% |
| 53.8 | | 4 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.0% | 0.0% |
| 100 | | 4 | 0.95 | 0.9284 | 0.9716 | 0.9 | 1 | 0.02887 | 0.05774 | 6.08% | 5.0% |

Mean Dry Biomass-mg Summary

| C-% | Control Type | Count | Mean | 95% LCL | 95% UCL | Min | Max | Std Err | Std Dev | CV% | %Effect |
|------|----------------|-------|--------|---------|---------|-------|-------|----------|----------|--------|---------|
| 0 | Dilution Water | 4 | 0.4727 | 0.4597 | 0.4858 | 0.427 | 0.509 | 0.01749 | 0.03499 | 7.4% | 0.0% |
| 9.88 | | 4 | 0.4358 | 0.435 | 0.4365 | 0.433 | 0.437 | 0.000947 | 0.001893 | 0.43% | 7.83% |
| 12.5 | | 4 | 0.4528 | 0.4474 | 0.4581 | 0.441 | 0.471 | 0.007099 | 0.0142 | 3.14% | 4.23% |
| 25 | | 4 | 0.4748 | 0.4579 | 0.4916 | 0.428 | 0.536 | 0.02255 | 0.0451 | 9.5% | -0.42% |
| 53.8 | | 4 | 0.451 | 0.4329 | 0.4691 | 0.398 | 0.51 | 0.0242 | 0.04841 | 10.73% | 4.6% |
| 100 | | 4 | 0.4597 | 0.4489 | 0.4706 | 0.426 | 0.497 | 0.01458 | 0.02916 | 6.34% | 2.75% |

Mean Dry Weight-mg Summary

| C-% | Control Type | Count | Mean | 95% LCL | 95% UCL | Min | Max | Std Err | Std Dev | CV% | %Effect |
|------|----------------|-------|--------|---------|---------|-------|--------|----------|----------|--------|---------|
| 0 | Dilution Water | 4 | 0.4727 | 0.4597 | 0.4858 | 0.427 | 0.509 | 0.01749 | 0.03499 | 7.4% | 0.0% |
| 9.88 | | 4 | 0.4358 | 0.435 | 0.4365 | 0.433 | 0.437 | 0.000947 | 0.001893 | 0.43% | 7.83% |
| 12.5 | | 4 | 0.4528 | 0.4474 | 0.4581 | 0.441 | 0.471 | 0.007099 | 0.0142 | 3.14% | 4.23% |
| 25 | | 4 | 0.4879 | 0.4686 | 0.5072 | 0.428 | 0.536 | 0.0258 | 0.05161 | 10.58% | -3.2% |
| 53.8 | | 4 | 0.451 | 0.4329 | 0.4691 | 0.398 | 0.51 | 0.0242 | 0.04841 | 10.73% | 4.6% |
| 100 | | 4 | 0.4854 | 0.4685 | 0.5023 | 0.455 | 0.5522 | 0.0226 | 0.0452 | 9.31% | -2.67% |

CETIS Summary Report

Report Date: 19 Jun-19 10:37 (p 2 of 2)
Test Code: 1906-011 | 11-0651-9917

Fathead Minnow 7-d Larval Survival and Growth Test

Rainier Environmental Laboratory

7d Survival Rate Detail

| C-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 |
|------|----------------|-------|-------|-------|-------|
| 0 | Dilution Water | 1 | 1 | 1 | 1 |
| 9.88 | | 1 | 1 | 1 | 1 |
| 12.5 | | 1 | 1 | 1 | 1 |
| 25 | | 0.9 | 1 | 1 | 1 |
| 53.8 | | 1 | 1 | 1 | 1 |
| 100 | | 0.9 | 0.9 | 1 | 1 |

Mean Dry Biomass-mg Detail

| C-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 |
|------|----------------|-------|-------|-------|-------|
| 0 | Dilution Water | 0.427 | 0.488 | 0.509 | 0.467 |
| 9.88 | | 0.437 | 0.437 | 0.436 | 0.433 |
| 12.5 | | 0.471 | 0.442 | 0.457 | 0.441 |
| 25 | | 0.473 | 0.536 | 0.428 | 0.462 |
| 53.8 | | 0.51 | 0.467 | 0.398 | 0.429 |
| 100 | | 0.426 | 0.497 | 0.461 | 0.455 |

Mean Dry Weight-mg Detail

| C-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 |
|------|----------------|--------|--------|-------|-------|
| 0 | Dilution Water | 0.427 | 0.488 | 0.509 | 0.467 |
| 9.88 | | 0.437 | 0.437 | 0.436 | 0.433 |
| 12.5 | | 0.471 | 0.442 | 0.457 | 0.441 |
| 25 | | 0.5256 | 0.536 | 0.428 | 0.462 |
| 53.8 | | 0.51 | 0.467 | 0.398 | 0.429 |
| 100 | | 0.4733 | 0.5522 | 0.461 | 0.455 |

7d Survival Rate Binomials

| C-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 |
|------|----------------|-------|-------|-------|-------|
| 0 | Dilution Water | 10/10 | 10/10 | 10/10 | 10/10 |
| 9.88 | | 10/10 | 10/10 | 10/10 | 10/10 |
| 12.5 | | 10/10 | 10/10 | 10/10 | 10/10 |
| 25 | | 9/10 | 10/10 | 10/10 | 10/10 |
| 53.8 | | 10/10 | 10/10 | 10/10 | 10/10 |
| 100 | | 9/10 | 9/10 | 10/10 | 10/10 |

Rainier Environmental
Washington Laboratory

Client:

Sample ID:

Test No:

Log-In#:

Yakima

WET I

1906-011

19-077

19-079

Initial and Final Chemistries

Seven Day Chronic Freshwater Bioassay

Start Date & Time: 6/4/19 1040

Stop Date & Time: 6/11/19 1045

Test Species: Pimephales promelas

19-081

| Conc. or % CON | Days | | | | | | | | | | | | | |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| pH | 7.85 | 7.60 | 8.15 | 7.68 | 7.87 | 7.58 | 7.92 | 7.52 | 7.85 | 7.40 | 7.79 | 7.55 | 7.85 | 7.34 |
| DO (mg/l) | 7.0 | 6.3 | 6.7 | 6.2 | 7.0 | 6.1 | 6.8 | 6.1 | 6.9 | 6.2 | 6.6 | 6.1 | 6.5 | 5.8 |
| Cond. (µmhos-cm) | 310 | 314 | 302 | 332 | 305 | 313 | 312 | 318 | 297 | 304 | 333 | 324 | 331 | 322 |
| Temperature (°C) | 24.5 | 25.0 | 24.7 | 25.1 | 24.5 | 25.2 | 25.2 | 25.2 | 24.7 | 25.3 | 25.1 | 25.2 | 25.2 | 25.3 |
| 9.88 | Days | | | | | | | | | | | | | |
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| pH | 7.66 | 7.69 | 7.91 | 7.74 | 7.71 | 7.51 | 7.93 | 7.55 | 7.65 | 7.43 | 7.83 | 7.52 | 7.81 | 7.39 |
| DO (mg/l) | 6.9 | 6.2 | 6.9 | 5.7 | 7.1 | 6.2 | 6.8 | 5.7 | 7.0 | 5.9 | 6.8 | 6.0 | 6.4 | 5.7 |
| Cond. (µmhos-cm) | 334 | 335 | 331 | 333 | 344 | 354 | 345 | 344 | 322 | 331 | 350 | 347 | 348 | 351 |
| Temperature (°C) | 24.6 | 24.9 | 24.8 | 25.2 | 24.9 | 25.2 | 24.8 | 25.2 | 24.7 | 25.4 | 25.0 | 25.2 | 25.2 | 25.1 |
| 12.5 | Days | | | | | | | | | | | | | |
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| pH | 7.61 | 7.68 | 7.84 | 7.73 | 7.69 | 7.62 | 7.23 | 7.56 | 7.62 | 7.44 | 7.81 | 7.54 | 7.80 | 7.41 |
| DO (mg/l) | 6.8 | 6.2 | 6.9 | 5.9 | 6.9 | 6.4 | 6.9 | 5.8 | 7.1 | 5.8 | 6.6 | 6.4 | 6.8 | 5.8 |
| Cond. (µmhos-cm) | 343 | 343 | 339 | 340 | 347 | 351 | 351 | 348 | 345 | 354 | 359 | 355 | 358 | 351 |
| Temperature (°C) | 24.6 | 25.0 | 24.8 | 25.2 | 25.0 | 25.2 | 25.1 | 25.3 | 25.0 | 25.3 | 25.0 | 25.3 | 25.3 | 25.2 |
| 25 | Days | | | | | | | | | | | | | |
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| pH | 7.47 | 7.65 | 7.63 | 7.68 | 7.55 | 7.64 | 7.54 | 7.54 | 7.45 | 7.45 | 7.67 | 7.51 | 7.59 | 7.40 |
| DO (mg/l) | 6.8 | 5.7 | 6.6 | 5.7 | 6.5 | 6.4 | 7.0 | 5.7 | 7.0 | 5.8 | 6.4 | 6.2 | 6.8 | 5.9 |
| Cond. (µmhos-cm) | 379 | 378 | 375 | 376 | 391 | 397 | 393 | 392 | 368 | 376 | 412 | 407 | 408 | 412 |
| Temperature (°C) | 24.8 | 25.2 | 24.9 | 25.4 | 25.3 | 25.2 | 25.2 | 25.3 | 25.1 | 25.3 | 25.1 | 25.3 | 25.3 | 25.2 |
| 53.8 | Days | | | | | | | | | | | | | |
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| pH | 7.17 | 7.60 | 7.29 | 7.61 | 7.24 | 7.60 | 7.27 | 7.49 | 7.22 | 7.36 | 7.42 | 7.50 | 7.37 | 7.48 |
| DO (mg/l) | 6.8 | 5.8 | 6.7 | 5.6 | 6.8 | 6.1 | 7.1 | 5.5 | 6.8 | 6.6 | 6.5 | 6.0 | 6.8 | 5.7 |
| Cond. (µmhos-cm) | 469 | 456 | 468 | 466 | 507 | 508 | 504 | 512 | 475 | 486 | 527 | 522 | 522 | 528 |
| Temperature (°C) | 24.8 | 25.1 | 25.1 | 25.4 | 25.1 | 25.2 | 25.4 | 25.1 | 25.3 | 25.4 | 24.9 | 25.3 | 25.5 | 25.1 |
| 100 | Days | | | | | | | | | | | | | |
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| pH | 6.88 | 7.45 | 7.02 | 7.46 | 7.01 | 7.45 | 7.04 | 7.43 | 6.97 | 7.09 | 7.20 | 7.23 | 7.22 | 7.45 |
| DO (mg/l) | 6.7 | 5.8 | 6.9 | 5.4 | 6.6 | 6.2 | 6.8 | 5.4 | 7.2 | 5.3 | 6.6 | 5.2 | 6.6 | 5.3 |
| Cond. (µmhos-cm) | 594 | 595 | 596 | 600 | 660 | 652 | 598 | 591 | 599 | 611 | 712 | 695 | 707 | 699 |
| Temperature (°C) | 24.8 | 25.2 | 25.3 | 25.5 | 25.2 | 25.2 | 25.8 | 25.2 | 25.4 | 26.5 | 24.5 | 25.3 | 25.7 | 25.4 |
| Tech. Initials | U | U | U | U | U | U | U | U | U | U | U | U | U | U |

Dilution Water Batch #: MHSW 043

Test Chamber: VNR

QA Check: U

Sample Description:

Animal Source:

Comments:

ABS

Date Received: 6/4/19 Date of Hatch: 6/3/19

Rainier Environmental
Washington Laboratory
5013 Pacific Hwy. E., Suite 20
Tacoma, WA 98424

Raw Data Sheet
Fathead Minnow
(*Pimephales promelas*)
Larval Survival

Client Name: Yakima

Test No.: 1906-011

Sample ID: WET I

| Rep. | Conc. or (%) | Cont. | Days | | | | | | | | Mean % Survival |
|---------------|-----------------|-------|------|----|----|----|----|----|----|----|--------------------|
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 1 | CON | 11 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 2 | | 21 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 3 | | 5 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 4 | | 14 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 1 | 9.88 | 16 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 2 | | 2 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 3 | | 9 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 4 | | 19 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 1 | 12.5 | 6 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 2 | | 22 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 3 | | 1 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 4 | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 1 | 25 | 23 | 10 | 10 | 10 | 10 | 10 | 10 | 9 | 9 | |
| 2 | | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 3 | | 7 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 4 | | 18 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 1 | 53.8 | 15 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 2 | | 20 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 3 | | 4 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 4 | | 17 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 1 | 100 | 8 | 10 | 10 | 10 | 10 | 9 | 10 | 9 | 9 | |
| 2 | | 12 | 10 | 10 | 10 | 10 | 10 | 10 | 9 | 9 | |
| 3 | | 24 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 4 | | 3 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| Tech Initials | | | jt | jt | jt | et | et | jt | et | et | |

Feeding Times: 0 10815 20830 30830 40800 50800 60815
1600 1530 1545 1545 1430 1500 1530

Comments:

QA Check: jt

**Rainier Environmental
Washington Laboratory
5013 Pacific Hwy. E., Suite 20
Tacoma, WA 98424**

**Raw Data Sheet
Fish Weights
Seven Day Chronic Bioassay**

Client: Yakima

Test No: 1906-011

Sample ID: WET I

Species: Pimephales promelas

| rep # | Conc. or (%) | cont # | pan wt. (gm) | pan + fish (gm) | fish wt. (mg) | # fish | avg. per fish (mg) | avg. per conc. (mg) |
|----------------------|--------------|--------|--------------|-----------------|---------------|--------|--------------------|---------------------|
| 1 | CON | 11 | 0.04119 | 0.04548 | | 10 | | |
| 2 | | 21 | 0.04065 | 0.04553 | | 10 | | |
| 3 | | 5 | 0.03801 | 0.04310 | | 10 | | |
| 4 | | 14 | 0.04141 | 0.04608 | | 10 | | |
| 1 | 9.88 | 16 | 0.04183 | 0.04520 | | 10 | | |
| 2 | | 2 | 0.03926 | 0.04363 | | 10 | | |
| 3 | | 9 | 0.03942 | 0.04378 | | 10 | | |
| 4 | | 19 | 0.04039 | 0.04472 | | 10 | | |
| 1 | 12.5 | 6 | 0.03837 | 0.04308 | | 10 | | |
| 2 | | 22 | 0.04116 | 0.04558 | | 10 | | |
| 3 | | 1 | 0.03916 | 0.04373 | | 10 | | |
| 4 | | 10 | 0.04001 | 0.04442 | | 10 | | |
| 1 | 25 | 23 | 0.04006 | 0.04479 | | 9 | | |
| 2 | | 13 | 0.04141 | 0.04677 | | 10 | | |
| 3 | | 7 | 0.03793 | 0.04221 | | 10 | | |
| 4 | | 18 | 0.04009 | 0.04531 | | 10 | | |
| 1 | 53.8 | 15 | 0.04173 | 0.04683 | | 10 | | |
| 2 | | 20 | 0.03999 | 0.04466 | | 10 | | |
| 3 | | 4 | 0.03921 | 0.04319 | | 10 | | |
| 4 | | 17 | 0.04018 | 0.04447 | | 10 | | |
| 1 | 100 | 8 | 0.03663 | 0.04089 | | 9 | | |
| 2 | | 12 | 0.04049 | 0.04546 | | 9 | | |
| 3 | | 24 | 0.04005 | 0.04466 | | 10 | | |
| 4 | | 3 | 0.03942 | 0.04397 | | 10 | | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| Technician Initials: | | | <u>AL</u> | <u>et</u> | | | | |

Date/Time in: 6/11/19 1045 Oven temp. (°C): 62.5
Date/Time out: 6/14/19 1230 Oven temp. (°C): 61.5

QA Check: et

Appendix B
Control Quality Assurance Plots

Fathead Minnow 7-d Larval Survival and Growth Test

Rainier Environmental Laboratory

Test Type: Growth-Survival (7d)

Organism: Pimephales promelas (Fathead Minn

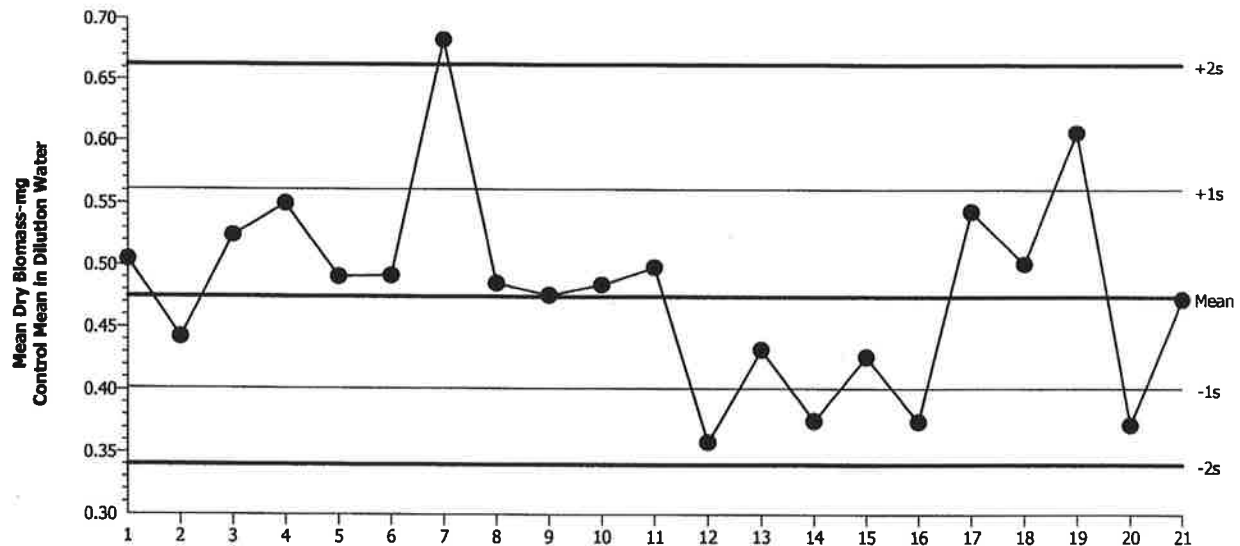
Material: POTW Effluent

Protocol: EPA/821/R-02-013 (2002)

Endpoint: Mean Dry Biomass-mg

Source: All SampleID Sources

Fathead Minnow 7-d Larval Survival and Growth Test



Mean: 0.4746

Count: 20

-1s Warning Limit: 0.4017

-2s Action Limit: 0.34

Sigma: NA

CV: 18.20%

+1s Warning Limit: 0.5608

+2s Action Limit: 0.6626

Quality Control Data

| Point | Year | Month | Day | QC Data | Delta | Sigma | Warning | Action | Test ID | Analysis ID |
|-------|------|-------|-----|---------|----------|----------|---------|--------|--------------|-------------|
| 1 | 2017 | Aug | 1 | 0.5045 | 0.02986 | 0.3658 | | | 09-8801-4875 | |
| 2 | | | 8 | 0.4423 | -0.03234 | -0.4231 | | | 04-0238-8337 | |
| 3 | | | 22 | 0.524 | 0.04936 | 0.5931 | | | 15-1040-5788 | |
| 4 | | Sep | 12 | 0.5495 | 0.07486 | 0.878 | | | 15-3091-9740 | |
| 5 | | Oct | 3 | 0.4907 | 0.01606 | 0.1995 | | | 20-8686-6814 | |
| 6 | | | 3 | 0.4915 | 0.01686 | 0.2093 | | | 06-4277-6651 | |
| 7 | | Nov | 14 | 0.6828 | 0.2082 | 2.18 | (+) | (+) | 12-5019-5420 | |
| 8 | 2018 | Jan | 9 | 0.4852 | 0.01056 | 0.1319 | | | 10-1603-8072 | |
| 9 | | | 9 | 0.4758 | 0.001161 | 0.01464 | | | 16-3953-1778 | |
| 10 | | | 23 | 0.484 | 0.009361 | 0.1171 | | | 05-7546-1981 | |
| 11 | | Feb | 6 | 0.4983 | 0.02366 | 0.2916 | | | 15-1842-1360 | |
| 12 | | May | 15 | 0.3582 | -0.1164 | -1.687 | (-) | | 03-0690-8438 | |
| 13 | | Jun | 12 | 0.4322 | -0.04244 | -0.5616 | | | 03-1338-1232 | |
| 14 | | Jul | 10 | 0.3755 | -0.09914 | -1.405 | (-) | | 11-0042-8245 | |
| 15 | | Sep | 18 | 0.4265 | -0.04814 | -0.6411 | | | 03-1890-5845 | |
| 16 | | Oct | 2 | 0.3748 | -0.09984 | -1.416 | (-) | | 14-7092-0084 | |
| 17 | 2019 | Jan | 8 | 0.5435 | 0.06886 | 0.8122 | | | 17-6245-8891 | |
| 18 | | Feb | 19 | 0.5013 | 0.02666 | 0.3276 | | | 10-2932-8699 | |
| 19 | | Mar | 5 | 0.6068 | 0.1322 | 1.473 | (+) | | 15-5646-0020 | |
| 20 | | May | 7 | 0.3722 | -0.1024 | -1.458 | (-) | | 16-3656-7563 | |
| 21 | | Jun | 4 | 0.4727 | -0.00194 | -0.02455 | | | 11-0651-9917 | |

Fathead Minnow 7-d Larval Survival and Growth Test

Rainier Environmental Laboratory

Test Type: Growth-Survival (7d)

Organism: Pimephales promelas (Fathead Minn

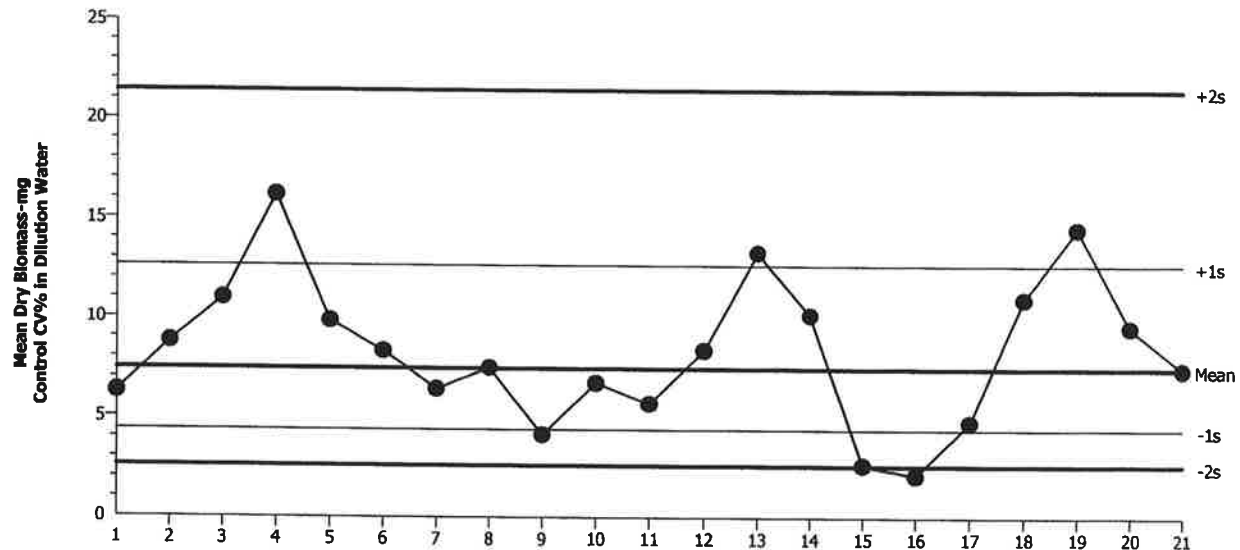
Material: POTW Effluent

Protocol: EPA/821/R-02-013 (2002)

Endpoint: Mean Dry Biomass-mg

Source: All SampleID Sources

Fathead Minnow 7-d Larval Survival and Growth Test



Mean: 7.441

Count: 20

-1s Warning Limit: 4.386

-2s Action Limit: 2.585

Sigma: NA

CV: 69.70%

+1s Warning Limit: 12.62

+2s Action Limit: 21.42

Quality Control Data

| Point | Year | Month | Day | QC Data | Delta | Sigma | Warning | Action | Test ID | Analysis ID |
|-------|------|-------|-----|---------|----------|----------|---------|--------|--------------|-------------|
| 1 | 2017 | Aug | 1 | 6.29 | -1.151 | -0.3179 | | | 09-8801-4875 | |
| 2 | | | 8 | 8.778 | 1.337 | 0.3126 | | | 04-0238-8337 | |
| 3 | | | 22 | 10.98 | 3.539 | 0.736 | | | 15-1040-5788 | |
| 4 | | Sep | 12 | 16.17 | 8.729 | 1.468 | (+) | | 15-3091-9740 | |
| 5 | | Oct | 3 | 9.828 | 2.387 | 0.5264 | | | 20-8686-6814 | |
| 6 | | | 3 | 8.307 | 0.866 | 0.2083 | | | 06-4277-6651 | |
| 7 | | Nov | 14 | 6.415 | -1.026 | -0.2807 | | | 12-5019-5420 | |
| 8 | 2018 | Jan | 9 | 7.482 | 0.04104 | 0.01041 | | | 10-1603-8072 | |
| 9 | | | 9 | 4.127 | -3.314 | -1.115 | (-) | | 16-3953-1778 | |
| 10 | | | 23 | 6.735 | -0.706 | -0.1886 | | | 05-7546-1981 | |
| 11 | | Feb | 6 | 5.701 | -1.74 | -0.5039 | | | 15-1842-1360 | |
| 12 | | May | 15 | 8.363 | 0.922 | 0.221 | | | 03-0690-8438 | |
| 13 | | Jun | 12 | 13.26 | 5.819 | 1.093 | (+) | | 03-1338-1232 | |
| 14 | | Jul | 10 | 10.14 | 2.699 | 0.5855 | | | 11-0042-8245 | |
| 15 | | Sep | 18 | 2.628 | -4.813 | -1.969 | (-) | | 03-1890-5845 | |
| 16 | | Oct | 2 | 2.117 | -5.324 | -2.378 | (-) | (-) | 14-7092-0084 | |
| 17 | 2019 | Jan | 8 | 4.754 | -2.687 | -0.8475 | | | 17-6245-8891 | |
| 18 | | Feb | 19 | 10.94 | 3.499 | 0.7291 | | | 10-2932-8699 | |
| 19 | | Mar | 5 | 14.48 | 7.039 | 1.259 | (+) | | 15-5646-0020 | |
| 20 | | May | 7 | 9.509 | 2.068 | 0.4639 | | | 16-3656-7563 | |
| 21 | | Jun | 4 | 7.401 | -0.03996 | -0.01019 | | | 11-0651-9917 | |

Appendix C
Sample Check-In Sheet

Rainier Environmental
5013 Pacific Hwy East, Ste. 20
Tacoma, WA 98424

Client: City of Yakima

Tests Performed: PP-2
Test ID No(s): 1906-011

| Sample ID: | WET I | WET II | WET III |
|---|--|--|--|
| Log-in No. (10-xxxx): | 19-077 | 19-079 | 19-081 |
| Sample Collection Date & Time: | 6/3/19 0800 | 6/5/19 0800 | 6/7/19 0800 |
| Sample Receipt Date & Time: | 6/4/19 1000 | 6/6/19 1030 | 6/8/19 1005 |
| Check-in Temperature (°C) | 2.0 | 1.2 | 0.6 |
| Temperature OK? | <input checked="" type="radio"/> Y <input type="radio"/> N | <input checked="" type="radio"/> Y <input type="radio"/> N | <input checked="" type="radio"/> Y <input type="radio"/> N |
| DO (mg/L) | 7.3 | 6.7 | 7.1 |
| pH (units) | 6.78 | 7.25 | 7.13 |
| Conductivity (µS/cm) | 574 | 634 | 623 |
| Salinity (ppt) | 0.3 | 0.3 | 0.3 |
| Tit. Vol / Sam. Vol. / Alkalinity (mg/L)* | 1.1 125 144 | 1.6 125 164 | 1.5 125 160 |
| Tit. Vol. / Sam. Vol. / Hardness (mg/L)* | 3.1 125 124 | 2.7 125 108 | 3.3 125 113 |
| Total Chlorine (mg/L) | <0.03 | <0.03 | <0.03 |
| Total Ammonia Nitrogen (mg/L) | 1.4 | 1.5 | <1.0 |
| Technician Initials | JS | JS | JS |

* = mg/L as CaCO₃, * = Measured for freshwater samples only, NA = Not Applicable,

NM = Not Measured

Freshwater Tests:

Control/Dilution Water Source: test type: PP-2 8:2 (DMW) MHW Other: -043 Alkalinity: 64 Hardness: 84
Control/Dilution Water Source: test type: 8:2 (DMW) MHW Other: Alkalinity: Hardness:
Additional Control? Y N = Alkalinity: Hardness:

Marine Tests:

Control/Dilution Water Source: test type: ART SW NAT SW Alkalinity: Salinity:
Control/Dilution Water Source: test type: ART SW NAT SW Alkalinity: Salinity:
Additional Control? Y N = Alkalinity: Salinity:
Sample Salted w/ artificial salt? Y N If yes, what ppt? test type:
Sample salted w/brine? Y N If yes, what ppt? test type:

Comments: Temperature for grab sample must be 0-20°C if received within 1 hour of collection time, 0-12°C if effluent received within 4 hours of collection time, and 0-6°C for all other samples.

Sample Check-In Information

| | |
|---|--|
| Sample Description: | |
| COC Complete? <u>Y</u> or <u>N</u> | |
| Filtration? <u>Y</u> <input checked="" type="radio"/> <u>N</u> <input type="radio"/> | |
| Pore Size: <u>Organisms</u> or <u>Debris</u> | |
| Aeration? <u>Y</u> <input checked="" type="radio"/> <u>N</u> <input type="radio"/> | |
| Length of Time: <u>Final DO:</u> <u>Final pH:</u> | |
| Hardness Adjustment? <u>Y</u> <input checked="" type="radio"/> <u>N</u> <input type="radio"/> | |
| If adjusted, please see worksheet for details. | |
| Sub-samples for additional chemistry: | |

QC Check: JS

Appendix D

Chain-of-Custody Forms

Sample Collection By:

Date 6/3/19 Page 1 of 1

Report to:

Company City of Yakima Watershed Division
Address 2220 E. Main Ave.
City/State/Zip Yakima, WA 98901
Contact Jaine Thompson
Phone 509-249-6816
Email Jaine.Thompson@yakima.wa.gov

Invoice To:

Company Same
Address Same
City/State/Zip Same
Contact Same
Phone Same
Email Same

ANALYSES REQUIRED

Receipt Temperature (°C)

SAMPLE ID

DATE

TIME

MATRIX

CONTAINER TYPE

NO. OF CONTAINERS

COMMENTS

1

WET I

6/2/19

8:00 AM

water

plastic

1

WET #1 24' comp.

X

Cerio daph-Chronic

2

6/3/19

8:00 AM

water

plastic

1

Chronic

X

Cerio daph-Chronic

3

4

5

6

7

8

9

10

PROJECT INFORMATION

SAMPLE RECEIPT

RELINQUISHED BY (CLIENT)

RELINQUISHED BY (COURIER)

Client:

City of Yakima

Total No. of Containers

1

(Signature)

Scott Queller

(Time)

8:30 AM

Scott Queller

(Date)

PO No.:

19-213

Received Good Condition?

Y

(Printed Name)

Scott Queller

(Date)

6/3/19

City of Yakima

(Company)

Shipped Via:

FED EX

Matches Test Schedule?

Y

(Signature)

City of Yakima

(Time)

19-077

ERIC TOLLERSON

(Date)

SPECIAL INSTRUCTIONS/COMMENTS:

NPDES #WA0024023

RECEIVED BY (COURIER)

RECEIVED BY (LABORATORY)

(Signature)

Eric Toller

(Time)

1000

ERIC TOLLERSON

(Date)

(Printed Name)

ERIC TOLLERSON

(Date)

6/4/19

19-077

(Company)

| Sample Collection By: City of Yakima Wastewater Division Report to: 2220 E. Viola Avenue Company: Yakima, WA 98901 Address: City/State/Zip: Contact: <u>Taine Thompson</u> Phone: <u>509-249-6816</u> Email: <u>Taine-Thompson@yakimawa.gov</u> | | | | Invoice To: Company: Address: City/State/Zip: <u>Same</u> Contact: Phone: Email: | | | | ANALYSES REQUIRED | | | |
|--|--------|---------|--------|---|-------------------|-----------------|---|--------------------------|--|--|--|
| | | | | | | | | | | | |
| SAMPLE ID | DATE | TIME | MATRIX | CONTAINER TYPE | NO. OF CONTAINERS | COMMENTS | | | | | |
| 1 | 6/4/19 | 8:00 AM | water | Plastic | 1 | WET #2 24' Comp | X | Cerio daph-chronic | | | |
| 2 | 6/5/19 | 8:00 AM | water | | | chronic | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

| PROJECT INFORMATION | | SAMPLE RECEIPT | | RELINQUISHED BY (CLIENT) | | RELINQUISHED BY (COURIER) | |
|--|----------------|---------------------------------|---|------------------------------|----------------------|---------------------------------|---------------------|
| Client: | City of Yakima | Total No. of Containers | 1 | Signature | <u>Scott Qualley</u> | Signature | |
| PO No.: | 19-213 | Received Good Condition? | Y | (Printed Name) | Scott Qualley | (Printed Name) | |
| Shipped Via: | FED EX | Matches Test Schedule? | Y | (Date) | 6/5/19 | (Date) | |
| SPECIAL INSTRUCTIONS/COMMENTS: <div style="font-size: 1.2em; margin-top: 10px;">NPD ES # WA0024023</div> | | | | RECEIVED BY (COURIER) | | RECEIVED BY (LABORATORY) | |
| | | | | Signature | | Signature | <u>Eric Tollman</u> |
| | | | | (Printed Name) | | (Printed Name) | ERIC TOLLMAN |
| | | | | (Time) | | (Time) | 1030 |
| | | | | (Date) | | (Date) | 6/6/19 |
| | | | | (Company) | | (Log In #) | 2419-023 19-079 |

Receipt Temperature (°C)

| | | | | | | | | | | | |
|---|--|--|--|---|--|--|--|--|--|--|--|
| Sample Collection By: City of Yakima Wastewater Division Report to: 2220 E. Viola Avenue Company: Yakima, WA 98901 Address: City/State/Zip: Contact: Phone: 509-249-6816 Email: Taimie.Thompson@yakimaww.gov | | | | Invoice To: Company: Address: City/State/Zip: Contact: Phone: Email: | | | | ANALYSES REQUIRED <div style="border: 1px solid black; height: 100px; width: 100%;"></div> | | | |
| | | | | Receipt Temperature (°C) | | | | | | | |

| SAMPLE ID | DATE | TIME | MATRIX | CONTAINER TYPE | NO. OF CONTAINERS | COMMENTS |
|-----------|--------|---------|--------|----------------|-------------------|-----------------|
| 1 | 6/6/19 | 8:00 AM | water | Plastic | 1 | WET #3 24° comp |
| 2 | 6/7/19 | 8:00 AM | water | | | chronic |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |

| PROJECT INFORMATION | | SAMPLE RECEIPT | | RELINQUISHED BY (CLIENT) | | RELINQUISHED BY (COURIER) | |
|--|----------------|--------------------------|---|--|----------------|--|---------------|
| Client: | City of Yakima | Total No. of Containers | 1 | Signature: | [Signature] | Signature: | [Signature] |
| PO No.: | 19-213 | Received Good Condition? | Y | (Printed Name) | Shawn LeBlond | (Printed Name) | Eric Tolleson |
| Shipped Via: | FED EX | Matches Test Schedule? | Y | (Date) | 8:30 AM | (Date) | 1005 |
| | | | | (Company) | City of Yakima | | |
| SPECIAL INSTRUCTIONS/COMMENTS: NPDES # WA 0084023 | | | | RECEIVED BY (COURIER) (Signature) _____ (Time) _____ (Printed Name) _____ (Date) _____ (Company) _____ | | RECEIVED BY (LABORATORY) (Signature) _____ (Time) _____ (Printed Name) _____ (Date) _____ (Log in #) _____ | |